CHILDREN'S HEALTH AND THE ENVIRONMENT IN EUROPE: A BASELINE ASSESSMENT

WORLD HEALTH ORGANIZATION
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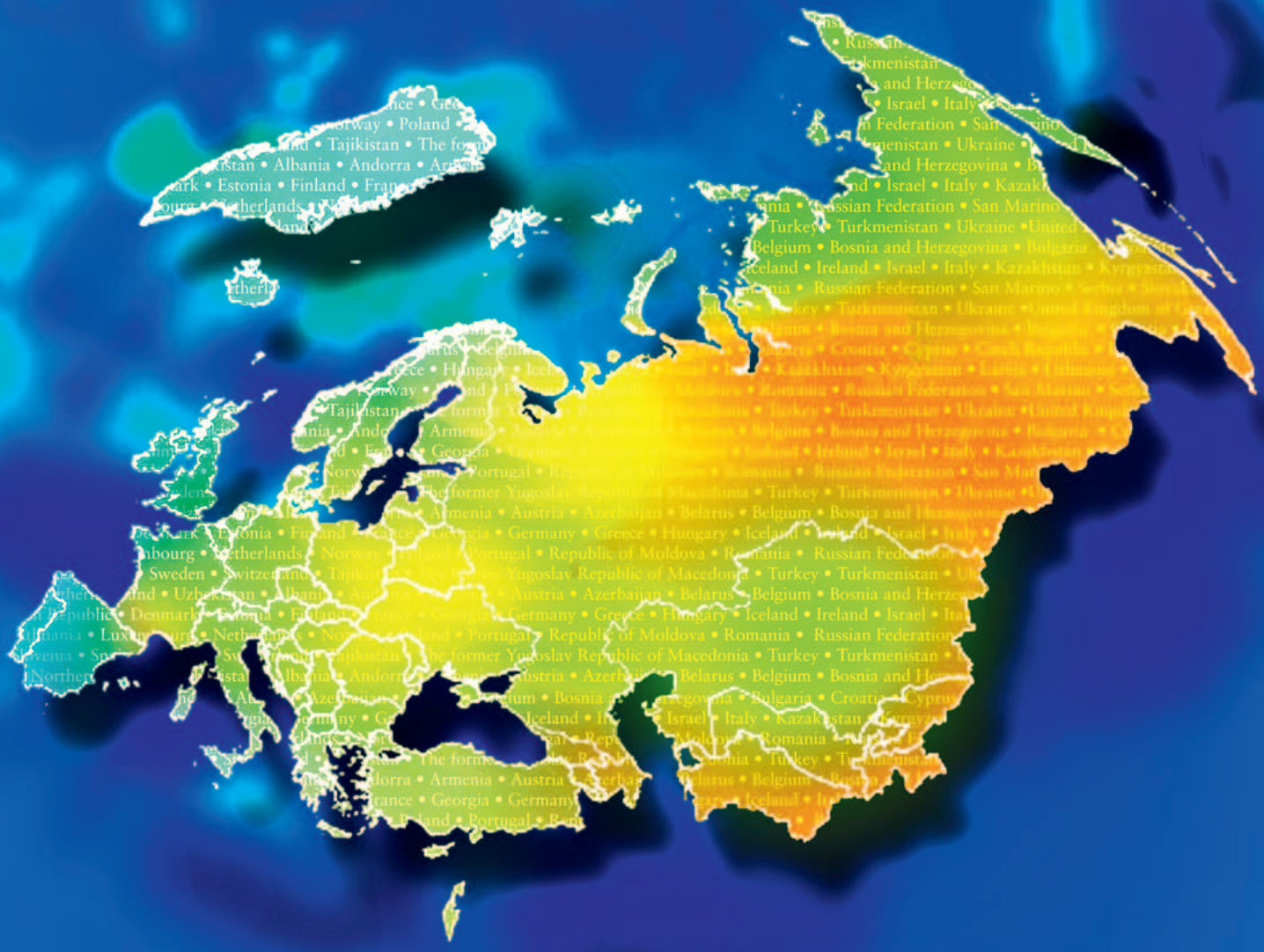

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ABSTRACT

This report summarizes the information gathered by the European environment and health information system (EHIS). EHIS was developed by the WHO Regional Office for Europe in collaboration with a wide group of Member States, following the recommendations of the Fourth Ministerial Conference on Environment and Health held in Budapest in 2004. The work is conducted in a series of projects supported by grants from the Directorate-General for Health and Consumer Protection of the European Commission, and contributes to the implementation of the public health action programme of the European Community. The report gives an overview of the establishment of the system and the outcomes of the methodological work. It provides information on the scientific basis, framework and scope of the system, and presents plans for future action. The use of the system is highlighted by presenting its main product: an indicator-based assessment of children's health and the environment in the WHO European Region in the context of the Children's Environment and Health Action Plan for Europe. The assessment provides a baseline against which the progress and effects of action taken can be evaluated at the Fifth Ministerial Conference in 2009.

KEYWORDS

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CHILDREN'S HEALTH AND THE ENVIRONMENT IN EUROPE: A BASELINE ASSESSMENT

Edited by
D. Dalbokova, M. Krzyzanowski, S. Lloyd

ENHIS
EUROPEAN ENVIRONMENT AND HEALTH INFORMATION SYSTEM

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GLOSSARY

ACCIS	Automated Childhood Cancer Information System
ALL	Acute lymphoblastic leukaemia
ARI	Acute respiratory infection
AML	Acute myeloid leukaemia
CEHAPE	Children's Environment and Health Action Plan for Europe
DALY	Disability-adjusted life years
EC	European Commission
EH	Environmental health
EHIS	Pan-European environment and health information system, based on a set of environmental health indicators and health impact assessment methods and forming part of the overall evidence base for policy in the WHO European Region
ENHIS	European environment and health information system, developed through collaborative projects coordinated by the WHO European Centre for Environment and Health in Bonn together with several Member States and the European Commission Directorate-General for Health and Consumer Protection, forming part of the broader initiative on EHIS
ETS	Environmental tobacco smoke
JMP	WHO/UNICEF Joint Monitoring Programme
MDG	Millennium development goal
PM	Particulate matter
POP	Persistent organic pollutant
PTWI	Provisional tolerable weekly intake
RPG	Regional priority goal (of the CEHAPE)
RTI	Road traffic injury
TDI	Tolerable daily intake
UVR	Ultraviolet radiation
WSP	Water safety plan

FOREWORD

Information on health and its environmental determinants is an essential tool for evidence-based public health policy- and decision-making. At the Fourth Ministerial Conference on Environment and Health, held in Budapest in 2004, Member States of the World Health Organization (WHO) European Region committed themselves to joint action with WHO, the European Commission and other international organizations to build comprehensive information support for policy. The aim was to strengthen the availability and comparability of data on health and environment and facilitate priority-setting, monitoring and evaluation. The WHO Regional Office for Europe was asked to lead this process, focusing on children's health as underlined by the main focus of the Budapest Conference.

With the support of the Directorate-General for Health and Consumer Protection of the European Commission and contributions from 18 Member States, the Regional Office has carried out a series of projects with the aim of designing and establishing an environment and health information system (ENHIS), while at the same time strengthening countries' capacities in this area. This is part of a broader initiative on building a comprehensive pan-European environment and health information system (EHIS) which will contribute to the overall evidence base for health policies in the Region. One of the key principles in the development of EHIS was to use, as far as possible, data already collated in existing databases in order to avoid any additional cost and information-gathering fatigue.

This report is one of the initial outcomes of this work. It aims to constitute the reference for assessment of the outcomes of action carried out in implementation of the Budapest Conference's deliberations. It is one of WHO's contributions to the Intergovernmental Mid-Term Review Meeting (held in Vienna from 13 to 15 June 2007), convened to evaluate the activities of the countries and international organizations undertaken as a follow-up to the Budapest Conference.

The report shows that substantial relevant data are available, they can be gathered and analysed in a comparable way, and they can be a very useful tool for overall assessment of the environment and health situation. Although the report should mainly be seen as a baseline focused on children's health in the first half of the current decade, it already contains some useful assessments of the links between effective policies and health outcomes, notably in the area of accidents and injuries as well as other contexts. By continuing the work and the partnerships involved in the European EHIS we will be able to provide public health decision-makers at the Fifth Ministerial Conference in 2009 with a set of information useful to validate, evaluate or support action undertaken and identify areas where resources and interventions are needed.

I am confident that the further dynamic development of the EHIS will strengthen the capacity of Member States' health systems to take targeted action to prevent disease and promote health. We look forward to continuing our collaboration with countries and other stakeholders, to strengthening the system and to making it a standard public health tool in Europe and a reference for other areas of the world.

Roberto Bertollini
Director, Special Programme on Health and Environment
WHO Regional Office for Europe

EXECUTIVE SUMMARY

This report summarizes information on the environment and health gathered by the European Environment and Health Information System (EHIS). EHIS was developed by the WHO Regional Office for Europe and a wide group of Member States following the recommendations of the Fourth Ministerial Conference on Environment and Health, held in Budapest in June 2004. It is designed to generate and analyse environmental health (EH) information to support relevant policies in Europe.

The work on EHIS has been conducted through a series of projects supported by grants from the Directorate-General for Health and Consumer Protection of the European Commission (EC), and contributes to the implementation of the European Union's (EU) programme of action in the field of public health (projects ENHIS and ENHIS-2[1]). The Budapest Conference adopted *inter alia* a Children's Environment and Health Action Plan for Europe (CEHAPE). The EHIS projects have focused on the health issues identified as priorities for pan-European action under the Plan and particularly on its four regional priority goals (RPGs).[2] The information covers health issues related to the environment, environmental issues affecting children's health, and action aiming at reducing or preventing the health risks.

The information is aggregated in the form of 26 indicators selected on the basis of their policy relevance and scientific reliability and the availability of necessary data in international databases or information sources. Most of the data used were retrieved from international databases; only for a few indicators were data obtained directly from Member States. For the majority of the indicators data are currently available from 13 to 29 countries; for a few, data covered almost all the countries in the WHO European Region. The lowest coverage is for the indicator related to outbreaks of waterborne diseases (case studies were only available from seven countries). Although access to data from EU countries, particularly those participating in the ENHIS projects, was easier than from the other countries, an effort was made to obtain information from non-EU countries. Future efforts will concentrate on increasing the geographical coverage of the system.

The information provided by each of the indicators, together with its scientific basis and policy context, was analysed and presented in the form of standardized fact sheets which are accessible on the ENHIS web site (http://www.enhis.org).[3] This baseline assessment aggregates the information and provides an evaluation of the status and trends in the first half of the current decade of the priority EH issues specified by the RPGs. Future trends and their policy links will be assessed by extending the time coverage of the data.

The introduction to this report summarizes the process of establishing the system, which involved the active participation of a large number of partner institutions and experts from all over the Region, particularly ENHIS project partners from 18 Member States. The active involvement of public health institutions provided the resources essential for developing the system as well as creating the capacities in the Member States necessary for both using and maintaining the system and extending it to the subnational level.

[1]Supported by Grant Agreements SPC 2003112 and SPC 2004124.

[2]*Children's Environment and Health Action Plan for Europe*. Fourth Ministerial Conference on Environment and Health, Budapest, 23–25 June 2004 (EUR/04/5046267/7; http://www.euro.who.int/document/e83338.pdf, accessed 17 June 2007).

[3]*European Environment and Health Information System*. Copenhagen, WHO Regional Office for Europe, 2007 (http://www.enhis.org, accessed 6 July 2007).

This assessment illustrates the wide disparities in health-related environmental conditions, both between different parts of the European Region and between populations within Member States. The following summary corresponds to the sections in Part I of this report, each of which addresses one of the RPGs.

RPG I: "*… significantly reduce the morbidity and mortality arising from gastrointestinal disorders and other health effects, by ensuring that adequate measures are taken to improve access to safe and affordable water and sanitation for all children.*"

The risks to children's health related to poor access to safe drinking-water and sanitation remain substantial in rural areas in the east of the Region. In many of these countries, over 60% of the rural population has no access to a public water supply and more than 50% live in dwellings with no connection to sanitation facilities. Poor water and sanitation lead to significant health problems across the Region. In 2001, over 13 500 children aged under 14 years died as a result of poor water conditions, most of them in central and eastern Europe and central Asia. Outbreaks of waterborne diseases occur throughout the Region. Even where there is wide access to good quality drinking-water, outbreaks occur due to factors such as contamination of water from broken pipes or the use of uncontrolled small water supplies. Many outbreaks go unnoticed as current monitoring and surveillance systems lack sensitivity and are to a large extent not harmonized.

RPG II: *"… prevent and substantially reduce health consequences from accidents and injuries and pursue a decrease in morbidity from lack of adequate physical activity, by promoting safe, secure and supportive human settlements for all children."*

Unintentional injuries are one of the leading causes of morbidity and mortality among children and adolescents in the Region, with rates varying substantially between countries. Falls, drowning, fires and poisoning, which kill more than 75 000 children annually, are several times more common in some countries in the east of the Region than those of the west. Road traffic injuries lead to 32 000 fatalities annually, an unacceptably high figure. There is an eightfold difference between the lowest and highest rates in the Region. Encouragingly, the comparatively low mortality rates achieved by some countries indicate that deaths due to injuries are preventable. This underscores the urgent need to implement safe transport policies and accident preventive strategies, which already exist in some Member States, across the entire Region.

A safe environment which encourages personal mobility and physical exercise is important for health and the prevention of obesity and excess body weight. Physical activity levels among children are very low in most countries of the Region. Among 11-year-olds, well over 50% of boys and over 60% of girls are not physically active; the proportion is even higher in 15-year-olds: 65% and 80%, respectively. Excess body weight and obesity is seen in from 5% to almost 35% of children in Member States, with higher rates tending to be in the west. Urgent action involving different sectors and at different levels is needed to increase the opportunities for children and adolescents to be and remain physically active in all settings of their daily lives.

RPG III: *"… to prevent and reduce respiratory diseases due to outdoor and indoor air pollution, as well as contributing to a reduction in the frequency of asthmatic attacks, in order to ensure that children can live in an environment with clean air."*

The incidence of respiratory diseases in children varies substantially across the Region, with deaths due to respiratory infections 100 times more likely in some countries than in others. In many coun-

tries, the prevalence of allergic diseases exceeds 15%. While the mortality due to respiratory infection is clearly higher in countries in the east of the Region, there is no such trend for allergic diseases. Multiple factors interact to determine respiratory health, including infections, diet, tobacco-smoking, social conditions and the availability of medical care. Air pollution, both out- and indoor, is among the key determinants of preventable respiratory disease.

Close to 90% of residents of urban areas, including children, are exposed to air pollution exceeding WHO guideline levels. Average exposure levels vary by a factor of three in the Region. Although full implementation of current policies should reduce air pollution and its impact over the next decade, only some action has shown an immediate effect in the Region.

Over half of the children in Europe are regularly exposed to environmental tobacco smoke (ETS) at home; in some countries, the prevalence of exposure reaches 90%. Around 15% of people live in homes with problems of damp, which contribute to the development and exacerbation of asthma. Exposure to products derived from the combustion of solid fuels is a considerable health problem in the eastern part of the Region. Policies to reduce the exposure of children to ETS and other indoor air pollutants exist in most countries but they vary in scope and effectiveness.

RPG IV: *"… reducing the risk of disease and disability arising from exposure to hazardous chemicals (such as heavy metals), physical agents (e.g. excessive noise) and biological agents and to hazardous working environments during pregnancy, childhood and adolescence."*

RPG IV covers a broad range of health and environment issues and relevant information is fragmented and only available for fewer countries than for other RPGs. For example, data on exposure to chemical hazards in food are only available for the general population in 13 EU countries and there is no harmonized monitoring of lead in children in the Region.

Four topics are covered relating to RPG IV.

Childhood leukaemia. There are about 6000 new cases of childhood leukaemia per year in the Region and 2400 deaths. Incidence tends to be higher in the more affluent countries, while survival is lower in the less affluent. Epidemiological research has produced much suggestive evidence for possible environmental causes, but established environmental risk factors account for very few cases. The burden of childhood mortality from leukaemia can be reduced by improving survival, especially in the eastern part of the Region. At present, no public health measure can be identified which would result in a substantial decrease in incidence.

Exposure to ultraviolet radiation (UVR) in childhood is an important risk factor for severe diseases in adulthood, including melanoma and non-melanoma skin cancer. Melanoma rates are high in many European countries, particularly in the north. Countries vary markedly in their implementation of policies to protect against UVR. The most important policies include increasing the promotion of sun protection behaviour and a ban on sunbed use by young people.

Food safety is one of the most important factors for good health. Among the chemical risks in children's food, two groups of chemicals are currently causing concern in Europe.

- *Heavy metals*. Lead and methyl mercury are the most relevant. While the phasing out of lead in fuels resulted in a fall in the exposure of children in most countries, the plumbing and local industries continue to be important sources in some. The most serious source of methyl mercury is fish, and both the risks and benefits of fish consumption must be considered.

- *Dioxin-like compounds*. Among the persistent organic compounds, dioxin-like compounds have the lowest safety margins. While their intake has decreased dramatically since the 1970s, monitoring is still warranted. At the same time, the consumption of breast-milk or fish should not be endangered by uncritical control measures. In addition, unhealthy diets and microbiological food quality are highly relevant for food safety and public health.

Health and safety at work. It is known that many children are injured at work but the true magnitude of the problem in the Region is unknown. The available data suggest that there has been a general fall in injuries in recent years, but these only cover relatively few countries and collection methods vary. Children can be protected through the enforcement of regulations that ensure that their rights are upheld. This should be supported by the establishment of a reliable workers' health information system, which will allow prioritization and monitoring of progress.

Part II of the report summarizes information about the scientific basis, framework and scope of the system, and presents plans for future action.

This assessment reveals the existence of gaps in the priority data and the need to harmonize monitoring and data collection. Together with the availability of ENHIS tools and the ENHIS network, it should stimulate Member States to improve existing national systems through the application of harmonized methods. In turn, this should enable a better assessment of the EH situation to be made, with guidance for action and an evaluation of its effect on health. Although this report should mainly be seen as a baseline focused on children's health in the first half of the current decade, it already contains some useful assessments of the links between effective policies and health outcomes, notably in the area of accidents and injuries as well as other contexts. With systematic maintenance and the acquisition of new data, the system will enable a first assessment to be made of the trends in the EH situation in the context of implementing the CEHAPE before the Fifth Ministerial Conference on Environment and Health takes place in 2009.

INTRODUCTION

Reliable information is essential when priorities are decided about action aimed at reducing environmental health (EH) risks and monitoring its effectiveness in terms of public health benefits.

Within the European environment and health process, the establishment of a well-coordinated mechanism for health and environment monitoring and reporting has increasingly become a priority. The Fourth Ministerial Conference on Environment and Health (held in Budapest in 2004) adopted the Children's Environment and Health Action Plan for Europe (CEHAPE).[4] To aid policy development, including for CEHAPE, Member States of the WHO European Region committed themselves to joint action with WHO, the European Commission (EC) and other international organizations in building a supporting information base.

The resulting European Environment and Health Information System is designed to generate and analyse EH information to support relevant policies in Europe, with a focus on those addressing children. The system is based on a set of EH indicators developed and updated by the ENHIS and ENHIS-2 projects; it uses health impact assessment methods and will contribute to the European Community Health Indicators system. The projects are part of a broader initiative on building a comprehensive pan-European environment and health information system (EHIS), which will contribute to the overall evidence base for health policies in the WHO European Region.

Establishment of the EHIS is of direct relevance to the European Union (EU) Action Plan on Environment and Health 2004–2010, which puts a special emphasis on children's health and their environment, and its key action focus on improving the information chain.

This report summarizes the status and progress of development and implementation of the comprehensive EHIS from the time of the Budapest Conference to 2007.

DEVELOPMENT OF EHIS

EHIS aims to enable the environmental health and policy situation in Europe to be monitored. Its development involved the analysis of knowledge about links between the environment and health, policy analysis, feasibility-testing and consensus-building around the essential elements of the system. The following steps were included.

- *Setting the scope:* to define public health topic areas, particularly for children's health and its relationship with environmental risk factors, and to identify indicators to measure and report on these links,
  - topic areas relating to children's health and the environment were defined based on the information needs of current policies, in particular for CEHAPE;
  - indicators were identified using the most up-to-date scientific evidence about links between health and the environment, focusing on the environmental factors most relevant to health, health outcomes most influenced by the environment, and policy action deemed to reduce and prevent the risks.

[4] *Children's Environment and Health Action Plan for Europe. Declaration.* Fourth Ministerial Conference on Environment and Health, Budapest, 23–25 June 2004 (EUR/04/5046267/6, paragraph 16; http://www.euro.who.int/document/e83335.pdf, accessed 16 March 2007).

- *Screening* for policy relevance, scientific evidence and feasibility was carried out by working groups of topic-specific experts and public health professionals.

- *Methodological guidelines* were developed for a set of children's EH indicators, identifying data sources and methods for data retrieval, information analysis (including health impact assessment – HIA) and reporting.

- *Methodology* was tested by the network of partner institutions. This provided important feedback on all elements and functions of the system, ranging from generation of the indicators to preparation of supporting information for use in policy debates. The testing has also provided experience and contributed to building the capacity of the network – an important mechanism assuring the relevance of EHIS.

- Member States *evaluated the process and outputs* for feasibility and usefulness for national application, agreement on a core set of indicators and approaches to resolving priority data gaps.

- *Implementation:* the information base was used in preparing the indicator-based assessment report across the European Region.

To ensure continuity, the process comprised two streams of activity running in parallel: implementation of indicators and other information methods, and development work on new approaches to data analysis or on EH issues for which no routine data are available in the Region.

TECHNICAL ACTIVITIES

The creation of a sustainable health information and knowledge system is a key priority of the European Community Public Health Action Programme. WHO, in collaboration with partner institutions in the member countries and cosponsored by the EC Directorate-General for Health and Consumer Protection, has been implementing projects to lay the foundations for EHIS.

The project *ECOEHIS – Development of environment and health indicators for European Union countries* proposed a set of 17 core indicators to address major environmental health risks as an integral part of the EC health information system.[5] *ENHIS – Implementing environment and health information system in Europe*, a project implemented in 2004–2005,[6] further advanced the work on indicators, moving towards the establishment of a solid methodological and organizational basis for operating the system. The follow-up ENHIS-2 project *(Establishment of environment and health information system supporting policy-making in Europe)* sets up and starts the operation of a comprehensive information and knowledge system focusing on children's health and the environment.

The indicators and underlying methodology were tested in national contexts in the framework of WHO country programmes implemented in Albania, Latvia and the Russian Federation in 2005–2006.

[5] *Development of EH indicators for EU countries (ECOEHIS)*. Copenhagen, WHO Regional Office for Europe, 2005 (Project Grant Agreement SPC 200230) (http://www.euro.who.int/EHindicators/Methodology/ 20030527_5, accessed 4 July 2007).

[6] *Implementing Environment and Health Information System in Europe – the ENHIS projects*. Copenhagen, WHO Regional Office for Europe, 2006 (Grant Agreements SPC 2003112 and SPC 2004124) (http://www.euro.who.int/EHindicators/Methodology/ 20050419_2, accessed 4 July 2007).

INVOLVEMENT OF MEMBER STATES

The ENHIS-2 project is being implemented by a consortium of 22 partner institutions from 18 Member States,[7] together with the French Agency for Environmental and Occupational Health and Safety, the WHO Regional Office for Europe, and the EC Joint Research Centre. The European Environment Agency, the National Board of Health and Welfare of Sweden and the United Kingdom Health Protection Agency collaborated with the project on a voluntary basis and have contributed to the preparation of the EHIS-based products. The project partners are the technical core of the EHIS network, providing an important organizational mechanism for creating capacities for operating the system and maintaining its relevance for the Member States.

The Regional Office is coordinating the technical activities and facilitating the establishment of EHIS and its use for assessment and reporting at Region-wide level. WHO is also facilitating the active involvement of Member States in developing the system, and ensuring the sharing of expertise and transfer of knowledge related to EH indicator-based reporting. Several countries across the Region have provided feedback on the development work and input into the preparation of EHIS-based products.[8] Besides offering expertise, case studies on specific EH issues related to CEHAPE and examples of national policy action, Member States have by their involvement allowed the process to be shaped to meet the users' needs better. The EHIS process and output were evaluated at a WHO meeting in Bonn in March 2007, where representatives of 26 Member States gave their support and approval.

Progress in developing the system has also been assessed at project meetings by representatives of ENHIS and ENHIS-2 project partners. Additional WHO Working Group meetings have been held to consult representatives of countries that did not participate in the ENHIS projects. Table 1 lists the key meetings. Progress on the development of the system has also been presented to the CEHAPE Task Force and has been closely monitored by the European Environment and Health Committee.

EHIS OUTCOMES

Two main products are being prepared to demonstrate the progress achieved in the development and implementation of EHIS and that the system is becoming operational. These are:

- a web-based information service (http://www.enhis.org) which enables dissemination of and access to data, indicators and related analysis, up-to-date fact-sheets, case studies of health impact assessment and policy action focusing on children's EH;

- this indicator-based report *Children's health and the environment in Europe: a baseline assessment,* which uses the information base to provide an assessment of the environment and health situation in Europe within the four regional priority goals (RPGs).

Building capacity in the Region for using existing information and evidence in EH policy-making is an important outcome of the EHIS process.

[7]Austria, Bulgaria, Czech Republic, Estonia, Finland, France, Germany, Greece, Hungary, Italy, Lithuania, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain.

[8]Albania, Armenia, Belarus, Belgium, Croatia, Georgia, Malta, Serbia, Sweden, The former Yugoslav Republic of Macedonia, United Kingdom, Uzbekistan.

Table 1. Key meetings on the development of the EH Information System (2004–2007)

Name of Meeting	Venue	Dates	No. of participating countries[a]
Environment and Health Information System. Third Meeting of a Working Group[a]	Bonn, Germany	10 November 2004	28
Implementing Environment and Health Information System in Europe. ENHIS. First Technical Meeting[a]	Bonn, Germany	9–11 February 2005	22
Establishment of Environment and Health Information System Supporting Policy-Making in Europe. ENHIS-2. First Coordination Meeting[b]	Bonn, Germany	15–16 December 2005	18
Environment and Health Information System. Meeting on Preparation for the Intergovernmental Mid-Term Review Meeting: an EH Information System-Based Assessment Report[a]	Bonn, Germany	27–28 April 2006	29
Establishment of Environment and Health Information System Supporting Policy-Making in Europe. ENHIS-2 mid-term review meeting[b]	Granada, Spain	9–10 October 2006	18
ENHIS-2 Editorial Meeting on Indicator-Based Report[b]	Bonn, Germany	25–26 January 2007	21
EHIS: Meeting on Evaluation of EHIS-Based Report and Process	Bonn, Germany	19–20 March 2007	29

[a] *Environment and health information system. Reports*. Copenhagen, WHO Regional Office for Europe, 2006 (http://www.euro.who.int/EHindicators/Publications/20030625_1, accessed 4 July 2007).
[b] *Environment and health information system. ENHIS 2 meetings*. Copenhagen, WHO Regional Office for Europe, 2006 (http://www.euro.who.int/EHindicators/Methodology/20060201_3, accessed 4 July 2007).

OBJECTIVES OF THE CEHAPE INDICATOR-BASED ASSESSMENT AND THE QUESTIONS IT ANSWERS

Children's health and the environment in Europe: a baseline assessment is based on policy-relevant indicators and information available in the system. It demonstrates the use of EHIS in providing evidence-based health arguments which empower the health sector to influence the development of policy in the environmental and other economic sectors. As the most recent data are from 2005, the assessment provides baseline spatial and time patterns of the EH situation in the Region, focusing on children's health and relevant policy in the context of the policies put in place before Member States began to implement the CEHAPE programme.

By showing the potential and flexibility of the system, the CEHAPE assessment should stimulate Member States to develop national systems using harmonized methods. It should also stimulate

countries to improve national data systems for gaps in their priority data, allowing better evaluation of the EH situation and implementation of action. The present assessment does not (and cannot) provide any indication of the effects and effectiveness of international and national policy action within the CEHAPE programme. Whenever possible, the trends from the early 2000s are explored in the report. With the maintenance of the system and acquisition of new data, it will be possible to prepare the first assessment of trends in the EH situation in the context of the CEHAPE implementation for the Fifth Ministerial Conference on environment and health in 2009.

The assessment presented in Part I of the report is organized in four sections corresponding to the RPGs. Each section adopts a storyline structure interlinking indicators and processes. For example, the section on RPG II (Be mobile and active – but safely!) takes a life-course approach, following how patterns and risk factors for unintentional and road traffic injuries change as a child gets older. In the section on RPG III (Clean air for health), the focus is on asthma and the contribution to it of outdoor and indoor air pollution. The section on RPG IV (Eliminating hazards from children's environment) addresses diverse public health issues which are new or re-emerging and are associated with changes in behaviour, social structures and the situation in countries.

For each RPG, the assessment addresses the following issues:

- public health importance: the magnitude and severity of the public health problem and its distribution within the Region;
- environmental risk factors that contribute to the public health problem: situation and time trends, potential for health gains;
- current policy response: policy measures and regulations in place in the Region, analysis of implementation and evaluation mechanisms.

The indicator-based assessment is complemented by country case examples highlighting effective surveillance, monitoring and control, prevention programmes or risk communication practices. Each section concludes with an overview of progress and action taken on the RPG across the Region, and pinpoints priority data and monitoring needs to improve the quality of the information and assessments.

Part II of the report summarizes basic information about the present system and planned future developments.

PART I.
ASSESSMENT OF THE SITUATION AND PROGRESS TOWARDS THE RPGs

Chapter 1. Clean water – condition of life[9]

RPG I

We aim to prevent and significantly reduce the morbidity and mortality arising from gastrointestinal disorders and other health effects, by ensuring that adequate measures are taken to improve access to safe and affordable water and sanitation for all children.
Children's Environment and Health Action Plan for Europe

KEY MESSAGES

- Safe drinking- and bathing water is vital for the health of the population. In western European countries, almost all of the populations have been connected to piped water supplies for decades and effective quality control and water treatment mechanisms are in place. Consequently, there is little impact on health by the traditional pathogens related to drinking-water. In the eastern parts of the Region, access to safe drinking-water is low in places, ranging from 58% to 80%, and there are important disparities between urban and rural areas:[10] only 30–40% of rural households in eastern European countries have access to safe drinking-water.
- Poor water and sanitation lead to significant health problems across the Region. Annually, over 13 500 children aged under 14 years die due to poor water conditions, with most deaths occurring in countries of central and eastern Europe and central Asia.
- Outbreaks of waterborne diseases occur throughout the Region, sometimes attributable to new emerging pathogens such as cryptosporidiosis. Even where there is wide access to good quality drinking-water, outbreaks occur due to issues such as contamination of water by broken pipes or the use of uncontrolled small water supplies. Many outbreaks go unnoticed as current monitoring and surveillance systems are to a large extent not harmonized and lack sensitivity.
- The EC Bathing Water Directive (76/160/EEC) *(2)* and the advances made in wastewater treatment have resulted in a considerable improvement in bathing water quality at identified bathing sites throughout Europe, therefore achieving the primary aim of protecting public health. The 27 EU member states will be following the revised bathing water Directive (2006/7/EC) *(3)*, which will ensure more consistent monitoring in the Region and tighter standards.

IMPORTANCE FOR PUBLIC HEALTH

Although over 90% of the population of the Region has access to an improved[11] water supply *(4)*, clean water is not available to at least two million people, leaving children exposed to a high risk of diarrhoeal diseases. Valent et al *(5)* estimated the disability-adjusted life years (DALYs) and

[9] By Kathy Pond, Alexandra Katsiri and Ilkka Miettinen, based on ENHIS fact sheets.
[10] *De facto* population living in areas classified as urban or rural (that is, the difference between the total population of a country and its urban population), according to the criteria used by each area or country *(1)*.
[11] Improved drinking-water sources include piped water into dwellings, plot or yards, public taps/standpipes, protected dug wells, etc., which are more likely to provide safe drinking-water than those characterized as unimproved *(4)*.

deaths attributable to inadequate water and sanitation from published studies and reports. Among 0–14-year-olds, inadequate water and sanitation in certain parts of the Region (especially central and eastern Europe and central Asia) account for a significant proportion of the burden of disease (3.5% of DALYs) and deaths (5.3%), with children aged under five years being at greatest risk *(5)*. Countries in the Eur-B epidemiological sub-region, where water and sanitation coverage is problematic, bear the greatest burden, with over 11 000 deaths in 2001 *(5)*. For the definition of epidemiological sub-regions and countries see Annex 1.

From 1993 to 2001, the standardized death rate (SDR) for diarrhoeal diseases in children under five years of age fell from 70.0 per 100 000 to 21.6 in the Commonwealth of Independent States (CIS)[12] and from 176.3 to 44.6 in the five central Asian republics including Kazakhstan *(6)*. Despite these gains, the situation is considerably worse than in the countries belonging to the EU before May 2004 (EU15), where the rate dropped from 0.64 to 0.36 over the same period. Between 1993 and 2001, the SDR fell from 186 per 100 000 to 86 in the CIS and from 396 to 143 in the central Asian republics. In the EU15 during the same period, it fell from 7.6 to 4.7 per 100 000 *(7)*.

These stark differences are for diseases that are largely preventable. Adequate quantities of drinking-water and good sanitation combined with high common standards for drinking-water quality and improved personal hygiene could significantly reduce the risk of infections that cause diarrhoeal disease and viral hepatitis. Simply washing hands at critical times (for example, after using the toilet or before handling and eating food) can reduce diarrhoeal episodes by 33% *(8)*.

Although the figures for diarrhoeal disease outbreaks are undoubtedly underestimates, investigations are an important source of information, especially to identify contributory factors. The causes of outbreaks are often breakdowns or failures in the water supply system (such as missing or faulty disinfecting procedures or leakages in the distribution system) resulting in contamination of the water supply. Waterborne outbreaks occur throughout the Region, even in countries with advanced drinking-water and sanitation systems. In some parts of the Region, disruptions in the water supply, breaks in pipes and use of unaccounted-for water have been increasing over recent years. In Georgia and the Republic of Moldova, for example, unaccounted-for water increased from 30% in 1998 to 45% in 2003, and is currently between 50% and 60% in Armenia and Kyrgyzstan. In Azerbaijan and Armenia, water can be available for as little as 5–7 hours per day *(9)*.

Reliable, comparable information concerning water-related disease outbreaks is not widely available and existing data do not provide an accurate picture. As part of the ENHIS project, data on outbreaks related to drinking-water were collected from seven European countries (Croatia, Estonia, Finland, Greece, Hungary, Slovakia and the United Kingdom) for 2000–2005, during which 75 outbreaks were recorded *(10)* (see also Box 1). This information should, however, be interpreted with caution as surveillance systems vary markedly from country to country. For example, Estonia reported no outbreaks between 2000 and 2005, while Finland, which has a well-established surveillance system and high-quality water supplies, reported the greatest number of outbreaks. The majority of the outbreaks in Finland occurred in small communities where monitoring and control systems are less intensive (Box 2). In addition, there is a general lack of child-specific data: only Croatia supplied these *(10)*.

[12]Armenia, Azerbaijan, Belarus, Georgia, Kazakhstan, Kyrgyzstan, Republic of Moldova, Russian Federation, Tajikistan, Turkmenistan, Ukraine, Uzbekistan

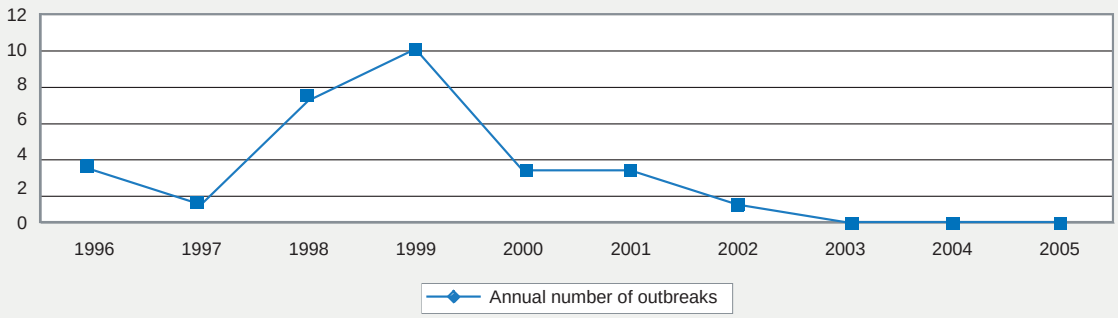
Box 1. Drinking-water quality control: an example from Slovakia

In 2000, the Government of the Slovak Republic adopted the National Health Strategy, a substantial part of which focused on health and drinking-water quality. Several measures were adopted to improve drinking-water quality, including:

- increasing the public water supply, with 85% of people connected in 2005;
- legally enforcing standards accompanying EU accession: drinking-water quality control in Directive 98/83/EC on water production and distribution to consumers has been legally tightened;
- stricter monitoring of drinking-water quality at the point of consumption to meet the requirements of Directive 98/83/EC: sampling and analysis of drinking-water at taps has been increased;
- introducing an early warning system on the quality of surface water sources in two areas in the eastern part of the country (16% of drinking-water distributed to the public water network comes from surface sources): the system was established along the lines of a twin project in Italy, and trout and mussels are used to detect water quality changes rapidly so as to prevent contaminated water reaching consumers.

These measures have contributed to a fall in the number of outbreaks of waterborne diseases in Slovakia (Fig. 1).

Fig. 1. Outbreaks of waterborne diseases in Slovakia, 1996–2005



Note. y-axis indicates number of outbreaks.
Source: WHO *(11)*.

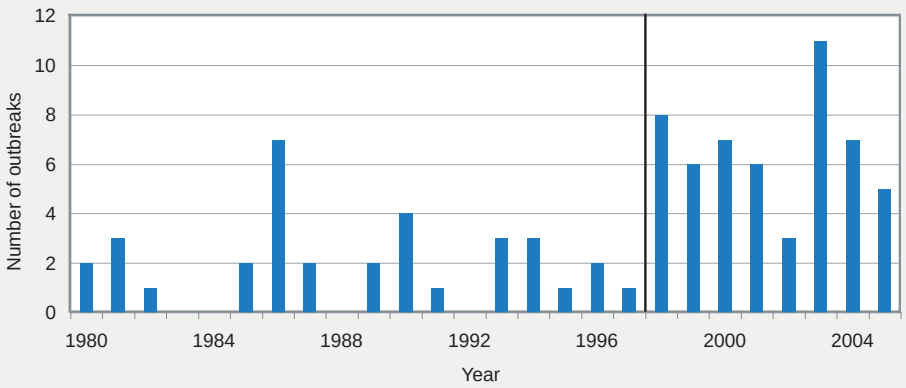
Recreational waters have been linked to illness, primarily gastrointestinal symptoms, by a number of epidemiological studies. Outbreak data suggest that there is a small risk of more serious illness caused by pathogens such as *Shigella sonneri, E. Coli* O157, protozoan parasites, and enteric viruses *(12)*. Estimates suggest that globally, more than 20 million cases of gastrointestinal disease and more than 50 million cases of severe respiratory diseases are incurred each year through swimming and bathing in wastewater-polluted coastal waters *(13)*. Infectious diseases associated with pathogenic microorganisms from land-based wastewater pollution of the seas are estimated to cause the loss of three million DALYs per year; the economic loss is around US$ 12 billion per year *(13)*. Young people and tourists, who do not have immunity to local endemic diseases, may be at higher risk of disease. Children tend to spend more time in recreational waters and are more likely than adults to intentionally or accidentally swallow water *(14)*.

Box 2. Outbreaks of waterborne disease in Finland, 1980–2005

In Finland, food- and waterborne outbreaks have been recorded annually since 1980 by a voluntary reporting system. In 1997, a new monitoring system for waterborne outbreaks was launched. Municipal health protection authorities are now obliged to report all outbreaks of suspected waterborne diseases to the National Public Health Institute, and even the smallest outbreaks, such as outbreaks related to the use of private well water, are noted.

The new system improved detection rates. From 1998 to 2005 between four and ten waterborne outbreaks were observed each year (Fig. 2). A total of 52 outbreaks, which resulted in over 16 700 cases of illness, were recorded over this period. The majority of the outbreaks occurred in communities with fewer than 500 inhabitants.

Fig. 2. Number of waterborne outbreaks recorded between 1980 and 2005 in Finland



Note. The vertical line indicates the beginning of the compulsory monitoring system.
Source: Finnish Food Safety Authority *(15)*.

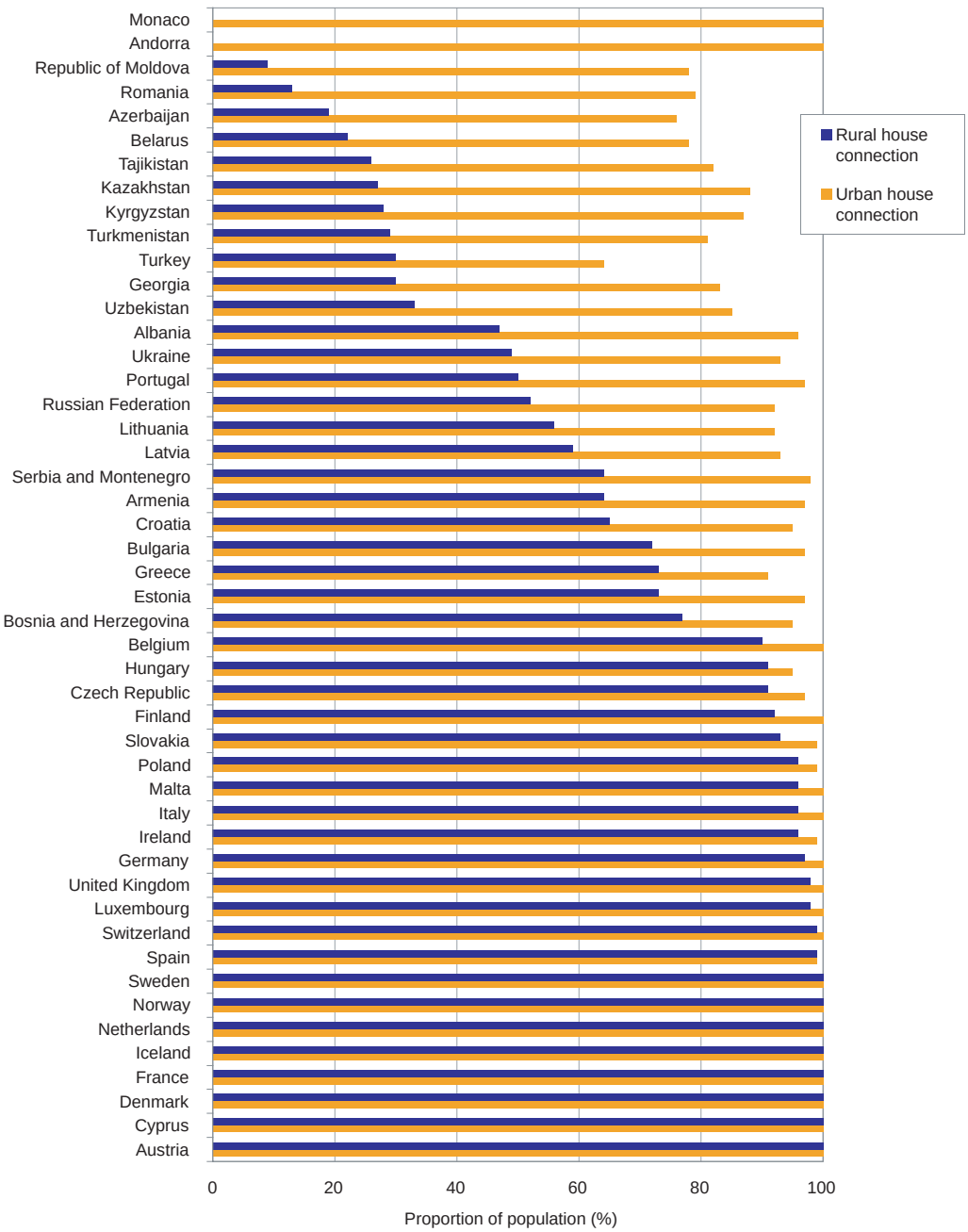
WATER-RELATED HEALTH DETERMINANTS: GEOGRAPHICAL AND TIME PATTERNS

Access to a regular, clean and safe supply of drinking-water is fundamental to the protection of public health and is a key component of sustainable development. Connection to a public water supply reduces the risk of waterborne diseases, provides water for drinking, cooking, hygiene and washing, and is associated with improved health in general. It also relieves women and children of the burden of having to fetch water, giving them time for other activities or for schooling.

Access to safe drinking-water at home is assessed by the WHO/UNICEF Joint Monitoring Programme (JMP) *(16)* which tracks the progress on global water supply and sanitation in the context of the millennium development goals (MDG). Access to safe drinking-water is estimated as the percentage of the population using improved drinking-water sources. The JMP also provides information about urban-rural disparities in water supply and sanitation.

The proportion of the population with access to safe drinking-water at home in the Region in 2004 (or latest available year) is shown in Fig. 3. There is a clear east-west gradient in the Region, and figures remain low in the east despite increasing coverage.

Fig. 3. Percentage of population with access to improved water supply at home in urban and rural areas, WHO European Region, 2004 or last available year[13]

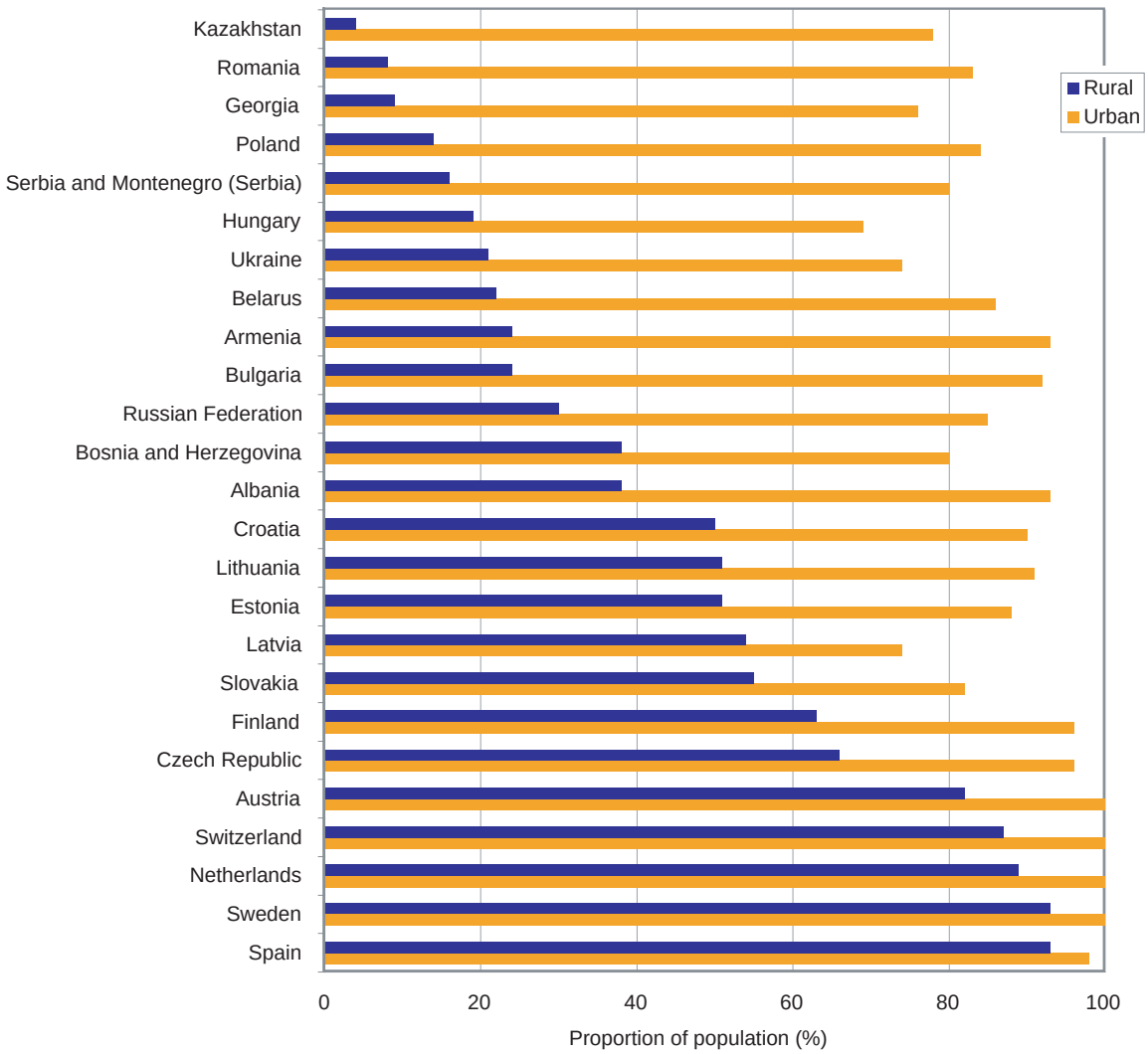


Note. Data for Belgium, Greece and Portugal are for 1995; data for Armenia, Azerbaijan, Belarus, Cyprus, Georgia, Kazakhstan, Kyrgyzstan, Republic of Moldova, Russian Federation, Tajikistan, Turkey, Turkmenistan, Ukraine and Uzbekistan are for 2002.
Source: WHO/UNICEF Joint Monitoring Programme *(16)*.

[13]Serbia and Montenegro became two separate Member States of WHO in September 2006. Throughout this report they are referred to as either one country or two countries according to the dates of the references or data. Where, prior to September 2006, separate data are available for either or both of the entities, they are shown as Serbia and Montenegro (Serbia) or Serbia and Montenegro (Montenegro).

Furthermore, important disparities exist between urban and rural areas, particularly in the eastern part of the Region, where the sources can be considered safe only for 30–40% of households. For sanitation facilities, the proportion of the population with a house connection shows similar east-west and urban-rural patterns (Fig. 4). Rural coverage is particularly low in eastern European and central Asian countries, where less than 50% of the rural population have home connections to sanitation facilities in the majority of countries *(16,17)*.

Fig. 4. Percentage of the population connected to sanitation facilities in urban and rural areas, selected countries in the WHO European Region, 2004



Note. The indicator considers household connections to a sewerage system only: privately owned septic tanks or dry sanitation are not included.
Source: WHO/UNICEF Joint Monitoring Programme *(16)*.

McKee et al undertook a survey of access to water in Armenia, Belarus, Georgia, Kazakhstan, Kyrgyzstan, the Republic of Moldova, the Russian Federation and Ukraine in 2001, and found that an average of 90% of respondents in urban areas had access to cold running water in their homes. In rural areas, the figure ranged from 44% in the Russian Federation to less than 10% in Kyrgyzstan and the Republic of Moldova. Access to hot running water inside the homes was exceptional in rural households. Indoor toilets were common in urban areas but not in rural areas *(18)*. In 2005, the Organisation for Economic Co-operation and Development (OECD) reported that in the CIS, sanitation coverage was as low as 24% for urban populations in some countries but reached 73% in others *(9)*.

WHO has recently published a country-by-country analysis of the environmental burden of disease for selected risk factors *(19)*. The results show that in the Region more than 12 000 deaths annually due to diarrhoea are caused by poor water, sanitation and hygiene and are thus preventable through interventions.

Coverage figures vary between surveys and reports, but the message is clear. Improvements in water and access to sanitation should result in a reduction in the water-related burden of disease in the Region. For instance, if the entire child population in the WHO Eur-B sub-region were given access to a regulated water supply and full sanitation coverage, with partial treatment for sewage, about 3700 lives would be saved and 140 000 DALYs averted *(5)*. However, providing access to safe water and sanitation does not necessarily mean that health gains will be made. Information to support use of the services and hygiene education is essential for health benefits to be seen (Box 3).

Box 3. Development of infrastructure and personal hygiene: the case of Kyrgyzstan

From 2002 to 2007, the Government of Kyrgyzstan invested US$ 70 million (through loans from the Asian Bank of Reconstruction and Development and the World Bank) to improve the water supply infrastructure in rural areas. This has given more than 370000 people in 243 villages access to safe drinking-water.

At the same time (2002–2006), a hygiene and sanitation project was implemented to maximize health benefits in cooperation with the United Kingdom Department of International Development. Personal hygiene and health behaviour were promoted through education and the building of adequate sanitation facilities in schools. The project reached a population of 32506 adults and schoolchildren in the villages of the Talas, Issyk-kul and Naryn regions.

A baseline assessment of 1289 schoolchildren from the three regions of Talas, Issyk-kul and Naryn in 2003 showed a high diarrhoea morbidity rate, most often from *Giardia lamblia* (75%, 61% and 79%, respectively). The project resulted in improved personal hygiene and reduced morbidity from *Giardia lamblia* by 39% in the Talas region and by 68% in Issyk-kul.

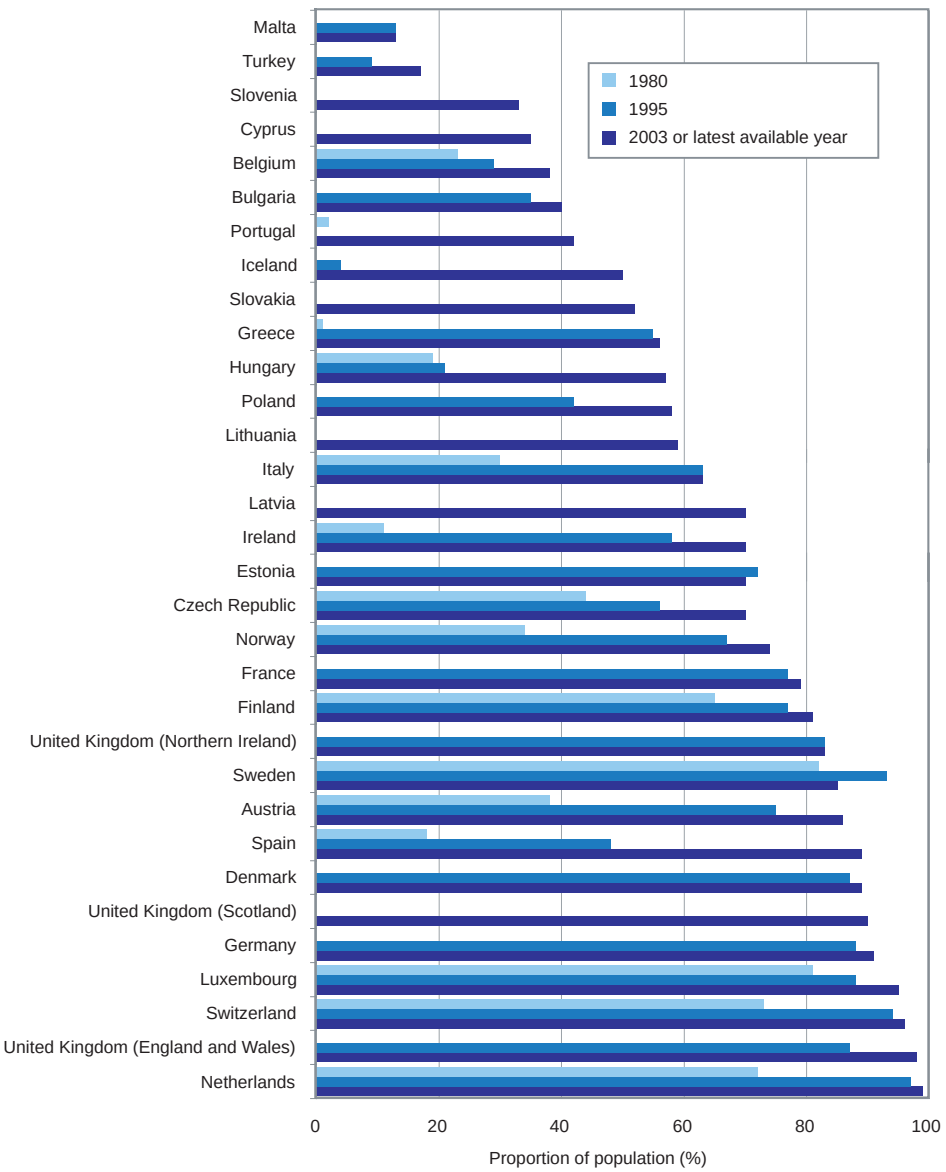
Source: WHO *(11)*.

SAFE RECREATIONAL WATER ENVIRONMENTS

Bathing water quality is influenced by urban wastewater treatment capacity which, in the EU, is covered by the Urban Wastewater Treatment Directive (91/271/EEC) *(20)*. Member States have invested significant amounts of money to comply with the standards. This has led to marked improvements in urban wastewater treatment capacity and, in turn, to better bathing water quality *(21)*.

Fig. 5 shows the percentage of the population connected to a wastewater treatment facility with any degree of treatment in 1980, 1995 and 2003 *(22)*. In 2003, the proportion of treated wastewater exceeded 85% in the Nordic and some northern European countries. Southern and south-eastern European countries treated between 40% and 60%, and some of the new EU member states and Belgium treated less than 40%. Describing time trends at the European level is difficult as many countries fail to report data each year. The available data show that many countries have made significant progress since 1980; these include the Czech Republic, Hungary, Iceland, Poland and Portugal. It is anticipated that the situation will improve significantly with planned increases in the capacity of collection networks and treatment plants.

Fig. 5. Percentage of country population connected to wastewater treatment facilities, 1980, 1995 and 2003

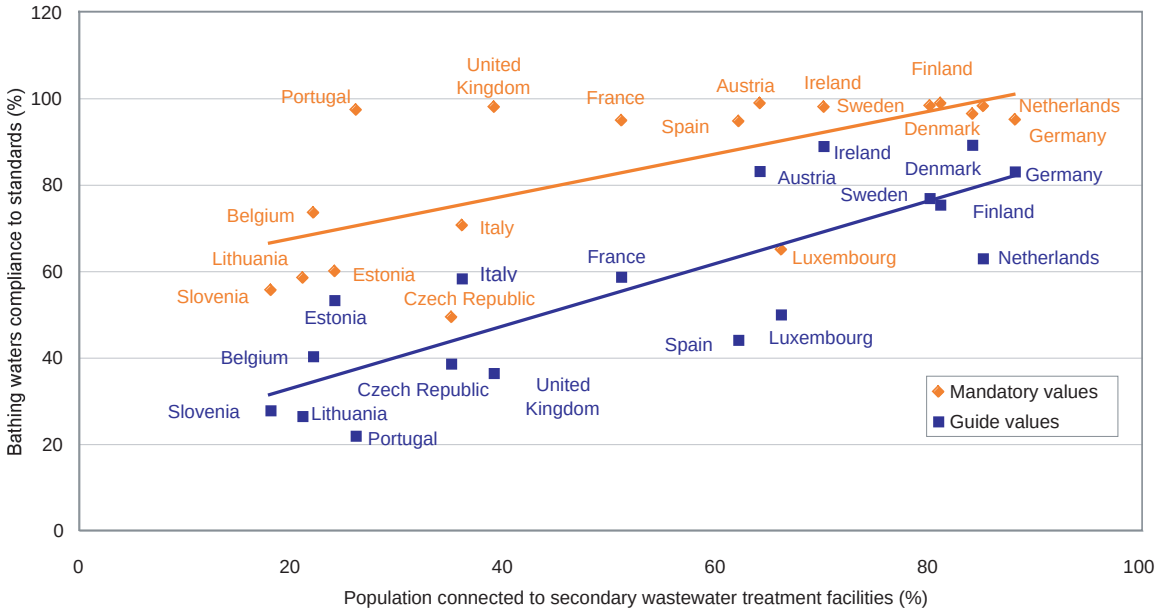


Source: Eurostat *(23)*.

EU countries must comply with the EU Bathing Water Directive *(2)*, which requires the monitoring of 19 pollutants and other parameters, including indicators of faecal contamination of the water. The Directive lays down mandatory standards, as well as guideline standards which Member States are encouraged to meet. The Directive applies to both inland and coastal bathing zones. A revised directive will come into force by 2014 *(3)*.

There is an apparent relationship between the proportion of a population connected to wastewater treatment facilities with at least secondary (biological) treatment and compliance with mandatory and guideline values for inland bathing water quality (Fig. 6).

Fig. 6. Relationship between wastewater treatment coverage and bathing water compliance to mandatory and guide values in fresh water zones.



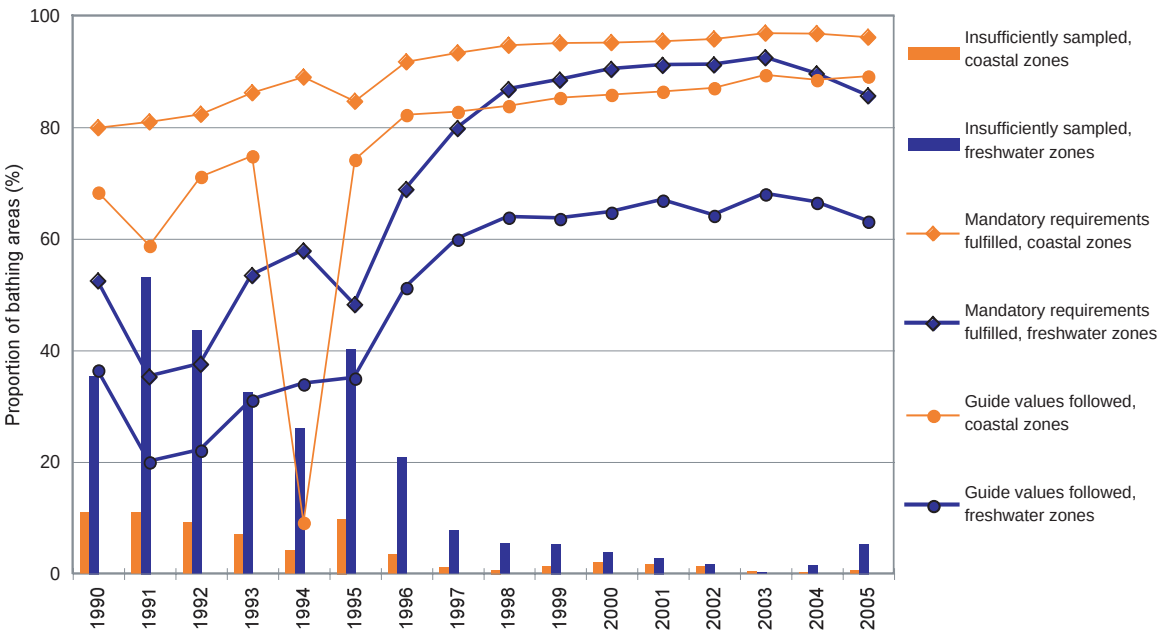
Source: Eurostat *(23)*; European Environment Agency *(24)*.

Fig. 6 clearly shows the effect of wastewater discharges on microbiological concentrations in inland waters. Around 70% of the variations in compliance with bathing water microbiological standards can be explained by wastewater treatment coverage when the more stringent guide values are considered. In the case of mandatory values, only 45% of the variations in bathing water quality can be explained by wastewater treatment. The difference is because mandatory values allow for greater levels of contamination and are relatively easily achieved regardless of the treatment coverage.

Surface waters can be polluted by sources other than wastewater. Diffuse sources such as runoff from agricultural land and storm water overflows from urban areas can contribute significantly to surface water loads of microorganisms and other pollutants, including nutrients and heavy metals *(25)*. A more thorough approach is needed to control this, and the new EU Bathing Water Directive will prove a useful tool.

Water quality in both coastal and fresh water zones improved steadily from 1992 to 2005 in the EU *(26)*. For coastal zones, the proportion of sites complying with the mandatory standards in the Bathing Water Directive (76/160/EEC) increased from 80% in 1990 to almost 97% in 2003. Compliance was lower in fresh water zones, but rose from 37% in 1992 to 92% in 2003. The number of bathing sites monitored also increased consistently over the same period, rising from 10 970 to 14 230 coastal sites and from 5275 to 6685 fresh water sites between 1992 and 2005 (Fig. 7).

Fig. 7. Bathing water quality in the EU, 1990–2005

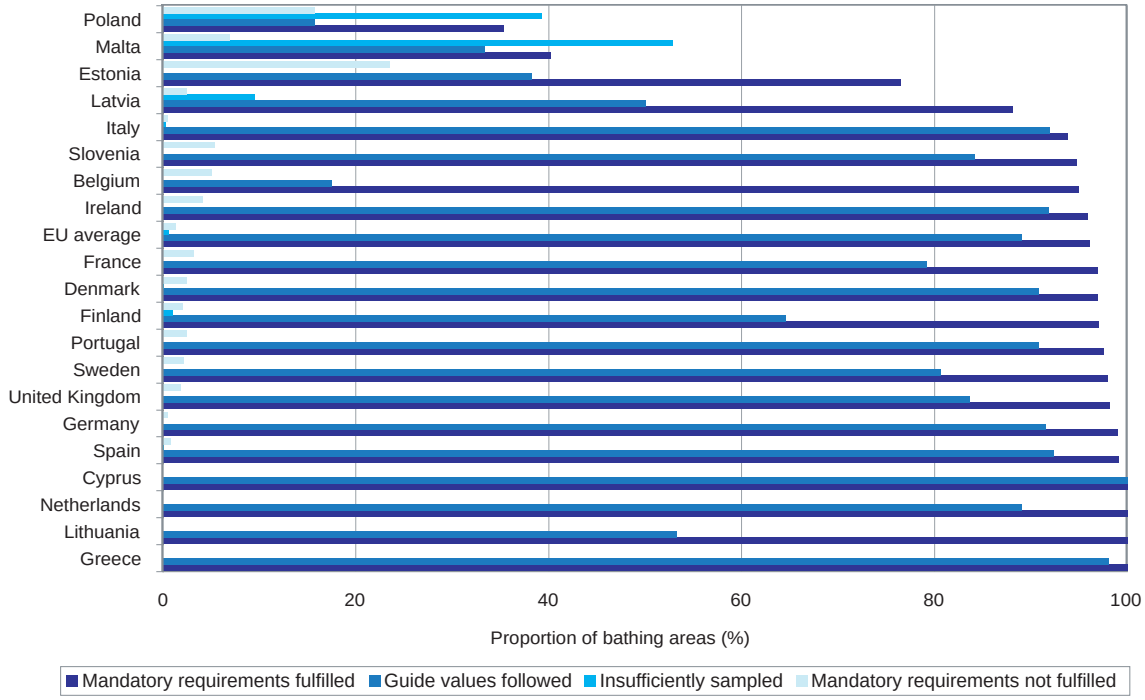


Source: EC *(27)*.

Despite the significant improvement in bathing water quality, 11% of Europe's coastal waters and 37% of inland bathing waters still did not meet the more stringent guide values (non-mandatory) in 2005. The differences are partly because inland waters are more sensitive to pollution from point and diffuse sources, the control of which requires structural changes to agricultural and environmental management practices. In coastal waters, self-purification capacity is significantly increased by initial dilution and dispersion due to currents. This protects the waters from becoming contaminated by pathogens at levels affecting human health. Fig. 8 shows the bathing water quality for coastal zones in the EU countries in 2005.

In general, while mandatory standards are often met, guideline standards are infrequently met in coastal and fresh waters. For inland waters, Greece, Ireland and the United Kingdom achieved 100% compliance with mandatory standards. It should, however, be noted that these countries have designated the fewest number of inland bathing waters in the EU (5, 10 and 12, respectively) compared with Germany (1570) and France (1400), which have designated the highest number. In several EU countries (including Belgium, Finland, France and Sweden) which have achieved high compliance with mandatory standards, coastal water quality lags behind the more stringent guide standards. The case of Portugal highlights the role of environmental legislation on improving the bathing water quality (Box 4).

Fig. 8. Bathing water quality for coastal zones in the EU, 2005

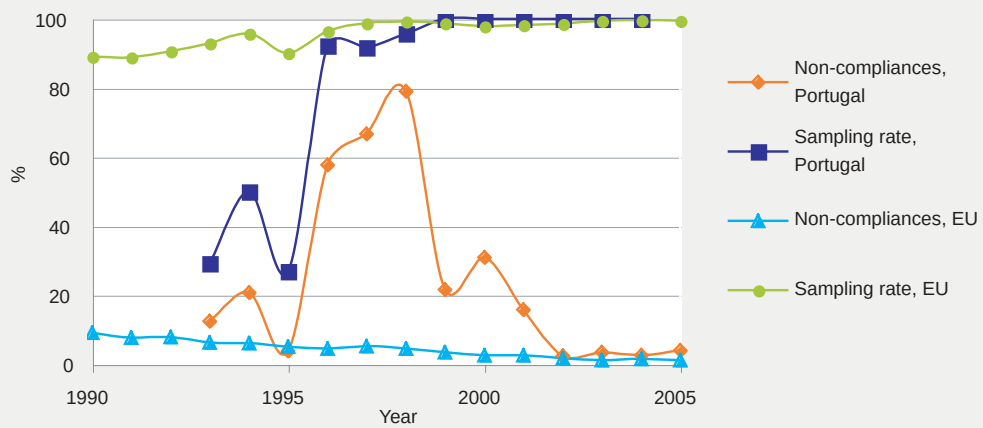


Source: EC *(27)*.

Box 4. Bathing water quality: the case of Portugal

Portugal took samples from 27% of its bathing waters in 1995 (Fig. 9). At the same time, non-compliance with the mandatory standards was at its lowest (3.8%). Such apparent high compliance was of course misleading due to the low number of samples taken. Because of this, the EC submitted a complaint to the European Court in 1998 (European Court, Case C-272/01). The Government of Portugal improved the monitoring system and implemented a series of management programmes to improve water quality. Sampling rates increased greatly (and are now at 100%), and the percentage of water achieving compliance has risen from 21% in 1998 to more than 95% in recent years *(28)*.

Fig. 9. Bathing water quality in Portugal: developments over time



Source: EC *(27)*.

A slight decrease in bathing water quality in coastal zones and a more marked decline in fresh waters was observed in the 2004 and 2005 bathing seasons, when the 10 new EU member states began to submit reports on their bathing waters. It is anticipated that, like the EU15, the new member states will need some time to implement the Directive fully.

Mandatory standards focus on levels of *E. Coli* and faecal coliforms, which are used as indicators of faecal contamination. Illness may, however, be caused by other pathogens, so that compliance does not necessarily indicate that waters are risk-free. Several studies have found that faecal streptococci (another indicator of faecal pollution) is a more useful indicator of the likelihood of infection; Kay et al suggest that more than 40 colony-forming units per 100 ml of seawater pose a significant risk of gastroenteritis *(29)*. The new EU Bathing Water Directive (2006/7/EC) lays down mandatory limits for intestinal enterococci, in an attempt to reduce the likelihood of illness *(3)*.

POLICY RESPONSE

Many international agreements recognize access to water and sanitation as basic human rights. Over 90% of people in the Region have access to an improved water source, but in many countries (particularly the CIS), the proportion with such access is considerably lower.

The seventh MDG aims to "halve, by 2015, the proportion of people without sustainable access to safe drinking-water and basic sanitation". The fourth MDG, to reduce child mortality, is also of relevance as childhood diarrhoea, most commonly caused by poor access to water and sanitation, is a major cause of death and illness *(30)*. While meeting the seventh MDG continues to be a big challenge for some European countries, there are improvements: Azerbaijan and Turkey, for example, are on target to meet the goal *(30)*.

Greater effort should be put into the development strategies to bring international commitments into national policies in some areas. Similarly, there are challenges to the introduction of effective reforms at local level, particularly a lack of resources. This notwithstanding, many positive examples exist throughout the Region, and these should be used as examples of good practice.

UNITED NATIONS ECONOMIC COMMISSION FOR EUROPE (UNECE)/ WHO PROTOCOL ON WATER AND HEALTH

Signatories to the UNECE/WHO Protocol on Water and Health *(31)* have agreed to establish and maintain comprehensive national and/or local surveillance and early warning systems to prevent and respond to water-related diseases. They have also agreed to promote international cooperation to establish joint or coordinated systems for surveillance and early warning systems, contingency plans, and responses to outbreaks and incidents of water-related diseases and significant threats of such outbreaks.

By adopting the Protocol, the signatory countries have agreed to take all appropriate measures to achieve:

- adequate supplies of wholesome drinking-water;
- adequate sanitation of a standard that sufficiently protects human health and the environment;

- effective protection of water resources used as sources of drinking-water, and their related water ecosystems, from pollution from other causes;
- adequate safeguards for human health against water-related diseases;
- effective systems for monitoring and responding to outbreaks or incidents of water-related diseases.

To date, 21 countries have ratified the Protocol on Water and Health: Albania, Azerbaijan, Belgium, Croatia, the Czech Republic, Estonia, Finland, France, Germany, Hungary, Latvia, Lithuania, Luxembourg, Norway, Portugal, the Republic of Moldova, Romania, the Russian Federation, Slovakia, Switzerland and Ukraine.

At their first meeting, the parties to the Protocol on Water and Health reviewed and adopted the work programme for 2007–2009 and agreed on legal documents, particularly the Rules of Procedure and the compliance regime. In a formal joint Declaration, parties and signatories reaffirmed their commitment to the Protocol's goal of providing access to safe water and adequate sanitation to all, thus making the Protocol a key instrument for ensuring access to safe water and for reaching the water-related MDGs (particularly Target 10 of the seventh MDG).

SURVEILLANCE

Surveillance is an essential part of public health practice and is vital in the control of waterborne disease. However, infectious disease surveillance alone is inappropriate unless it is linked to well-defined aims and objectives. It is extremely likely that the true incidence of diarrhoea caused by poor water (both drinking-water and exposure to recreational water) and sanitation in the population is underestimated since surveillance data do not record minor, self-limiting illnesses which are rarely reported to medical practitioners. Surveillance systems only have value if they lead directly or indirectly to the improvement of the health of the people surveyed. The aims of surveillance include, but are not limited to:

- determining important causes of illness, disability and death
- identifying vulnerable groups
- detecting outbreaks or epidemics.

Improved surveillance is a requirement of Article 8 of the Water and Health Protocol, which requires that:

> *The Parties shall each, as appropriate, ensure that comprehensive national and/or local surveillance and early-warning systems are established, improved or maintained which will identify outbreaks or incidents of water-related disease or significant threats of such outbreaks or incidents, including those resulting from water-pollution incidents or extreme weather events (31).*

At the second meeting of the signatories in 2003, priority diseases were designated for target-setting and reporting. The diseases of primary importance were: cholera, bacillary dysentery (Shigellosis), enterohemorrhagic *E. Coli*, viral hepatitis A and typhoid fever. Diseases and infections

of secondary importance were identified as campylobacteriosis, cryptosporidiosis, *Giardia intestinalis* and noroviruses. Signatories also recognized that there was a lack of coordination at the European level in surveillance of water-related diseases.

Many countries have no legal obligation to report specifically on waterborne diseases but do this as part of other reporting programmes. In many countries, surveillance is still primarily focused on drinking-water. However, surveillance of recreational water, including swimming pools, and coastal and fresh water bathing areas is gaining in importance *(14,32)*.

SMALL WATER SUPPLIES

It is estimated that as many as 50 million Europeans receive drinking-water from small or very small supplies *(33)*. There is a lack of information on the quality of water from these sources, as supplies that serve less than 50 people or produce less than 10m^3/day (very small water supplies) are not covered by the EC Drinking-water Directive *(34)* unless the water is supplied as part of a public or commercial activity, and no reporting is required.

Microbiological contamination of small water supplies is a serious problem and in many countries can pose a significant health risk which is generally underestimated (see Box 5). Most countries have very limited information on the number of small supplies and the number of people served by such supplies. There is no harmonized approach within Europe on the legal coverage.

Box 5. Contamination of private water systems in western Europe: a case study

A number of countries have identified small community water supplies as a critical issue for development and health, which requires further attention if the water-related MDGs are to be met. The MDGs focus on developing countries. Even in the developed world, however, small community supplies are those most susceptible to contamination and breakdown and pose a consistent health risk.

About 1% of the population of the United Kingdom obtains water from a private water supply, and despite being subject to the same regulatory standards as public water supplies, outbreaks of disease are common *(35)*. Between 1970 and 2000 there were 25 reported outbreaks of infection associated with private water supplies in England and Wales. The main pathogen, *Campylobacter,* was implicated in 52% of outbreaks *(36)*. The most common feature of these outbreaks was the transient nature of the affected populations. Other common features were a lack of treatment of the supply, the presence of grazing livestock, and slurry-spreading and heavy rains preceding or concurrent with the outbreak.

Schets et al *(37)* describe the quality of drinking-water from 144 private water supplies in the Netherlands. *E. Coli* O157:H7 was isolated from 2.7% of the samples which otherwise met the drinking-water standards. The *E. Coli* O157-positive samples were located on campsites in agricultural areas with large densities of grazing cattle, suggesting that cattle may be the source of contamination.

In many countries there is no national legislation and in general private well owners are responsible for assessing the quality of the water. Frequently, this is not carried out due to financial restraints and/or a lack of knowledge or sampling staff. An example of the potential size of the problem is provided by the Czech Republic, where analyses of water samples from 1700 public and 3300 private wells carried out by the Public Health Services found that water in 70% of the wells was unsafe to drink *(38)*.

The implementation of water safety plans based on knowledge and management of risks is a significant step forward in the improvement and protection of water supplies in general, including of small water supplies.

EU BATHING WATER DIRECTIVE

The protection of public health from contaminated bathing water is the aim of Council Directive 76/160/EEC on the quality of bathing water *(2)*. The public is very concerned with the quality of bathing water, whether the sea, rivers or lakes. Safe, clean water is considered a major indicator of environmental conditions and is an important consideration in tourism.

The Directive sets binding standards for bathing water throughout the EU, with the exception of water intended for therapeutic purposes and water used in swimming pools. It lays down the minimum quality criteria for bathing water, setting mandatory and more stringent guide values for certain physical, chemical and microbiological parameters. The minimum sampling frequency and method of analysis or inspection of samples are also specified. A member state's reporting compliance gives an indication of the efficiency of its environmental health surveillance system.

Over the last 15 years, the mean value for sampling rate compliance has remained high for the EU15 countries. At non-compliant sites, the establishment of adequate monitoring systems and taking of action to improve water quality has considerably improved bathing waters. This was seen for new member states when they submitted data from insufficiently sampled, and consequently non-compliant, sites for the first time.

Despite the high level of compliance with this Directive, an improved understanding of public health issues surrounding bathing water quality have led to it being repealed and replaced by Directive 2006/7/EC *(3)*. This Directive reduces the parameters for analysis from the current 19 to just two microbiological indicators of faecal pollution (intestinal *enterococci* and *E. Coli*), complemented by visual inspection for algal blooms or oils (Article 9 contains the following parameters: macro-algae, marine phytoplankton, tarry residues, glass, plastic, rubber or any other waste). The simplification resulted from the recognition that faecal material from inadequate sewage treatment or from animal waste is the primary health threat to bathers; it should result in a considerable cost reduction without compromising bathers' health.

The classification of water will be based on a three-year trend (Art. 4(2c): normally four-year but the use of three years of data is permitted) instead of a single year's results as at present, which will remove the skewing effect of one-off results. Four levels of classification will be established: poor, sufficient, good and excellent. Member states should also profile bathing waters, giving, among other things, a description of the area concerned, any sources of pollution, and the location of water monitoring points. Information on the classification and description of the bathing water must be available to the public on clear signs near the area concerned, as must notification of any relevant pollution incidents. Information must also be accessible over the internet.

BATHING WATER MANAGEMENT

At present there is no European legislative framework or policy on bathing water management. WHO has developed *Guidelines for safe recreational water environments (17,32)*, which are intended to provide a basis for setting standards. Vol. 1, concerning coastal and fresh waters, provides a review and assessment of the health hazards encountered during the recreational use of coastal and fresh water environments *(17)*.

The management of bathing water has the overall goal of reducing the risks encountered during use of recreational water. The first steps in effective management are the classification of water as recreational or bathing water and the identification of existing and potential hazards. Following this, the identified hazards must be monitored, controlled, or preferably, removed and/or prevented where possible. Hazards include, but are not limited to, drowning; injury; water quality with regard to microbiological, chemical and physical agents; beach sand quality; exposure to the elements; and aesthetic aspects. Since hazards can affect health even after a short exposure, the standards, monitoring and implementation must allow preventive or remedial action to be taken within an appropriate time frame. Ideally, the management of bathing water environments should be based on procedures that result in a continuously safe environment. A management framework should address the areas of compliance and enforcement, intervention and control measures, information dissemination, public awareness and health advice.

WHO GUIDELINES FOR DRINKING-WATER QUALITY

WHO's *Guidelines for drinking-water quality (39)* are the international reference point for standard-setting and drinking-water safety. To ensure the delivery of safe drinking-water, it is important that water safety objectives are established that take into account exposure and risk, in order to make informed and balanced judgments about the level of health protection to be provided. To assist in this process, WHO advocates the development of water safety plans (WSP). A WSP is the most effective way of ensuring that a water supply is safe for human consumption and that it meets health-based standards and other regulatory requirements. It is based on a comprehensive risk assessment and risk management approach to all the steps in a water supply chain from catchment to consumer.

The primary objectives of a WSP in protecting human health and ensuring good water supply practice are the minimization of contamination of source waters, the reduction or removal of contamination through appropriate treatment processes and the prevention of contamination in the distribution network and the domestic distribution system. These objectives are applicable to all water supply chains, irrespective of their size or complexity. The water supplier is the key player in a WSP, but other stakeholders have significant roles.

Essentially, a WSP has three key components.

(i) A system assessment determines whether the water supply chain as a whole can deliver water of a quality that meets health-based targets. It identifies potential hazards in each part of the water supply chain, the level of risk presented by each, and the appropriate measures to control the identified risks to ensure that the water supply is safe, standards and targets are met, and human health is protected.

(ii) Operational monitoring of an appropriate nature and frequency at an appropriate point in the water supply chain is defined for each control measure identified, and implemented from the system assessment to ensure that any deviation from the required performance is rapidly detected.

(iii) Management arrangements are documented, including details of the system assessment, operational monitoring and validation monitoring, and a description of the action to be taken in normal operation and incident conditions when there is, or there is a risk of, non-compliance with a standard or target value or failure to meet an operational

control, or there is a potential risk to human health. Such action should include appropriate investigations, remedial action in the form of improvement programmes, reporting and communication.

When a WSP is developed, existing water supply management practices generally form an integral part. However, these practices might not include hazard identification and risk assessment and management, and might not be tailored for each specific water supply chain. The development of a WSP for each water supply chain may be difficult for small supplies, and a suitable generic small supply WSP, with guidance on application to individual systems, could be used. For all other water supply chains, however, a WSP should be developed specifically for each system. WSPs vary in complexity depending on the water supply chain. Comprehensive guidance on developing a WSP can be found in the Guidelines for drinking-water quality website and Dawson et al *(39,40)*.

In England and Wales, 10 out of 26 water suppliers are moving towards implementing WSPs, with many considering improving conditions in the catchment rather than investing in treatment processes. A shift in risk management approaches requires close cooperation between the key stakeholders, including the agencies responsible for the regulation of drinking-water quality and source protection. WSPs are now beginning to emerge as a potential key element of drinking-water regulation within national standards and regional frameworks. The EC also supports the development of WSPs as the way forward for the EC Drinking Water Directive *(34)*, which is entering a period of revision. Although a new Directive is unlikely before 2009, adoption of the principles and practice encompassed in WSPs is thought to be encouraged.

EC WATER FRAMEWORK DIRECTIVE

The Water Framework Directive is the most substantial piece of EC water legislation to date. It requires all inland and coastal waters to reach "good status" by 2015. It will do this by establishing a river basin district structure within which demanding environmental objectives will be set, including ecological targets for surface waters. The Directive introduces an innovative, holistic approach to the management of water quality *(41)*.

OVERALL PROGRESS

RPG I aims to prevent and significantly reduce the morbidity and mortality arising from gastrointestinal disorders and other health effects, by ensuring that adequate measures are taken to improve access to safe and affordable water and sanitation for all children. Steps towards this goal are being made in some areas, but in many parts of the Region, particularly the east, there is still a lack of access to safe water and sanitation. The burden of water-related disease in children remains significantly higher in the eastern part of the Region compared to the western part.

In many countries in the Region, a substantial proportion of the population has no access to safe drinking-water. Of particular concern is the quality of drinking-water from small supplies and in rural areas. Further, as more people move into urban areas, maintaining drinking-water coverage becomes a greater challenge. Sanitation coverage remains low in many of the CIS countries, and the situation is worse in rural areas. Consequently, the risks for children's health and the environment continue to grow in certain parts of the Region. Considering this, there are two major issues which must be addressed if RGP I and the MDGs are to be met: the disparity between rural and urban coverage, and the continuing growth in the urban population.

On a European and national scale, implementation of the Water Protocol and of relevant EC legislation is aimed at improving the situation. The Water Protocol is the only pan-European instrument in the Region. As seen in many examples in the Region, some of which were illustrated in this report, the monitoring of compliance with relevant legislation and the taking of appropriate action is essential if the situation is to be improved. Compliance with legislation does not, however, necessarily mean improved health, and water that meets regulatory standards may still present a health risk. Further, much information collected in the Region is not used, and improved reporting of data would allow additional improvements.

Positive steps to improve the quality of bathing waters in the EU have been taken. The new EU Bathing Water Directive *(3)*, which takes account of the results of important epidemiological studies, was adopted in 2006 and sets higher standards for the management of bathing waters. The quality of coastal bathing waters has generally improved since 1992, although fresh water bathing quality needs to be improved in some areas, especially in the eastern part of the EU.

The investigation of disease outbreaks is important, and international cooperation and surveillance of infectious disease could be improved. MacLehose et al *(35)* highlighted a number of weaknesses in current systems: failure to identify and report cases within countries, failure to inform other countries, inadequate preparedness planning, inadequate funding arrangements, failure to link information to action, failure to provide the capacity for international outbreak investigations, and failure to share information.

In conclusion, despite a number of improvements, there is still some way to go before the aim of RPG I is met throughout the Region. However, it is recognized that the costs of interventions may be high, and many countries may have to make choices, based on costs and health effects, as to which standards to meet initially.

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Chapter 2. Be mobile and active – but safely![14]

RPG II

We aim to prevent and substantially reduce health consequences from accidents and injuries and pursue a decrease in morbidity from lack of adequate physical activity, by promoting safe, secure and supportive human settlements for all children.

Children's Environment and Health Action Plan for Europe

KEY MESSAGES

Unintentional injuries and obesity are a considerable public health problem for European children.

- In early childhood, unintentional injuries are more prevalent in and around the home environment than in other locations, causing nearly 75 200 deaths annually in the Region. This highlights the importance of safe housing and playgrounds.
- As children grow, road traffic becomes a more important cause of injuries. Road traffic injuries (RTI) are the leading cause of death in the group aged 5–29 years, with 32 000 fatalities annually in the Region. About half of the victims younger than 15 years die as pedestrians, while those aged 15–24 years predominantly die as car or motorcycle users. Thus, road traffic safety becomes one of the most important health determinants, not only as a cause of injury but also influencing physical activity.
- Children themselves report low levels of physical activity in most of the Region. The lack of physical activity is one of the determinants of obesity, which in many countries affects more than 15% of boys.
- The creation of safer and healthier environments where children move and play without risks has the potential to produce significant health gains, not only in children and adolescents but for the total population.

There is an increasing understanding of how these issues – accidents, physical activities and obesity – are interrelated, and that a new approach is needed to address them. While it is urgently necessary to adopt a policy response to this challenge, it should be recognized that there will be a time lag between action and positive health outcomes.

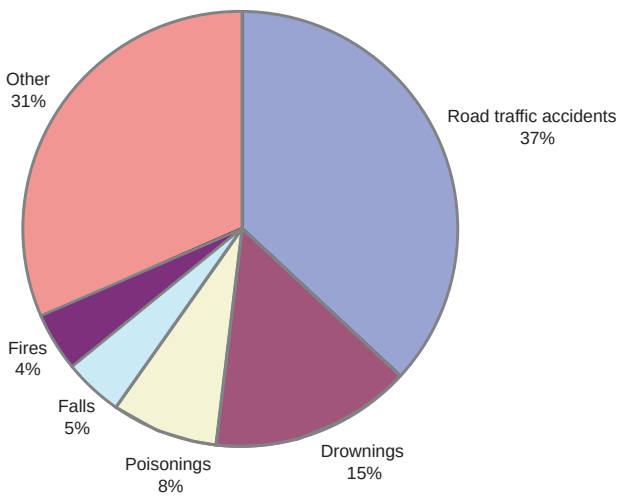
WHY ARE INJURIES AND PHYSICAL INACTIVITY PUBLIC HEALTH PROBLEMS?

In the European Region injuries are the leading cause of death in children after the first year of life – with 75 159 fatalities *(1)*. Deaths are only the tip of the iceberg: it is estimated that for each child dying from unintentional injuries in the home or at leisure, there are 160 hospital admissions and 2000 emergency department visits *(2)*. By this estimate, there would be around 4.5 million hospital admissions and 56 million emergency department visits for child injuries in the Region annually.

[14]By Sara Farchi and Laura Camilloni, based on ENHIS fact sheets.

The burden of unintentional injuries in childhood results in large costs to society through pain, suffering, loss of time and productivity, health care costs, and inconvenience to the victims and their families *(3,4)* (Fig. 10). For RTI alone, these costs are estimated to be in the order of 2% of gross domestic product. More severe forms of injury can result in substantial medical treatment, the need for rehabilitation, ongoing disability and even death. In the Netherlands in 1999, for example, the costs of health care for injuries over a lifetime were estimated to be € 1.15 billion *(5)*.

Fig. 10. Proportion of deaths from unintentional injuries by cause in the group aged 0–19 years, WHO European Region, 2002



Source: Revised global burden of disease (GBD) 2002 estimates *(4)*.

The hazards most likely to lead to injury change as a child grows up. During their first years of life, children spend the majority of their time at home, in kindergartens and in playground areas. This, combined with their natural curiosity, explorative behaviour, and limited coping skills and capacity to follow instructions, exposes them to a disproportionate risk of drowning, accidental poisoning, falls, scalds and burns. In 0–4-year-olds, 81% of accidental deaths and 85% of DALYs from injuries are a consequence of non-traffic-related unintentional injuries *(6)*.

As children grow into adolescence and adulthood, exposure patterns change, RTIs and violence contributing to a greater proportion of injuries (Table 2). RTIs increase sharply with age, and it has been estimated that in 2001 there were 1750 deaths attributable to RTIs in the Region in 0–4-year-olds, 4400 in 5–14-year-olds and 12 150 in 15–19-year-olds *(6)*.

Table 2. Distribution of deaths and DALYs from injury by external cause and age group in the WHO European Region

External cause	Percentage of injuries					
	Deaths			DALYs		
	0–4 years	5–14 years	15–19 years	0–4 years	5–14 years	15–19 years
RTIs	13.5	28.1	26.0	9.7	15.6	22.6
Unintentional injuries	80.7	56.3	36.0	84.7	70.5	43.6
Violence	5.8	15.6	38.0	5.6	13.9	33.8

Note. Unintentional injuries include poisonings (E850–869), falls (E880–888), fire (E893–899), drowning (E910), and other unintentional injuries (E800–807, E820–848, E870–879, E900–909, E911–949). Violence includes self-inflicted injuries (E950–959), violence (E960–969), war (E990–999), and other intentional injuries (E970–978).
Source: Valent F et al., 2004 *(6)*.

The fear of road traffic injuries also acts as a deterrent, discouraging parents from allowing their children to engage in daily physical activity such as walking, cycling and playing outside. This may contribute to overweight and obesity, for which physical activity, along with an unhealthy diet, is a major determinant. In the Region only 34% of children report undertaking physical activity at a level that meets the current guidelines *(7)*. At the same time, the prevalence of excess weight and obesity in childhood in the Region is high and increasing rapidly, affecting up to one third of 13- and 15-year-olds *(8)*. Neither unintentional injuries nor opportunities for physical activity are evenly spread across populations, and there are wide socioeconomic differences *(9–11)*. Higher rates of injury and lower rates of physical activity are seen as socioeconomic conditions worsen, with differences evident both between and within countries. Standardized death rates (SDR) from non-traffic-related unintentional injuries in the Region, by GDP, for children and adolescents aged 0–24 years are shown in Fig. 11. There are wide differences across the Region, with the lowest rates in the most industrialized countries and the highest in central and eastern Europe. A cluster of countries belonging to the former Soviet Union shows the highest mortality rates for the same GDP compared to other countries.

Socioeconomic inequalities reduce access to safe environments and opportunities for healthy physical activity. It also appears that inequalities influence the severity of injuries *(12)*. Possible explanatory factors could be that socioeconomically deprived families are more likely to live in unsafe neighbourhoods; may not always have the resources to allow adequate supervision of their children; may be less aware of or able to afford, safety equipment; and may have less access to high-quality health care services. Recent research indicates that children aged under 15 years from the most deprived backgrounds face more than 20 times the risk of death as pedestrians, cyclists and in fires compared to more privileged children and adolescents. This suggests that the most deprived children are more exposed to dangerous road traffic, and may reflect that the most deprived children live in poor housing *(13)*.

Overall, the reduction of injuries and increase in physical activity, especially with regard to children and adolescents from the most vulnerable social groups, are important public health challenges that should be addressed through multisectoral evidence-based action.

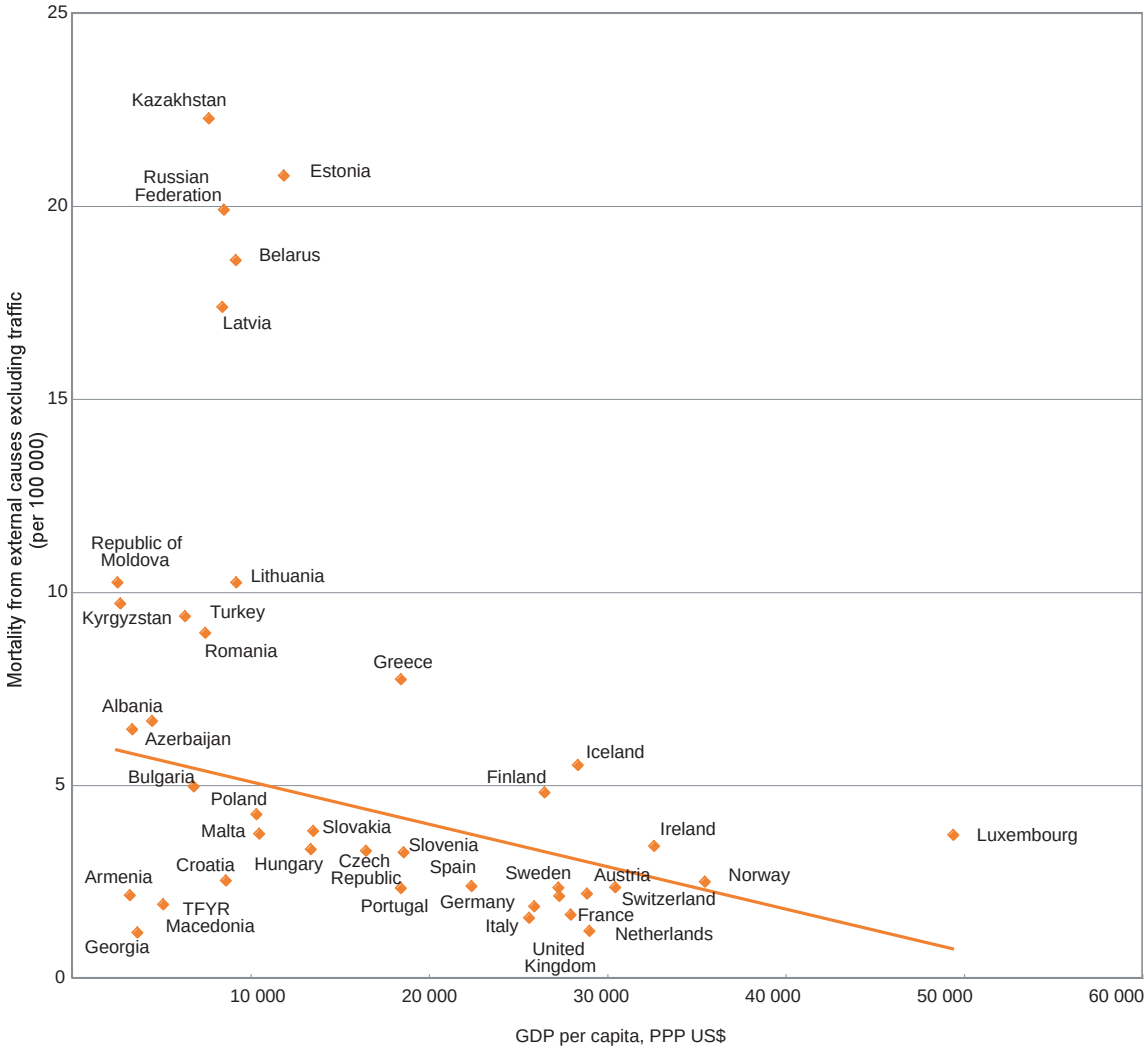
EARLY CHILDHOOD: KEY RISKS, CAUSES AND PREVENTION OF NON-TRAFFIC-RELATED UNINTENTIONAL INJURIES

Unsafe environments for children are associated with increased risks of drowning, burns, falls and poisoning. Factors that may make an environment unsafe include home and school building design, furnishing, products such as baby walkers, storage and packaging of toxic products, and a lack of childproof containers for drugs, cleaning products and other chemicals.

The Health Behaviour in School-aged Children (HBSC) study *(7)*, a cross-national survey conducted in collaboration with the Regional Office in 35 countries, showed that in 2002, 45% of young people aged 11–15 years reported at least one medically treated injury during the previous 12 months; of these, 50% reported the occurrence of two or more injuries and 5% reported four or more injuries. In each country, more boys than girls had had one or more medically treated injuries *(7)*.

The relative contribution of drowning, poisoning, falls and burns to all deaths from these causes in 0–24-year-olds is shown in Fig. 12. Drowning is the most frequent cause of death, but falls are the dominant cause in the majority of the industrialized countries, in particular in Austria, Italy and Switzerland. In the countries of eastern Europe, the Caucasus and central Asia, a large proportion of the deaths are due to poisoning – as many as 70% in Estonia.

Fig. 11. Mortality in the group of young people aged 0–24 years from non-traffic unintentional injuries and GDP per capita, WHO European Region



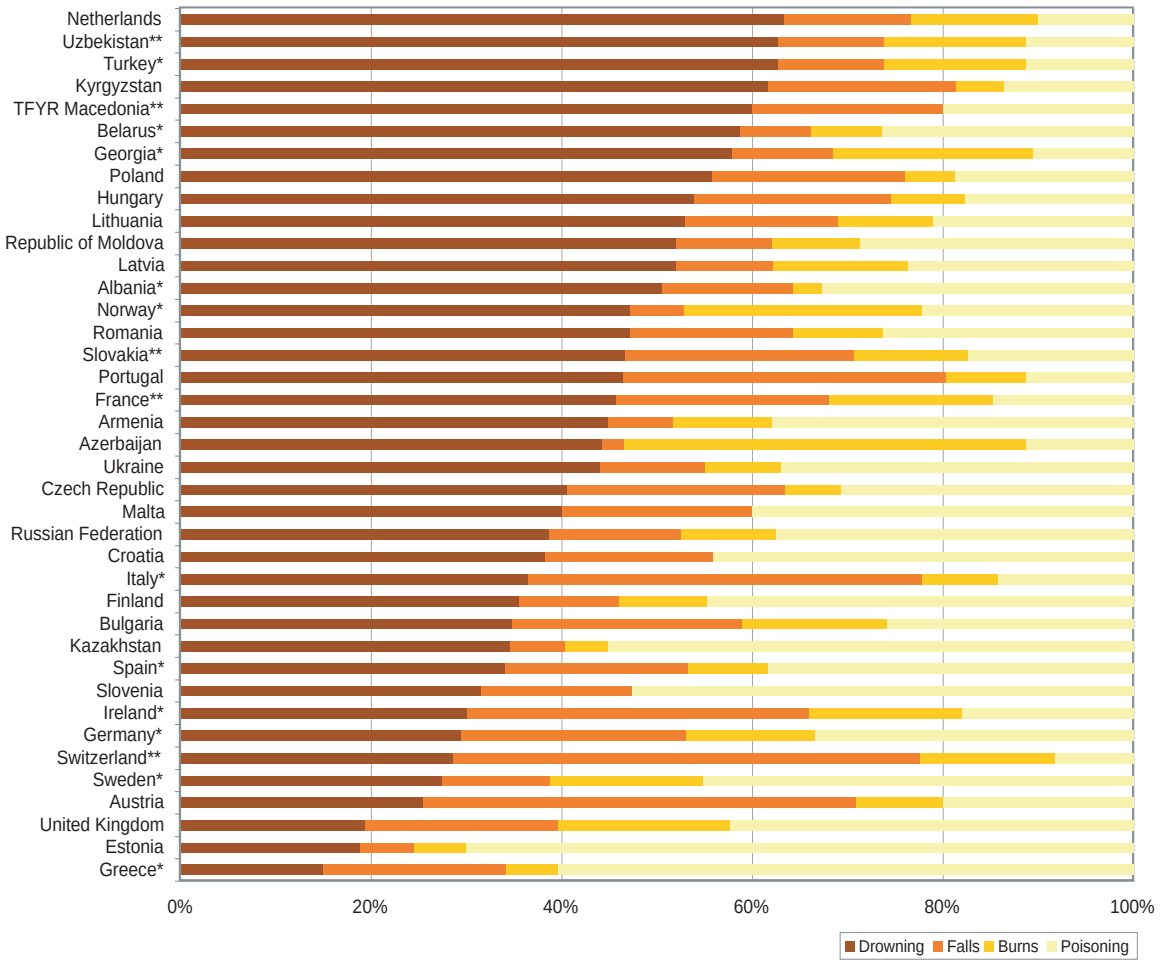
Notes. TFYR Macedonia = The former Yugoslav Republic of Macedonia.
Data for 2002 or latest available. Unintentional injuries include drowning (ICD 9 BTL: E521; ICD 10: W65 –W74), falls (ICD 9 BTL: E50; ICD 10: W00 – W19), burns (ICD 9 BTL: E51; ICD 10: X00 – X09), and poisoning (ICD 9 BTL: E48; ICD 10: X40 – X49).
Source: UNECE *(14)*, WHO mortality database *(15)*.

DROWNING

In many countries, drowning is the leading cause of mortality in children aged 1–4 years. Rates are highest in the former Soviet Union and Baltic countries (Fig. 12). The proximity of water is an important risk factor in different settings, particularly when children have unsupervised access to it, including unfenced pools or uncovered wells, and living near rivers, canals, ditches, dams and lakes *(16)*.

Boys are at greater risk of drowning than girls, probably because they swim more often and engage in riskier behaviour *(17–19)*. Children from lower socioeconomic groups tend to be less good at swimming than those from higher groups, resulting in an increased risk in the less well-off *(16)*.

Fig. 12. Proportion of deaths the group aged 0–24 years from selected external causes, excluding traffic, by country in 2002



Note. TFYR Macedonia = The former Yugoslav Republic of Macedonia.
* Data for 2001
** Data for 2000
Source: WHO mortality database *(15)*.

Measures to prevent drowning include the fencing of pools and other water areas, covering wells, better supervision of children in baths and swimming areas, and the provision of lifeguards and water flotation devices at swimming areas. Other useful measures include the prompt draining of bathtubs and training in swimming and water safety *(20,21)*.

POISONING

Children who have access to harmful substances due to storage in non-childproof containers in non-secured cupboards and within easy reach are at greater risk of being poisoned. Effective preventive measures include the use of child-resistant closures, packaging systems for drugs, safer storage and restricted availability of dangerous substances *(22,23)* (Box 6).

Box 6. Programme to reduce accidental poisoning in the Netherlands

Reducing the incidence of accidental poisoning by using child-resistant packaging for chemicals and drugs was the main objective of a programme initiated in the Netherlands in 1981 *(24)*. The programme targets the one million children under five years of age in the Netherlands and is still running. It involves a partnership between the Ministry of Health, the Ministry of Welfare and Sport, the Consumer Safety Institute, the National Poison Information Centre and manufacturers.

Surveillance data on poisoning collected by the Consumer Safety Institute are used to advocate legislation. With the support of the Ministry of Health, the requirements for child-resistant packaging of certain hazardous substances have been included in a Commodities Act, following consultations with manufacturers and other stakeholders. Products are tested for the need for child-resistant closures by laboratory facilities established by the Inspectorate for Commodities. The range of substances included has been extended in response to the changing pattern of poisoning and the introduction of new chemicals.

This programme has been successful: a 1991 evaluation showed that it had led to a 50% decrease in the hospitalization of children for poisoning over a 10-year period. At the same time, educational campaigns in the 1990s resulted in further decreases. The Netherlands now has the lowest poisoning rate in the Region.

In older children, particularly adolescents, acute alcohol poisoning through binge drinking is an emerging problem in Europe. Moreover, alcohol is a risk factor for the death of children and adolescents from interpersonal violence, suicide, RTIs and other injuries *(25,26)*.

FALLS

Among children most fatal falls are in urban areas, usually from buildings or other structures, and unsafe building design represents a risk factor. Socioeconomic deprivation, poor supervision and unsafe playgrounds, as well as the use of babywalkers are associated with injuries in falls. Effective interventions include the use of appropriate ground surfaces and lower climbing areas in playgrounds *(9,27)*. As most fall injuries occur in or around the home *(28)*, the use of balcony protectors, stair-gates, safety catches, restrictors and safety glass in windows are effective preventive measures *(9,27)*.

BURNS

Burns are an important cause of injury and death in children and adolescents (Fig. 12) *(29)*. Burns and scalds can arise from fires and contact with hot surfaces and liquids, radiation, electricity and chemicals. House fires are associated with the highest mortality, while scalds arising from contact with hot liquids, usually in the kitchen, cause serious injuries and often disability.

Smoking and alcohol are important risk factors for house fires, for example when an intoxicated person falls asleep while smoking. Other risk factors are, however, not well understood, and more information is needed on the circumstances, agents and location of burns accidents *(16)*.

The use of smoke detectors, fire-resistant clothing and raised cooking surfaces have been shown to be effective *(27,30)*, with an 80% decrease in injury and death from fires in the total population as a consequence of the correct use of smoke alarms *(31)*. Other preventive measures include the use of safer cooking stoves, enclosing open flames or using fire guards, avoiding smoking in bed, encouraging the use of child-safe lighters, using safe building designs, and encouraging safety inspections to enforce regulations. Scalding can be prevented by lowering the temperature of water heater thermostats, by using safer cooking utensils, and by equipping the stove with a safety device (Box 7).

Box 7. Home safety check scheme, Gloucestershire, United Kingdom

In 1984, the county of Gloucestershire, United Kingdom, adopted a Home Safety Check Scheme *(32)* which aimed to reduce the number of injuries in the home. It targeted vulnerable groups: very young children (under 5 years old), the elderly (over 60 years) and people suffering from an illness or disability. Services offered by the scheme include home safety visits with a safety inspection of all electrical appliances (including electric blankets), a free smoke detector fitting service and provision of a wide range of children's safety equipment. The smoke detector installation service operates in partnership with the Gloucestershire Fire and Rescue Service and provides regular servicing (including free replacement alarm batteries). The scheme is operated with other agencies to enable safety equipment to be made available to disadvantaged families free of charge.

Full evaluation is under way, but the results of a self-reported behaviour study show that over 80% of participants found the visits useful and reported increased knowledge and safer behaviour.

POLICY ACTION

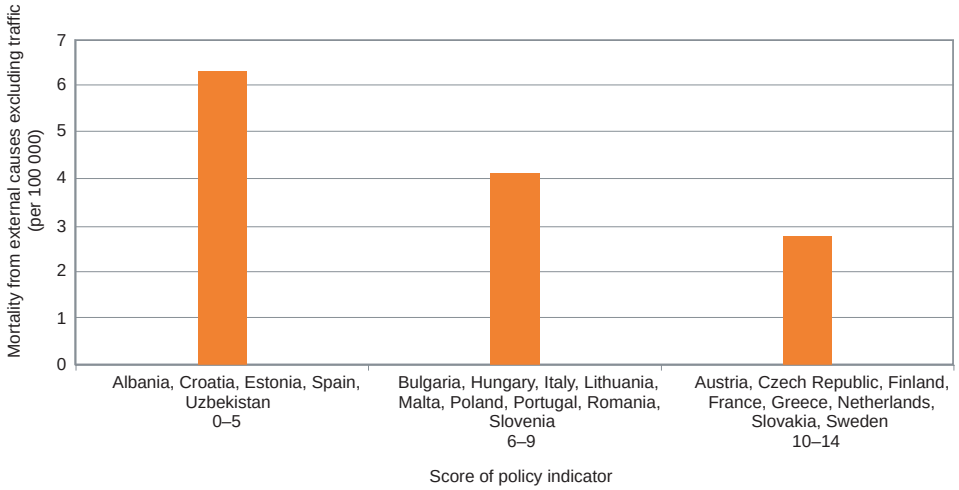
Guidance for the development of injury prevention strategies can be gleaned from the circumstances of an injury, including where it occurred; whether there was involvement of a product, building or environmental feature; and the activity engaged in at the time of injury. The vast majority of injuries reported by young people occur in the home; en route to, or at, school; in playgrounds and leisure and sports areas; and in rural/agricultural environments. A comprehensive safety strategy should include policy considerations, preventive countermeasures, institutional approaches, and the design and enforcement of regulations that contribute to the creation of safer physical environments *(22)*.

In the design of a strategy it should be recognized that some factors are more amenable to modification than others, particularly when the focus is on children. For example, in general the environments associated with injury in young people need to be made inherently safer, minimizing the need for children to adopt specific safe behaviour, since they cannot be expected to obey the rules. Innovative policies are required that promote safer home, school and sports-related environments. Such policies should include programmes to raise awareness and give guidance to those responsible for the maintenance and safety of these environments.

The most effective ways to create a safer environment involve the adoption and enforcement of legislation and regulations that have been shown to reduce injuries. In Europe, policies and legislation exist at various levels including municipal, national, EU-wide and WHO European Region-wide, but the level of enforcement varies greatly. At national level, legislative efforts to prevent non-traffic-related injuries in children vary in comprehensiveness and the effectiveness of their implementation; in some countries implementation and enforcement is particularly low. Analysis of the current situation in European countries participating in the ENHIS project showed that the most widely enforced and implemented action related to child-resistant packaging of dangerous chemicals and prohibition of the sale of fireworks to children. Legislation on child-resistant packaging of pharmaceuticals, working smoke detectors in all dwellings, a pre-set safe temperature for water heaters, barrier fencing for private pools, and the use of drawstrings in children's clothing was poorly implemented.

An indication of the health impact of successfully implemented and enforced policies is given in Fig. 13. Countries are grouped by a policy indicator score which reflects the extent to which 12 effective policies addressing unintentional injuries (excluding RTIs) are implemented, that is, those countries with a range of well-implemented policies are considered together, and so on. Policies cover different areas of prevention, such as school education, safety measures relating to chemicals and medicines or housing and children's environment safety standards. The figure suggests that there is an association between comprehensive policies that are well implemented and lower mortality in the group aged 0–24 years due to injuries. This association must be interpreted with some caution, however, as countries with the same indicator score do not necessarily have the same capability profile, which depends on the degree of enforcement of legislation, socioeconomic development, and policy-makers' trust and efforts *(33)*.

Fig. 13. Mortality in the group aged 0–24 years from non-traffic-related unintentional injuries and score of policy indicator, 2002

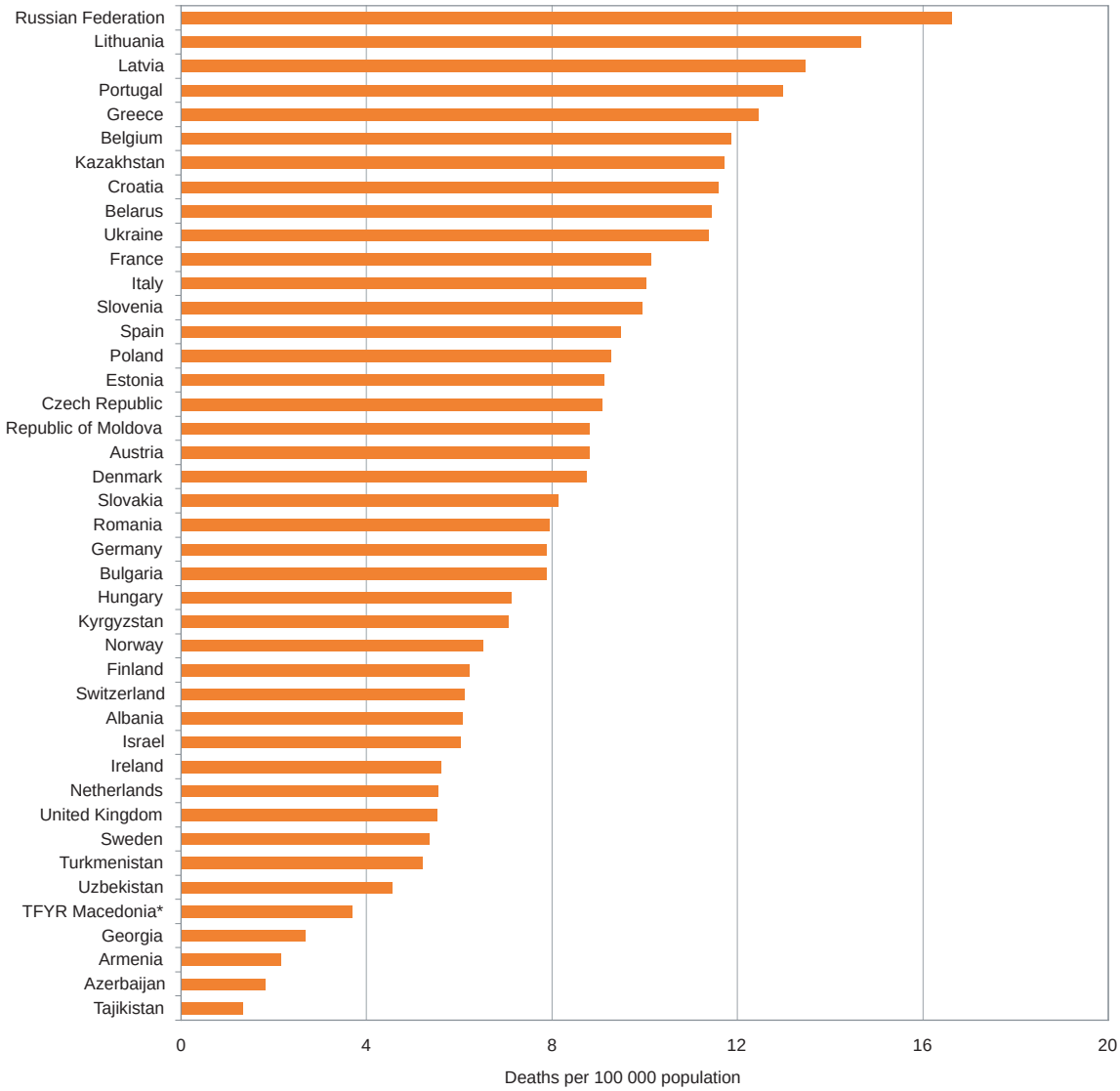


Note. Each policy covering several areas of prevention of non-traffic unintentional injuries has been ranked as follows: 0 – not implemented; 1 – partially implemented; 2 – implemented and enforced. The index is the sum of the ranks given to each legislative action and gives an overall indication about comprehensiveness and implementation of child-specific policies for injury prevention.
Source: ENHIS-2 project countries and countries volunteering data; WHO mortality database *(3,15,33)*.

FROM CHILDHOOD INTO ADOLESCENCE AND ADULTHOOD: ADDRESSING RISKS POSED BY RTIs

In the countries participating in ENHIS-2 there were 12 000 RTI fatalities involving children and young people (aged 0–24 years) in 2003 *(34)*. Standardized death rates for transport-related injuries in young people in the Region are shown in Fig. 14.

Fig. 14. Standardized death rates for road traffic injuries in children and young people aged 0–24 years in the WHO European Region: averages for 2002–2004 or the most recent three years



Note. *TFYR Macedonia = The former Yugoslav Republic of Macedonia.
Source: WHO health for all mortality database, January 2007 *(1)*.

The rates range from 1.4 per 100 000 in Tajikistan to 16.6 per 100 000 in the Russian Federation. In general, RTI child mortality rates are highest in the countries of the former Soviet Union and lower in countries in the western part of the Region, particularly in the Netherlands, Sweden and the United Kingdom (Fig. 14). Some countries, such as the Caucasian countries, report very low mortality rates. These results may be related to socioeconomic factors, proportionally fewer motor vehicles, and in part to poorer reporting *(34)*.

Children and adolescents are particularly vulnerable to RTIs due to their limited capacity to concentrate on traffic. They are considered particularly vulnerable when motor traffic is heavy or fast, visibility is limited, or a driver's attention is diverted. This may be reflected by the fact that in the group aged 0–14 years, nearly 50% of deaths due to RTIs involve child pedestrians. In contrast, road deaths among 15–24-year-olds are primarily in cars (59%) or motorcycles (19%) *(35)*.

Young drivers are a high-risk group as they lack maturity and driving experience, are less able to identify hazards, and are more likely to behave in a risky fashion such as speeding. Teenagers driving alone are far more likely to cause crashes than those driving in the presence of an adult, and those driving with teenage passengers are more likely to cause crashes than those driving alone. Driving after drinking alcohol increases the likelihood of crashes with severe or fatal injuries to the driver *(36)*.

Accidents in which young drivers are over-represented include single vehicle accidents; accidents related to loss of control, excessive speeding, alcohol and drugs or fatigue; and accidents occurring at nighttime and weekends. Young drivers are also involved in far too many accidents in which seat belts are not used and that involve young passengers *(37)*.

A number of risk factors for RTIs have been identified *(38)*. These can be classified according to four axes:

(i) factors influencing exposure to risk (socioeconomic factors, gender inequalities, high speed motorized traffic mixed with vulnerable road users, etc.);

(ii) risk factors influencing crash involvement (excessive speed, use of alcohol, drugs, substances, fatigue, etc.);

(iii) risk factors influencing the severity of the crash (non-use of safety devices such as helmets or seat belts, use of alcohol or substances, excessive speed, etc.);

(iv) risk factors influencing the post-crash outcome of injuries (delay in detecting the crash, fire, difficulty in rescuing and extracting people from vehicles, lack of appropriate pre-hospital care, etc.).

These should be borne in mind when road safety strategies are developed.

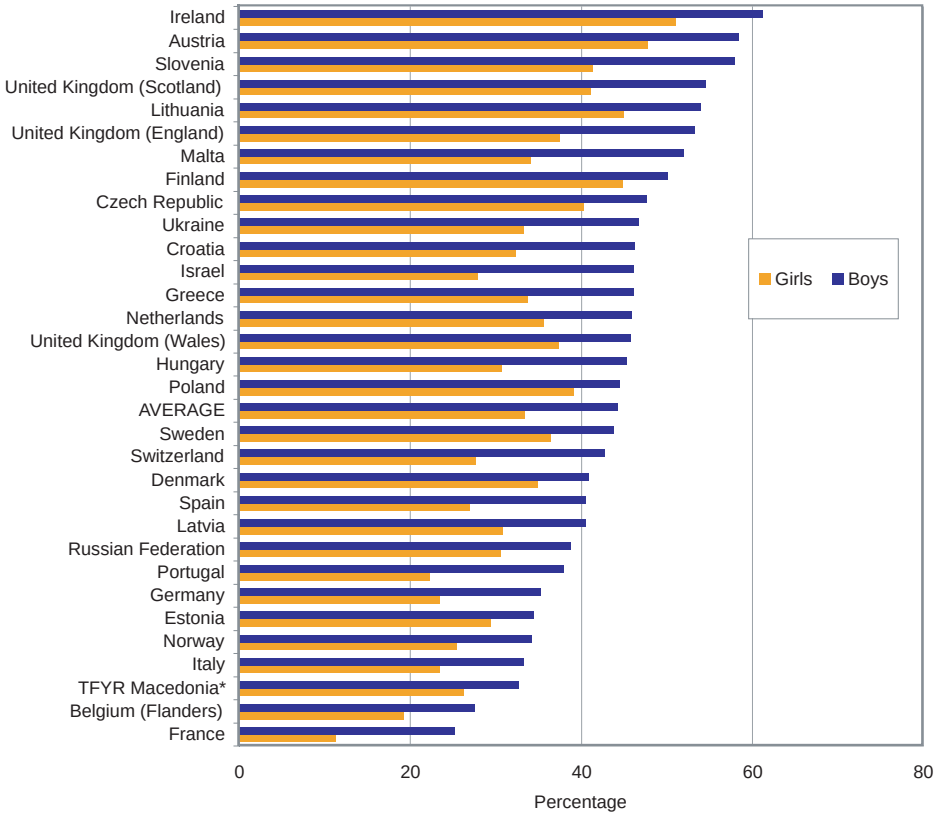
More than 50% of journeys undertaken by car are shorter than five kilometres and 30% are shorter than three kilometres. This means that walking and cycling may often be feasible alternative forms of transport, at times even for adults travelling with children. However, walkers and cyclists are discouraged in many European cities by fear of traffic injuries and hostile road environments, with high traffic volume and lack of infrastructure for vulnerable road users. Investments in the development of safe pedestrian and cycling environments are likely to be returned through an increase in children choosing independent and safe physical activity. Walking and cycling every day could become one of the pillars of the strategy to increase levels of physical activity, which would have the benefit of reducing the risk of obesity and chronic diseases. In other words, the risk of RTI has a bearing on levels of physical activity and obesity.

PHYSICAL ACTIVITY AND OBESITY

Physical activity benefits young people's health by improving aerobic fitness; positively affecting blood pressure, blood lipids and skeletal health; and benefiting psychological well-being, among other things. European guidelines suggest that young people should take 60 minutes or more of at least moderate intensity physical activity on five or more days a week, and a part of this could be achieved by walking or cycling to school (39). Beyond this, physical activity provides more than direct health benefits; it also improves the well-being of communities, offers protection to the environment and invests in future generations.

Despite the benefits of physical activity, the results of the Health Behaviour in School-aged Children (HBSC) study in 2001/2002 showed that, in all participating countries, a substantial proportion of young people aged 11, 13 and 15 years did not meet recommended guidelines for physical activity *(40)*. Overall, one third of young people (34%) reported that they undertook sufficient physical activity (according to the current guidelines), but there was wide variation. For example, sufficient activity was undertaken by 25% of 11-year-old boys in France compared to 61% in Ireland (Fig. 15). It appears that boys are more likely to meet the guidelines than girls, and those levels of physical activity decrease as young people become older, particularly among girls.

Fig. 15. Percentage of 11-year-olds undertaking sufficient physical activity[a] in selected countries in the WHO European Region, 2001/2002



[a]Sufficient physical activity is defined as being physically active for a total of at least 60 minutes per day.
Note. *TFYR Macedonia = The former Yugoslav Republic of Macedonia.
Source: Health Behaviour in School-aged Children study, 2001/2002 *(7)*.

Environmental factors supporting physical activity, such as the presence of green areas, safe infrastructure for cyclists and pedestrians, educational programmes and the inclusion of sport as a part of the school curriculum, together with the presence of recreational areas and facilities for physical activity, are linked to the proportion of children who are active (Boxes 8 and 9). The popularity of a sport is a factor that contributes to the number of active children.

Box 8. WHO Move for Health Initiative

The WHO Move for Health Initiative *(41)* is intended to promote sustained national and local physical activity initiatives, policies and programmes and thereby increase regular participation in physical activity across population groups and settings. A number of European countries are promoting the Initiative through partnerships involving contributions from various multidisciplinary institutions. The main aim is to create supportive environments, as evidence shows that environments conducive to physical activity encourage more people to take exercise and to achieve the recommended 30 minutes each day of physical activity.

National governments and local/municipal authorities have been identified as having a major role and responsibility in the planning and shaping of physical and social environments so as to enable and encourage increased participation in physical activity and sport by all. The realization of this requires the involvement and commitment of a number of sectors and actors, including health, sport, education, media, culture, transport, local government/municipalities and the economic planning sectors, as well as related nongovernmental organizations and relevant businesses. Sound policies and legislation are essential for reaching this goal.

Specific national and local/municipal legislation and measures should be enacted in order to create parks, allocate safe indoor and outdoor facilities and promote active transport initiatives, especially through walking, cycling, climbing stairs and the greater use of public transport. Further, the Initiative intends to facilitate the use of existing local sport facilities by community groups, and strengthen appropriate physical activity and sport for children and young people in and out of school, including the development of safe routes to school. Another important step in the Initiative is to raise awareness of the benefits of physical activity to society through the media, professional groups and local leaders.

Box 9. Projects to encourage physical activity in Italy and the United Kingdom

In Italy *(42)* and the United Kingdom *(43)*, Safe Routes to School projects have been successfully implemented. In Italy, the "Piedibus" project has been adopted in several Italian cities, in which a group of children walk in the formation of a bus, with an adult at the front and rear, following a route with stops where children can join the group.

In the United Kingdom, Sustrans *(44)* (a sustainable transport charity) works on practical projects to encourage people to walk, cycle and use public transport in order to reduce motor traffic and its adverse effects. As well as the National Cycle Network, Sustrans is working on Safe Routes to Schools, Safe Routes to Stations and other practical responses to transport and environmental challenges. Walking to school increases physical activity, encourages new social relationships and reduces car journeys.

An evaluation of a Sustrans project in St Luke's School in Lancashire showed a reduction of over a third in car journeys to and from school over two years, and an increase in cycling from 0% to 5% over the same period. At the start of the Travel Plan process car use was 57%. The Travel Plan Action Group reviewed the Plan in December 2004 and re-surveyed the pupils. There had been an increase in walking of 10% (up from 43% to 53%), with a corresponding decrease in car use from 57% to 47%. The combination of incentives for the pupils and information stressing the health benefits of walking for the parents has been influential in achieving a change in habits at this location.

Limited physical activity, together with a poor diet, is a major risk factor for obesity. The proportion of overweight (including obese) children is particularly high in some countries in the Region, ranging from 35% of 13-year-old boys in Malta to 3.1% of 13-year-old girls in Ukraine *(7)*. However, unlike with physical injuries, there are no clear geographical patterns.

There is a clear relationship between the prevalence of excess weight and the development of obesity: countries with higher percentages of the former also report a higher prevalence of obesity. Among 13-year-olds, boys have higher rates than girls in a number of countries, with the highest gender differences found in Malta and Spain. Similarly, the rate is higher among 15-year-old boys than girls in 10 countries, with the greatest differences seen in Croatia, Greece, Italy, Malta and Slovenia.

POLICY ACTION ON TRANSPORT SAFETY AND THE PROMOTION OF PHYSICAL ACTIVITY

Policy action on safe mobility and transport is increasingly being developed at the European and national levels. Such action includes the use of protection devices such as motorcycle and bicycle helmets; low speed limits in areas where traffic is close to children and measures to improve traffic safety for all vulnerable road users; prohibition of, or controls on, children riding motorbikes; legislation on the use of child safety seats, the use of seat belts or requiring children to sit in the back of cars; policies on traffic education in the school curriculum; and different forms of graduated driving licensing. Of course, simply having many policies addressing safety does not necessarily mean a better safety performance: this must be shown by reductions in mortality and morbidity.

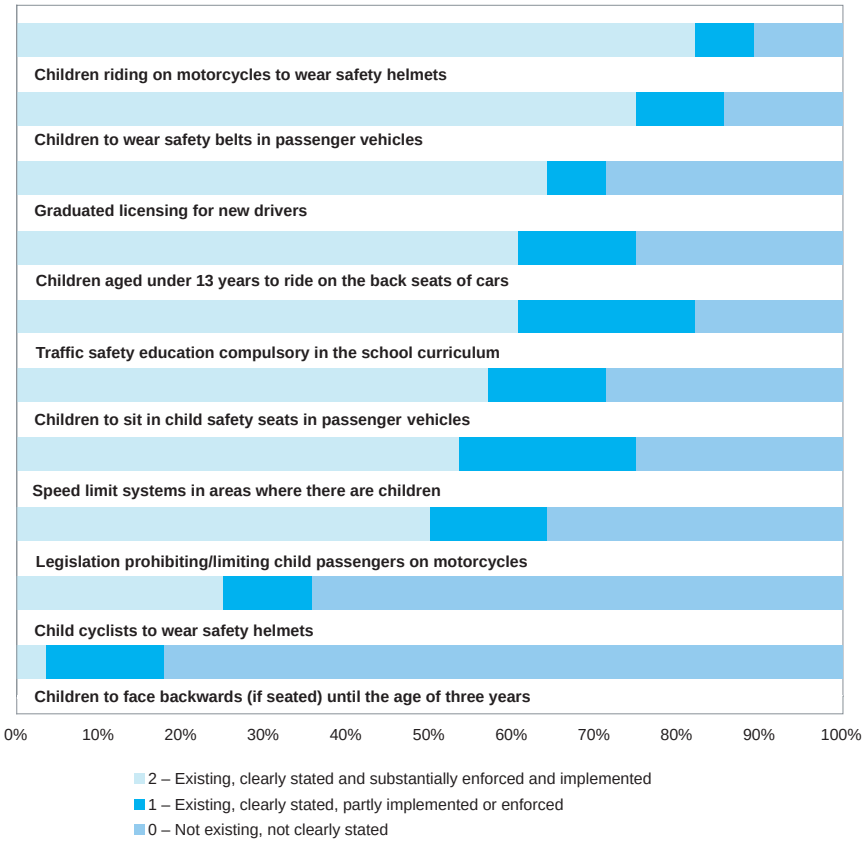
SAFE MOBILITY

The increasing evidence of the significant impact of transport on the environment and health is at the heart of the need to address transport-related issues effectively at national and international levels. Since the adoption of Agenda 21 at the 1992 Rio Conference on Environment and Development, which identified transport as a key priority for action, it has been increasingly recognized that moving towards sustainable transport necessitates integrated action by the sectors concerned. In line with this, the Third Ministerial Conference on Environment and Health adopted the Charter on Transport, Environment and Health, and in July 2002, a High-level Meeting on Transport, Environment and Health adopted the Transport, Health and Environment Pan-European Programme (the PEP) to bring together and focus the activities of the UNECE and WHO Regional Office on a number of key priority areas *(45)*. In September 2001, the EU adopted the Transport White Paper. This described the situation with regard to transport and set out an ambitious action programme comprising several measures between 2001 and 2010. In order to improve transport safety, the EU adopted the goal of reducing road fatalities by 50% by 2010. This goal is to be reached principally through harmonization of penalties and the implementation of new technologies for the improvement of road safety *(46,47)*.

Two years later, the EC Directorate-General for Health and Consumer Protection set up a task force on road safety within the Working Party on Accidents and Injuries to give recommendations on how the Directorate-General can support the issue of road safety from a public health point of view. The task force published a final statement in March 2005 with recommendations for action by the public health sector to improve road traffic safety, including that preventive action should focus on vulnerable users, building capacity, inclusive health promotion, delivery of health care and programme evaluation *(48)*.

Fig. 16 shows the combined level of implementation of traffic legislation aimed at creating safer mobility for children in 27 countries in the Region *(49)*. The legislation most often reported as enforced and implemented is that covering the use of seatbelts in vehicles and safety helmets on motorcycles. Legislation on the use of bicycle helmets and on rear-facing seats for children up to three years old was less frequently reported as implemented or was poorly enforced. Quite high levels of implementation were reported for traffic safety education as a part of the school curriculum and for graduated driving licensing systems.

Fig. 16. Percentage of selected countries[a] in the WHO European Region implementing specific policies aimed at preventing RTIs in children and young people, 2006



[a]Austria, Bulgaria, Czech Republic, Finland, France, Greece, Hungary, Italy, Lithuania, The Netherlands, Poland, Romania, Slovakia, Slovenia, Spain and volunteering countries (Albania, Armenia, Belgium, Croatia, Estonia, Malta, Sweden, The former Yugoslav Republic of Macedonia, United Kingdom (England) and Uzbekistan).
Source: ENHIS-2 project countries and countries volunteering data *(49)*.

Data from the comparison of policies reflect the earlier creation of road safety traffic laws and acts in the EU15 compared to other areas in the Region and show that there are wide differences between countries *(49)*. For example, Hungary reported putting traffic rules into operation in 1975, and Serbia and Montenegro in 1988. In contrast, Lithuania created new road traffic rules in 2002. It is, however, difficult to discuss policies in relation to mortality rates because these figures do not include prevention measures aimed at the general population which are also of relevance to children and young people, such as policies aimed at speed control and the prevention of drink-driving.

Overall, policy action on safe mobility and transport is increasingly being developed at European and national level. Evidence does not exist to show that all the policies are effective; however, recommendations on their implementation have been made. Nationally, the legislative effort directed towards the prevention of traffic-related accidents in children and adolescents is considerable. Within the ENHIS participant countries, more than 50% have put comprehensive laws and acts on road traffic safety in place, which provide a solid basis for preventive policy action and the promotion of safe mobility and transport for children. However, there is a need for better designation of responsibilities among relevant institutions at the national and local level, as well as multisectoral action, long-term political commitment and the allocation of appropriate human and financial resources *(50,51)*.

HEALTHY MOBILITY

In addition to creating safer transport conditions, there should be a focus on healthier mobility and preventing obesity, which can be partly achieved through a physical activity policy. At the international level, the Global Strategy on Diet, Physical Activity and Health adopted by the World Health Assembly in 2004 *(52)* provides the main policy framework. The Strategy urges countries to develop, implement and evaluate action appropriate to their national circumstances, with the ultimate aim of reducing the risk factors for, and incidence of, noncommunicable diseases caused by unhealthy diets and a lack of physical activity.

Policies to reduce obesity in children through an improved diet and more physical activity are implemented in Member States within national health programmes, in specific obesity/nutrition programmes, as well as through strategies to promote sports and cycling or walking. Of the 25 countries evaluated, however, 15 do not have legislation requiring a minimum of 30 minutes of physical activity per day in school, as recommended in the Global Strategy *(53)*. According to the international inventory of national policy documents on the promotion of physical activity, most of the initiatives to encourage physical activity are policies related to public health or health promotion in general, followed by policies promoting walking or cycling *(54)*. The nutrition policy database provides country information about the existence of nutrition-related national policy documents *(55)*. The available evidence suggests that the introduction of economic instruments, particularly in the form of taxes and price policies, could reduce food consumption, particularly the consumption of high saturated fat foods, and increase the purchasing of healthy foods *(56)*.

OVERALL PROGRESS

The important message is that unintentional injuries are preventable. Further, multidisciplinary strategies often have a range of benefits. For example, measures aimed at safe and healthy mobility would be expected to reduce RTIs but may also increase physical activity, and in combination with other physical activity and nutritional programmes, could help to slow down the rapid rise in obesity.

The new approach within RPG II recognizes the interrelations between the risks for unintentional injuries and the causes of inactivity and obesity. In other words, these areas should be addressed together rather than separately. Attention is directed towards the development and creation of a safer and healthier environment, where children can move and play without risks. This new approach is challenging but has the potential to achieve large health gains, not only in children and adolescents, but for the whole population, as safer and healthier environments will benefit society as a whole.

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Chapter 3. Clean air for health[15]

RPG III

We aim to prevent and reduce respiratory diseases due to outdoor and indoor air pollution, as well as contributing to a reduction in the frequency of asthmatic attacks, in order to ensure that children can live in an environment with clean air

Children's Environment and Health Action Plan for Europe

KEY MESSAGES

- The incidence of respiratory diseases in children varies substantially in the Region, with deaths due to respiratory infections 100 times more likely in some countries than in others. In many countries, the prevalence of allergic diseases exceeds 15%.

- Close to 90% of residents of urban areas, including children, are exposed to air pollution exceeding WHO guideline levels. Air pollution increases the incidence of acute diseases in infants and very young children and affects development of their respiratory system. The average exposure levels vary by a factor of three in the Region. Although full implementation of current policies should reduce air pollution and its impact over the next decade, there is little effective action showing an immediate effect in Europe.

- Over half of the children in Europe are regularly exposed to ETS, with the prevalence of exposure reaching 90% in some countries. Exposure to ETS contributes substantially to post-neonatal mortality, as well as the development and exacerbation of asthma. There are policies to reduce the exposure of children to ETS in most countries but their scope and effectiveness vary.

- Around 15% of people live in homes with problems of damp, which contributes to the development and exacerbation of asthma. Countermeasures such as the comprehensive implementation of relevant building codes and ventilation regulations will prevent adverse health outcomes.

- Exposure to products derived from the combustion of solid fuels is a considerable health problem in the eastern part of the Region. Urgent action needs to be taken to reduce the risk of respiratory infections in young children.

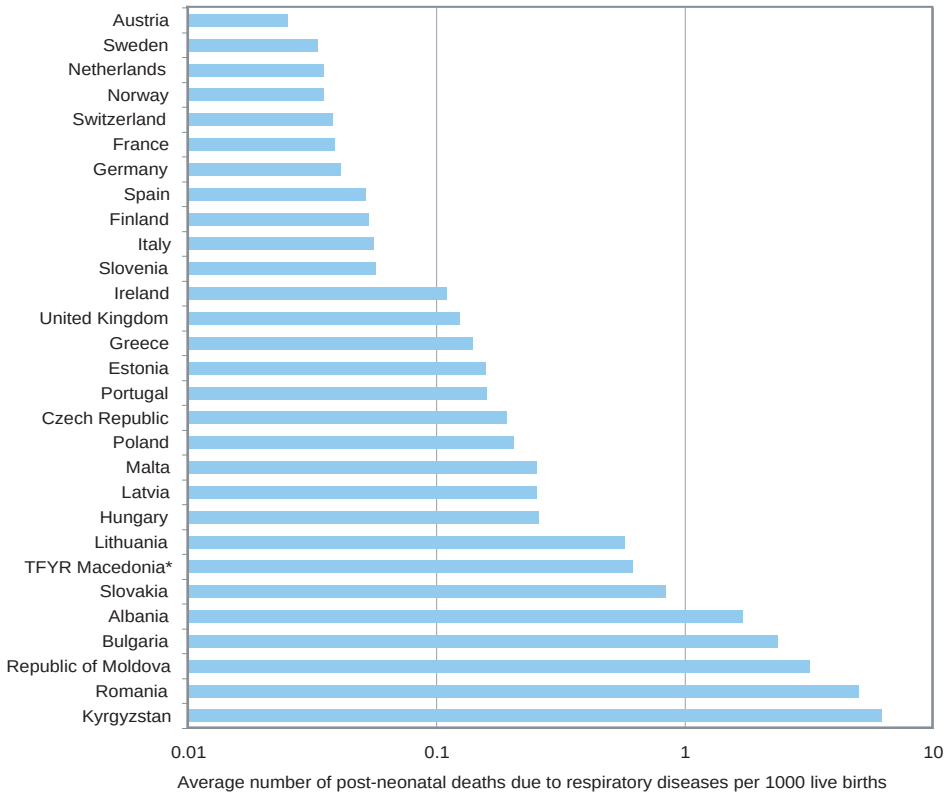
IMPORTANCE FOR PUBLIC HEALTH

Respiratory diseases are a major cause of poor health in children. In developing and emerging economies they are the leading cause of death, while in industrialized countries respiratory diseases are the most common cause of morbidity. Respiratory tract symptoms are particularly prevalent in young children. Multiple factors interact to determine respiratory health, including infection, diet, tobacco-smoking, social conditions and the provision of medical care. Air pollution both out- and indoors is one of the key determinants for preventable respiratory diseases.

[15]By Joachim Heinrich, Birgit Kuna-Dibbert and Øystein Solevag, based on ENHIS fact sheets.

Early childhood mortality due to respiratory diseases varies considerably across the Region (Fig. 17). On average, 13.6% of post-neonatal mortality in the Region is due to respiratory diseases, with an attributable mortality rate of 0.8 per 1000 live births *(1)*.

Fig. 17. Post-neonatal[a] mortality rate due to respiratory diseases, WHO European Region, 2001



[a]From 28 days to 11 months, with the upper limit referring to completed days and months *(2)*.
*TFYR Macedonia = The former Yugoslav Republic of Macedonia.
Note. Data for France, Slovakia, Switzerland and The former Yugoslav Republic of Macedonia are from 2000.
Source: WHO mortality database *(3)*.

This average masks wide variations, and a rising prevalence is evident moving from west to east. Encouragingly, there has been a fall in infant respiratory mortality in almost all countries over recent years, especially in countries with high rates, such as Albania, Kyrgyzstan, the Republic of Moldova and Romania. Even so, rates in those countries remain considerably higher than in the rest of the Region.

Acute respiratory infections (ARIs), in particular pneumonia, are a common cause of death and serious morbidity in young children and infants in countries with developing and emerging economies. It is estimated that there were 116 000 ARI deaths annually in children aged under five years from 2000 to 2003 in the Region. In the more affluent countries with low overall mortality,[16] ARIs accounted for less than 2% of under-five mortality, while in the rest of the Region, they were implicated in 13% of under-five deaths *(2)*. Causative infective agents differ between developed and developing parts of the Region: bacterial infections are common in developing countries, while viral infections cause most ARIs in developed

[16]Andorra, Austria, Belgium, Croatia, Cyprus, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Israel, Italy, Luxembourg, Malta, Monaco, the Netherlands, Norway, Portugal, San Marino, Slovenia, Spain, Sweden, Switzerland, the United Kingdom.

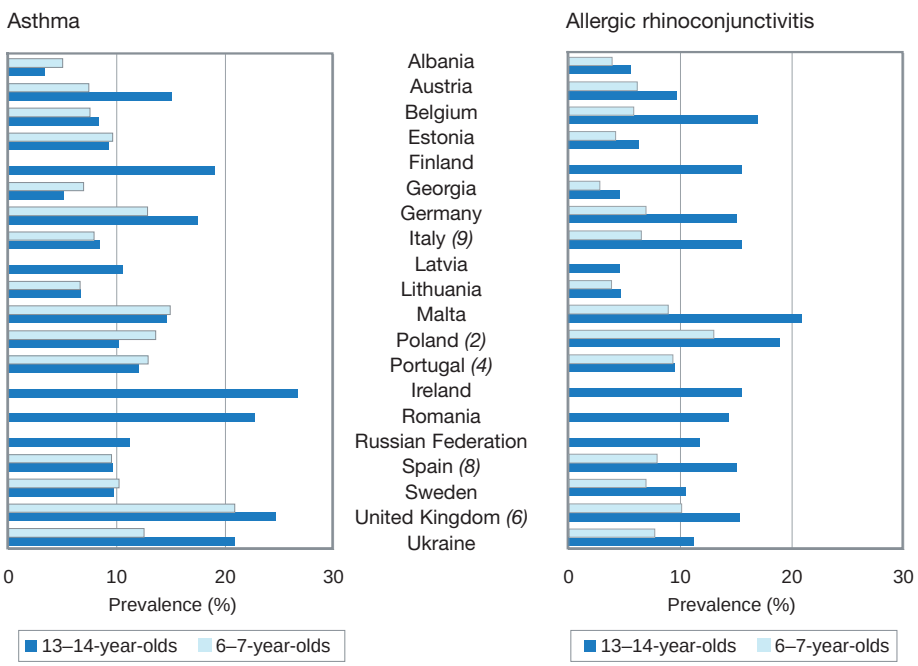
countries. Moreover, in temperate European countries there is a marked seasonality for ARIs, with a significant rise in incidence in the winter months falling to relatively low levels in the summer *(4)*.

Despite the now low levels of serious morbidity and mortality from ARIs in children in the most developed countries, the total burden due to respiratory diseases remains high. While life-threatening ARIs have decreased, childhood asthma and allergies have been on the rise over the last few decades. In fact, asthma is the most common chronic disease among children and is one of the major causes of hospitalization among those aged under 15 years *(5)*.

Routine statistics are not available to assess the prevalence of asthma and allergic rhinoconjunctivitis, mainly owing to the lack of a commonly agreed strategy for diagnosing and labelling asthma. The prevalence of these diseases in the Region may, however, be estimated using data from the International Study on Asthma and Allergies in Children (ISAAC), which employs standardized protocols to assess the prevalence of asthma and allergy *(6)* in samples of children aged 6–7 and 13–14 years.

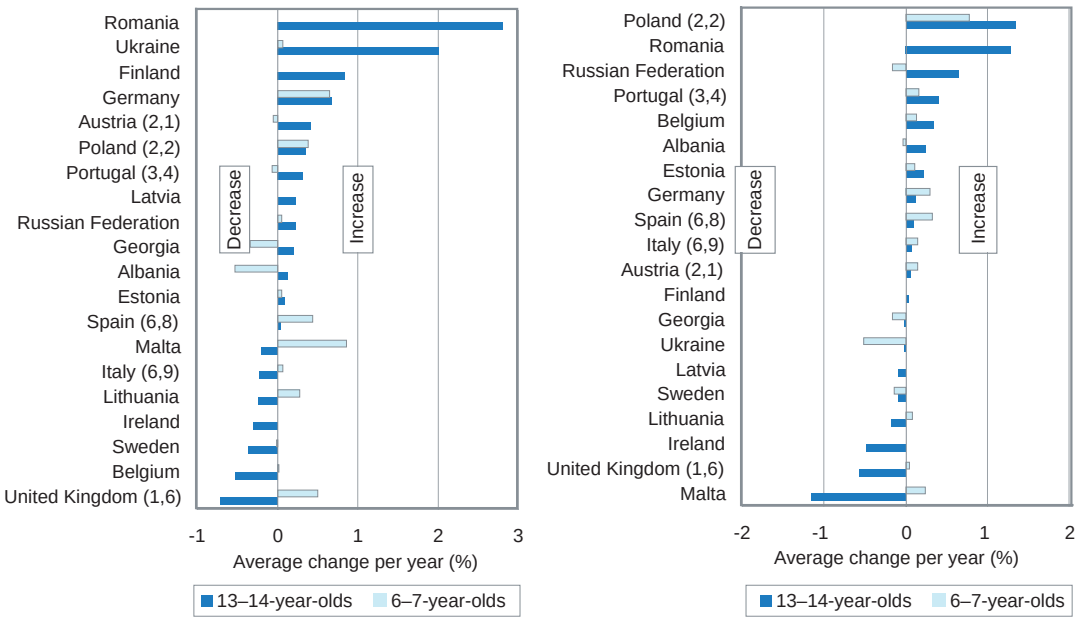
For 1999–2004, ISAAC found that the prevalence of both asthma and allergic rhinoconjunctivitis ranged from <5% to >20% in children across European study centres. Asthma symptoms were most prevalent in children in Ireland and the United Kingdom, seen in >20% of 6–7-year-olds and >25% of 13–14-year-olds *(7)*. Prevalence was lowest in Albania, under 5% for both age groups (Fig. 18). For allergic rhinoconjunctivitis symptoms, Malta and Poland had the highest prevalence and Albania, the Baltic States and Georgia had the lowest (Fig. 18). ISAAC data for 1992–1998 and 1999–2004 were used to assess changes in prevalence over time in the Region (Fig. 19).

Fig. 18. Prevalence of asthma symptoms and allergic rhinoconjunctivitis in children aged 6–7 and 13–14 years, ISAAC Phase Three, 1999–2004



Note. As the data were collected from specific centres only, prevalence figures are not country-representative. When data were collected from more than one centre, the number of centres is given in brackets.
Source: ISAAC *(6)*.

Fig. 19. Annual change in prevalence of asthma and allergic rhinoconjunctivitis in children between ISAAC Phase One (1992–1998) and Phase Three (1999–2004)



Note. The numbers of centres in countries for children aged 6–7 years and 13–14 years are given in brackets. Where there is no number, the data were collected from one centre.
Source: ISAAC *(6)*.

In the majority of countries, the prevalence of asthma symptoms tended to increase for children aged 13–14 years, with the greatest increase in Romania and Ukraine. There was an apparent decrease in prevalence in this age group in some countries. Overall, asthma is the most common chronic disease in children. By WHO estimates for 2005, 300 million people suffered from asthma and there were 255 000 deaths. Asthma is not only a public health problem in high-income countries: it occurs in all countries regardless of level of development, and over 80% of asthma deaths occur in low- and lower-middle-income countries. Further, asthma deaths will increase by almost 20% in the next 10 years if urgent action is not taken *(5)*. In terms of trends, recent reviews suggest an increasing prevalence of allergic diseases in the Region, no longer restricted to specific seasons or environments *(8)*.

Of note is the reasonably high correlation between the prevalence of asthma and allergic rhinoconjunctivitis symptoms. This correlation ranged from 0.47 in 13–14-year-olds in 1999–2004 and 0.80 in 6–7-year-olds in 1992–1998. Further, there was a correlation between the changes in the prevalence of asthma and allergic rhinoconjunctivitis symptoms (0.47–0.51). This should not be interpreted as indicative of a direct link between the two, as the underlying risk factors for these interrelated yet distinct disorders may be different, or there may be a difference in time of the onset of symptoms.

Asthma and allergies are associated with multiple factors, and the differences observed between countries may be due to differences in lifestyle, dietary habits, socioeconomic conditions and environmental or climatic factors, among other things *(9,10)*. The clear geographical variation and

recent trends in asthma prevalence in several countries, however, suggest the importance of environmental factors in the causation of asthma or the triggering of its symptoms. Importantly, it also suggests that asthma is a preventable disease and that the impact of these environmental factors can be reduced.

In summary, there are important differences in mortality and morbidity from respiratory diseases in children across the Region over time. Substantial health benefits can be achieved by tackling the determinants of respiratory health, in particular the underlying environmental ones.

ENVIRONMENTAL FACTORS THAT MAY EXPLAIN THE GEOGRAPHICAL AND TIME PATTERNS IN RESPIRATORY HEALTH

Respiratory health may be affected by a range of environmental factors. This assessment considers those for which (i) the latest scientific evidence linking an exposure to a health outcome is available, (ii) evidence identifies interventions that give health benefits, and (iii) comparable data are available across the Region. Evidence has linked ambient (outdoor) air pollution to the development and exacerbation of allergies and the aggravation of asthma, and suggests it contributes to postnatal respiratory mortality. For indoor air pollution, good evidence shows the detrimental health effects of tobacco smoke, damp homes, allergens and moulds (and mould derivatives) and combustion products.

Before considering these factors, it is worth reflecting on the impact of changing environmental conditions on respiratory health in societies in transition. An interesting case study is provided by the eastern part of Germany at the time of the rapid post-unification social and economic changes in the 1990s (Box 10).

RESPIRATORY HEALTH AND OUTDOOR AIR POLLUTION

Very young children, probably including unborn babies, are particularly sensitive to air pollutants, and good evidence suggests a causal relationship between pollutants and a number of health outcomes *(11)*. Particulate air pollution contributes to deaths from respiratory complaints in the post-neonatal period, and exposure to ambient air pollutants has been found to have adverse effects on the development of lung function. Both reversible deficits of lung function and chronically reduced lung growth rates and lung function have been associated with exposure to particulates. There is a causal association between exposure to particulate matter (PM) and the aggravation of asthma, and the increased prevalence and incidence of cough and bronchitis.

Among air pollutants, PM is widely present and people are exposed where they live and work. To a great extent, PM is generated by human activities such as transport, energy production, domestic heating and a wide range of industries. Concentrations of ambient PM_{10} (particles with a diameter of up to 10 µm, which are small enough to pass into the lungs) are a good approximation of population exposure to PM from outdoor sources. The value of this is supported by numerous epidemiological studies, conducted in Europe and in other parts of the world, which show links between various indicators of children's health and outdoor PM_{10}. Importantly, effects are seen on health at PM levels currently observed in European cities.

Box 10. Lessons from Germany after unification: respiratory health and ambient air quality

Air quality in the German Democratic Republic (GDR) was very poor compared to the Federal Republic of Germany (FRG) before unification. This, together with changes in respiratory health over time, provides a unique way to examine the potential impact on health of improving ambient air quality. The results need a distinct discussion, and it must not be assumed that changes over time in morbidity rates are exclusively caused by improved air quality levels. Children and adults in the GDR did not suffer from asthma, allergic rhinitis and allergic sensitization as much as those in the FRG at the beginning of the 1990s *(12,13)*. This was misused as an argument against the assumption that air pollution might cause asthma and allergy. However, in line with the underlying assumption, children in the GDR had significantly more bronchitic symptoms and poor lung function *(12,14)*.

This led to speculation that the development of asthma and allergies was more dependent on lifestyle-related factors than ambient air pollutants, such as sulfur dioxide (SO_2) and total suspended particulates. Further, exposure to these pollutants may increase bronchial symptoms and infections in very early childhood, which may have an effect on the response of the immune system and, consequently, reduce the risk of allergic diseases *(15)*.

Not only were air pollution levels different in the two countries at this time, so were the sources, and consequently, the components and distribution. A major source in the GDR was the combustion of surface coal with high sulfur content (up to 4%) for domestic heating, energy production in big power plants, and industry. In the FRG, motor vehicles were much more common and traffic exhausts were a major contributor to ambient air pollution *(14)*. With reunification, what is now the eastern part of Germany saw a shut-down of industry, the introduction of stringent emission controls and the replacement of surface coal with gas and oil. Air quality significantly improved *(16,17)*, although at the same time the number of cars per capita increased three- to five-fold.

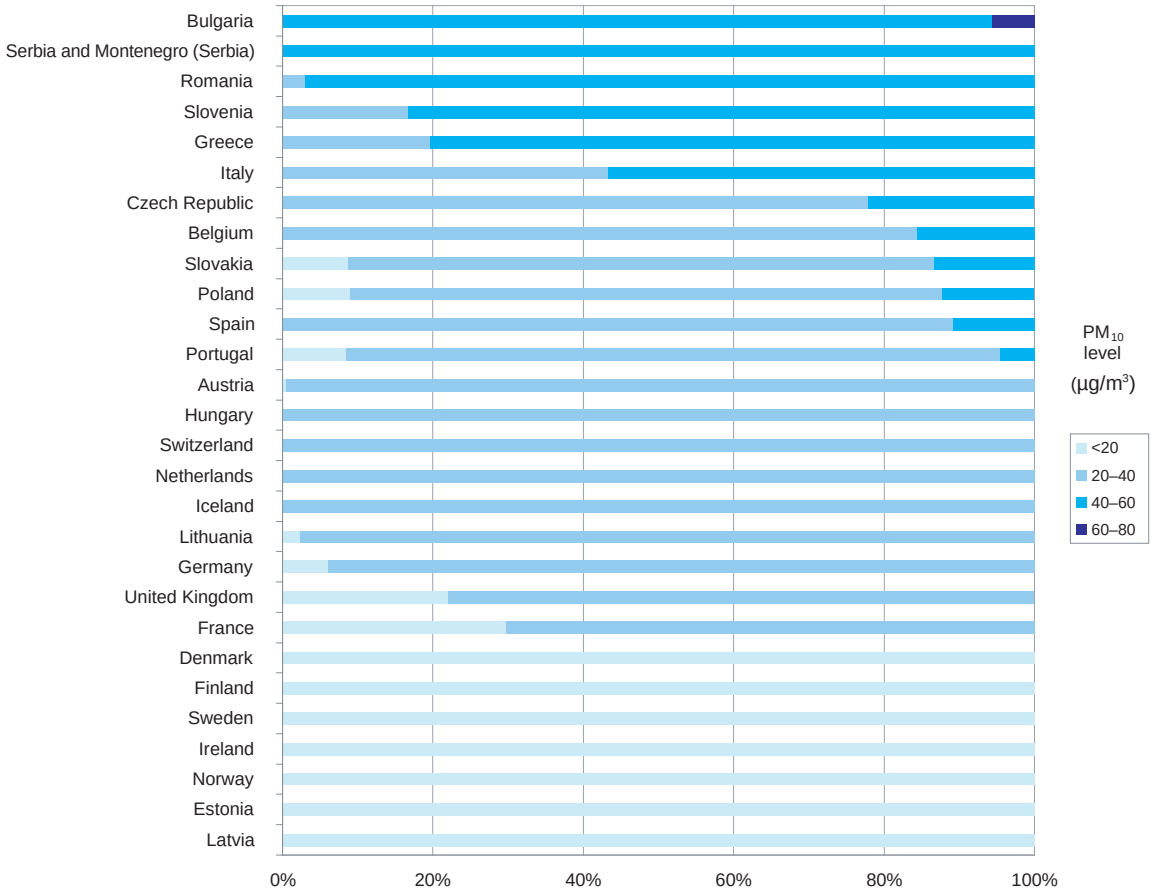
In parallel with the improved air quality in eastern Germany, there was a decline in the frequency of bronchitis symptoms and infectious diseases and improvement in lung function *(14,16,18)*. However, the prevalence of asthma and, even more so, of allergic rhinitis and allergic sensitization, increased *(14,16,19)*.

These findings are strong evidence that a reduction in air pollution from coal combustion could reduce bronchitis symptoms and improve lung function in children. A similar finding in Switzerland showed that air pollution levels had also decreased, without the concomitant social changes seen in eastern Germany *(20)*. Further, the increased prevalence of atopic diseases in the population in eastern Germany could be due to increased exposure to traffic-related pollutants, fewer infectious diseases in early childhood and the consequent delayed maturing of immune function, factors related to the adoption of a western lifestyle, or to a combination of these factors.

Fig. 20 shows the population exposure to PM_{10} (as an average annual concentration) in various European cities in 2004 (or the last available year). This is expected to approximate the exposure in children, assuming children comprise similar proportions of the cities' populations *(21)*. The average exposure to PM_{10} varied from 13–14 μg/m^3 (Finland, Ireland) to 53–56 μg/m^3 (Bulgaria, Romania and Serbia and Montenegro (Serbia)). Within some countries, a three-fold variation in the exposure level of children was observed. There have been no substantial changes in average exposure levels over the last few years in urban areas of the Region.

Of people living in European cities where PM_{10} is monitored, the vast majority (89%), including children, are exposed to levels exceeding the WHO air quality guideline level of 20 μg/m^3 *(24)*. This gives rise to a substantial risk to children's health. For 14% of people, the higher EU limit value of 40 μg/m^3 is exceeded. Finally, it should be remembered that for 31 countries in the Region – with 43% of the total population – no PM data from regular monitoring are available. However, an approximate assessment indicates that the pollution levels and corresponding health risks may be even higher in many of these countries.

Fig. 20. Percentage of children living in cities with various PM_{10} levels, 2004 (or last available year)



Note. In several countries the assessment is based on one city only.
Source: AirBase for PM_{10} concentration data *(22)*; Eurostat for city population data *(23)*.

The association between mortality and exposure to PM has been described and quantified. For children, a WHO analysis based on data from the late 1990s indicates that, annually, about 700 deaths due to ARIs in children aged 0–4 years in the Region can be attributed to exposure to PM_{10} *(25)*. Several studies reviewed by WHO *(11)* have demonstrated the strong effect of PM on respiratory mortality in the post-neonatal period. The review includes a nationwide Czech case-control study which confirmed this effect, with post-neonatal mortality from respiratory causes increasing by 74% (95% CI 1–198%) for each 50 µg/m³ increase in the concentration of total suspended particulates. Further, an increasing evidence base suggests that finer particulates may have even greater effects on respiratory health, which has led to studies on exposure to $PM_{2.5}$ (particles with a diameter of 2.5µm). Recently, Woodruff et al *(26)* found the risk of respiratory-related post-neonatal mortality more than doubled for each 10 µg/m³ increase in $PM_{2.5}$, after adjustment for other risk factors.

As regards adults, the dominant impact on health of exposure to PM is an increase in mortality from long-term exposure to $PM_{2.5}$ *(27)*. In Europe, current exposures to PM from anthropogenic sources lead to an average of 8.6 months loss of life expectancy. This ranges from around 3 months in Finland up to more than 13 months in Belgium. Around 348 000 premature deaths in the 25 EU countries can be attributed to PM exposure in the period of 1997–2002.

A recent WHO country assessment *(28)* of the impact on health of outdoor air pollution in cities with over 100 000 population shows that about 169 000 deaths per year in the Region could be prevented if PM levels were to be reduced to the WHO air quality guideline value of 20 μ/m^3.

The quantification of the impact of PM on morbidity is more difficult and gives less precise estimates, but studies show health benefits associated with a reduction of exposure to PM_{10}. For example, a reduction in exposure from the current levels to 20 μg/m^3 would lead to a 7% decrease in the incidence of coughs and lower respiratory symptoms and a 2% decrease in admissions to hospital of children aged under 15 years with respiratory conditions *(29)*.

While evidence suggests that ambient air pollution is associated with the exacerbation of asthma, an association with the onset of asthma has not been consistently shown *(11)*. However, recent studies, including birth cohort studies, are addressing these limitations, and there is increasing evidence that exposure to traffic-related air pollutants such as fine PM, black smoke and nitrogen dioxide, is associated with an increased risk for the onset of asthma in young children *(30,31)*.

Among the major contributors to urban air pollution, road transport is becoming ever more important. Traffic contributes to a range of gaseous air pollutants and to suspended PM of different sizes and composition. Tailpipe emissions of primary particles from road transport account for up to 30% of $PM_{2.5}$ in urban areas. Other emissions, such as those from resuspended road dust or resulting from worn tyres and brake linings, are the most important source of coarse PM. People of all ages experience high levels of exposure to traffic-related air pollutants when they live near busy roads, travel on roads or have to spend a long time on roads (Box 11). Epidemiological and toxicological studies indicate that transport-related air pollution contributes to an increased risk of death, particularly from cardiopulmonary causes, as well as to an increased risk of respiratory symptoms and diseases *(32)*. The exposure of children to traffic-related air pollutants such as PM has a considerable impact on their health and well-being *(11)*.

INDOOR AIR EXPOSURE

As well as exposure to ambient air pollutants, lifestyle-related factors and genetics, indoor factors are known to play a major role in the development and/or exacerbation of asthma and allergies. The incidence of allergic symptoms in children is associated with exposure to allergens in indoor environments with poor air quality *(36)*. This includes biomass combustion products, high humidity and moulds, dust mites, pets and ETS *(37)*. Further, the frequency of a child's exposure to poor indoor air may increase the risk of being affected by outdoor pollutants. In asthmatic individuals, exposure to ETS can trigger asthma attacks and make asthma symptoms more severe *(38)*. Some evidence suggests it may also lead to the onset of new cases of asthma, although at present there is no scientific consensus on the conclusiveness of this evidence.

Environmental tobacco smoke

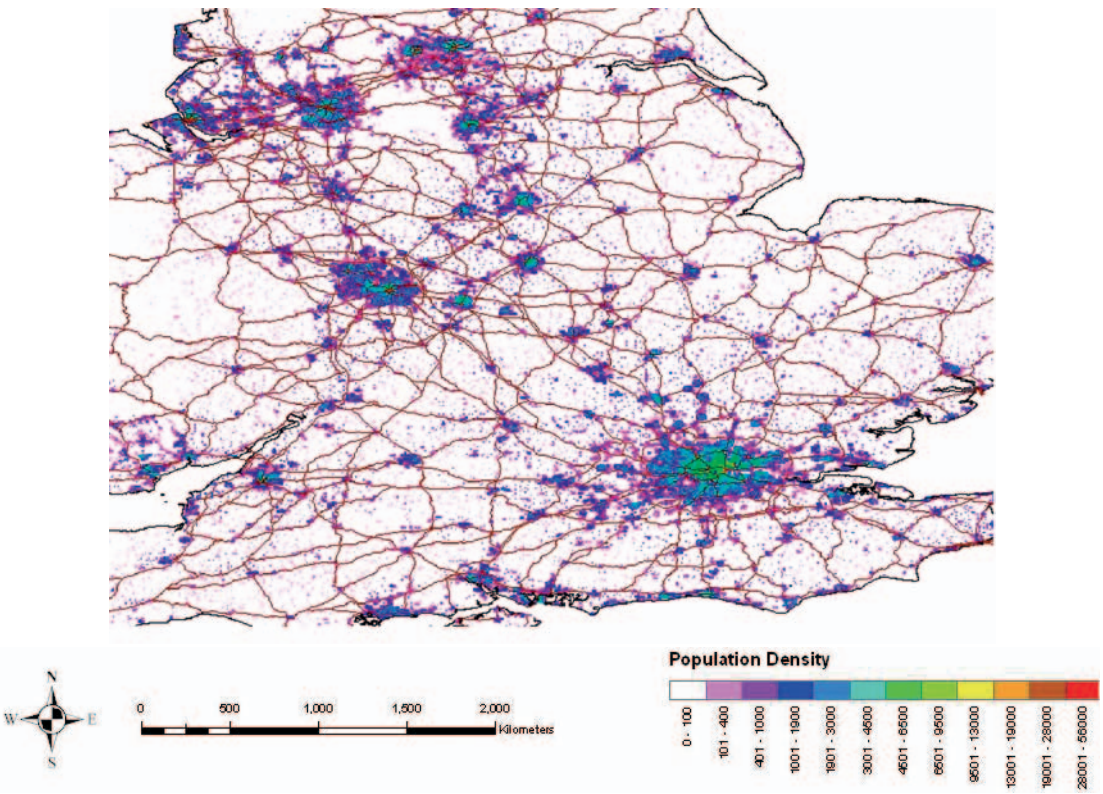
Exposure to ETS is defined as the involuntary or passive breathing of air contaminated with tobacco smoke by someone who is not smoking. Several comprehensive reviews of the effects of ETS on health have been conducted in the last few years *(39–41)*. Tobacco smoke is a known human carcinogen *(41)* and no level of exposure to ETS is free of risk. Chronic exposure to ETS among adults increases the risk of death and illness from cancer and cardiovascular and respiratory diseases. In infants and young children, exposure to ETS increases the risk of sudden infant death syndrome *(42)*, ARIs, chronic respiratory symptoms, middle ear disease, decreased pulmonary function and asthma. In children with asthma, ETS increases the severity and frequency of asthma attacks.

Box 11. Children living close to busy roads

A recent study conducted by the EC Joint Research Centre *(33)* using GIS techniques and overlaying population density with the road network has shown that nearly 1 300 000 children under 15 years of age live within 50 m of roads in the EU15. Roads included motorways, national roads with double lanes, national roads and other principal roads as classified by Eurostat. In terms of the proportion of national child populations, the average was 2% with the highest values in Belgium and Luxembourg (3.5%) and the lowest in Finland and Sweden (1.2%). Those children are at high risk from air pollution as well as noise and traffic accidents. Furthermore, they are restricted in normal children's activities such as playing, sports, and being healthily mobile.

A sample map showing road networks and population density (Fig. 21) suggests that the greatest problems are in big urban agglomerations with the highest concentration of people. The same methodology was used to assess the proportion of children living at a distance of 50 m, 200 m and 350 m from roads in London, Milan and Utrecht, three cities of comparable size, each covering approximately 100 km^2. Altogether, nearly 90 000 children live within 50 m of roads, and 350 000 within 200 m. The city of Utrecht has the greatest proportion of children aged under 15 years living close to roads as defined above.

Fig. 21. A sample map overlaying the road network and population density

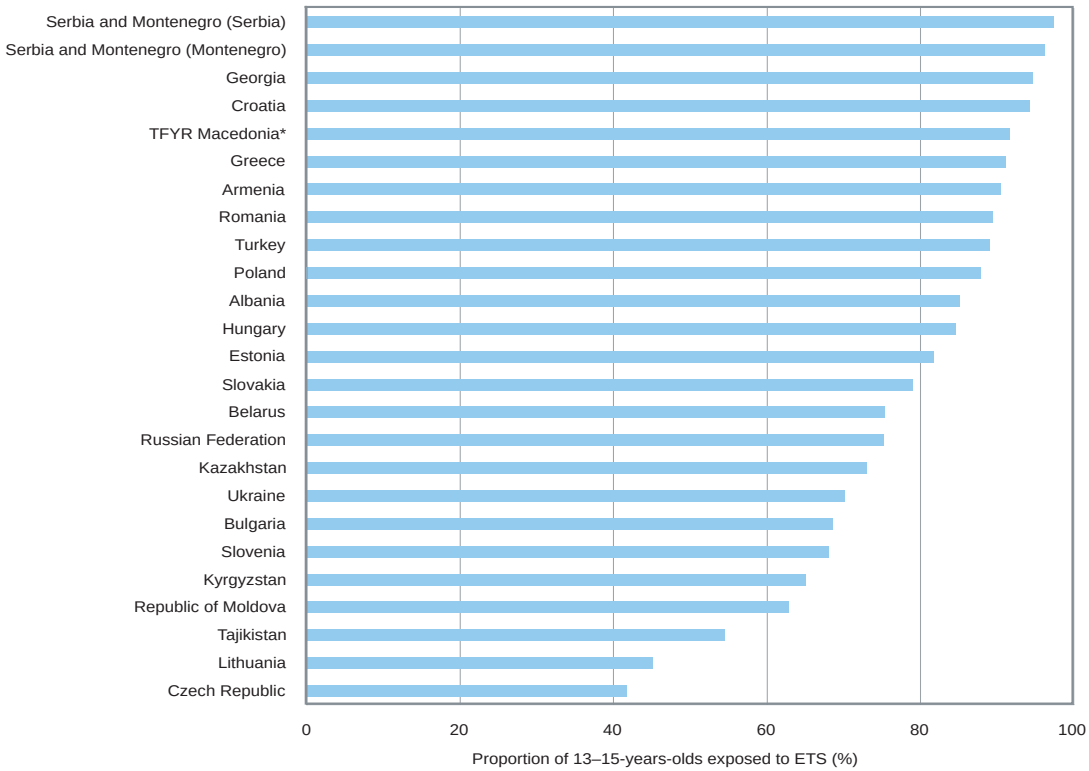


Source: The GISCO Database *(34)*; European Environment Agency *(35)*.

The proportion of children living at a distance of 50 m from roads in London, Milan and Utrecht is considerably lower than the respective national estimates. This difference is partly due to the fact that the road network database does not include the big busy streets within the cities unless they are designated as part of a national road. Further enhancement of the road database and availability of population density within the city will make it possible to make reliable estimates of exposure to traffic sources.

Over half of all children aged 13–15 years are exposed to ETS in their homes in the majority of the countries for which comparable information is available (Fig. 22). In the Balkans and the Caucasus, exposure exceeds 90%. The data used in Fig. 22 were drawn from the Global Youth Tobacco Survey (GYTS), which covered children aged 13–15 years *(43)* and are based on self-reported answers to the question as to whether they were "living in homes where others smoke in [their] presence". The geographic coverage of comparable data is restricted by the fact that only countries in central and eastern Europe, central Asia, the Balkans and the Caucasus participated in the GYTS. For western Europe, various studies indicate that the proportion of children exposed to ETS at home is 20–58% *(37,44)*.

Fig. 22. Proportion of 13–15-year-olds exposed to ETS in their homes, 2002–2005



Note. TFYR Macedonia = The former Yugoslav Republic of Macedonia.
Source: GYTS *(43)*.

On average, exposure to ETS in the 25 countries participating in the GYTS is very high: 84% of the 13–15-year-olds reported that they were exposed to tobacco outside their homes, and in some countries the figures were even higher (Table 3) *(45)*.

The impact of ETS on asthma episodes in children aged under 14 years was estimated using a recent meta-analysis *(39)* and current estimates of smoking prevalence in ENHIS countries *(46)*. The results suggested that exposure to ETS increases the number of asthma episodes by an average of 7.5% in the range 6–10%, depending on underlying smoking prevalence. Such estimates must, however, be treated with caution owing to the difficulties encountered when attempting to estimate a quantified measure of exposure to ETS, and specifically the scarcity of international databases with the information to allow a health impact assessment of ETS at the European level.

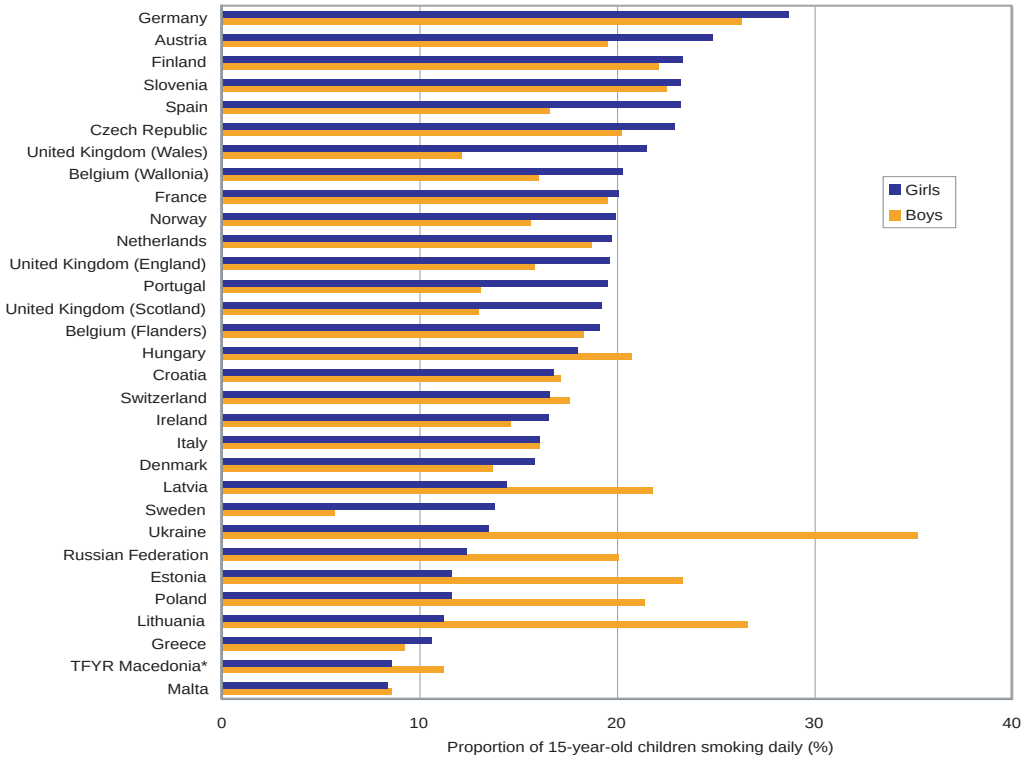
Table 3. Prevalence of exposure to ETS outside the home in 13–15-year-olds (%)

Country	Survey year	Exposure outside the home	Country	Survey year	Exposure outside the home
Albania	2004	80.6	Lithuania	2005	64.6
Armenia	2004	85.1	Poland	2003	90.4
Belarus	2004	90.1	Republic of Moldova	2004	96.7
Bulgaria	2002	75.7	Romania	2004	81.5
Croatia	2003	91.1	Serbia and Montenegro (Serbia)	2003	91.3
Czech Republic	2002	74.5	Slovakia	2003	85.7
Estonia	2003	90.7	Slovenia	2003	89.0
Georgia	2003	93.8	Tajikistan	2004	69.7
Hungary	2003	92.8	The former Yugoslav Republic of Macedonia	2003	80.2
Kazakhstan	2004	71.8			
Kyrgyzstan	2004	64.9	Turkey	2003	85.9
Latvia	2002	71.3	Ukraine	2005	84.4

Source: European tobacco control report (45).

Although exposure to ETS among children is strongly associated with patterns of smoking among parents, children may also be exposed to ETS outside the home by other people who smoke actively, including their peers. Fig. 23 shows the proportion of 15-year-olds who smoked daily, using self-reported data collected in the HBSC survey in 2001/2002 *(47)*. (Note that in Germany, only selected regions were included in the survey.)

Fig. 23. Proportion of children aged 15 years smoking daily, 2001/2002



Note. TFYR Macedonia = The former Yugoslav Republic of Macedonia.
Source: HBSC survey *(47)*.

On average, approximately 18% of 15-year-olds reported that they smoked every day, but there was considerable variation between countries and between girls and boys. Although the overall prevalence in 2001–2002 was similar to that in 1997–1998, it masks national trends, including increases in some countries (the Czech Republic, Estonia and Lithuania) and stable or slightly decreasing trends in western European countries. In the majority of the countries surveyed, 15-year-old girls were as likely, if not more so, to smoke every day as boys. This varied within the Region, with more boys than girls smoking in the east and more girls than boys smoking in the north and west. The pattern of gender differences in smoking is similar to changes observed in the adult population and may be associated with broader changes in the status of women in industrialized countries *(47)*.

In view of the considerable impact on health of ETS, particularly in children, measures to restrict smoking should be a major public health objective. In particular, efforts to reduce the exposure of children to ETS should focus on promoting smoke-free homes and cars.

Damp

Damp inside the home induces the growth of moulds, dust mites and various microbial agents and, at the correct temperature, may set in train chemical reactions leading to the release of chemicals from building materials and furnishings. The amount of water vapour in the air is influenced by overcrowding and activities such as cooking, laundering and bathing, the use of certain fuels for heating and cooking, the indoor temperature and especially the degree of ventilation. Water leakage due to structural damage may also contribute.

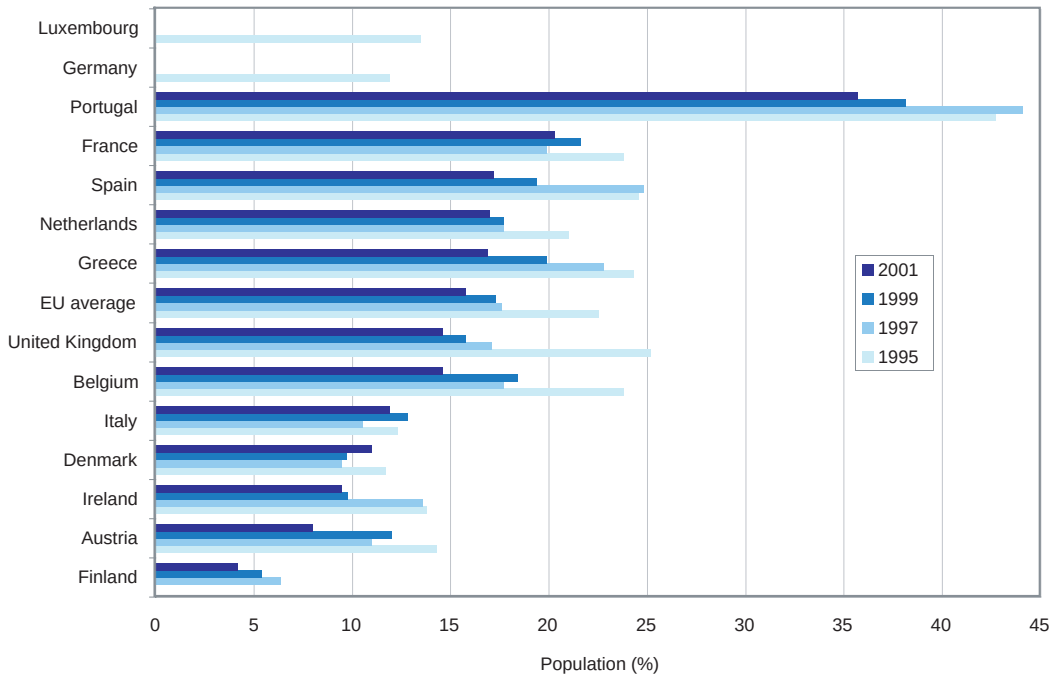
Mould and damp are important risk factors for a variety of illnesses, particularly those of the respiratory and immune systems. Generally, there are four kinds of health problem: allergic illness, irritation of the respiratory tract, infection and toxicological effects. In people who are sensitive to moulds, symptoms such as nasal irritation or congestion, dry or productive cough, wheezing, skin rashes or burning and watery or reddened eyes may occur. Those with severe allergies to moulds may have more serious reactions, such as hay-fever-like symptoms or shortness of breath. Moulds can also trigger asthma attacks in susceptible individuals. Individuals with chronic illnesses or those with immune deficiencies are more likely to develop infections from certain moulds.

It has been suggested that damp is associated with mental health problems and other types of illness. Depression and the presence of general symptoms such as fatigue, headache, dizziness and difficulty concentrating have been linked to damp, mouldy living conditions *(48)*.

Children, who tend to spend more time at home than adults and whose immune systems are still developing, are at increased risk of developing respiratory disorders when living in damp, mouldy housing. The prevalence of asthma, cough and wheezing among children living in homes with problems of damp or mould is 1.4–2.2 times higher than among children living in drier housing conditions. According to the currently available evidence, 13% of childhood asthma in developed countries could be attributable to damp *(49)*.

A survey of the total population of Europe has shown a three- to ten-fold variation in self-reported exposure to damp among European countries. Fig. 24 shows the proportion of the population in selected European countries living in housing with self-reported problems of damp between 1995 and 2001.

Fig. 24. Proportion of the total population living in homes with self-reported problems of damp, 1995–2001



Note. The EU average is based on the available data in Eurostat database.
Source: Eurostat *(50)*.

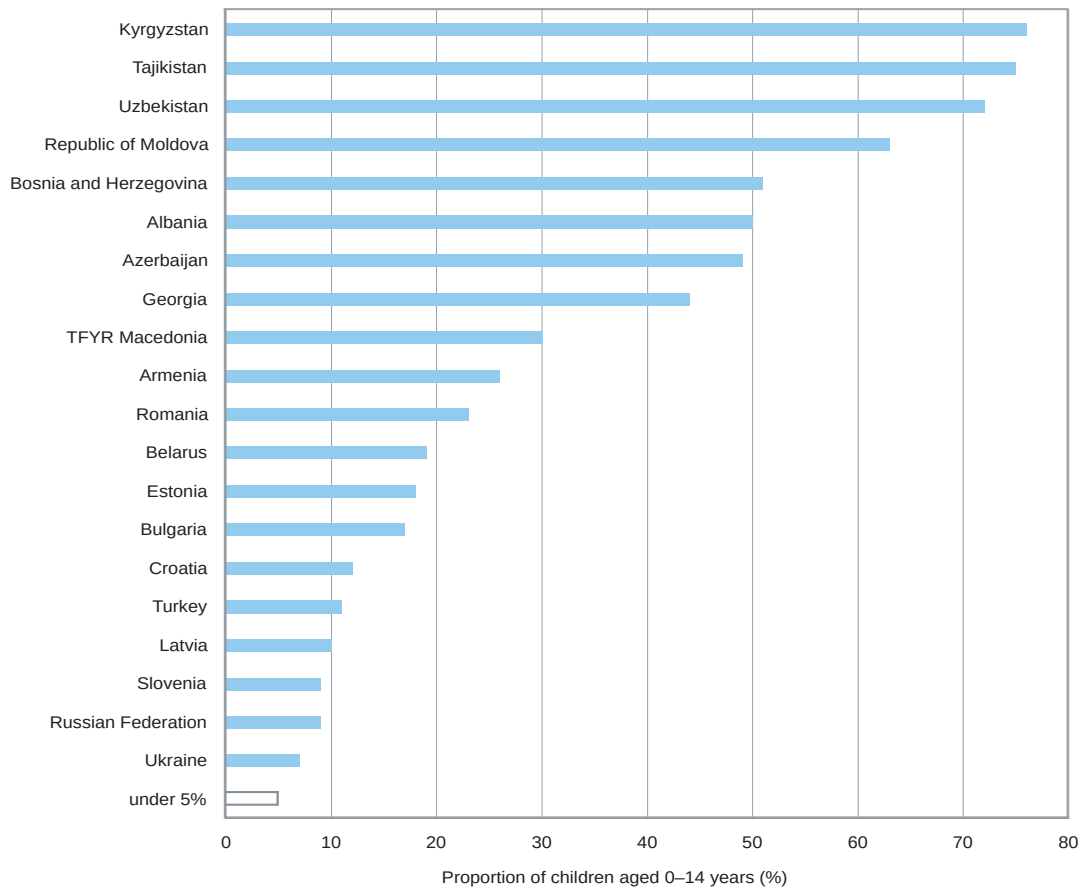
Overall, the exposed proportion decreased from 1995 to 2001, but in some countries there were no improvements. Differences between countries may be due to a combination of factors including climate characteristics, socioeconomic status, housing characteristics, culture and lifestyle and the existence and effectiveness of related policies (e.g. on ventilation or thermal insulation).

Damp can have a range of impacts on health, and WHO has concluded that the strongest evidence exists for the association of damp with cough, wheezing and asthma *(49)*. Children are particularly sensitive to these impacts. Damp is often associated with poor housing conditions related to socioeconomic inequalities, poor indoor air quality and inadequate housing hygiene, which includes factors such as overcrowding, low air exchange rate, low indoor temperature and poor insulation. All these factors have adverse effects on health. Reduction of mould and damp in housing can be achieved by comprehensive policy action. Financial incentives and supporting instruments are necessary for the implementation of effective interventions such as the rehabilitation of housing stock.

Exposure to sources of indoor combustion

Cooking and heating with solid fuels such as dung, wood, agricultural residues, grass, straw, charcoal and coal is a major source of indoor air pollution (Fig. 25). The indoor smoke comprises a variety of health-damaging pollutants, such as particles, carbon monoxide, nitrogen oxides, sulfur oxides and formaldehyde and carcinogens such as benzo[a]pyrene and benzene. Combustion of solid fuels in inefficient stoves under poor ventilation conditions can result in large burdens of exposure, particularly for women and young children who spend the major part of their time in the home *(51)*.

Fig. 25. Proportion of children aged 0–14 years living in homes using solid fuels, WHO European Region plus Liechtenstein, 2004



Notes. TFYR Macedonia = The former Yugoslav Republic of Macedonia.
For countries where the proportion of children is under 5% the data have been estimated (Andorra, Austria, Belgium, Cyprus, the Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Kazakhstan, Liechtenstein, Lithuania, Luxembourg, Malta, Monaco, the Netherlands, Norway, Poland, Portugal, San Marino, Slovakia, Spain, Sweden, Switzerland, Turkmenistan and the United Kingdom).
Source: World health statistics *(54)*.

There is consistent evidence that exposure to indoor air pollution increases the risk of pneumonia in young children, and chronic respiratory disease and lung cancer (due to coal use) among adults aged over 30 years *(52)*. Some evidence suggests associations between biomass smoke and lung cancer, asthma, cataracts and tuberculosis. A few studies provide suggestive evidence of a link between indoor air pollution and adverse pregnancy outcomes, in particular low birth weight. Tentative evidence exists for associations with ischaemic heart disease and cancers of the nose and throat *(53)*.

A general measure of exposure to pollutants, particularly fine particles, from indoor heating and cooking sources is given by the proportion of people (including children) living in homes where solid fuel is used. Worldwide, the use of solid fuel is the largest source of indoor air pollution, with 52% of the population using it for cooking and heating inside the home *(53)*. Within Europe, there are immense differences in the proportion of children living in homes where solid fuel is used (Fig. 25). In the majori-

ty of countries (mainly in western Europe), less than 5% (the lowest proportion modelled) of the population are exposed. In central and eastern Europe, the proportion ranges from more than 70% in Kyrgyzstan, Tajikistan and Uzbekistan to less than 5% in Hungary, Lithuania and Poland.

According to the WHO regional assessment of the burden of disease related to the use of solid fuels *(55,56)*, the highest burden falls on children aged under five years living in Eur-B countries (Table 4).

Table 4. Estimated burden of acute lower respiratory infections in children aged under five years attributable to use of solid fuels at home, 2004 and 2006

WHO epidemiological sub-regions	Comparative risk assessment project, 2004		Burden of disease study, 2006	
	No. of deaths (000s)	DALYs (000s)	No. of deaths (000s)	DALYs (000s)
Eur-A Andorra, Austria, Belgium, Croatia, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Israel, Italy, Luxembourg, Malta, Monaco, Netherlands, Norway, Portugal, San Marino, Slovenia, Spain, Sweden, Switzerland, United Kingdom	0	0	0	0
Eur-B Albania, Armenia, Bosnia and Herzegovina, Bulgaria, Georgia, Kyrgyzstan, Poland, Romania, Serbia and Montenegro, Slovakia, Tajikistan, The former Yugoslav Republic of Macedonia, Turkey, Turkmenistan, Uzbekistan	12	417	5	160
Eur-C Belarus, Hungary, Kazakhstan, Latvia, Lithuania, Republic of Moldova, Russian Federation	1	22	0	3

Source: Smith KR, Mehta S, Maeusezahl-Feuz M *(56)*; WHO *(57)*.

Estimates of the impacts on health of solid fuel use for individual countries have been recently published by WHO *(28)*. The results suggest that indoor air pollution from solid fuel combustion is a public health problem in some areas of the Region. The projected use of solid fuels in households is higher in the eastern countries than in the west.

School environment

Several important indoor environments for children such as day-care centres and schools could not be considered here because of a lack of Europe-wide data. Ongoing European studies, such as the example in Box 12, will provide data in the near future.

POLICY RESPONSE

The previous sections have shown that respiratory illnesses are an important cause of childhood mortality and morbidity in the Region as well as the rising prevalence of asthma and allergies in many countries. Appropriate management of asthma can control the disorder and enable people to enjoy a good quality of life in spite of the disease. However, medication cannot be the only way to control asthma, and primary prevention, including reduction of exposure to tobacco smoke and air pollution, is important for reducing the disease burden.

Box 12. Health Effects of the School Environment project

The Health Effects of the School Environment (HESE) project was the first study of European school environments. It was financed by the EU and carried out during 2004–2005 in Denmark, France, Italy, Norway and Sweden. Measurements were made of exposures in the school environment associated with asthma, allergies and effects on eyes and the respiratory tract in primary schoolchildren. Forty-six classrooms were studied in 21 schools.

Ventilation was assessed by measuring carbon dioxide levels, with a level of <1000 ppm taken as the reference level. Schools in Norway and Sweden generally met this norm, as the majority had effective mechanical ventilation. In the remaining countries, schools that did not have mechanical ventilation systems failed to meet the norm. Allergens from furry animals were detected in all school rooms in northern and southern Europe. Classrooms in Norway and Sweden had the lowest levels of airborne cat and dog allergens and lower levels of particulates, mould and bacteria. The levels of airborne allergens in France and Italy were two to five times higher than those in Sweden. Horse allergen in dust was a phenomenon specific to Sweden where there is an unusually high number of horse riders.

The frequency of wheezing in pupils was high in those classrooms with higher levels of particles (PM_{10} >50 mg/m^3). Pupils in classrooms with higher levels of carbon dioxide (>1000 ppm) had a higher frequency of dry cough at night and wheezing.

The results show that an effective mechanical ventilation system is a prerequisite for a good indoor environment in a school. Extensive investment in ventilation in Scandinavia during the 1990s improved the indoor environment in schools, but a corresponding investment in other parts of Europe still appears unlikely.

The project was reported to the EC Directorate-General for Health and Consumer Protection during 2006.

Note. Information about HESE can be found at the Uppsala University web site (www.ammuppsala.se) *(58)*.

Many studies show that respiratory diseases such as asthma and allergic conditions are under-diagnosed. Given this, raising awareness in the population is important to trigger relevant curative and preventive action. Box 13 outlines some ways of doing this.

Box 13. Raising awareness

World Asthma Day is an annual event organized by the Global Initiative for Asthma (GINA) to improve asthma awareness and care around the world. The Prevention of Allergy and Allergic Asthma Project is an outcome of a joint meeting between WHO and the World Allergy Organization – IAACI (WAO). This approach focuses mainly on different preventive measures for allergy and allergic asthma. Furthermore, the Global Alliance against Chronic Respiratory Diseases (GARD), a voluntary alliance of internationally recognized organizations and institutions, is part of WHO's activities to prevent and control asthma and allergic conditions. GARD includes GINA, which was formed in 1992 by WHO and the US-based National Heart, Lung and Blood Institute. It also includes the Global Initiative on Allergic Rhinitis and its Impact on Asthma (ARIA), in which WHO is a participant. The WHO Practical Approach to Lung Health (PAL), a strategy designed to help primary health care workers to improve their management of respiratory symptoms, is used in GARD's implementation strategy.

ENVIRONMENTAL TOBACCO SMOKE

ETS is by far the most significant indoor air quality issue in health terms. Most countries in the Region have implemented policies to restrict smoking in public areas and on public transport, the direct advertisement of tobacco products, and the sale of tobacco products to minors *(45)*. One aim of these is to reduce the exposure of children to tobacco smoke in public areas and to discourage active smoking. However, some countries still have no legal restrictions on smoking, even in health care or educational facilities.

In all countries policies to reduce the exposure of children to ETS are based on the principle that non-smokers should be protected from ETS in all public indoor environments. Policies tend not to focus exclusively on children, although they are generally considered a priority group. Many countries place a focus on child-specific environments such as nurseries, kindergartens, schools and play areas. Three quarters of the countries in the Region have banned smoking in education and health care facilities. Most national legislation prohibits smoking in theatres and cinemas. Smoking in restaurants and bars is regulated less strictly: 15% of countries have imposed bans, around 60% have imposed some restrictions and a quarter have no restrictions. Stronger policies should be implemented to protect the health of staff and customers in bars and restaurants, where the customers often include children and adolescents. Despite the bans on the sale of tobacco products to minors, tobacco is still widely available to young people throughout the Region *(45)*.

EU member states have been implementing stronger smoking control measures since European Council Recommendation 2003/54/EC *(59)* and most of them have enforced laws in response to EU Directives 2003/33/EC *(60)* and 2001/37/EC *(61)*. The WHO Framework Convention on Tobacco Control has been ratified (or will shortly be ratified) by several EU countries, including Austria, Bulgaria, the Czech Republic, Finland, Germany, Greece, Hungary, the Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia and Spain.

As it takes time to bring about changes in tobacco consumption in the Region, stronger capacity-building appears appropriate involving the development of human, financial and structural resources with long-term sustainability to support tobacco control.

Many Member States have already banned smoking in public places. However, for private indoor environments, a regulatory approach (even if necessary) is difficult to implement, and perhaps the focus should be on awareness-raising measures. More information is needed on the effects on health of exposure to ETS in the home and on children, and on what kinds of information campaign are the most effective, especially in targeting parents to encourage smoke-free homes. In the long term, a non-smoking social norm can be envisioned, with a trend towards smoke-free societies.

OUTDOOR AIR POLLUTION

The EU thematic strategy on air pollution was proposed by the European Commission in 2005 *(62)*. It established interim health-related objectives for air quality in the EU and recommended that current legislation be modernized and better focused on the most serious pollutants and that more is done to integrate environmental concerns into other policies and programmes. Implementation of the current EU air pollution legislation is expected to reduce the total number of premature deaths (adults and children) by about 116 000 annually in the 25 EU countries. Premature death could be further reduced by about 50% of the current estimates by implementing all currently feasible emission reduction measures (the maximum feasible reduction scenario) *(27)*.

However, an evaluation of EU member states' programmes in the areas not complying with the EU air quality directives in the first half of the current decade have found that they were to a large extent ineffective in reducing air pollution. There are several reasons for this, related to timing (late implementation), implementation problems or technical difficulties. The report assessing the programmes points to the need for sound planning and for better data and models to aid understanding of the scale and causes of the air quality problem, and better harmonization with other national plans and programmes *(63)*.

The UNECE Convention on Long-range Transboundary Air Pollution is also an important instrument contributing to the reduction of air pollution and population exposure to PM. The PM Working Group of the Convention is evaluating the degree of control of pollutants that contribute to the formation of PM, already provided for by existing protocols to the Convention and other instruments, as well as developing further technical and non-technical measures to assist the parties to reduce emissions of and exposure to PM *(64)*.

INDOOR AIR POLLUTION

Several political instruments have been suggested to achieve a reduction in health risks arising from exposure to pollutants emitted by indoor combustion. Suggestions include the implementation of dedicated taxes and subsidies (such as on fuels and appliances), regulation and legislation (air quality standards, standards for cooking appliances, etc.), and direct expenditure such as on public programmes for the provision of high-quality stoves or hoods with ventilation. There is an urgent need to investigate the real scale of the problem in Europe and to promote successful and sustainable interventions accordingly.

The introduction of high-quality fuels may be a more effective measure to reduce health damage from cooking and heating indoors than the provision of high-quality appliances to burn solid fuel inside the home. Information on the health benefits of interventions towards cleaner indoor air in European countries is currently limited and should be further investigated.

Damp in homes also compromises indoor air quality. In European countries, the problem of damp housing and its related negative health consequences is addressed partly by technical building codes, usually only relevant to new buildings, and partly by hygienic requirements that aim to ensure conditions that are not hazardous to life. These measures frequently fail to include a requirement for protection against excessive humidity. In addition, many European countries have public health services that carry out health inspections in dwellings according to specific guidelines. In general, existing policies aim to ensure habitable and healthy housing conditions but do not include specific health promotion objectives. For most European countries, the responsibility to avoid or reduce damp is largely left to the individual or household. With free housing markets, households that are vulnerable due to socioeconomic status are likely to be put at risk, as they will be restricted to access to housing that is both low-quality and likely to suffer from greater problems of damp.

Some national policies in Europe are increasingly taking health aspects into account. Portugal, with a high rate of housing with problems of damp, has introduced a project entitled “Housing and Health” that aims to create local housing and health action plans. This project will enable all the municipalities to develop their own plans, based on the directives that will be part of a guideline document. Finland, one of the countries with the lowest exposure to damp housing, addresses problems of damp in its Land Use and Building Act (132/1999). The United Kingdom has recently developed a Housing Health and Safety Rating System to evaluate residential buildings on the basis of their risk to health; damp and mould is a major issue in this System.

The lack of binding policies on the standard of housing stock, combined with the large number of organizations and authorities responsible for housing policy, make the rehabilitation of housing stock a challenge. In this context, international forums should support the development and implementation of national intersectoral policies on specific action aimed at improving the housing stock. For non-EU countries, standardized procedures to collect these data are required.

OVERALL PROGRESS

Outdoor air pollution remains a pan-European problem. Living close to busy roads and concomitant exposure to traffic-related air pollutants is a problem in many big metropolitan areas in Europe. To avoid exposure to traffic-related pollutants and the resulting adverse health effects, buildings used mainly by children, such as schools and day care centres, must not be located near busy roads. The creation of traffic-free zones may reduce the exposure of children to air pollution and noise as well as the risk of traffic accidents, and will have beneficial effects for physical activity.

The number of children exposed to ETS before and after birth at home and in public places is unacceptably high, and strong and effective action plans are needed to protect them from irreversible adverse health effects. While in some countries (for example, the Nordic countries) exposure to ETS has diminished in recent years, the situation remains bad in others such as Germany and countries in eastern Europe. Exposure to ETS remains a problem in several countries.

Damp homes contribute substantially to the development and exacerbation of asthma. This is avoidable. The implementation of countermeasures through an integrated regulatory framework which encompasses the relevant housing dimensions from building codes to ventilation will help to prevent adverse health outcomes.

Exposure to products derived from the combustion of solid fuels is a considerable health problem in some parts of the Region. Urgent action needs to be taken in order to reduce and prevent post-neonatal mortality and respiratory infections.

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Chapter 4. Eliminating hazards from children's environment

RPG IV

We commit ourselves to reducing the risk of disease and disability arising from exposure to hazardous chemicals (such as heavy metals), physical agents (e.g. excessive noise) and biological agents and to hazardous working environments during pregnancy, childhood and adolescence.

Children's Environment and Health Action Plan for Europe

RPG IV covers a wider range of environmental hazards than RPGs I–III, and is associated with changing behaviour and the institutional infrastructure and socioeconomic situation in countries. This section focuses on four topics, giving a baseline assessment of the situation for each separately: (i) childhood leukaemia, (ii) healthy exposure to UVR, (iii) chemicals in food, and (iv) children and young people at work. They were selected for several reasons, including a significant associated health burden, public concerns, the availability of data and evidence, and the potential to take targeted action to benefit health.

Despite the difference in the topics, they are all of special concern for child health for similar reasons: the particular sensitivities of pre- and postnatal babies and children due to their rapid development, their different metabolisms and behaviour compared to adults, and their potentially long life ahead which render them more vulnerable than adults to many environmental hazards.

KEY MESSAGES

- Leukaemia accounts for around one third of cancers in children aged under 15 years. The causes remain largely unknown, and despite studies that suggest links to a number of environmental factors, the established causes contribute to only a few cases. Consequently, without guiding evidence, the scope for preventive action is currently limited. On the other hand, good treatments which significantly improve survival are available. Action should be taken to increase access to adequate health care for children with cancer, particularly in less affluent parts of the Region.

- Excessive exposure to UVR in childhood can have serious effects on health in later life. These include malignant melanoma, the rates for which are high and rising in some European countries. Policies aimed at reducing exposure to UVR are often inexpensive and effective, but the degree of implementation varies across the Region. The situation should be improved, particularly for some kinds of exposure such as the use of sunbeds by teenagers.

- A well-balanced diet is essential for good health but food may also expose children to hazardous chemicals and microorganisms. The enforcement of regulations is useful for preventing exposure to microbiological agents and controlled chemicals. For unwant-

ed contaminants such as heavy metals, however, a risk–benefit approach is more effective. Owing to the wide range of chemicals to which people are exposed, priority must be given to those that have the greatest potential impact on public health.

- Working children face different risks to working adults. While it is known that many children are injured at work, the true magnitude of the problem in the Region is unknown. Available data suggest that there has been a general decline in injuries in recent years, but these data cover relatively few countries and collection methods vary. Children can be protected through the enforcement of regulations that ensure their rights are upheld. This should be supported by the establishment of a reliable health information system for workers, which will allow prioritization and monitoring of progress.

CHILDHOOD LEUKAEMIA[17]

INTRODUCTION AND OVERVIEW

Leukaemia is the most frequent type of malignancy among children in the industrialized nations. It is a subject of considerable public concern, especially in areas perceived as having an excessively high incidence and in relation to putative environmental causes such as radiation and chemicals. This sub-section reviews the rates and patterns of occurrence in the Region, the current state of knowledge about aetiology, and the prospects for alleviation of the burden of disease.

KEY MESSAGES

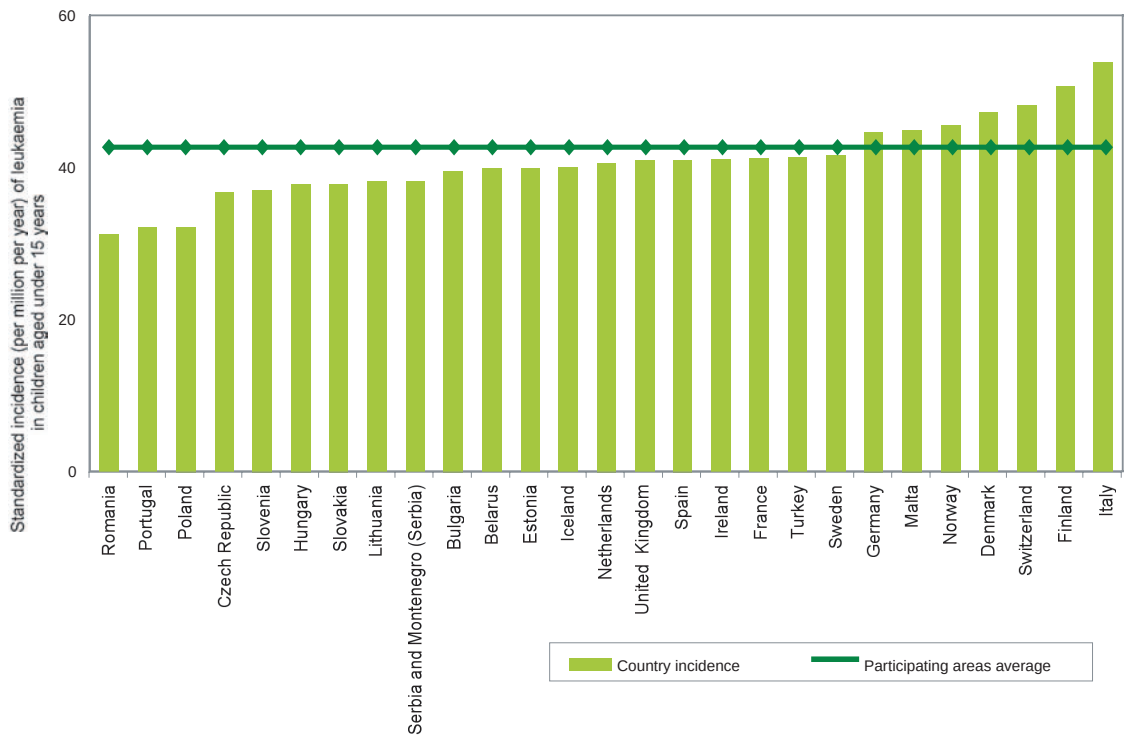
- There are about 6000 new cases of childhood leukaemia per year in the Region, with 2400 deaths. Incidence tends to be higher in more affluent countries while survival is lower in the less affluent.
- Epidemiological research has produced much suggestive evidence for possible environmental causes, but established environmental risk factors account for very few cases.
- Several rare genetic disorders carry an increased risk of childhood leukaemia but account for well below 10% of all cases. Infection seems likely to be important in many cases, but its precise role has yet to be confirmed.
- The burden of childhood mortality from leukaemia can be reduced by improved survival, especially in the eastern part of the Region. At present, no public health measure can be identified which would result in a substantial decrease in incidence.

INCIDENCE AND BURDEN OF DISEASE

In Europe, leukaemia accounts for around 30% of all cancers diagnosed among children aged under 15 years *(1)*. Fig. 26 shows the estimated national incidence (age-standardized annual rates) in the countries with population-based cancer registries represented in the Automated Childhood Cancer Information System (ACCIS) *(2,3)*. The calendar period to which the data refer varied from country to country within the three decades 1970–1999. For countries participating in ACCIS, the standardized average incidence for the period 1970–1999 was 42 cases per million per year. Estimated national incidence ranged from 30 cases per million per year (Romania) to 50 cases per million per year (Italy).

[17]By Charles Stiller, based on ENHIS fact sheet.

Fig. 26. Standardized estimates of leukaemia in children aged under 15 years, selected countries, 1970–1999



Notes. Incidence was standardized using the world population. For some countries national estimates are based on regional registries (France, Italy, Poland, Portugal, Romania, Spain, Switzerland, Turkey).
Source: ACCIS *(2)*.

Incidence varies with age throughout childhood, rising from birth to reach a peak at 2–3 years and decreasing again thereafter *(4)*. Incidence was highest in the Nordic countries and southern Europe and lowest in the countries of central and eastern Europe *(4)*. Each year there are around 6000 new cases of childhood leukaemia in the Region. The recorded incidence in Europe rose at an average of 0.7% per year during the period 1970–1999 *(1)*. The relative contributions of real increases in risk and improved data capture are not precisely known *(5)*.

Approximately 75% of childhood leukaemia in developed countries is acute lymphoblastic leukaemia (ALL), 20% is acute myeloid leukaemia (AML) and the remaining 5% is of other rare subtypes. ALL has a pronounced peak of incidence at age 2–3 years which is reflected in the peak for all leukaemias combined, whereas AML has a relatively constant incidence throughout childhood. The incidence of ALL is up to 40 per million in northern and southern Europe and around 30 per million in the east. AML has an incidence of 5–10 per million. Most of the inter-regional variation in childhood leukaemia incidence in Europe can be accounted for by the relative size of the early childhood peak of ALL, which is most marked in the north and south and somewhat attenuated in the east. The incidence of ALL among infants and at age 5–14 years and the incidence of AML throughout childhood do not vary much across Europe. About 85% of childhood ALL is of the precursor B-cell subtype, which accounts for the early childhood peak; the remaining 15% is precursor T-cell leukaemia with a more uniform age distribution.

Most childhood leukaemia can be successfully treated. Mortality rates are consequently much lower than incidence. In 2002, it was estimated that 2399 children in the Region died from leukaemia, one third of them in countries of the former Soviet Union *(6)*.

AETIOLOGY AND RISK FACTORS

There is strong evidence that most cases of childhood leukaemia are initiated by prenatal chromosomal and genetic alterations in blood or bone marrow cells *(7)*. Only 1% of affected children go on to develop leukaemia, however, and the causes of the second, postnatal genetic event necessary for this to happen are virtually always unknown. Several rare, constitutional genetic disorders (where the abnormality occurs in all cells) also carry an increased risk of childhood leukaemia, but collectively they account for well under 10% of all cases and most children with these disorders do not get leukaemia *(8–10)*.

A great many forms of environmental exposure have been proposed as causes of childhood leukaemia. In most cases, however, the evidence for their role is inconclusive *(5)* and the remainder probably only account for a tiny proportion of the total incidence. Ionizing radiation is one of the very few established risk factors. Obstetric irradiation has hardly accounted for any cases since it was almost totally superseded by ultrasound. Similarly, radiotherapy for benign childhood conditions was recognized as carcinogenic some decades ago and is now obsolete. The higher than expected incidence of childhood leukaemia near some nuclear reprocessing plants is probably attributable to factors other than radiation, and children living near to nuclear power plants do not have an increased risk of leukaemia. Most recent studies have found no association between levels of natural background radiation and risk of childhood leukaemia *(11)*. Several broad studies have found an increased risk of leukaemia among children with the highest levels of exposure to electromagnetic fields. The reasons for this are not well understood and may include incomplete controlling for selection bias in some studies. The rarity of high exposure levels in the population means that, at most, only a small proportion of cases can be attributed to electromagnetic fields.

Exposure to a wide range of chemicals has been investigated for possible association with childhood leukaemia but the results have been largely inconclusive. Benzene is one of the more plausible chemical agents, not least because occupational exposure is an established cause of AML in adults. Several studies have suggested that exposure to benzene and other hydrocarbons is a risk factor for leukaemia in children, but assessment of exposure was indirect, hence the need for results to be interpreted with caution. Also, the incidence of childhood AML is relatively constant across populations with presumably widely varying levels of exposure, indicating that the attributable number of cases is small. Many studies have reported associations between exposure to pesticides and childhood leukaemia, but frequent limitations have included small numbers of exposed children, the lack of detailed information on specific substances and timing of exposure, and the possibility of recall bias. Childhood leukaemia was associated with the use of insecticidal shampoo to treat head lice in one recent study, but this finding has yet to be replicated.

Since leukaemia is a malignant neoplasm of the white blood cells, a part of the immune system, an infectious aetiology is highly plausible *(12)*. Many epidemiological studies have indicated that infection is likely to have a role in the aetiology of childhood leukaemia, especially ALL (*13–15)*. The two principal hypotheses, which need not be mutually exclusive, are as follows:

(i) delayed exposure to infection, for instance as a result of immunological isolation in infancy, which could result in an abnormal response, leading to development of leukaemia;

(ii) leukaemia may be a rare response to a specific, though still unidentified, infectious agent; this would be most likely to occur, giving rise to localized increases in incidence, when susceptible children in populations with low herd immunity encounter high levels of infection introduced by, for example, new residents from diverse areas of origin.

Consistent with the first of these theories, many, though not all, studies have found an increased risk of leukaemia or ALL associated with probable markers for delayed or reduced childhood infection or impaired development of the immune system *(12)*. For example, breastfeeding and day-care attendance in early childhood both appear to have a protective effect. The second theory is supported by many studies that have found an increased risk of leukaemia in settings with unusually high levels of population mixing, though again such an effect has not invariably been found *(12)*. A recent study of childhood cancer incidence over a 25-year period throughout Great Britain showed that, in particular, there was significant evidence for space–time clustering at age 1–4 years and over childhood as a whole, but not specifically at age 5–14 years *(16)*. The same study, in common with many earlier investigations, also found that incidence was higher in areas of higher socioeconomic status, which could in itself be a marker for early protection from infection.

PROSPECTS FOR REDUCING THE DISEASE BURDEN

Intensive epidemiological research has produced much suggestive information about possible environmental causes of childhood leukaemia, but the causes of the overwhelming majority of cases remain unknown. In the present state of knowledge, there are no public health measures which could be expected to result in a substantial decrease in incidence. For example, it has been estimated that increasing the prevalence of breastfeeding in the United Kingdom from 50% to 100% would prevent no more than 5% of cases of childhood acute leukaemia or lymphoma *(17)*.

Childhood leukaemia is eminently treatable, and by the mid-1990s five-year survival in Europe had reached 82% for ALL and 53% for AML *(4)*. Survival from both ALL and AML was lower in the east than in other European regions *(4)*. There were large increases in survival during the 20-year period 1978–1997. The increase in the east was comparable with that in other regions for ALL, but relatively small for AML *(4)*. There is still room for considerable reduction in the burden of mortality from childhood leukaemia through improved treatment, especially in the eastern part of the region and for AML.

POLICIES AND ACTION

Effective preventive measures require much greater knowledge about aetiology than is currently available. There is a continuing need for focused epidemiological and laboratory research to elucidate the causes of childhood leukaemia. Meanwhile, the burden of mortality from childhood leukaemia could be substantially reduced by continuing improvements in treatment, especially in less affluent countries and for types of leukaemia that still have a relatively poor prognosis.

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ENJOYING THE SUN SAFELY[18]

INTRODUCTION AND OVERVIEW

UVR is essential for health and development, but excessive exposure poses an important environmental health threat and causes a substantial disease burden. Much exposure to UVR occurs in childhood and thus determines the risks for severe diseases such as malignant melanoma and skin cancer. Rates of melanoma are high in many European countries, particularly those with a predominantly fair-skinned population, and continuing to increase in some of them.

Countries have implemented policies to protect against and reduce UVR to varying extents. Much more could be done to reduce health risks effectively. Increased public promotion of sun protection and the banning of sunbed use for young people are among the most important policy actions. The strict implementation of the Montreal Protocol on Substances that Deplete the Ozone Layer *(1)* needs to continue so the UV-protective ozone layer eventually recovers. Comprehensive UVR protection policies will lead to a major reduction in the occurrence of skin cancer in European countries, but the impact will not be immediate. Therefore sustainable UVR protection policies will need to be devised while health monitoring, for example for melanoma and other skin cancers, needs to be continued or established.

KEY MESSAGES

- Exposure to UVR in childhood is an important risk factor for severe diseases in adulthood, including melanoma and non-melanoma skin cancer.
- Melanoma rates are high in many European countries, particularly in the north.
- Implementation of protection policies against UVR varies markedly between countries. It is particularly important to increase the promotion of sun protection behaviour and to ban the use of sunbeds by young people.

PUBLIC HEALTH AND UVR

Children and adults are exposed to natural solar UVR, but artificial sources of UVR, such as sunbeds, also contribute to exposure and health risks. UVR has a number of beneficial effects, including the production of vitamin D which improves musculoskeletal health. However, excessive exposure causes a considerable disease burden in many European populations. The main adverse health effect is melanoma, a malignant skin cancer. Other skin cancers as well as some eye diseases and other skin problems are associated with UVR *(2)*. Efforts towards environmental health protection must, therefore, focus on the reduction and avoidance of excessive exposure to UVR.

Children are particularly vulnerable to UV-related damage and may incur more sunburns than adults. Evidence suggests that sunburn during childhood and adolescence is linked to melanoma in relatively young people (aged under 55 years). Data on the incidence of melanoma are direct measures of UVR-related disease, and time trends of melanoma in people aged under 55 years can be interpreted as indicators of effective reduction in the exposure of children and adolescents to UVR.

[18]By Hajo Zeeb, based on ENHIS fact sheets.

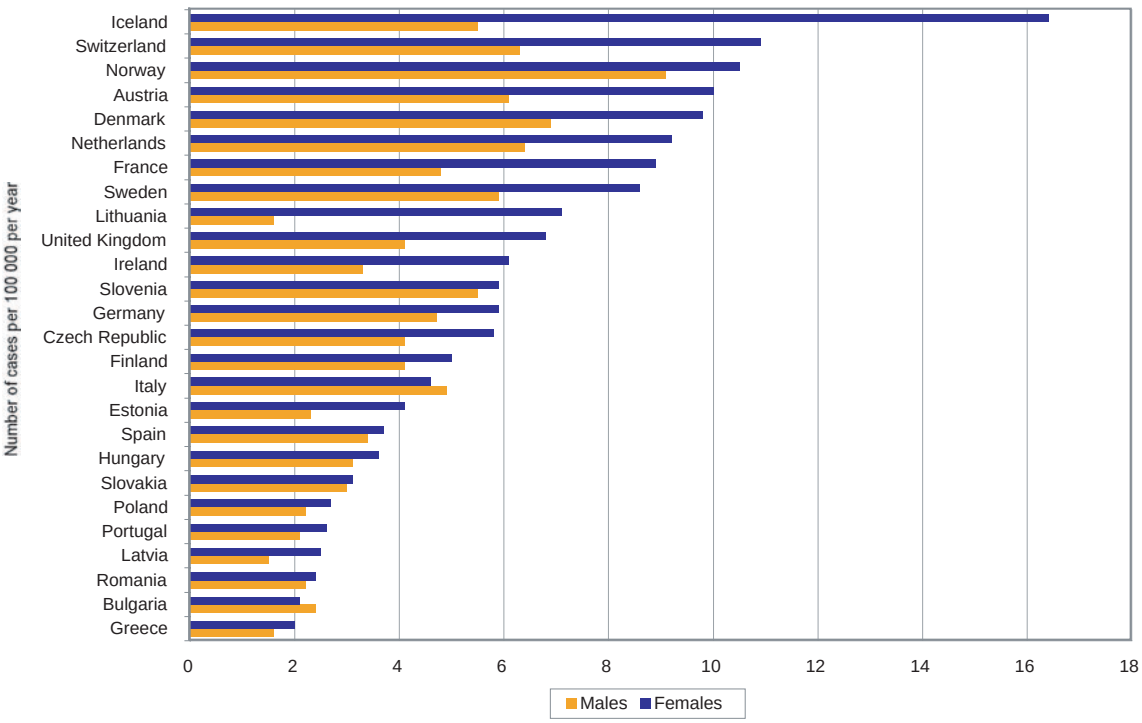
MALIGNANT MELANOMA IN EUROPE

In 2002, more than 21 000 new cases of melanoma were diagnosed in the population under the age of 55 years in Europe and accession countries *(2,3)*. For all ages combined, melanoma caused by UVR leads to the loss of up to 250 000 DALYs annually in the Region *(4)*.

The most important risk factors for melanoma are a light skin phototype (types I and II), a large number of naevi or atypical naevi, and a family history of skin cancer. Sunbed use is also a risk factor. Melanoma is more frequent among people of higher socioeconomic status, and in northern European populations. This is probably due to more frequent, intermittent and high exposure to UVR (for example, during frequent sunny holidays) and a light skin phototype. Additionally, diagnosis and case identification may be more common in this group, further increasing apparent rates.

Fig. 27 shows the standardized melanoma incidence for persons aged under 55 years in Europe for 2002. Melanoma rates are generally higher in women than men, and there is a major gradient (up to eight-fold for women) between southern/central and northern European countries.

Fig. 27. Age-standardized rates of melanoma incidence in people aged under 55 years, selected European countries, 2002

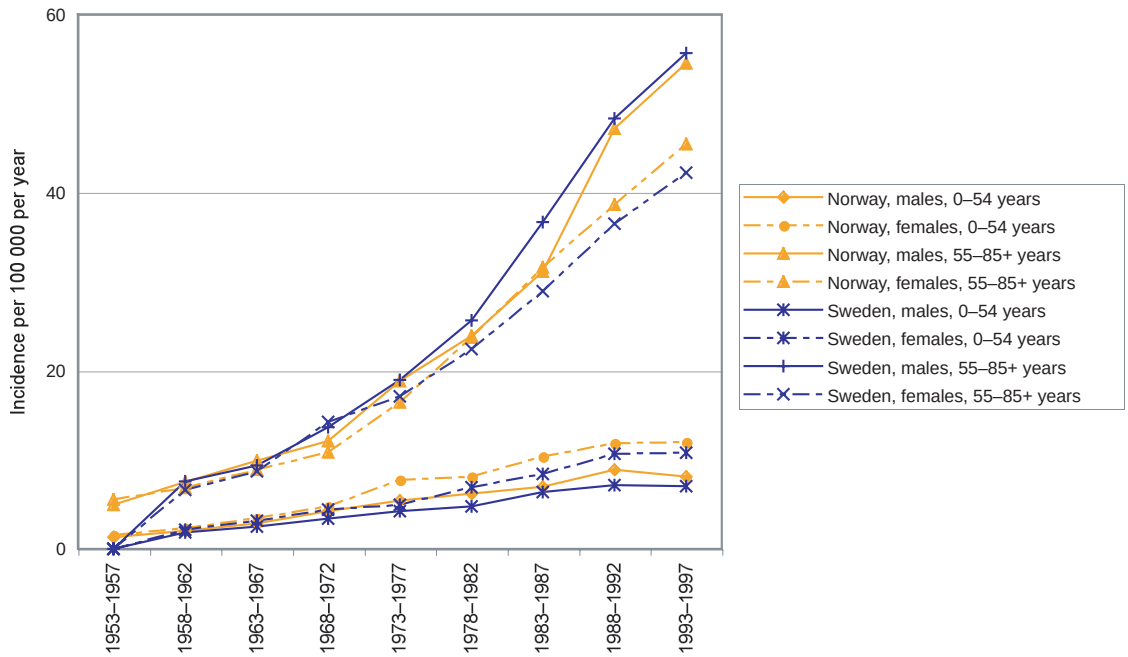


Source: GLOBOCAN *(3)*.

Time trends for melanoma incidence differ between European countries (Fig. 28). Sharp increases in melanoma frequency were seen all over Europe up to the 1980s and 1990s, and melanoma incidence is expected to increase further in countries of southern Europe. However, in some northern and western European countries incidence rates have stabilized over more recent years, particularly among younger people. A substantial decrease in melanoma occurrence among children and adolescents has recently been reported from Sweden *(5)*. These trends may reflect the first successes of

primary prevention policies, and should provide strong motivation for other countries to strengthen their activities to protect against UVR.

Fig. 28. Time trends of melanoma incidence in Norway and Sweden, 1953–1997



Source: IARC *(6)*.

Good data are essential to assess preventive activities and the identification of core issues of concern, thus the monitoring of melanoma time trends through high-quality cancer registries remains a high priority. Currently, not all countries can supply cancer data that cover all or a major part of the respective populations.

UVR AS A DETERMINANT OF ENVIRONMENTAL HEALTH

UVR reaching the earth's surface is largely composed of long wavelength UV-A. The atmosphere filters out most of the shorter wavelength UV-B and the very short wavelength UV-C. Several factors influence UVR levels *(7)*:

(i) elevation of the sun: the higher the sun in the sky, the higher the UVR level, with an increase in UV-B relative to UV-A, so that UVR levels vary with time of day and time of year;

(ii) latitude: UVR levels are higher close to the equator;

(iii) cloud cover: UVR levels are highest under cloudless skies; due to scattering within the atmosphere, UVR levels can be high even with cloud cover;

(iv) altitude: the atmosphere is thinner at higher altitudes and less UVR is absorbed;

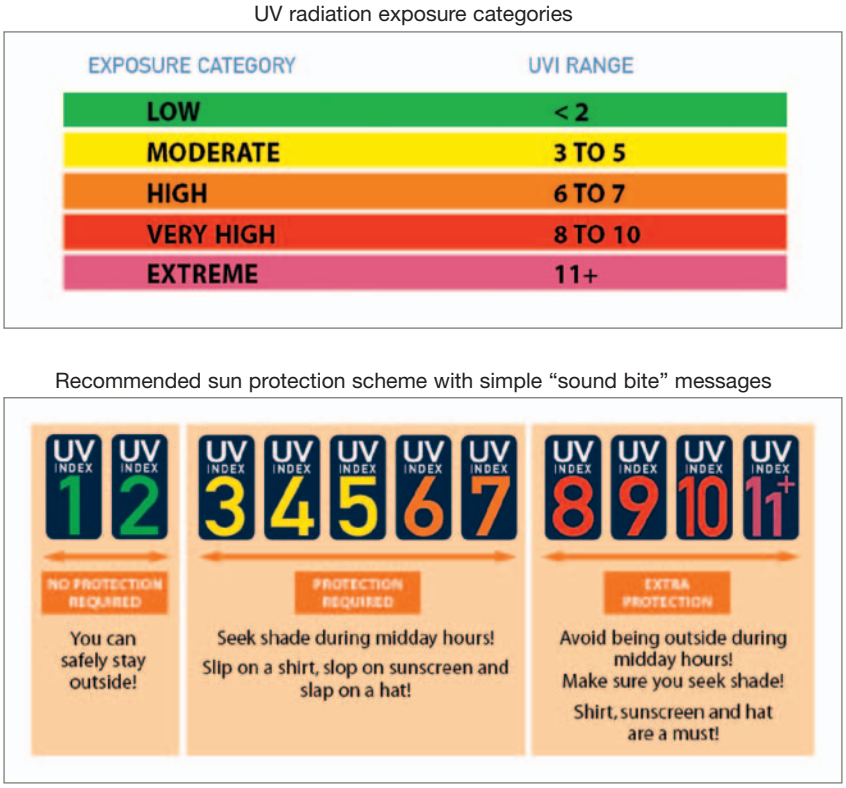
(v) ozone: ozone in the atmosphere absorbs some UVR radiation; ozone depletion leads to increased UV-B levels with little impact on UV-A levels;

(vi) reflection: grass, soil and water reflect very little UVR while dry beach sand reflects about 15% and sea foam about 25%; fresh snow reflects up to 80%.

Ozone depletion in the stratosphere has led to increased ground level exposure to UVR in recent years. Peak exposure will probably occur around 2020, decreasing slowly as the effects of the international ban on ozone-depleting substances begin. These environmental trends, in conjunction with the worrying level of sunbed use among adolescents in some countries, indicate the need for preventive action in Europe.

Measurements are necessary to determine UVR at ground level. The measurement-based solar UVR index *(8)* combines all solar UVR, taking account of differences in ability to damage skin. Fig. 29 shows the exposure categories and colours used for different UVR index ranges and the protective advice for each category *(9)*.

Fig. 29. Categories of exposure to UVR according to the global UV index and recommended protection schemes



Source: WHO *(9)*.

A recent survey found that more than 80% of participating countries in the Region provide regular and current UVR index information to their populations *(10)*. The UVR index can be easily displayed in public places such as schools, transport systems and recreational facilities, and is an important communication tool (Box 14).

Box 14. Use of the UV index in France

Information campaigns and the production of tools to evaluate the intensity of UVR are coordinated by the National Institute of Cancer, the National Institute of Prevention and Health Education and the Meteorological Institute.

Every spring the National Institute of Cancer launches a national campaign on television and other media to raise awareness of the risks linked to exposure to UVR and the need for preventive action. The campaign targets the general population, with children as the major focus.

In 2004, a further campaign targeting professionals was launched. UVR index forecasts and corresponding recommendations for appropriate behaviour are shown on television during weather reports in summer and all year round on the French meteorological agency web site *(11)*. A web site run by the nongovernmental organization Sécurité solaire (a WHO collaborating centre) and supported by the National Institute of Cancer also provides a wide range of information on protection from UVR, including the UVR index *(12)*.

Source: Jourdain F, Pirard P *(13)*.

UVR PROTECTION POLICIES AND ACTION

Children are generally more susceptible to the ill health effects of UVR than adults. A significant part of a person's lifetime exposure to UVR occurs before the age of 18 years, and children have more time to develop diseases with long latency. During outdoor activities children should be protected from high exposure to UVR and babies should always remain in the shade. It is particularly important to promote sun protection in schools and to inform children of the risks of overexposure and how to avoid them (Box 15). Resources for teachers and children can be found in recent publications from the United Nations Environment Programme, the United Nations Children's Fund and WHO.

Box 15. School-based skin cancer prevention programme in Hungary

In the Hungarian city of Györ, a survey was conducted (in collaboration with national and international partners) among primary schoolchildren aged 6–10 years to assess their UVR risk profile. The aim was to gather information to be used for raising the awareness of children and their parents about the risks of over-exposure to UVR.

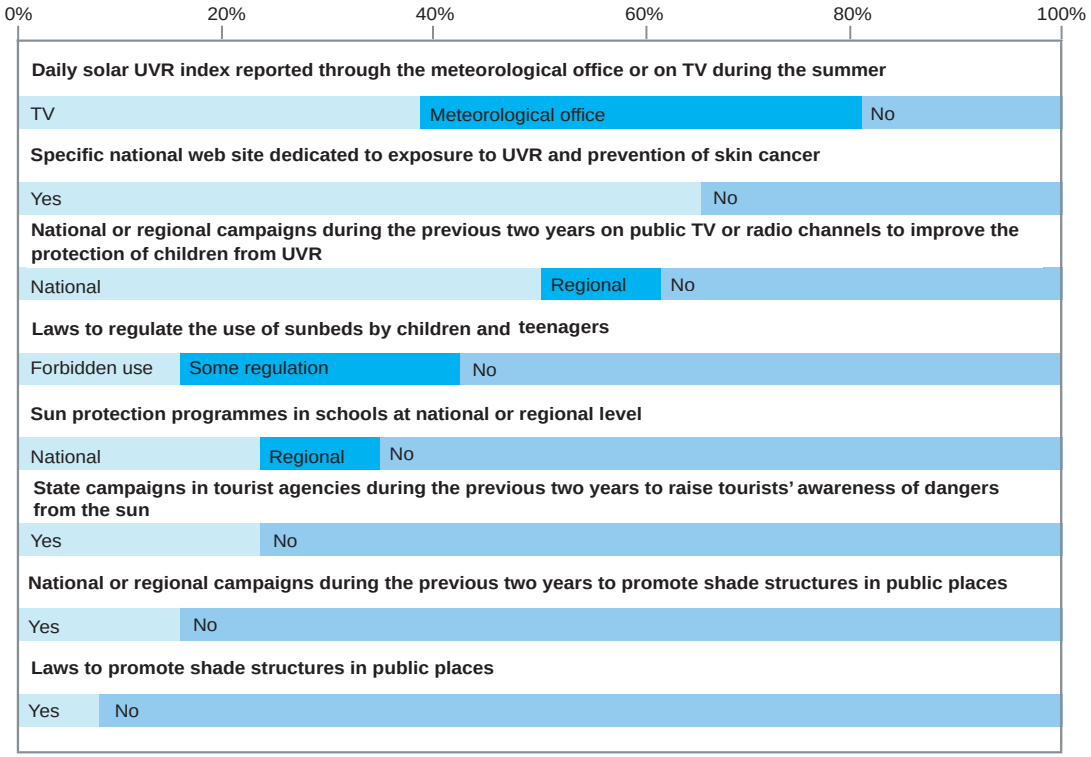
Questionnaires concerning the known genetic, environmental and behavioural risk factors were used to classify the children into low-, medium- or high-risk groups, considering skin sensitivity to solar radiation. The survey found that more than a quarter of the children belonged to the high-risk group, while 11% were classified as low risk. Following the assessment, recommendations that included personal sun safety measures were sent to each of the children. A regular follow-up to this school-based programme is planned, which will allow evaluation of the intervention.

Source: Fehér K et al *(14)*.

Together with national partners, WHO has developed international recommendations on protection from UVR. These are directed towards environmental health, and focus specifically on children when feasible. However, an ENHIS-CEHAPE survey on implementation of the WHO recommendations in 26 countries found that only a small number of countries have official regulations on protection from UVR *(10)*. Among other things, the survey reviewed policies and public infor-

mation action, the availability of the UVR index, school health programmes relating to UVR, the regulation of sunbed use by young people and the provision of shade structures. Fig. 30 gives an overview of the survey's results.

Fig. 30. Percentage of 26 WHO European countries implementing specific action to reduce the excessive exposure of children to UVR, 2006



Source: ENHIS-2 project countries and countries volunteering data *(10)*.

The survey found that the WHO recommendations were being implemented to varying degrees. Belarus, Malta, Sweden and The former Yugoslav Republic of Macedonia had implemented most of the recommendations. Overall, the daily solar UVR index received most attention, together with internet web sites promoting protection from UVR. More than 60% of responding countries had conducted child-focused mass media-based UVR protection campaigns in the recent past. However, most other recommendations had only been implemented to a minor extent. For example, laws to promote shade structures in public places were included in construction and technical building standards in Belarus, Slovenia and Uzbekistan. Only Belgium, France, Portugal and Spain prohibited the use of sunbeds by young people (Box 16), but some countries reported other approaches to the control of sunbed use (Box 17).

Box 16. Regulation of sunbed use in France

The use of artificial UVR in sunbeds is covered by strong legislation in France (Decree of 30 May 1997 No. 97–617). The General-Directorates of Health and of Consumption and Fraud Repression on Artificial UV control this. Under the regulation, all commercial sunbeds must be declared to the local authorities, and people putting sunbeds at the public's disposal are required to attend training. Also, before the installation of a sunbed, and subsequently every two years, there is mandatory technical control. Last but not least, the use of sunbeds is prohibited for young people aged under 18 years.

Of course, the immediate health benefits for children are difficult to establish. However, it is expected that sunburn in children should become rarer as policies lead to changes in behaviour. In support of this, and as outlined above, some countries have already experienced a levelling-off of melanoma rates following the introduction of UVR protection policies. Given this, it is clear that UVR protection polices need to be sustainable to allow time for the effects on health, such as a reduction in skin cancer, to be seen *(13)*.

Box 17. Healthy sun tanning: the case of Norway

In Norway, a tan is considered attractive by most people and the country has one of the highest rates of skin cancer in the world. Every year about 1000 individuals are diagnosed with malignant melanoma and 200 die. In stark contrast, only 100 people were diagnosed each year in the 1950s. On a positive note, however, there has been an attenuation of the rapid rise in diagnosed cases since the 1990s, and the number of medical consultations for severe sunburn at medical emergency clinics has significantly decreased over the last few decades.

Contributing to these improvements is an intervention programme, begun in 1998, which comprises daily UVR forecasting on the web and awareness-raising (*15)*. The latter includes press releases to the media, which have also been picked up by major television channels, radio stations and newspapers. There have also been stands at the popular beaches in the summer to draw attention to UVR intensities (UV index) and voluntary monitoring of moles on the skin.

A recent Norwegian Cancer Society report based on a survey of 1003 people aged 15 years and over conducted by the Norwegian Market Survey Institute found that in 2004, 38% of respondents sunbathed less than they did five years before. In a similar survey carried out in 1999, 48% had reduced their sunbathing. In both surveys, 11–12% of respondents said they sunbathed more than they had five years earlier.
This may indicate that public advice during the period of concern over the ozone hole in the 1990s was particularly effective, and that the advice on exposure to UVR has been absorbed by the main accessible audience. There was less use of sunbeds in 2004 (18%) than 2001 (27%). Future campaigns should target men and young people (15–24 years) of both genders, as they are generally relatively more careless about exposure to the sun.

Source: The Norwegian Cancer Society *(16)*.

STOPPING DEPLETION OF THE OZONE LAYER

The Montreal Protocol and its various amendments seek to stop the depletion of the UV-protective ozone layer by phasing out ozone-depleting substances. European countries have successfully implemented the protocol, and in EU countries, relevant substances have been almost entirely phased out, with small and consecutively reduced amounts covered by licences under the Protocol. For example, methyl bromide is a pesticide which is a potent ozone-depleting substance. By 2006, 91% of the historical methyl bromide consumption in the EC had been eliminated. France, one of the three EU countries that had the highest methyl bromide consumption in 1991, has achieved major reductions: less than 2% of the amount used in 1991 was licensed for use in 2006, and usage may have been even lower *(17)*.

Both in Europe and globally, implementation of the Montreal Protocol remains a top environmental policy priority. While it is anticipated the ozone layer will fully recover, it may be several decades before full UVR protection is regained.

CONCLUSIONS

Protecting children from excessive UVR is an important and effective way to avoid serious health consequences for them now and in later life. Only a small number of countries have implemented a full range of policies to protect children and the overall population from UVR. Thus, major opportunities exist for developing policies, as well as for harmonizing and strengthening efforts to reduce excessive exposure of children to UVR.

Excessive exposure to solar UVR is best prevented by regional and local awareness-raising and information campaigns, in particular in schools. Regulations – preferably a ban – for the use of sunbeds by children and teenagers have been adopted by a small number of countries, and should be implemented in all the WHO European Member States.

The complete phasing-out of ozone-depleting substances will particularly benefit children, who depend on their parents, teachers and other adults to protect them against excessive UVR as they learn to enjoy the sun safely.

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SAFE FOOD: CRUCIAL FOR CHILD DEVELOPMENT[19]

INTRODUCTION AND OVERVIEW

Food is one of the most important determinants of health. It has been known for several decades that around one third of cancers are associated with diet *(1)*, and its connection with cardiovascular disease is well established *(2)*. Research suggests that nutrition during childhood and foetal development influences the onset of disease later in life *(3)*. Also, along with nutrients, children come into contact with microbes and hazardous chemicals from contaminated food through the placenta, breast-milk or directly. Several serious accidental poisonings involving children have been due to food contaminated with pesticides, persistent organic pollutants (POPs) or heavy metals, and microbiological quality of food is crucially important for children's health. Reporting of microbiological and chemical food poisonings is, however, notoriously unreliable. Overall, then, food safety needs to be interpreted broadly in order to prioritize risks and improve and protect public health.

Prioritization is the key to dealing with risk, and the priority should be to assess those chemicals with the greatest risks for public health, rather than marginal risks chemical by chemical. This requires solid knowledge and understanding of the issues as well as willingness to prioritize. It would also be beneficial for food safety and control authorities to work together with a multidisciplinary team including nutritionists and risk assessors.

Priority should still be given to the well-established toxic chemicals such as heavy metals and POPs, as well as the ever-increasing number of new synthetic products. Chemicals that persist in the environment and those in use within or close to the food production chain generally have a greater chance of reaching humans via food. Naturally occurring chemicals should also be considered for screening, as often less is understood about them than synthetic chemicals; this may be a significant issue when experimenting with new or exotic foodstuffs. Finally, a foodstuff considered safe in one part of the world may not be safe everywhere. A practical example is lactose intolerance, which is relatively rare in Nordic populations adapted for milk consumption for thousands of years, but a prevailing genetic trait in many southern populations.

KEY MESSAGES

Food safety is one of the most important factors for good health. Prioritization of risks from food is a highly important but difficult task which is often poorly understood by the public. Different groups of chemicals have different possibilities of entering the human body and causing risks.

- Some chemicals are tightly regulated, and safety depends on appropriate enforcement in all countries.
- Some chemicals are unwanted contaminants. In their control, risk–benefit analysis must be included because measures that reduce the use of important food items or limit breastfeeding may cause more harm than good.
- Local emissions may cause specific local risks, and local authorities should know the sources in their own environment.
- Some risks related to food are linked to personal behaviour, and these are usually the most difficult to control as it requires that people understand and accept the existence of risks.

[19]By Jouko Tuomisto, based on ENHIS fact sheets.

Among the current chemical risks in children's food, two groups of chemicals are at present causing concern in Europe. In addition, unhealthy diets and microbiological food quality are highly relevant for food safety and public health.

(i) Heavy metals continue to be of concern. Lead and methyl mercury are the most relevant and should be monitored. While the cessation of lead use in fuels has resulted in decreased levels in children in most countries, plumbing and local industries continue to be important sources in some. The most important source of methyl mercury is fish, and both the risks and benefits of fish consumption must be considered.

(ii) Among the persistent organic compounds, dioxin-like compounds have the lowest safety margins. While their intake has decreased dramatically since 1970s, their monitoring is still warranted. At the same time the use of important nutrients such as breast-milk or fish should not be endangered by uncritical control measures.

GROUPS OF CHEMICALS OF POTENTIAL CONCERN IN EUROPE

Groups of chemicals that should typically be considered when assessing the safety of food are pesticide residues, veterinary drug residues, heavy metals, POPs and other organic contaminants, microbial toxins, food additives, compounds formed unintentionally during the processing of food, contaminants from packaging and storage and, last but not least, the major constituents of food itself, such as excess salt, sugar and fat.

Chemical exposure from food is not limited to intentionally manufactured chemical products, and also includes natural compounds in raw materials and microbial processes, chemicals formed in food processing, and cooking. It must be remembered that chemicals which are themselves inherently highly toxic, such as some pesticides, may not necessarily pose the most significant public health risk. The potential to actually cause harm is dependent on population exposure, which may be minimized through existing control measures, provided they are successfully implemented. In contrast, less toxic substances, such as pyrolysis products of natural compounds formed during food preparation, may pose a greater risk to the public as risk-reducing measures have not been taken.

In addition to chemical risks, the microbiological risks of food are very important. They are not dealt with in this review, but microbiological food poisoning incidents are common even in countries with high hygiene standards and may often be more important than chemical risks. Foodborne outbreaks are about an order of magnitude more common than waterborne, although usually fewer people are involved in each.

Pesticides and POPs

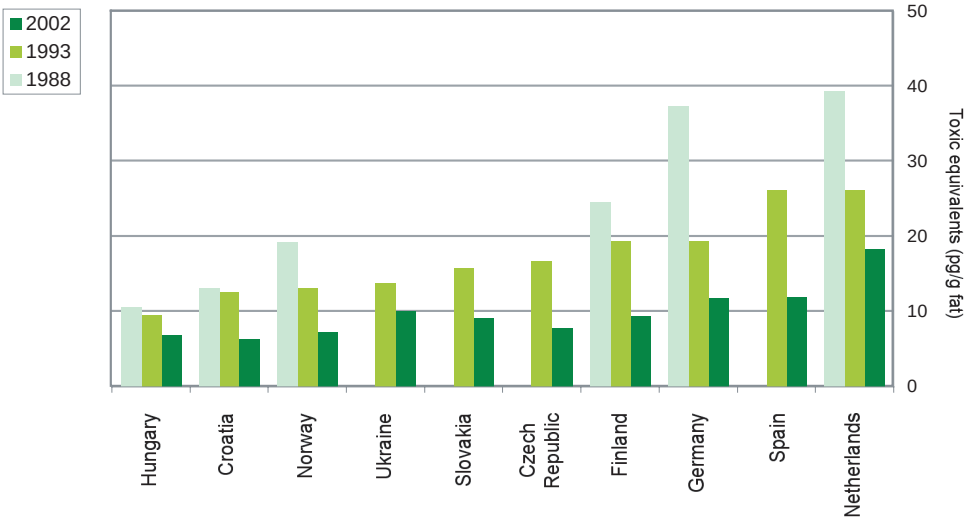
The key to reducing the risk posed by pesticide and veterinary drug residues is the enforcement of regulations and control measures promulgated by international expert organizations and authorities at EU and national level. The safety aspects are well and comprehensively covered by the regulations and, if they are followed, the risks will be minor. Surpassing the limit values, as measured by, for example, customs laboratories, is rare in European products but more common in fruits and vegetables imported from outside Europe *(4)*. In Finland, for example, 91% of pesticide intake is from imported foods.

A safety factor of 100 is usually used in setting the tolerable daily intake (TDI) values for pesticides. Estimates of actual pesticide intake are usually 1% or less of TDI, and are at most a few per cent.

This means human intake is four orders of magnitude (roughly ten thousand-fold) less than doses causing adverse effects in experimental animals. An exposure report from the United States by the Centers for Disease Control and Prevention was in agreement with this, finding that most human pesticide metabolite concentrations were very low, even if some pesticides were present at higher concentrations in children than in adults *(5)*. However, there are major differences among the EU countries. As noted above, in countries with poor control or unsatisfactory enforcement capabilities, risks may be substantial. The liberalization of world trade means the residues in imports must be monitored. Another aspect is accidents with toxic pesticides, which often involve children.

POPs are at present only a risk for high-exposure sub-groups of the population, such as some fishermen. The use of POP pesticides (DDT, cyclodienes such as endrin, and hexachlorocyclohexanes such as lindane) was discontinued long ago in most of Europe, and the concentrations are currently very low *(6)*. Perhaps the most problematic group is dioxin-like compounds (PCDD/Fs and dioxin-like PCBs *(6,7)*), the intakes of which may have caused some developmental effects during the 1970s and 1980s *(8)*. Since then, there has been a 70–80% decrease in intakes, suggested both by intake estimates and concentrations in human breast-milk (Fig. 31) *(6,9)*. The three rounds of a WHO coordinated exposure study *(10)* show a decrease in POPs levels in the order of 5% per year in many countries *(10)*. This trend is continuing, according to preliminary information from the next round (2007). In spite of the decrease, the safety margin to toxic levels is still narrow *(7,11)*.

Fig. 31. Dioxin levels in human milk in selected countries, 1988–2002



Source: Van Leeuwen FXR, Malisch R *(10)*.

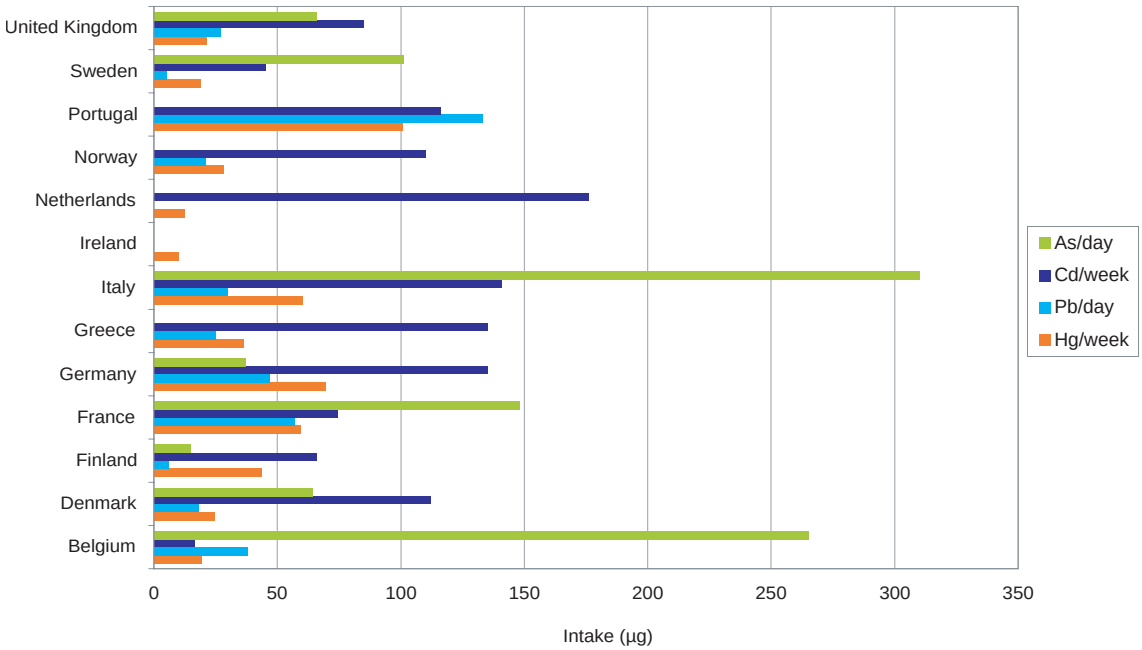
The factor most relevant for assessing foetal and breast-milk intake is the maternal body burden. It is important and encouraging that in young mothers the concentrations of these slowly accumulating compounds are much lower than in older age groups *(6,9,12)*.

Dioxin-like chemicals may be a risk to subpopulations with high exposure. This includes people who catch contaminated fish who consume their own catch every day. Again, before hastening to introduce restrictions, it must be considered that the benefits of consuming fish may be much more important than the risks of POPs *(2,7,13,14)*. Also, the clear benefits of breastfeeding weigh heavily in its favour, and a reduction so as to avoid POPs is not warranted *(15,16)*.

Heavy metals

Heavy metals remain one of the groups of chemicals with the lowest safety margins despite being a priority in scientific work and practical regulatory measures for decades *(7)*. The most important effects of lead and mercury are on the neurodevelopment of children, including cognitive development *(17,18)*. Adult intake in most European countries is 10–30% of the provisional tolerable weekly intake (PTWI) levels, but higher on occasions (Fig. 32) *(17)*.

Fig. 32. Heavy metal intake through food by adults, selected EU countries, 2004



Note. The intake of mercury (Hg) and cadmium (Cd) is weekly, that for lead (Pb) and arsenic (As) – daily.
Source: EC *(19)*.

Data on intake among children are very patchy. The total daily intake appears to be lower than in adults, but when calculated on a body weight basis it is higher *(19)*. This means that the difference between actual and tolerable intake is less in children than in adults.

In child-specific studies, the following intake estimates, as a percentage of the Food and Agriculture Organization (FAO)/WHO PTWI values, were found (Table 5): arsenic: about 10–20 (maximum 53)%, cadmium: about 30 (maximum 116)%, mercury: about 8–15 (maximum 69)%, and lead: about 5–20 (maximum 72)% *(20–22)*. In Sweden the respective number for methyl mercury was 9–15% *(23)*.

Table 5. Dietary intake of selected toxic metals in children aged 1–6-years as a percentage of PTWI

Intake parameter	Arsenic	Cadmium	Mercury[a]	Lead
PTWI (µg/kg/week)	15	7	1.6	25
Geometric mean (% PTWI)	9.7	32	15	21
Upper 95th percentile (% PTWI)	39	69	49	40
Maximum measured (% PTWI)	53	116	69	72

[a]Only fish consumers included.
Source: Wilhelm et al *(22)*.

Recently, organic tin compounds have caused concern. These are mostly used to prevent mollusc and algal growth on boats' and ships' bottoms and therefore high concentrations can be found along shipping routes and in harbours. They are less toxic than methyl mercury and usually present at lower concentrations in fish, but may cause concern locally. The most sensitive effect of organotin is immunotoxicity.

It should be noted that in contrast to pesticide residues, the safety margins included in heavy metal TWIs are relatively small. Hence, there is a disturbingly narrow margin between both the built-in safety margins and true intakes (percentage of PTWI), and exposure causing adverse effects in children.

Exposure to some heavy metals in Europe has clearly decreased, most notably to lead following the cessation of the use of tetraethyl lead as an anti-knocking compound in petrol *(18,24)*. However, this is not the case for other heavy metals, and exposure to lead in some countries remains high due to, for example, its use in water pipes or local industrial sources *(18)*.

For children, in general, methyl mercury appears to be the heavy metal of greatest concern at present *(7,25)*. There are relatively high mercury concentrations in some species of fish and whales. Studies from the Faroe Islands have implicated methyl mercury in developmental problems of the central nervous system *(26,27)*, but the evidence has been disputed *(28)*. Further, fish has clear developmental benefits and it prevents cardiovascular diseases *(2,13)*. Bearing this in mind, recommendations to reduce the consumption of fish should not be made lightly.

Average fish consumption in most countries is well below dietary recommendations, and only a small fraction of the consumption in the Faroe Islands. The families of recreational fishermen of predatory fish such as pike may, however, be at greater risk of a high methyl mercury intake. The same holds true for families of hunters of elk or other wildlife with high concentrations of cadmium in the liver and kidneys *(29)*, although the risks of cadmium only appear after cumulative lifelong exposure.

Food additives

The highest intakes of food additives as a percentage of TDI are for the preservatives nitrite and benzoic acid *(30)*. Generally, these are below 10% of TDI, but in population groups consuming lots of products containing these (e.g. sausages), the intake may be high. Nitrite, as well as salt, may be especially harmful in baby foods. Data on the public intake of food additives are available for Japan, where levels are very similar to those for Europe. In Japan, only nitrate intake (from fresh vegetables) exceeded the acceptable daily intake values; this was by a factor of two in small children *(31)*.

Food preparation

Preparing food may give rise to several unwanted chemicals. For example, acrylamide is formed when food is fried, such as potato chips and French fries, and coffee is roasted *(32)*. Likewise roasting, grilling or smoking meat results in many mutagenic compounds (e.g. polyaromatic hydrocarbons and heterocyclic amines), which are potential carcinogens *(33)*. The risks are not clear, but may be higher than those of well-controlled chemicals such as pesticide residues or food additives, and the simultaneous presence of a number of such compounds in food might partly explain the correlation between diet and cancer *(33)*. Some subpopulations of children may be at higher risk because of their consumption habits; the nutritional disadvantages of "junk food" may be even more important than the risks posed by other chemicals *(34)*.

Microbial and natural toxins

Microbial toxins may be a problem in special cases. For example, some nuts contain high concentrations of carcinogenic aflatoxin, and bacterial toxins are important as acute causes of poisonings. The natural toxins in many plants are noteworthy; the problem is that they are not nearly as well-known as synthetic compounds. It has been noted that if natural compounds had to meet requirements similar to those for pesticides, many would be seen as potential risks *(35)*.

People who experiment with new plants, herbs and spices may be at risk due to the many natural toxins in plants. Mushroom poisonings occur occasionally. The relatively recent development of selling food in facilities in which there are potentially many chemicals and untrained personnel, such as in service stations and kiosks, presents a risk. In these settings, it is very difficult to ensure food is handled safely, and accidental exposure due to errors or poor hygiene is possible. Both personnel and facilities selling food should be separated from car chemicals and other similar chemicals.

Sugar, fat and salt

By far the most important health risks associated with food are from its main constituents. Excessive food intake and high sugar content relative to energy needs leads to obesity, cardiovascular disease, and increased risks of diabetes and cancer; excessive saturated fats lead to obesity, arteriosclerosis and cardiovascular disease; and excessive salt leads to high blood pressure and cardiovascular disease. High exposure to these in childhood is likely to have a significant impact on health in adult life. In a broad sense, these are chemical risks in food, and advice should be given to parents so that they can provide children with a healthy diet and teach them about food choices.

Other risks

During foetal life some of the biggest risks are from mothers who smoke, consume alcohol and abuse drugs, which can be viewed as environmental risks to the foetus via their natural physiological nutritional pathways.

POLICY RESPONSE

Risk assessment and management

In order to ensure adequate standards of food safety and quality, FAO and WHO have developed the Codex Alimentarius *(36)*. The Codex includes a collection of standards for food labelling, additives, contaminants, hygiene, methods of analysis and sampling, and for residues of veterinary drugs and pesticides in foods. The WHO Global Environment Monitoring System, Food Contamination Monitoring and Assessment Programme (GEMS/Food) encourages all countries, in particular developing countries, to undertake total diet studies *(37)*.

WHO assists countries to develop and strengthen their food safety programmes. This includes harmonizing legislation with Codex Alimentarius guidelines and EU policies, strengthening food control services and promoting quality assurance systems. The WHO food safety programme also supports countries in building and updating their skills in the analysis, monitoring and management of food safety *(38)*.

The accession of the EU to the Codex Alimentarius Commission in 2003 strengthens consistency between the standards, guidelines and recommendations adopted under the Codex, and lays bind-

ing obligations on the EU member states in the area of food standards. EU legislation covers the chemical safety of foodstuffs in five areas: additives, flavouring, contaminants, residues and contact materials *(17)*.

The European Food Safety Authority was established in 2002 *(39)*, based on the White Paper on Food Safety which proposed a radical revision of the food hygiene rules of the EU *(40)*. Its function is to carry out risk assessments and to ensure common principles and responsibilities, scientific quality and efficient procedures for decision-making in matters of food safety. It is also responsible for the collection of data on food contaminants. Surveys show that the levels of hazardous chemicals in food are generally below the maximum amounts permitted by health authorities. Scientific cooperation on food-related questions coordinated by the Authority aims to retrieve pooled data from across the EU on particular food safety issues of concern.

Examples of policy action and risk communication

Following the Belgian PCB/dioxin feed contamination incident in 1999, the EU has been active in setting maximum levels for feed and food items: for dioxins in 2001 and for dioxin-like PCBs in 2006. One of the food items of concern was Baltic herring, which exceeded the dioxin limit of 4 mg/kg set in 2001. However, Baltic herring is an important fish in Finland and Sweden; for older people in particular, this affordable and good quality fish is a significant source of vitamin D and omega-3-fatty acid intake. For this reason, the EC allowed the limit to be exceeded in Finland and Sweden so that the fish could continue to be consumed, provided that dietary advice was given and that dioxin concentrations were adequately monitored (Box 18). This provides a good example of the use of risk–benefit assessment *(2)*. Dioxin concentrations have been thoroughly monitored, and levels in human milk have shown a clear decreasing trend *(6)*. Risk communication was very open and successful, and the public showed a clear understanding of the situation.

CONCLUSIONS

There may be big differences between European countries in children's food safety, but the lack of adequate statistics makes this very difficult to assess. The problem may be greatest in some eastern parts of the Region and in some southern countries. The large gaps in the data, especially on the exposure of children to hazardous chemicals via food, should be filled.

Most European countries have, however, taken measures to make food generally safe. By far the biggest health risks are inherent in the main components of food and their intake patterns, most notably excessive fat, sugar and salt. Following this, microbiological agents are most likely to pose risks, including food poisoning. To address these, there need to be improvements in hygiene control and education. The most important action to take in regard to controlled chemicals used in the food production chain (pesticide residues, veterinary drug residues, food additives) is adequate enforcement of the instructions for their use and the meeting of limits specified by the European Food Safety Authority and adopted by the EU (the "farm-to-fork" approach) and FAO/WHO Codex Alimentarius standards for non-EU countries. If these are strictly enforced, ample safety margins are usually guaranteed.

Box 18. Recommendations on the consumption of fish in Finland and Sweden

After a feed contamination incident in Belgium in 1999, the EC deemed it necessary to set maximum dioxin concentrations for food and feed in the European market. The Commission's requirement to monitor levels of dioxin-like compounds and give advice to the public on fish consumption led to fairly similar policies in Finland and Sweden. Concentrations in fish have been monitored to predict the trends in concentrations of contaminants. A long-term decrease is apparent but no immediate improvement that could affect the policies. The most crucial human indicator is breast-milk concentrations, which are measured within the WHO monitoring programme. Preliminary information from the last round (2007) indicates a continuous yearly decrease of about 5% in the PCDD/F and PCB concentrations in human milk.

Advice to the public is essentially similar in the two countries *(41,42)*. Because of the increasing evidence of the beneficial effects of fish consumption on cardiovascular morbidity and mortality, stroke and the development of the foetus and newborns *(2,13)*, people are encouraged to eat at least two meals of fish per week. To decrease intake of the contaminants, however, a variety of fish should be consumed. Some carnivorous fish species (e.g. pike, tuna) contain mercury, and girls and women of reproductive age are advised against consuming such fish more than once a week (Sweden) or once or twice a month (Finland) and no pike during pregnancy (Finland). Because of the high dioxin/PCB concentrations in large Baltic herring, the recommendation is to eat one meal a month only (Sweden) or 1–2 times a month in case of herring bigger than 17 cm (Finland). Farmed fish is low in contaminants due to feed control. In both countries the information has been well received by the press, the medical community and the public and, judging by the decreasing concentrations, the measures have been effective.

This case shows that in countries with a high educational level, good health care and advisory systems and trust in the health authorities, information guidance instead of normative controls can work well and is much more flexible. Monitoring to follow the situation is essential, as well as good intersectoral contacts (e.g. between food safety authorities and maternity health care).

For unwanted contaminants (heavy metals, POPs, microbial or plant toxins or other natural contaminants) which have not been deliberately added, regulatory methods can only control intake to a limited extent. At times, these contaminants are present in important and otherwise healthy food items, such as POPs in fish. In these cases, it is crucial that a thorough risk–benefit analysis should be made before the use of such food items is limited. Whenever possible, any control measures should be directed towards the primary source of the contamination. This was done, for example, by discontinuing the use of lead in petrol and the commercial use of PCBs and persistent pesticides, as well as by controlling dioxin emissions from waste incineration and industries. These measures have been quite effective. Mercury has been more problematic because only part of it comes from human activities; as a natural component of soil it will remain in the environment. To some extent this also applies to cadmium and arsenic.

At present the compounds with the lowest safety margins in children's food are heavy metals and some POPs, notably dioxin-like compounds. Intake in countries is varied, and geographical differences and time trends should be followed through monitoring.

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HEALTH AND SAFETY AT WORK FOR CHILDREN AND YOUNG PEOPLE[20]

INTRODUCTION AND OVERVIEW

Owing to their lack of experience and awareness of potential health hazards at work and their psychological and physiological immaturity, child workers and young employees are at specific risk for injuries at work. The quality of working conditions for children is reflected by the incidence of non-fatal work injuries in young people, which is an outcome indicator for health and safety at work.

This sub-section considers children's health and working conditions in Europe, and in doing so draws on data for non-fatal work injuries resulting in more than three days of absence for young people aged under 18 years and 18–24 years in 12 EU countries[21] and Norway. Using these data and specific European examples, an overview is given of the health implications of work-related hazards, policy developments, and the requirements to ensure that workplaces are healthy and safe for young people and children.

KEY MESSAGES

- Work injuries among young workers declined only slightly from 1995 to 2003, indicating that no important improvements in work-related health were made, and the need for policy action to safeguard young employees' health in Europe.

- Because of differences in health care systems and data collection methods between countries, data on non-fatal injuries are difficult to compare directly. Urgent action is needed to improve the comparability and quality of the underlying data across the Region. Efforts should also be made to develop methods and instruments to improve reporting on illegal working by children and young people.

- A harmonized information system on workers' health will effectively support the identification of occupational health problems across the Region. It will enable the planning and monitoring of interventions to improve working conditions, and ultimately prevent and reduce the burden of work injuries in children and young adults as well as in the general working population.

CHILDREN AND YOUNG PEOPLE AT WORK: HEALTH ISSUES

International Labour Organization (ILO) statistics show that, globally, nearly 218 million children aged 5–17 years carry out occupational and economic activities that adversely affect their safety, health and well-being *(1)*. These activities also hinder their education, development and future livelihoods. Many of them, mainly in developing countries, are employed under unacceptable working conditions where they are exposed to chemical agents, noxious fumes, dangerous machinery and other hazards at sites including coalmines, farms and plantations, construction sites, and in the service sector. The latter includes child labour in street shops, domestic work and waste collection. The lack of data and widespread under-reporting of accidents and ill health due to child labour are global problems. Contributing to this, work performed by children is often regarded as

[20]By Kinga Polanska and Eva Kunseler, based on ENHIS fact sheets.
[21]Austria, Belgium, Denmark, Finland, France, Greece, Ireland, Italy, the Netherlands, Spain, Sweden and the United Kingdom.

"helping-out"; thus it is seldom recognized in official statistics. As a result, the number of children killed, injured or suffering from health problems related to their work globally, including in Europe, is unknown *(2)*.

Work-related health effects are more frequent and severe among children than adults, as children are developing and are more sensitive to hazards. Workplace heat standards that are appropriate for adults may cause heat stress in children, partly because of their developing sweat-glands *(3)*. Working methods, work loads, tools, machinery and equipment designed for adults do not take account of the physical proportions of the child worker (Box 19). Safety equipment is seldom available; if it is, it is rarely designed to fit children.

Box 19. Examples of work injuries: a case report from Sweden

"I was to place a part into a tool for casting. But I needed a steady foundation so I placed the cast on the table of a drilling machine. When I should hammer the part into place, the hammer got stuck in a control of the drilling machine. It changed direction and I hit myself in the hand. Several fingers were broken." (17-year-old boy working in an engineering workshop).

Swedish work injury statistics show that young people suffer more accidents than older, more experienced workers. During 2003–2005, 561 work injuries were reported in minors (59% in boys); over the three years, numbers were increasing. More than half of the notifications were for pupils in vocational training. Most injuries occurred in warehouses, construction sites, hotels and restaurants and gardening. Two deaths occurred: one boy died while working on an electric power line, and the other when an empty oil drum exploded while he was cutting it.

"I was fetching a sack of potatoes and dragged it in the hallway towards the kitchen. It was heavy (25 kg) and I slipped and fell and hurt my back." (17-year-old girl, restaurant kitchen assistant).

One in three employers neglects to give young employees an introduction to work safety. This was shown by the thousands of inspections by the Work Environment Authority in 2006 of businesses and other operations employing large numbers of young people. Deficiencies were found in the retail trade, caring services for the disabled, takeaways, motor manufacturing and motor repair shops.

Nearly 350 visits were also made to vocational schools to assess whether the teachers were carrying out their duty to prepare students for risk and explain work safety issues. Fewer than half of the schools were fulfilling these obligations; 60% were issued with warnings calling on them to improve their training *(4)*.

Children are at greater risk of accidents, injuries and fatigue than adults, arising from their lack of experience, limited awareness of existing or potential risks and immaturity. The ILO found that, compounding this, children who suffer from malnutrition, fatigue, anaemia or other poverty-related health problems are at even higher risk. The combination of poor health and work-related hazards can lead to permanent disabilities and premature death *(1)*.

Preventive measures should be targeted at children and young people so as to create safe working environments. Awareness-raising activities are needed, such as education and training in occupational health and safety issues for employers as well as young employees (Box 20). This approach requires both parties to cooperate in specifying the risks and in defining appropriate protection measures *(2)*.

Box 20. Work-related health problems in adolescent labour and the role of education and training: a case study in the Lodz district, Poland

A survey was carried out by the Nofer Institute of Occupational Medicine *(5)* to assess workplace health hazards, accidents and injuries in students at vocational schools in the Lodz district during on-site training. One hundred and thirty-nine adolescent students at three vocational schools for electrical, mechanical and automotive professions took part. Most of them (90%) received training of varying duration, from one hour to more than four hours, on how to avoid injuries and accidents at work.

Of the respondents, 17% reported their job as one requiring heavy physical effort, 61% reported medium and 21% low physical efforts. More than half of the students perceived their work as strenuous. Almost all reported that they had not experienced or witnessed a workplace accident or injury. Minor injuries had been seen or experienced by 5%, and 4% had seen or experienced serious accidents.

It was interesting to assess how much new knowledge they had gained on occupational health and safety from training. Twenty per cent reported that most or almost everything in the training content was new to them. More than 60% already knew about most of the issues discussed during training.

A positive outcome of this study was that the majority of students reported that they remembered occupational safety and hygiene principles while working *(5)*, although 7% of the students did not.

WORK INJURIES IN CHILDREN AND YOUNG PEOPLE IN EUROPE

Eurostat is the only international data source which provides standardized incidence rates of non-fatal work injuries for children and young employees *(6)*. Data are available for the 12 EU countries and Norway from 1995 and 2003 (Fig. 33). Several economic sectors are covered, including the most hazardous workplaces such as electricity, gas and construction work.

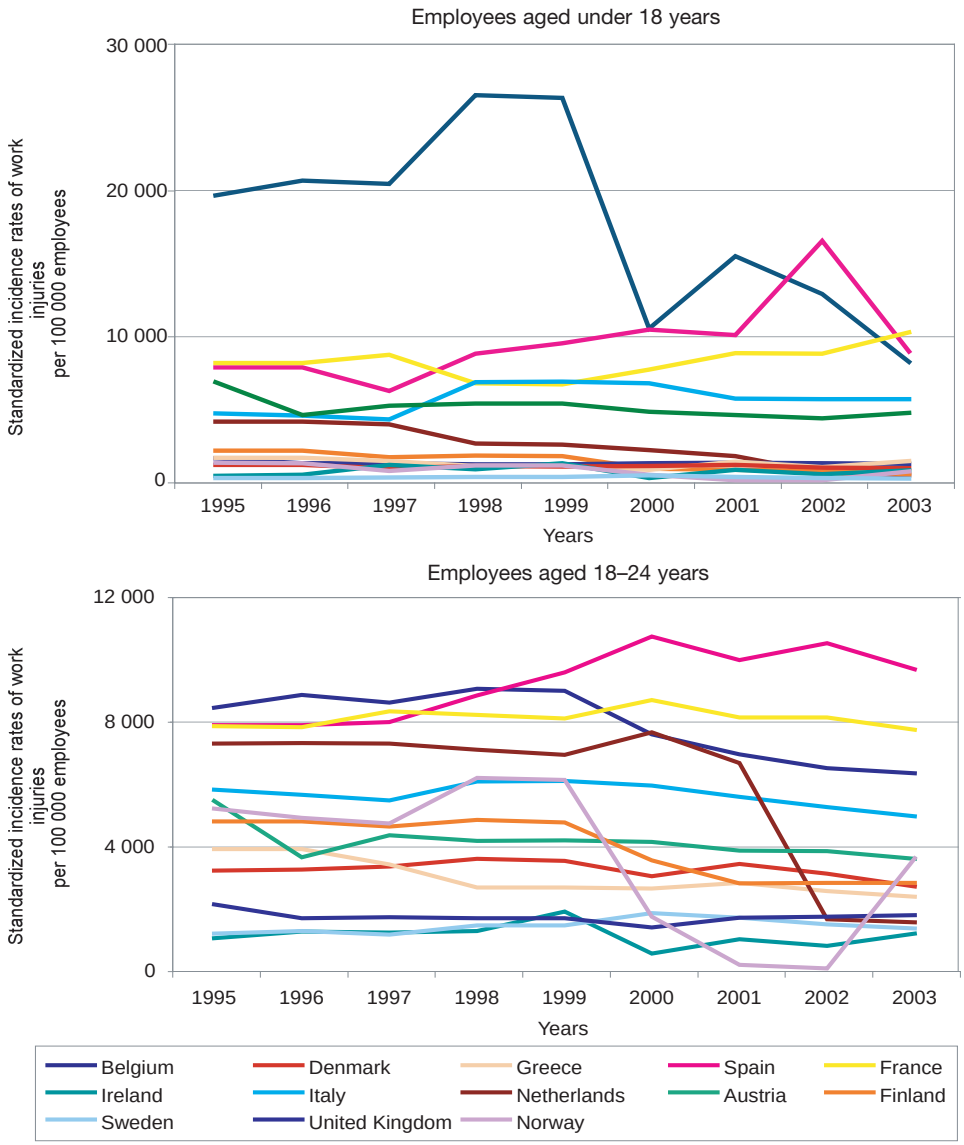
Standardized incidence rates of work injuries declined over time for both age groups in most countries. Among employees aged under 18 years, the downward trend was most pronounced in Belgium, Finland and the Netherlands. A decline in work injuries was observed among employees aged 18–24 years in Austria, Belgium, Finland, Greece, Italy and the Netherlands during the same reporting period *(7)*. Overall, however, the trends were not remarkable.

The decline in work injuries is partly due to the shift in work opportunities from the agricultural and industrial sectors to education, hotels, restaurants, shops and other areas of employment with lower accident risks. Conclusions about the impact of working conditions in different economic sectors cannot be made, as injury incidence rates are aggregated.

Data quality

Differences in rates between reporting countries can be partly explained by the unstable nature of the labour market, especially for people under 18 years of age who have an irregular work status throughout the year (for example, working and studying). Work-related injuries are usually reported for fixed as well as temporary employees. However, temporary employees are not counted as employed persons in the Labour Force Survey unless they happen to work during the week of the survey. This may result in discrepancy between the numerator (the number of accidents) and the denominator (the number of employees) of the incidence rate. The limited number of countries covered in the database, in particular in the east, as well as the differences in health care systems and data collection methods make it difficult to make an accurate assessment of the situation in the Region.

Fig. 33. Changes in standardized incidence rates of work injuries during 1995–2003



Source: Eurostat *(6,7)*.

Improvement of data

To make the data more comparable and informative two methods may be employed. Either only regular workers, excluding self-employed people, trainees and others, should be considered in the incidence rates. Alternatively, person-work hours for irregular and part-time workers should be accounted for, meaning the incidence could be calculated using time at risk. Calculations should be based on a denominator comprised of full-time equivalents. Even with modifications, the Survey-based data for those aged 18 years and under will remain biased, as the labour market situation changes many times during the year for this group.

It would be instructive to have a greater insight into the forms of child labour existing in the western and eastern parts of the Region. Understanding and identifying the similarities and differences between countries and sub-regions would help in laying the foundations of future strategies, policies and action plans.

A pan-European information system on workers' health would be necessary to ensure reliable information on the health and safety of the working population, including children and young people. Such a system would allow for the identification of occupational health problems, the planning and monitoring of interventions and, ultimately, a reduction in the burden of work injuries. The system would also allow authorities to prioritize labour inspections.

Finally, efforts should target the development of methods and instruments to improve reporting on illegal working by children and young people.

POLICY RESPONSE

The global policy framework on child labour is set by ILO Convention 182 *(1)*, which aims to eliminate progressively all forms of child labour that may be a risk to children's health. Priority is given to eliminating without delay those termed as "the worst forms of child labour". In ratifying the ILO Convention, countries become bound by international law to implement the Convention's provisions in national law and practice. ILO 182 entered into force on 19 November 2000. Currently, it has been ratified by all but six WHO European Member States. Implementation activities under the Convention are organized in cooperation between governments and workers' and employers' organizations and include the formulation of national programmes *(1)*. The ILO International Programme on the Elimination of Child Labour formulates enforcement strategies centring on prevention, withdrawal and protection. Prevention comprises identifying children at potential risk of entering hazardous work and stopping them from becoming child labourers, while the withdrawal strategy is aimed at children already carrying out hazardous work, who should be identified and removed from workplaces. Children aged 14–17 years, who have reached the legal minimum age for employment in their country, need to be protected by occupational safety and health conditions and arrangements *(2)*.

ILO Convention 182, together with ILO Convention 138 (the Minimum Age Convention of 19 June 1976 setting working hours for persons aged under 18 years) *(8)* and ILO Convention 187 of 2006 concerning the Promotional Framework for Occupational Safety and Health, covers the health protection of young employees in international law *(9)*. Moreover, ILO Convention 187 requires each member to take active steps towards the progressive achievement of a safe and healthy working environment through a national system and national programmes on occupational safety and health. Health benefits from enforcement of the ILO conventions are obvious: fewer children are subject to strenuous and unsafe working conditions.

At the World Health Assembly 2007, the Member States endorsed the Global Plan of Action on Workers' Health, 2008–2017 *(10)*. A key objective is to take measures to minimize the gaps in health and related risks between different groups of workers, with particular attention to vulnerable working populations.

The EU occupational health and safety strategy focuses on an integrated approach to well-being at work. The strategy is relevant to all countries of the WHO European Region, as the EU Neighbourhood Policy emphasizes the strengthening and securing of well-being in neighbouring countries to the east and on the southern and eastern shores of the Mediterranean *(11)*.

The Community Strategy on health and safety at work for 2007–2012 *(12)* is in the same vein as that for 2002–2006 *(13)*. Member states have made progress by drawing up more focused strategies and national action programmes. Data for 2000–2004 show that the rate of fatal accidents at work in the EU15 fell by 17%, while the rate of workplace accidents leading to absences of more than three days fell by 20%. A continuing, sustainable and uniform reduction in accidents at work and occupational illnesses continues to be the prime objective of the Community Strategy for the period 2007–2012. The overall objective is to reduce the total incidence rate of accidents at work by 25% in all 27 EU member states, as well as to improve tracking of progress, for which member states are encouraged to implement systematic health surveillance procedures. Workers who are overexposed to occupational risks, such as young workers in certain sectors, are given particular attention in the Community Strategy.

Achieving the objectives of the Community Strategy depends on the EU member states committing themselves to the adoption and enforcement of national strategies. It is equally important that they set up quantitative objectives for reducing the incidence of occupational accidents and illness and put in place follow-up mechanisms.

The 89/391/EEC Framework Directive on Health and Safety at Work states that particularly sensitive risk groups must be protected against dangers which specifically affect them *(14)*. The Framework Directive and its five individual directives are legally binding, but the EC evaluation of 2004 shows there are serious shortcomings in implementation and application, particularly in risk-bearing sectors such as small- and medium-size enterprises and the public sector, as well as for categories of workers who are most vulnerable, including young workers. Improved compliance with Community legislation will effectively contribute to a reduction in the number of accidents at work and occupational illnesses. Labour inspectorates have a crucial role to play here: labour inspectors can be used as agents of change to promote better compliance in small- and medium-size enterprises, first through education, persuasion and encouragement and then through stronger enforcement, where necessary *(15)*. An example from Norway highlights a mechanism for control dedicated to young people at work (Box 21).

Box 21. Case example of interventions to protect young people's health at work in Norway

The Norwegian Confederation of Trade Unions (LO) carries out many activities which focus on the rights of young workers and occupational health and safety *(15)*. Youth committees have been set up in 19 regions of the country, consisting of young representatives from the national unions. The LO has a youth secretary in each region who ensures that the plans are carried into practice. Since 1985, the LO has had an annual youth activity called the "LO's summer patrol". The patrol consists of more than 600 young LO members who are experts on working life legislation.

Every summer many young people get their first experience of working life. To ensure that young workers are treated well and that their rights are protected, teams from the patrol visit enterprises and businesses for a three-week period during the summer. The LO also has a telephone service where young people can ask questions about their working situation and their rights as workers.

In 2006 more than 1400 young people called the summer patrol telephone line, and the patrol visited 4500 enterprises and businesses. Eighty per cent of the enterprises and businesses visited had the required working contracts for their young workers; in most cases where these were lacking, the mistake was rectified when it was discovered. However, as many as 250 enterprises were reported to the local Labour Inspectorate for violating the law in 2006 compared to 150 in 2005. The number of enterprises not following the law concerning young workers fell from 50% in 1985 to about 20% in 2006.

It appears that an increasing number of employers visited by the LO's summer patrol improve the implementation of legislation concerning young workers' rights *(16)*.

EU Directive 94/33/EC on young people at work requires employers to guarantee that young people have working conditions appropriate for their age. As a general rule, young people aged under 18 years must not be allowed to carry out jobs that exceed their physical or mental capacities, expose them to radiation or to substances which are toxic or cause cancer, or involve extreme heat and noise or vibration. Work must not be harmful to their safety, health or development, or prevent them attending school or vocational guidance or a training programme *(17)*.

It is equally important to raise awareness of occupational health risks and provide adequate education and vocational training to give young people a safe and healthy start when they begin working. The EU Safe Start campaign seeks to promote these aims (Box 22).

Box 22. The EU Safe Start campaign

In 2006, the European Week for Safety and Health at Work focused on a safe and healthy start to young people's working lives. The Safe Start campaign was supported by all EU member states and the candidate and European Free Trade Association countries, the Austrian and Finnish EU Presidencies, the European Parliament and the EC, and by the European social partners.

The Safe Start campaign has two distinct elements:

(i) to promote awareness of occupational health risks among young workers and employers in the workplace, and to ensure that safety and health at work issues form an integral part of education and youth employment policies, agreements and activities;

(ii) to promote awareness and prevention of risk as an integral part of education, training and other activities in schools and colleges, youth organizations, vocational training centres and education authorities.

The different national initiatives were evaluated at the European Week on Health and Safety at Work *(18)*.

As part of the Community Strategy 2007–2012 on health and safety at work, the training programmes at all levels of education and in occupational and health safety management will be evaluated *(12)*.

CONCLUSIONS

The relatively high rates of work injuries in children and young workers, and the absence of clear falling trends, indicate the need for improved working conditions for young employees as well as for eliminating hazardous forms of child labour. Policy action targeted at children and young people should be implemented and enforced to ensure safe and healthy work environments.

Specific action needs to be taken to reduce health risks at work, such as awareness-raising activities for employers and young employees in the form of education and training in occupational health and safety issues. Using this approach, both parties can identify risks and cooperate to define appropriate protection measures. Improving reliability and comparability of occupational health information across the Region is equally important.

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PART II.
ENHIS

Chapter 5. About ENHIS

SCIENTIFIC BASIS

ENHIS uses the Driving force, Pressure, Status, Exposure, Effect, Action (DPSEEA) logical framework, focusing specifically on the links between exposure, effects and action. Only exposure with a demonstrated impact on health was included in the system. The primary inclusion criterion for a health issue (effect) was evidence (or justified concern) of its link with environmental exposure. The action and policies considered are those designed to affect either health outcomes directly or, more often, to influence the exposure that has an impact on health.

Scientific evidence on the links was reviewed when the indicators were defined. The principal bases for the evaluation were WHO reviews of evidence (such as water quality guidelines, air quality guidelines, environmental health criteria documents, or other systematic reviews). When available, major review papers published in scientific literature were used. A summary of the scientific basis for each indicator is given in the "Health and environment context" section of each ENHIS fact sheet, which cites the principal supporting references.

In several cases, the availability of data or feasibility of their collection for wide populations influenced the definition of the indicator. As a consequence, some became less specific. For example, "Access to public water supply and improved drinking-water sources", which focuses on the proportion of the population connected to a public water supply, is a rather crude indicator of population exposure to chemical or biological contaminants through the water actually drunk. The indicator is justified by the fact that water from public supply systems is regularly controlled and treated to avoid contamination, and that its availability reduces health risks due to water contamination. However, there remains a possibility that the public supply is contaminated, or that people use other water sources, for example to avoid water charges: the indicator cannot pick this up. Specificity and sensitivity of the indicator could be improved using better monitoring or special surveys, but a principle of the current system is to use data from existing sources which cover a large part of the Region systematically.

For the policy action summarized by action indicators, the scientific evidence on effectiveness is rather weak. The definitions created by the project are often based on expert evaluation of the intentions of the action, rather than through systematic analysis of the impact on health risks. Evaluation of such impact is, however, not often possible as the necessary information is rarely collected. Studies producing data on the impact of interventions and policies would allow validation of the indicator and enhance assessments of the effectiveness of action. Future application of the EH information system could be policy analysis using both policy and outcome indicators, although the high level of data aggregation might make such analysis difficult.

ELEMENTS OF THE SYSTEM

ENHIS integrates the following elements and services.

Environmental health indicators serve as the main tools for monitoring the situation and trends in countries and for communicating with a wide range of users. The methodology for a set of indicators was developed, focusing on environmental factors most relevant to health, health outcomes most influenced by the environment, and policy action deemed to reduce and prevent the risks. A core set of 26 indicators (Annex 2, Table 1) was selected during a process involving multiple working groups and consultations, using the criteria of scientific credibility, a focus on children's EH and relevant policy action such as CEHAPE, and feasibility.

ENHIS methodological guidelines for the indicators giving the rationale, definition, required data elements, calculation method, data sources, interpretation and policy relevance are integrated in the system. An information base has been created for the 26 children's EH indicators using international databases, case studies based on surveys in selected countries and examples of child-specific policies.

Reporting methods and tools for indicator fact sheets and periodic indicator-based assessments were designed for decision-makers. They provide evidence clearly and concisely to support the development of action which benefits public health and the environment, and to track the progress of its implementation.

Fact sheets have been prepared for the 26 indicators. Following an evaluation and revision process, they have been integrated into the information base.

Health impact assessment methods were developed and applied to the selected EH risk factors for outdoor (PM_{10} particles and ozone) and indoor (ETS and mould and damp in the home) air pollution. The assessment results were integrated into the indicator fact sheets.

Policy analysis serves to identify the format and contents of the information needs and define the policy-relevant indicators according to the methodology developed by the ENHIS projects. An inventory of EU and national policies in the context of CEHAPE RPGs was also created. The information needs and gaps for each thematic policy area contribute to the "Policy context and relevance" section of the fact sheets.

Information is disseminated via a web-based platform which brings together data, indicators and related trends in time and space, fact sheets describing the situation for each indicator and showing the potential health benefits of action and interventions, and links to relevant information resources. Users can access and search the information base on a theme of their particular interest at http://www.enhis.org. It should be emphasized that the electronic infrastructure, and in particular data- and meta-data ("data-about-data") base and data exchange modules, require further development and specialized resources for their maintenance and update.

The *network of partner-institutions* is an important mechanism for the operation of ENHIS, currently involving 25 project partners and collaborating institutions. The ENHIS network has provided substantial input for information gathering and data flows for the 26 indica-

tors, in particular to case studies on specific environmental health issues related to the four CEHAPE RPGs, as well as examples of national policy activities. The network members were responsible for the preparation of 23 indicator-based fact sheets, thus strengthening existing capacities for EH information processing, analysis and reporting. Establishment of the SharePoint project has facilitated the exchange of information and networking.

FRAMEWORK AND SCOPE

Although the approach taken in the development of ENHIS can, in principle, be applied to any policy framework, the current work focused on the information needed to support the CEHAPE and its four RPGs. This enabled the scope of the work to be clearly delineated to encompass the respective priority health and environment issues, and will allow the future assessment of trends, possibly in connection with the evaluation of policies and action taken to implement the Plan.

Since CEHAPE focuses on children, the ENHIS indicators need to be child-specific. Unfortunately, few monitoring systems provide child-specific data, especially those relevant to the exposure and action indicators. Therefore, in several cases, data pertaining to the general population were used as a proxy.

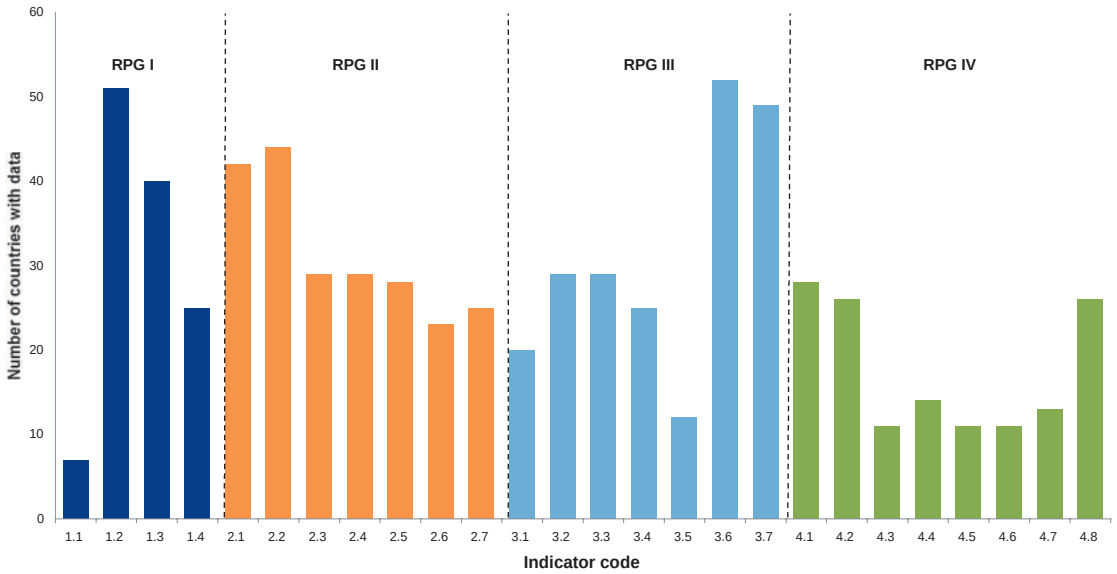
The European system is designed to provide intercountry comparisons, where the units of analysis are countries. However, if data are available at subnational level, similar analyses can be carried out within countries, meaning that action can be focused on problem areas and its effectiveness assessed with greater specificity. For national use, the system might need to be supplemented by additional, country-specific indicators, which correspond better with the particular needs of a country and its policies. If such additional indicators are demonstrated to be useful, this may encourage the collection of similar data in other areas of the Region leading to a possible expansion in the scope of the system.

GEOGRAPHICAL COVERAGE

ENHIS has been developed to cover all 53 WHO European Member States. However, data coverage across the Region varies. Since the predominant approach to information collection was the use of the international databases (as requested by Member States), the availability of the country-specific information in the system depends on the participation of the country in international surveys, data exchange or reporting systems.

Data for a number of the indicators were provided specially for the ENHIS project by national experts identified by CEHAPE Task Force members and/or ENHIS-2 project partners. Here, coverage reflects responses obtained by the project and can in theory be improved by a better response rate. For some of the more specific indicators, data were available from a limited number of countries (Fig. 34). Coverage is poorest for RPG IV issues, where relevant data must be collected in special surveys: a greater effort is needed to assure better geographical coverage and assessment of action related to RPG IV.

Fig. 34. Country coverage for each of the 26 core EH indicators



Annex 2, Table 2, summarizes the availability of information in international data bases and specific studies on each of the indicators for the WHO European Member States and Liechtenstein. Annex 2, Table 3 presents country profiles over the 26 indicators using the data for the latest available year. For the purpose the indicator distribution was divided into three 0.33-percentiles. A score of 1, 2 or 3 was assigned to the countries belonging to the relatively good, middle, relatively poor indicator value percentiles.

Annex 2, Table 3 provides a quick overview of the most important environmental health issues in the countries as measured by the set of indicators. It should therefore be interpreted as a country-by-country assessment rather than as a performance ranking.

FUTURE DEVELOPMENTS

EUROPEAN LEVEL

The projects implemented up to spring 2007 established the basic information platform of ENHIS, filled it with the baseline data (covering the period until 2004) and case studies, and provided basic data access and reporting tools. The system's usability and ability to provide policy support in the future will require maintenance, involving:

- periodic update of the databases (both concerning new data points to allow the analysis of trends, and expansion of country coverage);
- expansion of the system to new policy areas, for example, to cover the health aspects of climate change or high-risk groups in addition to children;

- further integration and expansion of the policy analysis, health impact assessment tools (HIA) and case studies;
- maintenance and updating of the system's web site and reporting tools (fact sheets); and
- maintenance and improvement of links with European health and environment information systems.

The system will be used for international reporting in the framework of both EU and WHO programmes. Such use is already planned for a major European project preparing a Global Report on the Health Status in the European Union.[22] The assessment of the health and environment situation and trends to be presented to the Fifth Ministerial Conference on Environment and Health will also be based on ENHIS.

ENHIS will be open to all users and will provide an opportunity for diverse analysis of EH data and policies from international as well as from national perspectives. The feedback from those analyses will be used for policy support and to improve the system, making it more relevant and more user-friendly.

The Regional Office will coordinate the maintenance of the system, using both its own resources and external funding. Close links with the EC Directorate-General for Health and Consumer Protection will be continued to ensure the system is fully harmonized with developments in the EU and EU institutions (in particular Eurostat and the European Environment Agency). Alongside this, efforts will be made to secure better system coverage in the non-EU WHO European Member States. It is expected that the network of institutions collaborating with WHO in developing the system will continue to be involved in maintaining the system, sharing experience and facilitating its use at national level.

NATIONAL LEVEL

The important and relatively straightforward step in the implementation of ENHIS will be its use for national analysis and priority-setting and for national communication: for example, translation of fact sheets concerning issues relevant to a particular country. Comparison of national indicators with those for the other countries will stimulate discussion on priorities in national policies and action. In many cases, it will point to the gaps in monitoring and reporting systems, stimulating either their expansion or modification of data reporting. The WHO programme on environment and health information will assist countries in the national use of ENHIS and in developing their capacity to use its information efficiently. Whenever possible, it will also evaluate, in collaboration with the national experts, the extent to which information available in the country but not routinely reported through established channels could be included in the ENHIS database, thus increasing its coverage and allowing comparison of national with regional situations.

The generation of subnational data on ENHIS indicators will be necessary to allow intracountry analysis of the issues identified as important for CEHAPE implementation on a European level. The use of ENHIS definitions and methodology should facilitate this intracountry work and ensure its

[22]European Union. EU Global Public Health Programme Project, Global Report on the Health Status in the European Union 2007 (http://www.eugloreh.it/default.do, accessed 15 July 2007).

international comparability. In this way, ENHIS will provide a methodological basis for national systems.

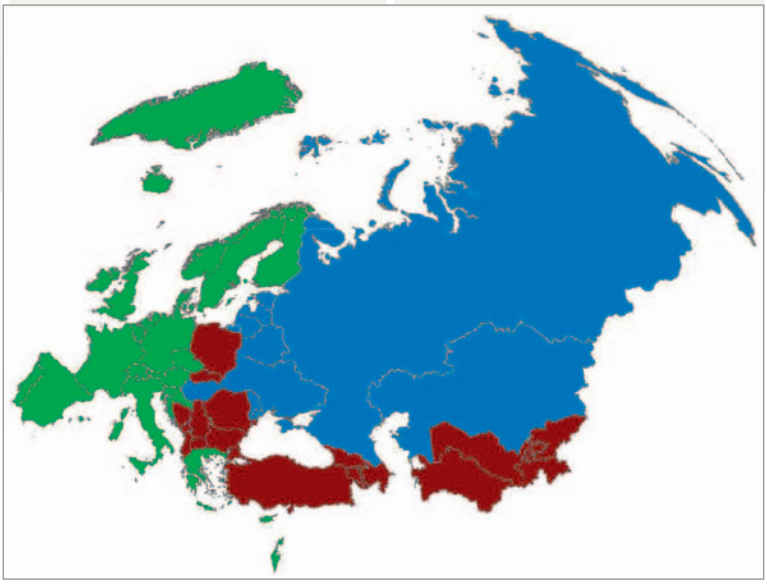
For a particular country, environment and health conditions, policies or action may require the development of indicators additional to the ENHIS core set. As mentioned in the "Framework and Scope" section above, additional indicators addressing special situations may be very useful from the European perspective, providing new methodologies and reference for possible expansion of the scope of the European system.

The application of ENHIS to national level assessment, analysis and reporting in the context of national policies will be the ultimate test of its usefulness in support of policies and action. WHO programmes will collect experiences from such analyses and will use them in upgrading the system.

ANNEX 1

Epidemiological Sub-regions of the WHO European Region

EUR-A Countries with very low mortality in both children and adults	**EUR-B** Countries with low mortality in both children and adults	**EUR-C** Countries with low child mortality and high adult mortality
Andorra	Albania	Belarus
Austria	Armenia	Estonia
Belgium	Azerbaijan	Hungary
Croatia	Bosnia and Herzegovina	Kazakhstan
Cyprus	Bulgaria	Latvia
Czech Republic	Georgia	Lithuania
Denmark	Kyrgyzstan	Republic of Moldova
Finland	Montenegro	Russian Federation
France	Poland	Ukraine
Germany	Romania	
Greece	Serbia	
Iceland	Slovakia	
Ireland	Tajikistan	
Israel	The former Yugoslav Republic of Macedonia	
Italy	Turkey	
Luxembourg	Turkmenistan	
Malta	Uzbekistan	
Monaco		
The Netherlands		
Norway		
Portugal		
San Marino		
Slovenia		
Spain		
Sweden		
Switzerland		
United Kingdom		



Source: The world health report 2002 – reducing risks, promoting healthy life. Geneva, World Health Organization, 2002 (http://www.who.int/whr/2002/en/, accessed 16 July 2007).

ANNEX 2

CEHAPE Indicators

Table 1. Core set of CEHAPE indicators

No.	Title	Code	Data source
1.1.	Outbreaks of waterborne diseases	RPG1_WatSan_E1	Case studies
1.2.	Public water supply and access to improved water sources	RPG1_WatSan_Ex1	a) Eurostat b) WHO/UNICEF JMP
1.3.	Wastewater treatment and access to improved sanitation	RPG1_WatSan_P1	a) Eurostat b) WHO/UNICEFJMP
1.4.	Bathing water quality	RPG1_WatSan_S1	European Environment Agency (EEA)
2.1.	Mortality from road traffic injuries in children and young people	RPG2_Traf_E1	WHO/Europe HFA MDB
2.2.	Mortality in children and adolescents from unintentional injuries (falls, drowning, fires and poisoning)	RPG2_Hous_E1	WHO/Europe HFA MDB
2.3.	Prevalence of excess body weight and obesity in children and adolescents	RPG2_Hous_E2	WHO/Europe Health Behaviour in School-aged Children (HBSC) survey
2.4.	Percentage of physically active children and adolescents	RPG2_Hous_Ex1	WHO/Europe HBSC
2.5.	Policies to promote safe mobility and transport for children	RPG2_Traf_A1	ENHIS survey
2.6.	Policies to reduce and prevent unintentional injuries from falls, drowning, poisoning, fires and choking	RPG2_Hous_A1	ENHIS survey
2.7.	Policies to reduce and prevent excess body weight and obesity in children and adolescents	RPG2_Hous_A2	ENHIS survey

No.	Title	Code	Data source
3.1.	Prevalence of asthma and allergies in children	RPG3_Air_E1	International Study of Asthma and Allergies in Children (ISAAC)
3.2.	Infant mortality from respiratory diseases	RPG3_Air_E2	WHO HFA MDB
3.3.	Exposure of children to outdoor air pollution (particulate matter)	RPG3_Air_Ex1	EEA AirBase, Eurostat
3.4.	Exposure of children to environmental tobacco smoke	RPG3_Air_Ex2	Global Youth Tobacco Survey (GYTS)
3.5.	Children living in homes with problems of damp	RPG3_Hous_Ex2	Eurostat European Community Household Panel
3.6.	Proportion of children living in homes using solid fuel	RPG3_Hous_Ex3	World Health Statistics
3.7.	Policies to reduce the exposure of children to environmental tobacco smoke	RPG3_Air_A1	WHO/Europe Tobacco Control Database
4.1.	Incidence of childhood leukaemia	RPG4_Rad_E1	Automated Childhood Cancer Information System IARC
4.2.	Incidence of melanoma in people aged under 55 years	RPG4_UVRd_E1	GLOBOCAN
4.3.	Persistent organic pollutants (POPs) in human milk	RPG4_Food_Ex2	WHO POPs survey
4.4.	Exposure of children to chemical hazards in food	RPG4_Food_Ex1	WHO Global Environmental Monitoring System GEMS/Food
4.5.	Levels of lead in children's blood	RPG4_Chem_Ex1	Case studies
4.6.	Radon levels in dwellings	RPG4_Rad_Ex1	EC DG JRC case surveys
4.7.	Work injuries in children and young people	RPG4_Work_E1	Eurostat
4.8.	Policies to reduce the excessive exposure of children to ultraviolet radiation	RPG4_UVrd_A1	ENHIS survey

Table 2. Overview of the data availability for each country for the core set of CEHAPE indicators

Indicators	1.1	1.2		1.3		1.4	2.1	2.2	2.3	2.4	2.5	2.6	2.7
Data source[a]		a)	b)	a)	b)								
No. of countries with data	7	22	48	30	26	25	42	44	29	29	28	23	25
Albania		n.a.	+	n.a.	+		+	+	–	–	+	+	+
Andorra			+		–		–	–	–	–	n.a.	n.a.	n.a.
Armenia		n.a.	+	n.a.	+		+	+	–	–	+		+
Austria		+	+	+	+	+	+	+	+	+	+	+	+
Azerbaijan		n.a.	+	n.a.	–		+	+	–	–	n.a.	n.a.	n.a.
Belarus		n.a.	+	n.a.	+		+	+	–	–	n.a.	n.a.	n.a.
Belgium		+	+	+	–	+	+	–	+	+	+	+	+
Bosnia and Herzegovina		n.a.	+	n.a.	+		–	–	–	–	n.a.	n.a.	n.a.
Bulgaria		+	+	+	+	–	+	+	–	–	+	+	+
Croatia	+		+		+	–	+	+	+	+	+	+	+
Cyprus		+	+	+	–	+	–	+	–	–	n.a.	n.a.	n.a.
Czech Republic		+	+	+	+	+	+	+	+	+	+	+	+
Denmark		+	+	+	–	+	+	+	+	+	n.a.	n.a.	n.a.
Estonia	+	+	+	+	+	+	+	+	+	+	+	+	+
Finland	+	–	+	+	+	+	+	+	+	+	+	+	+
France		+	+	+	–	+	+	+	+	+	+	+	+
Georgia		n.a.	+	n.a.	+		+	+	–	–	+		
Germany		+	+	+	–	+	+	+	+	+	n.a.	n.a.	n.a.
Greece	+	–	+	+	–	+	+	+	+	+	+	+	+
Hungary	+	+	+	+	+	+	+	+	+	+	+	+	+
Iceland		+	+	+	–	–	–	+	–	–	n.a.	n.a.	n.a.
Ireland		+	+	+	–	+	+	+	–	+	n.a.	n.a.	n.a.
Israel		n.a.	–	–	–		+	+	+	+	n.a.	n.a.	n.a.
Italy		+	+	+	–	+	+	+	+	+	+	+	+
Kazakhstan		n.a.	+	n.a.	+		+	+	–	–	n.a.	n.a.	n.a.
Kyrgyzstan		n.a.	+	n.a.	–		+	+	–	–	n.a.	n.a.	n.a.
Latvia		–	+	+	+	+	+	+	+	+	n.a.	n.a.	n.a.
Liechtenstein		+	–	–	–	–	–	–	–	–	n.a.	n.a.	n.a.
Lithuania		–	+	+	+	+	+	+	+	+	+	+	+
Luxembourg		–	+	+	–	+	–	+	–	–	n.a.	n.a.	n.a.
Malta		–	+	+	–	+	–	+	+	+	+	+	+
Monaco		–	+	–	–	–	–	–	–	–	n.a.	n.a.	n.a.

3.1	3.2	3.3	3.4	3.5	3.6	3.7	4.1	4.2	4.3	4.4	4.5	4.6	4.7	4.8
20	29	29	25	12	52	49	36	26	11	14	11	11	13	26
+	+	–	+	–	+	+	–	–	–	–	–	n.a.	–	+
–	–	–	–	–	+	–	–	–	–	–	–	n.a.	–	n.a.
–	–	–	+	–	+	+	–	–	–	–	–	n.a.	–	
+	+	+	–	+	+	+	+	+	–	–	–	+	+	+
–	–	–	–	–	+	+	–	–	–	–	–	n.a.	–	n.a.
–	–	–	+	–	+	+	+	–	–	–	–	n.a.	–	+
+	–	+	–	+	+	+	+	–	–	+	–	–	+	+
–	–	–	–	–	+	+	–	–	–	–	–	n.a.	–	n.a.
–	+	+	+	–	+	+	+	+	–	–	+	–	–	+
–	–	–	+	–	+	+	+	–	+	–	–	n.a.	–	+
–	–	–	–	–	+	–	+	–	–	–	–	–	–	n.a.
–	+	+	+	–	+	+	+	+	+	–	+	+	–	+
–	–	+	–	+	+	+	+	+	–	+	–	–	+	n.a.
+	+	+	+	–	+	+	+	+	–	–	–	–	–	+
+	+	+	–	+	+	+	+	+	+	+	–	+	+	+
–	+	+	–	+	+	+	+	+	–	+	+	+	+	+
+	–	–	+	–	+	+	–	–	–	–	–	n.a.	–	+
+	+	+	–	–	+	+	+	+	+	+	+	+	–	–
–	+	+	+	+	+	+	–	+	–	+	–	–	+	+
–	+	+	+	–	+	+	+	+	+	–	+	+	–	+
–	–	+	–	–	+	+	+	+	–	–	–	–	–	n.a.
+	+	+	–	+	+	+	+	+	–	+	–	–	+	n.a.
–	–	–	–	–	+	+	+	–	–	–	+	n.a.	–	n.a.
+	+	+	–	+	+	+	+	+	–	+	–	–	+	+
–	–	–	+	–	+	+	–	–	–	–	–	n.a.	–	n.a.
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+	+	+	–	–	+	+	+	+	–	–	–	–	–	n.a.
–	–	–	–	–	+	–	–	–	–	–	–	–	–	n.a.
+	+	+	+	–	+	+	+	+	–	–	–	–	–	+
–	–	–	–	–	+	+	–	–	–	–	–	–	+	n.a.
+	+	–	–	–	+	+	+	–	–	–	–	–	–	+
–	–	–	–	–	+	–	–	–	–	–	–	–	–	n.a.

Table 2 continued

Indicators	1.1	1.2		1.3		1.4	2.1	2.2	2.3	2.4	2.5	2.6	2.7
Data source[a]		a)	b)	a)	b)								
No. of countries with data	7	22	48	30	26	25	42	44	29	29	28	23	25
Montenegro[b]			+		+		–	–	–	–	+		
Netherlands		+	+	+	+	+	+	+	+	+	+	+	+
Norway		+	+	+	–	–	+	+	+	+	n.a.	n.a.	n.a.
Poland		+	+	+	+	+	+	+	+	+	+	+	+
Portugal		+	+	+	–	+	+	+	+	+	+	+	
Republic of Moldova		n.a.	+	n.a.	–		+	+	–	–	n.a.	n.a.	n.a.
Romania		+	+	–	+	–	+	+	–	–	+	+	+
Russian Federation		n.a.	+	n.a.	+		+	+	+	+	n.a.	n.a.	n.a.
San Marino		–	–	–	–	–	–	–	–	–	n.a.	n.a.	n.a.
Serbia[b]			+		+		–	–	–	–	+		
Slovakia	+	+	+	+	+	+	+	+	–	–	+	+	+
Slovenia		+	–	+	–	+	+	+	+	+	+	+	+
Spain		–	+	+	+	+	+	+	+	+	+	+	+
Sweden		+	+	+	+	+	+	+	+	+	+	+	+
Switzerland		–	+	+	+	–	+	+	+	+	n.a.	n.a.	n.a.
Tajikistan		n.a.	+	n.a.	–		+	+	–	–	n.a.	n.a.	n.a.
TFYR Macedonia[c]			–		–		+	+	+	+			+
Turkey		–	+	+	–		–	–	–	–	n.a.	n.a.	n.a.
Turkmenistan		n.a.	+	n.a.	–		+	–	–	–	n.a.	n.a.	n.a.
Ukraine		n.a.	+	n.a.	+		+	+	+	+	n.a.	n.a.	n.a.
United Kingdom	+	–	+	+	–	+	+	+	+	+	+		+
Uzbekistan		n.a.	+	n.a.	–		+	+	–	–	+	+	+

Key.
+ or – Data available or not available.
Blank Data source (reporting flow) not known.
n.a. Not applicable.
Countries in bold are ENHIS-2 project partners.

Notes.
[a] See Annex 2, Table 1.
[b] Serbia and Montenegro became two separate Member States of WHO in September 2006. The data availability status refers to before that date and to the then entity Serbia and Montenegro (Serbia) unless specified, as in the case of indicator 3.4.
[c] TFYR Macedonia = The former Yugoslav Republic of Macedonia.

3.1	3.2	3.3	3.4	3.5	3.6	3.7	4.1	4.2	4.3	4.4	4.5	4.6	4.7	4.8
20	29	29	25	12	52	49	36	26	11	14	11	11	13	26
–	–	+	+	–	–	+	+	–	–	–	–	n.a.	–	–
–	+	+	–	+	+	+	+	+	+	+	–	+	+	+
–	+	+	–	–	+	+	+	+	+	+	–	–	+	n.a.
+	+	+	+	–	+	+	+	+	–	–	+	+	–	+
+	+	+	–	+	+	+	+	+	–	+	–	–	–	+
–	+	–	+	–	+	+	–	–	–	–	–	n.a.	–	n.a.
+	+	+	+	–	+	+	+	+	–	–	+	+	–	+
+	–	–	+	–	+	+	+	–	–	–	+	n.a.	–	n.a.
–	–	–	–	–	+	–	–	–	–	–	–	–	–	n.a.
–	–	+	+	–	–	+	+	–	–	–	–	n.a.	–	
–	+	+	+	–	+	+	+	+	+	–	–	–	–	+
–	+	+	+	–	+	+	+	+	–	–	–	–	–	+
+	+	+	–	+	+	+	+	+	+	–	–	+	+	+
+	+	+	–	–	+	+	+	+	+	+	+	–	+	+
–	+	+	–	–	+	+	+	+	–	–	–	–	–	n.a.
–	–	–	+	–	+	+	–	–	–	–	–	n.a.	–	n.a.
–	+	–	+	–	+	+	–	–	–	–	+	n.a.	–	+
–	–	–	+	–	+	+	+	–	–	–	–	n.a.	–	n.a.
–	–	–	–	–	+	+	–	–	–	–	–	n.a.	–	n.a.
+	–	–	+	–	+	+	–	–	+	–	–	n.a.	–	n.a.
+	+	+	–	+	+	+	+	+	–	+	–	+	+	
–	–	–	–	–	+	+	–	–	–	–	–	n.a.	–	+

Table 3. Country[a] profiles on the CEHAPE indicators

Regional priority goal	RPG 1							RPG 2						
Indicators	**1.1**	**1.2 a**	**1.2 b**	**1.3 a**	**1.3 b**	**1.4.1**	**1.4.2**	**2.1**	**2.2**	**2.3**	**2.4**	**2.5**	**2.6**	**2.7**
Number of countries	**7**	**22**	**49**	**30**	**26**	**20**	**23**	**42**	**44**	**29**	**29**	**28**	**23**	**25**
Albania			3		2			1	3			3	3	3
Andorra														
Armenia			2		2			1	1			3		3
Austria		2	1	1	1		2	2	2	2	1	2	1	1
Azerbaijan			3					1	3					
Belarus			3		3			3	3					
Belgium		1	2	3		3	3	3		2	3[b]	3	1	2
Bosnia and Herzegovina			2		2									
Bulgaria		1	2	3	2			2	3			2	3	3
Croatia	3		2		2			3	2	2	1	1	2	1
Cyprus		1	1	3		1			1					
Czech Republic		2	2	2	1		3	2	2	2	1	2	1	3
Denmark		1	1	1		2	2	2	1	1	2			
Estonia	1	3	2	2	2	3	1	2	3	1	3	2	3	2
Finland	3		2	2	1	2	1	2	2	3	1	2	2	2
France		1	1	2		2	2	3	1	2	3	1	1	1
Georgia			3		3			1	1			3		
Germany		1	1	1		1	2	2	1	2	3			
Greece	3		2	3		1	1	3	2	3	2	3	1	2
Hungary	1	2	2	3	3		3	2	2	2	2	2	2	1
Iceland		2	1	3					2					
Ireland		2	1	2		2	1	1	2	2	1			
Israel								1	1	2	2			
Italy		1	1	2		3	3	3	1	3	3	2	1	2
Kazakhstan			3		3			3	3					
Kyrgyzstan			3					2	3					
Latvia			2	2	1	3	2	3	3	1	3			
Liechtenstein		3												
Lithuania			2	2	2	1	1	3	3	1	1	2	2	1
Luxembourg			1	1			3		2					
Malta			1	3		3			1	3	1	1	1	1
Monaco														
Montenegro			2		3							3		
Netherlands		1	1	1	1	1	1	1	1	1	2	3	2	1
Norway		2	1	2				2	1	2	3			
Poland		3	1	2	3	3	3	2	2	1	2	2	2	1
Portugal		3	3	3		2	2	3	2	3	3	1	3	

RPG 3							RPG 4							
3.1	3.2	3.3	3.4	3.5	3.6	3.7	4.1	4.2	4.3	4.4	4.5	4.6	4.7	4.8
20	29	29	25	12	52	49	28	26	10	13	11	11	13	26
1	3		2		3	3								3
					1									
			3		3	3								
3	1	2		1	1	2		3				3	2	1
					3	2								
			2		3	1	2							1
1		3		2	1	1				1			3	2
					3	1								
	3	3	1		3	1	2	1			3			2
			3		3	2			1					2
					1									
	2	3	1		1	1	1	2	2		2	3		2
		1		1	1	3	3	3		2			2	
1	2	1	2		3	1	2	1						2
3	1	1		1	1	1	3	2	2	3		3	2	1
	1	1		3	1	1	2	2		3	1	2	3	1
1			3		3	3								3
3	1	2			1	3	3	2	3	3	1	2		
	2	3	3	3	1	2		1		2			2	2
	3	2	2		1	1	1	2	1		1			2
		2			1	1	2	3						
3	2	1		1	1	1	2	2		1			1	
					1	1					2			
1	1	3		2	1	1	3	3		3			3	2
			2		1	3								
	3		1		3	3								
2	3	1			3	1		1						
					1									
1	3	2	1		1	1	1	1						1
					1	3								
2	2				1	1	3							1
					1									
		3	3			3	1							
	1	3		3	1	1	2	3	3	1		1	1	2
	1	1			1	1	3	3	1	2			3	
2	2	2	2		1	1	1	1			2	2		3
2	2	2		3	1	1	1	1		3				1

Table 3 continued

Regional priority goal	RPG 1							RPG 2						
Indicators	**1.1**	**1.2 a**	**1.2 b**	**1.3 a**	**1.3 b**	**1.4.1**	**1.4.2**	**2.1**	**2.2**	**2.3**	**2.4**	**2.5**	**2.6**	**2.7**
Number of countries	**7**	**22**	**49**	**30**	**26**	**20**	**23**	**42**	**44**	**29**	**29**	**28**	**23**	**25**
Republic of Moldova			3					2	3					
Romania		3	3		3			2	3			1	3	3
Russian Federation			3		2			3	3	1	3			
San Marino														
Serbia			2		3							3		
Slovakia	1	3	2	3	1		3	2	2			1	1	3
Slovenia		2		3		3	3	3	2	3	1	1	2	3
Spain			1	1	1	1	2	3	1	3	3	1	3	1
Sweden		3	1	1	1	2	1	1	1	1	2	1	1	2
Switzerland			1	1	1			1	1	1	2			
Tajikistan			3					1	3					
TFYR Macedonia[b]								1	2	3	3			3
Turkey			3	3										
Turkmenistan			3					1						
Ukraine			3		3			3	3	1	1			
United Kingdom	3		1	1[d]		1	1	1	1	3	1[e]	3		1
Uzbekistan			3					1	3			3	3	2

Key.

1 indicator value of the country belongs to the relatively good third of values
2 indicator value of the country belongs to the middle third of values
3 indicator value of the country belongs to the relatively poor third of values

[a]WHO European Member States and Liechtenstein.
[b]TFYR Macedonia = The former Yugoslav Republic of Macedonia.

Notes. Only countries with available data were included in the assessment.

For 1.2 a, data on public water supply came from Eurostat; for 1.2 b, data on access to water supply in rural areas came from WHO/UNICEF JMP.
For 1.4.1, mandatory requirements for freshwater zones fulfilled; for 1.4.2, mandatory requirements for coastal zones fulfilled.
For 2.3 and 2.4, only data for boys were used.
For 3.1, only data from the prevalence of asthma symptoms in children aged 13–14 years were used.
For 3.6, every country scoring below 5% is assigned rank 1.
For 3.7, WHO tobacco control database as of September 2006.
For 4.2, only data for males were used.
For 4.4, only data for Hg/week-intake were used.
For 4.5, only the current data were used.
For 4.7, only data from 2003 for the group aged 18–24 years were used.

RPG 3							RPG 4							
3.1	3.2	3.3	3.4	3.5	3.6	3.7	4.1	4.2	4.3	4.4	4.5	4.6	4.7	4.8
20	29	29	25	12	52	49	28	26	10	13	11	11	13	26
	3		1		3	3								
3	3	3	3		3	1	1	1			3	1		2
2			2		2	2					3			
					1									
		3	3			3	1							
	3	3	2		1	1	1	1	2					1
	2	3	1		2	2	1	3						3
1	1	2		3	1	1	2	2	3			3	3	1
2	1	1			1	2	3	3		1	1		1	1
	1	1			1	3	3	3						
			1		3	3								
	3		3		3	1					3			1
			3		3	2	3							
					1	1								
3			1		2	1			3					
3	2	2		2	1	3	2	2		2		1	1	
					3	3								3

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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This publication gives an overview of the establishment of an environment and health information system in Europe with the aim of providing up-to-date and reliable information about public health and the environment as well as the outcomes of methodological work. The publication presents information on the scientific basis, framework and scope of the system together with plans for future developments.

The use of the system is highlighted by presenting its main product: an indicator-based assessment of children's health and the environment in the WHO European Region in the context of the Children's Environment and Health Action Plan for Europe. The assessment provides a baseline against which the progress and effects of action taken can be evaluated at the Fifth Ministerial Conference on Environment and Health scheduled for 2009.

Targeted at policy-makers, public health professionals, epidemiologists and environmental science professionals, this publication offers a basis for the implementation of action to prevent diseases and promote healthy environments.

World Health Organization
Regional Office for Europe

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