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An Integrated Approach
to
High Coverage
Control of Measles
Elimination of Neonatal Tetanus
Eradication of Poliomyelitis

Introducing

The High Risk Approach

Expanded Programme on
Immunization

World Health Organization
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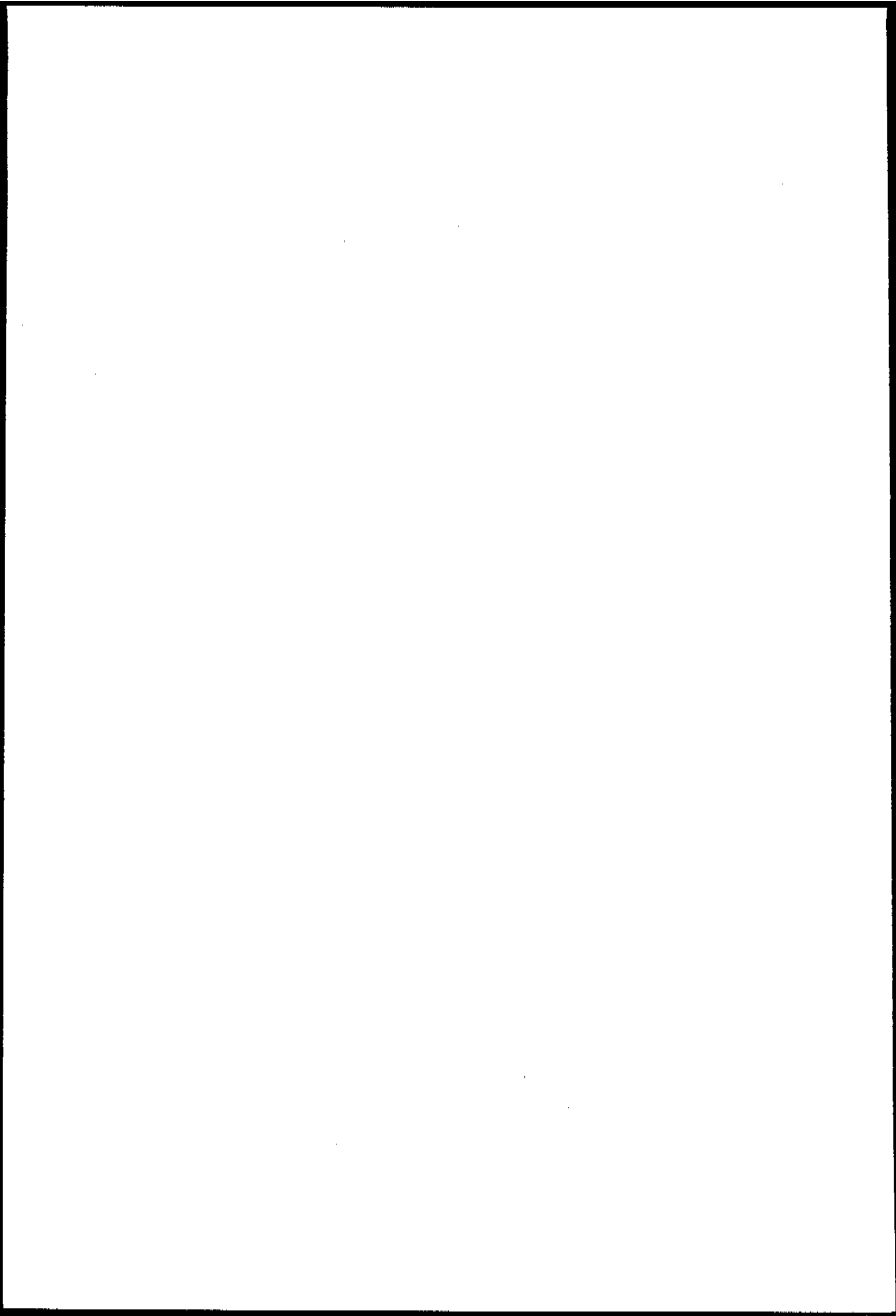
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1. Background

The World Health Assembly (WHA) has endorsed (resolution WHA 45.17) the World Summit for Children goals for immunization 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.

The WHA emphasized that the specific disease control goals should be pursued in ways which strengthen the development of the EPI as a whole, fostering its contribution, in turn, to the development of the health infrastructure and of primary health care (PHC).

As a response to these targets, WHO has developed plans of action for the three specific disease control initiatives:

Global Poliomyelitis Eradication by the Year 2000. Plan of Action. Revised 1992. (WHO/EPI/POLIO/92.2);

Plan of Action for Global Elimination of Neonatal Tetanus by the year 1995 (EPI/GAG/89/WP.9 being revised 1993);

Plan of Action for Global Measles Control (WHO/EPI/GEN/92.3 being revised 1993).

The global plans of action for neonatal tetanus (NT) elimination and polio eradication were preceded by action plans in some of the WHO Regions and in several countries. As new technical knowledge and operational experience emerge and the targets are approaching, the global plans of action will be revised.

The Purpose and Scope of this Document

As more countries are committing themselves to activities leading to the control of measles, elimination of NT and eradication of polio, it has become increasingly clear that there is a need for guidance on how to integrate the various activities recommended in the three separate plans of action. The purpose of this document is to review the three global plans and identify activities which are in common for the three initiatives. National managers might find it useful to conduct these activities with the aim of approaching the three specific disease control targets with the same set of activities. Such activities will, at the same time, increase

immunization coverage through a continued development of sustainable health infrastructures and management skills. The global plans of action for measles control, NT elimination and polio eradication contains sufficient technical information to allow better understanding of the rationale of the proposed activities.

Integration in this context means that when an activity is common to the three action plans, it should, in general, be conducted to promote all three initiatives at the same time. The three plans of action involve many such common activities, including surveillance and response to surveillance data. However, while increasing the efficient implementation of the plans, integration does not exclude the essential specific activities necessary to achieve the three disease control targets. Even in mature immunization programmes that have reached 70%-80% coverage with all EPI vaccines, including tetanus toxoid for women, special operations will still be needed to eliminate NT and eradicate wild polio virus. When to embark on such activities is largely dependent on the management capability at all levels of the programme and the resources available. An exception would be the need for applying the specific supplementary activities for polio eradication when a country becomes part of an expanding polio-free geographical zone even if the routine coverage level is low. In that case external support has to be provided for programme management and vaccine supply.

In order to ensure the highest possible impact of programme activities on disease occurrence and the most efficient use of scarce resources, there needs to be a strong programme management. To achieve this a management tool is introduced: the high risk approach.

2. Disease Reduction Strategies

The strategies to achieve the specific diseases reduction targets are presented in detail in the three separate plans of action for control of measles, elimination of neonatal tetanus and eradication of poliomyelitis. The main strategies are the following:

2.1 Measles

1. Increase coverage with measles vaccine to 90% in all districts.
2. Immunize all children in areas of high population density, including urban slums.
3. Identify other high risk populations through effective disease surveillance and use the data collected as a management tool to focus disease control activities.
4. Provide appropriate treatment of measles cases to reduce fatality rates. In areas where vitamin A deficiency is a public health problem, vitamin A should be used for treatment of measles cases and should be considered for severe cases in other areas as well.

2.2 Neonatal tetanus

1. Ensure that women of childbearing age have received at least two doses of tetanus toxoid and that all pregnant women are adequately immunized to protect their newborns from neonatal tetanus.
2. Identify high risk areas for NT and, in these areas, immunize all women of childbearing age and promote clean delivery practices.
3. Investigate all cases of NT to identify reasons for the case and apply appropriate remedial activities (immunization and clean delivery practices) in the epidemiologically appropriate population group, to prevent further cases.

2.3 Poliomyelitis

1. Achieve high immunization coverage (e.g. 80%) for all scheduled doses of polio vaccine in the first year of life. Oral polio vaccine (OPV) is the vaccine of choice for eradication of wild poliovirus.
2. Develop a sensitive disease surveillance system capable of detecting all cases that might be poliomyelitis, i.e. all cases of acute flaccid paralysis, especially in children aged under 5 years.

3. Conduct national or sub-national immunization days in countries that are part of expanding polio-free zones or that are potential major exporters of poliovirus. In such campaigns, OPV should be given to all children aged 0-5 years within a short period of time and repeated 4-6 weeks later.
4. Investigate all suspected polio cases and ensure rapid, expertly-managed response to suspected cases.
5. Conduct "mopping-up" immunization in high risk areas where wild poliovirus transmission may persist.

These five main strategies for polio eradication are complementary and will ideally follow each other in a maturing immunization programme. In reality, more than one strategy (e.g. 1, 2 and 3 or 2-5) may be pursued simultaneously. It should be noted, however, that in the most immature immunization programmes, the first strategy to achieve high OPV coverage is the most important; while in mature programmes, when polio has become infrequent and cases are focally clustered in a few districts, "mopping-up" activities become essential.

3. Implementation of the Strategies: The Case for an Integrated Approach

From the above it will be clear that two major components of the strategies are in common for the three diseases. High and uniform levels of routine immunization coverage serve as the foundation on which the disease reduction targets are based. Arbitrarily, this has been considered to be a level of 70%-80% coverage. It is clear, however, that high coverage levels, even above 90% which is the target for the year 2000, will not by themselves achieve these targets. Therefore, the other common strategy component, focusing supplementary immunization activities to areas and population groups at high risk of disease, becomes essential. The high risk approach (Section 8) requires an effective disease surveillance system (Section 5).

The time factor is important for all the three disease reduction initiatives. The target date for measles and neonatal tetanus is only three years away. This means that countries cannot afford to phase the diseases against each other: focus must be on both diseases if the targets are to be achieved. Therefore, what can be done for both these disease reduction initiatives simultaneously should have a high priority. Countries with coverage for routine immunizations below 70%-80% have to strengthen activities to increase coverage, but at the same time prepare and conduct more focused supplementary immunization activities aimed to reach areas/population groups at high risk for measles and neonatal tetanus. This means that what might be considered desirable from an operational point of view: to phase the activities and first go for uniformly high coverage levels and then start supplementary immunization activities, is not sufficient since it will not allow the target date to be reached. And more important: combining routine and supplementary immunization activities may have a greater impact on reducing disease and death burdens.

The same considerations apply for polio. Although the target date for global eradication is year 2000, this is not only for the elimination of the disease, but for the eradication of the virus. With the phased global plan of action it will take extensive efforts over the remaining eight years to achieve this goal. It is now generally assumed that most polio endemic countries will need to conduct national (or for the largest countries sub-national) immunization days for a period of several years. This will lead to the situation where the disease caused by wild poliovirus will remain only in certain foci, which then can be targeted for mopping-up immunizations. For polio it may also be necessary for countries with low immunization coverage to begin supplementary immunization activities before high coverage for routine immunization services has been achieved. As the only orally administered EPI vaccine, OPV can be given by non-health workers (community volunteers), which makes a campaign approach easier. While mopping-up must be conducted house-to-house, immunization days can be based on fixed collection points, with eligible children being brought for immunization at a point where this can be done easily and efficiently using a reliable cold chain for all vaccines.

As indicated above, there are several important technical and operational reasons to integrate common activities to achieve the specific disease reduction targets and the 90% immunization coverage. Furthermore, an integrated approach will ensure the most efficient use of scarce manpower at field level and the best return on available funds from national and international sources. As well as being technically and operationally sound and ensuring the best use of limited resources, an integrated approach also ensures the highest degree of sustainability.

4. Increasing Coverage

By the year 2000, immunization coverage should be at least 90%. As an operational sub-target, the EPI Global Advisory Group at its 1991 meeting recommended that immunization coverage against diphtheria, pertussis, tetanus, measles, poliomyelitis and tuberculosis for children at 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. In all districts at high risk of neonatal tetanus, all neonates should be protected by the immunization of women of childbearing age with tetanus toxoid by 1995. If the risk is unknown, it should be assumed to be high.

Seen in a 1992 perspective, substantial increase in routine coverage is most important for measles and neonatal tetanus. The goal of a 90% reduction in measles morbidity requires more than a 95% coverage with currently available vaccines, especially in more densely populated areas. Globally, the TT2+ coverage is around 40%, and in many areas at risk it is even lower. For neonatal tetanus, therefore, a general increase in coverage is the first priority. To achieve the 1995 goal, however, the NT initiative will depend on the early development of effective disease surveillance capable of identifying population groups at high risk for NT requiring special programme attention. Ultimately, even the occurrence of single cases of the disease must be perceived as a failure of the health system to ensure provision of tetanus toxoid and clean delivery services for all women.

Activities to increase coverage are shown in Table 4-1.

Within recent years, the inclusion of yellow fever vaccine in the routine immunization schedule has been recommended for 33 countries at risk in the African Region. The inclusion of hepatitis B vaccine in the infant immunization programme has been recommended for all countries, particularly those where hepatitis B virus infection is an important public health problem.

Table 4-1: Immunization Coverage

Topic	Common activities	Additional Specific Activities		
		Measles	NT	Polio
Schedule		One dose at 9 months	TT X 5 (3 x DPT equals 2 TT) Child-bearing age women and pregnant women where NT risk exists	OPV x 4 at birth and 6-10-14 weeks ¹
Target	1995: 80% in all districts 2000: 90% in all districts	1995: 90% coverage in all districts of infants in first year of life		
Strategies to reach target	Routine immunization through: - Fixed - Outreach - Mobile ² High risk approach ³ National Immunization Days ⁴			National Immunization Days: OPV x 2 to children aged 0-5 years ⁵

(Cont.)

Table 4-1.: Immunization Coverage (Cont.)

Topic	Common activities	Additional Specific Activities		
		Measles	NT	Polio
Monitoring	<p>Routine Monitoring system by districts and health facilities</p> <p>National routine coverage reporting should be confirmed, e.g. by coverage surveys⁶</p>		<p>Routine monitoring of protection of pregnant women and by 1993 onwards of children protected at birth (assessed at DPT1)</p> <p>Periodic coverage surveys of protection at birth in all high risk areas</p>	

Comments on Table 4-1: Immunization coverage

1. Four doses of OPV in the first year of life are recommended. If the birth dose is missed the fourth dose should be given at a later contact at least four weeks from the third dose.
2. To increase coverage in a sustainable way, the necessary health infrastructure needs to be developed. In many countries routine immunization activities in health facilities, including outreach activities, need to be expanded. Mobile teams are expensive and should only be used where population groups are otherwise impossible to reach with fixed and outreach services. In countries with low and medium-high coverage, the continued development of these basic routine immunization activities to reach at least 80% coverage should have the highest priority. Countries which have already reached 80% coverage should sustain these achievements through routine immunization and use the high-risk approach (see Section 8) to increase coverage to 90% and to achieve full immunization of children with OPV in areas where wild poliovirus transmission is persisting and of women of childbearing age with TT in areas/groups at high risk for NT.
3. The high risk approach is dealt with in section 8.

4. Special immunization activities using campaign approaches such as National Immunization Days should be considered in countries or parts of countries where, after thorough assessment, the build up or sufficient expansion of the health infrastructure based on fixed health centres in the near future is deemed unrealistic. Immunization days are targeted at service improvement, aiming to administer all appropriate EPI vaccines to infants in their first year of life and to women of childbearing age. Under certain circumstances the target age group may be expanded, e.g. to give OPV to children below five years and measles vaccine to children below 2 years of age. In areas which are difficult to reach and may only be visited once a year, tetanus toxoid may be given to all females below the age of 45 years or even to the whole population.

All campaign activities should aim to reach 100% of eligible children and women. If within the target area coverage increases by less than 20 percentage points during a campaign, a thorough evaluation should be carried out and constraints identified and solved before similar activities are repeated. All immunization campaigns should be planned and conducted in ways that are likely to leave behind an increased number of permanent immunization sites or activities, including their necessary logistical back-up.

Guidance for programme managers on how to organize immunization campaign activities will soon be available from EPI/HQ (see list of references, page 32).

Campaign approaches have been used successfully in certain countries in the Americas where measles elimination/eradication goals are being pursued.

5. Immunization Days may also be needed in countries in expanding polio-free zones with high coverage of routine immunizations but which have continued transmission of poliovirus that is not localized to a particular geographic area. In such activities OPV is given to all children aged 0-(3-)5 years irrespective of their immunization status within a short period of time and repeated 4-6 weeks later. National Immunization Days will normally use health facilities as delivery points and can therefore relatively easily, with sufficient logistical back-up, include all EPI vaccines.
6. 30 cluster surveys are a powerful tool with a function that goes beyond the simple measurement of immunization coverage to verify reported figures. Coverage surveys should always include protection at birth against tetanus.

Coverage surveys produce information essential for programme management: estimates of drop-outs, missed opportunities, incorrect intervals between immunizations, age at immunization and many other indicators. All these data are critical for programme managers to seek out the weak parts of their programmes and to help them concentrate their scarce resources on the areas that need them most.

5. Disease Surveillance

5.1 Routine Surveillance Activities

The most important objective of disease surveillance is to serve as a management tool allowing the programme manager to identify areas where the occurrence of the target diseases indicates a need for appropriate action and possible programme improvements. Surveillance is critical to allow monitoring of progress towards the control of the targeted diseases.

For all three specific disease control initiatives, effective disease surveillance is a precondition to achieve the targets. Even to achieve the 90% immunization coverage target, disease surveillance is an important tool to identify remaining pockets of susceptible individuals and then direct programme resources to these areas of greatest need. For EPI purposes, the goal of the disease surveillance system is to detect and report all cases of measles, NT and polio according to the standard case definitions to trigger activities for further control of the diseases. In the initial phases where the incidence of these diseases is still high, emphasis should be placed on timely and complete monthly reporting from all designated health facilities. When the incidence decreases, reporting must become increasingly accurate with all diagnosed cases being reported. Suspected cases of poliomyelitis should be reported immediately to the level responsible for actions such as investigation and initiating control measures. The active participation of communities in identifying and reporting suspected cases to health facilities becomes increasingly important to ensure that all cases occurring are being brought to the attention of the local health facility.

To ensure that surveillance information is quickly and effectively transformed into activities to promote disease prevention and control, the responsibility for management of the surveillance system and for appropriate response to surveillance information should be decentralized to district and health centre levels and given to designated health workers.

Detailed information on the requirements of a routine system for surveillance of infectious diseases that can serve EPI purposes, is outlined in the document "Improving Routine Systems for Surveillance of Infectious Diseases Including EPI Target Diseases: Guidelines for National Programme Managers" (WHO/EPI/TRAM/93.1).

It will be seen from table 5-1 that nearly all surveillance activities are shared between the three disease reduction initiatives with only a small number of specific activities.

Table 5-1.: Disease Surveillance

Topic	Common Activities	Additional Specific Activities		
		Measles	NT	Polio
<u>Data to be reported</u>	<p>Number of cases according to standard case definitions¹</p> <p>Reports by month and reporting unit</p> <p>Reports from all designated health facilities³</p> <p>At low incidence: immediate reporting of outbreaks (≥ 1 case)</p>		All neonatal deaths as NT and non-NT associated (only where NT is rare) ²	
<u>Compilation and Analysis</u>	<p>One designated person in charge at all levels, trained appropriately</p> <p>Record receipt of reports by date from more peripheral level</p> <p>Summarize number of cases</p> <p>Prepare spot maps and charts</p> <p>Look for trends</p>			

Cont.

Table 5-1.: Disease Surveillance (Cont.)

Topic	Common Activities	Additional Specific Activities		
		Measles	NT	Polio
Response to surveillance information	<p>Compare disease data to coverage data area by area</p> <p>Identify high risk areas and groups⁴</p> <p>Report to next level on time</p> <p>Instigate case or outbreak investigation⁵</p> <p>In case of upward trends: Identify reasons and act as appropriate</p> <p>Outbreak response as appropriate⁷</p> <p>Follow-up on reporting defaulters⁸</p> <p>Dissemination of surveillance information and feedback to reporting units⁹</p>			<p>Specimen collection⁶</p> <p>Intensified surveillance for 60 days after the last case ensuring community involvement in detection and reporting</p>

Comments on table 5-1: Disease Surveillance

1. Reporting of deaths from EPI target diseases through the routine disease surveillance system is not recommended. Such routine data cannot be used for calculations of case fatality rates in general and therefore they give only a very sketchy picture of the death toll by these diseases. Furthermore, reporting of cases and deaths from the same diseases complicates reporting for the peripheral health workers. Case fatality rates should be studied as part of outbreak investigations and in hospital and community based disease surveys.

It is important that the health workers in the peripheral health facilities know and are acquainted with the standard case definitions for reportable diseases adopted by the national authorities.

Currently WHO recommends the following standard case definitions:

Measles: Generalized maculo-papular rash and history of fever 38°C or more and at least one of the following:

- cough
- coryza
- conjunctivitis

Lay definition:

History of fever and rash AND any one of the following:

- cough
- running nose
- red eyes

NT History of normal suck and cry for the first 2 days of life, and history of onset of illness between 3 and 28 days of age, and history of inability to suck followed by stiffness and/or "convulsions".

Lay definition:

History of normal suck and cry first two days of life, AND
History of onset within the first month of life of inability to suck followed by stiffness and/or jerking of the muscles.

Polio: In endemic countries is:

Any child under five years of age with acute flaccid paralysis (including Guillain-Barré syndrome) for which no other cause can be identified.

In countries free of known wild poliovirus for many years, older age groups may be at risk of polio.

Lay definition:

History of sudden onset of weakness and paralysis of the leg(s), and/or arm(s) and/or trunk, AND history that paralysis was not present at birth or associated with serious injury or mental retardation.

2. The first priority for peripheral health facilities is to report all diagnosed cases of NT from their catchment area, to investigate the cases, list them and implement control measures (clean delivery practices and immunization) for the group of women to which the mother of the case belongs. The second priority, when the first one is functioning reasonably well, is for health facilities to obtain the collaboration of communities in the catchment area to make all cases of neonatal deaths known to them. The health workers then have to establish (according to the standard case definition) which deaths should be attributed to NT and which are non-NT deaths and to report accordingly to the district level (total number of neonatal deaths recorded; number of NT and non-NT deaths). The total number of NT cases reported from a peripheral health facility will consist of NT cases seen in the health facility and neonatal deaths reported from the community and diagnosed by the health workers as NT. Listing of investigated NT cases will be essential to keep track of NT cases referred to hospital treatment to avoid double reporting.
3. At its meeting in 1991, the Global Advisory Group recommended that by the end of 1992, all countries should ensure complete and timely¹ reporting of measles, neonatal tetanus and paralytic poliomyelitis (including reports of zero cases) on at least a monthly basis from all designated reporting sites.
4. Concerning the identification of high risk areas and groups, see Section 8.
5. The responsibility for urgent initiation of case or outbreak investigation should be clearly designated to one person. According to national policies, the investigation itself may be carried out by people at different levels of the health system. Investigation of cases of NT should be done by the health facility which has contact with the mother of a suspected case. Investigations of outbreaks of measles and polio, especially as incidence reaches low levels, should be carried out by trained, experienced professionals based at higher levels, possibly at the district.

¹ For definition of timeliness and completeness of reporting, see reference No. 5, page 29.

Guidelines on case and outbreak investigation are found in the following documents: "Guidelines for Investigating Suspected Cases of Neonatal Tetanus" (WHO/EPI/NT, 1992) and "Responding to a Suspected Polio Outbreak: Case Investigation and Control - A Managers Checklist" (WHO/EPI/POL, 1992).

6. Collection of stool specimens from every suspected polio case becomes increasingly important as the incidence decreases and a laboratory network is established and functioning according to national policy.
7. The character of the response to a measles/polio outbreak or a cluster of NT cases varies according to the disease, immunization coverage and local circumstances (geography/accessibility, seasonality, local practices, etc). For example, an outbreak of measles or polio in a heavily endemic area with low immunization coverage calls for strengthening of the routine immunization capabilities more than anything else, while in a country with an overall high immunization coverage and low incidence, it calls for careful analysis of reasons and corrective measures as appropriate (immunization days, outbreak control immunization or mopping-up). As polio incidence decreases to low levels, each reported case becomes a public health emergency.

In general, local outbreaks of measles are foreseen even in areas with high immunization coverage and immediate control measures in the form of an immunization campaign are not recommended, since they will have little effect on the course of the epidemic. However, in settings where energetic immunization activities might curb the epidemic, e.g. in cities, bigger towns and other highly populated areas, such activities should be considered to limit the death toll from the disease provided they can be conducted without jeopardizing the routine services. Strengthening the curative services to better deal with the measles-sick child should always be part of a measles outbreak response. In countries where measles is targeted for elimination/eradication, vigorous outbreak control measures should anyhow be undertaken. In the case of polio, in a country with an advanced routine immunization programme there will inevitably be political pressure for the health system to try to control the outbreak through an immunization campaign. Since infection with wild polio virus might already be widespread when the outbreak is discovered and investigated, local campaigns will most probably have little impact on the spread of the wild virus. The initial response should therefore be carried out to ensure continued public cooperation and stimulate active surveillance. However, it should be conducted in a limited manner, and should be followed by carefully planned control measures over a wide area, conducted to interrupt wild poliovirus transmission. The extent and age range of the targeted population will depend on the epidemiology of polio in the country, but will usually include only children zero to five years of age. Outbreak response immunization will cover progressively larger populations as the number of polio cases declines. It is best done on a house-to-house basis to all children in the targeted age range, regardless of their immunization status, and should be repeated four to six weeks later.

In countries with advanced routine immunization programmes, outbreaks of measles and polio and the occurrence of NT should always be thoroughly investigated and analysed to identify factors that can be corrected (see Section 8, The High Risk Approach). Such situations should be used to arouse awareness in the community and in political decision makers as to the importance of an effective immunization programme.

8. In following up on reporting sites that do not report, emphasis should be placed on identification of constraints affecting timely and complete reporting. These should then be addressed through closer contact e.g. through more frequent supervision or training/re-training of the staff at the particular health facilities.
9. Reported data should be transformed into easily understandable surveillance information. Such information should be fed back to all health facilities expected to report. At regular intervals, it should also be widely disseminated to political and administrative decision makers.

5.2 Special Surveillance Activities and Studies

The routine system for disease surveillance is the core information system on disease occurrence. The system is based on monthly (or weekly) reports from all health facilities including zero reporting. This system is the managers' tool at all levels to focus programme activities and make special interventions to improve disease prevention and control. In advanced systems capable of reacting to individual case reports, immediate reporting of individual cases of certain diseases of public health priority (e.g. polio) is part of the routine system.

There is, however, information of importance to programme planning/re-planning, strategy adjustment and progress monitoring that cannot be provided by the routine surveillance system. Activities to obtain such information are shown in table 5-2 and include vaccine efficacy studies, identification of the true frequency of diseases in a community, case fatality rates and risk factors for disease. Information on age distribution and immunization status of cases will come from outbreak investigations which are essential parts of the routine surveillance systems in advanced programmes. In some countries, however, such information can be routinely collected through selected specialized reporting sites, often called sentinel sites, which may be selected because they serve as referral facilities for specific diseases.

Table 5-2: Special Surveillance Activities

Common Activities	Additional Specific Activities		
	Measles	NT	Polio
Vaccine efficacy studies as part of outbreak investigations		Case-control studies to identify high risk areas	Environmental sampling for polio virus ²
Case fatality rates as part of outbreak investigations		Case-control studies of risk factors	Stool sampling from children without suspected polio ²
Hospital record review to study reporting accuracy and case fatality rates			Wild virus strain bank
Community based survey of true incidence and case fatality rates. ¹			

Comments on table 5-2: Special Surveillance Activities

1. Disease surveys are expensive and time consuming and will only get more so as the incidence drops. They should, therefore, never be part of the routine surveillance activities, but be conducted on an ad hoc basis in special situations. Community based NT surveys have been recommended for countries with no baseline information on the frequency of this disease.
2. For polio, activities to investigate the presence of wild virus in a community become essential where supplementary OPV immunization activities aimed at interrupting wild virus transmission (National Immunization Days, outbreak response immunizations and mopping-up) have taken place and cases of paralytic polio have disappeared.

6. Monitoring of Surveillance Effectiveness: Quality Indicators

The three main indicators of quality of reporting and of effective use of reported data are:

1. Timeliness/completeness of reporting measured as the number of monthly (or weekly) reports received on time at district, state/provincial and national levels compared to the number of health facilities designated to report. What "on time" means needs to be defined by national authorities depending on local conditions for communication; for monthly reporting, the deadline for peripheral health facilities' reports is often 2 weeks into the following month and at least before the end of the following reporting period. In most countries, eight weeks should be enough for the reports to be processed from the peripheral to the national level.
2. The number of investigated cases/outbreaks compared to the number of reported cases/outbreaks. For NT and polio in low endemicity countries, this parameter should relate to reported cases. For polio in high endemicity countries and for measles this parameter should relate to reported outbreaks/clusters of cases.
3. For NT and polio: The number of case/outbreak responses compared to the number of cases/outbreaks investigated.

For indicators 2 and 3, various time limits can be built in, for example how many polio cases were investigated within 48 hours after receipt of reports. For the various diseases other indicators can be monitored on the quality or effectiveness of different operational aspects as indicated in the following section.

7. Data needed for proper Management of National Immunization Programmes

For proper management of an immunization programme, information is needed on achievements and impact, as well as on the effectiveness and quality of performance of important programme activities. Such indicators should be kept as few and simple as possible, limited for example to information on disease occurrence, immunization coverage and timeliness and completeness of the disease reporting system. However, in countries with more advanced programmes (e.g. > 80% coverage) embarking on elimination of NT and eradication of wild polio virus, more indicators are needed to ensure that programme activities are effective and sustainable on a routine basis. At WHO Regional and global levels much fewer data are needed to provide overall programme monitoring and strategy evaluation. Proposals for data to be available for programme management and evaluation at national level are given in table 7-1 which also indicates data that should be reported to WHO.

Table 7-1: Data needed at national level
 (WHO) indicates national data, at a minimum, that should be routinely reported to WHO. Regions may decide on additional data to be reported.

Measles	NT	Polio
* Coverage (WHO)	* Coverage (WHO)	* Coverage (WHO)
* No. cases (WHO)	* No. cases (WHO)	* No. cases (WHO)
	* No. neonatal deaths (only where NT is rare) ¹	* No. acute flaccid paralysis (after case investigation)
	* % of districts reporting cases (WHO)	* % of districts infected (i.e. one case within previous 12 months)(WHO)
* Immunization status of cases (from outbreak investigation)	* Immunization status of mothers of cases (from case investigation)	* Immunization status of cases (from outbreak/case investigation)
* Age breakdown (from outbreak investigation)		* Age breakdown (from outbreak/case investigation)
* No. reports received on time compared to no. expected reports (WHO)	* No. reports received on time compared to no. of expected reports (WHO)	* No. reports received on time compared to no. of expected reports (WHO)
		* % of cases reported within 1 week, 2 weeks and > 2 weeks of onset of paralysis
	* % neonatal deaths investigated	* % of cases investigated
	* % neonatal deaths investigated within 1 month of detection (at health facility) or reporting (to districts)	* % of cases investigated within less than 48 hours of detection
	* % NT cases followed by corrective activities within 1 month of investigation	* % cases with outbreak response

(Cont.)

Table 7-1: Data needed at national level (Cont.)

Measles	NT	Polio
	* % pregnant women attending antenatal care (x 1,2 etc.) ² * No. maternal deaths (from maternity hospitals) ³	* % cases with outbreak response within 24 hours of investigation * % cases investigated that have 1 or 2 stool specimens taken * Rate of AFP detected per 100 000 children aged under 5 years

Comments on Table 7-1: Data needed at national level

1. The frequency of neonatal deaths is an important parameter in developing communities, but difficult to measure. In general, it is not included in routine surveillance systems. The development of effective community based surveillance systems of neonatal deaths is a priority in advanced immunization programmes - see comment 2 to table 5-1, on page 15. In districts where NT has been eliminated, a reporting system for neonatal deaths becomes essential and should be established. Where neonatal death is a reportable event, all recorded cases should be investigated and reported to the next level as NT or non-NT related and the timeliness/completeness of such investigations be used as a quality indicator (percentage of reported neonatal deaths investigated within one month).
2. Information on this indicator may be available at local level in many countries but a system for compilation of the data needs to be developed in close collaboration with maternal and child health (MCH) programmes.
3. This indicator is usually not readily available. The compilation methodology is simple, but needs to be implemented as a routine within MCH programmes. Maternal deaths may be reported by assumed cause of death, including tetanus.

8. High Risk Approach

The idea behind the high risk approach is to focus special efforts on areas and population groups where there is a particular risk of disease. In a situation with scarce financial and human resources, this approach offers an effective way to further increase coverage levels, to control measles, eliminate NT and eradicate wild polio virus.

Tables 8-1 and 8-2 summarize how to identify high risk areas or population groups and then what to do about them. In many instances there will probably be an overlap between high risk areas and groups for measles and polio; high risk areas and groups for NT might also turn out to be at relatively increased risk for polio and measles.

The high risk approach is essential to the eradication of wild polio virus, but will also be important for the two other specific disease control initiatives and for the sustainability of immunization programmes in general. Once health workers at national and district levels have become acquainted with the concept, the high risk approach can also be useful for other primary health care activities.

In general, at national level, high risk areas are identified based on coverage and disease incidence data. At this level high risk areas will often be defined as high risk districts and cities. At district level, high risk areas and groups will be identified using data on coverage and disease incidence and all the other parameters mentioned. At health facility level even more detailed knowledge (demographic, cultural, geographic, etc.) about the population living in the catchment area can be employed to identify population groups at special risk.

Whether or not high risk areas or groups, once identified, can be addressed by special immunization activities depends on how extensive these areas/groups are and the capacity of the health services to undertake additional activities. It is a decision of the managers at national and district levels to balance needs against resources. If large geographic areas are identified as being at high risk, priorities need to be set within these areas for special interventions (using, for example, easy accessibility and high population density as selection criteria). It will often be possible, however, to embark on some activities in all identified areas, for example intensified immunization in the immediate vicinity of health facilities and in towns. It should be emphasized that conducting specific or intensified activities in high risk areas should not jeopardize the continuation of the routine immunization activities.

Table 8-1: Identification of high risk areas and groups

Common Features	Additional Specific Features		
	Measles	NT	Polio
Areas with low coverage	High density population (e.g. urban poor) ³	Mothers of cases of NT	High density population
Population groups with low coverage	Children admitted to hospital	Refugees	
Populations with poor health access or service provision	Refugees Potentially HIV-infected mothers	High rate of deliveries attended by untrained persons	
Areas where high risk groups live ¹	Vitamin A deficient populations		
Areas where cases occur (irrespective of coverage)			Areas where cases have occurred within previous three years ⁴
			Areas where wild poliovirus is still present ⁵
The don't-know-areas (i.e. areas about which there is no information)			
War zones			
"Gut feeling" ²			

Comments to table 8-1: Identification of High Risk Areas and Groups

1. In areas where a group with particular risk of acquiring a disease (e.g. due to low coverage) live, the whole child population may have a higher risk for that particular disease, although in general better protected than the risk group. Therefore, control measures should be considered for all children (or certain age groups) in the area and not only for the particular risk group.
2. "Gut feeling" refers to the fact that managers very often know, without making a great analysis of the parameters mentioned, where they have their high risk areas and groups.
3. For measles, the urban poor should be considered as a special high risk group. Due to a crowded environment there is a high rate of transmission of measles virus. Such population groups might be an important reservoir for seeding measles virus to rural populations.
4. Areas where polio cases have occurred within the previous three years should only be considered for special control activities in the latter phase of poliovirus eradication.
5. In the absence of cases, presence of wild poliovirus may be detected by recovery of wild virus from the stools of children without suspected polio, and from the environment.

Table 8-2: Special activities in high risk areas and groups

Common Activities	Additional Specific Activities		
	Measles	NT	Polio
Analyse and identify reasons for being a high risk area/group	Special immunization activities in urban slums	House to house immunization of all females	National immunization days ¹
Produce appropriate measures (including immunization days where appropriate)	Immunization of all children ≥ 6 months on admission to hospital ³	Immunization of mothers of NT cases ⁴	Mopping-up ²
	Immunization of all children 6-59 months on admission to refugee camps ³	In refugee camps: TT to all females	

NOTE: Careful analysis and planning is essential before deciding appropriate immunization approaches. All available information on disease occurrence and immunization coverage and on the capacity of the existing health infrastructure should be considered.

Comments to table 8-2: Special activities in high risk areas and groups

1. National or sub-national immunization days are an important supplementary immunization activity to eradicate wild poliovirus, see comment No. 5 to table 4-1, page 10.
2. Mopping-up is a strategy reserved for the latter stages of eradication in countries where there is only focal poliovirus circulation. It is defined as the administration of OPV in areas at high risk of transmission of wild poliovirus, house-to-house, to all children in the targeted age range, usually children up to five years of age, regardless of their immunization status. Two doses are administered four to six weeks apart. Mopping-up should be targeted at high risk areas defined by disease surveillance data. It is conducted whenever possible in the low season for transmission of poliovirus and other enteroviruses.

Mopping-up should be an exceptional and carefully planned activity, and is, therefore, not an emergency operation as an immediate response to an outbreak.

The objective of mopping-up is, by wide distribution of OPV, to achieve high immunization levels in a short period of time, displacing the wild poliovirus from a large area/population group. The area should be as extensive as possible and the target group typically children below the age of 3-5 years. The greater the area and the larger the population group targeted with mopping-up, the more effective is the operation in displacing the wild polio virus. The definition of areas and groups is a difficult management decision to be taken at district and national level.

Since mopping-up is a well-planned activity it might in principle be possible to administer the other EPI vaccines to children below the age of 12 months according to their immunization cards. However, as the only orally administered EPI vaccine, OPV can be given by non-health-worker volunteers. Adding other EPI vaccines to the operation will increase the needs for health workers' participation, especially because mopping-up is conducted on a house-to-house basis. This will, in turn, increase the risk of jeopardizing routine immunization services and should therefore be carefully considered. The non-health-worker volunteer should always take advantage of the home visit to educate parents the importance of full immunization with all antigens and the date, time and place where all vaccines are available. National immunization days, on the contrary, may use health facilities as delivery points and can therefore relatively easily provided there is sufficient logistical back-up include all EPI vaccines.

3. Children immunized with standard measles vaccine before 9 months of age should be re-immunized at that age or as soon thereafter as possible.
4. Mothers of NT cases are at higher risk of having another newborn dying from NT. They should, therefore, be immunized whenever they are in contact with a health facility (e.g. when they bring their child with NT to hospital) or when identified in the field.

9. Supporting Activities

Supporting activities comprise:

- * Training
- * Supervision
- * Management of cold chain and logistics
- * Social mobilization and community participation.

These components and their individual importance to the overall success of an immunization programme are well known to programme managers and it goes beyond the scope of this document to discuss them in detail. A few aspects, however, are worth mentioning.

Training

As more and more emphasis seems to be put on disease control, it becomes imperative to remember that most activities remain common to all the three specific disease control initiatives as has been shown earlier in this document.

The implications for training activities are therefore that the majority of training courses and workshops should be planned and organized as an integrated approach addressing all three initiatives. This includes training related to:

- * Programme management at all levels
- * Immunization coverage
- * Disease surveillance and appropriate response activities
- * The high risk approach
- * Communication.

According to national priorities, emphasis may be given to specific disease control initiatives. However, this should not exclude other control initiatives to be addressed. In both cases training should be task specific and directed to those responsible for implementation at appropriate levels. Training methodologies should focus on participatory methods and always include ample time for skills practice.

Supervision

At their regular visits, supervisors should deal with all disease control targets and coverage issues. It is important, therefore, important that supervisors become familiar with the benefits and practicalities of an integrated approach.

Cold chain and logistics

The comprehensive approach to control of vaccine preventable diseases means that needs should be assessed for all disease control initiatives, including vaccines, repair/replacement/supplementary equipment, distribution and other transportation needs. Ways should be explored to reduce wastage rates for all vaccines used in national immunization programmes without compromising high coverage.

Social mobilization and community participation

It is true that all the previously mentioned aspects of an immunization programme need to be addressed by managers at various levels. It is also true, however, that all these technical approaches are not enough to achieve the targets. The communities must take an increasingly active role. It is not even enough that parents are sympathetic to having their infants immunized once the services are there: they must actively demand the services and have them maintained and improved to serve an increasing proportion of the children with still more components of primary health care. Many experiences indicate that the development of effective immunization services is a good first step in the introduction of primary health care at community level, since a real motivating impact on disease occurrence and death of infants and children can be achieved in a relatively short time period.

When communities are being mobilized, emphasis should be given to all vaccine preventable diseases and to other components of primary health care currently included in national policies.

In any disease control programme, only cases that are being brought to the attention of the health workers will be treated. For the vaccine preventable diseases, the occurrence of cases indicates, in principle, a failure of the immunization programme. If such cases are not seen by health workers they will not be reported and no corrective measures can be taken. The only way that such cases can be brought into the system is to involve the community. As diseases that are targeted by a reduction/elimination/eradication initiative become rare, it is even more important to involve the community in disease surveillance and control. Community health workers, healers, traditional birth attendants and community leaders should know which are the reportable diseases and how to recognize them. They should be encouraged to watch for these diseases among people in their community and to urge patients/parents of cases to seek care, and report suspected cases to the local health facility. Follow-up by local health workers of any reported or referred cases and formal recognition of community involvement, through ceremonies or other acknowledgements, are good ways to encourage communities to become part of the country's disease surveillance system. The targets for measles, neonatal tetanus and poliomyelitis can only be achieved through such active community participation.

10. Development of Integrated National Action Plans

Increasing coverage through routine immunization services is the most important means to channel health care services to an increasing proportion of children and women and, more specifically, to prevent thousands of children dying every year from vaccine preventable diseases including pertussis.

Countries and WHO Regions might choose to give different priorities to various components of their immunization programme. Some countries have selected the polio eradication component as the driving force for national immunization and other PHC activities while in other countries more emphasis is being given to the control of neonatal tetanus and measles as the major killer diseases among the vaccine preventable diseases.

Whatever emphasis countries and Regions place on different components of the immunization programme, it is obvious that activities which at the same time can promote all programme components should have high priority. Such activities, while promoting national immunization activities broadly, will also create the best possible platform for coordination with other PHC services directed at women and children.

Many countries have elaborated separate plans of action for neonatal tetanus elimination and polio eradication and are in the process of adding plans for activities to control measles. As demonstrated in the previous sections, several components of these disease control activities are in common, particularly the essential element of disease surveillance including the high risk approach and subsequent control measures.

National managers of immunization programmes are therefore encouraged to develop an integrated plan of action for national immunization programmes. Focusing such integrated action plans on activities (to reach more infants and women, disease surveillance and subsequent actions etc.) rather than on specific diseases may facilitate the addition of other health services targeted to children and women, especially services aimed at disease prevention and control directed by effective surveillance systems.

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