Environmental Health Indicators:
Development of a methodology for the WHO European Region

INTERIM REPORT
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EUROPEAN HEALTH21 TARGET 10
A HEALTHY AND SAFE PHYSICAL ENVIRONMENT

By the year 2015, people in the Region should live in a safer physical environment, with exposure to contaminants hazardous to health at levels not exceeding internationally agreed standards.

(*Adopted by the WHO Regional Committee for Europe at its forty-eighth session, Copenhagen, September 1998*)

EUROPEAN HEALTH21 TARGET 19
RESEARCH AND KNOWLEDGE FOR HEALTH

By the year 2005, all Member States should have health research, information and communication systems that better support the acquisition, effective utilization, and dissemination of knowledge to support health for all.

(*Adopted by the WHO Regional Committee for Europe at its forty-eighth session, Copenhagen, September 1998*)

ABSTRACT

The methodology provides a guiding structure for regular-based reporting and assessment on environment and health both within a country as well as at WHO-European region level. It aims at the establishment of a comprehensive system for monitoring trends in the state of environment and health, in order to assess the effect of interventions and the oversight of activities undertaken. At the same time the system enables decision-makers to focus on specific action areas covering health protection and intersectoral policies. The indicators system encompasses 11 environmental issues of public health significance, allowing for a balanced and comprehensive picture of the risks throughout the WHO/Euro region and is based on the cause-effect framework DPSEEA (Driving force - Pressure - State - Effect - Action). WHO consultation has selected a set of "core" indicators to be used for international assessments as well as for the analyses at sub-national level. In addition, an extended set of EH indicators was proposed for national/ local application. The operational forms for the core indicators presented in this document provide the contents structure for the development of a database exchange network system on environment and health. The report of the consultation and that of the planning meeting for the pilot implementation of the system in selected countries are presented as well.

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EXECUTIVE SUMMARY

This report summarizes the progress made in the first year implementation of the project "Environmental Health Indicators – development of a Methodology for the WHO European Region". It is based on the outcomes of three WHO expert meetings during the year. The work resulted in a proposal for a common "core" set of environmental health indicators and a protocol for their pilot testing in selected countries. The revised indicators system, after the pilot evaluation, will be recommended for implementation in the European region of the WHO.

The objective of the programme is the development of tools for information support of decision-makers in their public health and environmental policies. It focuses on the establishment of a comprehensive, environmental health indicators system for integrated assessment and regular reporting based on comparable data and information. The development of the indicators systems consists of three phases:
- Establishment of a set of indicators for use at (inter-)-national or regional levels
- Establishment of a (electronic) network for data access/exchange for which the indicators selected provide the contents structure
- Analyses and reporting for which the indicators selected serve as a guiding structure

The present document focuses on the first phase, i.e. on the establishment of a common "core" set of environmental health indicators serving countries in monitoring and adjusting their policies and at the same time enabling international comparisons throughout the WHO European region. The WHO/ECEH project "Design of an environment and health information system for use with NEHAPs" was initiated in October 1999 and was aimed originally at the establishment of a comprehensive EH monitoring within the framework of NEHAPs implementation. Nevertheless the system application can go beyond this objective.

The environmental health issues for which data and indicators should be included in the system have been selected according to the guidelines of a multidisciplinary Project Steering Committee (See Annex 1). Eleven environmental health issues (themes) were identified based on the following. They should provide a balanced and comprehensive picture of the most important environmental health issues in terms of both "scale" of the problem (a widespread significance both for the countries themselves and at multinational level) and a clear-cut relevance to public health.

A number of criteria and choices have been considered in defining operational indicators. The commonly accepted now cause-effect framework DPSEEA (Driving forces – Pressures – State – Exposure – Effect – Action) was used. The scope of the indicators system was conceived to cover mainly the state of environment, population exposure, health outcomes, and to a less extent – pressures and driving forces. To allow decision-makers to focus on specific action areas a number of indicators on health protection measures and intersectoral policies actions are included as well. Indicators are based as much as possible on routinely collected data from monitoring systems in order to avoid unnecessary duplication. The operational forms, adapted from the WHO guidelines on indicator profiles (WHO/SDE/OEH99.10) allow for a more precise identification of the indicators for which usable and comparable data exist. They also enable to take a closer account of earlier international work and related indicator sets. A number of experts contributed to the operational definitions of the environmental health indicators: the list is given in Annex 1.

The WHO consultation, Bilthoven, 22-24 May 2000, (see Annex 1 for the list of participants), has selected a set of 51 "core" indicators to be used for international assessments. Most of the core indicators are also applicable for the analysis of environmental health situation and actions at sub-national level. In addition, an extended set of indicators is proposed for national/ local application. Criteria for the selection of the indicators included sufficient evidence for a valid environmental exposure to health outcome relationship (WHO-Euro guidelines EUR/00/5020369, Copenhagen,

2000) and also more general ones, e.g. validity, sensitivity, timeliness, etc. Nevertheless, some environmental health risks, e.g. indoor air, noise, water quality, etc require implementation of new methods for information gathering (e.g. through surveys) and the development of standardised instruments. A few indicators were identified for future application as pointing at new developments and data needs.

The report of the WHO Consultation is presented in Part 1 of the document. Part 2 contains the operational forms for the set of core environmental health indicators, Part 3 – a brief description of the extended set.

To evaluate the relevance of the proposed system for wide-scale implementation in the European Region of the WHO a pilot testing is now starting in several countries. Accordingly, a planning meeting was convened in Bilthoven, 11-13 October 2000 (see Annex 1 for the list of participants) to agree on the scope of the pilot project and to design the protocol and the tools/ questionnaires for the feasibility study. The discussions and results of the meeting are summarised in Part 4.

The present document represents a step in an ongoing development. It has been reviewed (see Annex 2) and several useful suggestions are made that require further thorough consideration. Once the pilot development of these indicators has started, some unanticipated shortcomings will surface, resulting in an iterative process of improvement.

INTRODUCTION

According to the decisions of the 3rd Ministerial Conference on Environment and Health, London, June 1999, several countries of the WHO European Region have started implementing their National Environment and Health Action Plans (NEHAPs). Implementing the actions, the Member States will need to assess their progress and effectiveness. This requires the development of a health and environment information system, serving the Member States and, at the same time, enabling international comparisons. Monitoring public health and its determinants and adjusting policy actions has increased throughout Europe. The Third Ministerial Conference on Environment and Health, London, June 1999 has acknowledged the need for further development of information and assessment systems as a basis for implementing and monitoring policies and also for communication with the public. Driven by these requirements it gave WHO EURO a mandate at the highest political level to develop an appropriate set of core environmental health indicators and information system.

In order to fulfil this mandate, the WHO European Centre for Environment and Health, Bilthoven Division, has launched a project entitled "Design of environment and health information system for the NEHAPs". The main objectives of this project are to develop appropriate tools for integrated environment and health assessment and regular reporting. The tools consist of a set of core environmental health indicators and an appropriate framework to facilitate data access and exchange within as well as between the Member States.

This project builds on earlier efforts with related objectives. For several years, WHO-Euro's European Centre for Environment and Health (WHO-ECEH) developed and maintained the *Health and Environment Geographic Information System* (HEGIS). Over the years, several comprehensive reports were published, including WHO-ECEH's "*Concern for Europe's Tomorrow*" and an "*Overview of the Environment and Health in Europe in the 1990s*", as well as WHO's "*Health and Environment in Sustainable Development*". Indicator sets are also part of both the WHO "*Health 21*" program and the "*Healthy Cities*" project. In addition, WHO Geneva recently published a set of environmental health indicators – "*Environmental Health Indicators: Framework and Methodologies*" (WHO/SDE/OEH/99.10). All of these approaches feature certain strengths and certain limitations. The present project ensures the continuation and reinforcement of the efforts towards comparable data and information on the state of the environment and health for use at a WHO European Region-wide scale.

Objectives of the Consultation:

➢ To select the core set of indicators for international comparison, and to propose an extended set for additional, national/local application. The existing definitions, data collection practices and data availability should be taken into account.

➢ To identify the indicators for which further development and improvements are needed.

The consultation should lead to the agreement on the basics for the indicator reports and assessments: structure, analyses and presentation format, as well as to interfacing with other indicator systems. This will be the subject of further steps of the project.

Project Implementation

A small group of experts convened to steer the project implementation. The first meeting of the Steering Group was held in Bilthoven, Netherlands from 20 to 21 January 2000. The group proposed a general framework of the information system and a tentative set of indicators to cover the following environmental health issues: ambient and indoor air quality, housing and settlements, noise, waste and soil pollution, radiation, sanitation, drinking water, food safety, recreational waters, chemical emergencies and workplace. The set has been further elaborated according to the conceptual and methodological framework recommended by WHO, Geneva (WHO/SDE/OEH/99.10) by selected experts into an operational set with definitions, data specifications and methods for calculation. The indicators designed can be standardised for inter-country comparisons and/ or customised for countrywide information systems. They are based on data sets and statistics from routine monitoring and on evidence and knowledge of the magnitude of health risk related to the environmental exposures.

The background materials prepared by the experts containing proposals for operational sets have been distributed to the consultation participants for review in advance of the Consultation.

The Consultation was attended by experts from 18 countries and WHO staff members: a full list of participants is given in Annex 1. The experts were selected either due to their expertise in the subject areas of the indicators proposed or due to their involvement in national information systems which might use these indicators. Dr Alan Pinter was elected to chair the Consultation and Dr Kathy Pond acted as rapporteur.

DISCUSSION

The discussion centred on the following issues:

a. Background concepts for defining the set of core environmental health indicators and information system.
b. Experiences from other international/ national activities on environment and health assessment and information systems.
c. Selection of the set of core environmental health indicators and information system basics.

General discussions, on points a) and b) were carried out in plenary. Discussions on the selection of these indicators considered as ready-for-use and the identification of the development needs for the other indicators were mostly in small working groups. Further plenary discussions included progress reports and exchanging experiences from the working groups as well as final discussions on the selected sets of indicators.

Three **Working Groups** were identified – based on experiences of workgroup members and interrelations of the environmental health issues:

Working Group I:	Ambient and indoor air quality, housing and settlements, noise, traffic accidents
Working Group II:	Drinking and recreational water, sanitation, food safety
Working Group III:	Waste and contaminated lands, radiation, chemical emergencies, workplace

Chairperson and rapporteur were identified for each group:
➢ **Group I**   Chair: Roderick Lawrence;   Rapporteur: Brigit Staatsen
➢ **Group II**   Chair: František Kožíšek;   Rapporteur: Martin Silberschmidt
➢ **Group III** Chair: Signe Velina/Jan Zejda;   Rapporteur: Vlad Fourman

Background Concepts for Defining Core Indicators and Information System

Dr David Briggs has summarized the basic characteristics of "good" environmental health indicators. The fundamental assumption is that indicators are intended to serve a purpose. They must therefore be fit for their purpose. This implies that we know what purpose we want them for and who will use them in order to define and design them accordingly. To be useful indicators must relate to an issue of current or future interest or concern. Different issues raise different questions and different users have different interests and needs. To provide this information the indicator must be interpretable. This means that we must know what differences or changes is the indicator meant for. In addition, indicators should be accurate, so that they provide an undistorted picture of the condition of interest. At the same time they should be transparent – be readily understood and interpreted by the users. Crucial for the design of good indicators is the "denominator".

Environmental health indicators must tell us about the effects of the environment on health. Therefore, they must be based on an interpretable relationship between environment and health. This relationship must be known, consistent, unambiguous and largely un-confounded.

Of importance is to start with an issue and identify the purpose of the indicator. The indicator must be meaningful and designed in the correct way to avoid distortion of the results. The design can be fixed at a later stage but it is important to define the indicator in the first instance. The key criterion therefore in selecting an indicator is the fitness for a purpose. This implies relevance that in turn implies interpretability that subsequently implies sensitivity to the factor of interest that further implies a valid environmental health relationship.

Since indicators are important communication tools, they should be published regularly to show progress over time. Preparing a report based on indicators requires setting up a system for efficient and regular production of indicators and assessments – the Environment and Health Information System (EHIS). Dr R. Fehr has emphasized the basic aspects of the environment and health information system:
- Structure and organisational design
- "Logical" and technical design

To keep the system logical and manageable, all the information contained in EHIS should be **structured** in a transparent and convincing way. Common ways of structuring the environmental health issues include noxious agents (chemical, physical), environmental media (air, water, food…), and domains of life (housing, transport, waste disposal…). A tentative set of topic areas could be: (a) domains of life: housing, transport, work environment, waste disposal; (b) chemical and biological agents in environmental media (air, water, soil, food, consumer goods), and (c) physical agents: radiation, noise, mechanical energy, thermal energy.

Throughout EHIS, the **DPSEEA** (**D**riving forces – **P**ressure – **S**tate – **E**xposure – **E**ffect – **A**ction) model should be applied for structuring the information contained in EHIS. Using both the topic areas and the DPSEEA framework would create a matrix that should accommodate most of the indicators.

Designing the **data flow for the environment and health**, from raw data to indicators to statistical analyses is as important as producing the reports. Related to the flow are the aspects e.g. (i) **compatibility** across levels, including methods but also degree of aggregation over space (and time), and (ii) **interfacing** of EHIS with other systems, both within WHO (e.g. Health 21, Healthy Cities) and outside WHO (e.g. GEMS, OECD, UN-ECE, UN-CSD, and the common mortality statistics). Other aspects of logical design include the following: (i) agreement on the usage of standard tools of classifications (codes), (ii) preference of absolute numbers vs. relative frequencies; (iii) special attention given to vulnerable subpopulations (e.g. children).

Many of the EHIS objectives could be applied to various levels of administration: it is important to ensure a compatibility of the system operation from local through national to international level.

Concerning the **organizational design** of EHIS, topics to be decided on include the following: responsibilities, subtasks and coordination, (public) participation, and logistics. With respect to the time domain, in the typical case, the time period of concern will be the year, but other periods (shorter, longer) can be relevant, too. The desired **spatial and temporal resolution** of EHIS should be defined at an early stage of this project as this may impact the form of the raw data that needs to be collected.

Related Indicator Systems

Dr N. Ichikawa described the EBRD project on environmental indicators for countries in transition. This project was set up to monitor how the socio-economic changes drive changes in the state of environment, environmental policies and actions for the countries in transition – CEE and CIS countries. The next step is to include further in-depth assessment of the effects of environmental changes on population health. With this respect, the set of the environmental health indicators of the current project represents an important input to the EBRD's indicator reports.

Dr P. Kramers has summarised an integrated approach to establishing European Community health indicators. The health-monitoring programme of the EU has as its main objectives to develop an electronic database to share the indicator data and to identify the policy actions. The main strands of action in the EU public health strategy have been identified as: improving information; reacting to threats to health; tackling health determinants.

The following **indicator** groups are of particular relevance for **the environment and health relationships**:
1. Health status – mortality by 65 causes of death and incidence/prevalence of about 25 diseases/disorders.
2. Physical environment (*state* and *exposure* indicators): housing; drinking water and sewage supply; drinking water quality; outdoor and indoor air quality; surface water; radiation; noise.
3. Working conditions - physical workplace exposures, mental workplace exposures.
4. Health protection – e.g. regulations on food safety and quality
5. Health services - e.g. hospital discharges by disease group.

The proposed EU indicators and the WHO HFA indicators both basically cover the same scope. Nevertheless, the EU project will benefit from the WHO - ECEH indicators programme, in particular from an input on outdoor and indoor air quality, noise, drinking and recreational water quality and radiation indicators. The establishment of an information system - a Community-wide network for health information exchange between EU Member States, the Commission and international organisations as well as the development of tools for analysis and reporting on health status, trends, determinants and effects of policies, is envisaged for the future.

The Division of Environmental and Public Health, Sweden has produced a discussion paper to share their experience on setting a system for the follow-up of the environmental quality and related-health objectives for use by the Swedish authorities. The discussion points out the important aspects of accessibility of the indicators and the need for harmonisation between different indicators report systems. It was suggested that the use of the Internet technology should considerably improve accessibility.

Selection of the Set of Indicators and Basics of Information System

Applicability of the indicators and the extent to which they reflect the relationship between environment and health were agreed to be the main determinants for selection of the most appropriate indicators. Countries can then identify which indicators or data are already collected in the countries and how much effort it will cost to gather the relevant data. This will enable comparison of the benefits with the costs.

The consultation emphasized that the differences in data collection practices as well as the lack of harmonised criteria on how to address environmental health issues and setting priorities between the countries do not allow the selection of one, "universally" applicable set. Although initially conceived to be used for monitoring the NEHAPs implementation, the currently developed indicators should be useful, in general, for monitoring the environmental health policies and programmes. The approach for selection of both a core and a more extended set allow countries a greater flexibility in using the indicators. The core set enables inter-country comparisons and it is expected to be available in all Member States. The extended set can be customised for country reports.

The indicators will be selected according to their main use: *for monitoring changes in environment and health*. These could also be the result of different risk management actions including regulatory policies. There has been a big demand from the countries and the WHO to develop these indicators as tools to link environment and health. It was agreed that there is considerable value in the approach chosen, i.e. in defining a core set of indicators that give examples of good practice and prevents reinvention of good indicators already established. Most of the indicators proposed in the background documents are designed to use existing data and should be widely applicable and able to be piloted, and will benefit the users.

With respect to the users, the need for both a core and more extensive set of indicators to be used by decision-makers in the overall assessment of the environmental health situation was again emphasized. The extended set, which is intended for use mostly by professionals, may include indicators for which is difficult to obtain data from the routine monitoring or further improvement and harmonisation of the data collection is needed. These will require considerable input from professionals in the relevant fields, with advice from the WHO. However, this set is considered beyond of the scope of the meeting.

Additional criteria agreed for the selection include:
- Validity: Clear information on how environment-health relationship works
- Overall feasibility: Data availability; time-frame for development; comparability over time and space; cost-effectiveness
- Overall accuracy: Reliability of data sources; reliability of the methodology

It was decided to focus on the specific EH indicators, giving only a brief description for the general indicators on driving forces, state, general health status, and to indicate whether the selected indicators are sufficient or that additional indicators need to be developed.

While the exercise of developing the indicators is an important one in itself it is equally important to convince decision-makers, the general public as well as the data providers of the usefulness of indicators if they are to be used practically. Therefore, the *objectives of the Environment and Health Information System* are producing indicator reports and assessments for the purposes of:
- monitoring environmental health within the framework of NEHAPs and other programmes implementation
- quality control of environmental health management
- basis for benchmarking and for prioritisation
- providing a coherent picture of the European situation
- facilitating research
- improving public access to information.

It was agreed that the structure of the environment and health information system proposed at the consultation is a useful framework and should be further developed taking into account that the selected set of core indicators represents the reporting "mechanisms" of this system.

It was emphasized that there is little future for a system that addresses one administrative or territorial level. Monitoring and observation of changes in environment and health should be done at various levels, and each of the indicators used on a European regional level, which is especially important for

WHO, must be applicable also on national and at a local/ sub-national level. Information should be also available at the lowest level of resolution in order to pinpoint the problems: the indicators must be flexible and those developed for application at smaller scale must also be suitable for the bigger ones.

Concerning the logical design of the system the data warehouse framework has been recommended as a central tool for bringing together and storing the information at national level. Moreover, the use of the Internet as a "media" for publishing the reports should also facilitate the links between this set of the environmental health indicators and the existing indicators systems. It was emphasized that the trade-offs in the accessibility of data and indicators on the Internet should be determined and in some cases it is more effective to have access to the data themselves.

Concerning the "**marketing**" of the system it was recommended that the background paper dealing with guidelines on the structural and organisation aspects for setting an indicator reports and assessments system, i.e. the EHIS should be prepared for use with the core set of the environmental health indicators. It will be particularly useful in demonstrating how EHIS helps to break the vicious circle of lack of data quality, on one side and lack of usage of the data and information on the other.

CONCLUSIONS AND RECOMMENDATIONS

> ➢ The agreed set of core environmental health indicators is summarized in the Table 1. The indicators' operational forms are given in detail in Part 2. The set is recommended for integrated assessment of the state of environment and health. It should provide basis for priority setting and adjusting actions for wide application in the international analyses as well as for public health monitoring programmes including that done by the WHO. It should also become a part of the WHO – Health For All database.
The extended set of environmental health indicators is summarized in the Table 2. Its brief description is given in Part 3.

> ➢ It has been proposed that the indicators will be tested by a pilot group of selected countries. The initial group will include the countries integrated in the WHO and Danish Environmental Protection Agency Project - "Implementation of National Environmental Health Action Plan" co-sponsored by the Danish Environmental Protection Agency and WHO: Poland, Estonia, Lithuania, Czech Republic and Slovak Republic. Additional countries are welcome to participate in the pilot scheme.

> ➢ The importance of the indicators for use by national governments was highlighted, particularly where legislation is being developed. Other specific beneficiaries of the indicators are seen as EU accession countries that are required to provide considerable information and data and to harmonise their legislation. It is considered that the indicators may be used in this process.

> ➢ Design of the information system providing framework for the data collection, reporting, processing, analysis, presentation and information dissemination will be next step of this project.

> ➢ With respect to other implementations, it was emphasized that there is a good potential for the use of the indicators in sector-specific analysis. For example, in the field of water, the Water Protocol requires countries to monitor and report quite extensively. This is not manageable in terms of assessing trends in water quality and health and therefore the indicators will be valuable tools. Similarly, the Charter on Transport, Environment and Health could usefully make use of these indicators. Further development work is recommended in both these subject areas to facilitate the monitoring of all the health impacts related to these two subjects.

➢   Some subject areas were identified that had not been included in the present project. Preparedness and response to natural disasters were highlighted as being an important issue. It was considered that the scope of the EH indicators should be extended to encompass the emergencies defined as: "A sudden occurrence demanding immediate action that may be due to other epidemics, to natural or technological catastrophes, to strife or to other man-made causes" (cf. Community emergency preparedness: a manual for managers and policy-makers, WHO, Geneva, 1999). The Consultation recommends the WHO to develop indicators on this important issue taking into account previous work was the preventative infrastructure in place by national governments to deal with emergencies.

Another considered issue were social determinants of public health. However, it was noted that inclusion of this issue would broaden significantly the scope of the project and should be considered subject of a separate activity.

➢   It was recommended that WHO convene a small working group to develop guidelines for analysis of health status related to environment based on household surveys. The guidelines should include the subset of the appropriate environmental health indicators together with the standardised instruments (e.g. questionnaires, etc) for the data collection.

➢   It was suggested that an off-spin from the meeting should also be to identify research needs as data omissions are identified. The EU should be made aware of these.

TABLE 1. Overview of the Set of Core Environmental Health Indicators

Issue	Driving Force	Pressure	State	Exposure	Effect	Action
Air Quality	• Annual average number of kilometres driven by motor vehicle type • Annual average consumption of fuel by type from road transport	• Annual average lead consumption from cars • Annual emissions of SO_2, PM10, secondary PM10, NOx, VOC by economic sector		• Annual average concentration of NO_2, PM10 (or BS or TSP) and SO_2; 8h average O_3 (population-weighted) - in relation to reference values.	• Mortality rate due to respiratory diseases in children > one month and < one year of age ICD-10 code J00-J99 • Mortality rate due to respiratory diseases all ages ICD-10 code J00-J99	• Participation in International agreements & Environmental initiatives
Indoor Air Quality					• Mortality rate due to diseases of circulatory system -all ages ICD-10 code I00-I99	• Capability for implementing and enforcing policies on Environmental Tobacco Smoke Exposure
Housing and Settlements			• Living floor area per person	• Percentage of the population living in substandard housing	• Mortality rate due to external causes (domestic accidents, poisoning) in children < 5 years ICD-10 code W00-Y34	• Scope and application of building regulations for housing • Scope and application of regulations for land use planning in human settlements
Traffic Accidents					• Mortality rate for transport accidents ICD-10 code V01-V99 • Annual injury rate due to transport accidents ICD-10 code V01-V99	

Issue	Driving Force	Pressure	State	Exposure	Effect	Action
Noise					• Percentage of population annoyed by certain sources of noise • Percentage of population with sleep disturbance due to noise	• Capability to implement noise regulations and abatement measures
Waste and Contaminated Lands		• Annual amount of hazardous waste generated and imported by countries	• Area of contaminated land in a country per 1000 km^2 as a result of pollution or dumping of hazardous waste	• Percentage of children with blood lead level > 10μg/dl		• Scope and application of hazardous waste policies • Percentage of households served by regular waste collection services
Radiation				• Percentage of the population receiving a cumulative radiation dose in excess of 5 mSv/yr • UV light index	• Annual incidence rate of skin cancer ICD-10 code C43-C44	• Fraction of companies in each of different categories having an actual permit for use, emission, etc. of radioactive substances • Existence of effective Environmental monitoring of Radiation activity in compliance with national and international QA programmes
Recreational water		• Wastewater treatment coverage	• Exceedance of limit values for microbiological parameters		• Number of outbreaks of waterborne diseases	

Issue	Driving Force	Pressure	State	Exposure	Effect	Action
Drinking water			• Exceedance of WHO guideline values for microbiological parameters • Exceedance of WHO guideline values for chemical parameters	• Percentage of the population receiving drinking water complying with WHO guideline values • Percentage of the population with access to safe drinking water • Percentage of the population supplied from a public water supply		
					• Diarrhoea mortality rate in children under five years of age • Incidence of diarrhoea morbidity in children under five years of age	
Sanitation				• Percentage of the population with access to adequate excreta disposal		
Food safety				• Exposure to potentially hazardous chemicals monitored in food (GEMS/FOOD)		
					• Number of outbreaks of microbiological food-borne diseases • Incidence of microbiological food-borne diseases	

Issue	Driving Force	Pressure	State	Exposure	Effect	Action
Chemical Emergencies		• Number of sites containing large amounts of chemicals			• Mortality rate from chemical incidents	• Regulatory requirements for land-use planning around upper tier establishments containing large amounts of chemicals • Medical treatment guidelines • Existence of poison centres service • Government preparedness • Chemical incidents register
Workplace					• Occupational injury fatality rate • Annual incidence rate of occupational injury and illness • Standardised mortality ratio (SMR) (by occupational groups) • Sickness Absence rates • Statutory reports of occupational disease	

TABLE 2: Overview of the Environmental Health Indicators – Extended Set

ISSUE	INDICATOR TITLE	DPSEEA
Air Quality	Emissions of Pb, primary PM10, NOx and benzene in urban areas	Pressure
	Number of hospital admissions for respiratory diseases	Effect
	Number of hospital admissions for asthma	Effect
	Number of hospital admissions for diseases of the circulatory system	Effect
	Disability adjusted life years due to morbidity and mortality as a result of ambient air pollution *	Effect
	Investments in transport infrastructure	Action
Indoor Air	Proportion of residences having a moisture problem, visible mould or mould odour	Exposure
	Proportion of residences exceeding indoor air radon concentration of 200 Bq/m³	Exposure
	Consumption of tobacco products	Exposure
	Sources of indoor air pollution	Exposure
	Capability to implement indoor air quality (IAQ) management	Action
Housing & Settlements	Percentage of the population that have no permanent domicile (homelessness)	Exposure
	Incidence of asthma incl. LRI in children	Effect
Traffic Accidents	Quality of traffic control *	Action
Noise	Noise levels distribution	State
	Number of people exposed to noise levels above standard (L day/evening/night) in noise-levels categories	Exposure
	Number of people at working place exposed to noise levels (8 hr) > 80 dB(A)	Exposure
Waste & Contaminated Lands	Amount of hazardous waste disposed and exported	Pressure
	Existence of a register for contaminated lands *	Action
Recreational Water	Proportion of coastal or freshwater bathing sites with restrictions for recreational use	Exposure/ Action
	Drowning accidents *	Effect
	Capability of management of enclosed water generally available for bathing	Action
	Intensity of water quality monitoring	Action
	Level of management response to pollution incidents	Action
Drinking Water	Mean and percentile concentrations of selected chemical contaminants	State
	Percentage of the population receiving piped water at home	Exposure/ Action
	Number of discontinuities of public drinking water supply for > than 12 hrs	Exposure/ Action
	Number of cases of proven water-borne diseases	Effect
	Intensity of water quality monitoring	Action
	Capability for water resources quality management	Action
	Good practice to drinking water management	Action

ISSUE	INDICATOR TITLE	DPSEEA
Food Safety	Incidence of human zoonoses *	Pressure
	Dioxins and PCBs levels in human milk *	Exposure
	Incidence of animal zoonoses *	Effect
	Rate of official food control	Action
	Progress in implementation of HACCP system	Action
	Population awareness of food safety rules in households	Action
Chemical emergencies	Number of chemical incidents	State
	Exposure to chemical(s) from chemical incidents	Exposure
	Incidence of people hospitalised because of chemical incidents	Effect
	Communication with the public	Action
Work place	Self-reported work-related illness	Effect
	Voluntary reporting systems	Action
	Good occupational services coverage *	Action

* For future development

Part 2　Core Set of Environmental Health Indicators: Operational Forms

Note: The operational forms are adapted from the methodology sheets as described in the WHO publication: Environmental Health Indicators: Framework and Methodologies, WHO, Geneva, 1999 (WHO/SDE/OEH/99.10) at:
http://www.who.int/environmental_information/Information_resources/documents/Indicators/EHIndicators.pdf

Air_D1	**Kilometres driven per transport mode per person**	DPSEEA
Issue	Air Quality and Noise	
Definition of indicator	Number of kilometres driven per year by: personal cars, trucks, public transport (electric), public transport (fossil fuel), human powered (walking, bicycling) per head of population	
Underlying definitions and concepts	The indicator is based on the assumption that the amount of transport vehicles and the amount of kilometres driven by them represent a significant source for air pollution and noise Underlying definitions are: **Number of kilometres driven by vehicle [type]** = total number of vehicles [type] $\times$ average amount of kilometres driven per vehicle [type] **Summaries can be given**: in km/[type], or as percentage of the total number of kilometres driven by all types of vehicles	
Specification of data needed	Total number of vehicles per transport type per year Total amount of kilometres driven per transport type per year Total resident population	
Data sources, availability and quality	National inventories on transport are usually available from national statistical bureaux. On a local scale, a system of traffic counts or traffic flow models is required. If this is not available, use can be made from a vehicle registry system. Data on the total resident population should be available from national censuses and should be reliable	
Computation	See definition	
Units of measurement	Km [vehicle type]/ year/ head of population; or percentage	
Scale of application	Mainly local (urban) to regional (sub-national)	
Interpretation	The success of policies targeted at reducing the traffic as significant source of air pollution and noise can be assessed. Trends in kilometres driven can be coupled to economy (e.g. relation between the economic development as expressed by the GDP and transport needs) as well as to atmospheric emissions	
Linkage with the other indicators	Driving force: ***Number of kilometres driven per transport mode per person;*** *Average consumption of fuel by type* Pressure: *Emission of air pollutants; Average consumption of leaded gasoline* Exposure: *Ambient concentrations of air pollutants (urban): population-based exposure* Effect: *Mortality due to respiratory diseases (all ages); Mortality due to diseases of the circulatory system (all ages); Proportion of the population annoyed by noise due to traffic* Action: *Participation in International agreements and environmental initiatives*	
Related data, indicators	UN Indicators of sustainable development URL: gopher://gopher.un.org:70/11/esc/cn17/1996-97/indicators WHO Healthy Cities Programme Indicators http://www.who.dk/healthy-cities/pdf/indicap.pdf Related documents: Charter on Transport, Environment and Health: WHO Euro 3rd Min. Conference London http://www.who.dk/london99/WelcomeE.htm EEA (2000) Are we moving into the right direction. Indicators on transport and environment integration in the EU (TERM 2000) http://themes.eea.eu.int/binary/t/term2000_sum.pdf	

Air_D2	Consumption of fuel by type from road transport	DPSEEA
Issue	Air Quality	
Definition of indicator	Average consumption of fuel by type from road transport per inhabitant per year	
Underlying definitions and concepts	The indicator is based on the assumption that the use of fossil fuel represents a significant source of exposure to ambient air pollutants and health risk. Underlying definitions are: **Fossil fuel consumption**: total annual sales of all fossil fuel (e.g. gasoline, diesel, LPG by volume) multiplied by the average energy content for the respective fuel in a country (city) **Total population**: total resident population **Summaries can be given**: in MJ [type of fuel]/inhabitant, or as percentage of the total consumption (by all types)	
Specification of data needed	Amount of total sales of fossil fuel consumption by type in a country Total population	
Data sources, availability and quality	Data on the amounts of energy used by fuel type are usually available from national statistics, and are typically derived either from the trade data, taxation registries, or the sales data of the energy companies. These data are reasonably reliable at the national level; at the regional/ local level, however, they may be difficult to acquire (for the reasons of commercial confidentiality) and may be less accurate. Data on the total resident population should be available from national censuses and should be reliable	
Computation	The indicator can be expressed as: $(E_{mj} \times U) / P$, where U is the total volume of the respective type of fuel sold and E_{mj} is the average energy content (MJ/l or MJ/kg) of that fuel and P is the total population in the area under consideration.	
Units of measurement	MJ [type of fuel]/inhabitant; or as percentage	
Scale of application	Regional to international	
Interpretation	The indicator can be interpreted in terms of a measure of potential emission of air pollutants. Depending on the state of technology used (e.g. three-way catalyst) emission of various pollutants can be expected. An interpretation of the state of energy efficiency and pollution control can be made based on comparison with emission indicator: therefore changes in fuels consumption (with the likely exception of the CO2) should not necessarily be seen as direct evidence of a change of emissions.	
Linkage with the other indicators	Driving force: **Consumption of fuel by type from cars**; *Kilometres driven per transport mode* Pressure: *Emission of air pollutants; Average consumption of leaded gasoline* Exposure: *Ambient concentrations of air pollutants (urban): population-based exposure* Effect: *Mortality due to respiratory diseases (all ages); Mortality due to diseases of the circulatory system (all ages); Proportion of the population annoyed by noise due to traffic* Action: *Participation in International agreements and environmental initiatives*	
Related data, indicators	Related documents: Charter on Transport, Environment and Health: WHO Euro 3rd Min. Conference London http://www.who.dk/london99/WelcomeE.htm Towards a transport and environment reporting mechanism for the EU: technical report N. 18 (EEA and Eurostat) http://themes.eea.eu.int/binary/t/technical_18_part_1.pdf See also Urban Indicators – compilations from international lists http://www.ceroi.net/urbanind.htm	

Air_P1	Consumption of leaded gasoline	DPSEEA
Issue	Air Quality	
Definition of indicator	Average lead consumption from cars per inhabitant	
Underlying definitions and concepts	The indicator is based on the assumption that leaded fuel represents significant source of exposure to lead in the atmosphere and health risk. Underlying definitions are: **Unleaded gasoline consumption**: total volume of gasoline not containing lead sold per year **Total gasoline consumption**: total sales of all gasoline (by volume) per year **Average lead content in leaded gasoline**: average concentration of lead (g/l) in leaded gasoline **Total population**: total resident population	
Specification of data needed	Volume of unleaded gasoline sold in a country (city) Total volume of gasoline sold in a country (city) Average concentration of lead in leaded gasoline in a country Total population	
Data sources, availability and quality	Data on the amounts of gasoline sold are usually available from national statistics, and are typically derived either from the trade data, taxation registries, or the sales data from the oil companies. These data are reasonably reliable at the national level; at the regional/ local level, it may be difficult to be acquired (for reasons of commercial confidentiality) and may be less accurate.	
Computation	The **pressure** indicator can be computed as: $\{ (C_{pb} \times (T\text{-}U)) / T \} / P$, where U is the total volume of unleaded gasoline sold, and T is the total volume of all gasoline sold, C_{pb} is the average concentration of lead (g/l) in leaded petrol and P is the population in the area under consideration. The **action** indicator can be computed as: $(U / T) \times 100$	
Units of measurement	**Pressure**: g/ inhabitant **Action:** percentage	
Scale of application	Regional to international	
Interpretation	This indicator is relatively simple to interpret, in that sales of unleaded gasoline and the average lead content allowed in leaded petrol are influenced largely by policy action. In particular, differential taxation of fuels on the basis of their lead content is effective in controlling consumption. Nevertheless other factors affect consumption of unleaded fuels, including vehicle design and performance (both of which may be determined by manufacturers beyond the area of interest). Therefore, changes in sales of unleaded fuels should not, necessarily, be seen as evidence of the direct effects of policy action. When used as an indicator of pressure/exposure, it is also important to recognise that many other sources of exposure may occur, including industrial activity and coal combustion, both of which might be important locally. Recycling of lead in dust also means that relatively long delays may occur between reductions in use of leaded fuels and changes in atmospheric concentrations or human exposures.	
Linkage with the other indicators	Pressure: *Emission of air pollutants; **Average consumption of leaded gasoline*** Exposure: *Ambient concentrations of air pollutants (urban): population-based exposure* Effect: *Mortality due to respiratory diseases (all ages); Mortality due to diseases of the circulatory system (all ages);* Action*: Participation in International agreements and environmental initiatives; Availability of unleaded gasoline*	
Related data, indicators	Related documents: Charter on Transport, Environment and Health: WHO Euro 3rd Min. Conference London http://www.who.dk/london99/WelcomeE.htm WHO 1995 Inorganic lead. Environmental Health Criteria Series, Number 165. Published under the joint sponsorship of the UNEP, ILO and WHO. Geneva: WHO http://www.who.int/dsa/cat97/zehc1.htm Reducing lead in gasoline: a joint project of OECD and UNEP http://www.oecd.org/ehs/LEAD/index.htm	

Air_P2	Emissions of air pollutants	DPSEEA
Issue	Air Quality	
Definition of indicator	Annual emissions of SO_2, PM_{10}, secondary PM_{10}, NO_X, VOC by economic sector	
Underlying definitions and concepts	The indicator describes emissions of pollutants involved in trans-boundary air pollution, which forms a potential risk to the population. Part of the pollution is directly emitted into the atmosphere (primary emissions), other is formed photo-chemically (secondary PM_{10}, ozone). In this case, precursor emissions are aggregated using appropriate weight factors.	
Specification of data needed	National total and sectoral emissions for SO_2, (primary) PM_{10}, NO_X. For evaluating emissions of secondary PM_{10} and ozone precursors the national total and sectoral emissions for CH_4, CO, VOC and NH_3 are needed as well.	
Data sources, availability and quality	Data on national emissions including a sectoral breakdown of SO_2, NO_x, VOC, CO, NH_3, and CH_4 can be obtained from EEA/ETC-AE (CORINAIR project), from UNECE/CLRTAP/EMEP or from IIASA(results of the RAINS-model). An inventory of PM_{10} emissions is in preparation. Preliminary data is available from the Auto Oil II programme and from the *European Environmental Priorities: an Integrated Economic and Environmental Assessment*. Report 481505010, RIVM, Bilthoven	
Computation	The pressure indicator of SO_2, primary PM_{10}, NO_x is directly obtained from the reported total emissions. The secondary PM_{10} emissions are based on the emissions of SO_2, NO_x and NH_3 using weighting factors (SO_2 0.70, NO_x 0.88, NH_3 0.64). These weighting factors represent the fractions of primary emission that is in-situ converted to the secondary aerosol and the difference in molar mass of primary and secondary pollutant. The emission of ozone precursors is based on the emissions of NO_x, VOC, CO and CH_4 using their Tropospheric Ozone Formation Potential (TOFP) as weighting factors (NO_x 1.22, VOC 1.0, CO 0.11, CH_4 0.014). These weighting factors represent the formation potential of the ozone for each of the precursors (see for more details, De Leeuw F.A.A.M. (2000) Towards a set of emission indicators for long-range trans-boundary air pollution. In preparation).	
Units of measurement	Gg or ktons/yr; ozone precursor emissions are expressed in TOFP-equivalents (in Gg or ktons/year)	
Scale of application	National	
Interpretation	This indicator can be used to interpret temporal trends in air pollution emissions. In general terms, an increase in emissions may be taken to suggest an increase in concentrations, exposures and health risk of the urban population. The pollutants described in this indicator are typical examples of trans-boundary air pollution. It might well be that there is a discrepancy between the temporal trends in national emissions and country-wide averaged concentrations. Long-range transport over the European continent may lessen or may enhance the impact of a national emission trend.	
Linkage with the other indicators	Pressure: **Emission of air pollutants**; *Average consumption of leaded gasoline* Exposure: *Ambient concentrations of air pollutants (urban): population-based exposure* Effect: *Mortality due to respiratory diseases (all ages); Mortality due to diseases of the circulatory system (all ages);* Action*: Participation in International agreements and environmental initiatives; Availability of unleaded gasoline*	
Related data, indicators	Towards Environmental Pressure Indicators for the EU http://esl.jrc.it/envind/hm_me_en.htm Environmental signals 2000: Environmental assessment report no 6 (first in a series of regular indicator-based reports) http://themes.eea.eu.int/showpage.php?pg=40635 EMEP/CORINAIR Atmospheric Emission Inventory Guidebook (Second edition) http://themes.eea.eu.int/toc.php/state/air?doc=39186&l=en See also Urban Indicators – compilations from international lists http://www.ceroi.net/urbanind.htm The Particulate-related health benefits of reducing power plant emissions at: http://www.cta.policy.net/fact/mortality/abt.vtml	

Air_Ex1	**Ambient concentrations of air pollutants (urban): population-based exposure**	DPSEEA
Issue	Air Quality	
Definition of indicator	**Population – weighted exceedance of reference concentration of selected air pollutants** The indicator consists of seven sub-indicators, representing population-weighted mean exceedance of the reference concentrations for air pollution: Reference values (RV) NO_2 (annual average): 40 µg.m-3 PM_{10} (annual average): 40 µg.m-3 SO_2 (daily average): 125 µg.m-3 PM_{10} (daily average): 50 µg.m-3 TSP (daily average): 230 µg.m-3 Black smoke (daily average): 150 µg.m-3 O_3 (8 hourly moving average): 120 µg.m-3	
Underlying definitions and concepts	This indicator is based on the assumption that outdoor levels of air pollution in urban areas represent a significant source of exposure and health risk. The four selected pollutants (NO_2, PM_{10}, SO_2, O_3) give a good picture of ambient concentrations in cities and are related to health effects. The formula for each sub-indicator is based on the assumption that an increase of the incidence of health outcomes to exposure in a given population is linearly proportional to the pollutant concentration over the selected RV and to the size of the exposed population. The indicators relate to the calendar year. Underlying definitions are: **Mean annual concentration**: mean concentration of the pollutant of concern, averaged over all hours of the year. **Population weighting**: based on measurements at city background measurements sites or other assessment techniques the exceedance area in a city is calculated by a modelling. The percentage/number of the city population living in this area is the required number and is, ideally, based on the actual number of people living there. If this number is not available (e.g. due to insufficient spatial resolution in the population data), the fraction of the urban built-up area in exceedance is taken as the estimate of the fraction of the population in a city living in an exceedance area. **Urban (cities) area:** The built-up area of a municipality. There is no international agreement on the minimum size required. In international studies urban areas with a population above 100.000 inhabitants are usually included, sometimes extended with a representative sample of urban areas with 20.000 to 100.000 inhabitants.	
Specification of data needed	Distribution of mean 24-hour concentration of SO_2, PM_{10}, TSP, Black smoke, and of maximum daily 8-h moving average for O_3. Distribution of mean annual for NO_2 and PM_{10}, measured over the calendar year. Site location, site type (street, urban background), monitoring method (e.g. passive sampler, continuous monitor) and sampling frequency. Number of residents of an urban area for which the estimate of air pollution concentration is relevant.	
Data sources, availability and quality	Data on ambient air pollution concentrations can be obtained from national or local monitoring networks, using either continuous (fixed-site) monitors or passive samplers. Population distribution, the number of people living in an certain urban area/city/ agglomeration is usually obtained from the national/local bureau's of statistics.	
Computation	For a pollutant y (reference value RV_y) and population P, the indicator is calculated as: $$I_y = SUM \{(P_i / P) * (C_{yi} - RV_y)\},$$ Where: C_{yi} – concentration of pollutant y in sub-population i, P_i – number of residents in sub-population i; $P = SUM (P_i)$ For the daily pollution data, the sum is calculated over all separate days with the data in the calendar year, and all sub-populations.	
Units of measurement	µg / m^3	

Scale of application	Mainly local to regional; application at broader scales can be limited by the spatial non-representativeness of monitoring stations. Application of pollution concentration models may increase the scale to the areas with a limited monitoring only.
Interpretation	This indicator can be used to interpret both spatial patterns and temporal trends in exposure to air pollution. In general terms, an increase in pollutant concentrations may be taken to suggest an increase in exposures and raised health risk; a reduction in pollution levels implies a decrease in exposures and a reduction in health risk. SO_2 could be considered as a proxy of industrial pollution and NO_2 – as an indicator for traffic exposures. Although PM_{10} data may not be available for many countries, preference should be given to it. TSP, that's mostly available, may be not comparable between the countries. With respect to the Black Smoke it is a good indicator for long-term traffic exposure. Several factors nevertheless need to be taken into account in interpretation. One of the most important is the siting of the monitors. As a measure of exposure, data is generally most relevant where monitoring sites are located in residential or densely populated areas. Allowance also needs to be made for the detection limits, accuracy and comparability of the measurement methods. In particular, care needs to be taken when comparing data from different monitoring networks, due to the possibility of differences in sampling or measurement techniques. When used as a basis for assessing exposure, it is also important to recognise that actual exposures depend fundamentally upon indoor concentrations and time activity patterns of individuals. When used for impact calculations, possible representation of one pollution mix by several correlated pollutants must be considered.
Linkage with the other indicators	Pressure: *Emission of air pollutants; Average consumption of leaded gasoline* Exposure: ***Ambient concentrations of air pollutants (urban): population-based exposure*** Effect: *Mortality due to respiratory diseases (all ages); Mortality due to diseases of the circulatory system (all ages);* Action*: Participation in International agreements and environmental initiatives; Availability of unleaded gasoline*
Related data, indicators	EEA/ETC-AQ. AIRBASE, The European Air Quality Information system (www.etcaq.rivm.nl). AIRBASE is a pan-European AQ database which can be accessed through the Internet. It contains raw AQ data and statistics. WHO Healthy Cities Programme Indicators http://www.who.dk/healthy-cities/pdf/indicap.pdf WHO 1998 Healthy cities Air Management Information System AMIS 2.0 WHO: Geneva http://www.who.int/peh/air/amis.html UN 1996 *Indicators of Sustainable Development: framework and methodologies*. Report for the UN Commission on Sustainable Development. New York: UN Department for Policy Co-ordination and Sustainable Development. URL: gopher://gopher.un.org:70/11/esc/cn17/1996-97/indicators WHO 1987 *Air Quality Guidelines for Europe*. WHO Regional Publications, European Series No. 23. Geneva: WHO. (2nd edition: see http://www.who.int/peh/air/Airqualitygd.htm) For more information on monitoring ambient air quality for health impact assessment see the manual of the software tool AirQ opening the Air Quality section of the http://www.who.nl/

Air_E1	Infant mortality due to respiratory diseases	DPSEEA
Issue	Air Quality	
Definition of indicator	Annual mortality rate due to respiratory diseases in children older than one month and under one year of age	
Underlying definitions and concepts	The indicator is based on the following definitions: **Respiratory disease:** an acute or chronic illness affecting the respiratory system; includes acute respiratory infections, bronchitis, pneumonia, influenza, chronic obstructive pulmonary diseases **Mortality due to respiratory diseases:** death for which the primary cause is defined as respiratory disease (ICD-10 codes J00 - J99) **Infants**: children less than one year of age and older than one month of age. **Total population of infants**: number of live births in the year (or other survey period). According to available epidemiological studies, infant mortality may be correlated with level of air pollution in the place of residence. However numerous other factors play a role in determining this mortality as well. The indicator is a necessary input to estimation of the burden of disease attributable to air pollution.	
Specification of data needed	Annual number of deaths of children under 1-12 months of age due to respiratory diseases. Total number of live births in the survey year.	
Data sources, availability and quality	Data on infant deaths due to respiratory illness may need to be obtained from a variety of different sources. In most European countries, national statistics are collated, based on death certification. However, some differences in reporting mechanisms and – more importantly in many cases – in diagnosis may exist. In other cases, data may be provided by national demographic surveillance systems: in a number of countries, these have included a verbal autopsy module aimed at collecting information on the cause of death in children. Data on the total population of infants are obtainable from national censuses. For inter-censual years, estimates may need to be made using vital registration data or demographic models, but these may contain some uncertainties due to effects of migration	
Computation	This indicator can be computed as: $1000 * (M_{ri} / P_i)$ where M_{ri} is the number of deaths due to respiratory diseases in children 1-12 months of age, and P_i is the total number of live births in the survey year	
Units of measurement	Number of deaths per thousand live births	
Scale of application	National or international, though at international scales problems of data consistency and differences in the range of respiratory illnesses may create difficulties for interpretation.	
Interpretation	This indicator may be interpreted to show trends or patterns in post-neonatal infant mortality as a result of respiratory diseases. An increase in mortality rates might imply higher exposures and worsening air pollution conditions; a reduction in mortality might imply a decrease in exposures and an improvement in air quality. For many reasons, however, such interpretations need to be made with care. Inconsistencies in diagnosis may cause problems in many cases. Crucially, the association between respiratory mortality and ambient air pollution is not simple. Many forms of respiratory illness occur, relating to a wide range of causes including exposures not only to ambient air pollution but also to pollutants and allergens (e.g. tobacco smoke, dust mite, fur) in the home and exposures to infectious agents. Diet and other lifestyle, environmental and social factors may also be important. In developing countries, for example, HIV and malaria are extremely important factors in either causing lower respiratory infection, or presenting as LRI. These may thus have a substantial effect on observed death rates. Mortality is also highly dependent upon the effectiveness of the health care system and availability of treatment. In many developed countries, mortality rates due to respiratory diseases have remained broadly stable over recent decades, or have even declined, despite a large increase in morbidity.	
Linkage with the other indicators	Pressure: *Emission of air pollutants;* Exposure: *Ambient concentrations of air pollutants (urban): population-based exposure* Effect: ***Infant mortality rate due to respiratory diseases;*** *Mortality due to respiratory diseases (all ages); Mortality due to diseases of the circulatory system (all ages);* Action*: Participation in International agreements and environmental initiatives Availability of unleaded gasoline*	
Related data, indicators	See WHO, Geneva about children's environmental health http://www.who.int/peh/child/index.html	

Air_E2	Mortality due to respiratory diseases, all ages	DPSEEA
Issue	Air quality	
Definition of indicator	Annual mortality rate due to respiratory diseases	
Underlying definitions and concepts	The indicator is based on the following definitions: **Respiratory disease:** an acute or chronic illness affecting the respiratory system (ICD – 10 codes J00 – J99) **Mortality due to respiratory diseases:** death for which the underlying cause is defined as respiratory disease. **Total population**: number of resident people at the midpoint of the year (or other survey period).	
Specification of data needed	Annual number of deaths due to respiratory diseases. Total population at the mid-point in the survey year.	
Data sources, availability and quality	Data on deaths due to respiratory illness may need to be obtained from a variety of different sources. In most European countries, national statistics are collated, based on death certification. However, some differences in reporting mechanisms and – more importantly in many cases – in diagnosis may exist. Where national statistics on death due to respiratory illness are not available, it may be necessary to collect data directly from hospitals or health authorities (e.g. by sample surveys). Data on the total population are obtainable from national censuses. For inter-censual years, estimates may need to be made using vital registration data or demographic models, but these may contain some uncertainties due to effects of migration.	
Computation	This indicator can be computed as: $100000 * (Mrt / P_t)$ where M_{rt} is the total number of deaths due to respiratory diseases, and P_t is the total population.	
Units of measurement	Number of deaths per hundred thousand population	
Scale of application	National or international, though at international scales problems of data consistency and differences in the range of respiratory illnesses and age structure may create difficulties for interpretation.	
Interpretation	This indicator may be interpreted to show trends or patterns in mortality as a result of respiratory diseases. A small part of respiratory mortality it can be attributed to exposure to air pollution. Mortality rate is a necessary input to the assessment of burden of disease attributable to air pollution, estimated using the information on population exposure and data from epidemiological studies. Many other factors than air pollution may cause respiratory diseases, including exposures to pollutants and allergens in the home (e.g. smoking, dust mite, pets) or at work, and exposures to infectious agents. In developing countries, for example, HIV and malaria are extremely important factors in either causing lower respiratory infection, or presenting as LRI. These may thus have a substantial effect on observed death rates. Mortality is also highly dependent upon the effectiveness of the health care system and availability of treatment; indeed, in many developed countries, mortality rates due to respiratory diseases have remained broadly stable over recent decades, or have even declined, despite a large increase in morbidity. Differences in age structure may also make direct comparisons between different countries or periods difficult; age- and gender-standardised rates may then need to be computed. Inconsistencies in diagnosis may cause problems in many cases as well.	
Linkage with the other indicators	Pressure: *Emission of air pollutants;* Exposure: *Ambient concentrations of air pollutants (urban): population-based exposure* Effect: *Infant mortality due to respiratory diseases;* **Mortality due to respiratory diseases (all ages)**; *Mortality due to diseases of the circulatory system (all ages);* Action*: Participation in International agreements and environmental initiatives; Availability of unleaded gasoline*	
Related data, indicators	Health for All (HFA) indicators for monitoring and evaluation of Health 21 http://www.who.dk/cpa/pb9912e.htm Health For All Statistical Database (HFA – DB) http://www.who.dk/country/country.htm Or for on-line access via European Public Health Information Network for Eastern Europe (EUPHIN – East) http://www.euphin.dk/hfa/Phfa.asp	

Atlas of leading and avoidable causes of death in countries of Central and Eastern Europe
http://www.who.dk/country/readme.htm
See also Urban Indicators – compilations from international lists
http://www.ceroi.net/urbanind.htm
National Morbidity, Mortality and Air Pollution Study. HEI Research Report N. 94 Part 1, May 2000 at: http://www.healtheffects.org/Pubs/Samet.pdf
"Death, disease and dirty power" Mortality and health damage due to air pollution from power plants. Clean Air Task Force, Boston, MA, October 2000
http://www.cta.policy.net/fact/mortality/mortalitystudy.vtml

Air_E3	Mortality due to diseases of the circulatory system, all ages	DPSEEA
Issue	Air Quality	
Definition of indicator	Annual mortality rate due to cardiovascular diseases all ages (ICD –10 codes I00 – I99)	
Underlying definitions and concepts	The indicator is based on the following definitions: **Diseases of the circulatory system**: ICD – 10 codes I00 – I99 **Mortality due to diseases of the circulatory system**: death for which cardiovascular illness is identified as the primary cause. **Total population:** number of resident people at the midpoint of the year (or other survey period).	
Specification of data needed	Annual number of deaths due to cardiovascular illness. Total resident population	
Data sources, availability and quality	Data on deaths due to cardiovascular illness may be obtained from a variety of different sources. In most European countries, national statistics are collated, based on death certification. However, some differences in reporting mechanisms and – more importantly in many cases – in diagnosis may exist. Where national data are not available, it may be necessary to collate information from more local sources (e.g. hospitals or health authorities), for example through sample surveys. Data on the total population are obtainable from national censuses. For inter-censual years, estimates may need to be made using vital registration data or demographic models, but these may contain some uncertainties due to effects of migration	
Computation	This indicator can be computed as: $100000 * (M_{ct} / P_t)$ where M_{ct} is the total number of deaths due to cardiovascular illness, and P_t is the total population.	
Units of measurement	Number of deaths per hundred thousand population	
Scale of application	National and international, though at broader scales problems of data consistency and differences in the specific causes of death may make interpretation difficult.	
Interpretation	This indicator may be interpreted to show trends or patterns in mortality as a result of cardiovascular diseases. A small part of cardiovascular mortality can be attributed to exposure to air pollution. Mortality rate is a necessary input to the assessment of burden of disease attributable to air pollution, estimated using the information on population exposure and data from epidemiological studies. For many reasons, however, such interpretations need to be made with care. Many other factors than air pollution cause cardiovascular diseases, such as diet and lifestyle factors (e.g. exercise, tobacco smoking). Many of the effects of these risk factors have long latency periods, so that death may be separated by many years from the period of exposure. Mortality is also highly dependent upon the effectiveness of the health care system and availability of treatment. Differences in age structure may also make direct comparisons between different countries or periods difficult; age- and gender-standardised rates may then need to be computed. Inconsistencies in diagnosis may cause problems in many cases.	
Linkage with the other indicators	Pressure: *Emission of air pollutants;* Exposure: *Ambient concentrations of air pollutants (urban): population-based exposure* Effect: *Infant mortality due to respiratory diseases; Mortality due to respiratory diseases (all ages);* ***Mortality due to diseases of the circulatory system (all ages);*** Action*: Participation in International agreements and environmental initiatives Availability of unleaded gasoline*	
Related data, indicators	Health for All (HFA) indicators for monitoring and evaluation of Health 21 http://www.who.dk/cpa/pb9912e.htm Health For All Statistical Database (HFA – DB) http://www.who.dk/country/country.htm Or for on-line access via European Public Health Information Network for Eastern Europe (EUPHIN – East) http://www.euphin.dk/hfa/Phfa.asp Atlas of leading and avoidable causes of death in countries of Central and Eastern Europe http://www.who.dk/country/readme.htm	

Air_A1	**Participation in International agreements and Environmental initiatives**	DPSEEA
Issue	Air Quality	
Definition of indicator	Composite index for participation in environmental agreements, treaties, and initiatives for reducing ambient air pollution	
Underlying definitions and concepts	The indicator is based on the assumption that dissemination of information is an important tool for a transparent and effective management of air pollution control. The indicator also represents an overview of the targets/ agreements the countries or cities have committed themselves to in an (inter-) national context. The indicator also takes into consideration the impact of the participation in terms of measurable results.	
Specification of data needed	Evidence for lists of relevant treaties, agreements, protocols and initiatives Evidence for the level of participation	
Data sources, availability and quality	Responsible national (city) authorities	
Computation	The index is computed as *SUM* (Ci) where Ci is the score for component **i** from the list of treaties, agreements and initiatives For each component the following scoring is accepted: 0 – Not existing 1 – Signed only, not ratified 2 – Signed and ratified The full list for the above components (Ci) is as follows: 1. Convention on Long-range Transboundary Air Pollution (Geneva, 13 November 1979). 2. Protocol to the 1979 Convention on long-range transboundary air pollution on long-Term Financing of the Co-operative Programme for Monitoring and Evaluation of the Long-Range Transmission of Air Pollutants in Europe (EMEP) (Geneva, 28 September 1984). 3. Protocol to the 1979 Convention on Long-Range Transboundary Air Pollution on the Reduction of Sulphur Emissions or their Transboundary Fluxes by at least 30 per cent (Helsinki, 8 July 1985). 4. Protocol to the 1979 Convention on Long-Range Transboundary Air Pollution concerning the Control of Emissions of Nitrogen Oxides or their Transboundary Fluxes (Sofia, 31 October 1988). 5. Protocol to the 1979 Convention on Long-Range Transboundary Air Pollution concerning the Control of Emissions of Volatile Organic Compounds or their Transboundary Fluxes (Geneva, 18 November 1991). 6. Protocol to the 1979 Convention on Long-Range Transboundary Air Pollution on Further Reduction of Sulphur Emissions (Oslo, 14 June 1994). 7. Protocol to the 1979 Convention on Long-Range Transboundary Air Pollution on Heavy Metals (Aarhus, 24 June 1998). 8. Protocol to the 1979 Convention on Long-Range Transboundary Air Pollution on Persistent Organic Pollutants (Aarhus, 24 June 1998). 9. Protocol to the 1979 Convention on Long-range Transboundary Air Pollution to Abate Acidification, Eutrophication and Ground-level Ozone (Gothenburg, 30 November 1999). 10. Vienna Convention for the Protection of the Ozone Layer (Vienna, 22 March 1985). 11. Montreal Protocol on Substances that Deplete the Ozone Layer (Montreal, 16 September 1987). 12. Amendment to the Montreal Protocol on Substances that Deplete the Ozone Layer (London, 29 June 1990). 13. Amendment to the Montreal Protocol on Substances that Deplete the Ozone Layer (Copenhagen, 25 November 1992). 14. Amendment to the Montreal Protocol on Substances that Deplete the Ozone Layer adopted by the Ninth Meeting of the Parties (Montreal, 17 September 1997). 15. Amendment to the Montreal Protocol on Substances that Deplete the Ozone Layer (Beijing, 3 December 1999).	

	16. United Nations Framework Convention on Climate Change (New York, 9 May 1992).
	17. Kyoto Protocol to the United Nations Framework Convention on Climate Change (Kyoto, 11 December 1997).
Units of measurement	Ordinal score (0 – 34)
Scale of application	Urban and (inter-) national level
Interpretation	The indicator shows how firm a country or a city is connected to the (inter-) national network and community. Successful initiatives will be recognised and the public will have an overview of the goals and targets the city or country has committed itself to.
Linkage with the other indicators	Pressure: *Emission of air pollutants; Average consumption of leaded gasoline* Exposure: *Ambient concentrations of air pollutants (urban): population-based exposure* Effect: *Annual mortality rate due to respiratory diseases (all ages); Annual mortality rate due to cardio-vascular diseases (all ages);* Action*: **Participation in International agreements and environmental initiatives***; *Availability of unleaded gasoline*
Related data, indicators	Related documents: Charter on Transport, Environment and Health: WHO Euro 3rd Min. Conference London http://www.who.dk/london99/WelcomeE.htm Environmental signals 2000: Environmental assessment report no 6 (first in a series of regular indicator-based reports) http://themes.eea.eu.int/showpage.php?pg=40635 EEA (2000) Are we moving into the right direction. Indicators on transport and environment integration in the EU (TERM 2000) http://themes.eea.eu.int/binary/t/term2000_sum.pdf See also Urban Indicators – compilations from international lists http://www.ceroi.net/urbanind.htm Directory of relevant European Community's legislation can be viewed at: http://europa.eu.int/eur-lex/en/lif/ind/en_analytical_index_15.html Some of the conventions can be found at: http://www.unece.org/env/

Air_A2	**Policies to reduce environmental tobacco smoke exposure**	DPSEEA
Issue	Indoor Air	
Definition of indicator	Composite index of capability for implementing policies to reduce environmental tobacco smoke exposure and promoting smoke free areas	
Underlying definitions and concepts	The existence, implementation and enforcement of instruments and measures to prohibit smoking in indoor environment (facility, room, etc.) The existence of instruments to restrict smoking in designated areas with separate exhaust ventilation	
Specification of data needed	Evidence of existence and enforcement of regulations to reduce ETS exposure	
Data sources, availability and quality	Information on the existence and scope of the legislation and abided by population	
Computation	The index is computed as a sum of 10 subset variables *SUM* (Ci) where Ci is the score for component i. For each component the following scoring is accepted: 0 – Not existing, not clearly stated 1 – Clearly stated, partly (not) implemented or enforced 2 – Clearly stated and obeyed, implemented and enforced The full list of components (Ci) is as follows: 1. Smoking prohibited/restricted in schools 2. Smoking prohibited/ restricted in day-care centres 3. Smoking prohibited/ restricted in governmental offices and other public buildings 4. Smoking prohibited/restricted in public traffic vehicles in urban areas 5. Smoking prohibited/restricted in public traffic vehicles – long distance 6. Smoking prohibited/restricted in hospitals 7. Smoking prohibited/restricted in work places 8. Smoking prohibited/restricted in cinemas, theatres, museums etc 9. Smoking prohibited/ restricted in bars, restaurants 10. Advertisement of cigarettes prohibited	
Units of measurement	Ordinal score (0-20)	
Scale of application	Regional/ national to international	
Interpretation	This indicator provides a general measure of the capability to implement policies for reducing environmental tobacco smoke exposure and promoting smoke free areas: an increase in the score should be taken as a broad indication of increased capability, a reduction the reverse. Like all compound indicators, however, this one needs to be interpreted with care for the final score is the sum of many different components: areas with the same indicator score, therefore, do not necessarily have the same capability profile. It is equally important to examine the components of the indicator and handle appropriately the lack of data before drawing conclusions.	
Linkage with the other indicators	Effect: *Infant mortality due to respiratory diseases; Mortality due to respiratory diseases (all ages); Mortality due to diseases of the circulatory system (all ages);* Action: ***Policies to reduce environmental tobacco smoke***	
Related data, indicators	US EPA Indoor Environments Division. Introduction to IAQ. http://www.epa.gov/iaq/ia-intro.html. US EPA Second Hand Smoke (SHS) also known as: Environmental Tobacco Smoke (ETS) http://www.epa.gov/iaq/ets.html WHO-Euro Alcohol, Drugs and Tobacco Unit http://www.who.dk/adt/tobacco/tcountry.htm	

Hous_S1	Living floor area per person	DPSEEA
Issue	Housing and Settlements	
Definition of indicator	Mean habitable floor area per person NB Median should be used in the future instead of mean	
Underlying definitions and concepts	**Habitable floor area**: total surface area of housing units including the kitchen but not the circulation space, bathroom, toilet, laundry and other service areas **Population**: the resident population in a housing unit or a residential building (including those living in informal settlements)	
Specification of data needed	Habitable floor area Resident population	
Data sources, availability and quality	Data on habitable floor area can be derived from national censuses. Alternatively data could be derived from building plans or from household surveys. Data on resident population are usually available from the national censuses and are generally reliable	
Computation	The indicator can be computed as: Mean value of A_i / P_i Where A_i is the habitable floor area of a housing unit and P_i is the total residential population in it	
Units of measurement	Square metres (m^2)	
Scale of application	Local to national	
Interpretation	This indicator in one of ten "key" housing indicators approved by the UN Commission on Human Settlements to be collected in all countries and in a number of cities in each country to measure the progress towards meeting the objectives of the Global Shelter Strategy. Although a low level of the indicator is a sign of overcrowding it should be interpreted with caution. The relation between the magnitude of the living area and health status depends on many factors such as the quality of the housing unit and residential building and its immediate environment (including ambient air quality, water quality, noise etc.) Where these conditions are inadequate, the overcrowding may be taken as a measure of an increased risk for health.	
Linkage with the other indicators	State: *Living area per person* Exposure: *Population living in substandard housing* Effect: *Mortality due to external causes (domestic accidents, poisoning) in children* Action: *Housing standards and building regulations; Land-use and urban planning regulations*	
Related data, indicators	UN Centre for Human Settlements: list of key urban indicators and database http://www.urbanobservatory.org/indicators/database/housing1.html UN Indicators of sustainable development URL: gopher://gopher.un.org:70/11/esc/cn17/1996-97/indicators WHO Healthy Cities Programme Indicators http://www.who.dk/healthy-cities/pdf/indicap.pdf UN Economic Commission for Europe Annual Bulletin on Housing and Building Statistics for Europe and North America, 1998 http://www.unece.org/env/hs/bulletin/cnt2_e98.htm	

Hous_Ex1	Population living in substandard housing	DPSEEA
Issue	Housing and Settlements	
Definition of indicator	Percentage of the population living in substandard housing, that is without the exclusive use of a toilet, shower or bath and private cooking facilities.	
Underlying definitions and concepts	This indicator requires the ability to identify, and measure the extent of substandard housing. This poses significant difficulties, for these are all to a large extent both environmentally and culturally dependent, and thus are liable to vary from one area (or one time) to another. **Possible definitions of substandard housing may also include housing units** which are: • physically unsound and likely to be dangerous to occupants because of poor construction, or inadequately maintained services (e.g. electricity or gas), or • located in a physically hazardous area (e.g. an area of flood or earthquake risk) or constructed on contaminated land (e.g. by chemical wastes, radioactivity), or • provides serious risks of exposures to indoor pollution (e.g. air pollutants) or pathogens (e.g. moulds, ticks, fleas), or • provides inadequate amenities (e.g. lack of a private shower or bath, toilet, cooking facilities, central heating). **Total population**: the total resident population at the time of census or survey.	
Specification of data needed	Number of people living in substandard housing Total resident population	
Data sources, availability and quality	Data on the quality of the housing stock, and the number of people living in substandard housing is rarely available from routine sources. In some countries, an approximation to this may be available from the census statistics (e.g. housing lacking basic amenities). Generally, however, <u>data will need to be obtained by housing condition surveys</u>. In all cases, these data are liable to considerable margins of error and inconsistency due to difficulties of definition, inconsistent reporting and difficulties of ensuring representative sampling. Data on the total resident population should be available from national censuses and should be reliable.	
Computation	The indicator can be computed as: $100 * (U / P)$ where U is the number of people living in substandard housing and P is the total resident population.	
Units of measurement	Percentage	
Scale of application	Mainly local	
Interpretation	This is a housing indicator, which has wide-ranging significance for policy. In providing a measure of the condition of the housing stock, it also acts as an indicator of health risks associated with basic sanitation, poor sanitation, exposures to indoor air pollution, and access to safe water. It can therefore help to interpret a range of other issues and indicators. Like all general-purpose indicators, this one needs to be interpreted carefully. The characteristics, which render a housing substandard may clearly vary. Without information on these specific characteristics it can be misleading to infer either the existence of particular health risks or effects or the need for specific actions. Lack of consensus about definitions is also likely to pose major difficulties for comparisons between different neighbourhoods or cities, or between different housing condition surveys. A clear understanding of the data is therefore essential before interpretations are made. Standard protocols should be developed and applied.	
Linkage with the other indicators	State: *Living area per person* Exposure: ***Population living in substandard housing*** Effect: *Mortality due to external causes (domestic accidents, poisoning) in children* Action: *Housing standards and building regulations; Land-use and urban planning regulations*	
Related data, indicators	UN Centre for Human Settlements: list of key urban indicators and database http://www.urbanobservatory.org/indicators/database/housing2.html UN Economic Commission for Europe Annual Bulletin on Housing and Building Statistics for Europe and North America, 1998 http://www.unece.org/env/hs/bulletin/cnt2_e98.htm	

Hous_E1 of age	Mortality due to external causes in children under 5 years	DPSEEA
Issue	Housing and Settlements	
Definition of indicator	Annual mortality rate due to the external causes: domestic accidents, poisoning in children under five years of age (ICD 10 codes W00.0 or W00.1 – Y34.0 or Y34.1)	
Underlying definitions and concepts	The indicator is based on the following definitions: **Domestic accidents:** an accident, taking place inside the housing unit, which leads to physical injury and to death. Common domestic accidents include falling downstairs, electrocution, scalding and accidents with kitchen utensils and equipment **Poisoning:** the deliberate, accidental, short- or long-term exposure to a substance of natural or anthropogenic origin at levels sufficient to cause illness and death. **Total number of children less than 5 years of age**: total resident population of children less than 5 years at the time of survey.	
Specification of data needed	Annual number of deaths of children under five years of age due to domestic accidents and poisoning (ICD 10 codes W00 – Y34 with fourth digit either 0 for accident or poisoning occurred at home, or 1 for accident or poisoning occurred at the institutional place of residence) Total number of children less than 5 years of age.	
Data sources, availability and quality	Data on children's deaths due to external causes – domestic accidents and poisoning may need to be obtained from a variety of different sources e.g. national poison centres, emergency medical services etc In most European countries, national statistics are collated, based on death certification. However, some differences in reporting mechanisms and – more importantly in many cases – in diagnosis may exist. In other cases, data may be provided by national demographic surveillance systems: in a number of countries, these have included a verbal autopsy module aimed at collecting information on the cause of death in children. Data on the total number of children aged less than 5 years should usually be available from national censuses and should be reliable.	
Computation	$100000 * (M_{ec} / N_c)$ where M_{ec} is the number of deaths due to domestic accidents and poisoning in children under 5 years of age, and N_c is the total number of children less than 5 years at the time of survey.	
Units of measurement	Number per hundred thousand children under 5 years of age	
Scale of application	Local to international though problems of data consistency and availability may limit interpretations at broader scales	
Interpretation	Where reliable data exist, the indicator can be interpreted as a direct measure to the hazardousness of the home environment. Nevertheless, care is needed in making comparisons between different areas or countries, or over long periods of time. Data are likely to be affected also by the ease of access to the medical services, and by differences in reporting procedures.	
Linkage with the other indicators	Exposure: *Population living in substandard housing* Effect: ***Mortality due to external causes (domestic accidents and poisoning) in children less than 5 years of age*** Action: *Scope and application of building regulations for housing*	
Related data, indicators	Agency for Toxic Substances and Disease Registry Office of Children's Health http://www.atsdr.cdc.gov/child/ See WHO, Geneva about children's environmental health http://www.who.int/peh/child/index.html	

Hous_A1	Scope and application of building regulations for housing	DPSEEA
Issue	Housing and Settlements	
Definition of indicator	Composite index for the scope and application of building regulations for housing	
Underlying definitions and concepts	This indicator is based on the assumption that housing and building regulations can help to reduce health risks by controlling new housing construction on unsuitable sites and by providing adequate standards for building construction and design. Underlying definitions are: **Building regulations**: legally defined standards and norms for new buildings, which must be met by the developer. Building regulations may cover issues such as the amount of space per occupant, construction materials and methods and safety standards. **Housing standards**: formal procedures for the design, layout and amenities provided in new residential buildings. These procedures usually require formal consent from municipal or national authorities before construction can begin. Requirements for the site location and orientation of residential buildings, car parking and access to public transport may also be included.	
Specification of data needed	Evidence of the existence, implementation and enforcement of building regulations and housing standards for new housing.	
Data sources, availability and quality	Evidence can normally best be obtained by reading relevant legislation and guidelines for architects, builders and other professionals.	
Computation	The index is computed as SUM (Ci) where Ci is the score for component i

For each component Ci the following scoring is accepted:
0 – Not existing, not clearly stated
1 – Clearly stated, partly (not) implemented or enforced;
2 – Clearly stated and obeyed, implemented and enforced

The full list of components (Ci) is as follows:
- Formal planning consent required for all new housing construction
- Strict requirement for urban infrastructure provision and connection to sites of new residential buildings (e.g. piped water, drainage, sewerage, electricity, gas)
- Housing standards exist which define minimum requirements and living conditions (e.g. amenities, lighting, thermal insulation, ventilation) for new residential buildings
- Building regulations exist which control building construction methods and non-toxic materials for residential buildings
- Building regulations exist which define safety standards for housing units. | |
Units of measurement	Ordinal score (0-10)	
Scale of application	Local or national to international	
Interpretation	This indicator provides a general measure of the scope and application of housing standards and building regulations, including the requirement for formal approval prior to construction. The simple scoring system means that this indicator should be interpreted with caution because the existence of the various standards, regulations and control instruments does not necessarily mean that they are effectively implemented and enforced.	
Linkage with the other indicators	State: *Living area per person* Exposure: *Population living in substandard housing* Effect: *Mortality due to external causes (domestic accidents, poisoning) in children* Action: **Housing standards and building regulations**; *Land-use and urban planning regulations*	
Related data, indicators	UN Centre for Human Settlements: list of key urban indicators http://www.urbanobservatory.org/indicators/database/key.html UN Economic Commission for Europe Annual Bulletin on Housing and Building Statistics for Europe and North America, 1998 http://www.unece.org/env/hs/bulletin/cnt2_e98.htm	

Hous_A2	Land use and urban planning regulations	DPSEEA
Issue	Housing and Settlements	
Definition of indicator	Composite index for the scope and application of regulations for land use planning in human settlements	
Underlying definitions and concepts	This indicator is based on the assumption that land use and urban can help to reduce health risks by controlling new development on unsuitable sites and by providing adequate standards for industrial, commercial and housing construction and design. Underlying definitions are: **Land use regulations**: formal procedures for controlling where, and under what conditions, land is developed for industrial, commercial and housing purposes. These procedures usually require formal consent before development and construction can occur. Land may also be zoned, with specific areas designated for prescribed functions. **Urban planning regulations**: legally defined standards and norms for urban development, which must be met. Regulations may cover issues such as accessibility to public transport and community services, proximity of different kinds of activities to each other and specific requirements for discharges and waste disposal from industrial and commercial buildings.	
Specification of data needed	Evidence of the existence, implementation and enforcement of land use and urban planning regulations.	
Data sources, availability and quality	Evidence can normally best be obtained by reading relevant legislation and guidelines for professionals.	
Computation	The index is computed as *SUM* (Ci) where Ci is the score for component i. For each component Ci the following scoring is accepted: 0 – Not existing, not clearly stated 1 – Clearly stated, partly (not) implemented or enforced; 2 – Clearly stated and obeyed, implemented and enforced The full list of components (Ci) is as follows: • Formal planning consent required for all new site development • Prescribed land use zoning indicating sites for industrial, commercial and housing development • Regulations exist which define minimum for the collection and treatment of discharges and waste disposal from industrial and commercial buildings • Regulations exist which control safety standards in industrial and commercial buildings • Regulations exist which define minimum requirements for the provision of community services (e.g. public transport; medical and educational services) in residential neighbourhoods	
Units of measurement	Ordinal score (0-10)	
Scale of application	Local or national to international	
Interpretation	This indicator provides a general measure of the scope and application of land use and urban planning regulations. It indicates the level of commitment to ensuring safe living environment in human settlements. The simple scoring system means that this indicator should be interpreted with caution because the existence of the various regulations and planning instruments does not necessarily mean that they are effectively implemented and enforced.	
Linkage with the other indicators	State: *Living area per person* Exposure: *Population living in substandard housing* Effect: *Mortality due to external causes (domestic accidents, poisoning) in children* Action: *Housing standards and building regulations;* ***Land-use and urban planning regulations***	
Related data, indicators	UN Centre for Human Settlements: list of key urban indicators http://www.urbanobservatory.org/indicators/database/key.html	

Traf_E1	**Mortality from traffic accidents**	DPSEEA
Issue	Non-occupational health risks, human settlements	
Definition of indicator	Death rate due to transport accidents (ICD 10 codes V01 – V99)	
Underlying definitions and concepts	The indicator is based on the following definitions: **Deaths due to road traffic accidents:** all deaths directly or indirectly attributable to involvement in a vehicle traffic accident however caused. This includes deaths of vehicle drivers, passengers and pedestrians/cyclists. It also includes both immediate and delayed deaths (though the latency period is rarely clearly defined). This definition is based on the assumption that data on cause of death defines the source of the injury. **Total population:** total resident and visiting population. (Note: for this indicator the total resident and visiting population is more appropriate as denominator, since many deaths in road accidents occur to tourists or other visitors.)	
Specification of data needed	Total number of deaths due to road traffic accidents (ICD 10 codes V01 – V99) Total resident and visiting population	
Data sources, availability and quality	Data on deaths due to road traffic accidents should be available at the national level from official statistics, and at the regional/local level from either registrations of cause of death or from police statistics. These statistics have a number of weaknesses, including the way in which cause of death is defined (reference may be made only to the nature of the injury causing death, not its source), the method of geo-coding (individuals will usually be defined by place of residence, not the location of the accident), and lack of distinction between deaths of pedestrians and vehicle users. Data on total resident population should be available from national censuses and should be reliable. Some census statistics also provide a measure of the number of temporary residents (i.e. visitors) at the time of survey, though definitions tend to vary between countries, and the data may not be representative of the number of visitors at other times in the year. Where appropriate, separate estimates of the number of visitors may be obtained from tourist statistics.	
Computation	The indicator can be computed as: $100000 * (M_t / P)$ where M_t is the total number of deaths due to traffic accidents and P is the total population.	
Units of measurement	Number per hundred thousand population	
Scale of application	Local to international, though problems of data consistency and availability may limit interpretations at broader scales	
Interpretation	This indicator is in general relatively easy to interpret, in that the link between cause and health effect is explicit. Changes in the indicator may nevertheless imply different processes. For example, a reduction in the mortality rate may be due, *inter alia*, to: a reduction in total traffic volume, reduced traffic speeds (e.g. due to increased congestion), an improvement in road design, improved traffic management, improvements in vehicle safety, improvements in driver behaviour, improved environmental conditions (e.g. weather), fewer pedestrians or cyclists, greater segregation of pedestrians from road traffic, improved emergency services, or improved health services. Problems inherent in the data also need to be considered, especially where different countries or regions, with different reporting systems, are being compared. Difficulty also exists in allowing for the number of visitors (especially in transit), which may be significant in some areas.	
Linkage with the other indicators		
Related data, indicators	WHO HFA database: http://www.euphin.dk/hfa/Phfa.asp Health for All (HFA) Indicators for monitoring and evaluation of Health 21 see also http://www.who.dk/cpa/pb9912e.htm OECD Road transport and research programme: The International Transport Research Documentation (ITRD) and the International Road Traffic Accident Database (IRTAD) http://www.oecd.org/dsti/sti/transpor/road/index.htm	

Traf_E2	Rate of injuries by traffic accidents	DPSEEA
Issue	Non-occupational health risks, human settlements	
Definition of indicator	Injury rate due to traffic accidents (ICD 10 codes V01 – V99)	
Underlying definitions and concepts	The indicator is based on the following definitions: **Injuries due to road traffic accidents:** injuries directly or indirectly attributable to involvement in a motor vehicle traffic accident. This includes injuries of vehicle drivers, passengers and pedestrians/cyclists. It also includes from both one or more slight injuries – secondary injuries such as sprains or bruises, to serious injuries such as fractures, concussion, internal lesions, crushing, severe cuts and laceration, severe general shock requiring medical treatment and any other serious lesions entailing detention in hospital. **Total population:** total resident and visiting population. (Note: for this indicator the total resident and visiting population is more appropriate as denominator, since many road accidents occur to tourists or other visitors.)	
Specification of data needed	Total number of injured (ICD 10 codes V01 – V99). Total resident and visiting population	
Data sources, availability and quality	Data on injuries due to road traffic accidents should be available at the national level from official statistics, and at the regional/local level from either registrations of medical (emergency) care facilities or from police statistics. These statistics have a number of weaknesses, including the way in which cause of injury is defined (reference may be made only to the nature of the injury, not its source), the method of geo-coding (individuals will usually be defined by place of residence, not the location of the accident), and lack of distinction between deaths of pedestrians and vehicle users. Overall, the joint use of official statistics from police and statistics from medical institutions (services) gives the possibility to reveal over 90% of real number of accident casualties Data on total resident population should be available from national censuses and should be reliable. Some census statistics also provide a measure of the number of temporary residents (i.e. visitors) at the time of survey, though definitions tend to vary between countries, and the data may not be representative of the number of visitors at other times in the year. Where appropriate, separate estimates of the number of visitors may be obtained from tourist statistics.	
Computation	The indicator can be computed as: $100000 * (I_t / P)$ where I_t is the total number of injured due to traffic accidents and P is the total population	
Units of measurement	Number per hundred thousand population	
Scale of application	Regional to national	
Interpretation	This indicator is in general relatively easy to interpret, in that the link between cause and health effect is explicit. Changes in the indicator may nevertheless imply different processes. For example, a reduction in the injury rate may be due, inter alia, to: a reduction in total traffic volume, reduced traffic speeds (e.g. due to increased congestion), an improvement in road design, improved traffic management, improvements in vehicle safety, improvements in driver behaviour, improved environmental conditions (e.g. weather), fewer pedestrians or cyclists, greater segregation of pedestrians from road traffic, improved emergency services, or improved health services. Problems inherent in the data also need to be considered, especially where different countries or regions, with different reporting systems, are being compared. Difficulty also exists in allowing for the number of visitors (especially in transit), which may be significant in some areas	
Linkage with the other indicators		
Related data, indicators	OECD Road transport and research programme: The International Transport Research Documentation (ITRD) and the International Road Traffic Accident Database (IRTAD) http://www.oecd.org/dsti/sti/transpor/road/index.htm Promoting road safety in the European Union http://europa.eu.int/scadplus/leg/en/lvb/l24055b.htm	

Noise_E1	**Population annoyance by certain sources of noise**	DPSEEA
Issue	Noise	
Definition of indicator	Percentage of the population annoyed by certain sources of environmental noise	
Underlying definitions and concepts	The indicator is based on the assumption that exposure to high levels of noise originated from different sources, e.g. traffic (road, railway and air), industry, entertainment facilities, induce general annoyance and sleep disturbance. Underlying definitions are: **Annoyance**: "a feeling of displeasure associated with any agent or condition, known or believed be an individual or group to adversely affect them" (cf. Guidelines for Community Noise: B. Berglund, T. Lindvall, D. Schwela Ed, WHO, Geneva, 1999). It can be assessed by standardised questionnaires. **Population:** total population surveyed	
Specification of data needed	Self-assessment of the extent of annoyance on a standardised questionnaire by certain sources The subdivision of the source type can be the following: *Road traffic:* ▪ highway ▪ urban road ▪ vans ▪ heavy trucks ▪ motor bikes ▪ mopeds/ scooters *Air traffic:* ▪ civil aviation ▪ military flight ▪ general aviation *Railway traffic:* ▪ passenger trains ▪ freight trains ▪ metro *Industry:* ▪ factories and manufacturers ▪ building equipment ▪ load/ unload facilities *Entertainment:* ▪ bars/ disco's ▪ luna-parks etc ▪ noisy sports (shooting, motorcycling) *Neighbours* Total population of the sample surveyed	
Data sources, availability and quality	Data are collected by surveillance of a representative sample of the population, preferably by trained interviewers, although in some circumstances a telephone survey is a viable alternative. Postal surveys are not recommended. The sample should be randomly selected from a collection of national addresses of habitations (non-inhabited addresses excluded). With large samples, the time for travelling of the interviewers can be reduced by generating multiple addresses in the same area. Care has to be taken to select persons per address according to a chosen scheme; otherwise bias may result. Preferably only persons living longer then one year on the address are selected. A questionnaire is administered which contains the core questions on noise annoance, and limited information about the person (age, gender, education, main occupation) and about the dwelling (building year, type of insulation, quiet side(s)). Some additional questions may be helpful to interpret results: noise sensitivity and anxiety with respect to the source. When at the same time noise levels are determined at the address, this can serve to relate the results to, as well as to construct a distribution of noise levels over houses. If little data are available (e.g. traffic flows, industrial activity, flight patterns), this can prove to be a difficult accomplishment.	

	Annoyance questionnaire: The annoyance question will usually be part of a general household survey, so other relevant data are obtained as well. If not, for a sample questionnaire see: http://www.xs4all.nl/~rigolett/ENGELS/quest/questfr.htm *Next is a zero- to- ten scale on how much (...source...) noise bothers, disturbs or annoys you when you are here at home. If you are not at all annoyed choose zero, if you are extremely annoyed choose ten, if you are somewhere in between, choose a number between zero and ten. Thinking about the last 12 months or so, what number from zero to ten best shows how much you are bothered or annoyed by (...source...) noise?* Both questions should be accompanied by visual answer, that display the words or numbers at equally spaced intervals cards in face-to-face interviews. A question about "hearing" a noise can be informative but must not be used as a filter. Sample sizes may vary, but a minimum of 1000 respondents is felt to be necessary in a homogenous population.
Computation	The indicator can be computed for each source of noise as: $100 * (N_a / N_t)$ where N_a is the number of annoyed people and N_t is the total number of surveyed population The number of **annoyed people** is counted by adding the subjects **scoring 6, 7, 8, 9 and 10**. The number of **highly annoyed people** is counted by adding the subjects **scoring 8, 9 and 10**. Information on annoyance should be supplied with description on grouping of the noise sources
Units of measurement	Percentage
Scale of application	National as well as local – residential settings
Interpretation	The indicator provides a measure of the long-term health effects related to exposure to high levels of environmental noise by some sources when the survey is carefully designed and the above methodology is used. It can serve as a basis for adjusting policy options and regulations on reducing noise and undertaking noise abatement measures..
Linkage with the other indicators	Effect: ***Population annoyance by certain sources of noise****; Sleep disturbance by noise* Action: *Application of regulations, restrictions and noise abatement measures*
Related data, indicators	Long-term health effects of noise: http://www.xs4all.nl/~rigolett/ENGELS/gez_eng.htm EEA EIONET Noise Newsletter http://themes.eea.eu.int/theme.php/issues/noise Guidelines for Community Noise (B. Berglund, T. Lindvall, D. Schwela Ed), WHO, Geneva, 1999 http://www.who.int/peh/noise/noiseindex.html

Noise_E2	Sleep disturbance by noise	DPSEEA
Issue	Noise	
Definition of indicator	Percentage of the population with self-reported sleep disturbance by environmental noise	
Underlying definitions and concepts	The indicator is based on the assumption that exposure to high levels of noise originated from different sources, e.g. traffic (road, railway and air), industry, entertainment facilities, neighbours induce general annoyance and sleep disturbance. Underlying definitions are: **Sleep disturbance**: self-reported noise-induced sleep disturbance and increase of noise-induced awakenings during the habitual sleeping time. Sleep disturbance is seen as a health effect on its own, but may cause also after effects like mood changes, fatigue (and therewith related accidents) and other impaired functions. **Population:** total population surveyed	
Specification of data needed	Self-report of the extent of sleep disturbance on a standardised questionnaire by certain source The subdivision of the source type can be the following: *Road traffic:* ▪ highway ▪ urban road ▪ vans ▪ heavy trucks ▪ motor bikes ▪ mopeds/ scooters *Air traffic:* ▪ civil aviation ▪ military flight ▪ general aviation *Railway traffic:* ▪ passenger trains ▪ freight trains ▪ metro *Industry:* ▪ factories and manufacturers ▪ building equipment ▪ load/ unload facilities *Entertainment:* ▪ bars/ disco's ▪ luna-parks etc ▪ noisy sports (shooting, motorcycling) *Neighbours* Total population of the sample surveyed	
Data sources, availability and quality	Data are collected by surveillance of a representative sample of the population, preferably by trained interviewers, although in some circumstances a telephone survey is a viable alternative. Postal surveys are not recommended. The sample should be randomly selected from a collection of national addresses of habitations (non-inhabited addresses excluded). With large samples, the time for travelling of the interviewers can be reduced by generating multiple addresses in the same area. Care has to be taken to select persons per address according to a chosen scheme; otherwise bias may result. Preferably only persons living longer then one year on the address are selected. A questionnaire is administered which contains the core questions on sleep disturbance, and limited information about the person (age, gender, education, main occupation) and about the dwelling (building year, type of insulation, quiet side(s)). Some additional questions may be helpful to interpret results: noise sensitivity and anxiety with respect to the source. When at the same time noise levels are determined at the address, this can serve to relate the results to, as well as to construct a distribution of noise levels over houses. If little data are available (e.g. traffic flows, industrial activity, flight patterns), this can prove to be a difficult accomplishment.	

	Sleep disturbance questionnaire: Two questions are recommended: 1. Sleeping behaviour: *-At what time usually you go to sleep at working days/weekends?* *-At what time usually you wake up at working days/weekends?* *-Do you usually sleep (nap) at other times during the day?* 　　*If yes: between ... and ... hour* 2. Disturbance: *Next is a zero- to- ten scale on how much (...source...) noise disturbs your sleep when you are at home. If you are not at all annoyed choose zero, if you are extremely annoyed choose ten, if you are somewhere in between, choose a number between zero and ten that best reflects the extent to which your sleep is disturbed. Thinking about the last 12 months or so, what number from zero to ten best shows how much your sleep is disturbed by (...source...) noise?* For a sample questionnaire see: http://www.xs4all.nl/~rigolett/ENGELS/quest/questfr.htm The questionnaire can be combined with the annoyance for the purposes of regular surveys. Sample sizes may vary, but a minimum of 1000 respondents is felt to be necessary in a homogenous population
Computation	The indicator can be computed for each source of noise as: $100 * (N_{sd} / N_t)$ where N_{sd} is the number of sleep disturbed people and N_t is the total number of surveyed population The number of **sleep-disturbed people** is counted by adding the subjects **scoring 6, 7, 8, 9 and 10**. The number of **highly sleep-disturbed people** is counted by adding the subjects **scoring 8, 9 and 10**. Information on sleep disturbance should be supplied with description on grouping of the noise sources
Units of measurement	Percentage
Scale of application	National as well as local – residential settings
Interpretation	The indicator provides a measure of the long-term health effects related to exposure to high levels of environmental noise by some sources when the survey is carefully designed and the above methodology is used. It can serve as a basis for adjusting policy options and regulations on reducing noise and undertaking noise abatement measures.
Linkage with the other indicators	Effect: *Population annoyance by certain sources of noise;* **Sleep disturbance by noise** Action: *Application of regulations, restrictions and noise abatement measures*
Related data, indicators	Long-term health effects of noise: http://www.xs4all.nl/~rigolett/ENGELS/gez_eng.htm EEA EIONET Noise Newsletter http://themes.eea.eu.int/theme.php/issues/noise Guidelines for Community Noise (B. Berglund, T. Lindvall, D. Schwela Ed), WHO, Geneva, 1999 http://www.who.int/peh/noise/noiseindex.html

Noise_A1	Application of regulations, restrictions and noise abatement measures	DPSEEA
Issue	Noise	
Definition of indicator	Composite index of capability to implement regulations, restrictions and noise abatement measures	
Underlying definitions and concepts	The existence, implementation and enforcement of instruments and measures aimed at controlling or reducing noise level in the environment. The existence, implementation and enforcement of legally specified noise metrics and limits for noise per certain type of source. The existence and implementation and enforcement of restrictions on night traffic/ flights and administrative measures. The existence of noise abatement measures: insulations, barriers.	
Specification of data needed	Evidence of existence and enforcement of regulations to reduce noise levels Evidence of existence of noise abatement measures	
Data sources, availability and quality	Information on the existence and scope of the legislation and abided by population	
Computation	The index is computed as a sum of 7 subset variables *SUM* (Ci) where Ci is the score for component i For each component Ci the following scoring is accepted: 0 – Not existing, not clearly stated 1 – Clearly stated, partly (not) implemented or enforced; 2 – Clearly stated and obeyed, implemented and enforced The full list of components (Ci) is as follows: 1 Legislation for noise prevention for new roads 2 Legislation for noise prevention for new railways 3 Legislation for noise prevention for new airports 4 Local authorities required to deal with nuisance complaints 5 Building regulations require insulation between houses 6 Improvement grants for existing dwellings with high noise loads 7 Noise levels or annoyance are monitored on a regular basis	
Units of measurement	Ordinal score (0 – 14)	
Scale of application	National to international	
Interpretation	This indicator provides a general measure of the capability to implement policies for reducing environmental noise: an increase in the score should be taken as a broad indication of increased capability, a reduction the reverse. Like all compound indicators, however, this one needs to be interpreted with care for the final score is the sum of many different components: areas with the same indicator score, therefore, do not necessarily have the same capability profile. It is equally important to examine the components of the indicator and handle appropriately the lack of data before drawing conclusions.	
Linkage with the other indicators	Effect: *Population annoyance by certain sources of noise; Sleep disturbance by noise* Action: ***Application of regulations, restrictions and noise abatement measures***	
Related data, indicators	Airport information database http://www.boeing.com/assocproducts/noise/list.html Review of the statutory limits in the Netherlands http://www.xs4all.nl/~rigolett/ENGELS/normeng.htm Noise Control for Licensed Bars, Hotels and Restaurants http://www.xs4all.nl/~rigolett/ENGELS/horeca/horecafr.htm Noise control at the source: noise levels for outdoor equipment; noise levels for motor vehicles; http://www.xs4all.nl/~rigolett/ENGELS/equipment/equipfr.htm http://www.xs4all.nl/~rigolett/ENGELS/typetest/typfr.htm Guidelines for Community Noise (B. Berglund, T. Lindvall, D. Schwela Ed), WHO, Geneva, 1999 http://www.who.int/peh/noise/noiseindex.html	

Waste_P1	Hazardous waste generation	DPSEEA
Issue	Waste and Contaminated Lands	
Definition of indicator	Amount of hazardous waste generated and imported by country per year irrespective of source	
Underlying definitions and concepts	**Hazardous waste**: waste (i.e. materials which are considered no longer to have value or utility and which are thus to be disposed of), which pose dangers to human health in the event of either long-or short-term exposures either to the wastes themselves or their decay products. Exposure may occur either directly (e.g. through contact with the waste) or indirectly e.g. via seepage into soil, groundwater or surface water, release into the atmosphere or accumulation in the food chain. **Import/export of hazardous waste**: total quantity of hazardous waste per year, subject to trans-boundary movement, which takes place in accordance to the Basel Convention.	
Specification of data needed	Amount of hazardous waste generated by category and/or amount of that, which is subject to trans-boundary movement (imports), per year	
Data sources, availability and quality	At international level data may be obtained from the secretariat of the Basel convention. At national level - by the respective agencies. For some countries it may be difficult to obtain data	
Computation	Sum of all quantities of hazardous waste categories produced and/or subject to trans-boundary movement per year: $HW_M = HW_G + HW_I$ where HW_M – total amount of hazardous waste to be managed in a country; HW_G – total amount of hazardous waste generated within the country; HW_I – total amount of hazardous waste imported	
Units of measurement	Tonnes/ year	
Scale of application	National to international	
Interpretation	Differences of definitions of hazardous waste point out to some limitations. Another limitation is in the availability and accuracy of the data	
Linkage with the other indicators	Pressure: ***Hazardous waste generation*** State: *Contaminated land area* Exposure: *Blood lead level in children* Action: *Hazardous waste policies*	
Related data, indicators	UN Indicators of sustainable development URL: gopher://gopher.un.org:70/11/esc/cn17/1996-97/indicators List of hazardous waste http://www.oecd.org/ehs/waste/ehmono/c8890FNL.pdf For the OECD control system of trans-frontier movement of waste see http://www.oecd.org/ehs/Waste/Index.htm Secretariat of the Basel Convention on Control of Trans-boundary Movements of Hazardous Wastes and their Disposal administered by the United Nations Environment Programme (UNEP) http://www.unep.ch/basel/index.html See also the US EPA web-page on Solid Waste http://www.epa.gov/osw/index.htm EU Directive on Hazardous Waste http://europa.eu.int/eur-lex/en/lif/dat/1991/en_391L0689.html For the EUROSTAT/ OECD Joint Questionnaire on waste check http://europa.eu.int/comm/eurostat/Public/datashop/print-catalogue/EN?catalogue=Eurostat&collection=06-Detailed%20Tables Overview of European waste legislation see the web-page of the EU Topic Centre on Waste http://www.etc-waste.int/Activities/0000104.htm	

Waste_S1	Contaminated land area	DPSEEA
Issue	Waste and Contaminated Lands	
Definition of indicator	Fraction of the area (per 1000 km^2) of contaminated land in a country as a result of pollution or dumping of hazardous waste in unsuitable sites/land areas, where no measures are taken to prevent harm to human health and environment due to exposure to hazardous waste.	
Underlying definitions and concepts	The indicator is based on the following definitions: **Hazardous waste**: waste materials (i.e. materials which are considered no longer to have value or utility and which are thus to be disposed of), which pose dangers to human health in the event of either long- or short-term exposures either to the wastes themselves or their decay products. Exposure may occur either directly (e.g. through contact with the waste) or indirectly e.g. via seepage into soil, groundwater or surface water, release into the atmosphere or accumulation in the food chain. **Contaminated land**: land which has been affected, either on the surface or at depth, by pollutants (e.g. organic or inorganic chemicals, radioactive) which are likely to persist on site (i.e. for periods of several years or decades) and which might have adverse effects on the environment and human health. **Contaminated site**: land (arable, protected areas, human habitats) affected by pollution due to inappropriate management of hazardous waste or dumping of hazardous waste; soil conditions, hazardous waste constituents and concentration levels, degree of contamination, size and depth of contamination should be taken into account **Total area**: total surface of a country.	
Specification of data needed	Area of each contaminated site Total area of the country	
Data sources, availability and quality	For many developed countries data are available. No regular data collection is being required. For developing countries differences may be encountered to obtain data	
Computation	The indicator can be computed as: 1000 * SUM (A$_c$) / A$_t$ where A$_c$ is the area of the c- contaminated site, SUM means the sum of all contaminated areas for c = 1, …, N N is the total number of contaminated sites and A$_t$ is the total area of the country	
Units of measurement	km^2 per 1000 km^2	
Scale of application	National to international	
Interpretation	The indicator needs further elaboration in terms of ranking of the contaminated lands. Radioactive contamination is an important consideration in the case of mixed contamination of soil relevant to military sites	
Linkage with the other indicators	Pressure: *Hazardous waste generation* State: ***Contaminated land area*** Exposure: *Blood lead level in children* Action: *Hazardous waste policies*	
Related data, indicators	UN Indicators of sustainable development URL: gopher://gopher.un.org:70/11/esc/cn17/1996-97/indicators OECD Waste management programme http://www.oecd.org/ehs/Waste/Index.htm See also the US EPA Programme on Land Disposal Restrictions http://www.epa.gov/epaoswer/hazwaste/ldr/snapshot.html See also Urban Indicators – compilations from international lists http://www.ceroi.net/urbanind.htm	

Waste_Ex1	**Blood lead level in children**	DPSEEA
Issue	Waste and Contaminated Lands	
Definition of indicator	Percentage of children with blood lead levels > 10 μg/dl	
Underlying definitions and concepts	The indicator is based on the assumption that blood-lead levels provide a general measure both of exposure to lead in the environment, and of potential health effects. The focus on high-risk groups helps to strengthen the link with these health effects and to target those most at risk. Children aged 0-5 years of age are identified as the main high-risk group in this case due to their tendency to receive high doses of lead (e.g. through playing in polluted areas), and their specific susceptibility to neurological and developmental effects. Underlying definitions are: **Raised blood lead level:** blood lead concentrations, measured using standard tests, in excess of 10 μg/dl **Children**: children aged under 5 years of age at the time of survey (or at the mid-point of the survey year).	
Specification of data needed	Number of children aged under 5 years with blood lead levels > 10 μg/dl Total number of children aged under 5 years of age in the survey	
Data sources, availability and quality	Data on this indicator can sometimes be obtained through national surveys or surveillance programmes. These will normally be targeted at high-risk groups. Variations in the definition of high-risk groups and in the sampling methods used may mean that data from different areas, or different surveys, are inconsistent. Comparisons should therefore be made with caution. Where data are otherwise not available, special surveys may be required.	
Computation	The indicator can be computed as: $100 * (N_h / N_t)$ where N_h is the number of children surveyed with blood-lead levels > 10μg/dl, and N_t is the total number of children in the survey. In order to ensure quality assurance, and aid interpretation, of the indicator, it is important also that blood sampling techniques and analytical procedures are specified.	
Units of measurement	Percentage	
Scale of application	Local to international	
Interpretation	The level of lead in the blood represents one of the most important markers of exposure to environmental pollution. As well as providing information on the levels of exposure in high-risk groups, this indicator also gives an indication of general environmental concentrations of lead, and possible health risks. Increases in blood lead levels can usually be taken as indicative of increased environmental concentrations and exposures and raised levels of risk. Reductions in blood lead levels may be anticipated where policy actions or other developments (e.g. technological changes or behavioural changes) resulted in lower exposures. Problems with interpreting the exposure relate primarily to the potential limitations in the data - in particular, the effects of possible sampling bias and inconsistencies or ambiguities in the definition of high-risk groups. These need to be taken into account when comparing data from different areas or surveys. The effects of potential confounding (e.g. by nutritional or behavioural factors in children, or by lifestyle factors in adults) also need to be considered when the indicator is used to infer possible health risks. In using the indicator to identify possible policy responses, it is also important to recognise the existence of different sources and exposure pathways, which may be involved.	
Linkage with the other indicators	Pressure: *Hazardous waste generation* State: *Contaminated land area* Exposure: ***Blood lead level in children*** Action: *Hazardous waste policies*	
Related data, indicators	UN Indicators of sustainable development URL: gopher://gopher.un.org:70/11/esc/cn17/1996-97/indicators See WHO, Geneva about children's environmental health http://www.who.int/peh/child/index.html	

Waste_A1	Hazardous waste policies	DPSEEA
Issue	Waste and Contaminated Lands	
Definition of indicator	Composite index on the levels of hazardous waste policies and regulations	
Underlying definitions and concepts	**Hazardous waste:** waste materials (i.e. materials which are considered no longer to have value or utility and which are thus to be disposed of), which pose dangers to human health in the event of either long- or short-term exposures either to the wastes themselves or their decay products. Exposure may occur either directly (e.g. through contact with the waste) or indirectly e.g. via seepage into soil, groundwater or surface water, release into the atmosphere or accumulation in the food chain. **Hazardous waste policy and regulations:** formal legislation, acts of parliament or stated government intentions aimed at reducing the production of hazardous wastes (waste minimisation), at controlling the storage, transport, import/export and disposal of hazardous wastes (waste management).	
Specification of data needed	Evidence for existence of effective policies and measures for hazardous waste minimisation and management.	
Data sources, availability and quality	Information on the existence, scope and rigour of hazardous waste policies can best be obtained by scrutiny of the relevant legislation.	
Computation	The indicator can be computed by ranking the strength and scope of the legislation as follows: 0 - *if legislation is not existing, or not clearly stated*; Guidance/voluntary procedures for some aspects of hazardous waste production, storage, transport, export/import and disposal, for some hazardous wastes 1 – *if the condition is clearly stated, partly/ not implemented or enforced*; 2 – *if the condition is implemented and enforced* Guidance/voluntary procedures for most aspects of hazardous waste production, storage, transport, export/import and disposal, for most hazardous wastes 3 – *if the condition is clearly stated, partly/ not implemented or enforced*; 4 – *if the condition is implemented and enforced* Guidance/voluntary procedures for all or most aspects of hazardous waste production, storage, transport, export/import and disposal, covering most hazardous wastes; mandatory controls on some aspects for a limited range of wastes 5 – *if the condition is clearly stated, partly/ not implemented or enforced*; 6 – *if the condition is implemented and enforced* Mandatory controls on all aspects of hazardous waste production, storage, transport, export/import and disposal, covering a limited range of hazardous wastes; voluntary agreements or guidelines on most other hazardous wastes 7 – *if the condition is clearly stated, partly/ not implemented or enforced*; 8 – *if the condition is implemented and enforced* Mandatory controls on all aspects of hazardous waste production, storage, transport, export/import and disposal, covering a wide range of hazardous wastes 9 – *if the condition is clearly stated, partly/ not implemented or enforced*; 10 – *if the condition is implemented and enforced* *Note:* as with all such scoring systems, qualitative judgements need to be made about which category is the most appropriate in any given situation, since the classes are not wholly exclusive or all-encompassing.	
Units of measurement	Ordinal scale (0-10)	
Scale of application	National to international.	
Interpretation	This indicator provides a simple, yet reasonable robust measure of the scope, strength and	

	effectiveness of policies and legislation on hazardous wastes. In general, the higher the score achieved, the more effective are the policies. In interpreting the indicator, however, it is important to bear in mind both the multivariate nature of hazardous waste policies (the nature of the policy instruments, their scope and the range of pollutants covered) and the simple, qualitative character of the indicator. The existence of legislation, also, does not necessarily translate into effective action: policies also need to be applied and enforced.
Linkage with the other indicators	Pressure: *Hazardous waste generation* State: *Contaminated land area* Exposure: *Blood lead level in children* Action: ***Hazardous waste policies***
Related data, indicators	UN Indicators of sustainable development URL: gopher://gopher.un.org:70/11/esc/cn17/1996-97/indicators OECD Waste Management Programme: http://www.oecd.org/ehs/Waste/achieve.htm EU Directive on Hazardous Waste http://europa.eu.int/eur-lex/en/lif/dat/1991/en_391L0689.html

Waste_A2	Municipal waste collection	DPSEEA
Issue	Waste and Contaminated Lands	
Definition of indicator	Percentage of households served by regular solid waste collection services	
Underlying definitions and concepts	The indicator is based on the following definitions: **Solid waste:** solid materials, which have no further useful purpose and are thus discarded. **Regular waste collection service:** a regular and frequent service, which collects and safely disposes of domestic waste from the door or a designated waste collection site. The frequency of collection should be such that it avoids the accumulation of uncontained rubbish. **Household:** a single housing unit (e.g. a house or apartment) intended for permanent residence.	
Specification of data needed	Total number of households covered by the waste collection service using either plastic bags, containers or voluntary selective collection. Total households in the area of study.	
Data sources, availability and quality	Data on the number of households covered by the waste collection services may be available from local authorities or from the waste collection agencies. Often, these data will be collated at national level by national statistical offices or by the relevant ministries. Data on the total number of households should be available through national census statistics, though care is needed in relation to the definition of a 'household' (e.g. how large residential buildings are classified). Alternatively, data can be collected via household or special surveys.	
Computation	The indicator can be computed as: (W / H) * 100 where W is the number of households using a specific type of waste collection service; and H is the total number of households in the area.	
Units of measurement	Percentage	
Scale of application	Local to international.	
Interpretation	This indicator provides a measure of the extent to which waste removal services are adequate to avoid health risks. As such, an increase in the proportion of households covered by the waste collection service may be interpreted as evidence of increased action, and reduced health risks; a reduction in the proportion covered would imply that action was unable to keep up with need, and a heightened health risk. For various reasons, however, the indicator needs to be interpreted with caution. The main problem concerns the reliability of the data, especially in remote or rural areas. The existence of a waste collection service does not necessarily mean either that it operates effectively, or that the waste is then disposed of safely.	
Linkage with the other indicators		
Related data, indicators	UN Indicators of sustainable development URL: gopher://gopher.un.org:70/11/esc/cn17/1996-97/indicators WHO Healthy Cities Programme indicators http://www.who.dk/healthy-cities/pdf/indicap.pdf UNCHS http://www.urbanobservatory.org/indicators/database/key.html For the EU Directive on Waste see http://europa.eu.int/eur-lex/en/lif/dat/1975/en_375L0442.html For possible problems with the definitions for the data collection see http://www.etc-waste.int/Activities/0000217.htm See also CEROI core set of environmental indicators http://www.ceroi.net/coreset.htm	

Rad_Ex1	Cumulative radiation dose	DPSEEA
Issue	Environmental Radiation	
Definition of indicator	Percentage of the population receiving a cumulative radiation dose in excess of 5 mS/year	
Underlying definitions and concepts	**Environmental radiation:** ionising radiation in environmental media - i.e. in the air, soil, water and foodstuffs. This thus includes radiation from cosmic, geological and many anthropogenic sources but excludes radiation from medical treatment (e.g. X-rays) and non-ionising radiation (e.g. from the sun or from electromagnetic fields). **Cumulative dose:** the total body dose of radiation, from all sources, calculated to reflect overall impact on health. **Total population:** total resident population	
Specification of data needed	Number of people receiving a cumulative radiation dose in excess of 5 mS/year Total population	
Data sources, availability and quality	Data on the cumulative radiation dose of the population may be obtained either from dosimetry studies or from modelling based on measured activity levels in environmental media (e.g. as part of the GERMON programme). Sampling for environmental monitoring is conducted according to a consistent protocol and results are therefore likely to be broadly comparable. Nevertheless, marked local variations in levels of radioactivity may occur (especially in relation to radon and around local emission sources), and the quantity of monitoring is limited. Estimates can thus be interpreted only as general indications of levels of exposure to radiation across the population. Data on total population are usually available from national censuses and should be reliable.	
Computation	The indicator can be computed as: $100 * (N_{>5} / N_s)$ where $N_{>5}$ is the number of people in the survey with an cumulative dose of greater than 5 mS/yr and N_s is the total number of people in the survey.	
Units of measurement	Percentage	
Scale of application	Regional to international	
Interpretation	This indicator poses considerable problems of interpretation, primarily because of the varied nature and multiple sources of radiation, the many different pathways of exposure, and the limited available data. Broad trends can be detected, where monitoring is carried out consistently over several years; broad geographic patterns in radiation levels can also be identified for some forms of radiation (e.g. radon or radiation in drinking water and the ambient air). Estimates are, however, highly dependent on the coefficients used to integrate exposures to different types of radiation, from different sources. UNSCEAR estimates the average radiation dose to be composed as follows: Natural background 2.2 mSv composed of: - Cosmic rays 0.4 mSv - Terrestrial gamma-rays 0.5 mSv - Radon 1.0 mSv - Ingestion 0.3 mSv Diagnostic medical examinations 0.3 mSv Atmospheric nuclear testing 0.005 mSv Chernobyl accident 0.002 mSv Nuclear power production 0.001 mSv (Contributions from all other sources (such as radionuclides in consumer products) are far smaller than that from nuclear power production.)	
Linkage with the other indicators		
Related data, indicators	See Ionising Radiation Safety Set at: http://www.who.int/peh/Radiation/radindex.htm See also the situation analysis in the Hungarian NEHAP at: http://www.who.dk/nehap/hun/hun450.htm	

Rad_Ex2	UV light index	DPSEEA
Issue	Environmental Radiation	
Definition of indicator	UV light index	
Underlying definitions and concepts	**UV light index**: a time-integrated measure of the amount of short-wave, ultra-violet radiation from the sun which reaches the ground surface **Weighted irradiance**: a measure of the solar radiation, defined as the weighted integral of the spectral radiance over direction and wavelength at ground level. This is based on the CIE erythemal action spectrum	
Specification of data needed	Weighted irradiance	
Data sources, availability and quality	Data on the levels of UV radiation are generally available from national meteorological services, and may be considered reliable. Monitoring networks are, however, often sparse, so they may be unable to detect local variations in UV levels.	
Computation	The indicator is based on the Global solar UV index (International Commission on Non-Ionising Radiation Protection – ICNIRP, 1995). It is computed as: It * 40 Where It is the time-weighted average effective irradiance	
Units of measurement	W/m^2	
Scale of application	Regional to international	
Interpretation	The indicator provides a direct measure of the levels of exposure to UV radiation: the higher the index, the greater the level of exposure and the greater the potential of adverse health effects. The relationship between levels of UV radiation and health outcome are, however, complex: they are fundamentally affected by lifestyle and behavioural factors, such as time spent outdoors, choice of clothing and use of UV protection. Nevertheless, the indicator may be used to: raise public awareness about the potential risks of exposures to solar radiation; monitor the effectiveness of public information and other campaigns, aimed at reducing exposures, etc	
Linkage with the other indicators		
Related data, indicators	See INTERSUN the International Project on health, solar UV and environmental change at: http://www.who.int/peh-uv/index.html and for publications at: http://www.who.int/peh-uv/publications/index.html	

Rad_E1	**Incidence of skin cancer**	DPSEEA
Issue	Radiation	
Definition of indicator	Annual incidence rate of skin cancer	
Underlying definitions and concepts	The indicator is based on the following definitions: **Skin cancer**: a malignant neoplasm (ICD 10 code C43 – C44) **Total population:** total resident population	
Specification of data needed	Annual number of skin cancer cases ICD10 code C43 – C44 Total population	
Data sources, availability and quality	Data on skin cancer cases should be available from the national cancer registries or from specialised medical services Data on total population are usually available from national censuses and should be reliable	
Computation	$100000 * (I_{sc} / P_t)$ where I_{sc} is the annual number of skin cases and P_t is the total population	
Units of measurement	Number of cases per hundred thousand of population	
Scale of application	Regional to national	
Interpretation	This indicator can be interpreted very cautiously as indirect health effect to exposure to UV radiation. The relationship is however rather complex: it is fundamentally affected by lifestyle and behavioural factors, such as time spent outdoor, choice of clothing and use of UV protection. Skin colour and nevus are also important.	
Linkage with the other indicators		
Related data, indicators	GLOBAL SOLAR UV INDEX WHO Warns About Possible Public Confusion WHO: Geneva http://www.who.int/inf-pr-1998/en/pr98-53.html GLOBAL SOLAR UV INDEX WHO: Geneva http://www.who.int/inf-fs/en/fact133.html INTERSUN The Global UV Project http://www.who.int/peh-uv/ See also Health for All (HFA) Indicators for monitoring and evaluation of Health 21 http://www.who.dk/cpa/pb9912e.htm/	

Rad_A1	Topicality of permits on the use of radioactive substances	DPSEEA
Issue	Radiation	
Definition of indicator	Fraction of companies, according to different categories, having an actual permit for handling processing, emission etc. of radioactive substances	
Underlying definitions and concepts	Categories of companies: – nuclear facilities – radionuclide laboratories (research and hospitals) – non-nuclear industries processing materials with enhanced levels of natural radionuclides (e.g. sedimentary phosphate ores and mineral sands) – producers of consumer products containing radionuclides – carriers of radioactive sources and radioactive waste – radioactive waste repositories – users of encapsulated sources, accelerators and irradiators, X-ray generators Radiation control capability: existence of a system of enforcement of regulations on the use and emissions of radionuclides and radiation sources including, e.g. a registry and a system of inspection	
Specification of data needed	A registry of companies having a permit to e.g. use radioactive substances, providing the total number of licenses and their topicality	
Data sources, availability and quality	A registry held by the authority responsible for granting of licenses, for the most part a national one.	
Computation	1) calculate the fraction of up-to-date licenses per category: $f_i = m_i/m$, with 'm' being the number of licensed companies in a given category and 'm_i' the number having one which is less than five years old 2) [optional step] add fractions of all categories and divide by the total number of categories, 'n': $1/n.\Sigma f_i$	
Units of measurement	$0 \le x \le 1$ (per category as well as for the sum of categories)	
Scale of application	Mainly national	
Interpretation	It provides a measure of the scope and implementation of legislation Problems: • An adequate and harmonised aggregation of activities/companies into categories. Discriminating between types of companies and distinguishing a step 1 and 2 in the calculation, however, has the advantage that serious "leeways" may be more easily interpret. Breaking up in categories somewhat counterbalances the next disadvantage. • Though the health risk of two different activities either from the same or especially from different categories may be very different, they have the same weight in this indicator.	
Linkage with the other indicators	Complementary to the indicator on the effectiveness of environmental monitoring. Whereas this one deals with efforts spent on controlling sources the complementary one is on controlling exposure. Comparable to other indicators quantifying the degree of regulatory control on a given problem area, as is the case for various indicators on chemical emergencies	
Related data, indicators		

Rad_A2	**Effective environmental monitoring of radiation activity**	DPSEEA
Issue	Radiation	
Definition of indicator	Existence of effective environmental monitoring of radiation activity in compliance with national and international quality assurance programs	
Underlying definitions and concepts	QA programmes on environmental monitoring will among others set criteria with respect to set-up of the system, monitoring frequency, density and sensitivity. As an example – or, if desired, as a reference system – the criteria of the EC draft recommendation on monitoring of the levels of radioactivity in the environment are given. **Density:** The EC recommends a sparse and a dense network with different sampling frequency for each media, among others 'representative for various geographical regions and taking population distribution into account' **Frequency:** dense network: ≤quarterly; sparse: ≤monthly; ambient dose: continuously. **Sensitivity:** detection limit < reporting level	
Specification of data needed	Accurate information on the density of monitoring networks and their operation (monitoring frequency and sensitivity in relation to reporting levels, etc) One may score for each of the following media (N=5): – airborne particles – ambient dose rate – mixed diet and milk (i.e. a representative food package) – surface water – drinking water And on various aspects (N=5): – density of the network – frequency of measurements – sensitivity in comparison with reporting levels – monitoring on a routine basis and not only in case of an accident – successful participation in international inter-comparisons One may score each of these aspects for the sparse and the dense network (N=2)	
Data sources, availability and quality	The organisations (national or otherwise) responsible for environmental surveillance. Doing the survey may be hampered when different organisations are responsible for each of the sampling media.	
Computation	Sum of scores	
Units of measurement	Ordinal score (0 – 25; and 0 – 50 when two networks with different density are distinguished)	
Scale of application	Mainly national	
Interpretation	This indicator provides a useful measure of the attention given to monitoring of radiation levels, and as such shows how seriously this issue is being taken. The presence of enhancements is not a condition for the existence of a monitoring programme given the fact it has to be considered an early warning and follow-up system in case of accidents (which may have a trans-boundary effect). The indicator does not describe the actual radiation risk but the level of compliance with standards.	
Linkage with the other indicators	Complementary to the indicator on topicality of permits on the use of radioactive substances. Whereas this one deals with efforts spent on controlling exposure the complementary one is on controlling the sources.	
Related data, indicators	Website Euratom treaty: http://europa.eu.int/abc/obj/treaties/ Draft recommendation on the application of Article 36 of the Euratom Treaty concerning the monitoring of the levels of radioactivity in the environment for the purpose of assessing the exposure of the population as a whole (doc 6064/99 EN) NB! It is still a draft (to be approved in the autumn 2000) and, as a result, not yet available on the Web. The address given simply is the text Euratom treaty, which does not specify requirements for radiation monitoring. The status of the document can be checked by searching at http://www.cordis.lu/	

WatSan_P1	Waste water treatment coverage	DPSEEA
Issue	Water and Sanitation	
Definition of indicator	Percentage of the waste water adequately treated by a waste water treatment facility	
Underlying definitions and concepts	**Waste water:** waste water originating from household activities associated with daily human life, e.g. bathing, washing, cleaning, nutrition, food preparation, laundering, personal hygiene **Household:** a single housing unit (e.g. a house or apartment) intended for permanent residence **Waste water treatment:** any process that reduces the amount of the suspended and/or dissolved compounds in a waste water **Adequately treated:** > 90 % reduction of biodegradable organic compounds (BOD_5) > 90 % reduction of suspended solids	
Specification of data needed	The number of households connected to a sewerage with waste water treatment facility (H_i) The type of waste water treatment used (T_i) The total number of households in a community or region considered (H_t)	
Data sources, availability and quality	Data may be available from relevant administrative authorities, both national and local	
Computation	The indicator can be computed as: $100 * \Sigma(H_i * T_i * Q_i) / H_t$ where: H_t = the total number of households in the community or area under consideration H_i = the number of households connected to a sewerage with a waste water treatment facility T_i = a numerical value describing the efficiency of the type of waste water treatment; $T = 0.3$ for mechanical treatment (primary treatment or settlement), $T = 1$ for biological treatment (secondary treatment) Q_i = a correction factor for improper functioning of a wastewater treatment facility due to overloading. Q_i is the (by design) capacity of the WWTP divided by the load of wastewater; both expressed in equal units e.g. m^3/day, number of inhabitants, number of pollution equivalents, number of houses etc. $Q_i = \frac{(design)\,capacity}{load}$ Only in case of overloading, i.e. $Q_i < 1$, the actual value is used; in all other cases $Q_i = 1$	
Units of measurement	Percentage	
Scale of application	Local to international	
Interpretation	High percentage => lower health risk from exposure to untreated or partially treated wastewater. Compared to national targets => progress to achieve them	
Linkage with the other indicators	Pressure: *Waste water treatment coverage* State: *Exceedance of recreational water limits for microbiological parameters; Exceedance of WHO guideline values for microbiological parameters* Exposure: *Access to adequate sanitation; Access to safe drinking water; Access to drinking water complying with WHO guideline values; Supply from public drinking water supplies* Effect: *Diarrhoea morbidity in children; Diarrhoea mortality in children; Outbreaks of water-borne diseases*	
Related data, indicators	UN Centre for Human Settlements: list of key urban indicators and database http://www.urbanobservatory.org/indicators/database/housing1.html Related documents: Protocol on Water and Health Article 6: http://www.who.dk/london99/WelcomeE.htm Water Supply and Sanitation Sector Questionnaire WHO/UNICEF Global Assessment 2000 http://www.who.int/water_sanitation_health/p-2000evaluation/quescont.html WHO Healthy Cities Programme Indicators http://www.who.dk/healthy-cities/pdf/indicap.pdf UN Economic Commission for Europe Annual Bulletin on Housing and Building Statistics for Europe and North America, 1998 http://www.unece.org/env/hs/bulletin/cnt2_e98.htm See also Core Set of Environmental Indicators http://www.ceroi.net/coreset.htm	

WatSan_S1	**Exceedance of recreational water limit values for microbiological parameters**	DPSEEA
Issue	Safe recreation water environment: does NOT include enclosed water i.e. swimming pools	
Definition of indicator	Proportion of the bathing water analyses exceeding the current imperative and guideline values specified by the European Commission under the bathing water Directive (76/160/EEC) or the US EPA over the bathing season. These are: **For the EC: Total coliforms**: Guide 80%<500 per 100 ml Imperative 95%<10,000 per 100 ml **Faecal coliforms** Guide 80%<100 per 100 ml Imperative 95%<2000 per 100 ml **Faecal streptococci** Guide 100 per 100 ml No imperative standard **For the US EPA: Enterococci** 35 per 100 ml (marine, logarithmic average for a period of 30 days of at least 5 samples) 33 per 100 ml (freshwater, logarithmic average for a period of 30 days of at least 5 samples) **Reported separately for (a) freshwater and (b) marine water**	
Underlying definitions and concepts	**Number of bathing water samples exceeding the EC standards or US EPA standards** for the parameters: *total coliforms*, *faecal coliforms*, *faecal streptococci*, *enterococci per 100 ml* **Total number of samples** made by an official monitoring agency over a given time period (one bathing season) at a specified point. **Frequency of monitoring** defined into the following categories: none, minimum (fortnightly), above minimum (more frequent than fortnightly). The EC requirements are samples to be taken fortnightly. **The monitoring of water quality by official agencies implies:** The provision of relevant data, and its use for policy and management purposes by the agencies concerned Selection of the number and location of sampling points, and minimum sampling frequency per designated bathing site are uniform across the whole scale of application of monitoring The implementation of quality assurance system in the monitoring laboratories	
Specification of data needed	Number of valid (a) freshwater and (b) marine water bathing measurements taken from a specified point of a designated bathing site per bathing season Number of analyses with presence of *faecal coliforms and / or faecal streptococci, (total coliforms, enterococci)* for (a) freshwater and (b) marine water sites Category of frequency of monitoring	
Data sources, availability and quality	Accurate information on the number of valid bathing water measurements taken from a specified point of a designated bathing site and the results should be available from the relevant monitoring agency and should be reliable given the above mentioned assumptions	
Computation	The indicator can be computed as: $(E / T) * 100$ where E is the number of analyses exceeding the EC or US EPA standards for *faecal coliforms and / or faecal streptococci*, and T is the total number of the samples analysed per bathing season Information on exceeding guideline values should be supplied with information on number of bathing sites monitored and number of samples taken for each evaluated parameter	
Units of measurement	Percentage	
Scale of application	Local to international, though at broader scales considerable problems with data comparability	
Interpretation	It is a measure of the microbiological quality of bathing waters. Data on exceedances may be subject to large margins of error due to inconsistencies in reporting, sampling practices. Interpretation of the indicator can be assisted by (dis)/ aggregating the data by type of waters: category of monitoring frequency; primary classification of the beach; coastal and/or estuaries	

	vs. fresh water *NB* The WHO guideline values follow a risk management approach and should be interpreted in light of regional and or local factors. It is up to regulatory authorities to define "acceptable" or tolerable excess disease and for national authorities to apply these principles for risk management under their specific conditions.
Linkage with the other indicators	Pressure: *Waste water treatment coverage* State: ***Exceedance of recreational water limits for microbiological parameters;*** *Exceedance of WHO guidelines for microbiological parameters* Effect: *Outbreaks of water-borne diseases, Diarrhoea mortality in children, Diarrhoea morbidity in children*
Related data, indicators	For on-line information see: http://www.who.int/environmental_information/information_resources/on_line_water.htm/ WHO 1998 Guidelines for safe recreational water environment: Vol. Coastal and Fresh-waters. Geneva, WHO (Unpublished document EOS/Draft/98.14) at: http://www.who.int/water_sanitation_health/Recreational_water/eosdraft9814.htm Monitoring Bathing Waters (J. Bartram, G. Rees Eds), WHO Geneva, 1999 abstract at: http://www.who.int/water_sanitation_health/Water_quality/bathing.pdf WHO 1999 Health-based monitoring of recreational waters: the feasibility of a new approach (the Annapolis Protocol). Outcome of an expert consultation, Annapolis, USA, co-sponsored by USEPA: http://www.who.int/water_sanitation_health/Water_quality/recreat.htm or the report at: http://www.who.int/water_sanitation_health/Recreational_water/Annapolis.pdf Bathing water quality in the EU Directive 76/160/EEC at: http://www.europa.eu.int/water/water-bathing/directiv.html See the EU bathing water quality report for 1999 at http://www.europa.eu.int/water/water-bathing/report.html

WatSan_S2	Exceedance of WHO drinking water guidelines for microbiological parameters	DPSEEA
Issue	Water and sanitation	
Definition of indicator	Proportion of drinking water samples with *E coli* or with *faecal streptococci* exceeding the guideline value of 0 / 100 ml water over a given time period	
Underlying definitions and concepts	**Number of drinking water samples exceeding the limit value** (0 / 100 ml) for the parameters ***E coli and faecal streptococci*** **Total number of samples** for microbiological parameters specified above made by an official monitoring agency and/or producer over a given time period (one year) at a specified point of the supply chain A single sample with one microbiological parameter not in compliance with WHO guidelines is reported as a sample not in compliance **The monitoring of water quality by official agencies implies:** The provision of relevant data, and its use for policy and management purposes by the agencies concerned Selection of the water supplies liable to reporting, and minimum sampling frequency are uniform across the whole scale of application of monitoring The implementation of the international standards for *E. coli* and *faecal streptococci* (ISO 9308-1 and ISO 7899-1-2) in the monitoring laboratories	
Specification of data needed	Total number of samples for microbiological parameters taken from a specified point of the supply chain over the previous year Number of samples with presence of *E coli or faecal streptococci* Aggregating data such as type of supply (public, individual), type of source (ground, surface water); point of taking the measurements, category (number of population supplied)	
Data sources, availability and quality	Accurate information on the number of drinking water samples taken from a specified point of the supply chain and the results should be available from the relevant monitoring agency or from the producer and should be reliable given the above mentioned assumptions	
Computation	The indicator can be computed as: (E / T) * 100 where E is the number of samples with presence of *E coli or faecal streptococci*, and T is the total number of the samples analysed for EC/FS per year	
Units of measurement	Percentage	
Scale of application	Local to international, though at international level some problems with data comparability may occur	
Interpretation	It is a measure of the state of drinking water microbiological safety, especially under conditions of inadequate water, hygiene and basic sanitation. Data on exceedances may be subject to large margins of error due to inconsistencies in reporting, sampling practices, analytical methods used, etc. Interpretation of the indicator can be assisted by (dis)/aggregating the data by type of supply (public, individual), type of source (ground, surface water); point of taking the measurements, category (number of population supplied).	
Linkage with the other indicators	Pressure: *Waste water treatment coverage* State: ***Exceedance of WHO drinking water guidelines for microbiological parameters***; *Exceedance of WHO drinking water guidelines for chemical parameters* Exposure: *Access to safe drinking water; Access to adequate sanitation; Supply from public drinking water supplies; Access to drinking water complying with WHO guideline values* Effect: *Diarrhoea mortality in children; Diarrhoea morbidity in children; Outbreaks of water-borne diseases*	
Related data, indicators	WHO 1993-1997 Guidelines for drinking water quality. Vol. 1-3. Geneva: WHO http://www.who.int/water_sanitation_health/Water_quality/drinkwat.htm/ For Council Directive 98/83/EC on the quality of water intended for human consumption, see http://www.europa.eu.int/water/water-drink/index_en.html Note: According to the Council Directive 98/83/EC a mandatory reporting of water quality from drinking water systems supplying more than 5000 inhabitants is under preparation for the EU Member States	

WatSan_S3	**Exceedance of WHO drinking water guidelines for chemical parameters**	DPSEEA
Issue	Water and Sanitation	
Definition of indicator	Proportion of the drinking water analyses with chemical parameters exceeding the respective WHO guideline values over a given time period	
Underlying definitions and concepts	**Number of drinking water analyses exceeding the corresponding limit value for the enlisted chemical parameters:** <u>inorganics</u> – arsenic, lead, fluoride, nitrates, nitrites, and <u>organics</u> – benzene, organochlorine pesticides, VOCs, trihalomethanes. **Total number of analyses** for each chemical parameter made by an official monitoring agency and/or producer over a given time period (one year) at a specified point of the supply chain **The monitoring of water quality by official agencies implies:** The provision of relevant data, and its use for policy and management purposes by the agencies concerned Selection of the water supplies liable to reporting, and minimum sampling frequency are uniform across the whole scale of application of the monitoring The implementation of quality assurance system in the monitoring laboratories and fulfilment of the requirements for analytical methods e.g. GLP	
Specification of data needed	Number of analyses with parameters from the inorganics and organics list exceeding the respective WHO drinking water guidelines Total number of analyses for the respective listed chemical parameter taken from a specified point of the supply chain over the previous year Aggregating data such as type of supply (public, individual), type of source (ground, surface water); point of taking the measurements, category (number of population supplied)	
Data sources, availability and quality	Accurate information on the number of valid drinking water measurements taken from a specified point of the supply chain and the results should be available from the relevant monitoring agency or from the producer and should be reliable given the above mentioned assumptions	
Computation	The indicator can be computed as: $(E / T) * 100$ where E is the number of analyses in which the respective guideline value was exceeded, and T is the total number of the samples analysed per year	
Units of measurement	Percentage	
Scale of application	Local to international	
Interpretation	It is a potential measure of the state of the drinking water contamination, especially under conditions of inadequate water source protection, water hygiene and basic sanitation. Data on exceedances may be subject to large margins of error due to inconsistencies in reporting, sampling practices, analytical techniques (especially for organics). Interpretation of the indicator can be assisted by (dis)/aggregating the data by type of supply (public, individual), type of source (ground, surface water); point of taking the measurements, category (number of population supplied).	
Linkage with the other indicators	Pressure: *Waste water treatment coverage* State: *Exceedance of WHO drinking water guidelines for microbiological parameters;* ***Exceedance of WHO drinking water guidelines for chemical parameters*** Exposure: *Access to safe drinking water; Supply from public drinking water supplies; Access to drinking water complying with WHO guideline values; Access to adequate sanitation* Effect: *Diarrhoea mortality in children; Diarrhoea morbidity in children; Outbreaks of water-borne diseases*	
Related data, indicators	WHO 1993-1997 Guidelines for drinking water quality. Vol. 1-3. Geneva: WHO http://www.who.int/water_sanitation_health/Water_quality/drinkwat.htm/ For Council Directive 98/83/EC on the quality of water intended for human consumption, see http://www.europa.eu.int/water/water-drink/index_en.html Note: According to the Council Directive 98/83/EC a mandatory reporting of water quality from drinking water systems supplying more than 5000 inhabitants is under preparation for the EU Member States	

WatSan_Ex1 values	Access to drinking water complying with WHO guideline values	DPSEEA
Issue	Water and Sanitation	
Definition of indicator	Percentage of the population receiving drinking water complying with the WHO guideline values to the home	
Underlying definitions and concepts	**Drinking water complying with WHO guideline values**: Drinking water that at the consumer tap in all monitored parameters is in compliance with the WHO guideline values. **Compliance** is referred to as in the requirements of Council Directive 98/83/EC on the quality of water intended for human consumption, i.e. water complies with given limit(s) if any non-compliance found has occurred for not more than 30 days on aggregate during the year evaluated and poses no risk to human health. **WHO guidelines** consider a number of parameters: microbiological, operational and aesthetic, chemical including natural physical-chemical features, a range of chemical contaminants, and radiological. (see *WHO 1993-1997 Guidelines for drinking water quality Vol. 1-3. Geneva: WHO*). **Total population**: total resident population	
Specification of data needed	Number of people living in households receiving drinking water complying with the WHO guideline values Total population	
Data sources, availability and quality	Data on number of people living in households receiving drinking water complying with WHO guideline values may be available from water companies, in some countries also centrally from national water agencies. Data on the total population should be available through national census statistics and should be reliable	
Computation	The indicator can be computed as: $$(P_w / P_t) * 100$$ where P_w is the number of people living in households receiving drinking water complying with WHO guideline values, and P_t is the total population	
Units of measurement	Percentage	
Scale of application	Local to international, though at broader scales problems with data availability and completeness	
Interpretation	High percentage => reduced exposure and health risk.	
Linkage with the other indicators	Pressure: *Waste water treatment coverage* Exposure: *Access to safe drinking water; Supply from public drinking water supplies;* **Access to drinking water complying with WHO guideline values**; *Access to adequate sanitation* Effect: *Diarrhoea mortality in children; Diarrhoea morbidity in children; Outbreaks of water-borne diseases*	
Related data, indicators	Related documents: Protocol on Water and Health: http://www.who.dk/london99/WelcomeE.htm WHO 1993-1997 Guidelines for drinking water quality. Vol. 1-3. Geneva: WHO http://www.who.int/water_sanitation_health/Water_quality/drinkwat.htm/ For Council Directive 98/83/EC on the quality of water intended for human consumption, see http://www.europa.eu.int/water/water-drink/index_en.html	

WatSan_Ex2	Access to safe drinking water	DPSEEA
Issue	Water and Sanitation	
Definition of indicator	Percentage of population with access to safe drinking water in the following categories of supply: 1) Continuous water supply inside the dwelling and of adequate amount 2) Intermittent (discontinuous) supply inside the dwelling 3) Supply within a convenient distance from the dwelling	
Underlying definitions and concepts	**Safe water:** water which either naturally, or as a result of treatment, is free from any micro-organisms, parasites and substances which, owing to their numbers or concentration, constitute a potential danger to human health (Protocol on Water and Health, Article 4). **Adequate amount of water:** an amount of water, sufficient to meet the needs of the user for drinking and hygiene: the minimum volume required is 20 litres per person per day **Continuous supply:** a supply which operates, without interruption, 24 hours per day **Intermittent supply:** a supply, which operates on a discontinuous basis, e.g. regularly for less than 24 h/day or occasionally for more than 3 days per year) **Access inside the dwelling** **Convenient distance:** defined as 15 minutes walking distance each way, or < 1000 metres **Total population:** total resident population	
Specification of data needed	Number of people with access to safe drinking water category 1) Number of people with access to safe drinking water category 2) Number of people with access to safe drinking water category 3) Optionally in category 2, for local assessments, typical number of hours per week of available water Total population	
Data sources, availability and quality	Data on the availability of, and access to, piped or public water supplies or water supplies provided under the above mentioned three conditions may be obtained both from censuses and from relevant administrative authorities (e.g. water companies, public water departments). Data on total population are available from national censuses and should be reliable.	
Computation	The indicator can be computed for each of the respective three conditions as: $$100 * (P_{ai} / P_t) \text{ for } i = 1 \div 3$$ where P_{ai} is the number of people with access to safe water supplies in each category, and P_t is the total population	
Units of measurement	Percentage	
Scale of application	Mainly local to national; at broader scales problems of data availability and consistency	
Interpretation	The indicator provides a measure of the access to safe drinking water and thus to potential health effects of dependence on inadequate or unsafe supplies in three common categories of supply. Unreliable supply or inconvenient access may encourage unsafe water storage in the home and may exacerbate risks of water-borne diseases. Interpretation can be assisted by (dis)/ aggregating the data by urban/ rural settings	
Linkage with the other indicators	Pressure: *Waste water treatment coverage* State: *Exceedance of WHO drinking water guidelines for microbiological parameters; Exceedance of WHO drinking water guidelines for chemical parameters* Exposure: ***Access to safe drinking water**; Supply from public drinking water supplies; Access to drinking water complying with WHO guideline values; Access to adequate sanitation* Effect: *Diarrhoea mortality in children; Diarrhoea morbidity in children; Outbreaks of water-borne diseases*	
Related data, indicators	UN Indicators of sustainable development URL: gopher://gopher.un.org:70/11/esc/cn17/1996-97/indicators UNCHS http://www.urbanobservatory.org/indicators/database/ WHO Healthy Cities Programme indicators http://www.who.dk/healthy-cities/pdf/indicap.pdf Related documents: Protocol on Water and Health: http://www.who.dk/london99/WelcomeE.htm Water Supply and Sanitation Sector Questionnaire WHO/UNICEF Global Assessment 2000 http://www.who.int/water_sanitation_health/p-2000evaluation/quescont.html Human Settlements Basic Statistics Technical Notes: http://www.unchs.org/unchs/english/stats/tnotes.htm	

WatSan_Ex3	Supply from public water supplies	DPSEEA
Issue	Water and Sanitation	
Definition of indicator	Percentage of the population supplied from a public water supply to the home	
Underlying definitions and concepts	**Public drinking water supply**: a system, that provides piped water to the public for human consumption. Such system: • Serves a specified number of customers or provides large quantities of water quantities (e.g. in the Council Directive 98/83/EC it is minimum 10 m^3 a day as an average or 50 customers); • Is subject to monitoring, control and enforcement under national regulations; • Discontinuities in water supply may occur accidentally only, not exceeding 1% of the year (3 days) **Individual drinking water supply**: a small water system, not owned or operated by a water facility (In the Council Directive 98/83/EC such system is specified as providing less than 10 m^3 a day as an average or serving fewer than 50 persons that do not have access to a public water system) **Total population**: total resident population	
Specification of data needed	Number of people living in households supplied from a public water supply Total population	
Data sources, availability and quality	Data on number of people living in households supplied from a public drinking water supply may be available from the national water agencies or government statistics, and are liable to be broadly reliable Data on the total population should be available through national census statistics and should be reliable	
Computation	The indicator can be computed as: $$(P_p / P_t) * 100$$ where P_p is the number of people living in households supplied from a public drinking water supply, and P_t is the total population	
Units of measurement	Percentage	
Scale of application	Local to international, though at broader scale problems with data consistency, completeness	
Interpretation	High percentage => reduced exposure and health risk. High taxes for water may encourage unsafe water storage or disconnection in the home and may exacerbate risks of water-borne diseases.	
Linkage with the other indicators	Pressure: *Waste water treatment coverage* State: *Exceedance of WHO drinking water guidelines for microbiological parameters; Exceedance of WHO drinking water guidelines for chemical parameters* Exposure: *Access to safe drinking water; **Supply from public drinking water supplies**; Access to drinking water complying with WHO guideline values; Access to adequate sanitation* Effect: *Diarrhoea mortality in children; Diarrhoea morbidity in children; Outbreaks of water-borne diseases*	
Related data, indicators	For the Council Directive 98/83/EC see http://europa.eu.int/water/water-drink/98_83en.pdf Related documents: Protocol on Water and Health Article 6: http://www.who.dk/london99/WelcomeE.htm See also: UNCHS http://www.urbanobservatory.org/indicators/database/ WHO Healthy Cities Programme indicators http://www.who.dk/healthy-cities/pdf/indicap.pdf Water Supply and Sanitation Sector Questionnaire WHO/UNICEF Global Assessment 2000 http://www.who.int/water_sanitation_health/p-2000evaluation/quescont.html See also core set of environmental indicators http://www.ceroi.net/coreset.htm	

WatSan_Ex4	Access to adequate sanitation	DPSEEA
Issue	Water and Sanitation	
Definition of indicator	Percentage of the population with access to an adequate excreta disposal in two categories: 1) Connection to a household conventional public sewer 2) Without household connection	
Underlying definitions and concepts	**Adequate excreta disposal facilities:** a private or shared satisfactory sanitary means providing for the controlled disposal of human excreta in ways which avoid direct human exposure to faeces, or contamination of food and local water supply by raw faeces. Suitable facilities – from simple but effective pit latrines, to flush toilets with sewerage; effective means to be correctly constructed and properly maintained. **Access to adequate excreta disposal facilities:** excreta disposal facility either in their dwelling or located within a convenient distance (< 50 metres) from the user's dwelling. This thus includes the urban and rural populations served by connections to public sewers; household systems (pit privies, pour-flush latrines, septic tank, etc); communal toilets; etc. **Population served with** household conventional public sewers **Population without** household connection, but served with adequate, private or shared on-site system **Total population:** total resident population	
Specification of data needed	Number of people with access to adequate excreta disposal facilities category 1) Number of people with access to adequate excreta disposal facilities category 2) Total population	
Data sources, availability and quality	Data on excreta disposal facilities may be available from relevant administrative authorities (e.g. public works, sanitary works or housing departments). In some countries, data are also available via national censuses. Where such sources do not exist or are inadequate, special surveys will be necessary. Data on total population are available from national censuses and should be reliable.	
Computation	The indicator can be computed as: $$100 * (P_{ei} / P_t) \quad \text{for } i = 1, 2$$ where P_{ei} is the number of people living in dwellings with access to adequate excreta disposal facilities in each category, and P_t is the total population	
Units of measurement	Percentage	
Scale of application	Local to international	
Interpretation	High percentage => low risks to health from exposures to infectious agents. Compared to national targets => progress to achieving them. The availability of a facility does not always translate into their proper utilisation and improved hygiene!	
Linkage with the other indicators	Pressure: *Wastewater treatment coverage* State: *Exceedance of recreational water limits for microbiological parameters; Exceedance of WHO guideline values for microbiological parameters; Exceedance of WHO guideline values for chemical parameters* Exposure: *Access to safe drinking water; Supply from public drinking water supplies; Access to drinking water complying with WHO guideline values;* **Access to adequate sanitation** Effect: *Diarrhoea morbidity in children; Diarrhoea mortality in children; Outbreaks of water-borne diseases*	
Related data, indicators	UN Indicators of sustainable development URL: gopher://gopher.un.org:70/11/esc/cn17/1996-97/indicators WHO Healthy Cities Programme Indicators http://www.who.dk/healthy-cities/pdf/indicap.pdf Related documents: Protocol on Water and Health: WHO Euro 3rd Min. Conference London http://www.who.dk/london99/WelcomeE.htm Water Supply and Sanitation Sector Questionnaire WHO/UNICEF Global Assessment 2000 http://www.who.int/water_sanitation_health/p-2000evaluation/quescont.html See Human Settlements Basic Statistics technical notes http://www.unchs.org/unchs/english/stats/tnotes.htm See the UNICEF programme on Water, Environment and Sanitation Technical Guidelines: http://www.unicef.org/programme/wes/pubs/glines/water.htm	

WatSan_E1	Outbreaks of water-borne diseases	DPSEEA
Issue	Water and Sanitation	
Definition of indicator	Number of outbreaks of water-borne diseases and total number of cases reported separately for drinking water and recreational waters	
Underlying definitions and concepts	**Water-borne diseases** - diseases which arise from the contamination of water by human or animal faeces or urine infected by pathogenic viruses, bacteria or protozoa, or from the contamination of water by chemical substances, and which are directly transmitted when the water is drunk or used in the preparation of food, or for recreational purposes. Water-borne diseases may be separated from several other categories of diseases, e.g.: **Water-washed diseases** - caused by poor personal hygiene and skin or eye contact with contaminated water; include scabies, trachoma and flea, lice and tick-borne diseases. **Water-based diseases**: caused by parasites found in intermediate organisms living in water; include dracunculiasis, schistosomiasis and other helminths. **Water-related diseases -** caused by insect vectors which breed in water; include dengue, filariasis, malaria, onchocerciasis, trypanosomiasis and yellow fever. **Water-dispersed diseases** – infections whose agents proliferate in fresh water and enter the human body through the respiratory tract (e.g. Legionella) **Outbreak:** an occurrence of two or more linked cases of the same illness, or an increase in the number of observed cases over the respected number. **Total number of cases:** total number of people affected during the survey period	
Specification of data needed	Number of outbreaks of water-borne diseases within a specified area within a specified period (e.g. a year) Total number of people affected by water-borne diseases	
Data sources, availability and quality	Data on the number of outbreaks of water-borne diseases can be derived from a variety of sources, including: Routine passive case reporting by health care workers (based on detection and investigation of the reportable outbreak cases) Community based surveillance programmes Special surveys Analysis of hospital admissions or GP statistics and records All these are likely to lead to significant under-estimation of the number of outbreaks, due to incomplete referral and reporting. Serious inconsistencies in the estimates also occur between different areas or reporting periods because of variations in referral rates, in diagnosis and in reporting methods and accuracy. Data on the total resident population can usually be obtained from national censuses and should be reliable.	
Computation	The indicator is computed as: N where N is the number of reported outbreaks per year. The result should be reported together with the total number of people affected by the outbreaks. **The results for drinking water and recreational water should be presented separately**.	
Units of measurement	Number	
Scale of application	Local to international, though at broader scales interpretation is limited by problems of data consistency and completeness	
Interpretation	Considerable care, because of the inherent inconsistencies and inaccuracies in the available data. Information relating to the incidence of outbreaks should not be used to infer the absolute numbers of cases, since outbreaks may vary greatly in terms of number affected	
Linkage with the other indicators	Pressure: *Waste water treatment coverage* State: *Exceedance of WHO drinking water guidelines; Exceedance of recreational water limit values for microbiological parameters* Exposure: *Access to safe drinking water; Supply from public drinking water supplies; Access to drinking water complying with WHO guideline values; Access to adequate sanitation* Effect: *Diarrhoea mortality in children; Diarrhoea morbidity in children;* **Outbreaks of water-borne diseases**	
Related data, indicators	Protocol on Water and Health (Article 8) http://www.who.dk/london99/WelcomeE.htm See also http://www.who.int/inf-fs/en/fact112.html	

WatSan_E2	Diarrhoea morbidity in children	DPSEEA
Issue	Water and Sanitation Food safety	
Definition of indicator	Incidence of diarrhoea morbidity in children under five years of age	
Underlying definitions and concepts	**Diarrhoea:** three or more watery stools in a 24-hour period, a loose stool being one that would take the shape of the container (WHO, 1996) or local definition of diarrhoea **Episode of Diarrhoea:** An episode of diarrhoea begins with a 24-hour period with three or more loose or watery stools. An episode of diarrhoea is considered to have ended after 48 hours without three or more loose watery stools within a 24-hour period. **Incidence of diarrhoea morbidity:** total number of episodes of diarrhoea during a 1-year period amongst the children surveyed. **Total population of children under five years of age:** number of children less than five years of age in the survey, at the time of the survey.	
Specification of data needed	Data on the number of episodes of diarrhoea among children under five Population data for total number of children under five years of age Aggregating data such as socio-economic status, geographic area and age/sex of children	
Data sources, availability and quality	Morbidity data for diarrhoea disease does not tend to be collected on a routine basis, and usually depends on *special surveys* or from notification systems. The later, report mostly cases in children under 2 years of age. Methods for data collection by surveys are recommended by the WHO Division for the Control of Diarrhoea and Acute Respiratory Diseases household survey manual. The Household Survey is designed to collect qualitative and quantitative information on diarrhoea episodes occurring in the past two weeks. It includes also instructions how to convert the results into an annual incidence taking into account seasonal variations.	
Computation	The indicator can be computed as: $$I_c / P_c$$ Where I_c is the incidence of diarrhoea in children under five years of age in the survey, and P_c is the total number of children under five years of age in the survey.	
Units of measurement	Number of cases per child per year	
Scale of application	Local to international; although application at broader scales may be limited by problems of data consistency and completeness	
Interpretation	It is a measure of health status of children, especially under conditions of inadequate water or food hygiene and basic sanitation. Data on incidence of diarrhoea are also subject to large margins of error due to inconsistencies in reporting and in definitions, and problems of ensuring adequate sampling in surveys. Interpretation of the indicator can be assisted by dis/ aggregating the data by age and gender of the child, economic status of the parents and geographic area.	
Linkage with the other indicators	1) Water and sanitation: Pressure: *Wastewater treatment coverage* State: *Exceedance of recreational water limits for microbiological parameters; Exceedance of WHO guideline values for microbiological parameters; Exceedance of WHO guideline values for chemical parameters* Exposure: *Access to safe drinking water; supply from public drinking water supplies; Access to drinking water complying with WHO guideline values; Access to adequate sanitation* Effect: ***Diarrhoea morbidity in children****; Diarrhoea mortality in children; Outbreaks of water-borne diseases*3) Food safety: Exposure: *Potential exposure to chemical hazards monitored in food* Effect: *Food-borne illness; Diarrhoea mortality in children;* ***Diarrhoea morbidity in children***	
Related data, indicators	WHO 1994 household survey manual: diarrhoea and ARI WHO/CDR/94.8. Geneva: WHO http://www.who.int/water_sanitation_health/ ; http://www.who.int/inf-fs/en/fact112.html See WHO, Geneva about children's environmental health http://www.who.int/peh/child/index.html and also water, sanitation and health evaluation Water Supply and Sanitation Sector Questionnaire WHO/UNICEF Global Assessment 2000 http://www.who.int/water_sanitation_health/p-2000evaluation/quescont.html	

WatSan_E3	Diarrhoea mortality in children	DPSEEA
Issue	Water and Sanitation Food Safety	
Definition of indicator	Annual death rate due to intestinal infectious diseases (ICD – 10 codes A00 – A09 and in particular A00 – cholera, A02 – other salmonella infections, A03 – shigellosis, A08 – A09) in children under five years of age	
Underlying definitions and concepts	**Death due to diarrhoea in children under five years of age:** death in which the abovementioned diseases are specified as underlying causes of death of a child of less than five years of age at the time of death. **Total population of children under five years of age:** number of children less than five years of age at the midpoint of the survey year	
Specification of data needed	Total number of deaths due to diarrhoea in children under five years of age Total population of children under five years of age	
Data sources, availability and quality	Data on death due to diarrhoea should be available through national or regional/local death statistics. Differences in both diagnosis and reporting practice may be significant, especially when diarrhoea is part of a complex of symptoms (e.g. associated with malnutrition). Where statistical data are not available from routine sources, special surveys are necessary. Data on the total population of children under five years of age should be available via national censuses. Care is needed in applying a consistent and appropriate census date, especially when marked seasonal patterns in birth may occur.	
Computation	The indicator can be computed as: $$100000 * (M_c / P_c)$$ where M_c is the total number of deaths amongst children under five years of age and P_c is the total population of children under five years of age	
Units of measurement	Number per hundred thousand children under five years of age	
Scale of application	Local to international, though at broader scale problems with data consistency	
Interpretation	It is a measure of health status of children, especially under conditions of inadequate water or food hygiene and basic sanitation. Death of young children due to diarrhoea may also be a result of several different, and inter-related, exposures. Rates of mortality are also affected by the effectiveness of, and access to, the health service and levels of awareness amongst parents	
Linkage with the other indicators	1) Water and Sanitation: Pressure: *Wastewater treatment coverage* State: *Exceedance of recreational water limits for microbiological parameters; Exceedance of WHO guideline values for microbiological parameters; Exceedance of WHO guideline values for chemical parameters* Exposure: *Access to safe drinking water; Supply from public drinking water supplies; Access to drinking water complying with WHO guideline values; Access to adequate sanitation* Effect: *Diarrhoea morbidity in children; **Diarrhoea mortality in children**; Outbreaks of water-borne diseases* 2) Food Safety: Exposure: *Potential exposure to chemical hazards monitored in food* Effect: *Food-borne illness; **Diarrhoea mortality in children**; Diarrhoea morbidity in children* Action: *Monitoring of chemical hazards in food*	
Related data, indicators	See also http://www.who.int/water_sanitation_health/; See http://www.who.int/inf-fs/en/fact112.html Water Supply and Sanitation Sector Questionnaire WHO/UNICEF Global Assessment 2000 http://www.who.int/water_sanitation_health/p-2000evaluation/quescont.html	

Food_Ex1	**Monitoring chemical hazards in food: potential exposure**	DPSEEA
Issue	Food Safety	
Definition of indicator	Dietary exposure assessment to potentially hazardous chemicals monitored in food Global Environmental Monitoring System/Food Contamination Monitoring and Assessment Programme (GEMS / Food)	
Underlying definitions and concepts	**Chemical monitoring of food:** the routine sampling and analysis of food commodities, including drinking water with the aim of assessing dietary exposure of the population to hazardous chemical contaminants or constituents **The monitoring implies:** Accreditation of laboratories for the provision of relevant data, and its use for policy and management purposes by the agencies concerned, as well as for the implementation of quality assurance system in the monitoring laboratories and fulfilment of the requirements for analytical methods **Contaminant/ food combination:** a specific combination of a chemical constituent or contaminant and food, considered to pose potential threat to human health according to the core list of the GEMS/Food yielding altogether 47 combinations (with exclusion of the group of organo-chlorine pesticides). **Assessment of dietary intake of chemicals:** evaluation of the amount of chemical ingested in diet. **Acceptable daily intake (ADI):** the amount of chemical, expressed on a mg/kg body weight basis, that can be ingested in daily over a lifetime without incurring any appreciable health risk, and is based on an evaluation of available toxicological data. **Provisional Tolerable Weekly Intake (PTWI):** the tolerable amount of chemical to be ingested weekly. Provisional values are re-evaluated.	
Specification of data needed	GEMS/Food regional diets or national food consumption data e.g. Food Balance Sheets Food categorisation system (not harmonised) Body weight estimates (e.g. mean), or standards (e.g. adults 60 kg, children 15 kg) Concentrations of chemicals in food, number of samples analysed and results of the analyses Codex Alimentarius limits for the food chemical concentration Aggregating/ disaggregating data such as age-group (e.g. children), gender, high percentiles food consumption (95th or 97.5[th])	
Data sources, availability and quality	Data on monitoring results should be should be available from the national food control authorities (agencies) and should be reliable given the above mentioned assumptions	
Computation	The indicator can be computed as: 1) ***Dietary exposure*** $= \dfrac{\textit{Food Chemical Concentration} \times \textit{Daily Food Consumption}}{\textit{Body Weight}}$ where *Food Chemical Concentration* is either same as Codex limit or weighted average of monitoring results; *Daily Food Consumption* is the individual or averaged ingested amount of food (in g/day), regional or national estimate, and the *Body Weight* is standard/ estimate. Some processing factors should be taken into account for the pesticides (for details refer to http://www.who.int/fsf/!pest.pdf). The exposure to the given chemical contaminant can be expressed also as proportion of the ADI, PTWI. 2) Weighted average of the monitoring results	
Units of measurement	1) ADI, PTWI units 2) Same units as in Codex limits	
Scale of application	From national to international	
Interpretation	It is a measure of the level of contamination and potential exposure. Interpretation of the indicator can be assisted by presenting data for sensitive groups, e.g. children. Codex limit values may be available in electronic forms, food grouping are not harmonised in the Codex: for pesticides, food additives and contaminants different food grouping is used. National and international food consumption estimates are based on different grouping of the food products.	
Linkage with the other indicators	Exposure: ***Potential exposure to chemical hazards monitored in food*** Effect: *Food-borne illness, Diarrhoea morbidity in children, Diarrhoea mortality in children*	

Related data, indicators	UN Indicators of sustainable development: Proportion of potentially hazardous chemicals in food URL: gopher://gopher.un.org:70/11/esc/cn17/1996-97/indicators
	WHO/FSF/FOS/97.5 Food consumption and exposure assessment of chemicals. Report of a FAO/ WHO Consultation, Geneva, 10-14 February 1997: http://www.who.int/fsf/chemicalcontaminants/index2.htm
	WHO/FSF/FOS/98.3 GEMS/Food Regional Diets http://www.who.int/fsf/gems/index.htm
	WHO/SDE/PHE/FOS/99.9 Total Diet Studies Report on a Joint USFDA/WHO International Workshop on total diet studies, in co-operation with PAHO, Kansas City, Missouri, 26 July – 6 August 1999 http://www.who.int/fsf/chemicalcontaminants/index2.htm
	Codex Alimentarius http://www.fao.org/WAICENT/faoinfo/economic/ESN/codex/Default.htm
	Codex General Standard for Contaminants and Toxins in Foods CODEX STAN 193-1995 (Rev.1997):http://www.who.int/fsf/Codex/GENERALSTANDARDCONTAMINANTSAND TOXINSInFOODS.pdf
	Assistance to National Authorities in Developing and Strengthening National Food Safety Programme at: http://www.who.it/docs/fdsaf/GSNFSP6.pdf
	See also http://www.who.int/fsf/chemicalcontaminants/Acute_Haz_Exp_Ass.htm/
	See also Urban Indicators – compilations from international lists http://www.ceroi.net/urbanind.htm

Food_E1	**Food-borne illness**	DPSEEA
Issue	Food Safety	
Definition of indicator	Outbreaks of food-borne illness are defined as: 1) Number of outbreaks of food-borne illness, **and** 2) Incidence rate for all type of food borne illness, food borne infections and intoxications	
Underlying definitions and concepts	**Food:** any substance, whether processed, semi-processed or raw which is intended for human consumption, including drinks, chewing gum and any substance which has been used in the manufacture, preparation or treatment of 'food' but excluding cosmetics, tobacco and substances used only as drugs. **Food-borne illness:** Diseases, usually either infectious or toxic in nature, caused by agents that enter the body through the ingestion of food. (WHO, 2000) **Outbreak:** an incident in which two or more persons experience a similar illness after ingestion of the same food and where epidemiological evidence implicates the food as a source of illness (WHO/FSF/FOS/97.3 Annex 2, 112) **Total population:** total resident population	
Specification of data needed	Number of outbreaks and number of cases, per year within a specified area Total population within the specified area Aggregating data such as type of foodstuff; causative agent: microbiological (incl. serotypes), viruses, parasites, biogenic amines, chemical, other agents; identified or suspected reason of outbreak and geographical area; age; gender; socio-economic character	
Data sources, availability and quality	Outbreaks of food-borne diseases may be reported by a wide range of individuals and agencies, including the public, the media, health care providers and practitioners, and laboratories dealing with samples referred for analysis. In many countries, statutory notification systems also exist for some types of food-borne disease. Data on outbreaks are often collated by public health authorities. In all cases, however, the quality and the completeness of the data may be variable, because of incomplete reporting (many cases may not be referred to health services) and inconsistencies in diagnosis. Post-hoc investigations of outbreaks may also be undertaken, though these are likely to cover only more severe or unusual outbreaks. Data on total population are available from national censuses and should be reliable	
Computation	The indicator can be computed as: 1) O_f where O_f is the number of outbreaks of food-borne illness per year, **and** 2) $100000 * (N / P_t)$ where N is the total number of cases of food-borne illness per year, and P_t is the total population	
Units of measurement	1) Number of outbreaks 2) Number of cases per hundred thousand population	
Scale of Application	Local to international, though problems of data consistency and completeness may limit applications at broader scales	
Interpretation	For policy purposes, use the outbreak rate is more informative for interventions: Increase in outbreak rate => deterioration in health conditions and food hygiene. For monitoring public health use the incidence rate is more informative for the magnitude of the overall problem Problems of data quality and availability need to be taken into account. Different methods of monitoring and reporting are liable to give very different results, and care is needed in comparing or pooling data from different sources. Substantial uncertainties in the data also arise due to variations in the diagnosis, reporting methods, health system infrastructure. The episodic nature of food-borne disease outbreaks also means that long-term trends should not be inferred from short runs of data; the clustered nature of outbreaks similarly means that national patterns should not be deduced from local surveys. Only a small proportion of the total number of cases occur as outbreaks The existence and degree of sophistication of the notification system are important for reliable reporting	
Linkage with the other indicators	Exposure: *Potential exposure to chemical hazards monitored in food* Effect: **Food-borne illness**; *Diarrhoea morbidity in children; Diarrhoea mortality in children*	
Related data,	http://www.who.int/inf-fs/en/fact237.html	

indicators	WHO Health For All statistical database (HFA – DB): http://who.dk/country/country.htm or for on-line access via the European Public Health Information Network for Eastern Europe (EUPHIN – East) at: http://www.euphin.dk/hfa/Phfa.asp Health For All (HFA) Indicators for monitoring and evaluation of Health21: http://www.who.dk/cpa/pb9912e.htm WHO Guidelines for investigation and control of food borne disease outbreaks. Geneva: WHO (under preparation) http://www.who.int/fsf/fdstxt1.htm#surveillance http://www.who.int/fsf/fdstxt1.htm#recommendations See also WHO Recommended Surveillance Standard. Second Edition. Geneva: WHO http://www.who.int/emc-documents/surveillance/whocdscsrisr992c.html See also report of WHO/FAO consultation on risk assessment of microbiological hazards in food at http://www.who.int/fsf/mbriskassess/Report_of%20_July2000_Consultation.pdf Visit also WHO Surveillance Programme for Control of Food borne Infections and Intoxications in Europe at http://www.who.it/docs/fdsaf/fs_survprog.htm International and national data on food borne diseases in Europe http://www.who.it/docs/fdsaf/fddata.htm Assistance to National Authorities in Developing and Strengthening National Food Safety Programme at: http://www.who.it/docs/fdsaf/GSNFSP6.pdf

Chem_P1	Sites containing large quantities of chemicals	DPSEEA
Issue	Chemical Emergencies	
Definition of indicator	Number of sites containing large quantities of chemicals according to the criteria of the EU 'Seveso II' directive	
Underlying definitions and concepts	The indicator is based on the ability to identify fixed facilities qualifying as upper and lower tier establishments according to the EU Council directive 96/82/EC(09 Dec 1996), i.e. the 'Seveso II' directive. Underlying definitions are: **Establishment:** the whole area under the control of the operator where dangerous substances are present in one or more installations, including common or related infrastructures or activities. **Dangerous substance**: a substance, mixture or preparation listed in the Seveso II directive's annex I, part 1, or fulfilling the criteria in annex 1, part 2.	
Specification of data needed	Inventory of all establishments that could potentially come under the Seveso II directive. Quantity of dangerous substances present in the fixed facilities identified above as a raw material, product, by-product, residue or intermediate, including those substances for which it is reasonable to suppose that may be generated in the event of accident.	
Data sources, availability and quality	All EU member states should have an inventory of establishments coming under the scope of the directive since February 1999. Other states can apply the methodology detailed in annex I of the directive to determine if establishments qualify as an upper or lower tier establishment, although this may require a fair amount of work.	
Computation	Count the numbers of upper tier and lower tier (only those *not* qualifying as upper tier) establishments separately, as outlined in annex I of the directive.	
Units of measurement	Numbers	
Scale of application	National and international	
Interpretation	The indicator has a reasonable degree of resonance with the concept of potential damage to the public health. The few surveillance data available indicate that 80% of chemical incidents occur in fixed facilities; the proportion of those occurring in the larger facilities that (would) come under the scope of the Seveso II directive is unknown. All operators of establishments in EU member states coming under the scope of the Seveso II directive need to send a notification to the competent authority and to establish a Major-Accident Prevention Policy. In addition, operators of upper tier establishments need to establish a Safety Report, a Safety Management System and an Emergency Plan. Therefore, a facility coming under the scope of the Seveso II directive may be considered a serious potential hazard for its surroundings, the magnitude of the actual risk depending a/o. on the safety management, land-use planning and emergency planning.	
Linkage with the other indicators	Pressure: *Sites containing large quantities of chemicals* Effect: *Mortality from chemical incidents* Action: *Regulatory requirements for land-use planning; Existence of poison centres, Medical treatment guidelines, Existence of chemical incidents register; Government preparedness*	
Related data, indicators	EU Council directive 96/82/EC(09 Dec 1996) the 'Seveso II' directive http://www.europa.eu.int/comm/environment/seveso/index.htm See also Seveso Substance Database at http://mahbsrv.jrc.it/turku/seviisubs/seviisubs1.html See also Guidance Documents for Implementing Seveso II at: http://mahbsrv.jrc.it/NewProducts.html	

Chem_E1	**Mortality from chemical incidents**	DPSEEA
Issue	Chemical Emergencies	
Definition of indicator	Mortality rate attributable to acute chemical incidents	
Underlying definitions and concepts	This indicator requires the ability to identify cases of mortality due to chemical incidents. People killed at the incident site will be more identifiable, but people dying in hospital and people dying later, and people dying due to the late effects (such as cancer or chronic lung disease) will be more difficult to identify. Later deaths may or may not be ascribable to the incident. Sometime the nature of the incident may be such that it is not necessarily certain that a chemical was released.	
Specification of data needed	Number of deaths per year ascribable to acute chemical incident releases in the general pubic, first responders, and chemical site employees. Population of the country.	
Data sources, availability and quality	Most countries do not have a system collecting data on chemical incidents or chemical incident deaths. Death certifications could be used but are unlikely to accurately record the cause as a chemical incident. Under-reporting may occur if just health service statistics are used, and double counting may occur if the other services (such as police, fire and ambulance) provide information as well. Ideally a national system should be set up.	
Computation	The indicator can be expressed as: $(M_n / P) * 1000000$ where M_n is the number of deaths in year N attributable to chemical incidents, and P is the population of the country in year N	
Units of measurement	Number of deaths per million population	
Scale of application	Mainly national to international	
Interpretation	This indicator has a high degree of resonance with the concept of damage to the public health. However, difficulties and differences in the definition of acute chemical incidents, and problems in ensuring comprehensiveness of collection of all the deaths means that comparison between countries may prove difficult, even if they get national collecting systems running. Nevertheless, setting common definitions before their establishment can only be beneficial.	
Linkage with the other indicators	Pressure: *Sites containing large quantities of chemicals* Effect: ***Mortality from chemical incidents*** Action: *Regulatory requirements for land-use planning; Existence of poison centres, Medical treatment guidelines, Existence of chemical incidents register; Government preparedness*	
Related data, indicators	OECD chemical accidents programme: http://www.oecd.org/ehs/accident.htm	

Chem_A1	Regulatory requirements for land-use planning	DPSEEA
Issue	Chemical Emergencies	
Definition of indicator	Regulatory requirement for land-use planning around sites containing large quantities of chemicals according to the criteria for upper tier of the EU 'Seveso II' directive	
Underlying definitions and concepts	Underlying definitions are: **Establishment:** the whole area under the control of the operator where dangerous substances are present in one or more installations, including common or related infrastructures or activities. **Dangerous substance**: a substance, mixture or preparation listed in the Seveso II directive's annex I, part 1, or fulfilling the criteria in annex 1, part 2. **Regulatory requirement on the land-use planning**: clearly outlined restrictions on land use in the safety zone(s). The safety zones around an establishment are determined based on the identification and definition of accident scenarios involving the dangerous substances and determination of the likelihood of (health) consequences of these scenarios.	

Specification of data needed	- Inventory of all establishments that could potentially come under the Seveso II directive.
	- On the basis of an assessment of establishments so identified, an inventory of establishments that (would) qualify as an upper tier Seveso II establishment (for all EU member states should have been completed by February 1999). Other states can apply the methodology detailed in annex I of the directive.
	- Existence and enforcement of regulatory requirement for land-use planning around all those fixed facilities that meet the upper tier criteria. The regulatory requirement should at least include:
	  - Identification and definition of accident scenarios involving dangerous substances.
	  - Rules for determining the likelihood of and the (health) consequences of these accident scenarios.
	  - On the basis of the possible health outcomes, determine risk zones around an establishment.
	  - Clearly outlined restrictions on land use in the safety zone(s).
	  - Sanctions for non-compliance with the land use planning regulations.	

Data sources, availability and quality	Information on the existence of these instruments and measures. Information should be available at ministries responsible for environment, safety and/or emergency response.	

Computation	0. A score 0 is assigned if any of the following apply:
	  • There is no inventory of establishments that could potentially come under the Seveso II directive, *or*
	  • Less than 80% of the inventory of potential sites has actually been assessed for compliance with the Seveso II directive, *or*
	  • There is no regulatory requirement that meets at least 4 of the above 5 criteria, or the land-use requirements are not enforced, *or*
	  • Less than 20% of the establishments that (would) qualify as upper tier Seveso II are required to comply with regulatory land-use requirements as detailed above.
	1. A score 1 is assigned if:
	  • All of the criteria under 1) do not apply, *and*
	  • A proportion of 20% - 80% of the establishments that (would) qualify as upper tier Seveso II are required to comply with regulatory land-use requirements as detailed above.
	2. A score 2 is assigned if:
	  • All of the criteria under 1) do not apply, *and*
	  • More than 80% of the establishments that (would) qualify as upper tier Seveso II are required to comply with regulatory land-use requirements as detailed above.	

Units of measurement	Ordinal score (0 – 2)	
Scale of application	National and international	
Interpretation	This indicator has a reasonable degree of resonance with the concept of potential damage to the public health. The underlying construct is that competent authorities should have a regulatory tool to enforce a 'safety distance' between hazardous installations and vulnerable objects, such as residential areas, schools, recreational areas etc.	

Linkage with the other indicators	Pressure: *Sites containing large quantities of chemicals* Effect: *Mortality from chemical incidents* Action: ***Regulatory requirements for land-use planning****; Existence of poison centres, Medical treatment guidelines, Existence of chemical incidents register; Government preparedness*
Related data, indicators	EU Council directive 96/82/EC (09 Dec 1996) the 'Seveso II' directive http://www.europa.eu.int/comm/environment/seveso/index.htm See also "Land-use planning in the context of Major Accident Hazards" at http://mahbsrv.jrc.it/turku/lup/sld001.htm

Chem_A2	Chemical incidents register	DPSEEA
Issue	Chemical Emergencies	
Definition of indicator	Presence of an active, cumulative register of chemical incidents with national coverage	
Underlying definitions and concepts	Underlying definitions are: **Register** - active database, with the population and geographical areas defined. The register should define the incident at least in terms of: • Identification of the source: chemical(s) released (name and CAS number), estimated quantities and the medium to which the chemical(s) have been released. • Information about the location of the incident: unique identifier of geographical location (grid co-ordinates, latitude and longitude, or similar), fixed site or transportation. • Outcome: estimate of the number of people actually exposed (population, workers and responders). • A contact source of further information on the incident **Incident** - an agreed exposure-category of incident. Typically this can be taken as the IPCS Level 3 - where there is suspected or actual ill-health; and IPCS Level 4 - where a major emergency plan is activated.	
Specification of data needed	Evidence of existence of register with the above characteristics.	
Data sources, availability and quality	Information on the existence of the register.	
Computation	A score 0 is assigned if there is no such instrument. A score 1 is assigned if the conditions are met partly, **and** less than 80% of the country is covered, A score 2 is assigned if: - the conditions are met completely, i.e. the register is in operation with its full specifications, but less than 80% of the country is covered, or - the conditions are met partly, **and** 80% or more of the country is covered. A score 3 is assigned if the conditions are met completely, i.e. the register is in operation with its full specifications, **and** 80% or more of the country is covered.	
Units of measurement	Ordinal score (0 – 3)	
Scale of application	National and international	
Interpretation	The indicator is a measure of the degree of sophistication in a country's approach to chemical incidents. However, increases in the rate of incidents may be due to a real increase in the rate of incidents, or may be due to better incident ascertainment.	
Linkage with the other indicators	Pressure: *Sites containing large quantities of chemicals* Effect: *Mortality from chemical incidents* Action: *Regulatory requirements for land-use planning; Existence of poison centres, Medical treatment guidelines, **Existence of chemical incidents register;** Government preparedness*	
Related data, indicators	The WHO Collaborating Centre for a Clearing House for Chemical Incidents (mailto:healthchem@uwic.ac.uk). For definitions of the IPCS chemical incident level, cf 'Public Health and Chemical Incidents. Guidance for National and Regional Policy Makers in the Public/Environmental Health Roles. Cardiff: WHO Collaborating Centre for an International Clearinghouse for Major Chemical Incidents, 1999'. International Programme on Chemical Safety homepage: http://www.who.int/ipcs/	

Chem_A3	Poison centre service	DPSEEA
Issue	Chemical Emergencies	
Definition of indicator	Poison centre service staff per head of population	
Underlying definitions and concepts	A **poison centre service** provides all of the following functions relating to poison control: 1. Permanent (24 hours/day, 365 days/year) poison information service. 2. Clinical services for patients exposed to chemicals (includes lists of antidotes and other agents used in treatment of poisoning). 3. Analytical toxicology services. 4. Toxico-vigilance and prevention of poisoning. 5. Response to major emergencies involving chemicals. 6. Availability of common antidotes. 7. Expertise and experience with industrial chemicals (not just poisoning by medication and household products!). **Poison centre** is a health care facility, which provides full poison centre service (as defined above) with appointed staff. **Poison centre staff**: number of whole-time equivalent technical and professional staff (not including administrative staff) appointed those poison centres that provide full poison centre service. **Total population**: total population size.	
Specification of data needed	Whole-time equivalent technical and professional poison centre staff. The population size	
Data sources, availability and quality	Information on the existence of the centres. Data on the total population size exist from censuses.	
Computation	The indicator can be computed as: $N_{pcs} * 10^6 / P_t$ Where N_{pcs} is the number of whole-time equivalent poison centre staff that meet the criteria outlined above, and P_t is the total population.	
Units of measurement	Number of whole-time equivalent staff per million inhabitants	
Scale of application	National to international	
Interpretation		
Linkage with the other indicators	Pressure: *Sites containing large quantities of chemicals* Effect: *Mortality from chemical incidents* Action: *Regulatory requirements for land-use planning;* **Poison centres**, *Medical treatment guidelines, Existence of chemical incidents register; Government preparedness*	
Related data, indicators	Guidelines for Poison Control. International programme on Chemical Safety. First draft. WHO, Geneva, 1997. Webpage IPCS: http://www.who.int/ipcs Health Aspects of Chemical Accidents. Guidance on Chemical Accident Awareness, Preparedness and Response for Health professionals and Emergency Responders. OECD Environmental Health Monograph No. 81. Paris, OECD, 1994: http://www.oecd.org/ehs/accident.htm	

Chem_A4	Medical treatment guidelines	DPSEEA
Issue	Chemical Emergencies	
Definition of indicator	Medical treatment guidelines	
Underlying definitions and concepts	Underlying definitions are: **Medical treatment guideline**: a document containing information on at least verification of exposure, decontamination, diagnosis (signs and symptoms, severity, diagnostic testing, etc.), personnel safety aspects, and medical intervention for subjects exposed to a certain chemical or class of chemicals. **Widely accepted**: formal or informal nationwide acceptance and application as a guideline for medical treatment.	
Specification of data needed	The number of chemicals / chemical classes from a list defined below for which emergency guidelines have been developed, and certain characteristics of the guidelines. The degree of national acceptance and application: is the acceptance formalised (by law, by formal agreement between all parties involved, etc) or it is informal.	
Data sources, availability and quality	Ministries of health or those in charge of emergency response will generally have a picture of the medical treatment guidelines for acute chemical exposure applied in the country. If the data are unavailable from the source above, poison centres, local hospitals and ambulance services can be consulted about applied the medical treatment guidelines. This will require a separate (pilot) study, which can be limited to a quick telephone survey.	
Computation	The indicator can take a value of 0, 1, 2 or 3 (on an ordinal scale). The Indicator Value is determined by an Indicator Score which is calculated according to the steps below: 1. Determine the number of chemicals or chemical classes listed below for which nationally accepted and applied medical treatment guidelines exist (N_C). Medical treatment guidelines should contain information on at least: verification of exposure, decontamination, diagnosis (signs and symptoms, severity, diagnostic testing, etc.), personnel safety aspects, and medical intervention for subjects exposed to the chemical or chemical class. - Ammonia, chlorine, hydrogen fluoride, other corrosive acids, other corrosive alkalis, arsine, hydrogen sulphide, carbon monoxide, methanol, cyanides, methemoglobin inducing agents, cholinesterase inhibitors, aromatic hydrocarbons, petroleum products. - If no nationally accepted and applied list of medical treatment guidelines is available, $N_C = 0$. 2. For each guideline, determine if information is available for each of the 4 possible portals of entry: inhalation, ingestion, skin and eye (N_P). 3. Determine if the national acceptance is informal, or has been formalised in some way. - If informal: Indicator Score = $N_C * N_P$. - If formalised: Indicator Score = $2 * N_C * N_P$. - The maximum Indicator Score is $2 * 15 * 4 = 120$. 4. The Indicator Value is based on the Indicator Score: - Indicator Score ≤ 20 Indicator Value = 0. - Indicator Score > 20 and ≤ 60 Indicator Value = 1. - Indicator Score >60 and ≤ 100 Indicator Value = 2. - Indicator Score > 100 Indicator Value = 3. 5. Indicator Value qualifications: 0 (virtually) absent 1 poor 2 acceptable 3 adequate	
Units of measurement	Ordinal scale (0 – 3)	
Scale of application	National to international	
Interpretation	The indicator provides information about the potential for exposed patients to receive proper medical attention, particularly those that do not receive treatment at a poison centre.	
Linkage with the other	Pressure: *Sites containing large quantities of chemicals* Effect: *Mortality from chemical incidents*	

indicators	Action: *Regulatory requirements for land-use planning; Poison centres,* **Medical treatment guidelines**, *Existence of chemical incidents register; Government preparedness*
Related data, indicators	Examples of medical treatment guidelines are the ATSDR Medical Management Guidelines for Acute Chemical Exposures, webpage: http://www.atsdr.cdc.gov/mmg.html
	Health Aspects of Chemical Accidents. Guidance on Chemical Accident Awareness, Preparedness and Response for Health professionals and Emergency Responders. OECD Environmental Health Monograph No. 81. Paris, OECD, 1994 http://www.oecd.org/ehs/accident.htm

Chem_A5	**Government preparedness**	DPSEEA
Issue	Chemical Emergencies	
Definition of indicator	Government preparedness for chemical incidents	
Underlying definitions and concepts	Government plays a pivotal role in the preparedness for chemical incidents. This indicator relates to the central government's ability to respond adequately to a chemical incident. The following are crucial elements that a government should have in place to enable its (co-ordinating role in the) response function: • **National Advisory Body**: an institution/body (ideally centrally funded) staffed by professionals with a background in legislation, chemical incident management and data collation; and with access to specialist professionals. Its function is to advise Government on preparedness, and during significant chemical incidents: it can also provide a co-ordinating function for all the regional and local functions. • **Environmental/Public Health Plans** for dealing with chemical incidents: an active, written, document detailing the actions required of public health and environmental health professionals before, during and after a chemical incident. • **Emergency Response Guidelines**: A widely accepted set of emergency response guidelines is an essential element of a country's ability to perform a rapid health risk assessment for a chemical incident. *Emergency response guideline*: an airborne concentration of a substance indicating a certain level of possible adverse toxic effect from a single exposure during a specified exposure period in the general population. *Widely accepted*: formal or informal nationwide acceptance and application as a guideline for rapid health risk assessment in chemical emergencies. • **Public alerting system**: The presence of a system with very wide coverage to alert the public that an incident has occurred.	
Specification of data needed	Evidence of existence of such instruments at regional or national level Population/geographical areas covered.	
Data sources, availability and quality	Information on the existence of a national advisory body, environmental/public health plans, emergency response guidelines and a public alerting system can be available through the national ministries of health or government agencies responsible for emergency planning and response.	

Computation	The value of this indicator (N_{GP}) is calculated as the sum the value of 4 sub indicators for each of the aspects presented above, which are calculated according to the steps below:

1. **National Advisory Body**: an institution/body (ideally centrally funded) staffed by professionals with a background in legislation, chemical incident management and data collation; and with access to specialist professionals, offering advice to central government.
   To determine N_{NAB}, score 0 if none of these conditions are met, 1 if conditions are partially met, and 2 if conditions are fully met.

2. **Environmental/Public Health Plans**: an active, written, document detailing the actions required of public health and environmental health professionals before, during and after a chemical incident.
   To determine N_{EPH}, score 0 if these conditions are not met, 1 if conditions are partially met, and 2 if conditions are fully met.

3. **Emergency Response Guidelines**: The value of this sub-indicator is determined on the basis of a sub-indicator score, which is calculated as follows:
   - Determine the number of chemicals with nationally accepted and applied emergency response guidelines (N_C).
   - If no nationally accepted and applied list of emergency response guidelines is available, $N_C = 0$.
   - Determine the number of levels available for each chemical (N_L). The availability of an emergency guideline level for more than 1 time period is discounted: if 2 levels are available, $N_L = 2$ regardless if the levels are available for 1, 2 or more time periods.
   - Determine if the national acceptance is informal, or has been formalised.
   - If informal: Score = $N_C * N_L$.
     If formalised: Score = $2 * N_C * N_L$.

   The Sub-indicator Value is based on the Score:
   Score ≤ 100   Sub-indicator Value $N_{ERG} = 0$.
   Score > 100 and ≤ 500   Sub-indicator Value $N_{ERG} = 1$.
   Score > 500   Sub-indicator Value $N_{ERG} = 2$

4. **Public Alerting System**: The value of the sub-indicator N_{PAS} is calculated on the basis of a score representing the presence of a system with very wide coverage to alert the public that an incident has occurred.
   - A general auditory public alerting system that covers at least 90% of all households.
   - Public alerting system covers at least 90% of recreational areas with high numbers of visitors (theme parks, beaches, etc.).
   - Public alerting system covers at least 90% of non-residential working areas (ports, industrial zones, etc.).
   - Special arrangements in place for people with auditory handicap.
   - Clear arrangements about roles and responsibilities for activating the system.
   - Testing of the public alerting system at least once a year, with notification to the public.
   - The score = the number of each of the above criteria that are met (maximum = 6).

   The Sub-indicator value is determined as:
   If score ≤ 1   sub-indicator value = 0
   If score 2, 3 or 4   sub-indicator value = 1
   If score 5 or 6   sub-indicator value = 2

5. The final score for Government preparedness N_{GP} is calculated as the sum of the sub-indicator values:
   $N_{NAB} + N_{EPH} + N_{ERG} + N_{PAS}$. The value of N_{GP} can range from 0 to 8.

Units of measurement	Ordinal score (0 – 8)
Scale of application	Regional or national
Interpretation	This indicator is a measure indicating a degree of sophistication in a country's approach to chemical incidents. Governments may be able to institute these functions after an incident has occurred (e.g. obtain advice from individuals, or from (interested) parties and bodies), but the effectiveness would be much reduced as compared with a well-prepared organisation.
Linkage with the other indicators	Pressure: *Sites containing large quantities of chemicals* Effect: *Mortality from chemical incidents* Action: *Regulatory requirements for land-use planning; Poison centres, Medical treatment guidelines, Existence of chemical incidents register;* **Government preparedness**
Related data, indicators	Web-page with example of National Advisory Body: http://www.natfocus.uwic.ac.uk Web-page for Environmental/Public Health Plans: • OECD chemical accidents programme: http://www.oecd.org/ehs/accident.htm • ATSDR Chemical Accidents: http://www.atsdr.cdc.gov/mmg.html Web-pages for Emergency Response Guidelines: • Emergency Response Planning Guidelines: http://www.scapa.bnl.gov • Acute Emergency Guideline Levels: http://www.epa.gov/oppt/aegl (under construction).

Work_E1	Occupational fatality rate	DPSEEA
Issue	Workplace	
Definition of indicator	Occupational fatality rate	
Underlying definitions and concepts	This indicator requires the ability to identify deaths due to accidents or inappropriate working conditions and practices. Underlying definitions are: **Fatalities** – death due to occupational injury, regardless of the time between occupational injury and the death **Total number of workers**: the number of people carrying out or involved in, a trade or business are employed in the country	
Specification of data needed	The number of cases of fatalities due to work related injury The total number of workers	
Data sources, availability and quality	Data on occupational fatalities are available in all countries through routine reporting in accordance with employment and health and safety legislation. This indicator tends to be reliable and under-reporting is infrequent. Data on the total number of workers is usually available from the national employment statistics or company records. Such statistics, however, tend to omit those employed in informal or casual work or who have multiple (and often unregistered) jobs.	
Computation	The indicator can be expressed as: $$100{,}000 * (M_f / W)$$ where M_f is the total number of reported fatalities reported in the target workforce, and W is the total number of workers.	
Units of measurement	Number per hundred thousand workers	
Scale of application	Local, enterprise level, community level to international	
Interpretation	Reliable and consistent data is usually available in relation to fatal workplace accidents. Under-reporting of workplace fatality is less common than any other occupational health and safety indicator. The indicator provides potentially useful measure of workplace health risks associated with the occupational environment. The safety pyramid familiar in safety science allows this measure to infer performance of work associated injury and morbidity. An increase may be used to infer deterioration in the working environment and in the quality of the management of health and safety risks. A reduction in the number of deaths may imply an improvement. In making these in inferences there will be margins of error in relation to the reporting of fatalities with long related times to non specific causes. Problems in accurately quantifying the number of workers (total number of working years) may add to uncertainty. Changes in the total number of people employed may also affect the rate. Changes in the rate may reflect changes in the pattern of employment. Improvements could occur because of the decline in heavy manufacturing industry with a relative growth in service industries. In these circumstances a reduction may not reflect improvement. It is therefore important to look at the rates of fatalities per industry sector and within occupational groups if this data is available.	
Linkage with the other indicators		
Related data, indicators	International Statistical Classification of Diseases and Related Health Problems (ICD-10) in Occupational Health http://www.who.int/environmental_information/Information_resources/documents/Occupational_health/classdis_in_OH.pdf	

Work_E2	Rates of injuries	DPSEEA
Issue	Workplace	
Definition of indicator	Rates of injuries	
Underlying definitions and concepts	These indicators require the ability to identify cases of occupational injury, occupational illness due to accidents in inappropriate working conditions and practices. They also require the ability to identify work days lost as a consequence of these injuries or illness. In certain circumstances they also require the ability to identify the number of cases of first aid treatments provided at the workplace for minor injury. Definitions are **Loss time/injury/illness rate** – the incidence rate per hundred per 1000 employees/working hours. Time lost by an employee or a group of employees because of occupational injury or illness. **Lost work days rate** – the work days lost is a consequence of absence from work due to occupational injury or illness **Restricted work cases** – the number of employees deployed to alternative work because of occupational ill health or injury **Over three day injury rate per hundred thousand employees** – this is the number of injuries requiring more then three days absence from work. **First aid treatment cases per hundred thousand employees** – the number of cases requiring first aid treatment not necessarily administered by a health professional.	
Specification of data needed	The number of cases of occupational injury and illness. The lost work days due to these cases of injury and illness. The number of employees who have to be deployed to alternative work because of occupational ill health or injury. The number of first aid treatment in a workplace Total number of workers and total number of potential working days	
Data sources, availability and quality	Many enterprises will record some or all of the above as part of their routine reporting of their health and safety performance. Some of the data such as over three day injury rate per hundred thousand employees is often required to be reported by health and safety legislation. The information on restricted work cases i.e. the number deployed to alternative work is not normally reported outside companies but is a useful indicator of the morbidity caused by occupational illness or injury. Within enterprises there may be under-reporting of some of these indices due to poor recording of workers injury by the companies or enterprise and by incomplete recall and attribution of injury by workers. Data on the days lost may be inaccurate.	
Computation	These indicators can be expresses by a number of events per thousand or hundred thousand working hours or employees: e.g. $100,000 * (M / W)$ where M is the total number of reported cases or events reported (in accordance with the above definitions) in the target work force and W is the total number of workers per working hours worked by the workforce.	
Units of measurement	Number per thousand or per hundred thousand workers or per hundred thousand working hours.	
Scale of application	Local to international problems of data consistency and availability may limit interpretation of broader scales.	
Interpretation	Reliable and consistent data are available. These indicators provide useful measures of the health risk associated with the occupational environment. Some of these indicators are reported in health and safety agencies within countries. Within enterprises particularly multi national companies many of these indices are standard measures of health and safety performance and within these enterprises where recording is consistent these provide useful indicators of the level of work associated morbidity and give a more complete picture when used in addition to other indicators such as fatalities and serious injuries.	
Linkage with the other indicators		
Related data, indicators	International Statistical Classification of Diseases and Related Health Problems (ICD-10) in Occupational Health http://www.who.int/environmental_information/Information_resources/documents/Occupational_health/classdis_in_OH.pdf	

Work_E3	**Standardised mortality ratio (SMR) by occupation**	DPSEEA
Issue	Workplace	
Definition of indicator	Standardised mortality ratio (SMR) by occupational groups (main disease groups)	
Underlying definitions and concepts	This indicator requires the ability to identify causes of death and the main occupation of the deceased. It also requires knowledge of the age structure of the occupational group being considered to be able to calculate the expectant number of death in the group	
Specification of data needed	Deaths – all deaths, by main ICD groups, by main occupational groups Census data providing the denominator information of the population in general and also the occupational group	
Data sources, availability and quality	Data on mortality are available in all countries through routine reporting in accordance with social and employment legislation. This indicator tends to be reliable. Data on the total number of the employed population relies on census information but this is only gathered periodically. The accuracy of census information vary given population movement throughout Europe. In addition there may be a significant number of workers who are not registered in countries and who have entered the country through irregular means. The statistics therefore may omit those employed in an informal or casual work or who have multiple and often unregistered jobs.	
Computation	Age specific death rates in a standard population are applied to the age structure of the occupation group being considered to calculate an expected number of deaths in the occupational group (by main ICD groups). The indicator can be expressed as: $$(100 \times O / E)$$ where O is observed number of deaths over the E - expected number of deaths	
Units of measurement	The SMR of the standard population is a hundred. An SMR over or under one hundred indicates a higher or lower mortality rate in a specific group	
Scale of application	Community level to international	
Interpretation	Reliable and consistent data is usually available in relation to deaths in populations. Under reporting of death is less common than any other indicator. Calculation of SMR requires accurate attribution of the cause of death and also of the relevant occupational group. The quality of such data varies according to who reports the death and whether the occupation described is the last job which may have been followed by the deceased is the job which they occupied for the majority of their working life. Health professionals may give inaccurate information about the cause of death and relatives may provide inaccurate information about the occupation followed by the deceased.. The SMR has advantages as a single summary measure to compare mortality rates between the standard population and a particular occupational group. It requires accurate population data by age for both the standard population and for the particular occupational group. The information for the occupational group in a non-census year may be inaccurate. Numerator and denominator bias can arise because of the different data sources used to calculate the observed and expected number of deaths. SMR is useful in comparing mortality in a particular occupation with that of the population in general. It should not be used to compare different occupation groups with each other. There may be problems associated with the recording of women's occupations in death certificates and on census returns, which increases the likelihood of bias in the calculation of SMR. Changes in SMR can be a reflection of such bias. It may reflect genuine changes in the mortality of a particular occupational group either positively or negatively.	
Linkage with the other indicators		
Related data, indicators		

Work_E4	Sickness absence rate	DPSEEA
Issue	Workplace	
Definition of indicator	This indicator is frequently defined as a severity rate collecting the amount of time lost due to absence attributable to illness compared to the normal working hours available. As such it includes all injuries, which result in absence from work. A number of more sophisticated indicators of sickness absence can be calculated (see below). Sickness absence can be usefully measured and reported separately for different occupational groups for different classes of illness and by gender and age.	
Underlying definitions and concepts	Indicators which can be used to analyse absence attributable to illness are as follows: **Severity** – lost time %. The hours of work time lost due to absence attributable to illness over the expected normal working hours x 100 **Prevalence** – point prevalence the number of individuals absent from work divided by the total population who should be present on the day. **Period Prevalence**. The number of workers absent from work over the total population during a period of time x 100 **Incidence** – sickness absence. The total number of new spells of absence per annum over the total population employed **Duration** – the average length of each spell of absence: total days absence divided by the number of spells of absence **Long-term absence** – Percentage of absentees of work due to illness for more than one month **Short-term absence** – The percentage of absentees of work for less than one month.	
Specification of data needed	The number of all absences from work attributable to illness. The causes of all of these absences. The duration of all of these absences. Occupational category of each of these absences attributable to illness The total number of workers employed within the Occupational group and in the enterprise. Disaggregating data such as causes of sickness absence: analysis by ICD 'Diagnosis in workers of work'	
Data sources, availability and quality	Data on absence attributable to illness are available in many countries although routine reporting of this data does not occur to health and safety organisations. Data is usually available within industry or employment sector or professional organisations and relies on reports being made entirely by the organisation to the co-ordinating body. The data is often subject to considerable inaccuracy due to poor recording of absence by organisations, inaccurate self-certification by workers or by inaccurate labelling of causation by doctors. Data on the total number of workers is usually available from national employment statistics or company records. The statistics however, tend to omit those employed in informal or casual work or those who have multiple work or unregistered jobs. Data for the higher socio economic categories in employment tend to be incomplete due to a lack of compliance of these groups with company organisation requirement to report and record absences from work.	
Computation	According to the underlying definition type (see above)	
Units of measurement	According to the underlying definition type (see above)	
Scale of application	Local to international though problems of data consistency and availability will limit the interpretations at a broader scale	
Interpretation	Where reliable and consistent data are available, this indicator provides a potentially useful measure of the well being of the work force associated with a particular occupational environment. Adverse trends can reflect a deterioration in the physical mental and social well being of the workforce including the control of workplace preventable ill health and work environments	
Linkage with the other indicators		
Related data, indicators		

Work_E5	**Statutory reports of occupational diseases**	DPSEE**A**
Issue	Workplace	
Definition of indicator	Existence of formal system for reporting the cases of diseases diagnosed and confirmed as due to work in specific occupation at risk. The existence of formal system could be considered as an action indicator; cases of diseases confirmed – as an effect one.	
Underlying definitions and concepts	Underlying definitions are: **Diagnosis** – confirmed by a doctor **Occupation** – affected individuals current or previous job involves the work activity specifically associated with the disease	
Specification of data needed	Number of cases of industrial diseases due to specific occupational exposures.	
Data sources, availability and quality	Data on occupational diseases are available in all countries through routine reporting in accordance with Employment and Health and Safety legislation. This indicator where it is based on governmental reports is reliable. However the criteria for diagnosis of the industrial disease are usually very strict thus only a small proportion of individuals potentially affected may be included in the official statistics. Data on the total number of workers employed in relevant industries is usually available from national employment statistics or company records.	
Computation	The indicator can be computed as number per hundred thousand workers	
Units of measurement	Number per hundred thousand workers	
Scale of application	National only	
Interpretation	Data based on governmental reports is usually accurate as the formal systems for diagnoses of occupational and industrial disease are based on compensation systems and therefore linked to payment. However the criteria for diagnoses are usually restricted and the number of cases probably represents only a proportion of the true number of cases within a working population. Where there is less than absolute certainty about diagnoses or about the occupation of the individual under reporting will occur. An increase can be used to infer deterioration in the quality of the working environment and in the control of workplace health risks. Decrease in cases represents an improvement. The diseases included formal recording systems for occupational diseases usually of those associated with historical industries and many were identified in the 19th and early 20th centuries. With the changing patterns of employment and improved working conditions since those past days, there has generally been a consistent decline in the number of cases occurring partly due to the decline in these industries but also due to improved controls which themselves are often based on legislation. Nevertheless because the industrial diseases are generally agreed (Information Notices and Diagnoses of Occupational Disease: European Commission: Report EUR 14768EN), they do provide a common basis for the recognition reporting of these classical occupational diseases.	
Linkage with the other indicators		
Related data, indicators		

PART 3   EXTENDED SET OF ENVIRONMENTAL HEALTH INDICATORS: BRIEF DESCRIPTION

Environmental Health Issues

ISSUE	INDICATOR	DPSEEA	DESCRIPTION	COMMENTS
Air Quality	Emissions of Pb, primary PM10, NOx and benzene in urban areas	Pressure	Urban emissions of the mentioned pollutants representative for industrial and/ or traffic related air pollution	Detailed emissions inventories at urban scale are only available for a limited number of (mega) cities. In general terms, procedures to estimate urban emissions from national totals are available, see: - Topic Report 30-1996, Air Emissions, European Environment Agency; - Auto Oil II programme (see http://www.etcaq.rivm.nl/ - *European Environmental Priorities: an Integrated Economic and Environment Assessment*, Report 481505010, RIVM, Bilthoven, The Netherlands
	Number of hospital admissions for respiratory diseases	Effect	Number of hospital admissions for respiratory illness per 100000 people per year	*ICD10 codes J00-J99*
	Number of hospital admissions for asthma per 100000 people per year	Effect	Asthma – hyper-reactivity of the airways in response to an external stimulus, leading to bronchial spasms. Hospital admissions – registered admission to a hospital as an in-patient	*ICD10 codes J45-J46*
	Number of hospital admissions for diseases of the circulatory system	Effect	Number of hospital admissions for diseases of the circulatory system per 100000 people per year	*ICD10 codes I00-I99*
	Disability adjusted life years due to morbidity and mortality as a result of ambient air pollution	Effect		For the *Future* See comments below
	Investments in Transport Infrastructure	Action	Give the total amount of investment for both publicly and privately financed projects in EURO. Application: urban and national level	Suitable for sector-specific analysis

Comments	Noise to signal ratio very high (air pollution not main risk factor of respiratory and cardiovascular diseases). These indicators might be prone to misinterpretation. Therefore most sensitive indicators should be selected. Include recommendation how to calculate relative risks (or refer to such available exercises), but mention possible caveats. May provide insight in magnitude of (potential) effects and results of interventions. For future development: attributable mortality/ morbidity and possibly Aero-allergens			
Indoor Air	Proportion of residences having a moisture problem, visible mould or mould odour.	Exposure	Recording of visual signs of moisture or visible mould, completed with surface moisture recorder, sensory evaluation of mould odour	Household surveys
	Proportion of residences exceeding indoor air radon concentration of 200 Bq/m³	Exposure		Monitoring intensity differs
	Consumption of tobacco products	Exposure	Amount of different kind of tobacco products per head of population	In HFA database. Proxy indicator! See http://www.who.dk/adt/ecos/whomanual/whoworldmanual2.htm
	Sources of indoor air pollution	Exposure	Percentage of households using coal, wood, dung or kerosene as the main source of heating and cooking fuel	Census, or household surveys Should be in combination with data on ventilation
	Capability to implement indoor air quality (IAQ) management (Composite indicator to combine both existence and rigour of legislation)	Action	Consisting of: -Existence of:IA legislation; guidelines for material emissions and IAQ; ventilation standards -Existence of: consultant services -Existence and enforcement of IAQ guidelines -Capability to measure and report for IA pollutants: VOC, CO, NO2, NH3, HCHO, PM10 -Education and training programmes	Adapt dimensions, scales, scores
Housing & Settlements	Percentage of the population that have no permanent domicile (homelessness)	Exposure	Defined as: People who sleep outside housing units or in temporary accommo-dation and charitable institutions; or people who lack access to adequate amenities	Socio-economic indicator; Problems with the data

	Incidence of asthma incl. LRI in children	Effect	Annual incidence of asthma, i.e. hyper-reactivity of the airways in response to an external stimulus, leading to bronchial spasm) and LRI in children less than 15 years	Modified, needs refining *ICD10 codes J45-J46*
Traffic Accidents	Quality of traffic control	Action	Can be expressed e.g. as % of people living in area speed limit < 30 km/ hr	A new proposed indicators for the ***Future***
Noise	Noise levels distribution	State	Noise levels distribution can be obtained from the routinely collected data (e.g. traffic data) or by random sample. For a homogenous country, a sample size of 1000 may be sufficient to get reliable data for the most important sources (transport)	The EU directive requires that cities over 250000 inhabitants (later over 100000) make a noise map. The EC is now working on harmonisation of calculation methods, data requirements, format and presentation of noise mapping information
	Number of people exposed to noise levels above a standards (day/evening/night) in noise level categories	Exposure	The proportion of people exposed to certain noise levels could be derived from GIS data (real estate, traffic flow), if existing, or from random sample. In both cases modelling is needed and the software for the calculation method is readily available. It is recommended to start the inventory from $L_{den} = 50dB$ (A)	The EU noise standard metrics will be L_{den}: based on the energy equivalent noise level (A frequency curve) with factors 5 dB for the evening period (4-hours) and 10 dB – for the night (8 hours). Evening and night period are determined for each country based on climatic and cultural characteristics See also Urban Indicators – compilations from international lists http://www.ceroi.net/urbanind.htm
	Number of people at working place exposed to noise levels (8 hr) > 80 dB(A)	Exposure	1. The preferred method is to sample industries trade-wise and collect noise data by measuring on the work floor and obtaining the number of the workforce exposed. The total is calculated by extrapolating within each line of trade. 2. A proxy can be obtained by asking in a household survey if the working respondents have difficulty communicating when working (having to shout when	Indicator for work place

3.4

			speaking at 1 m distance). Categories: sometimes, often, always.	
Comments on, traffic, noise, air	Indicators for state /driving forces available for specialist. The respective data can be used in sophisticated models to calculate the numbers of exposed, therefore making it possible to demonstrate the beneficial effects of introducing such indicators. See also Urban Indicators – compilations from international lists http://www.ceroi.net/urbanind.htm			
Waste and contaminated lands	Amount of hazardous waste disposed and exported	Pressure	Sum of the amount of hazardous waste disposed of by final disposal (land filing, dumping) or by waste incineration without energy recovery, and amount of hazardous waste subject to export (transboundary movement), per year by a country $HW_D = HW_L + HW_E$	For application at national to international level (tonnes per year)
	Existence of a register for contaminated lands	Action	Register includes ranking of public health significance	For the ***Future***
Recreational water	Proportion of coastal or freshwater bathing sites with restrictions for recreational use	Exposure/ Action	Percentage of bathing sites with restrictions for use due to water quality problems out of all designated bathing sites	(Percentage)
	Drowning accidents	Effect	Mortality rate due to drowning per 100000 per year	ICD10 codes W67-W70 For the ***Future***: to express as proportion of the bathing population (special surveys are needed!) Divide into two age groups: < 15 yr, and 15 + yr
	Capability of management of enclosed water generally available for bathing – composite indicator	Action	Components: regulatory framework and capability to enforce compliance with it; public access to information on water quality and related health risks	Scoring needs refinement! (Ordinal score)

	Intensity of water quality monitoring	Action	Number of valid measurements per pollutant per bathing season, per designated bathing site (Number per month of bathing season)	Difficulties since monitoring intensity for required for a given water depends on its quality
	Level of management response to pollution incident – composite indicator	Action	Components: Regulatory framework and compliance Effectiveness of policy actions to control pollution Expenditure on pollution abatement measures (Ordinal score)	Scoring needs elaboration For information see also http://www.waterland.net/bericht/centrum /engels/toel.html#zwemwater For more info on water management see also GEMS/water Web page: http://www.cciw.ca/gems/intro.html
Drinking water	Mean and percentile concentrations of selected chemical contaminants	State	Selected from the list: arsenic; lead; fluoride; nitrates and nitrites; VOCs; benzene; organochlorine pesticides; trihalomethanes	(mg/l) or (μg/l)
	Percentage of the population receiving piped water at home	Exposure/ Action	Taps installed either within the individual house or within a private plot of land positioned outside the house structure	(Percentage) Data can be obtained from censuses or from household surveys
	Number of discontinuities of public drinking water supply for > than 12 hours	Exposure/ Action	Number of discontinuities of public drinking water supply for > 12 hours	Difficulties to express in way for making comparisons Can be included into composite indicator on drinking water quality management
	Number of cases of proven water-borne diseases	Effect		Difficulties to obtain comparable data Depends on the reporting system!
	Intensity of water quality monitoring	Action	Number of valid measurements per pollutant/ capita/ year	Units: Number of measurements per thousand head of population
	Capability for water resources quality management - composite indicator	Action	Components: • Regulations to enforce for pollution • Independent control of pollution sources • Water quality monitoring • Water management plans • Codes for good agricultural practice • System for management of water pollution incidents	Can be used either as a composite indicator or by each separate component. In the later case, a qualitative expression (Yes/ No) is obtained allowing for comparisons. When used as a composite indicator, scoring needs refinement and one should be cautious when making comparisons. (Ordinal score)

	Good practice to drinking water management – composite indicator	Action	Components: • Existence of sanitary protection zones • Ensuring surface water quality as source for drinking • Reporting system for treatment deficiency • Regulations and capability for enforcement of use of certified materials, chemicals, technology for abstraction, treatment, distribution of drinking water • Capability to ensure safe drinking water in emergencies • Public access to information on water quality and related health risks	Can be used either as a composite indicator or by each separate component. In the later case, a qualitative expression (Yes/ No) is obtained allowing for comparisons. When used as a composite indicator, scoring needs refinement and one should be cautious when making comparisons. (Ordinal score) For more info on water management see also GEMS/water Web page: http://www.cciw.ca/gems/intro.html
Food Safety	Incidence of human zoonoses	Effect	Food-borne illness and symptoms arising from the ingestion of contaminated (source - the animal) food of animal origin.	(Number per hundred thousand per year) Currently under development in the EU. For the future after testing in countries which have good reporting system
	Dioxins and PCBs levels in human milk	Exposure	Laboratory analytical measurement	For the *Future*: Big limitations due to QC/ QA
	Incidence of animal zoonoses	Pressure	Rates of zoonoses in animal populations proven by testing (Number per thousand of head of animals)	Usually data at national level should exist at veterinary offices For the *Future*: A lot of harmonization is still needed and is ongoing for the EU
	Rate of official food control	Action	Composite indicator of: • Number of inspected establishments by categories, • Categories included in inspection, • Number of infringements, • Type of infringements detected by analysis by type of food, • Categories of food for inspection (Ordinal score)	Data on number of establishments by category and number of inspections are collected in EU member countries within the framework of the directive "Official Control of Foodstuffs" (89/397/EEC) See also the EU Guidelines on harmonisation of the conditions for submitting statistics on the annual inspections EN/03/95/51200000.POO. Scoring needs elaboration

	Progress in implementation of HACCP system	Action	Composite indicator of: • Existence of regulatory framework, • Availability of training on HACCP, • Evaluation* of implementation of HACCP in establishments as well as within the governmental services *by internal and/or external audits	(Ordinal score) Scoring needs adaptation See also "Assistance to national authorities in developing food safety programmes" at http://www.who.it/docs/fdsaf/GSNFSP6.pdf
	Population awareness of food safety rules in households	Action	Based on questionnaire Food safety rules defined as WHO Golden Rules for safe food preparation in health surveillance and management procedures (Ordinal score)	Questionnaire should be designed Scoring needs elaboration Data collection based on interviews If the questionnaire is developed and standardised (validated) this is a promising indicator also for household surveys!! NB WHO Golden Rules are now in the stage of updating
Comments	More indicators on food safety could be derived from the document: Assistance to National Authorities in Developing and Strengthening National Food Safety Programme (WHO-ECEH, Rome Division) downloaded from http://www.who.it/docs/fdsaf/GSNFSP6.pdf			
Chemical emergencies	Number of chemical incidents	State	Number of incidents per year	Editorial work needed
	Exposure to chemical(s) from chemical incidents	Exposure	Number of exposed people per million population to chemicals from acute chemical releases, in the general public, first responders, and chemical sites employees	Difficulties with the data
	Annual incidence of people hospitalised for more than 1 day because of chemical incidents	Effect	Number of admissions per million population and ascribable to an acute chemical incident	For countries with good reporting systems
	Communication with the public	Action	Composite indicator of: • Regularity of communication • Training in the desired behaviour • Presence of alertness system • Capability for communication on the health risks and protective actions	Mostly for use at local level, needs elaboration (Ordinal score)

Work place	Self-reported work-related illness	Effect	Surveys of appropriate design on occupational groups	
	Voluntary reporting systems	Action	Reporting on a voluntary basis	Needs special reporting system
	Good occupational services coverage	Action	Percentage of enterprises into categories covered by good (according to accepted "good practice" standards) occupational health services	For the _future_, needs elaboration
Comments	For a more complete indicators set on workplace one should refer to the Health, Environment and Safety Management of Enterprises (HESME) programme at http://www.who.nl			

PART 4   REPORT ON THE PLANNING MEETING FOR THE PILOT PROJECT

BACKGROUND

The WHO Consultation recommended a pilot implementation of the environmental health indicators system (EHIS) in selected countries in order to test their feasibility. The data collection practices as well as the capacity for establishment of network between the different data- and stakeholder groups will be evaluated based on the feasibility study.

Therefore the planning meeting has as main objectives:

- To determine the scope of the pilot implementation and to design the protocol for the feasibility study with the respective time-frame
- To develop the appropriate instruments for testing the feasibility of the core environmental health indicators in terms of: data availability and quality/ reliability, data accessibility and mechanisms of data transfer, reporting practices and ability to addressing policy questions.

The key issues for establishment of a national environment and health information system and links to the WHO were discussed as well.

The meeting was attended by 26 experts and WHO staff members: a full list of participants is given in Annex 1. Dr Bogdan Wojtyniak was elected chairman and Dr Anna Paldy acted as rapporteur.

Experiences from indicator-based assessments

Peter Bosch summarized the experience of the European Environment Agency on the pan-European information system for regular generation of indicators and assessments. The necessity for clearly formulated policy questions that the indicator-based report can give answer to, has been emphasized. The EEA environmental indicators typology provides means for better structuring the policy questions and assessing the availability of indicators for them. Regular communication with policy makers, bringing all available knowledge, mobilising countries and supporting their efforts in harmonisation of data collection are key factors for maintaining an efficient pan-European environmental information network. EEA is interested in collaborating in the WHO-ECEH environmental health indicators project and in providing expertise with clarifying the policy questions to be addressed as well as identifying possible data sources.

When constructing a database it is essential to avoid duplication and to harmonise data collection. Brigit Staatsen stressed this in the presentation of the results of National Environmental Outlook report for The Netherlands. The usefulness of an aggregated health impact indicator and a common "health loss" metrics to represent the effect of various environmental exposures and in evaluating policy options has been emphasized. The critical point on the uncertainty of the estimates was raised that becomes more important with changing from quantitative health responses to qualitative e.g. annoyance to noise. Data needs may differ depending on the policy developments – calling for a high degree of flexibility in the information system. This is the case with the newly emerged environmental health concern of "liveability" in The Netherlands.

The key issues in establishing an environment and health information system (EHIS) were discussed based on a parallel between some examples from the North Rhine Westphalia and the system planned in the WHO project made by Wolfgang Hellmeier. These are e.g. to maintain permanent communication with many different partners/ stake-holders, to use data from sources on different geographical scales, to link routinely collected data from many institutions. Although the general framework of the system e.g. main objectives, users, a networked structure and the core set of EH indicators have been agreed, several key issues should be made explicit before establishing national information systems.

In particular, the following key features are of particular importance for the data management system functions:

- The questions we want to answer with the system and the deliverables/wanted output
- The tasks and responsibilities of the countries and WHO

- The capacity of the countries and WHO to execute these tasks

SUMMARY OF THE DISCUSSIONS

On the system structure

The primary purpose of the system is a comprehensive EH monitoring to support policies and actions for mitigating the health risks. The output of the system should enable for continuous or periodic measurement of the effects of an intervention or the oversight of activities. The EHIS output should also allow the decision-makers to focus on specific action areas covering health protection and intersectoral policies. Therefore indicator-based reporting should have a clear, simple format of presentation, and could be considered as a digest of evidence-based trends in the health status and the environment.

Discussion was focused on what are the data needs: raw, aggregated, and standardised at different administrative-territorial levels. The primary aim of the data collection, analysis, interpretation and reporting is to have on local, regional and national level information that can serve as a basis for decision-making on the relevant levels. Furthermore it is of great importance to ensure internationally comparable indicators and compatibility of the underlying databases. The question to what extent the participating countries can fulfil these requirements can be answered only on the basis of the results of the feasibility study.

Other important issues in relation to the EH information system were discussed. A question was raised whether the national coordinating centre should collect individual or aggregated data. The environment and health relationships are complex and dynamic: sometimes information that needs to be reported on local scale cannot be aggregated across the different territorial levels without distorting these relationships. It was suggested to collect data on that level which allows the calculation of stratified indicators. It was also agreed that for the WHO analyses it is important to have indicators and their "categories" reported at national and also sub-national level.

During the plenary session the need for a harmonised format and structure of the databases, and a common method for data exchange between national and international databases was stressed. Modern information technologies provide accessibility of international and also national and sub-national databases through networks. The role of the WHO in revising and maintaining the international database was discussed.

On the design of the protocol and the instruments for the feasibility study

Three working groups were set up to elaborate the protocol and the questionnaires for the feasibility study, i.e.:
Group I was assigned to elaborate the feasibility study questionnaire on environmental indicators.

Group II was assigned to elaborate the feasibility study questionnaire on health indicators.

Group III worked out the protocol for the implementation of the feasibility study based on the experience of three countries (Bulgaria, Latvia and Romania).

The first two groups outlined the questionnaires to be used for the feasibility study.

The problem of quality of the data was discussed in detail. The set of core indicators has been accepted in earlier stages of the project (WHO Consultation, May 2000). The feasibility tools should contain the relevant questions in order to assess the quality of the data sets, their reliability, their spatial resolution/ degrees of aggregation and also the geographical coverage. It was agreed that participating countries should make the evaluation of the existing databases on environment and health as critically as possible in order to produce correct information and conveying the right message to policy-makers later on. The results of the feasibility study will indicate which data items are available in the majority of the countries. Based on these results, the revised set of indicators from pilot study could be accepted for a wide-scale implementation.

On the follow-up actions for the pilot implementation

The protocol for the process of implementation was discussed in the plenary and the deadline of the submission of feasibility questionnaire was set to the end of March 2001. Before launching the feasibility study the responsibilities and tasks of the participating authorities and institutions should be clearly stated.

The Ministers of Health of the participating countries should support the project according to the mandate given by the 3rd Ministerial Conference in London, 1999 and the Aarhus Convention. The data suppliers should be sent a letter describing the scope of the project and the need for collaborations, besides these meetings are necessary to discuss the ways of collaboration.

Further the resources of the feasibility study and data collection computation of indicators and reporting were discussed. It was stated that 5 countries (Czech Republic, Estonia, Lithuania, Poland and Slovakia) can fulfil the programme within the framework of the DEPA-WHO project. Bulgaria, Hungary, Romania, Finland, Russia, The Netherlands, Armenia and Switzerland have volunteered to participate in feasibility project; Spain and Latvia are considering their participation. Under the terms of the London Declaration, individual countries committed themselves to supporting EH monitoring. Furthermore, governments are encouraged to include in their information policies promoting of a comprehensive, easily accessible network of databases, involving as appropriate representatives of major providers and users of environment and health information. Coordination functions of WHO should be assured: it was noted that the resources to support these functions in the long-term are currently not available. The meeting concluded that the EH indicators and the databases should be used, at national and international level, for the evaluation of the environmental health situation at the 4th Ministerial Conference being held in Budapest, 2004.

CONCLUSIONS AND RECOMMENDATIONS

1. This project follows decisions of the 3rd Ministerial Conference of London 1999 and of the Aarhus convention. The cooperation of the different data producing institutions is essential for its successful implementation.

2. The WHO-ECEH, Bilthoven Division should approach the Ministers of Health of the participating countries asking them to support the project at a national level. The Ministers should authorize National Coordinators to collect data in collaboration with different institutions and data suppliers, and make available sufficient resources to fulfil their obligations taken at the London Conference.

3. In addition, the resources for the long-term coordinating role by WHO should be assured. National governments should also be urged to provide substantive support for the WHO coordination of this project.

4. The feasibility study should be carried out within next 6 months according to the time schedule in Table 1. The electronic questionnaires for this study will be elaborated by the WHO based on the questions proposed by this meeting.

5. Following the feasibility study WHO in collaboration with the study participants, will evaluate country reports and develop the detailed action plans for the pilot implementation. In particular, the decisions on the following issues should be taken at that stage:
   a. Final core set of indicators to be included in the pilot study
   b. Database structure on national and sub-national levels
   c. Methods of data exchange
   d. Data management and the respective roles of programme partners
   e. Methods of analysis, including potential for calculation and interpretation of attributable risks and burden of disease
   f. Outline of the report from the programme

6. After the pilot phase, the above listed issues will need to be reviewed and revised as necessary. The revised system will then be considered for implementation throughout the WHO-European region.

7. The EH indicators and the database should be used, at national and international level, for the evaluation of the environmental health situation at the 4th ministerial conference being held in Budapest, 2004.

TABLE 1. Protocol for the process of implementation of feasibility study

	ACTIVITY	*DURATION (WEEKS)*	ENDS IN WEEK N.
1	A letter from WHO telling about the mandate from the London conference and about the pilot study (to the Minister of Health).	*1*	1
2	Formation of a Steering committee for the pilot project: ♦ Leading official from the Ministry of Health (Welfare) responsible for public health or environmental health ♦ Head of the National PH or EH institution implementing the study ♦ WHO pilot study coordinator	*2*	3
3	Establishment of a team of specialists. Number of people should be enough to cover the indicators on all environmental health issues.	*1*	4
4	Translation of the specification of data needed	*2*	5
5	Translation into local language of: ♦ Indicators (optional – depends on money) ♦ Questionnaire Can be done through contracting a special person or ask the members of the group to perform the task (some extra money necessary)	*2*	5
6	Identification of data holders	*2*	6
7	Establishment of contact with the heads of data holder institutions ♦ Informing about the project ♦ Asking for collaboration ♦ Nominate the contact person	*3*	9
8	Meeting with the nominated representatives of data holders, presenting the translated ♦ Indicators ♦ Data needed ♦ Tools ♦ Distribute tasks / questionnaires among data holders	*2*	11
9	Questionnaires filled-in by the data holders	*3*	14
10	The team of specialists analyses the data (questionnaire) received and clarifies the questionnaire, if needed (preferably by a direct interview)	*2*	16
11	Compiling of data according to agreed report	*4*	20
	Submitting country report to WHO	*1*	20
12	Analysis by WHO	*4*	24
	Communication with the countries, evaluation meeting	*4*	28

QUESTIONS TO BE INCLUDED IN FEASIBILITY STUDY

1A   HEALTH INFORMATION SYSTEMS

Indicator: [ENTER WHO DEFINITION]
         National / relevance to the WHO required

NUMERATOR DATA
Part 1. Data-holder and reporting practices

1. Organization responsible for data collection / recording
2. Name of the organization responsible for data processing, data base management
3. Availability of data as individual-based records or in aggregated format
4. Data aggregation/ transformations – what is the lowest level of aggregation?
5. Method of data collection (full registry (complete geographical coverage?), sample, sentinel)
6. Starting date of data collection. Is the time-series complete?
7. What summary statistics are already published

Part 2. Data availability, quality and reliability

1. Do you use standardized forms and procedures for data collection across the whole country?
2. How complete are the data? (>95 %, >90%, >80 %, ≤80 %)
3. Do you think there are problems with data reliability? If yes, please specify.
4. ICD Coding; if exists; revision in use (9 or 10, when the change was made?)
5. Quality control for the diagnoses, coding (incl. local / central) and data entry
6. Registration by place of residence or place of event
7. Regularity of update
8. Are the data stored individually?
9. If no individual data – can the data be stratified by the following variables:
    - gender
    - age-group (+ <1, 1-4, 5-14, …, 85+);
    - geographical area (specify the lowest level)
    - time period (specify the shortest period)
10. Has there been any change in the method of data collection or coding which might lead to discontinuities in a time series? If so, give details, please.

Part 3. Accessibility and mechanisms of data transfer (for the purpose of EH Indic. System)

1. Legal restrictions on the data access
2. Costs of the data access
3. Existence of framework for data access/ exchange
4. Are data available to us for past years, and if so for how long?
5. Access through electronic networks

Part 4. Policy framework of data system

1. Will these data be produced in the future?
2. Is the recording of these data a statutory requirement?

Part 5. Miscellaneous

1. Are there problems with the data collection that have not been covered above?
2. <u>If the data do not meet the minimum requirements</u> for the indicator calculation now, can they be improved in the future?
3. <u>Where there are no current data:</u> Can the needed data be added to an existing data collection system (e.g. supplementary question in a national survey)? If yes:
   - Please give details, including
           i. Which survey or data collection system
          ii. Which agency has responsibility for designing and carrying out this survey
   - Will additional funding be needed?
   - Is there a possibility that funding can be obtained from:
     a. Government
     b. Other sources
4. Do you currently report a similar indicator to the one defined above? If yes, please describe.

DENOMINATOR DATA
Part 6. Description of denominator source and data quality
1. Source (e.g. population census, sentinel practice register,…)
2. How complete are the data? (>95%, >90%, >80%, ≤80%)
3. Do you think there are problems with data reliability? If yes, please specify.
4. Is there quality control for coding and data entry? If yes, please specify.
5. Can the data be stratified by:
   - gender
   - age-groups (<1,1-4,5-14,15-24,…65-74,75-84,85+)
   - geographical area (specify lowest level)
6. At what time interval are these data collected/up-dated?
   If not collected annually, are annual interpolations calculated?

Part 7. Any other comments…

1B   ENVIRONMENTAL INDICATOR INFORMATION

Part 1:
Name of supposed data holder: *Filled by the coordinator*

Indicator name and reference: *Filled by the coordinator*
Indicator definition:
Specification of data: *Filled by the coordinator*
        Data categories e.g. different pollutants included in one and the same indicator (if applicable): *List compiled by the coordinator. Respondent fills checkboxes for category: Yes/No*

        If no appropriate data available:
        Are there alternative data for replacement? (Give the alternative definition)
        Will it be possible to establish or improve data processing in future?
        List.

DATA
Part 2. Data availability, quality and reliability
1.   Sources of collected data/collecting institution.
2.   Is standardized method used throughout the country?
3.   Spatial coverage and spatial resolution
List of administrative units filled by coordinator and checked by respondent.
4. Starting year of available data collection and updating frequency.
List of time intervals filled by coordinator and checked by respondent
5.   Stratifying/ descriptive categorical variables

Part 3. Accessibility and mechanisms of data transfer
1.   Legal restrictions on the data access; if there are, who is entitled to access data.
2.   Other restrictions: only agencies, research institutions.
3.   Costs of the data access
4.   Access through electronic networks

Part 4. Regulatory framework and policy relevance
1.   Is there a legal act requiring data collection? Which?
2.   Will these data be produced in future?

Part 5. Miscellaneous
1.   Main problems with the data collection

1C   ACTION INDICATORS

Indicator reference …

Data specification

1. Data category / action / regulation (= index component)

2. Information holder:

INTERNATIONAL TREATIES			
Treaty description + CODE [Feasibility study]	Contact name & address [Feasibility study]	Date signed	Date ratified
E.g. Convention on long-range trans-boundary air poll. 1979 *Air_A1[1]*		12.79	3.80

OTHER REGULATIONS & LAWS			
Index component + CODE [Feasibility study]	Contact name & address [Feasibility study]	Brief description of law/ regulation	Date became effective
E.g. Formal planning required for new housing. Hous_A1[1]		*Statutory building regulation, 1964*	03.64

To be added and filled in the pilot phase:

Description of the component
Date adopted / action implementation
Level of implementation
Score

1D. LIST OF THE MAIN DATA ITEMS FOR THE FEASIBILITY EVALUATION

AIR
1. National total and sectoral emissions for SO_2, (primary) PM_{10}, NO_X. For evaluating emissions of secondary PM_{10} and ozone precursor additionally national total and sectoral emissions for CH_4, CO, VOC and NH_3 are needed
2. Distribution of mean 24-hour concentration of SO_2, PM_{10}, TSP Black smoke,
3. Distribution of maximum daily 8-h moving average for O_3.
4. Distribution of mean annual for NO_2 and PM_{10}, measured over the calendar year.
5. Site location, site type (street, urban background), monitoring method (e.g. passive sampler, continuous monitor) and sampling frequency.

WATER
1. Number of analyses of bathing water with presence of faecal coliforms and/ or faecal streptococci
2. Number of analyses of drinking water with presence of E. coli and/ or faecal streptococci
3. Number of analyses of drinking water with organic and inorganic parameters exceeding WHO drinking water guidelines
4. Mean values of the measured organic and inorganic parameters

5. Number of valid bathing water analyses per designated point of a bathing site per season
6. Number of valid drinking water microbiological analyses for a specified point of the supply chain per year
7. Number of valid drinking water chemical analyses for a specified point of the supply chain per year
8. Type of supply (public, individual), type of source (ground, surface water), category according to the number of supplied customers

FOOD
1. Number of monitored combinations of chemical food contaminants and food (GEMS/Food core list)
2. Number of samples analysed
3. Number of samples analysed exceeding Codex Alimentarius limits
4. Mean concentrations of the monitored chemical contaminant in the respective food product

MORTALITY
1. 1-12 months of age respiratory diseases
2. All age respiratory diseases.
3. All age cardiovascular diseases
4. All age road traffic accidents
5. Under 5 year domestic accidents and poisoning (4-digit coding necessary!)
6. Under 5 years diarrhoea ICD10 A00, A02, A03, A04+A08+A09
7. All deaths by age and occupation
8. Death from acute chemical incidents
9. Fatality cases due to work-related injury

MORBIDITY
1. Skin cancer incidence (registry!)
2. Incidence of occupational diseases (registry!)
3. Episodes of diarrhoea under 5 years of age (survey; surveillance system???)
4. Incidence of food-borne diseases
5. Number of outbreaks of food-borne diseases (notification system!)

6. Number of outbreaks of water-borne diseases
7. Number injured in traffic accidents
8. Cases of occupational injury
9. Number of first aid treatment in workplace
10. Sickness abseenteism

OTHER HEALTH
1. Annoyance by type of source (survey)
2. Sleep disturbance by type of source (survey)
3. Number of children under 5 with blood lead level > 10 ug/dl (survey)

HOUSING
1. Habitable floor area
2. Number of people living in substandard housing
3. Number of households connected to a sewerage treatment
4. Number of people living in household with "WHO-compliance" drinking water quality (census, waterworks??)
5. Number of people with access to adequate supply of safe drinking water (census, survey?)
6. Number of people living in households supplied from a public water supply (census)
7. Number of people living in households supplied from a reliable (continuous) water supply
8. Number of people with access to adequate excreta disposal facilities
9. Number of households covered by regular municipal solid waste collection service

TRANSPORT STATISTICS
1. Total number of vehicles per transport type per year
2. Total amount of kilometres driven per transport type per year
3. Amount of total sales of fossil fuel by type in a country
4. Volume of unleaded gasoline sold in a country (city)
5. Total volume of gasoline sold in a country (city)

HAZARDOUS WASTE, CONTAMINATED LANDS, CHEMICAL SITES
1. Amount of hazardous waste per year according to Basel convention
2. Area of contaminated lands
3. Number of sites containing large amounts of chemicals according EU Seveso II

DENOMINATOR
1. Total population (at the mid-point of the year)
2. Total population in the census
3. Total population by age-group
4. Total number of children less than 5 years age
5. Total number of live births in year
6. Number of people living in area with air pollutant concentration exceedance**
7. Total population in noise effects surveys!!
8. Total number of children under 5 age in blood lead level survey
9. Total number of children under 5 age in diarrhoea survey
10. Total number of households
11. Total number of employed
12. Population by age group and occupation

ANNEX 1   WORKING GROUP MEMBERS

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