eurocat
eurpean surveillance of congenital anomalies

Interpretation of Prevalence Rates

(For definition of "Prevalence at Birth" and "Total Prevalence" see Calculation of Prevalence Rates).

EUROCAT Registries follow a number of principles of organisation and registration (see Surveillance Strategy) to optimise the accuracy of estimation of prevalence rates and achieve standardisation across regions. Many factors potentially affect the accuracy of estimation of prevalence rates at birth and total prevalence rates. Data from the most recent year at the website is provisional as there is likely to be under-reporting as late diagnoses may not be included.

Definition of the Population

All full member registries of EUROCAT are population-based. The definition of the population covered by each registry is given under EUROCAT Population and Member Registries.

Registries can be "population-based" or "hospital-based". "Population-based" means that they cover residents of a defined geographical area. "Hospital-based" means that they cover births in selected hospitals. Where a registry is hospital-based, it is possible that there has been some selection of high-risk pregnancies towards or away from the selected hospitals, and thus estimated prevalence rates may be biased upwards or downwards. If a registry is population-based, it must ensure coverage of residents who deliver outside the geographic boundaries, who may also be at higher or lower risk than the rest of the population. In practice, there are also some variants of the above definitions based on knowledge of how information can be gathered and where mothers go to deliver. Assessing the potential for bias requires detailed knowledge of the local situation.

Definition and Classification of congenital anomalies and Diagnostic Practice

Epidemiological data are derived from diagnoses made by clinicians working within given health service conditions. A registry is rarely in a position to impose a standard definition or diagnostic practice, though it may facilitate the adoption of standards. EUROCAT include cases with major congenital anomalies. Minor anomalies are those which do not in themselves have serious medical, functional or cosmetic consequences for the child. EUROCAT applies a standard list of minor anomalies for exclusion (see EUROCAT Guide 1.4). These minor anomalies are not excluded if they appear in association with major anomalies. Some anomalies are present in gradations from minor to major forms, such as microphthalmia, microtia and microcephaly, the minor forms usually being much more common. Variable prevalence rates in these anomalies can be due to variable registration of their minor forms. Hypospadias is only recommended for registration when the opening of the urethra is displaced . However, these details may not be specified in the medical notes, in which case registration of the more common minor form will occur. Syndactyly can vary from slight webbing of the skin between two fingers to fusion of the bones between two fingers, and polydactyly can refer to the addition of a tiny digit to a fully formed digit. Unless a detailed description of syndactyly or polydactyly are given, it is difficult to standardise the exclusion of minor form.

Many variations in diagnostic practice may affect the reported prevalence of congenital anomalies. For example, the accurate reporting of chromosomal anomalies (e.g. Trisomy 13 or 18 and Down Syndrome) is dependant on karyotyping rates and indications for karyotyping. The autopsy rates for stillbirths and neonatal deaths will determine the likelihood that a birth defect is diagnosed, or the accuracy of the diagnosis, especially for conditions which are not externally visible such as serious congenital heart disease (e.g. hypoplastic left heart syndrome) and diaphragmatic hernia.

Children with syndromes and multiple anomalies present particular classification problems. EUROCAT recommends recording of up to eight malformations, as well as a syndrome if present (see EUROCAT Guide 1.4). Nevertheless, practice may vary as to whether all of the component malformations of a syndrome are recorded. Defects that are seen as consequences of other defects i.e. "sequences" (e.g. hydrocephaly when associated with spina bifida) are counted only under the primary defect in EUROCAT prevalence rates (see classification of subgroups in EUROCAT Guide 1.4).

Ascertainment and Coding

A diagnosis must not only be made, but also be recorded accurately, with the record reaching the registry, often through one or more intermediary records. There can be a loss of information between the place of diagnosis and the registry, either in terms of whether the child is recorded as having a congenital anomaly at all, or in terms of the detail or accuracy of the diagnosis recorded (e.g. is the baby recorded with congenital heart defect , or specifically with coarctation of aorta). Registries work hard to establish and maintain an information pathway which will lead to high case ascertainment (ie. the proportion of diagnosed cases who are registered), and accurate diagnostic information. Another step where there can be loss of information is between the text diagnostic information and the coding of that information. EUROCAT registries use versions 10 of the International Classification of Disease, using the British Paediatric Association extension with ICD10 to allow more detail to be recorded. The McKusick Classification is used for conditions with Mendelian inheritance. Use of Orpha codes will be implemented in the local and the central databases.

Overall case ascertainment probably never reaches 100%, and its level depends on a registry's methods of data collection. Registries need to use multiple sources of information. Under-ascertainment of some anomalies can occur if sources of information stop in the early neonatal period, as diagnoses may be made later than this. Specialist services treating children later than the postneonatal period are also vital for confirmation of diagnostic details. Some congenital anomalies are being discovered early in life due to prenatal and postnatal screening programmes. For example, cystic kidneys are more likely to be diagnosed early in life if there is ultrasound screening of the kidneys. This can lead to variation in prevalence rates between regions and over time as screening practice changes.

While EUROCAT recommends registration of fetal deaths from 20 weeks gestation (see Principles of Registration), some registries have difficulties ascertaining fetal deaths outside the official stillbirth definition of their country (which may be 24 or 28 weeks or 500g). As malformed fetuses tend to be born preterm or stillborn, ascertainment of fetal deaths of 20-27 weeks can influence prevalence rates for certain congenital anomalies.

It is more difficult for registries covering very large populations to attain a high level of case ascertainment. Local contact with clinicians and other information sources is vital. The level of resources available to the registry or local office to employ suitable personnel, and the stability of those resources to retain experienced personnel, will also affect the quality of the data collected. Data management itself can be complex, even the conceptually simple tasks such as not registering the same child twice.

Termination of Pregnancy Following Prenatal Diagnosis

Prenatal screening policies (and the resources for prenatal screening) vary enormously between different countries and between regions and even hospitals within countries [Reference most recent EUROCAT prenatal diagnosis report here]. The "culture" in terms of how often prenatal diagnosis of a congenital anomaly leads to termination of pregnancy also varies. For example, termination of pregnancy is very widespread for lethal conditions such as anencephaly, but the practice is much more variable for conditions such as spina bifida and severe cardiac defects. Thus, prenatal screening followed by termination of pregnancy introduces considerable geographic and temporal variation in prevalence rates at birth, and the proportion of terminations must be known or well estimated to assess whether there are real differences in "risk" between populations related to genetic or environmental risk factors.

Registries often require access to entirely different sources of information to ascertain terminations. Assessment of completeness of ascertainment of terminations requires detailed knowledge about local use of services (public and private) and information flows.

Ideally for epidemiologic purposes, terminations of pregnancy should be subject to the same rigour of diagnostic verification as live and stillbirths, but this is not always so. For example, autopsies may not be carried out to confirm the diagnosis, and a karyotype may not be performed where multiple malformations have been detected prenatally by ultrasound, to determine whether a chromosomal anomaly is present.

Reporting of terminations of pregnancy can lead to relative "over-ascertainment" of cases. The earlier in pregnancy the termination, the greater the probability that the pregnancy would in other circumstances have ended naturally in a spontaneous abortion. A spontaneous abortion would not necessarily have been examined for congenital anomalies or reported to the registry. These probabilities are generally small, but when the number of early terminations are high might result in a slight inflation of the total number of cases recorded compared to what would be expected if no terminations had been performed.

Prenatal screening and diagnosis, whether or not followed by termination, can also lead to relative "over-ascertainment" of cases when the average age of detection of a congenital anomaly is brought within the age coverage of the registry. This obviously depends on the age limit each registry applies to its information gathering, as well as diagnostic practice regarding the age when the anomaly would usually be detected postnatally. Similarly, the recorded proportion of all cases which are terminations of pregnancy may be inflated if prenatally diagnosed cases are ascertained by the registry more completely than postnatally diagnosed cases.

Laws and practices vary between countries as to the upper gestational age limit for termination (see the Registry Descriptions of Members Registries for more detail).

The purpose of prenatal diagnosis is to increase the possibility of optimal management of the pregnancy and baby. While the issues of prenatal diagnosis and termination of pregnancy are intertwined in the evaluation of prevalence rates based on epidemiologic data, they are not intertwined in health service terms. Prenatal diagnosis can lead to beneficial outcomes such as effective early neonatal treatment or care. As outcomes improve, the practice of termination may well change.