In the future, major advances in health will come, not from technological breakthroughs, but from improvements in two other spheres: the planning and management of the use of existing technology, and changes in lifestyles. Good planning and management depend on the availability of reliable, accurate and timely information about the health situation. Evaluation of the effect of interventions related to lifestyle also requires valid information. Information support is aimed at providing health planners and managers with the information they need to manage their programmes effectively and decide whether or not the situation is improving, and how much of any improvement is due to their intervention.

All countries have institution-based systems for the collection of routine information on the number of inpatients and outpatients seen. But these account for only a fraction of the population suffering from health problems, and often only a fraction of the population attending institutions, since figures from the nongovernmental and private health-care sectors are frequently not included. The usual response to this problem has been to conduct surveys. Methods have been worked out to allow for drawing samples that will be representative of a given population while meeting the necessary constraints of size and cost. Repeat surveys using the same sampling units (cohort studies) or the same populations can show how the situation changes with time. Correlations can be sought between the results of a survey and those of institution-based reporting of the same disease or condition, which may then permit extrapolations from the routine data system to the whole of the population surveyed. The literature on health surveys is extensive (see, for example, lists of references in [3]). A simple series of guides to the planning and conduct of such surveys has been produced by Lutz (1-6).

This issue of the *World health statistics quarterly* explores some alternatives to nationwide institution-based reporting and national sample surveys, as means for collecting the information required for health-system planning and management. One article describes a household health-and-development survey based on a small number of representative districts in Kerala (India). Another presents a preview of the sentinel city project of the Expanded Programme on Immunization (EPI). This project is designed to study the impact of immunization on the incidence of the six EPI target diseases in 25 major cities of the developing world with a combined population of over 115 million. A third paper describes a method for evaluating surveillance systems, which is very practical for determining the usefulness, cost-effectiveness and quality of a system. Related articles detail the ways in which the International Classification of Diseases (ICD) and the International Health Regulations (IHR) contribute to health planning and management by facilitating: the recording and reporting of morbidity and mortality; the comparison of health and disease status between countries; the detection of trends over time within countries; and the rapid exchange of information on diseases of importance to international travel and trade.

**Sentinel surveillance**

Various attempts have been made to find a system that would provide a measure of disease incidence in a country in the absence of good nationwide, institution-based surveillance and without having to resort to large, expensive sample surveys. One popular solution has been to designate health-care facilities or physicians as sentinel sites. Sentinel sites may be entire cities, or one or more major or specialized institutions within a city. A sentinel network may consist of a number of sentinel sites or physicians distributed around the country.

Important considerations in selecting sentinel sites are the quality of the data they provide, the volume of case reports they produce, and their ability and willingness to act as sentinels. Quality is judged on the basis of accuracy of diagnosis, completeness and promptness of reporting and provision of additional details. Large numbers of patients should be seen in order for the site to be representative. But if a site meets all these requirements and yet the personnel are not willing to cooperate in reporting the data, due to overwork or any other reason, then it is no good as a sentinel station.

The way sentinel sites are selected for systematic surveillance of the EPI target diseases, and their effectiveness in operation, may be illustrated by the following examples.

In Malawi, 60 hospitals and outpatient clinics were contacted to provide details of the age and vaccination status of all the 4,590 children they diagnosed as measles cases during the first five months of 1984 (7). The results revealed regional differences in age-specific attack rates and in the immunization history of cases. A complementary special study was done at Kasungu District Hospital of the 354 measles cases seen there during the first four months of 1985. The percentage of measles cases with a history of vaccination seen at the hospital (36%) was similar to that found in the 60-institution study (32%), and the case-fatality rate for measles (10.5%) was similar to that derived from routine surveillance reports from all Malawi hospitals (1978-1983 average of 7.8%). Thus, Kasungu District Hospital appears to be a good sentinel site, representative of the whole country for measles surveillance.

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* Scientist (Epidemiologist), Development of Epidemiological and Health Statistical Services, WHO, Geneva.
  6 Local area monitoring (LAM), p. 19.
  7 A method for evaluating systems of epidemiological surveillance, p. 11.
  8 International Statistical Classification of Diseases and Related Health Problems—Tenth Revision, p. 32.
  9 Le Règlement sanitaire international: bilan et perspectives, p. 37.
In Dhaka (Bangladesh) the Dhaka Medical College Hospital (DMCH) was selected for preliminary testing. A retrospective survey was made of all 10,447 admissions to the two paediatric units between January 1982 and November 1985 (8). For each of the 875 cases found with a discharge diagnosis of an EPI target disease, a note was made of the sex, residence and outcome. Around 55% of admissions were boys, which suggests that hospital data may not be representative of the disease situation in girls. Residents of Dhaka Municipality accounted for 90% of neonatal tetanus cases but only 81% of poliomyelitis cases, with the other target diseases (diphtheria, measles, pertussis, tuberculosis) ranging in between. One hundred per cent of patients with neonatal tetanus, 88% of other tetanus cases and 61% of diphtheria cases were transferred to other hospitals, compared with 1% or less for the other target diseases. The conclusion was that the DMCH would be a good sentinel site, but that the institutions to which the tetanus and diphtheria cases were transferred should also be included as sentinel sites for the city. Dhaka, with its population of 3.5 million, was included in the list of 25 major cities in the developing world to be surveyed in the Local Area Monitoring Project of the EPI.

Istanbul (Turkey) is another of the 25 cities. In Istanbul, municipal data on incidence of the EPI target diseases, collected from 169 inpatient and outpatient services citywide, were compared with the number of cases of those diseases seen at the Istanbul Children’s Hospital (9). The Children’s Hospital sees over 4,000 inpatients and 40,000 outpatients per year. Inpatient records are regularly reported to the Istanbul Health Office, but outpatient visits are not routinely reported or analysed. Since only a small proportion of measles cases are hospitalized, a retrospective review of the outpatient registers was made for records of measles for the years 1980–1986, and the curve obtained was found to match very closely the curve for citywide reports of measles for the same years, which include both inpatient and outpatient records. The Children’s Hospital inpatient records did not show such a good fit, and there were gaps in reporting. The curves for poliomyelitis and pertussis for the same seven years, comparing citywide data with inpatient data from the Children’s Hospital, have been published elsewhere (9). The fit for pertussis is good up to the end of 1983, while for poliomyelitis it is less good because the overall number of cases is small. The correlation is also poor for diphtheria, which is similarly seen less frequently. Thus, this single sentinel hospital could adequately substitute for the citywide reporting system for at least measles and pertussis, with concomitant economic and programme-management point of view, the value of the Istanbul data is that they show persisting low levels of measles and pertussis incidence since the mass immunization campaign held at the end of 1985.

In Bombay (India), measles cases and deaths at the Kasturba Infectious Disease Hospital (inpatient and outpatient) were monitored and identified as an epidemic of excess mortality between 1984 and 1985 (10). They showed little change from year to year (measles vaccination was only begun in 1983, and coverage was less than 10%). The Public Health Department of the Bombay Municipal Corporation (BMC) registers death by cause and records morbidity and mortality from communicable diseases. For the same period, the BMC records show measles deaths peaking in 1981 and 1982, but in the BMC outpatient services, the number of measles deaths reported to the BMC in 1980 (32) was less than the number recorded at Kasturba Hospital alone (35). It appears that this particular hospital serves a population that is not representative of the BMC area. For Bombay, the BMC is the sentinel site of choice, especially as it records poliomyelitis cases by residence, and since 1982 has reported neonatal tetanus separately from other tetanus. The separate poliomyelitis records for each of the cities, and for the vaccination programme to be monitored without being confounded by cases in non-residents. The separate tetanus records mean that the impact of maternal versus child vaccination can be followed. An 11-year review (1974–1984) of BMC records showed that diphtheria cases had declined more than tenfold, and that although the number of poliomyelitis cases had remained at around the same level in the face of a 36% population increase in the interval, the incidence rate of poliomyelitis had also declined. These findings are consistent with the results of immunization coverage surveys of Bombay that showed rising levels of coverage with DPT and polio vaccines from 1980 to 1983. The BMC records are therefore useful for immunization programme evaluation.

In the United Republic of Tanzania, a questionnaire was sent in mid-1986 to each of the 391 hospitals and health centres in the country requesting retrospective morbidity and mortality data on the six EPI target diseases (11). By the end of the year over 150 replies had been received. These included 60 institutions with monthly measles records going back to 1981, and 42 with monthly pertussis records since that date. Plotting the average monthly number of cases for each year revealed consistent and rapid declines in both diseases, correlating with the introduction of the cold chain in 1982, the implementation of the vaccine distribution system in 1984 and its expansion to all peripheral health units in 1985. The 42 institutions reporting pertussis since 1981, assuming they all also reported measles, would be the logical sentinel network for continuing surveillance of these diseases. Some additions or subtractions might be necessary to ensure representative geographic coverage of the country. As for the other country sentinel systems described above, the results from the Tanzanian sites are useful for evaluating the impact of the national immunization programme.

Turning from the EPI target diseases to other communicable diseases, an outstanding example is the network of sentinel cities in the United States of America. Since 1918 a large group of cities has reported weekly to the United States Public Health Service the number of deaths from all causes and the number of deaths from pneumonia and influenza. At present, the number of cities participating is 121. Each city health department sends information every week on a postcard on the number of death certificates filed the previous week, classified by age group and death, and the subtotal of pneumonia and influenza deaths. The city death certificates are the EPI programme-management point of view, the value of the United States data, which are not available in National Center for Health Statistics (NCHS) figures. For planning purposes, the 121-city surveillance system is more rapid than the 10% sample of death certificates published by the NCHS 3–4 months after death, and correctly identifies all epidemics of excess mortality between 1962 and 1979 as corroborated by independent sources (13). It has been used to monitor the impact of influenza on mortality throughout the United States, to alert health officials to the severity and extent of influenza activity, and to identify areas where unusual clusters of death occur. Besides identifying influenza epidemics, it documented excess mortality from the 1966 heat wave, and may be used in future to measure infant mortality.

The Islamic Republic of Iran has, since 1974, reported to WHO morbidity and cause-of-death data for up to 21 cities in place of national data, which are not available (14).
In the area of chronic disease, the United States also provides an example of a sentinel network. The National Cancer Institute operates a Surveillance Epidemiology and End Results (SEER) Programme which provides detailed information on incidence of and mortality due to malignant neoplasms (15). The sentinel sites, which have been reporting since 1972-1974, comprise four major metropolitan areas, five states (including Hawaii) and the Commonwealth of Puerto Rico. This is the only system, apart from other state cancer registries, that permits the observation of trends in cancer incidence, and has been responsible for documenting the continuing increase in cancer of the lung and bronchus, and the decline in stomach cancer. Case-finding audits have shown that the data are 99% complete, with both sensitivity and specificity greater than 95%. However, although the population covered by the 10 sites is almost 13% of the total population, it is not at all representative, since although it includes 12% each of the white, black, and Hispanic populations, it contains 27% of all American Indians and 32%, 38% and 47% respectively of United States residents of Chinese, Filippino and Japanese origin.

Since the focus of this issue of the Quarterly is on methods applicable at national level, only passing reference will be made here to international sentinel networks. A prime example of those is the WHO-sponsored MONICA project (MONItoring of trends and determinants in Cardiovascular disease). Planned to run for the decade 1984-1993, it involves 40 centres in 26 countries and covers a population of 11 million. Its principal objectives are to measure trends in cardiovascular morbidity and mortality, and to relate these to changes in risk factors, health care and socioeconomic conditions. The results will be of major assistance in the planning of actions to be taken to reduce mortality from cardiovascular disease (16).

These versions of sentinel surveillance may be compared with those instituted by five European countries based on sentinel physicians. Four of the countries report influenza through their networks, and four cover measles and mumps; otherwise a wide variety of conditions is included, different for each country and often changing from year to year (Table 1). The British system is the oldest, having been started in 1967 (17), followed by the Netherlands (18), Belgium (19), France (20) and Switzerland (21). In these countries, networks of volunteer physicians report each week the number of cases of certain specified diseases or conditions seen in their practices. The physicians are selected as far as possible to be a representative sample by geographical distribution (in France, the 570 physicians participating are selected also on the basis of age, sex and type of practice, to be representative of all French physicians, including those in overseas departments). Their reports are rapidly collated by computer and the results sent back every week to the participants as tables and maps. In France, both reporting and feedback are through a "minitel" computer terminal connected to the doctor’s telephone. This enabled, for example, participating physicians to follow the spread of an influenza epidemic throughout France with only a week's delay.

The United Kingdom also has sentinel physician networks at regional level in South Wales, at county level in Surrey, and at city level in Oxford (D.M. Fleming, personal communication, 1987). The Netherlands has two city

### TABLE 1. CHARACTERISTICS OF FIVE SENTINEL PHYSICIAN NETWORKS

<table>
<thead>
<tr>
<th></th>
<th>United Kingdom</th>
<th>Netherlands</th>
<th>Belgium</th>
<th>France</th>
<th>Switzerland</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reference</td>
<td>Royaume-Uni</td>
<td>Pays-Bas</td>
<td>Belgique</td>
<td></td>
<td>Suisse</td>
</tr>
<tr>
<td>Population covered</td>
<td>0.4%</td>
<td>1.1%</td>
<td>...</td>
<td>1% a,b</td>
<td>...</td>
</tr>
<tr>
<td>Number of doctors</td>
<td>106</td>
<td>62</td>
<td>150</td>
<td>570*</td>
<td>200*</td>
</tr>
<tr>
<td>Number of practices</td>
<td>40</td>
<td>46</td>
<td>...</td>
<td>570*</td>
<td></td>
</tr>
<tr>
<td>Reporting mode</td>
<td>mail</td>
<td>mail</td>
<td>...</td>
<td>computer</td>
<td>mail</td>
</tr>
<tr>
<td>Feedback frequency</td>
<td>W/H</td>
<td>W/H</td>
<td>W/H</td>
<td>W/H</td>
<td>W/H</td>
</tr>
<tr>
<td>Conditions reported d</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Influenza</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Measles - Rougeole</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Mumps - Oraillons</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Rubella - Rubéole</td>
<td>x</td>
<td></td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pertussis - Coqueluche</td>
<td>x</td>
<td></td>
<td></td>
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<tr>
<td>Otitis media - Otite moyenne</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Upper respiratory infection</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>respirotoires superieures</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hepatitis - Hépatite</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chickenpox - Varicelle</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Herpes zoster - Zona</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mononucleosis - Mononucléose</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accidents</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Attempted suicide - Tentative de suicide</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hay fever - Rhume des toins</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cancer (new cases) - Cancer (nouveaux cas)</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Myocardial infarction - Infarctus du myocarde</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sexually transmitted diseases - Maladies sexuellement transmissibles</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Other - Divers</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
</tbody>
</table>

a Target - But.
b Percentage of physicians covered - Pourcentage de médecins inclus.
c W/H = weekly - hebdomadaire; O/T = quarterly - trimestrielle.
d Not all reported every year - Ne sont pas tous notifiés chaque année.

networks, in Amsterdam and the Hague; the latter had 25 physicians covering 12% of the population of the Hague in 1983 (18). Norway has operated a national network since 1975, which requests a weekly return from most practices, but in fact the coverage is around 60% (National Institute for Public Health, Oslo, personal communication, 1987). Even for the more restricted sentinel networks referred to above, participation is affected by public holidays and vacations. The percentage of possible reporting days (based on a five-day week) for which reports were received by the Netherlands system in 1983 was 88%, and the number of physicians reporting from the Swiss network varied between 92 and 125 for weeks 39 and 41 of 1987 (22).

Community-based reporting

The article by Scott (2) relates an interesting experiment in community-based reporting in Kerala State (India) which is still continuing. The study collects socioeconomic data from the community plus information on infant deaths, illness, and height and weight of children through household surveys using paid local interviewers. The conclusions that can be drawn from this account of the first five years include the following. The initial samples were found to be too small (10,000 people) and were expanded to include entire administrative districts (over 25,000). Even so, they were still too small to produce reliable estimates of the infant mortality rate. The trends in weight-for-height, height-for-age and weight-for-age in relation to average income produced the reverse of the expected result, with the trend deteriorating with time in the more affluent areas. The difference between areas was statistically significant, and no satisfactory explanation has been found for this result. The morbidity rate, measured as the inability to pursue normal activities because of illness on at least one day during the week before interview, was 19.3 per 1,000. This is low compared with that found in other studies, which have usually used a two-week recall period. Morbidity rates per 1,000 from two survey rounds in Ethiopia (1982-1983) were 183 and 169 respectively (J. E. Dowd, personal communication, 1987): in Nigeria (1982) the rate was 208 (23); and in Colombia (1977-1980), for the population aged 6 years and above, it was 107 (24). The rates for Kerala (1979-1980) can be derived from Table 3 of Scott's article in this issue (25) and were 19.3 for the whole population, or 17.7 for those aged 5 years and above (both for the previous seven days). Assuming the probable (but win for one or more days of restricted activity due to illness is proportional to time, then a two-week rate for Kerala is obtained by doubling, giving 38.6 for the whole population or 35.4 for those aged 5 years and above. This is 3-6 times less than the other countries quoted, but comparable to the rate of 37.8 per 1,000 found in Burma for one or more morbidity conditions (not necessarily incapacitating) in the previous 14 days (25). It could be hypothesized that the lower rates for the Asian countries are due to cultural differences, such as reluctance to admit to being diseased or incapacitated, or greater fortitude in continuing normal activities in spite of sickness. The rates could also be markedly affected by the season of the survey, for example whether the study was done at the height of the malaria or diarrhoea season.

The design of the surveys was changed after the first two years, so that the early results are not comparable to the later ones, and there were a number of other difficulties. The detailed discussion of the methodology of the Kerala survey and possible modifications, given in the original paper on which the article is based, should be consulted by anyone interested in performing similar studies.

Evaluating surveillance systems

The article by Thacker and the Surveillance Coordination Group (SCG) of the United States Centers for Disease Control in this issue outlines a very practical method for evaluating surveillance systems. The basic criterion should always be usefulness: whether a system leads to prompt action to reduce morbidity and mortality or to promote health. On what basis should this be evaluated? Can the system be improved at no additional expense, or maintained at lower cost? Finally, its quality should be assessed on the basis of seven other criteria: sensitivity, specificity, representativeness, timeliness, simplicity, flexibility and acceptability. Using these criteria, it is likely that community-based health reporting as described by Scott would not qualify without some changes in methodology, whereas some sentinel cities' systems would qualify.

The SCG has produced a Surveillance Evaluation Manual, and has applied the method to the 121-city influenza morbidity surveillance system and the SEER Programme, both mentioned above, and also to the Behavioural Risk Factor Surveillance System (BRFSS). The BRFSS is a state-based telephone survey system, which interviews approximately 100 adults each month in each participating state using a random digit dialling technique (Centers for Disease Control, personal communication, 1987). It is only applicable in situations where domestic telephone density in relation to population is very high. The risk behaviours studied include current smoking status, alcohol use, drinking and driving, hypertension, obesity, seatbelt use and physical activity. Following the suggested evaluation criteria, the system's usefulness is for the study of trends in risk behaviour and the detection of epidemics of such behaviour. The system can identify demographic characteristics associated with the behavioural risk factors and be used to estimate the impact of risk-factor reduction measures on morbidity and mortality, thereby permitting cost-effectiveness analysis of the measures. The cost at state level represents about US$20 per completed interview and at national level about US$29 per interview, including the costs of training state personnel. This total of US$49 compares favourably with about US$78 per patient studied in the SEER Programme. Regarding simplicity, the system, being active, is not as simple as a passive system, but concerning flexibility, it is very adaptable, since the questionnaire can be readily modified. Acceptability is high (90% completion rate for questionnaires). Sensitivity and specificity are not critical, given the nature of the behaviours being studied, such as drinking and smoking. As for representativeness, the system covers 25 states and the District of Columbia, accounting for 60% of the United States adult population. The lower socioeconomic status group without telephones is by definition excluded. An attempt is made to weight data to the age, race and sex distribution within each state.

Promote health. Once this criterion is fulfilled, what is the cost? The system will be improved at no additional expense, or maintained at lower cost? Finally, its quality should be assessed on the basis of seven other criteria: sensitivity, specificity, representativeness, timeliness, simplicity, flexibility and acceptability. Using these criteria, it is likely that community-based health reporting as described by Scott would not qualify without some changes in methodology, whereas some sentinel cities' systems would qualify.

International Classification of Diseases

The International Classification of Diseases (ICD) has evolved through various revisions, as described here by Brämer. Its primary purpose is for the recording and reporting of morbidity and mortality statistics, and as such it has been made as comprehensive as possible. It has been criticized on the grounds of its complexity, yet in some developing countries such as Malaysia, health workers have been observed to be able to code patient records from memory (K. Kupka, personal communication, 1987). It suffers from the changes in certain cate-
gories of disease introduced in some revisions. For example, since Japan and the United States switched over to using the Ninth Revision of the ICD (ICD-9) they have reported a decline in ischaemic heart disease which is disproportionate to the decline in heart disease as a whole in those countries. This suggests an artefact due to internal reassignments within the group of heart diseases (28). Other countries have problems with coding other diseases. One African country never reports any cases although it includes these under the category "diseases of the gastro-intestinal tract". This is misleading, and in addition it is not in compliance with the International Health Regulations.

Fourteen countries or territories stopped reporting mortality data to WHO when ICD-9 was introduced in 1979. Five European countries plus Turkey and the Islamic Republic of Iran have continued to report using the older ICD-8, which means that their mortality data for recent years cannot be directly compared with that from other countries. One hundred countries or areas have reported diseases to WHO using either ICD-8 or ICD-9, accounting for nearly 40% of the world population (Map 1). China will raise that to 60% when it begins reporting shortly, but most of Asia does not report, and Egypt remains the only country of the entire African continent that reports using the ICD.1

The recent publication of the Evaluation of the strategy for health for all (27) reporting the results obtained by most countries of the world, has brought into the foreground the problem of how leading causes of morbidity and mortality should be categorized so that they can be both useful to the country and comparable between countries. Some countries use the main ICD chapter headings, so that their five leading causes of death, for example, would be diseases of the circulatory system, neoplasms, accidents and injuries, diseases of the respiratory system and infectious and parasitic diseases. Other countries use a more detailed level of the classification, so that, for example, ischaemic heart disease, hypertension and cerebrovascular disease all rank among the five leading causes. One country lists normal childbirth as a leading cause of morbidity. While this is undoubtedly a leading cause of hospital-bed occupancy, it is not helpful to include it among the priority causes of ill health for the country. Several countries include the category of symptoms, signs and ill-defined conditions as a leading cause, which is only useful in so far as it gives a measure of the lack of specific diagnoses available through the health services. There is need for a consensus on the most useful categories for ranking leading causes of morbidity and mortality before the next evaluation process in 1990.

The International Health Regulations

The evolution of the International Health Regulations (IHR) is reviewed by Vessereau.2 Paradoxically, the spread of cholera, one of the diseases responsible for the introduction of the IHR, has never been effectively prevented by the Regulations, and it was not the determining factor in the eradication of smallpox. But they have shown results in containing the spread of two other notifiable diseases, yellow fever and plague. The reasons are to be found in the different characteristics of the diseases of cholera, and includes them under the category significant protection, yellow-fever vaccine is highly effective in protecting travellers from infection and, together with vector control, in aborting epidemics. However, because it is carried by mosquitoes and forest monkeys, yellow fever is still able to cross frontiers undetected and to escape eradication. Smallpox was controlled and eventually eliminated by means of an effective vaccine and vaccine-delivery technique, and the lack of a wild vector or reservoir made its eradication possible. In the case of plague, on the other hand, although there is no vaccine practical for mass immunization and a wild rodent reservoir exists, urban and shipboard rat-control methods have become so effective that there is no longer any serious threat of the importation of plague into ports or airports, nor of its spread from its wild reservoir into controlled urban areas.

It is recognized that there has been considerable under-reporting of cases of the diseases notifiable under the IHR. As mentioned earlier, at least one country does not report cholera cases as such. Jungle yellow fever has a relatively low case-fatality rate, and it is often only the fatal cases that are reported, so that the actual numbers of people falling ill during a jungle-yellow-fever epidemic are never known, although subsequent serological surveys for post-infection immunity may provide an estimate. For this reason, the figures for the IHR diseases reported by individual countries have been consolidated by continent in Vessereau's article,3 to give an idea of trends while diminishing any false impression of precision.

There is still misunderstanding in some countries about the exact meaning of the IHR, to which they have subscribed.4 There is no epidemiological justification for demanding a yellow-fever immunization certificate from a traveller coming from a country in the yellow-fever-endemic area, or even from a country that has reported a current yellow-fever outbreak if that person has not visited the infected area. For example, many tourists will visit only major cities, which are normally not involved when there is a local outbreak of jungle yellow fever. On the other hand, some physicians do not understand that yellow-fever vaccination is required for travellers. Also, when the notifications are accompanied by serological samples for confirming the diagnosis, there is no justification for compulsory measures to meet the possibility of infection, rather than excessive measures to meet the threat of an unknown situation.

The obligation under the IHR for countries to notify cases of certain diseases means, when followed faithfully and when the notifications are accompanied by epidemiological information, that other countries can take appropriate measures to meet the possibility of importation, rather than excessive measures to meet the threat of an unknown situation.

A topical example of the application of the IHR is the question of whether AIDS should be included under the Regulations. WHO's position is that no measures, and no health document, other than those provided for in the Regulations, may be imposed on arriving travellers. Also, since carriers far outnumber those people who could be identified as ill with the infection, there is no practical method for preventing the spread of the virus across borders, and any attempt at mass serological screening of visitors with quarantine of positives would be useless as a protective measure, since it would miss some true positives and in addition turn up a large number of false positives. It would also be prohibitively expensive, and

1 South Africa uses the ICD-9, but does not report to WHO.
2 Most countries subscribe to the IHR, notable exceptions being Australia and Papua New Guinea.

Negotiations are in progress to obtain cause-of-death data from China — Des négociations sont en cours pour obtenir de la Chine des données sur les causes de décès.

- All the countries/territories in the Lesser Antilles use ICD-9 except for Anguilla, Cayman Islands and Montserrat (ICD-8) — Tous les pays/territoires des Petites Antilles utilisent la CIM-9, à l'exception d'Anguilla, des îles Caïmanes et de Montserrat (CIM-8).
would divert resources from more effective measures such as blood-bank screening and public information and education on the means of prevention. Also there is no risk of infection for people sharing public transport with someone infected with human immunodeficiency virus, even if that person is clinically ill with AIDS.

Conclusions

To sum up, every country needs a system to provide valid information on the health situation rapidly enough to form the basis for the decisions to be taken for the planning and management of its health programmes. Routine institutional surveillance should be restricted to the collection of data items essential to proper management of health services. Time and scarce resources should not be wasted on collecting figures for cases of a disease for which no intervention programme is either in place or planned. It may well be advantageous to supplement or partly replace a nationwide surveillance system by local sentinel physician- or site-based networks, if these can be selected so as to be sufficiently representative. In countries which do not have a national system, a sentinel network might be the first step towards establishing such a system.

Summary

The promotion of health and the prevention of disease depend to a large extent on the good planning and management of health programmes. Good planning and management in turn depend on the availability of reliable, accurate and timely information about the health situation. All countries have institution-based systems for the collection of routine information about health services delivery. Many countries also use surveys to obtain information about other aspects of the health situation. This issue of the World health statistics quarterly describes two types of surveillance which may be used to supplement (or compensate for the absence of) nationwide routine systems or surveys, and a method for evaluating surveillance systems. It also includes articles on the International Classification of Diseases and Causes of Death (ICD) and the International Health Regulations (IHR) in relation to their use for planning and management.

Two alternative surveillance systems are described. One uses institution- or city-based records of incidence of target diseases of the Expanded Programme on Immunization (EPI) in a number of developing countries to determine the impact of minimization on the reduction of disease. In this article, some additional background material is reviewed on sentinel hospitals and cities in India, Bangladesh, Turkey, Malawi and United Republic of Tanzania. The other system is based on district-level household surveys of mortality, morbidity and nutrition-related indicators in Kerala State (India) carried out by trained local personnel who live in the districts. These methods are compared with two sentinel-site systems for influenza and cancer reporting in the United States of America, and sentinel physician networks in six European countries for reporting the incidence of measles, mumps, influenza and a number of other diseases and conditions such as accidents and attempted suicides.

Documenting a decrease in the incidence of the target disease is the only direct way to measure the impact of an immunization programme. Even then, it is necessary to distinguish the portion attributable to the programme as against that due to other possible factors such as seasonal or other periodic cycles. Hence the importance of continuous, consistent, sensitive and specific collection of data on diseases and health events for which interventions are to be made.

International notification of diseases should be based on the International Health Regulations. Restrictions on travel should not be applied to diseases which are not covered by these Regulations. National notifications should be based on the categories of the International Classification of Diseases. Countries should emphasize the country's priority health problems. All countries should use the most recent revision of the ICD (currently ICD-9) so that their rates can be directly compared with those from other countries.

Information on that part of the population not contacting the health services may be sought through surveys, either mounted by specialist teams or conducted by local personnel. In each case, the information sought should again be restricted to the minimum required for effective management of health programmes. Finally, every system of surveillance should be regularly evaluated to ensure that it is doing the job expected of it, at reasonable cost, and producing results of acceptable quality.

The basic criterion for evaluating any surveillance system should be whether it leads to prompt action to reduce illness or promote health. Once this criterion is satisfied, questions of cost-effectiveness and quality arise. Quality should be assessed on the basis of sensitivity, specificity, representativeness, timeliness, simplicity, flexibility and acceptability. These aspects are discussed in detail in the article on evaluation, and their application is discussed in this introduction in relation to the Behavioural Risk Factor Surveillance System in the United States.

The ICD is a basic tool for standardizing the reporting of causes of illness and death within a country and between countries, and thus facilitating epidemiological analysis, the study of trends and the planning and management of programmes. There are some problems due to countries misclassifying diseases, and due to changes between revisions of the ICD. Also, only some 40% of the world's population is covered by ICD-based reporting, although this will rise to 60% when China begins reporting soon.

The IHR have shown their value in the control of the spread of yellow fever and plague, and in the international dissemination of epidemiological information on disease outbreaks so as to permit countries to take proper precautions against importation of epidemic diseases. It is strongly recommended that visitors intending to travel in rural areas of a yellow-fever-endemic country be vaccinated for their own protection, even if the country does not require that travellers be vaccinated. WHO recommends against invoking measures restricting the travel of persons suffering from AIDS or infected with human immunodeficiency virus.
RÉSUMÉ

Introduction: approches épidémiologiques de la planification sanitaire: gestion et évaluation

La promotion de la santé et la prévention des maladies dépendent pour une large part d'une planification et d'une gestion satisfaisantes des programmes sanitaires. Pour être satisfaisantes, la planification et la gestion exigent de leur côté que l'on dispose d'informations fiables, exactes et opportunes sur la situation sanitaire. Tous les pays possèdent des systèmes fondés sur les établissements pour la collecte des renseignements de routine sur les prestations sanitaires. Nombreux sont les pays qui ont aussi recours à des enquêtes pour obtenir des informations sur d'autres aspects de la situation sanitaire. Le présent numéro du Rapport trimestriel de statistiques sanitaires mondiales décrit deux types de surveillance qui peuvent être utilisés pour compléter (ou compenser l'absence) de systèmes ou enquêtes de routine appliqués à l'échelle nationale, ainsi qu'une méthode d'évaluation des systèmes de surveillance. Il comprend aussi des articles sur la Classification internationale des maladies et causes de décès (CIM) et sur le Règlement sanitaire international (RSI) pour ce qui est de leur emploi dans la planification et la gestion.

Deux systèmes de surveillance différents sont décrits. L'un utilise les relevés indiquant par établissement ou par ville l'incidence des maladies visées par le Programme élargi de vaccination (PEV) dans un certain nombre de pays en développement, afin de déterminer l'impact que la minimisation peut avoir sur la réduction de la maladie. Cet article passe en revue une documentation complémentaire sur les hôpitaux et les villes jouant le rôle de «sentinelles» en Inde, au Bangladesh, en Turquie, au Malawi et dans la République-Unie de Tanzanie. L'autre système repose sur des enquêtes dans les ménages au niveau du district, portant sur les indicateurs liés à la mortalité, à la morbidité et à la nutrition dans l'État de Kerala (Inde) et menées par un personnel local qualifié qui réside dans les districts. Ces méthodes sont comparées avec deux systèmes à «sentinelles» utilisés pour la notification de la grippe et du cancer aux Etats-Unis d'Amérique, ainsi qu'avec des réseaux sentinelles de médecins dans six pays d'Europe pour la notification de l'incidence de la rougeole, des oreillons, de la grippe et d'un certain nombre d'autres maladies et états, notamment les accidents et les tentatives de suicide.

Le critère de base pour l'évaluation de tout système de surveillance consiste à vérifier s'il permet d'intervenir rapidement pour réduire une maladie ou promouvoir la santé. Ce critère une fois satisfait, il se pose des questions de rentabilité et de qualité. La qualité doit être évaluée en fonction de la sensibilité, de la spécificité, de la représentativité, de l'opportunité, de la simplicité, de la souplesse et de l'acceptabilité. L'article sur l'évaluation traite en détail de ces aspects, tandis que leur application au regard du Système de surveillance des facteurs de risque liés au comportement, en vigueur aux Etats-Unis, est traitée dans cette introduction.

La CIM est un instrument fondamental pour normaliser la notification des causes de maladie et décès dans un pays et d'un pays à l'autre et, partant, faciliter l'analyse épidémiologique, l'étude des tendances et la planification et la gestion des programmes. Il existe quelques problèmes dus au fait que des pays classent certaines maladies de façon erronée et que des changements sont intervenus entre les diverses révisions de la CIM. D'autre part, quelque 40% seulement de la population du globe sont couverts par la notification fondée sur la CIM, encore que la proportion atteindra 60% dès que la Chine commencerà à notifier, ce qui ne saurait tarder.

Le RSI a démontré sa valeur dans la lutte contre la propagation de la fièvre jaune et de la peste et dans la diffusion internationale des informations épidémiologiques sur les fiambles de maladies afin de permettre aux pays de prendre des précautions judicieuses pour éviter l'importation de maladies épidémiques. Il est vivement recommandé aux personnes qui se proposent de voyager dans les zones rurales d'un pays à endémicité amarielle de se faire vacciner pour assurer leur propre protection, même si le pays en question n'exige pas la vaccination des voyageurs. L'OMS recommande de ne prendre aucune mesure pour restreindre les déplacements des personnes atteintes du SIDA-maladie ou infectées par le virus de l'immunodéficience humaine.

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