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# Measles Mortality Reduction

*Regional Strategic Plan 2003-2005*

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## ABBREVIATIONS

AFP	–	Acute Flaccid Paralysis
GAVI	–	Global Alliance for Vaccines and Immunization
CDC	–	Centers for Disease Control and prevention (USA)
CIDA	–	Canadian International Development Agency
CRS	–	Congenital Rubella Syndrome
DFID	–	Department for International Development, United Kingdom
HIV	–	Human Immunodeficiency Virus
ICC	–	Interagency Coordinating Committee
JICA	–	Japanese International Agency for Cooperation
MCV	–	Measles containing vaccine
MMR	–	Measles-Mumps-Rubella vaccine
MR	–	Measles-Rubella vaccine
NIDs	–	National Immunization Days
OPV	–	Oral Polio Vaccine
SIDA	–	Swedish International Development Agency
SEAR	–	South-East Asia Region
UNDP	–	United Nations Development Programme
UNFP	–	United Nations Population Fund
UNHCR	–	Office of the United Nations High Commissioner for Refugees
UNICEF	–	United Nations Children’s Fund
USAID	–	United States Agency for International Development
VPD	–	Vaccine Preventable Disease
WHO	–	World Health Organization

## GLOSSARY

**Catch-up campaigns** are one-time only events targeting multiple cohorts in which susceptible children have accumulated. The target age group depends on the measles susceptibility profile of the population. During a catch-up campaign all children in the target age range receive a supplementary dose of measles vaccine, regardless of prior disease or vaccination history.

**Follow-up campaigns** are periodical events (E.g. every 3-5 years) to maintain low levels of susceptibility among preschool-aged children. The interval between campaigns depends on the routine immunization coverage and the existence of pockets of unprotected children. The target age group for immunization in these campaigns should include all children aged over nine months who were born after the previous mass immunization (e.g. catch-up campaign).

**GAVI:** Global Alliance for Vaccines and Immunization. GAVI is a partnership dedicated to ensuring that all children have equal access to vaccines regardless of socio economic status. It also works to spur the development of new vaccines against major killers that primarily affect the world's poorest people. It is founded on the principle that immunization is a human right and a key step towards overcoming poverty.

**Measles control:** Reduction of measles morbidity and mortality in accordance with targets; continued immunization intervention measures are required to maintain the reduction.

**Measles elimination:** The situation in large geographical area in which measles virus circulation has been interrupted, endemic transmission of measles cannot occur and sustained transmission does not occur following the occurrence of an imported case; continued immunization measures are required.

**Measles eradication:** Interruption of measles transmission worldwide as a result of deliberate efforts; intervention methods may no longer be needed. Eradication represents the sum of successful elimination efforts in all countries.

**Routine immunization:** Regular provision of immunization services to successive cohorts of infants through vaccination at fixed sites, door-to-door canvassing, outreach activities, or periodic pulse campaigns (one or more a year as appropriate). The activities usually involve the screening of vaccination records (selective immunization).

**Pulse campaigns:** Periodic campaigns, usually conducted at the district level, targeting all children aged over nine months who were born after the last pulse vaccination.

**Supplementary immunization:** Mass campaigns targeting all children in a defined age group, with the objective of reaching a high proportion of susceptible individuals. Each campaign is conducted over a wide geographical area (e.g. province or country) in order to achieve a rapid reduction in the number of susceptible children. It is not usual to conduct screening for vaccination status and prior disease history (i.e. the campaigns are usually non-selective)

## EXECUTIVE SUMMARY

Since the introduction of the measles vaccine in the routine immunization programmes of the countries in the mid-1980s, the morbidity and mortality due to measles has been substantially reduced. However, measles remains the leading cause of childhood deaths and disability due to a vaccine preventable disease (VPD). According to global estimates of mortality, 202 000 measles deaths (29% of estimated global deaths) occurred in the countries of the Region in 2000<sup>(1)</sup>. Immunization coverage levels of Member Countries in the Region indicate that there are many unvaccinated children in the SEA Region. In addition, the average seroconversion rate of 85% following a single dose of measles vaccine at nine months leaves a significant proportion of children susceptible<sup>(2)</sup>. Accumulation of children who are either not immunized or do not develop immunity from one dose of vaccine in successive birth cohorts can result large measles outbreaks, even in countries where vaccination coverage is high. This situation warrants improving and accelerating measles control strategies in the Region.

The overall goal of the regional strategic plan is to provide a framework for countries of the Region to contribute to the global goal of reducing the number of measles deaths by half by 2005 relative to 1999 estimates.

The specific objectives are:

- (1) To reduce the number of measles deaths by half by 2005 relative to 1999 estimates in polio- free countries of the Region;
- (2) To achieve reliable monthly reporting of the number of measles cases and deaths, together with AFP, NT and other priority VPD, by all Member Countries by 2004;
- (3) To achieve investigation of at least 20% of measles outbreaks by all Member countries in 2004 and 80% of outbreaks by 2005;
- (4) To achieve and maintain 80% coverage with routine measles vaccination in at least 80% of districts in all Member Countries by 2005, and
- (5) To provide a second opportunity for measles immunization to eligible children in Member Countries by 2005.

Globally, two separate sets of strategies have been defined for measles mortality reduction and measles elimination<sup>(3)</sup>. Countries in the South-East Asia Region have achieved varying levels of measles control. Bangladesh, India, Myanmar, Nepal and Timor-Leste, where measles mortality is high, should focus on reducing measles mortality. Other countries including Bhutan, DPR Korea, Indonesia, Maldives, Sri Lanka and Thailand have achieved low measles mortality levels, but experience periodic measles outbreaks. These countries, who have already achieved the standards set for mortality reduction, could strengthen their immunization strategies and surveillance standards towards elimination of measles. Large countries, including India and Indonesia should evaluate their large administrative areas separately and adapt specific strategies that are appropriate for those areas, either on mortality reduction or elimination.

Improving routine immunization is the key strategy for sustainable measles mortality reduction and elimination. This plan endorses a second opportunity for measles immunization in addition to the first dose of measles vaccine at nine months of age<sup>(4)</sup>. Immunization initiatives should be backed by an effective surveillance system to monitor disease epidemiology and vaccination coverage. Data generated should be used to assess the impact of immunization activities and adapt policies and strategies for targeted programme implementation. The existing polio surveillance system in the region provides a sensitive and responsive structure for high-quality disease surveillance and should be expanded to include measles and other vaccine preventable diseases. Based on the strengths of each national immunization programme, the second opportunity could be provided through supplementary immunization activities (SIAs) and/or through routine immunization services.

It is also necessary to improve the management of measles cases through collaboration with initiatives which focus on reducing childhood mortality and morbidity. Moreover, ensuring immunization safety should be a priority. Opportunities to provide vitamin A, OPV and integrating rubella vaccination and surveillance could be considered where appropriate<sup>(5)</sup>.

Achieving polio eradication remains the top priority for the Region. Bangladesh, India, Indonesia, Myanmar and Nepal have a well-established polio eradication infrastructure, based on a network of surveillance officers supported by WHO. This network will most probably continue to operate for several years until such time global polio-free certification is achieved. These countries should take advantage of this infrastructure to support strengthening of routine immunization services and measles surveillance, including other VPDs as appropriate.

## **1. BACKGROUND AND OBJECTIVES**

This document updates the regional plan of action for reducing measles mortality in the South-East Asia Region (SEAR), which was endorsed by the Technical Consultative Group for Vaccine Preventable Diseases in the South-East Asia Region (TCG) at its meeting in October 2001<sup>(6)</sup>. It includes the recommendations of (i) the Joint WHO/UNICEF Inter-Regional Workshop on Measles Control and Maternal and Neonatal Tetanus Elimination Meeting held in February 2002, and (ii) the Partners' Consultation on Measles Control in the Region held in February 2003. It is adapted from the WHO/UNICEF Global Strategic Plan for Measles Mortality Reduction and Regional Elimination 2001-2005, in which the primary goal is to reduce the number of measles deaths by half by 2005 relative to 1999 estimates<sup>(3)</sup>. It provides a strategic framework for measles mortality reduction in the South-East Asia Region (SEAR) for the period 2003-2005 and the estimated external financial resources requirements. The global measles strategic plan was endorsed by the UN Special Session on Children in May 2002 and the World Health Assembly in May 2003.

## **2. BURDEN OF MEASLES IN THE REGION**

Despite the declining trends in measles cases from a reported 440 000 in 1989 to 88 584 in 2002 corresponding to an increase in routine measles immunization coverage, measles remains a major cause of morbidity and mortality in the Region (Fig. 1). It is a major killer of children. Although data on reported measles cases and deaths are available in the Region, both are grossly under-reported. However, global estimates of measles deaths indicate that as many as 202 000 (29% of estimated global deaths) deaths occurred in the Region in 2000<sup>(1)</sup>. The primary reason for this high burden is under-utilization of measles vaccine in the Region and weak immunization services resulting in inadequate vaccination coverage. These deaths are unacceptable, because measles vaccine is safe, highly effective, and cost-effective<sup>(7, 8)</sup>.

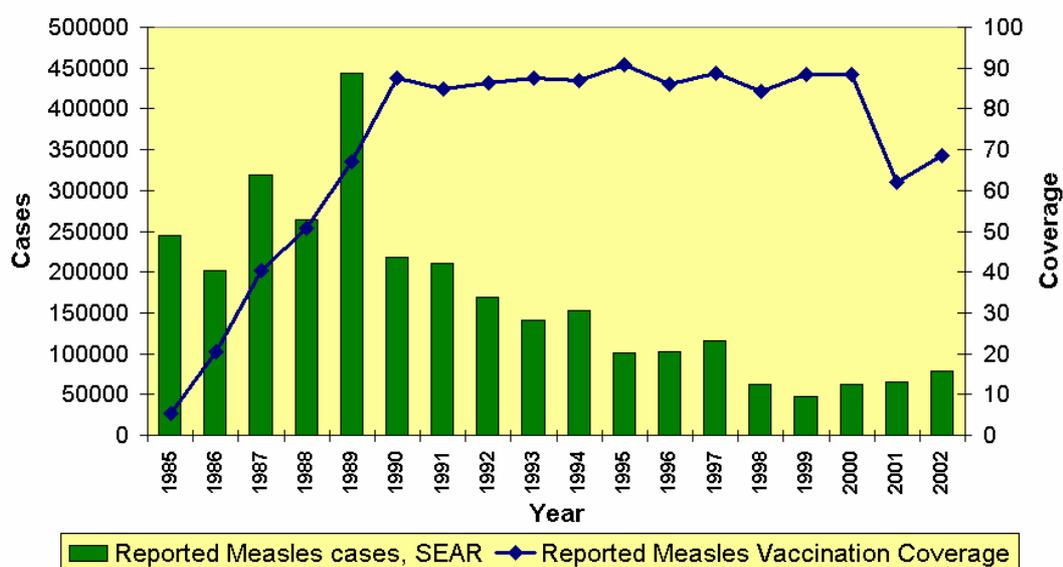
### 3. CURRENT STATUS OF IMPLEMENTATION OF MEASLES CONTROL STRATEGIES IN REGION

#### 3.1 Routine immunization

All countries in the Region include a dose of measles containing vaccine in their routine immunization schedule. Sri Lanka provides a second dose as measles-rubella at three years of age and Thailand provides a second dose as measles-mumps-rubella at six years of age (Table 1).

Routine vaccination of infants against measles since the mid 1980s has resulted in declining measles cases and deaths in the countries of the Region (Fig.1). However, measles vaccination coverage has remained stagnant around 80 percent in most countries. The decline in coverage in 2001 was mainly the result of a shift in India from administrative coverage to survey coverage as source of official coverage information.

Figure 1: *Reported Measles Cases and Coverage, SEAR, 1985-2002*



Source: WHO/UNICEF Joint Reporting Form

The age distribution of measles cases varies within the Region (Table 2, 3 and 4). In Bhutan, Indonesia, Thailand, Sri Lanka and Maldives, the majority of cases reported occurred among children above five years, indicating relatively good measles control programmes. In India, Bangladesh and Myanmar, more than 50% of cases were reported in children less than five years of age, indicating insufficient routine measles immunization.

### **3.2 Supplemental Immunization and Linkages with Polio Eradication and Vitamin A Delivery**

In order to increase population immunity and reduce incidence of measles, most countries in the Region have conducted measles SIAs (Table 5). These have varied in geographical extent from national (DPR Korea in 1999 and Bhutan in 2000) to large sub-national (Bangladesh 2001, Maldives 2000 and Myanmar 2002) to urban areas/high risk areas (India 2001, Indonesia 2002 and Thailand 2000). The age groups targeted by these campaigns have also varied: 9-23 months, 9-35 months, 9-59 months, 6-59 months, 5-14 years, below 15 years, and 6 months to 18 years (Table 5).

Several countries have used the opportunity provided by the national/sub-national immunization days for polio eradication to deliver other services, such as measles and TT vaccination and vitamin A administration. For example, Indonesia used the polio NIDs in 2002 to deliver measles vaccine in high risk villages. Bhutan delivered measles vaccine nationwide at the time of the second round of its SNIDs in 2000. Bangladesh, Nepal, DPR Korea and Indonesia used a round of the NIDs in 2002 to deliver vitamin A to targeted children.

### **3.3 Surveillance**

Achieving certification standard AFP surveillance is the overriding priority in the countries of the Region. Nonetheless, all countries in the Region have included measles in their communicable disease reporting systems, which routinely and passively reports numbers of cases, and deaths. Bhutan, Indonesia, Maldives, Sri Lanka and Thailand have established integrated surveillance systems that include measles surveillance.

Bangladesh, India, Indonesia, Myanmar and Nepal use a WHO supported network of trained Surveillance Medical Officers (SMOs) to assist their governments in conducting AFP surveillance. In 2000, Myanmar started integrated AFP, measles and NT surveillance system, using the SMO network. In 2002, Bangladesh and Nepal developed guidelines and initiated training and implementation of an integrated AFP, measles and NT surveillance system.

Nationally, India does not have a disease surveillance system in which disease information for measles and other vaccine preventable diseases (VPD) is used for immediate local action. However, a number of states in India have developed responsive, integrated disease surveillance systems. Number of disease surveillance efforts have been initiated, including a collaborative effort with the World Bank and WHO to develop a national plan for an integrated disease surveillance system that will include VPDs, communicable and non communicable diseases.

A measles laboratory network has been established in the Region. Bangladesh, Bhutan, Indonesia, Maldives Myanmar, Nepal, Sri Lanka, and Thailand have national measles laboratories linked to epidemiological surveillance. Laboratory staff from all the countries, except DPR Korea and Timor-Leste has received training organized by WHO.

### **3.4 Progress in 2002 and 2003**

In 2002, at the WHO/UNICEF inter-regional workshop, Member Countries were well-informed about measles control strategies and the need for integrated disease surveillance. Indonesia, Myanmar and Sri Lanka drafted national measles control plans and Myanmar conducted a mass measles campaign for 1/3 of the country. Bangladesh and Nepal started integrated disease surveillance. India has a plan of action to integrate AFP and measles surveillance in the polio-free states of Tamilnadu and Kerala. A measles laboratory network was established through training staff of the Member Countries in laboratory diagnosis to ensure laboratory support for epidemiological surveillance. In February 2003, a partner consultation on measles in the Region was conducted to review strategies and coordinate support to Member Countries.

### **3.5 Summary**

In summary, the countries of the SEA Region are at varying stages of measles control (Table 2). Bhutan, DPR Korea, Maldives, Sri Lanka and Thailand have achieved low measles mortality. The other countries, especially those which have SMO-supported AFP surveillance, seem to have high measles mortality. The priority is to accelerate measles control in the Region, particularly in those countries with high mortality, building upon the experiences, momentum and infrastructure developed through polio eradication. To achieve this, development of partnerships and collaboration between Member Countries and international agencies will be crucial.

## **4. PLAN OF ACTION 2003-2005**

The overall goal of the regional strategic plan is to provide a framework for the countries of the Region to contribute to the global goal of reducing the number of measles deaths by half by 2005 relative to 1999 estimates.

### **4.1 Specific Objectives**

The specific objectives are:

- (1) To reduce the number of measles deaths by half by 2005 relative to 1999 estimates in Polio-free countries of the Region;
- (2) To achieve reliable monthly reporting of the number of measles cases and deaths, together with AFP, NT and other priority VPD, by all Member Countries by 2004;
- (3) To achieve investigation of at least 20% of measles outbreaks by all Member Countries in 2004 and 80 % of outbreaks by 2005;
- (4) To achieve and maintain 80% coverage with routine measles vaccination in at least 80% of districts in all Member Countries by 2005, and
- (5) To provide a second opportunity for measles immunization to eligible children in member Countries by 2005.

## 4.2 Key Milestones

### **By 2003**

- All countries of the Region would have a 3-5 year national plan of action for measles mortality reduction.
- Regional guidelines for accelerated VPD surveillance and supplementary immunization activities (SIAs) would be developed and disseminated.
- All countries, including polio-free states in India, would accelerate measles surveillance and begin to investigate measles outbreaks.
- A Measles Laboratory Network would be established with at least one measles laboratory in every Member Country.
- All countries in the Region would have strategies in place to increase access to routine immunization.
- Myanmar and Sri Lanka would implement SIAs as planned.

### **By 2004**

- All countries would have accelerated measles surveillance including active surveillance, outbreak investigation, laboratory confirmation and weekly or monthly reporting to the national level and to the Regional office. Integrated AFP, measles and NT surveillance would be extended to other states in India.
- Measles and rubella surveillance reviews would be conducted in priority countries.
- Myanmar and Sri Lanka would complete SIAs as planned. Indonesia, Maldives, Nepal and Timor-Leste would conduct mass campaigns as appropriate.

### **By 2005**

- All countries in the Region would achieve key measles surveillance performance indicators.
- All countries in the Region would have at least 80% coverage of measles vaccine in at least 80% of their districts.
- Bangladesh, India and Nepal conduct would SIAs as appropriate.
- A revised long-term plan would be developed for control of measles, rubella and congenital rubella syndrome (CRS) in the Region.

### 4.3 Key Strategies

The key regional strategies to achieve the goal of measles mortality reduction are:

- Achieving high routine measles vaccination coverage of infants at nine months of age or shortly thereafter;
- Providing a second opportunity for measles immunization to appropriate age groups of children through either a second routine dose of measles containing vaccine (MCV) or through supplemental immunization activities;
- Conducting effective measles surveillance that provides information at a minimum; about **number of cases and deaths** by month, age and vaccination status of cases and deaths, conducts outbreak investigation and monitors routine vaccination coverage, and
- Improving management of measles cases, including vitamin A supplementation and adequate treatment of cases.

These strategies are described in detail in the ***Global Strategic Plan for Sustainable Measles Mortality Reduction and Regional Elimination 2001-2005***, a plan that was jointly developed by WHO and UNICEF<sup>(3)</sup>. The plan categorizes the strategies into "Mortality Reduction" and "Elimination" according to measles control targets. In both categories, the strategies are similar, except for the following in the "Elimination" category:

- Higher level of achievement set for routine immunization and
- Case-based measles surveillance

Since the regional goal is sustainable measles mortality reduction, it is necessary for all countries in the Region to adopt at least the mortality reduction target and develop a multi-year plan of action with emphasis on achieving and sustaining high population immunity, improving the quality of measles surveillance to identify changes in measles epidemiology and forecast outbreaks, and evaluating programmes to decide further intervention. The plan of action should include an appropriate section on ensuring and monitoring immunization safety, as well as adverse events following immunization (AEFI). The following WHO publications, available in the website [www.who.int/vaccines-documents](http://www.who.int/vaccines-documents) provide the necessary technical guidance.

- (1) Measles Mortality Reduction and Regional Elimination Strategic Plan 2001-2005 (*WHO/V&B/01.13*)
- (2) Module on best practices for measles surveillance (*WHO/V&B/01.43*)
- (3) Manual for the laboratory diagnosis of measles virus infection, (*WHO/V&B/00.16*)
- (4) WHO guidelines for epidemic preparedness and response to measles outbreaks (*WHO/CDS/CSR/ISR/99.1*)

It is recognized that Member Countries of the Region are at varying stages of measles control, with some at a more advanced stage than others. The countries that have already achieved the standards set for mortality reduction could strengthen their immunization strategies and surveillance standards towards elimination of measles.

Bhutan, DPR Korea, Indonesia, Maldives, Sri Lanka and Thailand have achieved low measles mortality levels, but continue to experience periodic measles outbreaks. These countries should implement strategies to raise and/or maintain evaluated routine measles immunization coverage of infants to at least 80 percent in all districts. An immediate priority is to strengthen surveillance and fully investigate measles outbreaks. Proper case management with administration of vitamin A should be an integral feature of outbreak investigation<sup>(9)</sup>. Depending on the strength of the national surveillance system, these countries could decide to conduct case-based measles surveillance. These countries should work towards providing a second opportunity for measles immunization targeting populations susceptible to measles.

Sri Lanka and Thailand have already included a second dose of measles containing vaccine in their immunization schedule. Other countries could consider a two-dose vaccination schedule, provided that the system in the country has the capability to maintain high coverage for both doses and there is a system for following up of defaulters<sup>(4)</sup>. Since at the time of introducing a second dose to a national immunization schedule, there are children who are older than the age for second dose, SIAs are recommended to be conducted as an early step in a measles control plan to catch up the children in susceptible age groups. Before a decision is taken to conduct a supplementary vaccination campaign, countries should refer to the global strategic plan for details of this approach and aspects that should be considered. Campaigns conducted prior to the introduction of a second routine dose need to be

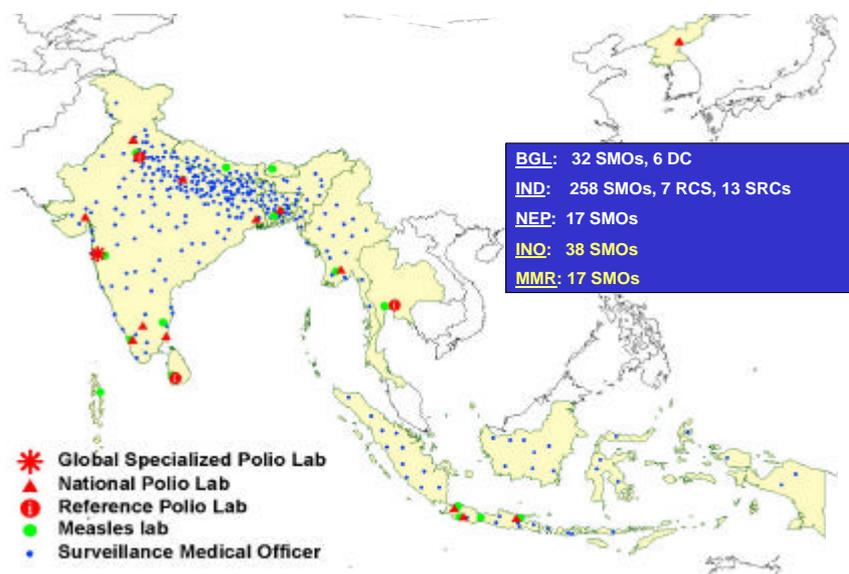
national in scope and target a wide age group<sup>(3)</sup>, usually 9 month to 15 year olds. However, the exact age group to be targeted should be determined on the basis of analysis of measles data<sup>(4)</sup>.

Bangladesh, India, Myanmar and Nepal continue to have a high burden of measles cases and deaths. The measles burden in Timor-Leste is not well known. The priorities in these countries are to raise and sustain routine immunization coverage, conduct effective surveillance and offer a second opportunity for measles immunization to age groups at highest risk of measles mortality. These countries should track and investigate outbreaks to get a better understanding of measles epidemiology<sup>(10)</sup>. Case management and vitamin A administration should be an integral feature of outbreak investigation<sup>(9)</sup>. A second routine dose of measles vaccine is not recommended at the moment. However, SIAs may be required and in order for these to have optimal impact, they should be of sufficient geographical extent and target the appropriate age groups and susceptible groups as determined by the measles epidemiology. Although there is no fixed target age group, initial campaigns in countries with high mortality can target nine months to five year olds, with periodic follow-up campaigns targeting all children aged over nine months who were born after the last campaign and any other susceptible age groups. However, experience in Africa and the Americas has shown that targeting a wider age range, (e. g nine months to 15 years) often results in a more immediate reduction in measles mortality.

Bangladesh, India, Indonesia, Myanmar and Nepal have a well-established polio eradication infrastructure, based on a network of surveillance officers supported by WHO, which will most probably continue to operate for several years until such time as global polio-free certification is achieved (Fig 2). These countries should take advantage of this infrastructure to support strengthening of routine immunization services and measles surveillance, including other VPDs as appropriate. Depending on the capability of the system, countries may consider implementing case-based measles surveillance.

Large countries in the Region, such as India and Indonesia, should evaluate their large administrative areas separately and adapt the implementation of the strategies as appropriate.

Figure 2: **Polio eradication infrastructure, SEAR, 2003: Building on AFP surveillance to support measles and other VPD surveillance**



## 5. ISSUES

### 5.1 Rubella Control

Sri Lanka and Thailand have included combined measles-rubella vaccine in the routine immunization programmes. Some of the other countries are exploring the use of combined measles-rubella and measles-mumps-rubella vaccine in their routine immunization programmes. WHO recommends that the priority of any congenital rubella syndrome (CRS) prevention programme is the protection of women of child bearing age. If child rubella immunization is implemented, rubella immunization of adult women should be introduced at the same time or earlier. Rubella vaccine should be added to the infant immunization schedule only if coverage >80% can be sustained on a long-term basis. Inadequately implemented childhood rubella immunization programme runs the risk of altering rubella transmission dynamics by shifting the average age of infection to women in child bearing age and then potentially increasing the incidence of CRS cases<sup>(5,11)</sup>.

## 5.2 Vitamin A

Several studies have shown that the administration of vitamin A during a measles episode reduces severity of measles and measles case fatality ratios<sup>(12, 13)</sup>. It is vital that all measles patients receive vitamin A as part of the treatment irrespective of whether it has been previously administered and whether immunization has been given. In order to promote overall improvements in child health, measles vaccination should be used as an opportunity to administer vitamin A prophylaxis in areas where vitamin A deficiency is prevalent.

All children with measles should be treated with two doses of vitamin A whenever they reach health services, with special attention to provide vitamin A during measles outbreak investigations. Measles SIAs can be used as an opportunity to provide vitamin A supplementation for children in appropriate age groups<sup>(3)</sup>.

## 5.3 Immunization Safety, including Waste Disposal and Adverse Events following Immunization

The administration of millions of doses of measles vaccine during measles SIAs necessitates careful planning and training at all levels, availability of sufficient injection safety equipment and safe disposal of used syringes and needles<sup>(14,15)</sup>. Tools are available to assess immunization safety and develop and implement safety plans for routine immunization and mass campaigns<sup>(16)</sup>.

Strengthening the reporting, investigation and responding to adverse events following immunization is important, since these events can cause disability and death and public reluctance to immunization strategies.

When measles SIAs are conducted, immunization safety and adverse events following immunization should be promptly monitored. WHO would monitor measles plans of action of the countries to ensure that this component is adequately addressed.

## 6. IMPLEMENTATION

### 6.1 Policy Development and Coordination

Regional policy and strategy development and the implementation and monitoring of the programme will be coordinated at the regional level with

national governments and partners through the Regional Partners Consultation, the SEAR EPI Managers Meeting, and the SEAR Technical Consultative Group (TCG). At the country level, WHO will promote the national Inter-Agency Coordinating Committee (ICC) as the principal coordinating mechanism. WHO/SEARO will coordinate the development of regional guidelines and tools, and the development and institutionalization of a regional reporting system and a regional laboratory network. For both routine immunization and supplementary campaigns, countries need to coordinate with UNICEF to ensure adequate supply of measles vaccine.

## **6.2 Mobilization of Human Resources**

In consultation with donors and other partners, polio-funded staff in Member Countries will be increasingly used to support implementation of the plan. In polio-free countries, this could be done without compromising AFP surveillance quality. In India, staff in polio-free provinces may be able to spend as much as 25 percent of their time on non-polio EPI and VPD surveillance activities. Efforts will be made to broaden the resource base to insure that polio-funded staff can expand their responsibilities.

Additional staff requirements for the regional office are: a full-time measles professional officer and a full-time measles laboratory coordinator. One full time national professional with one programme assistant will also be required for Bangladesh, India, Indonesia, Myanmar and Nepal. External funding will be sought for them.

## **6.3 Regional Reporting System and Database**

A regional reporting system and database are currently being developed to monitor the changing measles epidemiology within the Region, to prioritize the resource needs, and make informed decisions about establishing a regional elimination goal in 2005. This is being developed based on the experiences of the polio surveillance system and will focus on integrated reporting of acute flaccid paralysis (AFP), measles and neonatal tetanus (NT). For those countries with electronic reporting systems, compatibility with the regional reporting system will be assessed. For countries without electronic reporting systems, an electronic system will be provided with support for training and implementation. All Member Countries are encouraged to have a

national level database similar to the AFP-IFA database to enter and analyze data as well as feed it forward to SEARO. Member Countries will be expected to report monthly aggregate data on the following core variables.

- Number of cases by age
- Number of cases by districts
- Number of cases by immunization status
- Number of cases by gender
- Number of cases by outcome
- Number and percentage of specimens serologically confirmed for measles and rubella

In outbreak situation case base data is preferred for the above core variables but aggregate data is acceptable. The SEAR weekly polio bulletin will be redesigned as a VPD reporting bulletin, once the reporting system has been established.

#### **6.4 Regional Laboratory Network**

A regional measles laboratory network is being established to provide laboratory support to the programme in the countries. This will be based on the experiences gained in the polio laboratory network. However, it is envisaged that the measles network will require more national laboratories than the polio network. The laboratories will have adequately trained personnel, appropriate equipment and reagents. All laboratories will do serological tests to confirm or discard suspected measles and rubella cases. All countries will have access to a laboratory able to isolate measles virus from appropriately collected urine or nasopharyngeal specimens. Additionally, regional reference laboratories will be established to support national laboratories. Whenever necessary, virus isolates will be sent to a global reference laboratory for genetic characterization.

### **7. CHALLENGES**

#### **7.1 Ensuring Societal and Political Support**

The Inter-agency Coordinating Committees (ICC) in the countries should ensure that communication, social mobilization and advocacy are

components of the national measles plan of action. Indicators will be developed for this purpose and monitored by WHO at the regional level.

National authorities need to be informed and convinced of the value of measles control activities to ensure that measles activities are given due priority. Such activities should be seen as worthwhile investment in the future. At the community level, families and community leaders should be encouraged to accept and practise the recommended measles control strategies, such as participation in routine immunization or SIAs.

Advocacy to build the requisite high-level support for the implementation of measles mortality reduction plans and for the further development of routine immunization services is a priority. In particular, efforts will be made to ensure that sufficient resources are available to countries where measles mortality is high. Countries in receipt of GAVI funds should utilize these for strengthening immunization delivery systems.

## **7.2 Ensuring Adequate Supplies of Measles Vaccine of Assured Quality**

A 3-5 year forecast of vaccine needs and a multi-year funding proposal will be prepared to secure adequate vaccine supply for countries in the Region for both routine and supplemental immunization. In this connection, it is vital to increase the effectiveness and timeliness of forecasting of both demand and production capacity at national levels<sup>(3)</sup>.

On the basis of the current epidemiology and maturity of the programme in the countries, activities are suggested for discussion and planning with Member Countries (table 2). The timing of these activities, the extent and age groups to be targeted would depend on country preparedness and would be subjected to availability of funds and vaccines. The estimated amount of vaccines and injection safety equipment required for countries to conduct supplementary immunization activities is appended (Table 6).

## **8. MONITORING**

The following key indicators have been identified to monitor the implementation of measles control strategies at national and regional levels.

- Number of countries with measles plan of action

- Annual number of reported measles cases and deaths
- Percentage of outbreaks investigated
- Percentage of known outbreaks confirmed serologically
- Measles immunization coverage – national level
- Percentage of districts with routine measles coverage <50%, 50-79%, 80-94%, 95%+
- Coverage of mass campaigns- national level
- Percentage of districts with mass campaign coverage level <80%; 80-94% and >=95%
- Completeness and timeliness of monthly surveillance reports.

In addition, countries implementing elimination strategies could monitor the progress using the specific indicators mentioned for elimination in **Module on best practices for measles surveillance** (WHO/N&B/01.43)

## 9. **ADVOCACY, RESOURCE MOBILIZATION AND ROLE OF PARTNERS**

National governments, with technical and financial support from WHO, UNICEF and the Centers for Disease Control (CDC), Atlanta, will take the lead in the implementation and monitoring of the recommended strategies. In 2003, a strategic plan for advocacy and sustainable resource mobilization will be developed in consultation with Member Countries and partners. Every effort will be made to extend the partnership to national academic institutions contributing to the development of strategies and new technologies and other bodies, such as GAVI, CVP, UNDP, USAID, CIDA, DFID, DANIDA, European Commission, KfW, JICA, Government of the Netherlands, SIDA, American Red Cross, IRC and red cross/crescent organizations in the region.

## 10. **ESTIMATED ADDITIONAL RESOURCES REQUIREMENT**

Key activities for regional plan of action have been identified based on the available country plans for measles control and the minimum requirement of mortality reduction in all countries. The estimates were calculated on the basis of additional activities appropriate for countries. The budget includes the cost

estimates for surveillance including laboratory support, mass measles campaigns, and regional coordination. Funds required for routine immunization have not been included. Estimated cost for laboratory network is based on joint assessments made by WHO staff/consultants with country focal points. The final requirement for resources and their allocation to national and regional levels will be based on more detailed 3-5 year country plans of action.

Table 7 summarizes the additional resource requirement for the period 2003-2005. Table 8 provides a detailed country wise requirement of estimated additional resources for the period 2003-2005. These figures provide an indicative target for resource mobilization. Exact figures would change yearly depending upon the results of the resource mobilization efforts and progress with the implementation of the Regional Plan of Action.

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**Table 1: Measles/Rubella Vaccine and Vitamin A Administration Schedules, South-East Asia Region 2002\***

Country	Measles, measles-rubella, measles/mumps/rubella vaccine	Vitamin A (during routine EPI)
Bangladesh	One dose at nine months (M-V)	Under one year, usually with measles vaccine
Bhutan	One dose at nine months (M-V)	Six months x 3, school children every six months
DPR Korea	One dose at nine months (M-V)	Twice to children 6-59 months, six month interval
India	One dose at nine months (M-V)	Nine months then every 6 months until three years
Indonesia	One dose at 9-11 months (M-V)	6-11 months, 12-59 months
Maldives	One dose at nine months (M-V)	Twice yearly from 6 months – 5 years
Myanmar	One dose at nine months (M-V)	NA
Nepal	One dose at nine months (M-V) (up to 36 months if recommended dose missed)	Twice yearly ages 6-60 months
Sri Lanka	One dose at nine months (M-V) One MR at three years	At 9 months, 18 months and 5 years
Thailand	Two doses MMR (or MR if MMR is not available): 9-12 months and six years	NA

\* Source: WHO vaccine-preventable disease monitoring system, 2001 global summary

**Table 2: Current status of measles control  
in the South-East Asian Region**

Country	Reported Measles cases 2002 <sup>(1)</sup>	Reported incidence for 100,000 pop 2002.	Measles cases below 5 years % <sup>(2)</sup>	Under 5 mortality rate <sup>(3)</sup>	Reported measles vaccination coverage 2002 <sup>(4)</sup>	Polio eradication <sup>(5)</sup>		Measles surveillance status		
						Last polio case	Non Polio AFP rate 2002	Method	Data	Integrated with AFP
Bangladesh	3 494	2.43	72.3(R)	92	65 (S)	2000 Aug	2.70	Active	Case based	Yes
Bhutan	27	1.23	28(R)	80	78 (A)	1986	0.38	Passive	Case based	Yes
DPR Korea	0	0.00	ND	50	97 (A)	1996	1.11	Passive	Aggregate	Yes
India	51 780	4.93	74.5(O)*	86	67 (S)	2003 Sep	1.87	Passive	Aggregate	No
Indonesia	14 492	6.67	36.5(R)	49	44 (S)	1995 Oct	1.29	Passive	Aggregate	Yes
Maldives	926	299.76	6.9(O)**	47	99 (A)	1994	3.28	Passive	Case based	Yes
Myanmar	736	1.51	59.1(R)	133	75 (A)	2000 Feb	1.90	Passive	Aggregate	Yes
Nepal	6749	27.43	ND	98	71 (S)	2000 Nov	1.98	Active	Case based	Yes
Sri Lanka	139	0.74	13(O)	23	99 (S)	1993 Nov	1.41	Active	Case based	Yes
Thailand	10 241	16.47	32.8(R)	26	94 (S)	1997 Apr	2.00	Passive	Aggregate	Yes
Timor-Leste								Passive	Aggregate	No
SEAR	88 584	5.57			68					

(1) WHO/UNICEF joint reporting forms from the countries, (S) survey coverage, (A) administrative coverage

(2) EPI/TCG forms for all countries except India and Maldives.

outbreak investigations, (R) Routine reporting system, (O) Outbreak Investigation, (ND) No data

\* Indian Journal of Paediatrics Vol. 69 Jan 2002, \*\* outbreak investigation 2002

(3) World population prospectus: The 2000 revision

(4) WHO vaccine preventable disease monitoring system 2001 global summary,

(5) Weekly polio bulletin SEAR

**Table 3: Age distribution of measles cases reported through routine disease surveillance (1999-2001)**

Country	Year	Total No. of measles cases	Age distribution (Percentage of cases in each age group)							
			<9 M	9-11 M	1-4 Y	5-9 Y	10-14 Y	15-19 Y	20-24 Y	> 25 Y
Bangladesh	1999	46	2.4	7.3	46.3	29.3	14.6	0		
	2000	67	14.9	4.5	37.3	21.9	14.9	1.5		
	2001	149	14.2	7.1	44.4	20.7	7.7	1.8	1.8	2.4
Bhutan	1999	86	18.6		39.5	41.9				
	2000	418	6.7		21.1	72.2				
	2001	756					100			
Indonesia	1999	10 805	8.6		26.8	33.9		30.7		
	2001	3 715	11.3		25.2	42.8	15	5.7		
Myanmar	1999	1 196	0.3	5.4	27.6	36.5	22.3	7.9		
	2000	712	0.4	11.2	32.3	27	22.6	6.5		
	2001	1 503	0.9	7.0	51.2	32.1	7.8	1.1		0
Sri Lanka	1999	1 635	6.4	2.6	4.9	19	14.7	52.4		
	2000	3 945	4.3	2.8	6.3	16.3	15.8	54.5		
	2001	127	4.7	2.4	10.2	6.3	7.1	32.3	28.3	8.7
Thailand	1999	3 312	19.1		25.4	21.5	13.6	20.3		
	2000	4 074	15.5		23.3	19	16.1	26.1		
	2001	7 319	10.8		22.0	22.1	22.7	18.2		5.0

Source: Table 3 of EPI/TCG form from 1999-2001 received from Member Countries

**Table 4:** Age distribution of measles cases in outbreaks

Country	Year	Total No. of Cases	No. of out-breaks	Age distribution (Percentage in each age group)							
				<9 M	9-11 M	1-4 Y	5-9 Y	10-14Y	15-19 Y	20-24 Y	>25 Y
Bhutan	1997		1	3		20	12	18	47		
India	1999 <sup>a</sup>	283	1	7.8		66.7	24.8		0.7		
Indonesia	2001 <sup>b</sup>	183	4	2.2	0.5	29	31.7	35	1.6	0	0
Maldives	2000 <sup>c</sup>	50	1					36	64		
	2002 <sup>d</sup>	915	1	2.0		4.9	14.6	26.1	37.9	10.5	3.0
Myanmar	1999 <sup>e</sup>	563	5	4.8	0	47.4	31.6	16	0	0	0
	2000 <sup>e</sup>	549	5	6.7	16.6	16.9	39.7	14.8	5.3		
	2001 <sup>e</sup>	1629	11	0.8	6.4	47.2	40.1	7.2	1		
Nepal	2000 <sup>f</sup>	60	1	0		13	33	37	17		
Sri Lanka	2000 <sup>g</sup>	6 392	1	5	2.7	5.3	16.3	16	54.8		
Thailand	2000 <sup>e</sup>	58	3	41.4	1.7	0	3	22	8		
	2001 <sup>e</sup>	781	8	1	4.9	46.7	20.2	17.2	1.2	0	0.9

a. Indian Journal of Paediatrics, Jan 02

b. EPI/TCG form

c. EPI/TCG form

d. Outbreak 2002

e. EPI/TCG form

f. Outbreak 2000

g. EPI/TCG form

**Table 5: Measles supplementary immunization campaigns conducted in the South East Asia Region, 1997-2002\***

Country	Year	Campaign	Target age group	Number of children targeted	Number of children reached	Coverage
Bangladesh	1995	Sub national -130 sub districts	9-23 Months		216 414	79 %
	1999	Sub national - 52 High Risk areas	9-35 months	8 852 310	821 708	96.41 %
	2001	Sub national High risk unions		909 354	1 130 370	124.3 %
Bhutan	1995	National catch up campaign	9-59 months		68 622	100 %
	2000	20 districts	< 15 yrs	214 128	214 128	100 %
DPR Korea	1999	National Catch up campaign	9-23 months	427 280	427 280	100 %
India	2000	Urban measles campaign in four states	9 months - 5 years	974 034	739 417	75.9 %
	2001	Urban measles campaigns	9 months -5 years	1 402 621	929 125	66.24 %
Indonesia	1997	High risk areas	9-59 months	2 738 580	2 696 506	98.5 %
	2000	School catch up campaign in two provinces	Classes 1-6	6 665 950	6 341 407	95. 1%
	2000	Multi-antigen campaign with SNIDs in five provinces	6 -59 months	11 42 183	948 012	89.5 %
	2001	Sub-national Catch up with OPV	9 months – 5 years	166 087	155 101	93.39 %
	2002	High risk areas	6 -59 months	2 667 343	2 031 029	76.1%
Maldives	1997	Sub national	5-14 Years		31 112	94 %
	2001	Mop up campaign		700	450	64.29 %
Myanmar	1995	82 urban townships	9 months - 3 years		236 352	90.7 %
	2002	1/3 of the country	9 months – 5 years	1 792 980	1 577 169	88%
	1997	Catch up campaign in 74 townships in two divisions	9 months – 5 years		1 063 641	90.4 %
Nepal	1995	Three districts			17 993	
Thailand	2000	Outbreak response	Various group from 6 mon. to 18 years	18 985	18 788	98.96 %

\*Source: EPI/TCG reports, WHO

**Table 6: Estimated vaccine and injection safety equipment requirement for supplemental immunization activities, 2003-2005**

Country	Year for SIA	Target age group	Target population	Type of SIA	Vaccine doses	AD syringes	Reconstitution syringes	Safety boxes
Bangladesh	2005	9m-5Y	174 991 69	Nationwide	21 873 961	19 249 086	2 187 396	214 365
India	2005	9m-5Y	79 821 150	five states	99 776 438	87 803 265	9 977 644	977 809
Indonesia	2004	9m-15Y	65 854 626	Nationwide	82 318 283	72 440 089	8 231 828	806 719
Maldives	2005	9m-15Y	143 878	Nationwide	179 848	158 266	17 985	1 763
Myanmar	2002	9m-5Y	1 622 029	1/3 of country	2 027 536	1 784 232	202 754	19 870
	2003	9m-5Y	1 720 995	1/3 of country	2 151 244	1 893 095	215 124	21 082
	2004	9m-5Y	2 074 854	1/3 of country	2 593 568	2 282 339	259 357	25 417
Nepal	2004	9m-15Y	10 195 250	Nationwide	12 744 063	11 214 755	1 274 406	124 892
Sri Lanka	2003	10-14 Y	2 057 000	Nationwide	2 571 250	2 262 700	257 125	25 198
	2004	16-20 Y	1 870 000	Nationwide	2 337 500	2 057 000	233 750	22 908
Timor-Leste	2004	9-15 Y	254 910	Nationwide	318 638	280 401	31 864	3 123
Total			183 113 861		228 892 327	201 425 248	22 889 232	2 243 145

**Table 7: Estimated total financial resources required to achieve measles control goals, 2003-2005**

Activity	2003	2004	2005	Total USD
Vaccine and injection equipment cost for supplemental immunization	447 459	18 692 270	26 256 399	45 396 128
Operational cost of supplemental immunization	326,739	41 119 959	59 383 362	100 830 060
Measles surveillance and laboratory	420 700	2 198 000	2 198 000	4 816 700
<b>Subtotal for country level activities</b>	<b>1 192 898</b>	<b>69 500 326</b>	<b>86 417 082</b>	<b>157 112 306</b>
<b>Operational cost for regional coordination</b>	<b>180 000</b>	<b>315 000</b>	<b>390 000</b>	<b>885 000</b>
<b>Operational cost for regional laboratory network</b>	<b>120 000</b>	<b>330 000</b>	<b>330 000</b>	<b>780 000</b>
<b>Total</b>	<b>1 492 898</b>	<b>70 145 326</b>	<b>87 137 082</b>	<b>158 777 306</b>

**Table 8: Estimated resources requirement for country level measles control activities**

Activity	Year	Bangladesh	India	Indonesia	Maldives	Myanmar *	Nepal	Sri Lanka	Timor-Leste	Subtotal
Vaccine and Injection equipment	2003					447,459		534,820		982,279
	2004			17,122,203		539,462	2,793,626	486,200	66,277	21,007,768
	2005	4,549,784	20,753,499		37,408					25,340,691
	Sub-total	4,549,784	20,753,499	17,122,203	37,408	986,921	2,793,626	1,021,020	66,277	47,330,738
Operational cost of supplemental immunization	2003					300,000		26,739		326,739
	2004			39,512,776		350,000	6,117,150	26,739	152,946	46,159,611
	2005	10,499,501	47,892,690		86,327					58,478,518
	Sub-total	10,499,501	47,892,690	39,512,776	86,327	650,000	6,117,150	53,478	152,946	104,964,868
Measles surveillance and laboratory	2003	190,000		164,000		31,200	35,500			420,700
	2004	260,000	1,380,000	280,000		82,000	176,000		20,000	2,198,000
	2005	260,000	1,380,000	280,000		82,000	176,000		20,000	2,198,000
	Sub-total	710,000	2,760,000	724,000		195,200	387,500		40,000	4,816,700
Sub total	2003	190,000		164,000		776,659	35,500	26,739		1,192,898
	2004	260,000	1,380,000	56,914,979	86,327	971,462	9,086,776	561,559	239,223	69,500,326
	2005	15,309,285	70,026,189	280,000	37,408	82,000	176,000	486,200	20,000	86,417,082
<b>Total</b>		<b>15,759,285</b>	<b>71,406,189</b>	<b>57,358,979</b>	<b>123,735</b>	<b>1,832,121</b>	<b>9,298,276</b>	<b>1,074,498</b>	<b>259,223</b>	<b>157,112,306</b>

Assumptions for calculating the financial resources:

- Measles vaccine and safety injection equipment cost in US \$ for 2002 for:
  - Cost of measles vaccine is US \$ 0.26 per child including the cost of auto disable syringes and the fraction of the cost of the safety box
  - Operational cost for supplementary vaccination, according to global estimations(planning, supervision, transport, per diem, social mobilization and training):US \$0.6 per targeted child
- Operational cost for disease surveillance and laboratory: Included for countries already assisted by SMOs for AFP surveillance. Measles surveillance for 2003 is based on actual estimates of the countries. For 2004 and 2005, it is assumed that additional amount of 20% of the 2003 AFP surveillance budget would be required for measles surveillance.
- Countries which are not assisted by SMO network will be technically assisted through the budget allocated for regional coordination and regional laboratory network, in susceptibility analysis for measles, evaluating campaigns and in providing technical support and essential material for laboratories.
- \*Already funds have been identified for campaigns in 2003 (Myanmar through CIDA and Sri Lanka through CDC). All other activities are subject to availability of funds and bundled vaccines.
- Currently measles mortality is not a problem in Bhutan, DPR Korea and Thailand. So far these countries have not prepared a plan of action aiming elimination. Technical assistance for these countries to analyze susceptibility for measles and improve surveillance with laboratory confirmation will be provided through resources allocated for regional coordination and regional laboratory network.