WORLD HEALTH ORGANIZATION
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Outbreaks of waterborne diseases

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Number of outbreaks of waterborne diseases attributable to drinking-water and bathing water each year.

This summary is based on data describing outbreaks of waterborne diseases related to drinking- and bathing water. An outbreak of waterborne disease is generally defined as a situation in which at least two people experience a similar illness after exposure to water and the evidence suggests a probable water source.

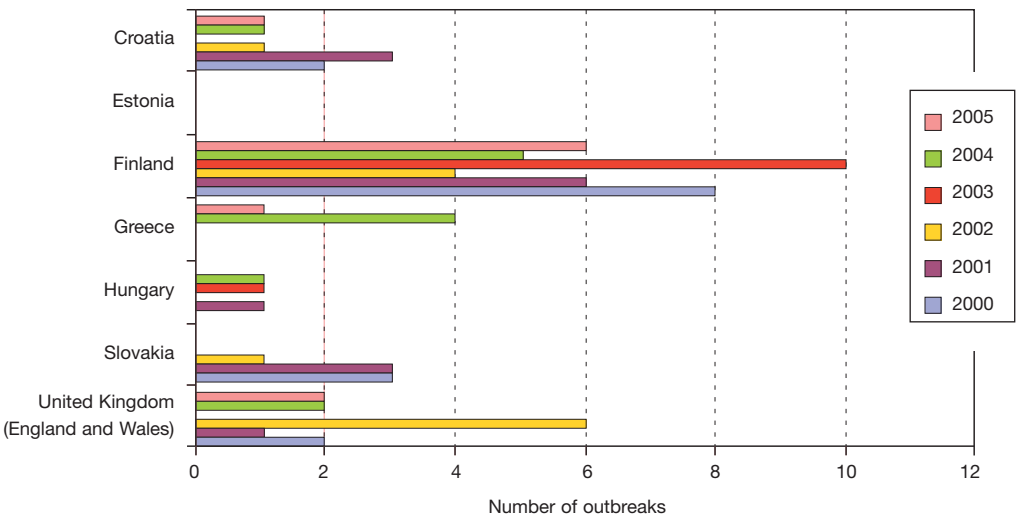
KEY MESSAGE

The indicator shows that in seven European countries surveyed there were 75 outbreaks of waterborne diseases related to drinking-water resulting in over 12 000 episodes of illness between 2000 and 2005. The data must be interpreted cautiously, as differences between countries are likely to reflect the efficiency of surveillance systems rather differences in outbreaks, and data were only available for a few countries. This underlines the need for more widespread and effective surveillance systems. Additionally, as the provision of adequate water and sanitation is associated with outbreaks of disease, the successful efforts to improve coverage in recent years must be continued.

RATIONALE

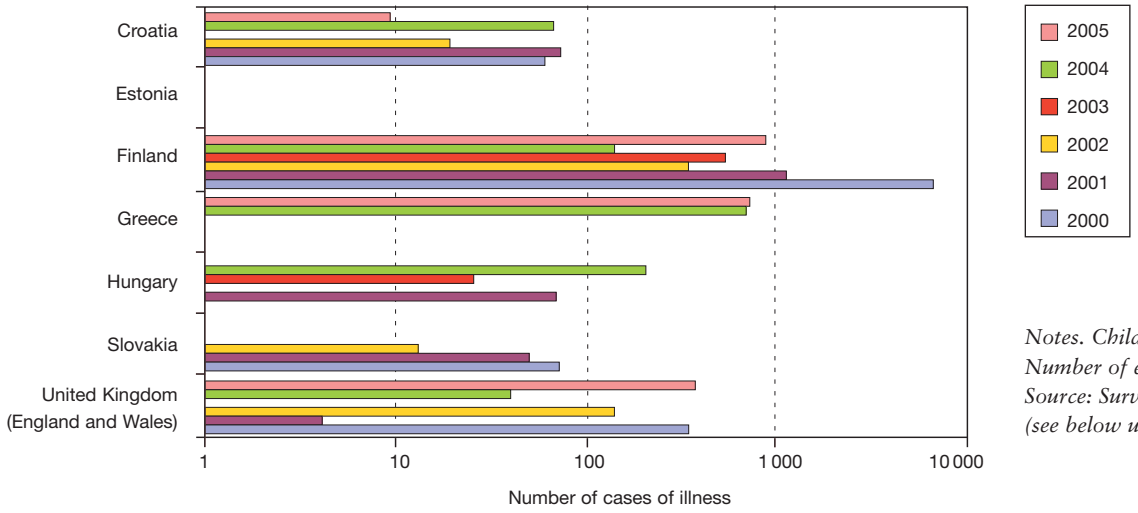
Safe drinking- and bathing water is vital for the health of the population, particularly children. The number of outbreaks of waterborne diseases provides an indication of the quality of the drinking- or bathing water.

Fig. 1. Number of reported outbreaks of diseases arising from drinking-water in selected European countries, 2000–2005



Source: Surveys of various national agencies (see below under Data underlying the indicator).

Fig. 2. Number of reported episodes of illness attributable to diseases carried in drinking-water in selected countries, 2000–2005



Notes. Child-specific data are not available. Number of episodes shown on a log-scale. Source: Surveys of various national agencies (see below under Data underlying the indicator).

PRESENTATION OF DATA

Figure 1 shows the number of outbreaks of diseases arising from drinking-water reported in Croatia, Estonia, Finland, Greece, Hungary, Slovakia and the United Kingdom (England and Wales) from 2000 to 2005. Outbreaks were seen in all reporting nations except Estonia.

Figure 2 shows the number of illness episodes attributable to outbreaks of disease carried in drinking-water reported in the same countries over the same period. The data reflect cases in whole populations as child-specific data are not available.

HEALTH – ENVIRONMENT CONTEXT

Waterborne diseases arise from the contamination of water either by pathogenic viruses, bacteria or protozoa, or by chemical substances. These agents are directly transmitted to people when the water is used for drinking, preparing food, recreation or other domestic purposes. An outbreak of waterborne disease is usually defined as an event meeting two criteria: (i) at least two people have experienced similar illness after exposure to water, and (ii) epidemiological evidence implicates water as the probable source of the illness. The occurrence of outbreaks of waterborne diseases is not limited to developing countries: affluent nations are also affected *(1)*.

Drinking-water

The risk of outbreaks of waterborne diseases increases where standards of water, sanitation and personal hygiene are low. Globally, the proportion of people with access to safe drinking-water and basic sanitation rose from 78% in 1990 to 83% in 2004. Despite this progress, an estimated 425 million children aged under 18 years still have no access to an improved water supply. In 2004 it was estimated that diarrhoea due to unsafe water and the lack of basic sanitation contribute to the death of 1.5 million children aged under five years each year *(2)*. In the European Region the burden of diarrhoeal disease attributable to poor water, sanitation and hygiene in children aged 0–14 years is estimated at more than 13 500 (5.3% of all deaths) and 31.5 disability-adjusted life-years per 10 000 children The burden of disease attributable to poor quality water, sanitation and hygiene is estimated to be 5.3% of all deaths in children aged 0–14 years in the Region *(3)*.

Contaminated drinking-water is a frequent cause of diseases including cholera, typhoid, viral hepatitis A and dysentery. Water may be contaminated with naturally occurring inorganic elements such as arsenic, radon or fluoride. Human activities may also cause water contamination through agents such as lead, nitrates and pesticides *(4)*.

Bathing water

In addition to the potential risks posed by poor quality drinking-water, contaminated bathing water can cause serious and potentially fatal diseases. These include severe diseases such as typhoid and leptospirosis as well as a number of minor infections. Health risks are highest among people with impaired immune systems or among specific risk-groups, such as tourists who do not have immunity against local endemic diseases *(5)*. At present, the general quality of bathing water in Europe, as measured by the presence of faecal indicators and pathogens in bathing waters *(6,7)*, poses limited health risks. The quality has improved since the 1990s: in 2003, 97% of the monitored coastal bathing waters and 92% of inland bathing waters complied with the mandatory standards. However, high compliance with mandatory standards (for example, occurrence of indicator bacteria) does not necessarily mean there are no factors which could potentially affect public health *(8–10)*.

POLICY RELEVANCE AND CONTEXT

The WHO-United Nations Economic Commission for Europe (UNECE) Protocol on Water and Health *(11)* includes legally binding targets covering the prevention of waterborne diseases. In addition to general targets concerning access to safe drinking-water and provision of sanitation, common requirements for surveillance systems and contingency plans for detection and prevention of waterborne outbreaks are specified.

WHO has developed the concept of water safety planning. This is a new approach to ensure safe drinking-water through enhanced risk assessment and management systems for the production and distribution of drinking-water. The three major components are system

assessment, monitoring and management and communications *(4,12)*. Water safety planning is at an early stage in Europe.

In 2004, the Fourth Ministerial Conference on Environment and Health adopted the Children's Health and Environment Action Plan for Europe (CEHAPE), which includes four regional priority goals to reduce the burden of environment-related diseases in children. One of the goals (RPG I) aims at preventing and significantly reducing morbidity and mortality arising from gastrointestinal disorders and other health effects, by ensuring that adequate measures are taken to improve access to safe and affordable water and adequate sanitation for all children *(13)*.

In the European Union (EU), the Drinking-water Directive (98/83/EC) presents parametric and indicator values for water intended for human consumption and how the quality should be controlled to obtain safe drinking-water *(14)*. The Directive requires that all possible action should be taken in cases of contamination to prevent any negative health impact.

The European Water Framework Directive *(15)* represents a single system for all water management replacing seven earlier directives. The main goal is to achieve a good status for all waters by 2015 in Europe. The key objectives are the general protection of aquatic ecology, the specific protection of unique and valuable habitats, the protection of drinking-water resources, and the protection of bathing water *(15)*.

Bathing water

The Council Directive on the Quality of Bathing Waters (76/160/EEC) included mandatory and guidelines values for bathing water quality and instructions for reporting the results to the EU *(16)*. According to the Directive, a reduction in the pollution of bathing waters is necessary to protect both the environment and public health. A new bathing water directive 2006/7/EC entered into force in March 2006, containing instructions on improving the management of bathing sites by, for example, using bathing water profiling, emergency planning and better information for the public *(17)*.

ASSESSMENT

This indicator assesses the number of reported outbreaks of waterborne diseases in a country. The data must be interpreted cautiously: the reported numbers may underestimate the real situation, and variations between countries are partially due to differences in surveillance systems. The chain of events leading to the detection of outbreaks is complex: an affected person must have symptoms and seek medical care, the surveillance agency must be notified, the number of cases must be noted as unusually high for a given time and place, and an effective outbreak investigation must be carried out. Owing to such complexity, the effectiveness of surveillance systems varies greatly. As an example, a high number of reported outbreaks may paradoxically be seen in countries with high quality drinking-water and an efficient surveillance system.

Drinking-water

The comparative assessment in this indicator was made using the data on outbreaks of disease caused by drinking-water gathered from a CEHAPE questionnaire completed by Croatia, Estonia, Finland, Greece, Hungary, Slovakia and the United Kingdom (England and Wales). All the participating countries had a routine surveillance system for waterborne outbreaks, based on a legal framework. Child-specific data were not available. In the seven participating countries, there were 75 outbreaks during 2000–2005, resulting in 12 348 episodes of illness (Figs 1,2). The most common causative agents were bacterial (Campylobacters, Shigella Sonnei, Aeromonas species) and were responsible for 45 (60%) of the outbreaks and 34.8% of the cases of illness cases. Viral agents were implicated in 20 outbreaks (27%) and 60.6% of cases of illness. Four outbreaks were caused by protozoa (3.7% of cases of illness), two by chemical contamination (0.1% of cases of illness), and in four cases an unknown microbial agent was implicated (0.8% of the cases of illness). There are no trends either between or within countries evident in the data.

Bathing water

For bathing water, the indicator showed that associated outbreaks were infrequent (from zero to seven annual outbreaks) *(18)*. This may be partially due to the known improvements in EU bathing water quality (see under Health and Environment Context above) as well as to the relative lack of routine surveillance systems for bathing water outbreaks.

While the numbers of outbreaks reported varied greatly between the countries, they might not reflect the true situation (for reasons outlined above). It must also be noted that this indicator is only available for few a countries and provides a very limited picture of the situation in the Region.

In general, there is a need for widespread and effective monitoring and reporting systems for outbreaks of waterborne diseases to give a better idea of the true magnitude of such outbreaks and their impact on health in the Region.

DATA UNDERLYING THE INDICATOR

Data source

The data are based on a questionnaire *(18)* concerning outbreaks of waterborne diseases in Europe and surveillance systems for such outbreaks. The questionnaire covered items such as the legal framework for outbreak monitoring, the number of outbreaks and cases of illness, age groups and causative agents. It was completed by the following organizations: National Institute of Public Health, Croatia; Health Protection Inspectorate, Estonia; Health Protection Agency, United Kingdom; National School of Public Health, Greece; National Public Health Institute, Finland; Public Health Authority, Slovakia; National Centre for Epidemiology and National Institute of Environmental Health, Hungary.

Description of data

Data were mainly obtained from national surveys. In most countries the information concerning outbreaks of waterborne diseases is included in the general infectious diseases monitoring system. Finland applies a separate monitoring system for outbreaks of diseases attributable to drinking-water. Croatia, Estonia, Hungary, Slovakia and the United Kingdom (England and Wales) have monitoring and reporting systems for bathing water outbreaks. Only Croatia was able to produce statistics concerning cases of illness among young people aged under 18 years.

Geographical coverage

Croatia, Estonia, Finland, Greece, Hungary, Slovakia and the United Kingdom (England and Wales).

Period of coverage

In all the countries except Greece (2004–2005) the data cover the whole period 2000–2005.

Frequency of update

All the countries confirmed that routine reporting/monitoring systems were used. It must therefore be assumed that all the countries have continuous monitoring systems that include a periodic/annual national reporting system for such outbreaks.

Data quality

Reporting systems vary. Croatia, Finland and Greece use a compulsory reporting system for outbreaks of waterborne disease. Other countries use national surveys that may include information collected using both compulsory and voluntary reporting systems.

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