

**WORLD HEALTH ORGANIZATION
REGIONAL OFFICE FOR THE WESTERN PACIFIC**



**WESTERN PACIFIC REGIONAL PLAN OF ACTION
FOR MEASLES ELIMINATION**

**Manila, Philippines
January 2003**

WESTERN PACIFIC REGIONAL PLAN OF ACTION
FOR MEASLES ELIMINATION

The Regional goal is to eliminate measles, with a target date to be established through an annual review process.

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EXECUTIVE SUMMARY

Measles remains the leading cause of vaccine-preventable death and disability among children in the Western Pacific Region. Following certification of polio-free status in 2000, it is now time to direct attention to the elimination of this killer disease.

Central to this Regional Plan is a strategy for providing a second opportunity for measles immunization. A single dose of measles vaccine protects about only 85% of children, but 95% of the population must be immune to stop transmission. A second dose, given after the age of one year, will protect 99% of children. Therefore, to eliminate measles, children must have a second opportunity that reaches practically every child.

The plan describes objectives in three strategic areas, which are directed at producing, sustaining and verifying interruption of virus transmission:

- ✓ immunization;
- ✓ surveillance; and
- ✓ laboratory support.

The immunization objectives are to strengthen routine immunization and to provide a second opportunity for measles immunization. The surveillance objectives are to progress from aggregated data reporting to a full case-based system as incidence levels fall and to integrate measles surveillance with existing active acute flaccid paralysis (AFP) surveillance. The laboratory support objectives are to establish national accredited measles laboratories as part of a Regional laboratory network to confirm clinical diagnosis and identify the source of viruses. In addition, in a number of countries in the Region with inadequate measles control, further efforts will be needed to improve measles case management, including use of vitamin A in order to reduce measles-associated mortality and disability.

As the countries of the Region are in very different stages of and have different capacities for measles control, no Regional target date for elimination has been set. It is proposed that this date will be established through an annual review of progress in measles control in the Region.

GLOSSARY OF TERMS

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

Measles elimination: The situation in a large geographical area in which endemic transmission of measles cannot occur and sustained transmission does not occur following the occurrence of an imported case; continued intervention 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: The regular provision of immunizations to successive birth cohorts of children at fixed sites or by outreach activities.

Mass immunizations. A campaign that targets all children of a specified age (usually wider age range than for routine immunization) that are in the target area (usually national).

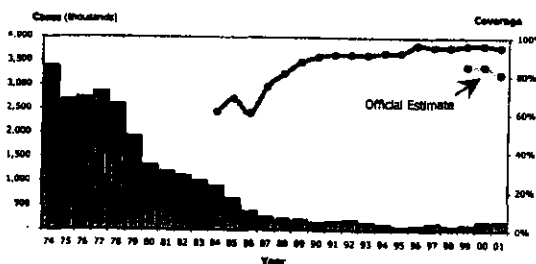
Second opportunity: A strategy to provide a first dose for children who were missed by the initial opportunity and a second dose to those who did receive a previous dose (to protect the small proportion not protected by a single dose).

WESTERN PACIFIC REGIONAL PLAN OF ACTION FOR MEASLES

1 BACKGROUND

About 40 years ago, a vaccine was invented against measles. Safe, effective and cheap, it had the potential to wipe out a disease that has killed children for centuries. Yet, measles remains the leading cause of vaccine-preventable death among children, estimated at over 30 million cases and 875 000 deaths in 1999. Although measles immunization programs have produced impressive results, achieving an estimated 75% reduction in cases globally and a 95% reduction in cases in the Western Pacific, there are still an estimated 1 170 000 cases and 32 000 deaths in the Region (See Figure 1 for reported cases and immunization coverage). These cases, and the resulting disability and deaths, are preventable.

Figure 1. Regional Reported Measles Cases and Measles Vaccine Coverage, Western Pacific Region, 1974-2001



Note: China officially adopted the best estimate method in 1999 as the administrative method underestimated births. Both best estimate and administrative methods for estimating coverage have been reported for years 1999-2001. (Because China accounts for most births in the Region, the change in reporting in China affected the Regional coverage significantly).

The countries of the Region have achieved polio-free status (certified on 29 October 2000). Now it is the time to add to this achievement and eliminate measles from the Western Pacific Region by building on the control efforts to date (Annex 1) and by using the strategies in the Global Measles Mortality Reduction and Regional Elimination Strategic Plan (2001-2005).

A second opportunity for measles immunization is a critical success factor in achieving elimination.

2 RATIONALE

Until it is eliminated, measles will continue to cause large epidemics, which are costly in terms of loss of life, disability and health resources, which are diverted to control outbreaks. On average, in a non-immune population, one child with measles will infect nearly 20 others. If, on the other hand, at least 95% (19 of 20) are immune to measles, transmission of the virus is effectively interrupted. Each child would, on average, pass the infection to just less than one child, leading to eventual elimination of measles. Therefore, to eliminate measles, it is necessary to achieve ~95% population immunity.

Measles elimination is achieved when population immunity is high enough to interrupt indigenous transmission, and an importation leads to only a limited outbreak. Measles elimination does not mean zero cases because importations and limited secondary transmission are likely to occur. The extent of spread from an importation is an indicator of population immunity. Mathematical modelling suggests that if population immunity is close to the threshold level needed to maintain elimination, an importation is likely to cause an outbreak of less than about 50 cases.

Measles immunization at age nine months protects about 85%; a second dose, given after age 12 months protects 99% of children. Therefore, with even 100% coverage of a single dose the ~95% population immunity for elimination cannot be achieved, but with very high coverage of two doses it can. The second opportunity achieves two important outcomes:

1. Children who missed the first dose are given one, essential to achieve the population immunity threshold; and
2. Children who received the first dose but are in the ~15% who did not seroconvert are given a second dose that will then protect practically all of

these 'vaccine failures' to achieve the population immunity threshold.

Goal:
To eliminate measles from the Region, with a target date to be established through an annual review process.

3. REGIONAL OBJECTIVES

The following Regional objectives are proposed to monitor progress towards the elimination goal:

- ✓ to annually review Regional progress to establish the target date for Regional measles elimination;
- ✓ to achieve and maintain the interruption of measles transmission in countries with an existing elimination goal;
- ✓ to achieve further morbidity and mortality reduction in the remaining countries as a basis for the eventual elimination of measles in the Region;
- ✓ to establish surveillance indicators that can be used for the purposes of monitoring progress and certification of elimination; and
- ✓ to develop National Plans of Action for Measles as components of Multi-Year Immunization Plans and Annual Immunization Workplans (Annex 2).

4. STRATEGIES AND ACTIVITIES

4.1. Strategies

Three strategies need to be implemented for measles elimination: immunization, surveillance and laboratory support:

1. to achieve and maintain 95% population immunity to measles in each birth cohort within each district of each country in the Region (Immunization Strategy);
2. to develop and maintain effective surveillance in each country in the Region (Surveillance Strategy); and

3. to develop and maintain effective access to an accredited laboratory for each country in the Region (Laboratory Support Strategy).

In addition, improved case management with associated vitamin A supplementation is a key component of measles morbidity and mortality reduction.

4.1.1 Immunization Activities

1. Establish and/or strengthen functional national coordination bodies.
2. Achieve effective and timely routine delivery of measles vaccine to each new birth cohort.



Measles Immunization

3. Achieve effective second opportunity measles vaccine delivery.
4. Routinely monitor population immunity.



Acute Measles

4.1.2 Surveillance Activity

1. Develop case-based surveillance (including response to cases) with laboratory confirmation.

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4.1.3 Laboratory Support Activity

1. Provide laboratory support for measles diagnosis and virus tracking through a Regional network of accredited laboratories.

5. ANNUAL PROGRESS REVIEW

An annual Regional review will establish when it is appropriate to set an elimination target date. The criteria (see Annex 3) have been derived from the three strategies (immunization, surveillance, and laboratory support). They are:

- ✓ two opportunities for every child to receive measles vaccine;
- ✓ functioning case-based surveillance; and
- ✓ national access to an accredited measles laboratory.

See Annex 3 for current status.

6. IMPLEMENTING THE PLAN

Implementing the strategies requires an analysis of current and previous measles



Laboratory

control efforts in each country to develop a national plan, if one is not already in place (see Annex 2).

A three- to five-year measles plan as a component of national multi-year immunization plans and annual immunization workplans should be developed to address the three strategies: immunization, surveillance, and laboratory support and a national measles elimination target date.

6.1 Immunization

6.1.1 National Coordination

A national coordinating body, such as the inter-agency coordinating committee (ICC), or a measles-specific one, should be established or strengthened to:

- ✓ advocate for political participation in measles initiatives;
- ✓ coordinate multi-sectoral support;
- ✓ provide overall guidance in the development of national strategies and plans; and
- ✓ endorse National Measles Plans of Action.

To be effective, the coordinating bodies need competent, high level technical and political representation within their membership.

6.1.2 Measles First Dose Delivery

The delivery of the Expanded Programme on Immunizations (EPI) vaccines to new birth cohorts requires a substantial on-going detailed operational planning effort (microplans) at district and facility levels.

Each country should strengthen its microplanning capacity by focusing efforts and resources at district and facility levels and ensuring that these add to general EPI initiatives (including communication strategies to promote timely uptake of measles and other EPI vaccines).

6.1.3 Second opportunity for measles immunization

Countries need to offer children a second opportunity to receive measles vaccine to achieve 95% population immunity (Annex 4). The second opportunity needs to reach practically all children.

A national measles mass immunization targeting all age groups where population immunity is likely to be less than 95% is best where feasible. This mass immunization may be conducted as a one-round mass activity (over a 10 to 14 day period) or it may be staged according to specific country circumstances. The critical factor is achieving very high coverage, especially for the previously unreached.

A comprehensive set of options for delivery of the second opportunity need to be considered, comparing the advantages and limitations of each option to make the most appropriate decision for each country. Having chosen the method for the second opportunity, careful and consistent implementation will be needed to maintain population immunity at 95% or higher for each birth cohort.

For countries where it is not feasible to adopt a nationwide mass measles immunization strategy, the second opportunity should be started as soon as possible, if not already in place.

Monitoring of second opportunity coverage activities is needed, together with improved disease surveillance to guide decisions on mopping up immunizations.

Strategies that can be included in a comprehensive set of options comprise:

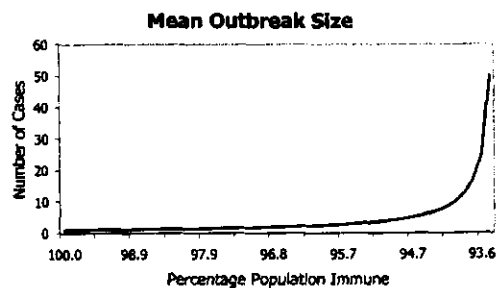
- ✓ routine two-dose measles immunization (with the second dose either as part of the schedule or regular national measles mass immunizations every four years, targeting children aged nine-59 months)
- ✓ specific geographic location mass immunization where there is focal transmission of measles;
- ✓ periodic national measles mass immunizations as indicated by falling population immunity (five or more years after the initial wide age range mass immunization), targeting children from nine months to the birth cohort born the year before the initial wide age range mass immunization; and
- ✓ house-to-house or mopping up immunizations to identify and immunize children who have missed first and/or second dose opportunities.

Social mobilization specifically directed toward second opportunity activities is needed to achieve high coverage.

6.1.4 Monitoring population immunity

Population immunity can be monitored using routine and/or survey coverage data, and validated through disease surveillance. As re-introductions of measles virus are practically inevitable, the number of cases and size of outbreaks can provide an indication of population immunity, after adjusting for the number of cases that the surveillance system identifies. Mathematical models, using coverage and disease data, can be used to estimate immunity based on the size of an outbreak (see Figure 2). Also, serologic survey data can be used to estimate population immunity. But, these additional sources of information are not required as a routine.

Figure 2. Population Immunity as a function of outbreak size.



District and facility level analysis of immunity data needs to be undertaken regularly to guide management decisions for immunization delivery.

Details of immunization strategies and procedures are presented in the *Field Guidelines for Accelerated Measles Control in the Western Pacific Region 2002*.

6.2 Disease Surveillance

6.2.1 Overall Policy, Including Integration with acute flaccid paralysis (AFP) Surveillance

The national plan needs to address the development and dissemination of a policy on measles surveillance, including integration with AFP surveillance, investigation and responses to outbreaks and case management.

A process to integrate measles with AFP surveillance should be developed in countries that have not yet already done so, and where that will be the best process to

strengthen surveillance. The process should include, where needed, plans for a phased development of measles surveillance activities, from aggregated data reporting and analysis to case-based surveillance with laboratory confirmation. The process should also include the development of country-specific surveillance guidelines, standardized case investigation forms and procedures and plans for training and/or re-training staff. In addition, all countries should consider the health promotion and social mobilization implications of enhancing measles surveillance capacity and efficacy (see Annex 5).

6.2.2 Case Definitions, Reporting Forms and Process

Each country needs to prepare and disseminate measles case definitions, reporting forms, and the actions to take in response to suspected measles (rash and fever illness). The flow of completed forms and data from lower levels up and the flow of data and analyses from upper levels down must be specified, regular and routine. Standard indicators for measles surveillance should be adopted to monitor activities. Examples of indicators for measles surveillance include:

- ✓ number of cases reported;
- ✓ age-specific measles incidence;
- ✓ number of annual measles deaths;
- ✓ number of hospitalized cases;
- ✓ immunization status of cases;
- ✓ percent of cases with blood taken for confirmation of diagnosis;
- ✓ number of outbreaks;
- ✓ percent of outbreaks investigated; and
- ✓ completeness and timeliness of facility and district reporting.

6.2.3 Investigation and Response

The policy also needs to define the investigation for individual cases and outbreaks and the response to them. As measles will not spread if population immunity is sufficiently high, there is not necessarily a need for an immunization response to an importation, unless the investigation shows that the area has low levels of immunization coverage.

6.2.4 Case Management

Optimal case management of measles cases will result in fewer deaths and severe complications. At minimum, health services can deliver vitamin A supplementation to ill children and children at high risk of vitamin A deficiency. Other interventions such as hospitalization will depend on the local resources.

Details of disease surveillance and outbreak investigation, reporting and response strategies are presented in the *Field Guidelines for Accelerated Measles Control in the Western Pacific Region 2002*.

6.3 Laboratory Support

Measles cannot be reliably diagnosed clinically, especially when it becomes uncommon. All countries need access to an accredited national reference laboratory. A measles laboratory network of national diagnostic laboratories, Regional reference laboratories and global special laboratories is a key element of the plan.

Further details, including recommendations for blood specimen collection, are contained in the *WHO Manual for Laboratory Diagnosis of Measles 1999*.

6.4 Cross-cutting Issues

Measles elimination strategies will intersect with other immunization-related initiatives, including those with activities in:

- ✓ safe injection practices including the introduction of auto-disable syringes;
- ✓ safe disposal of used injection materials;
- ✓ introduction of rubella vaccine as measles rubella (MR) or measles-mumps-rubella (MMR), a simple, cost-effective addition to measles elimination activities;
- ✓ strengthening the investigation of and response to adverse events following immunization (AEFI); and
- ✓ health sector reform issues.

When implementing specific measles elimination-related activities, all countries should seek to build on the existing scheduled immunization program capacity in particular and health service delivery mechanisms in general.

7. FINANCING THE PLAN

Eliminating measles from the Region will have significant health and economic benefits for all countries. However, to do the task properly, financial resources over and above existing national budget and external support funds will be needed. Each country will need to prepare annual budget estimates (for three to five years), which include additional costings under the following headings:

- ✓ vaccines, syringes, needles and safety boxes;
- ✓ operational costs;
- ✓ waste disposal;
- ✓ surveillance costs;
- ✓ National Measles Laboratory establishment and maintenance costs;
- ✓ AEFI investigations;
- ✓ training/re-training costs;
- ✓ health promotion costs; and
- ✓ social mobilization costs.

At the Regional office level, budgets have been prepared reflecting the costs of coordination and oversight of activities already scheduled as well as the establishment and maintenance costs of the laboratory network (Annex 6).

PROGRESS IN MEASLES CONTROL IN THE WESTERN PACIFIC REGION

The Western Pacific Region is made up of 37 countries and areas that have a wide range of socio-economic, geopolitical, and demographic conditions. These varying conditions mean that what is appropriate in one country may not work in another. Therefore, there is a need for local flexibility, innovation, and initiative. However, a Regional plan with objectives and strategies can provide a basic framework for all countries.

In 1996, the Western Pacific Regional Plan of Action for Accelerated Measles Control was prepared. The stated objectives were:

- (1) to reduce the burden of measles in every country of the Region, starting in 1999; and
- (2) to develop measles surveillance to the extent that outbreaks of measles can be rapidly investigated and controlled, and epidemics predicted and prevented.

The stated strategies to achieve these objectives were:

- (1) to evaluate the burden of measles disease through measles surveillance; and
- (2) to reduce measles morbidity and mortality and prevent measles outbreaks.

Details of these strategies were: an active surveillance system integrated into the acute flaccid paralysis (AFP) surveillance system; laboratory confirmation of suspected measles cases; delivery of two doses of measles vaccine through extremely high routine first dose coverage and a second dose by mass immunizations or routine activities, as indicated.

The countries of the Region implemented this plan enthusiastically, but of course there is wide variation in measles control between countries. Overall, great progress has been made. (See Tables 1 and 2 below). In addition, the Annual Review Matrix (Annex 2 of this Plan) indicates progress by country and measles control activity.

Table 1. Measles Immunization Schedules, Reported MCVI Coverage and Cases, 1999 – 2001, Selected Countries, Western Pacific Region

Country	Measles Immunization Schedule				Total Population (Thousands)	<1 Yr. Population (Thousands)	MV1 Coverage (%)			Reported Number of Cases		
	No. of Doses	Vaccine Used	Age, 1 st Dose	Age, 2 nd Dose			1999	2000	2001	1999	2000	2001
Australia	2	MMR	12m	4-5y	119,138	247	89	92	93	235	108	141
Brunei Darussalam	2	MMR	12m	10-13y	328	7.5	94	99	100	23	42	11
Cambodia	1	M	9m		13,104	448	63	65	59	19,827	12,237	3,761
China	2	M	8m	7y	1,275,133	18,835	98	97	79	61,840	71,093	88,962
Hong Kong, SAR, China	2	MMR	12m	6y	7,200	53	87	96	84	32	60	179
Japan	1	M	12m		127,096	1,214	96	96	98	-	22,497	22,552
Korea, Republic of	2	MMR	12m	4-6y	46,740	609	94	95	97	8	32,088	23,044
Lao PDR	1	M	9m		5,279	182	71	42	50	2,302	332	94
Macao, SAR, China	3	M & MMR	9m	15m-5-6y	330	45	92	95	90	1	15	3
Malaysia	1	M	9-12m		22,218	521	88	88	88	2,576	6,187	2,198
Mongolia	2	M	8-12m	3y	2,539	55	93	94	95	10	925	10,677
New Zealand	2	MMR	15m	4y	3,778	54	82	85	85	106	65	65
Papua New Guinea	2	M	6m	9m	4,809	149	57	68	49	6,304	7,135	4,023
Philippines	1	M	9m		75,653	1,998	88	80	75	2,981	7,120	7,360
Singapore	2	MMR	15m	12y	4,018	50	86	93	89	65	141	408
Vietnam	1	M	9-11m		78,137	1,522	94	97	97	14,134	16,512	12,058
Total					1,685,494	27,373				104,444	176,547	175,536
Pacific Island Countries	Doses	Vaccine	1st Dose	2nd Dose	Total Pop. (Actual)	<1 Population (Actual)	1999	2000	2001	1999	2000	2001
American Samoa	2	MMR	12m	4y	59,585	1,812	99	90	92	0	1	0
Cook Islands	2	M	9m	5-6y	19,572	405	63	76	84	0	2	0
Fed. St. of Micronesia	2	MMR	12m	13m	120,370	2,654	79	85	84	0	0	0
Fiji	1	M	9m		825,995	17,893	95	-	90	20	-	17
French Polynesia	2	MMR	12m	8y	240,034	4,803	98	-	98	13	0	3
Guam	2	MMR	12m	4-6y	158,311	4,231	93	90	86	1	0	0
Kiribati	1	M	9m		89,077	2,423	62	80		2	0	0
Marshall Islands	2	MMR	12m	18m-6y	52,706	1,598	93	80	89	0	0	0
Nauru	1	MMR	12-15m		11,851	145	-	8	95	1	0	0
New Caledonia	2	MMR	12m	6y	216,046	4,476	-	-	-	1	-	0
Niue	2	MMR	15m	11y	1,918	27	100	100	100	0	0	0
Northern Mariana Is.	2	MMR	12m	4y	71,214	1,445	93	70	86	0	0	0
Palau	2	MMR	12m	15m	19,905	277	96	83	83	0	0	0
Samoa	1	M	9m		175,194	3,930	91	93	92	-	-	-
Solomon Islands	1	M	9m		428,835	15,376	59	-	-	-	-	0
Tokelau	1	M	9m		1,477	46	100	100	100	0	0	0
Tonga	2	M	9m	2-15y	99,521	2,399	97	-	93	6	0	4
Tuvalu	1	M	9m		10,069	224	94	-	100	0	-	0
Vanuatu	1	M	9m		195,633	5,754	94	94	94	12	52	7
Wallis and Futuna	1	MMR	12m		14,634	439	100	100	-	0	0	-
Total					2,811,947	70,357				56*	55*	31*

Sources: World Health Organization. WHO vaccine-preventable diseases: monitoring system: 2001 global summary. Geneva, 2001. (WHO/V&B/01.34). Also, WHO/UNICEF Joint Reporting Forms, 1999, 2000, 2001.

* NOTE: suspect cases; only 3 confirmed cases, all are imported virus in French Polynesia in 1999

Table 2.
Measles Mass Immunizations Up To 2001

Country	Type	Date	Target Age	Target Pop.	Coverage
American Samoa	None				
Australia	National	Jul-98	5 - 12 years	1,780,000	75
Brunei Darussalam	None				
Cambodia	Pilot	Jan-00	9m - 59m	228,532	82
	National, phase 1	Jan-01	9m - 59m	171,772	90
	National, phase 2	Jan-02	9m - 14 years	2,500,000	99
China	Sub-national				
Cook Islands	National	Mar-98	9m - 14 years	6,524	85
Fiji	National	Nov-97	9m - 14 years	251,109	81
French Polynesia	National	Mar-98	8 - 12 years	25,000	77
Guam	None				
Hong Kong, SAR, China	National	1997	1 - 19 years	~900,000	97
Japan	None				
Kiribati	National	Feb-98	9m - 14 years	27,297	86
Korea, Republic of	National	May-01	8 years - 16 years	5,848,257	96
Lao People's Democratic Republic	Pilot	Mar-00	9m - 59m	64,040	95
	National	Mar-01	9m - 59m	636,730	~85
Macao, SAR, China	None				
Malaysia	None				
Northern Mariana Islands	None				
Marshall Islands	Mop-up	1998			
Federated States of Micronesia	None				
Mongolia	National	Oct-94	3 - 7 years	218,034	75
	National	May-96	9m - 11 years	558,187	97
	National	Oct-00	9m - 7 years	~300,000	~97
Nauru	National	Dec-97	9m - 14 years	2,540	100
New Caledonia	National	Nov-97	6 years - 10 years	20,026	90
New Zealand	National	Apr-97	2 - 10 years	~400,000	~75
Niue	National	Oct-97	9m - 15 years	796	99
Palau, Republic of	Mop-up	1998			
Papua New Guinea	National	Sep-97	9m - 59m	679,311	84
Philippines	National	Sep-98	9m - 14 years	27,000,000	~85
Pitcairn Islands	None				
Samoa	National	Apr-98	9m - 15 years	74,470	97
Singapore	None				
Solomon Islands	National	Jul-98	9m - 14 years	153,757	81
Tokelau	National	Jun-98	9m - 16 years	568	100
Tonga	National	Mar-98	9m - 14 years	35,458	94
Tuvalu	National	Mar-98	1 year - 14 years	3,033	100
Vanuatu	National	Apr-98	9m - 14 years	77,850	95
Vietnam	Pilot	Nov-99	9m - 10 years	253,295	99
	Enlarged pilot	Dec-00	9m - 10 years	327,500	98
	Pilot	Oct-01	9m - 10 years	1,554,120	99
	National, phase 1	Mar-02	9m - 10 years	6,729,171	99
Wallis and Futuna	None				

DEVELOPMENT OF A NATIONAL PLAN OF ACTION

Each country/area of the Western Pacific Region should develop a National Plan of Action for/towards Measles Elimination which is a component of the Multi-Year Immunization Plan and Annual Workplans. For countries that are not yet ready to set a target date for elimination, the plan should include a process for working towards setting that date. The plan should include:

- background information about the level of achievement for measles control;
- establishment of a national measles control or elimination task force, through the ICC;
- an overview of measles surveillance in the country;
- an activity plan for measles surveillance, including:
 - active measles surveillance and integration with AFP and NT active surveillance;
 - the objectives of the Measles Surveillance System;
 - the target surveillance population;
 - standard case definition;
 - case investigation;
 - data management;
 - indicators and data flow; and
 - a plan for development and expansion of the system;
- information on the size of the target population for routine and supplementary measles immunization activities, number of districts with outbreaks reported and investigated, mapping of measles cases;
- an activity plan for supplementary immunization activities in the country;
- an activity plan for scheduled immunization activities;
- a budget for implementation of activities; and
- the time schedule for programme activities.

ANNUAL REVIEW MATRIX

Country/Area	Planning for Measles Elimination	Second opportunity activities	Case-based surveillance	Access to accredited laboratory	Second opportunity activities	Case-based surveillance	Access to accredited laboratory	Target	Status
Australia	X	X	X	X	X	X	X	YES	E
Brunei Darussalam	X	X	X	X	X	X			R
Cambodia	X	X	X	X	X	X			R
China		X		X	X				N
Hong Kong, SAR	X	X	X	X	X	X			R
Japan			X	X					N
Lao PDR	X	X	X	X	X				R
Macau, SAR	X	X	X	X	X	X			R
Malaysia	X	X	X	X	X				R
Mongolia	X	X	X	X	X	X			R
New Zealand	X	X	X	X	X	X		YES	E
Pacific Island Countries	X	X	X	X	X	X	X		E
Papua New Guinea				X					N
Philippines	X	X	X	X	X	X		2008	E
Republic of Korea	X	X	X	X	X	X		2005	E
Singapore	X	X	X	X	X	X			R
Viet Nam	X	X	X	X	X			YES	E

N = Not ready for elimination
R = Ready for elimination (all elements planned)
E = Elimination mode

MEASLES VACCINE SECOND OPPORTUNITY STRATEGIES

Second opportunity for measles immunization

To achieve the high level (95%) of population immunity required to eliminate measles, requires very high coverage with two doses of measles vaccine. Each country will need to determine the best way of achieving this. Even with a two-dose schedule, a second opportunity may be needed if coverage of the scheduled doses is not high enough.

In all countries that have only had a single scheduled dose of measles vaccine, a mass immunization activity is needed. Even with 100% coverage for a single dose of measles vaccine, population immunity is not more than about 90% immunity.

An epidemiological analysis of disease and coverage data can identify the cohorts who are likely to have less than 95% immunity. There is an immediate need to immunize these cohorts while still of school age, as mass immunizations in older groups are more challenging.

Mass immunizations

A mass immunization can rapidly reduce measles morbidity and mortality. As a general rule, mass immunizations should deliver measles-containing vaccine only, and should not attempt to deliver other injectable vaccines. However, vitamin A supplementation should be part of supplementary measles immunization activities in populations at risk for vitamin A deficiency, because vitamin A deficiency increases the risk of serious sequelae and death from measles infection. The following strategies should be considered:

(1) One-round national measles mass immunization

The objective of the initial mass vaccination is to substantially reduce measles cases and deaths. This intervention can achieve such reductions years earlier than the introduction of a two-dose measles schedule, resulting in fewer cases and deaths. The target age of the activity should include those age groups where more than 5%-10% of the population is susceptible. Experience in other regions indicates that, in countries with good measles control, this is usually from 9 months to 14 years of age, while, in countries with poorer measles control, the upper age limit will be less (10 years of age or younger). An increased number of deaths from measles among young infants can justify reducing the lower limit to six months. The target population should be vaccinated regardless of previous immunization status or history of disease. The objective is to reach >95% coverage on a district basis (third administrative level) countrywide. Very high coverage should be reached in areas not reached by scheduled immunization services. Careful attention must also be given to areas that, although within the reach of scheduled immunization services, are usually only covered poorly because of local constraints. Slum areas or squatter settlements, dispersed riverside populations, very remote villages or nomadic people, and "institutionally neglected" populations are examples of this category.

Due to the increased resource requirements for the successful implementation of a large-scale mass immunization activity with measles vaccine, it is recommended that countries pilot the intervention on a small scale, targeting epidemiologically meaningful areas. Major factors that will contribute to successful implementation include:

- a very high level of political commitment toward the initiative;
- effective coordination of activities at the national and lower levels;

- effective planning, with careful distribution of fixed sites and mobile teams according to population distribution and careful attention to populations with a high risk of remaining as foci of measles transmission after the event;
- a single vaccine intervention;
- timely provision of sufficient vaccine, logistics and funds for operations;
- effective social mobilization, with appropriate strategies according to the local cultural settings;
- use of tally sheets to record vaccinated children (nominal lists of target populations should be used in exceptional circumstances only as they usually reduce the speed and quality of services in fixed sites, increase the error in coverage estimates – usually overestimation – and do not help mobile teams working in critical settings like markets, etc.);
- fully dedicated personnel during the activity; and
- effective supervision of vaccination teams.

More detailed information regarding the planning and implementation of measles mass immunization activities, including immunization safety requirements, to be provided in the *Field Guidelines for Accelerated Measles Control in the Western Pacific Region 2002*.

(2) One-round subnational measles mass immunization

For countries with focal measles transmission, the implementation of a one-round subnational measles mass immunization campaign can be appropriate. The technical requirements and factors that will contribute to its success are the same as for national measles mass immunization activities (see above). A national mass measles immunization may also be delivered progressively through several subnational mass immunizations.

(3) Follow-up measles mass immunization

Countries that have already conducted an initial national measles mass immunization may need supplementary mass immunization to decrease the newly accumulated susceptibles, and should plan to conduct a subsequent national measles mass immunization every four years. The target age group should be 9-59 months, unless the local epidemiology of measles indicates a wider age group should be targeted.

In countries where the current control strategies have already resulted in the interruption of indigenous transmission of measles, it is imperative to continue to achieve excellent coverage with two doses of measles vaccine and excellent surveillance. There may still be a role for supplementary measles activities in such countries. Data on the current epidemiology of measles in the country is essential to decide when, where and whom to target in any supplementary immunization activity. Periodic mass immunizations may be required to decrease the number of newly accumulated susceptible children so as to maintain population immunity above 95%.

ESTABLISHING A CASE-BASED MEASLES SURVEILLANCE SYSTEM

The establishment of an effective measles surveillance system is a key factor for the successful implementation of the measles accelerated control or elimination initiative in every country.

The main objectives of the measles surveillance system are:

- (1) to identify all areas of measles transmission in the country;
- (2) to measure the impact of measles control and elimination strategies; and
- (3) to detect the occurrence of measles outbreaks in order to ensure timely and appropriate outbreak response.

For countries with an elimination goal, it is imperative that all cases are reported.

Strategic approach to building surveillance systems

It is recommended that countries follow a phased or step-by-step approach in building their case-based measles surveillance systems in order to ensure high quality for the whole process.

Initial stage

- ✓ First of all, measles should be a *reportable* disease for all areas of the country and for all ages.
- ✓ Case identification should be based on a *standard case definition* and case-based data should be collected in all countries (see below for sample data collection form). All routine reports should contain individual case data on date of rash onset, age, immunization status, location and outcome (if the patient died or not). The recording of surveillance case investigation data should be done on standardized case investigation forms.
- ✓ To improve case detection and case investigation, active surveillance for measles should be implemented in major hospitals, with zero reporting on a regular basis, to detect and investigate all cases managed in these hospitals. The activity should be integrated into the existing active surveillance systems for cases of acute flaccid paralysis (AFP) and neonatal tetanus (NT). Blood specimen collection and serological testing should be carried out according to the capacity of the existing national measles laboratories.

Outbreak investigation and response

Measles outbreak investigation is part of the recommended surveillance activities and should be conducted by provincial- and national-level personnel. The investigation should include limited serological testing of blood specimens. Health facilities not included in the active surveillance system should report measles outbreaks immediately.

In the case of a confirmed outbreak in a population, it is important to plan a systematic response, based on available data. The convening of a response team is essential to ensure quality decisions and coordination. It should be understood that the immunization response in most outbreaks usually occurs too late to blunt the impact of the outbreak. However, in closed communities or institutions, such as refugee camps, hospitals or military barracks, it may be necessary to conduct supplementary immunization activities as soon as possible. In refugee camps, vaccination of all children below five years of age is indicated as soon as they arrive in the camp. Delay in implementing this

recommendation may result in high morbidity and mortality. It is also important to note that the priority during outbreaks is to provide appropriate treatment and reduce mortality.

(More information on measles outbreak investigation and response is provided in the *Field guidelines for measles accelerated control in the Western Pacific Region 2002*.)

Expansion stage

As the measles accelerated control initiative matures, active surveillance for measles should be expanded to cover all ages and all districts. Case investigation should be conducted at the district (third administrative level) and should include laboratory confirmation of cases (>80% of cases should have one blood specimen collected from 4-28 days after onset of rash). All outbreaks should be detected, reported, investigated and confirmed by the laboratory. All surveillance and laboratory data should be entered into an electronic database at the national level to make data management efficient (facilitating consolidation, analysis and reporting, including data feed forwarding to other government departments, other agencies and the WHO Regional Office).

Consolidation stage

Active surveillance for measles should be comprehensive, complete, timely, sensitive and reliable. It is anticipated that immunization activities will result in markedly reduced measles transmission, so all health care facilities should report immediately all suspected measles cases and make supplementary zero reports when there are no cases. All suspected cases must be investigated rapidly and confirmed or discarded by laboratory testing. All reports should contain individual case data obtained from fully investigated cases.

Detailed information on measles surveillance and data management requirements, including reporting and analysis to be provided in *Field guidelines for measles accelerated control in the Western Pacific Region 2002*.

**Estimated Additional External Funds Needed for
Currently Planned Activities (in US\$)**

Year	Periodic Immunization			Country Level	Regional Level		Total
	Bundled Vaccine	Operational Costs	Waste Disposal	Surveillance and Immunization Safety	Coordination	Laboratory Network	
2003	\$9,207,000	\$2,300,000	\$907,000	\$280,000	470,000	\$375,000	\$13,539,000
2004	\$47,000	\$40,000	\$8,000	\$280,000	470,000	\$377,000	\$1,222,000
2005	\$304,000	\$340,000	\$58,000	\$320,000	470,000	\$377,000	\$1,869,000
Total	\$9,558,000	\$2,680,000	\$973,000	\$880,000	\$1,410,000	\$1,129,000	\$16,630,000