



Incidence of childhood leukaemia

FACT SHEET NO. 4.1 · MAY 2007 · CODE: RPG4_Rad_E1

Standardized incidence rate of leukaemia as defined by ICD-10 codes C90-95 in children aged 0 to 14 years

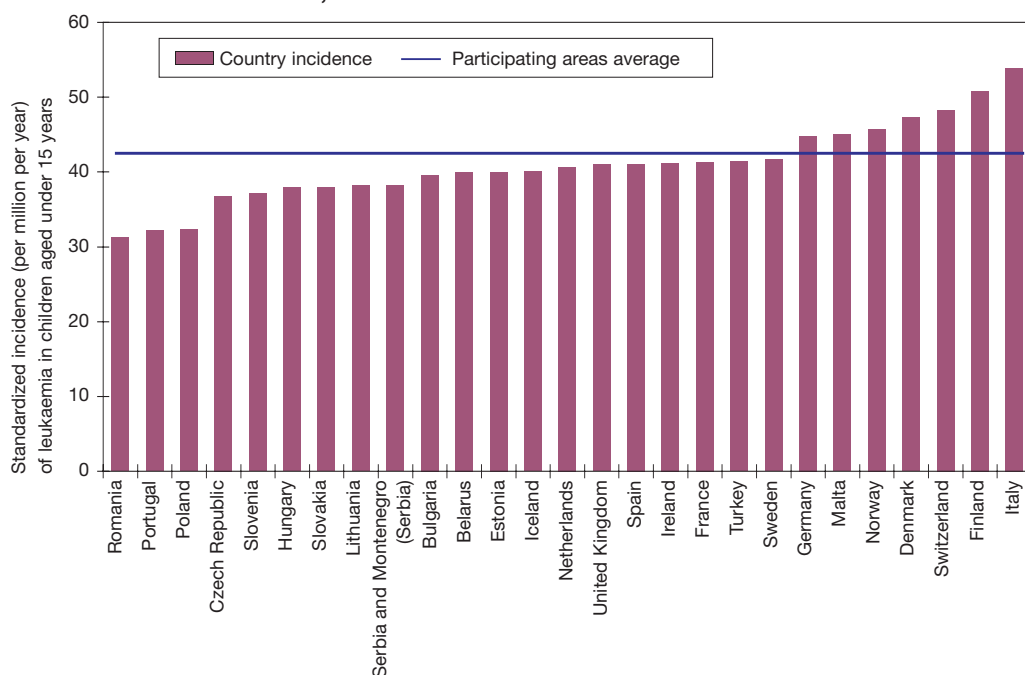
KEY MESSAGE

☹ Leukaemia is the most common childhood malignancy. It accounts for 30% of all cancers diagnosed in children aged under 15 years. In the 1990s the average incidence rate in Europe for this age group was 42 cases per million per year, with a slightly lower level in eastern European countries than western. European population-based registries of leukaemia diagnosed between 1970 and 1999 show an average increase in the incidence of leukaemia during this period of 0.7% per year. Effective preventive measures require knowledge about aetiology and cover the early development stages (in utero). There is a need for focused research to unravel the causes of childhood leukaemia.

RATIONALE

Virtually all childhood cancers have unknown causes. Specific potential environmental causative agents such as nonionizing radiation, radon gas, ionizing radiations and environmental chemicals make only a small contribution to childhood leukaemia. However, given the public concern about the impact of the environment on childhood leukaemia, the real potential for clustering, the possibility of other environmental risks and our incomplete understanding of how environmental agents react with living tissue, the surveillance of childhood leukaemia is important.

Fig. 1. Standardized estimates of leukaemia in children aged under 15 years, selected countries, 1970–1999



Note. Incidence was standardized using the world population. Serbia and Montenegro became two separate Member States of WHO in September 2006. The data in Fig. 1 relate to before that date and to the then entity of Serbia and Montenegro (Serbia). For some countries national estimates are based on regional registries (France, Poland, Romania, Turkey, Italy, Portugal, Spain, Switzerland).

Source: ACCIS (1).

PRESENTATION OF DATA

Figure 1 shows standardized (on world population) incidence of leukaemia in children aged under 15 years for those European countries that participated in the Automated Childhood Cancer Information System (ACCIS) (1). The standardized average incidence in participating countries for 1970–1999 was 42 cases per million per year, ranging from 30 cases per million per year in Romania to 50 cases per million per year in Italy.

HEALTH – ENVIRONMENT CONTEXT

In the majority of cases of childhood leukaemia the causes are unknown. While a number of causes and highly suspected risk factors have been identified, reviews stress that these are responsible for only a very small number of cases. The known and highly suspected causes include genetic factors (2–3% of cases are associated with Down syndrome), exposure to Epstein-Barr virus (for certain types of childhood Hodgkin lymphoma), exposure to ionizing radiation in utero and after birth and a number of drug treatments (for example, chlorambucil and chloramphenicol at birth) (3,4). Infectious diseases are likely to have a role in the aetiology of childhood leukaemia, especially acute lymphoblastic leukaemia (ALL) (4–7). Delayed exposure to infection during early infancy could result in an abnormal response, leading to development of leukaemia. Leukaemia could also be a rare response to a specific although unidentified infectious agent.

Other risk factors, including environmental factors, have been less clearly identified. The International Agency for Research on Cancer has concluded that extremely low frequency (ELF) magnetic fields are possibly carcinogenic to humans, based on consistent statistical associations of high-level residential magnetic fields with a doubling of risk of childhood leukaemia (3,8). Several studies suggest that children exposed to certain hazardous chemicals (benzene, hazardous air pollutants) have an increased risk of childhood leukaemia, with benzene being the suspected causal agent (4,9). A number of papers have shown statistical associations between the risk of childhood leukaemia and exposure to household insecticides used on plants and lawns and in head lice shampoos (10,11).

There are different types of leukaemia with varying geographical distribution patterns. In children aged 0–14 years, approximately 75% of leukaemia is classified as ALL; in developed countries this includes 70% of the pre-B-cell type that accounts for the peaks in early stages of life and explains the difference observed in the standardized global incidence of leukaemia between countries. Indeed, ALL shows an incidence of up to 40 cases per million in western countries among white populations, up to 20–30 cases per million among eastern European countries, but fewer than 15–20 per million in sub-Saharan countries. The second most frequent type of leukaemia in childhood is acute myeloid leukaemia (AML), which accounts for 20% of all cases of leukaemia and shows a remarkably stable worldwide incidence of 4–10 cases per million (2,5).

The Committee on the Medical Aspects of Radiation in the Environment (COMARE) has reported that the rates of many childhood cancers, including those of leukaemia, are slightly higher in areas with high socioeconomic status compared to more deprived areas (7). The reason for this is not known.

POLICY RELEVANCE AND CONTEXT

Leukaemia is often discussed when environmental issues and childhood diseases are considered. The causes of the majority of cases are, however, unknown. As a result, there is a lack both of policies aiming directly at reducing the incidence of leukaemia and of big programmes fostering research into the potential risk factors for leukaemia in Europe.

The new Regulation of the European Parliament and the Council concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) is of relevance (12). It considers that the carcinogenicity, mutagenicity and reproductive toxicity of chemical industrial substances are priority criteria when they are submitted to security constraints and declarations authorizing their use. The target of REACH is to substitute progressively substances that are known to be safer for most carcinogenic, mutagenic and toxic industrial substances. Of further relevance is Council Directive 97/43/EURATOM (12), which aims to protect patients from excessive exposure to radiation for medical use and ensure that there is minimum exposure during pregnancy and early childhood.

ASSESSMENT

The indicator uses data from the ACCIS project (1) which compiled and analysed data from 63 European cancer registries between 1970 and 1999. Data for children aged 14 years or under were included in the indicator. During the study period there was an average annual increase in the incidence of childhood leukaemia of 0.7% (2,5). East-west differences were evident, with an average of 39.3 cases per million person-years in eastern European countries and 45.7 per million person-years in western European countries during the study period.

A number of ecological studies show a positive correlation between ALL, which accounts for 70% of all leukaemia in children under 15 years of age, and increasing socioeconomic status. This correlation may be relevant to the discrepancy observed in the ACCIS results between eastern and western countries.

As causal factors of leukaemia are not clear, policies to reduce incidence are difficult to formulate or have limited impact. For example, policies to reduce exposure to ionizing or electromagnetic radiation potentially prevent only a small proportion of leukaemia cases. Thus it is necessary to undertake further coordinated research into environmental influences on leukaemia and environmental/genetic interactions. It is particularly important to monitor childhood leukaemia. National registers with continual follow-up that employ standardized or comparable methods should be universal. In addition, the methods used in cluster analysis need to be further developed.

Curing leukaemia is also of great importance. Most childhood leukaemia can be successfully treated, and by mid-1990s the five-year survival rate had reached 82% for ALL and 53% for AML (5). Further collaborative research and exchange of knowledge about therapies between European countries could enhance the percentage of survivors among children diagnosed with leukaemia. From the public health point of view, mortality from leukaemia is an important co-indicator to assess the quality of the health care system.

DATA UNDERLYING THE INDICATOR

Data source

The main data source used is the ACCIS project, supported by the European Commission, with the objective of collecting, presenting, interpreting and disseminating data on child-

hood cancer in Europe. The ACCIS database contains 160 000 records of childhood and adolescent cancer cases registered over the last 30 years in 78 European population-based cancer registries.

Description of data

The methodology sheet proposed incidences of number of cases per 100 000 person-years in children and young people aged 0–19 years. In this fact sheet the incidence is given in number of cases per million-person years in children aged 0–14 years. This shorter period has been given since it allows more countries to be included in the comparison.

Method of calculating the indicator

National estimates of incidence rates standardized to world standard population aged 0–14 years: number of new cases per 100 000 person-years.

Geographical coverage

63 European population-based registries in 27 European countries.

Period of coverage

Between 1970 and 1999, depending on the registry.

Frequency of update

Every five years.

Data quality

Data sources differ according to their geographical and time coverage, which has to be borne in mind when comparisons are made. The datasets submitted are verified using automatic check procedures. The tumours are classified according to the International Classification of Childhood Cancer (14). The ACCIS Scientific Committee evaluates the comparability of the individual datasets presented in a set of standard tables and comments on differences in data collection and processing.

There are currently no data available after 1999 for international comparisons. Most European registries have data available from the beginning of the 1980s. Data sampling is annual.

From the public health point of view, mortality from leukaemia is an important co-indicator in assessing the quality of health care. Comparable methods of collection, classification, description and registration of information are important to allow comparisons between the incidence of and mortality from leukaemia. Complete national data registries for leukaemia in children and young people aged 0 to 19 years are of crucial importance. More recent data are essential to assess the problem of leukaemia.

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