EXPANDED PROGRAMME ON IMMUNIZATION, AND VACCINE QUALITY

Progress report by the Director-General

This forward-looking report is composed of two parts. Part I highlights the achievements, lessons learned, goals, policies, strategies and approaches for the Expanded Programme on Immunization for the 1990s. It was endorsed by the Programme's Global Advisory Group in October 1991, together with actions proposed for the 1990s.

As indicated in part II, improving vaccine quality control will help to relieve the current shortage of high-quality vaccines required to meet the goals set by the Health Assembly for the Expanded Programme on Immunization (EPI). WHO is requesting all countries where vaccines are produced to establish quality-control mechanisms and proposes a way to do so. The actions proposed were reviewed by the Programme's Global Advisory Group in October 1991, which recommended their endorsement.

The Executive Board at its eighty-ninth session adopted resolution EB89.R8 on "Immunization and vaccine quality", recommending a resolution for adoption by the Forty-fifth World Health Assembly.
I. EPI FOR THE 1990s

Introduction

1. For the Expanded Programme on Immunization (EPI), the past decade has been one of building national immunization systems, with the primary focus on developing countries and with the primary objective of expanding coverage as quickly as possible. National programmes, backed by an impressive coalition of national and international partners, have for the most part now succeeded in establishing systems which reach the majority of children attaining one year of age with a protective course of immunizations.

2. The success of the global immunization initiative has been remarkable, but it can by no means lead to complacency. The sustainability of immunization services in many developing countries remains fragile, a symptom in part of poorly developed health infrastructure. In the 1990s EPI will have as a central task, along with other WHO programmes, the strengthening of the health care infrastructure. This will be pursued both by working to integrate immunization better with other primary health care activities and by further improving immunization services themselves, with a special focus on "reaching the unreached", the segment of each society which bears the highest burden of disease and disability. Integration will be carried out through training and evaluation linked with other maternal and child health programmes and by the active promotion through EPI of other interventions such as micronutrient supplementation. The major strategy for improving immunization services themselves is to move from a focus on coverage to a focus on impact. This is where the disease control initiatives concerning neonatal tetanus, measles and poliomyelitis play a critical role.
3. This progress report highlights the current status of immunization programmes and details a conceptual framework for EPI for the 1990s. The Programme's Global Advisory Group endorsed the report in October 1991, together with the actions proposed for the 1990s. The Executive Board adopted resolution EB89.R8 recommending to the Health Assembly the adoption of a resolution on Immunization and vaccine quality which reaffirms the immunization-related health goals contained in the World Declaration on the Survival, Protection and Development of Children and the related Plan of Action and recommends additional operational targets and actions for EPI for the 1990s.

Background

4. The Expanded Programme on Immunization has its basis in resolution WHA27.57 adopted by the Health Assembly in May 1974. General programme policies, including the EPI goal of providing immunization for all children of the world by 1990, were approved in resolution WHA30.53, adopted in May 1977. The importance of EPI as an essential component of maternal and child health and primary health care was recognized in resolution WHA31.53, adopted in May 1978, and in the Declaration of Alma-Ata in September 1978. In 1982 the Health Assembly warned that progress would have to be accelerated to meet the 1990 goal and urged Member States to take action on a five-point programme (resolution WHA35.31).

5. In 1986 the Health Assembly assessed progress since 1982. It again warned that continuing acceleration of national programmes would be needed to meet the 1990 goal and urged Member States to pursue vigorously three general and four specific recommendations by the Director-General (resolution WHA39.30). In 1988, in the light of global immunization progress, the Health Assembly declared the commitment of WHO to the global eradication of poliomyelitis by the year 2000, emphasizing that eradication should be pursued in ways which strengthen the development of EPI as a whole, fostering its contribution, in turn, to the development of primary health care (resolution WHA41.28). The next year the Health Assembly adopted resolution WHA42.32 raising awareness to the challenges, in addition to poliomyelitis eradication, of measles reduction, neonatal tetanus elimination, improving surveillance, introducing new or improved vaccines, promoting other primary health care practices, and achieving and maintaining 90% immunization coverage with all EPI vaccines.

Achievements

6. The global achievement of the 1990 target of 80% immunization coverage among infants worldwide with BCG and measles vaccines, and the third dose of DPT and of oral poliovirus vaccines (see Figure 1) represents a milestone on the way to universal childhood immunization. This progress in global immunization is directly attributable to the efforts of national governments, WHO, UNICEF and other bodies of the United Nations system, bilateral development agencies, and nongovernmental organizations such as Rotary International. The development of the capacity to achieve these levels of coverage of infants represents a major public health triumph for the decade of the 1980s.

7. Global statistics, however, mask disparities among regions (see Figure 2), countries (see Figures 3 and 4), states/provinces, and districts. Differences in immunization coverage levels reflect, in part, the varied development of the primary health care infrastructure and are one of the measures of the degree of equity and social justice that communities have achieved. Also, the much lower coverage of 39% reported for tetanus toxoid for pregnant women in developing countries to protect their newborns from neonatal tetanus serves as a reminder that neonatal tetanus was the "forgotten" vaccine-preventable disease of the past decade, partly owing to the fact that efforts for its prevention are directed to a target population different from infants.

8. At current levels of immunization coverage, it is estimated that immunization programmes prevent each year some 3.2 million deaths from measles, neonatal tetanus and pertussis, as well as some 440 000 cases of paralytic poliomyelitis (see Figure 5). The occurrence each year of an estimated 1.7 million deaths from these same diseases, and some 120 000 cases of paralytic poliomyelitis, underlines the urgent need to continue raising immunization coverage levels and to focus on control of the target diseases. The 1-2 million deaths attributable to hepatitis B infection emphasizes the importance of adding new vaccines.
Figure 1. Expanded Programme on Immunization: immunization coverage 1977 to 1990

Percentage coverage of children in the first year of age

- BCG
- DPT, third dose
- Poliomyelitis, third dose
- Measles
- Tetanus toxoid, second or booster dose in pregnant women

(data before 1984 are estimated)

Figure 2. Immunization coverage of children in the first year of age, by WHO Region, August 1991

Percentage coverage

- BCG
- DPT, third dose
- Poliomyelitis, third dose
- Measles
- Tetanus

* up to 2 years of age
** tetanus toxoid (in pregnant women)
Figure 3. Coverage of children under one year of age with three doses of diphtheria/pertussis/tetanus vaccine (DPT3), 1990

The designations employed and the presentation of material on this map do not imply the expression of any opinion whatsoever on the part of the World Health Organization concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries.
Figure 4. Immunization coverage of children in the first year of age, by groups of countries*, August 1991

Figure 5. Number of deaths due to measles, neonatal tetanus and pertussis and number of poliomyelitis cases occurring and prevented by immunization in developing countries, 1990
Lessons learned

9. The worldwide immunization effort over the past 15 years has demonstrated that a global coalition, sharing common goals, can create an unprecedented degree of cooperation among all peoples, including a wide spectrum of national governments and international, national and local organizations.

10. The development of immunization programmes over these years has taught specific lessons that will continue to guide immunization programmes in the 1990s. For example:

- nearly all children of the world and their mothers can be reached with immunization services which provide an excellent entry point for other primary health care interventions and significantly reduce mortality, morbidity, and disability;

- personal involvement of heads of State and political, religious and social leadership at all levels generates political will, creates demand for immunization services, mobilizes communities and can even overcome such obstacles to immunization as low levels of socioeconomic development, and civil war (for instance by promoting "days of tranquillity");

- goals set by the World Health Assembly help to galvanize the international community into action;

- policies and strategies recommended by the EPI Global Advisory Group provide a common direction for immunization efforts;

- motivated and trained senior managers at global, regional and country levels have helped to set up the basic structure of the programme and to develop it continuously in the light of experience gained from the field;

- the effective coalition between national governments, bodies of the United Nations system, bilateral development agencies, nongovernmental organizations and countless communities resulted in a rapid improvement in immunization coverage and demonstrates that a preventive health strategy can mobilize cooperation on a global scale;

- communication is a critical component of immunization programmes and should be planned and designed as an integral part of the programme. Successful programmes are based on audience research and use multiple channels (face-to-face, print, mass media) to deliver the action-oriented message;

- inclusion of only essential and proven cost-effective elements in immunization interventions is a factor in their success;

- successful programmes have a process measure (e.g. immunization coverage) as well as an outcome indicator (e.g. disease incidence);

- decentralization of resources, coupled with national plans of action, permits countries to plan and execute activities more effectively and rapidly;

- research and development in logistics, the cold chain, injection equipment, new and improved vaccines, delivery strategies, immunization schedules, and monitoring and evaluation methodologies provide a technical basis for advancing programme policies and strategies;

- training provides the technical skills for planning and management to strengthen the health infrastructure and to develop the needed human resources at senior, middle and peripheral levels;

- emphasis on surveillance strengthens all aspects of an immunization programme and helps to focus efforts on areas at highest risk;

- unwarranted contraindications to immunization, unbalanced concerns over adverse reactions of vaccines compared to the risks of disease, and public apathy towards immunization as disease
incidence declines are phenomena, seen especially in developed countries, that must be countered everywhere;

- the need to share lessons learned between developing and developed countries is increasingly important as immunization coverage rates reach similar levels and as common problems are recognized, such as unimmunized groups in urban areas and breaks in the cold chain.

11. Some diseases can be effectively controlled and even eradicated. In addition to the important humanitarian goal of averting needless suffering, the cost of a control effort saves money by reducing the numbers of patients treated, and the cost of an eradication effort can result in additional savings by halting the need to immunize against the diseases.

12. The achievements and lessons learned provide grounds for optimism that the new challenges facing immunization programmes in the decade of the 1990s will be met.

Goals

13. With the achievement of the goal to immunize 80% of the world's children by 1990, immunization programmes are now moving towards the challenges of the current decade. The World Summit for Children, by endorsing the joint WHO/UNICEF health goals, clearly set the major objectives for immunization programmes in the 1990s as follows:

- maintenance of a high level of immunization coverage (at least 90% of children under one year of age by the year 2000) against diphtheria, pertussis, tetanus, measles, poliomyelitis, tuberculosis and against tetanus for women of childbearing age;

- by 1995, reduction by 95% of measles deaths and reduction by 90% of measles cases compared to pre-immunization levels as a major step towards the global eradication of measles in the longer run;

- elimination of neonatal tetanus by 1995; and

- global eradication of poliomyelitis by the year 2000.

14. The following additional targets are proposed for immunization programmes for the 1990s to help to ensure the equitable distribution of immunization services and to control better the EPI target diseases, to quantify indicators for improving disease surveillance, and to specify new vaccines and a mechanism for their introduction into immunization programmes in the countries in greatest need.

- **Immunization coverage:** Coverage against diphtheria, pertussis, tetanus, poliomyelitis, and tuberculosis for children under one year of age should reach at least 80% in all districts by 1995 and 90% by the year 2000. Measles immunization coverage should reach at least 90% in all districts by 1995. Meeting the goals of measles reduction, neonatal tetanus elimination and poliomyelitis eradication will require even higher coverage in certain high-risk areas. In all districts at high risk of neonatal tetanus, all births should be protected by the immunization of women of childbearing age with tetanus toxoid by 1995. If risk is unknown, it should be assumed to be high.

- **Surveillance:** All countries should ensure complete and timely reporting of paralytic poliomyelitis, neonatal tetanus and measles (including reports of zero cases) on at least a monthly basis from all designated reporting sites by the end of 1992.

- **New vaccines incorporated into EPI:** Yellow fever vaccine should be routinely administered to children under one year of age in all countries at risk for yellow fever by 1993.

**Hepatitis B vaccine** should be integrated into national immunization programmes in all countries with a hepatitis B carrier prevalence (HBsAg) of 8% or greater by 1995 and in all countries by 1997. Target groups and strategies may vary with the local epidemiology. When carrier prevalence is 2% or greater, the most effective strategy is incorporation into the routine infant immunization schedules.
Countries with lower prevalence may consider immunization of all adolescents as an addition or alternative to infant immunization.

15. Improving immunization coverage beyond 80% and achieving the disease control targets will be more difficult than reaching the 80% immunization coverage target for 1990 since efforts will need to be targeted toward high risk, perhaps difficult to reach, populations. This means that immunization programme managers will have to improve the information system to identify pockets of unimmunized children and areas of continued disease transmission as well as expend greater efforts to determine which aspects of the programme need to be enhanced to reach them. Increased resources to intensify the delivery system and strengthen capabilities for outbreak response will be required.

Policies and strategies

16. The Health Assembly has provided general guidance on the policies to achieve immunization-related goals by stating in resolution WHA42.32 that "efforts should be pursued in ways which strengthen the development of the Expanded Programme on Immunization as a whole, fostering its contribution, in turn, to the development of the health infrastructure and of primary health care".

17. Thus, immunization and other highly cost-effective interventions will serve as a "leading edge" for a more comprehensive primary health care system. The disease control goals (measles reduction, neonatal tetanus elimination, and poliomyelitis eradication) serve as a driving force to ensure maximum impact and identify remaining pockets of susceptible individuals. A focus on these diseases will keep the spotlight on the health of children and mothers and direct programme resources to the areas of greatest need.

18. The disease control goals will also enhance all aspects of immunization programmes, including improving coverage, assuring adequate supply of effective vaccines, setting up surveillance systems, collecting and analysing programme information and taking appropriate action.

19. The specific benefits of a disease-oriented focus for the policies and strategies of immunization programmes in the 1990s include:

- identifying high-risk areas with low immunization coverage and conducting intensified immunization activities in these underserved areas. This can also help to develop and sustain community participation and to strengthen the infrastructure needed to introduce other essential primary health care;

- strengthening the surveillance systems for EPI target diseases, and other diseases of high priority, so that they may provide "information for action" that will also contribute to developing national capabilities for timely and complete reporting, to laboratory support, and to outbreak investigation and control;

- serving as an indicator of programme quality by pinpointing vaccine failures due to deficiencies of manufacture, storage, transport and administration of vaccine;

- determining priorities for research and development on new and improved vaccines against the main causes of mortality, morbidity, and disability;

- in the case of a successful control or eradication effort, allowing savings of money to be allocated to other public health priorities; and

- helping to sustain political will and donor commitment for EPI and other essential primary health care by demonstrating an impact which results in decreasing incidence of the target diseases.

20. The global plans of action for the specific disease control goals of measles reduction, neonatal tetanus elimination, and poliomyelitis eradication include recommended policies and strategies. These policies and strategies continue to be refined in the light of recommendations of the EPI Global Advisory Group as additional experiences are gained. Regions and countries should form technical advisory groups that will assist in adapting such policies and strategies to the unique opportunities and constraints that exist in each region.
and country. The process of decentralizing decision-making and planning to the local level will help the sustainability of immunization programmes.

21. There will also be a need to elaborate policies and strategies specific to urban areas. All regions are experiencing rapid urbanization and it is expected that half the world's population will reside in cities by the year 2000. Urban areas will have to increase their immunization efforts with an emphasis on identifying those responsible for ensuring the provision of immunization services in each area of the city. Cities may also serve as reservoirs for vaccine-preventable diseases such as measles, and so, for example, controlling measles in cities may be critical to global measles control. Cities present unique opportunities for creative approaches, as well as special challenges that will have to be addressed. It is appropriate for maturing immunization programmes to lead the way for improved urban health by helping to bring integrated primary health care into the cities and by initiating needed policy dialogue on urban health issues.

Resources

22. The new goals of measles reduction, neonatal tetanus elimination and poliomyelitis eradication and the activities to achieve the immunization coverage goals will require significantly more resources, including more vaccine. Strategies to achieve these and other goals must be evaluated and prioritized using information that includes the cost implications and impact on available resources such as vaccines, staffing, equipment and budgets. Information on the resource needs of various strategies will be gathered through selected programme reviews to determine their effectiveness and the inherent trade-offs between different strategies.

23. Resource limitations are perhaps the greatest constraint on achieving the EPI goals of the 1990s. To overcome these limitations, immunization programmes need to strengthen and broaden a donor constituency. Public awareness of the benefits of immunization is necessary not only in developing countries, but in the industrialized donor countries as well. Immunization programmes in many developing countries are dependent, in part, on the contributions of donors that could be enhanced if the public understood better the benefits of global immunization.

24. The public's knowledge and awareness of the benefits of achieving the immunization goals will be raised by designing, in collaboration with the donor community, a global communications strategy for "EPI for the 1990s".

25. The Global Advisory Group of EPI has recommended that a global interagency coordinating committee be established to complement regional and national interagency coordinating committees in helping to mobilize the additional resources required. This committee will foster more effective communication and enhance participation among all current and potential partners in immunization programmes.

Planning and coordination

26. Immunization and disease control plans of action will be formulated at all levels, reviewed periodically, and revised as necessary to establish policies and strategies and set priorities on activities to meet the goals. Plans for achieving specific immunization coverage and disease control targets should be part of an overall immunization plan of action. This, in turn, should be an integrated component of the primary health care strategy. The formation and strengthening of technical advisory groups at regional and country levels, similar in function to the EPI Global Advisory Group, will assist in drawing up such plans. In the 1990s an emphasis on decentralizing immunization and disease control responsibilities in these plans will allow programme implementation and monitoring, including data analysis and timely action, to be taken at the most appropriate local level. This will be facilitated by coordinated efforts to improve district-level management.

27. The establishment and effective functioning of interagency coordinating committees that improve the coordination of donors in support of global, regional and national immunization programmes are needed to assist in the formulation and implementation of such plans and to integrate activities aimed at sustaining primary health care programmes. Such committees should be chaired at the country level by a government official with decision-making authority and would elaborate detailed financial plans which outline the commitments of the national governments and their donor partners over the medium term. They would review programme performance through periodic meetings and make adjustments to the plans and their funding. This coordination benefits both recipients and donor agencies by promoting effective use of available resources and
by providing individual donors with the accountability and visibility needed for continuing support. The committees would ideally have a broader mandate for coordination of other primary health care activities to help ensure the best use of resources at the country level by integrating logistics, transport, supervision, and maintenance systems of all programmes.

28. The planning process provides the opportunity for regions, governments and donors to balance global goals, policies and strategies with regional and national priorities. Each region and country set their own priorities based on the magnitude of the disease burden, available resources, expected outcome, and fit within the overall health care goals. Targets and activities will be planned and implemented in a phased manner depending on the degree to which immunization programmes have been developed.

Training

29. Training is crucial in developing the human resources to plan and implement effectively the activities to meet the goals of the 1990s. Training materials and curricula for the management of immunization programmes and for disease surveillance and control are designed to help strengthen managerial capabilities for implementing primary health care activities. They also ensure that health workers at all levels are equipped to apply national primary health care policies.

30. Training in the 1990s will increasingly use pre-service education by developing and strengthening curricula in medical, nursing and paramedical schools to ensure that all health workers graduate with sufficient knowledge and skills to implement national immunization policies.

31. Whereas, in the past, in-service training had to concentrate on ways to establish an immunization programme from scratch, in-service training in the 1990s will emphasize problem-solving approaches. Immunization workers will bring their problems and data to workshops, to work out, in collaboration with their colleagues, ways to overcome constraints on programme implementation, and will return with revised plans. In-service training will continue to support the new surveillance focus on disease control and on evolving strategies for outbreak investigation, control and prevention. Efforts will also be made to identify and respond to managerial problems in the delivery of primary health care at the district level.

32. EPI will continue to develop, field test, introduce and revise training materials and curricula based on national, district and community needs. Efforts will be made to join forces with other WHO programmes conducting similar activities. Regional offices and national governments will need to further develop capabilities for timely adaptation, dissemination and implementation of these materials and curricula.

33. Challenges for WHO in the 1990s in the development of new training materials include the need for more:

- specific materials on an increasing number of specialized topics such as case investigation, outbreak investigation and control, and adverse event monitoring;

- general materials that address the issues that cut across primary health care programmes, such as management, supervision, transportation and logistics; and

- integrated materials that describe ways in which the infrastructure established by national immunization and other primary health care programmes can support each other. This requires increasing collaboration with other training programmes related to maternal and child health to strengthen training efforts aimed at the integration of immunization and other primary health care activities.

Communication

34. Communication can provide immunization programmes with a strategy for promoting and sustaining health behaviour change in a target group. In the past, communication activities in support of immunization have focused primarily on creating consumer demand for immunization services. This was relevant to the task of the 1980s to increase rapidly immunization coverage rates. The task for the 1990s is more difficult and challenging. In the coming decade communication should fulfil the following three functions.
35. **Sustain demand for immunization and serve hard-to-reach groups:** Consumers change in demographic composition and in their knowledge base, attitudes about immunization and health care practices. Communication programmes are important to ensure that future decisions made about the vaccines (the product), their distribution (the place), accessibility and affordability to consumers (the price), and key messages to mothers (the promotion) are all anchored on an understanding of what the consumer wants and what is consistent with public health policies. Two consumer issues will need attention. The first is sustaining consumer demand among people who have begun using immunization services. The second is serving hard-to-reach groups. In situations where this is primarily a matter of lack of physical access to services, communication has a limited role. But where consumer barriers are an issue (e.g., where questions of information, motivation, and cultural beliefs are important), communication will play an important role.

36. **Strengthen health workers' ability to communicate to improve service delivery continuously:** Successful immunization programmes have found ways to bring the health worker and professional staff responsible for communication activities together in implementing an immunization strategy that the consumer finds beneficial and rewarding. Health worker communication skills can be strikingly improved through training in counselling skills, talking with groups or using simple audiovisual aids at the health centres. Other methods include strengthening training design, applying proven behavioural principles to enhance training effectiveness, and extending in-service training through the use of complementary means, such as print or broadcast media, to keep health workers up-to-date on immunization policy issues.

37. **Keep immunization on the policy-makers' agenda:** Although substantial gains in immunization coverage have been achieved in recent years, policy-makers need to maintain their support of immunization. The obstacles to attaining long-term, sustained impact from immunization programmes will need to be addressed by using communication as an important tool for enlightening policy-makers and programme managers on the changing issues brought about by earlier successes, and on options for future action. Policy-makers will be asked for their continued support to sustain funding, ensure adherence to existing disease control strategies, and encourage innovation in vaccine development and service delivery.

### Vaccine supply and new vaccines

38. Vaccine supply is emerging as a priority in the 1990s. There is an increasing demand for vaccines as immunization coverage rises and as outbreak control and new delivery strategies are implemented to achieve the disease control targets. Costs of vaccines are also increasing. Both these trends have raised concern that additional funds must be forthcoming from national and international sources to assure supply of the quantities of vaccines needed by developing countries to achieve their goals. Rising demand is likely also to require enhanced production capacity.

39. There is also concern about the quality of vaccines. An increasing number of instances are being reported where vaccines have been found to be of poor quality or where infrastructure at the country level is insufficient to assure the maintenance of the relevant WHO standards of quality. Production in developing countries must be based on the proper transfer of technology and the strengthening of national control authorities to monitor quality and good manufacturing practice. Governments and the international community must take urgent steps to assure that all vaccines meet WHO requirements (see part II).

40. A long list exists of additional vaccines, either already in production or still under development, that are suitable for widespread use in developing countries. Finding ways to make them affordable for developing countries is a major challenge. The Children's Vaccine Initiative, enunciated in New York in September 1990, spells out some of the challenges facing immunization programmes in the 1990s: "Work on vaccines themselves must be accompanied by investments which bring them rapidly into large-scale and inexpensive production and effective use. Such investments are needed to simplify production and quality control methods; to support field trials; to speed licensing; to develop approaches - including production in developing countries - which assure that vaccines are available for all; to simplify the logistics of storing, transporting and administering vaccine; and to strengthen national epidemiological and applied research capacities, especially in developing countries, so that each vaccine is used to best advantage".

41. Hepatitis B vaccine provides an example of the problems encountered when a relatively expensive vaccine is introduced. As a means of long-term control of hepatitis B infection, the EPI Global Advisory Group has recommended that hepatitis B vaccine should be integrated into national immunization programmes.
and has endorsed the call for action contained in the Yaounde Declaration on the Elimination of Hepatitis B Infection (February 1991). WHO, UNICEF and others in the international community are seeking ways to bring such vaccines into general use in developing countries. In the 1990s it is a priority for EPI to find alternative solutions to these problems. These include the development of alternative financing schemes to assist the least developed countries, use of the UNICEF tendering process to reduce prices, transfer of technology for local packaging or production, and the Vaccine Independence Initiative to provide a means for purchase of vaccines using non-convertible currencies. It will be a great tragedy if the cost of hepatitis B and other vaccines prevents their use in developing countries, where they could have their greatest impact.

Monitoring and evaluation

42. In the 1990s monitoring of immunization coverage will increasingly be refined to ensure that immunization coverage levels can ultimately be recorded and reported in all communities. Such data will help immunization programmes to identify and direct intensified activities to the underserved population.

43. As immunization coverage levels rise, there will be an increasing focus on disease surveillance to monitor and evaluate programme impact. Such surveillance helps to direct immunization activities to areas of greatest need and is a prerequisite to achieving the goals of measles reduction, neonatal tetanus elimination and of poliomyelitis eradication. Actions such as investigation of outbreaks, application of outbreak control measures, assessment of vaccine efficacy, and review of immunization policies and strategies will be an integral part of these monitoring and evaluation efforts. Progress in surveillance will be assessed by managers responsible for disease surveillance using monitoring indicators such as timeliness and completeness of reporting, and promptness in instituting control measures. Since many cases of vaccine-preventable diseases seek treatment in the private sector, establishing and improving surveillance will require close collaboration with private practitioners and their associations.

44. Computerized EPI information systems will be increasingly used as management tools in the 1990s for disease surveillance as well as for monitoring surveillance indicators (e.g., timeliness and completeness of reporting) and immunization coverage. The systems will be progressively expanded and integrated into more generalized health information systems.

45. EPI programme reviews will continue to be promoted in the 1990s. There will be a new emphasis on areas such as management, supervision, training, quality of care, logistics, and disease surveillance that cut across other primary health care activities. EPI indicators will be elaborated and monitored through programme reviews and other methods to assess the extent to which immunization and other primary health care activities support each other. Programme reviews will also focus on solving specific constraints on the programme.

46. The World Summit for Children outlined a process for monitoring and evaluating progress towards all the goals set out in the World Declaration on the Survival, Protection and Development of Children. The monitoring activities and the mid-decade review called for in the Declaration and the Plan of Action adopted by the Summit will provide a highly visible forum for assessing progress towards the major immunization and disease control goals of the 1990s and the contribution of EPI to strengthening primary health care.

Research and development

47. Continued research and development activities directed at solving operational problems are an important component of immunization programmes at all levels. High priority areas of research in the 1990s include:

- improved disease control strategies - refining immunization strategies, conducting studies of the acceptability of immunization, and studying the delivery of immunization-related services through the primary health care infrastructure;

- improved methods and materials for diagnosis of the EPI target diseases and environmental sampling - making full use of available technology for rapid and simplified diagnosis at field level and identification of wild polioviruses in the environment;
- improved surveillance and programme monitoring tools - testing surveillance-system monitoring indicators to improve routine surveillance of preventable infectious diseases; developing methods for improving surveillance for acute flaccid paralysis, neonatal deaths, and rash illness; determining methods for assessing the effectiveness of "mopping-up" and outbreak response activities; and developing successful models of community-based surveillance systems;

- improved methods and materials for cold chain and logistic support - developing and testing refrigeration and injection equipment; conducting and refining studies and surveys on the quality of the cold chain; and investigating technologies and methodologies for improving logistics and transport (including computerized logistics management tools, vehicle maintenance and driver safety). This research will rely extensively on TECHNET, a global network of cold chain and logistic experts who plan and conduct such research; and

- introduction of new and improved vaccines - collaborating with the Children's Vaccine Initiative to evaluate strategies for, and cost implications of, incorporating new and improved vaccines into immunization programmes.

48. A complete list of priority research needs is periodically reviewed by the EPI Research and Development Group which meets every six months to monitor progress in immunization programme-related research. Many of the research needs have common points with other programmes and increased efforts will be made to share experiences between programmes.

Sustainability

49. The great success of immunization programmes must be sustained and will require continuing intense efforts for the foreseeable future to avoid a resurgence of vaccine-preventable diseases. The unprecedented level of world commitment to improving the well-being of children and women makes this an appropriate time to consider the challenges to sustainability. First, the need for health services never goes away; in every new birth cohort the success of immunization programmes must be repeated. A strong health care infrastructure is needed to continue this recurrent task despite difficulties in maintaining interest and excitement. Secondly, immunization programmes must compete with investments in other health and non-health related areas. Lastly, the quality of care and efficiency in use of programme resources, essential elements of immunization programme sustainability, are inadequate in most countries.

50. Overall programme sustainability is concerned with every activity of an immunization programme. Some of the crucial aspects to be taken into account in the planning and design of all immunization programmes in the 1990s to overcome the above challenges are:

- financial sustainability (where the money will come from; planning for future resources; allocation of resources; and costing programme elements);

- managerial sustainability (using available money and personnel in the most efficient and effective way possible; human resources management that includes maintaining high morale and adequate supervision; district-level planning; monitoring progress toward objectives and targets; equipment maintenance; and logistics);

- political sustainability (fostering the support of the communities served; political, religious and social leaders; and women's organizations); and

- technical sustainability (choice of the best policies and appropriate technologies to get the work done efficiently and the training needed to maintain the necessary skills and competence).

51. Research should also be conducted on improved methods for determining the recurrent costs associated with all components of immunization programmes and on devising mechanisms for cost sharing or cost recovery for immunization services.
Roles and responsibilities

52. National governments will continue to be responsible for coordinating and implementing immunization programmes in their countries. They have been primarily responsible for the achievements of immunization programmes to date, and will continue to be so in the future. Formation and strengthening of technical advisory groups will help to provide recommendations for national immunization programmes. In developing countries, and especially in the least developed countries, donor partners will continue to be needed for the foreseeable future to support governments in achieving universal mother and child immunization and the goals of measles reduction, neonatal tetanus elimination and poliomyelitis eradication. Interagency coordinating committees will play a critical role in coordinating donor input.

53. The Health Assembly and regional committees will continue to set goals and targets for immunization and WHO will recommend policies and strategies based on the suggestions of the EPI Global Advisory Group and regional technical advisory groups. The technical basis for such policies and strategies is elaborated in collaboration with technical consultative bodies such as the EPI Research and Development Group, EPI technical consultative meetings, and ad hoc meetings of experts. WHO will continue to produce training and educational materials and develop curricula; cooperate in planning and evaluating immunization programmes; monitor global, regional and country immunization coverage and disease surveillance data; disseminate information and encourage exchange of experience; promote the necessary research and development to solve operational problems; and provide technical support.

54. In the 1990s WHO will increasingly help in mobilizing resources for the countries in greatest need by intensifying cooperation and assuring that vaccines used in immunization programmes meet WHO requirements. WHO will strengthen its technical leadership by placing additional medical and technical advisers in key regional and country positions to cooperate in efforts to reduce measles, eliminate neonatal tetanus and eradicate poliomyelitis and to achieve the other goals for the 1990s.

55. UNICEF will continue to be a major provider of programme support, especially in the least developed countries. This includes supply of vaccines; provision of cold chain, injection and logistics equipment; participation in planning, implementing and evaluation of immunization activities; implementation of training programmes; promotion of social mobilization; and monitoring of public health communications that create demand for immunization services. UNICEF will also continue its successful advocacy efforts to keep immunization programmes on the agenda of decision-makers and leaders at the highest political levels.

56. UNICEF and WHO will continue to work closely together to ensure that their activities are complementary, using such mechanisms as WHO/UNICEF intersecretariat meetings, the UNICEF/WHO Joint Committee on Health Policy and interagency coordinating committees at all levels.

57. Other United Nations organizations and agencies, including UNDP and the World Bank, will continue to support immunization programmes in their development assistance programmes. UNFPA will also play a role in helping to increase immunization coverage with tetanus toxoid for women of childbearing age.

58. The Task Force for Child Survival and Development will serve as a forum for dialogue among heads of WHO, UNICEF, UNDP, World Bank, UNFPA and the Rockefeller Foundation. In addition, special meetings called by the Task Force serve an important function by raising awareness of the needs and challenges facing immunization programmes as well as the actions necessary to achieve the goals of the Plan of Action for Implementing the World Declaration on the Survival, Protection and Development of Children in the 1990s.

59. Bilateral development agencies are expected to continue to support immunization programmes in their development assistance programmes as called for in the Plan of Action. They will be active partners in interagency coordinating committees at all appropriate levels.

60. Disease control agencies and laboratories in developed countries are expected to strengthen their activities to assist in disease control initiatives in developing countries, especially as it becomes increasingly recognized that all countries benefit from worldwide control of the EPI target diseases. Such agencies and laboratories will be helpful in researching prevention and control strategies, assisting in outbreak investigation and control activities, developing laboratory networks, and refining environmental sampling methodologies and diagnostic tests.
61. Nongovernmental organizations, including such organizations as the Canadian Public Health Association, the International Federation of Red Cross and Red Crescent Societies, Médecins sans frontières, the Rockefeller Foundation, Rotary International, and Save the Children Fund, will continue to support immunization programmes in ways specific to their own mandates. It is anticipated that in the 1990s an increasing number of organizations, both international and local, will join in the global immunization effort. They would also participate actively in interagency coordinating committees at all appropriate levels. Private physicians will have an increasing role in many countries in providing immunization services, and special efforts will be made to involve medical societies in the recording and reporting of immunizations administered and cases of EPI target diseases diagnosed.

Conclusion

62. The past 15 years has witnessed a "quiet revolution" in health. Immunization programmes have been a prime mover in the development of an increasingly effective health infrastructure that is now making some 500 million contacts with infants and mothers each year. The challenges lie in tapping the full potential of these contacts in the decade of the 1990s to control an expanding number of target diseases and to help provide increasingly complete primary health care. The global coalition built around immunization programmes will serve to further improve immunization and disease control and will act as a catalyst in working to build more comprehensive health services in developing countries. This health infrastructure contributes, in turn, to national development.

63. In addition to the important humanitarian reasons for immunizing, the investment in immunization services makes sound economic, epidemiological and political sense. Disease prevention through immunization reduces not only deaths, but also the need for expensive curative and rehabilitative care. Immunization, in both industrialized and developing countries, will continue to be an important element of national health programmes as new and improved vaccines become available. Each dollar invested will result in an even greater return in prevented medical care costs, disability and death.

64. To these direct benefits are added important indirect benefits: immunization provides a means of helping to break the vicious circle of high infant and childhood mortality rates. Immunization, by permitting more of a family's children to survive, reduces the number of births desired by a family, which, in turn, reduces maternal, infant and child mortality rates. In this way it acts in strong synergy with family planning activities and makes the further expansion of immunization services one of the best bargains available for primary health care and national development.

65. Immunization programmes have entered into a new decade filled with exciting challenges. The continued commitment of governments and the international community to meeting these challenges will move everyone closer to the ultimate vision of a world free of suffering, disability and death from vaccine-preventable diseases.

II. VACCINE QUALITY

Introduction

66. In its efforts to assure that only vaccines meeting appropriate standards of safety, potency and efficacy are used throughout the world, WHO has generally relied on the application of international requirements by the competent national control authority (NCA). Only in isolated cases, notably for smallpox, yellow fever, and BCG vaccines, has WHO undertaken the task of certifying vaccines to meet international standards, in keeping with resolutions of the Health Assembly and Executive Board. In the case of these vaccines the procedures have evolved over time, being adapted to the characteristics of the vaccines and their use on a global scale.

67. Resolution WHA41.28 (May 1988) sets as a goal the global eradication of poliomyelitis by the year 2000. The Forty-second World Health Assembly (May 1989) set two additional targets for immunization programmes: the elimination of neonatal tetanus and the control of measles, both by the end of 1995. The effect of implementing strategies to meet these targets is an immediate and sustained increase in vaccine needs.

1 Resolutions EB2.R5; EB3.R6; EB13.R52; WHA3.18; WHA14.40; WHA27.54.
68. EPI recommends the use of oral poliovaccine as the vaccine of choice, with three doses in the first year of life plus a dose at birth in countries where poliomyelitis remains endemic. In 1990, 84% of children in the world were reported to have received a full course of poliovaccine in their first year of life. Maintaining the 1990 achievement will require the production of approximately 500 million doses annually. To achieve the eradication of poliomyelitis, the efficacy of supplementary mass immunization in high-risk areas has been demonstrated. In these areas, all children within a defined age group receive oral poliovaccine in house-to-house campaigns. The conduct of campaigns creates a short period of high demand for vaccine.

69. Similarly, the measles and neonatal tetanus objectives demand increased immunization coverage overall and, in particular, achievement of very high coverage in areas at high risk of disease. The sheer numbers of doses required and their cost in hard currency may necessitate production of vaccines in countries which may have had limited experience in controlling vaccine quality.

70. Resolution WHA35.31 (May 1982) called for the use in immunization programmes of only those vaccines meeting international requirements, and the Forty-second World Health Assembly endorsed the plan of action for the global eradication of poliomyelitis by the year 2000 which, inter alia, called for universal use of poliovaccines meeting international requirements by the end of 1990. Plans for control of measles and elimination of neonatal tetanus also specify the use of vaccines meeting international standards of quality.

71. Despite these resolutions, countries are still using vaccines which may be below the minimum standards of potency, safety, and efficacy. In 1990 international attention was focused on unprotected children born of mothers immunized with a tetanus toxoid product found not to have adequate potency.

Current situation

72. The international requirements provide for manufacturing procedures and control to assure the quality of vaccine, and WHO distributes international standards and reference reagents to be used in the necessary testing. UNICEF is a major supplier of vaccine for use in EPI. Guidelines have been formulated and applied to assure that the manufacturers of the vaccines supplied by UNICEF adhere to the international requirements. The process involves a preliminary review of protocols and documentation by WHO; assurance of consistency of production of five or more consecutive lots prepared from different bulk lots; and an inspection of the manufacturing facilities by WHO staff and consultants together with a representative of the NCA. The NCA may also be visited. Based on the satisfactory outcome of these steps, WHO can consider vaccines acceptable in principle for procurement by UNICEF. In addition, WHO tests vaccine potency and stability in independent laboratories of lots selected at random from among those supplied to UNICEF. However, the ultimate responsibility for assuring the quality depends upon the continuing activity of the NCA.

73. To meet the international requirements, vaccines must be subject to control by the NCA of the producing country. The international requirements provide for supply of a certificate by the NCA stating that the vaccine meets these requirements.

74. For a certificate to be valid, it must be issued by an authority competent within the meaning of the Certification Scheme on the Quality of Pharmaceutical Products Moving in International Commerce.

Implementation of objective: universal use of vaccines meeting international requirements

75. To confirm that all countries use vaccines which meet the international requirements, several steps are required:

First, health authorities of each Member State should resolve to use only vaccines meeting international requirements and include this as part of their EPI plans.

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2 Resolution WHA41.18.
Second, countries producing vaccines should develop procedures to ensure that their vaccines meet the relevant international requirements for quality. An example of a procedure to assist countries to achieve compliance is described in the Annex for illustrative purposes only. A final detailed procedure will be drawn up in collaboration with the concerned parties. Such a procedure is also intended to provide for an independent assessment of vaccine safety, potency and efficacy when the criteria used by the NCA deviate from the international requirements, and for independent testing of vaccines and of test procedures, coordinated by WHO. It may be convenient to coordinate activities to evaluate NCAs on a regional basis, through mandates of the regional committees.

Third, WHO would collaborate with Member States in which vaccine manufacturing takes place in the development or maintenance of effective and competent NCAs. WHO could do this by establishing training programmes for NCA officers in the control of vaccines. The individuals selected for training by WHO and the Member State, already possessing basic knowledge in the science and technology related to vaccines, would spend time in approved laboratories learning the testing procedures and with experienced individuals in the inspection of established vaccine production facilities. These procedures must then be applied in their own countries.

The role of WHO in ensuring the quality and supply of vaccines is in keeping with resolutions of the Health Assembly.1

Conclusion

76. The decrease in the number of cases of EPI target diseases and, particularly, the fact that large areas of the world are already poliomyelitis-free, attests to the high quality and efficacy of most of the vaccines now in use. To succeed with the global poliomyelitis eradication initiative and other WHO targets, WHO must take the lead in devising ways for Member States to assure that they are using only vaccines meeting international requirements.

77. This will result not only in the universal use of high-quality vaccine, but also in the establishment of infrastructure that is vital for quality assurance of all biological products. An analysis of the costs of implementation of this proposal for the certification of quality of poliovaccines which, together with that of tetanus toxoid, is the first priority, suggests a biennial figure of about US$ 500 000 for one region. Later efforts would extend the proposal to all vaccines.

1 Resolutions WHA27.57; WHA28.66; WHA31.53; WHA35.31.
EXAMPLE OF AN INTERNATIONAL PROCEDURE TO EVALUATE NATIONAL SYSTEMS TO ASSURE THE QUALITY OF ORAL POLIOVACCINES

1. Initiation of the scheme

A letter will be sent by WHO to national authorities of countries identified as manufacturing oral poliovaccine, inviting them to participate in the scheme.

2. Country evaluation

On receipt by WHO of a letter requesting inclusion in the scheme, two or more independent experts with a history of involvement in production quality control and licensing of oral poliovaccine will make a visit to evaluate the country activities.

In order that this step proceed with the minimum delay and maximum consistency a small panel of experts will be formed.

The evaluation will be based on the relevant WHO guidelines and requirements for both national authorities and manufacturers of oral poliovaccine. The experts will consider and report on the adequacy of the data submitted by the manufacturer to the licensing authority and the tests performed on behalf of the national authority on the final and, if appropriate, intermediate, stages of the vaccine, to confirm compliance with specifications. A visit will be made to the manufacturer, together with a representative of the national authority, to confirm compliance with good manufacturing practices.

The final report will be submitted to a group of experts for review (see below), together with copies of relevant documents received during the visit, and it will include a conclusion on suitability of the national procedures and a recommendation for any further action deemed necessary.

3. Review of country evaluation and conclusions

A group of five or more experts with an international reputation, including some from the WHO Consultative Group on Poliovaccine, will review the evaluation reports.

This group of experts will relate closely to the Children's Vaccine Initiative Task Force for the Needs Assessment of National Control Authorities in Developing Countries, since its findings will be of direct relevance to the Task Force in its role of encouraging and introducing new vaccines.

The evaluation reports will be confidential and will not be made available to third parties without the agreement of the country concerned.

The frequency of the meetings of the expert group remains to be decided but for the initial poliomyelitis activity one meeting in the first year should be adequate.

4. Action to strengthen country activities

The group of experts will draft proposals for funding for action to strengthen, where necessary, national authorities and manufacturers.

This remedial action will in general require training and support within the country, although external testing of samples may be needed.

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1 This example is provided for illustrative purposes only. A final detailed procedure will be drawn up in collaboration with the concerned parties.