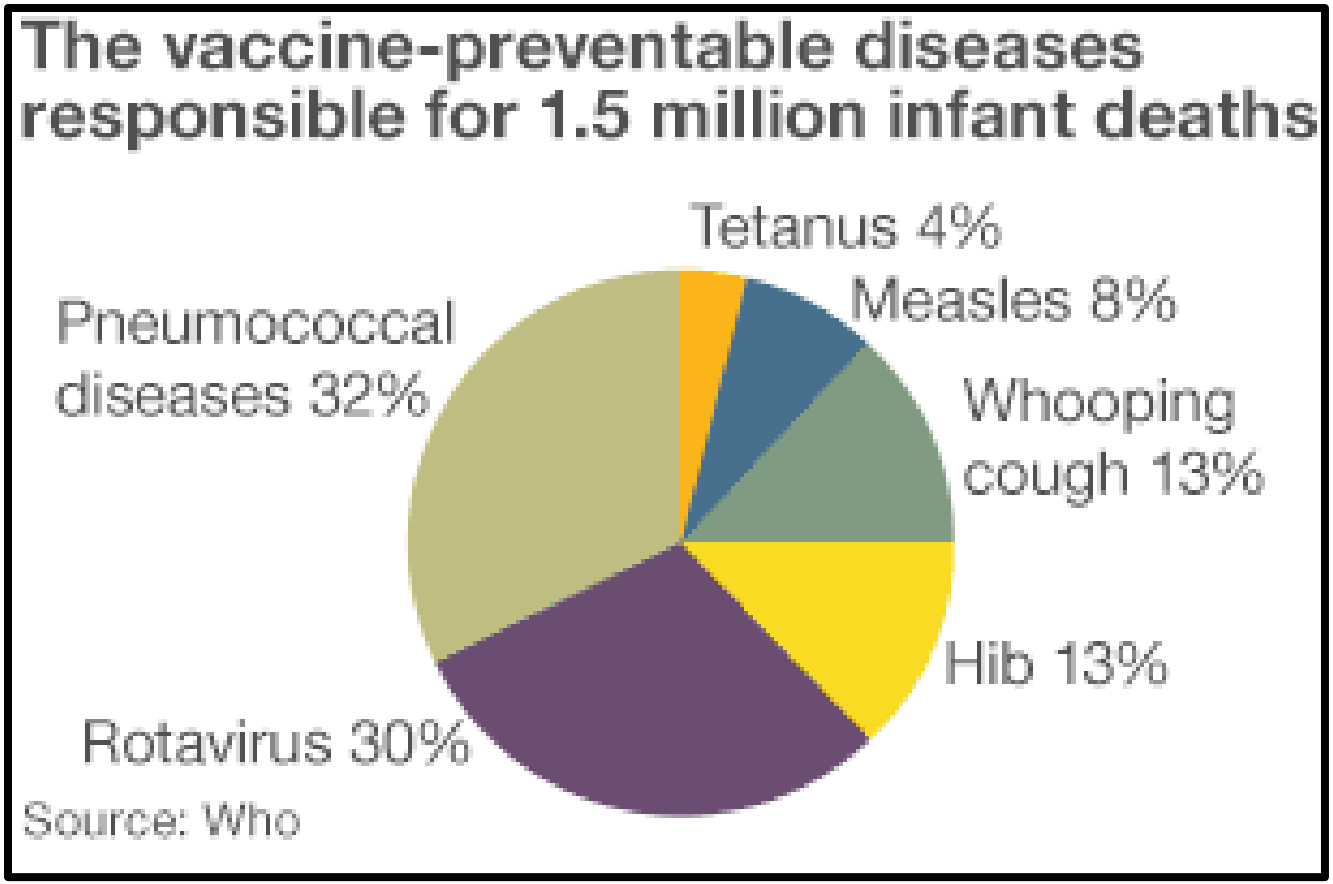
Risk Assessment for Vaccine Preventable Diseases (VPDs)

KHAING KHAING GYI

28 November 2017

Vaccine Preventable Diseases VPDs



http://news.bbcimg.co.uk/media/images/70510000/gif/_70510972_vaccines_pie304x200.gif

Vaccine Preventable Diseases (VPD) threats

- VPDs (Measles, Rubella, Polio, Diphtheria, Pertussive, Neonatal tetanus, Pneumococcal , Japanese Encephalitis, Rota virus) particularly causes high morbidity and mortality in children
- Assessing risk is critical to identify priority interventions, and to contribute to the reduction of morbidity and mortality in highly vulnerable populations
- A systematic assessment of the risk of VPDs , based on the best available evidence (risk assessment), is necessary to to mitigate this increased risk

RISK ASSESSMENT

- Continuous evaluation of risk for VPD is required to strengthen the confidence in immunization programmes.
- A risk assessment should:
- **Address the population at risk** (not the individual at risk),
- Take into account related issues (economics, availability of alternative vaccines, sociopolitical and cultural factors),
- Be prompted by a newly identified risk, The need for urgent action should be weighed against the need for further investigation;

Things to consider for VPDs Risk Assessment

- Population factors include **immunization coverage**
- The process of threat/vulnerability assessment identifies potential interactions between the -affected population (host factors), likely pathogens (agents) and exposures (environment) that determine factors that facilitate VPDs disease transmission.
- Considered the history of recent outbreaks areas / Epidemic-prone diseases and recent epidemics
- Cultural practices, e.g. consumption of bush meat or interaction with domestic animals,
- the potential magnitude of the health impact and the likelihood of the event occurring

SEAR Member States adopted the goal of measles elimination and rubella/CRS control in the South-East Asia Region by 2020.

World Health Organization Measles Programmatic Risk Assessment T

Background of the Measles Risk Assessment Tool

- Identifies areas not meeting measles programmatic targets in order to guide and **strengthen measles elimination program activities and reduce the risk of outbreaks**
- Assesses subnational programmatic risk for the year of risk assessment **as the sum of indicator scores in 4 categories:**
  - Population immunity
  - Surveillance quality
  - Program performance
  - Threat
- **Each district is assigned to a risk category of low, medium, high, or very high risk based on the overall risk score**

cutoff limit.pdf

The Risk Indicators

1. Population immunity

- Assesses measles susceptibility using administrative **vaccination coverage data and case-based surveillance data**
- **Total possible points = 40**

1.Population immunity

1. Administrative MCV1 coverage

- **Calculate the average administrative coverage of the first dose of measles-containing vaccine (MCV1) in each district from the past three years to assign risk point.**
- MCV1 coverage =

$$\frac{\text{Year 1 MCV1 coverage} + \text{Year 2 MCV1 coverage} + \text{Year 3 MCV1 coverage}}{3}$$

1.Population immunity cont;

2. Percent of neighboring districts with MCV1 <95%

- Assess representativeness of immunity gap in surrounding area of a district using the average MCV1 coverage from the previous three years.
- Percent of districts with MCV1 <95% =
- $$\frac{\text{Number of neighboring districts with} < 80\% \text{ MCV1}}{\text{Total number of neighboring districts}}$$

1.Population immunity cont;

3. Administrative MCV2 coverage

- Calculate the average administrative coverage of the second dose of measles-containing vaccine (MCV2) in each district from the past three years to assign risk point.
- If MCV2 was introduced in the past three years, then use only the years with reported coverage.
- If MCV2 has not been introduced, then give the maximum score.
- MCV2 coverage =

$$\frac{\text{Year 1 MCV2 coverage} + \text{Year 2 MCV2 coverage} + \text{Year 3 MCV2 coverage}}{3}$$

1.Population immunity cont;

4. Subnational coverage of measles SIA

Vaccination coverage associated with a measles supplemental immunization activity (SIA) campaign conducted within the past three years.

Districts with >95% for both MCV1 and MCV2 receive 0 risk points.

If no nationwide SIA was conducted in the past three years but an outbreak response immunization (ORI) campaign was performed for an entire district, report ORI coverage to assign risk point.

If measles SIAs are not part of the national strategy, assign 0 risk points (i.e. countries in post-elimination period or high-income countries).

1.Population immunity cont;

5. Measles SIA target age group

- Target age group of measles SIA conducted within the past three years. Narrow age group is defined as ≤5 birth cohorts (9m-59m or less); wide age group is defined as >5 birth cohorts (greater than 9m-59m). Districts with >95% for both MCV1 and 2 receive 0 risk points.
- If measles SIAs are not part of national strategy, assign 0 risk points (i.e., countries in post-elimination period or high-income countries).
- If measles SIAs are part of national strategy but were not conducted within the past three years, assign 2 risk points.

1.Population immunity cont;

6. Years since last measles SIA

- The number of years since the last measles SIA was conducted, using the evaluation year as the index year (e.g., if the evaluation year is 2015, and the last SIA was conducted in 2011, the value for this indicator would be 4 years).
- If measles SIAs are not part of the national strategy, assign 0 risk points
- Districts with >95% for both MCV1 and MCV2 receive 0 risk points.
- If the SIA spanned two years, use the most recent year for this calculation.

1.Population immunity

7. Percent of suspected measles cases who were unvaccinated

- Data source: Measles case-based surveillance
- Among suspected measles cases reported through case-based surveillance during the past three years, the percentage who were unvaccinated for measles or who had unknown measles vaccination status.
- Percent of suspected measles cases who were unvaccinated =

$$\frac{\text{Suspected measles cases who were unvaccinated} + \text{Suspected measles cases with unknown vaccination status}}{\text{Total number of suspected measles cases who were age-eligible for MCV1}}$$

The Risk Indicators cont.;

2. Surveillance quality

- **Evaluates the ability of a district to detect and confirm cases rapidly and accurately (**Strengthening Vaccine-Preventable Disease Surveillance)
- **Total possible points = 20**

Develop and sustain a sensitive and timely case-based measles and rubella surveillance system and Congenital Rubella Syndrome surveillance in each country in the Region that fulfils recommended surveillance performance indicators

Cased based measles surveillance

Clinical case definition

- Any person in whom a clinician suspects measles infection, **or** Any person with fever and maculopapular rash (i.e. non-vesicular) and cough, coryza (i.e. runny nose) or conjunctivitis (i.e. red eyes)

Laboratory criteria for diagnosis

- Presence of measles-specific IgM antibodies
- **Epidemiologically confirmed:** A case that meets the clinical case definition and is linked to a laboratory-confirmed case
- **Clinically confirmed:** A case that meets the clinical case definition and for which no adequate blood specimen was taken
- **Discarded:** A suspect case that does not meet the clinical or laboratory definition

Surveillance Quality (20%)	Cut-off	Risk point	Cut-off	Risk point	Cut-off	Risk point
Non-measles discarded rate	≥2	0	<2	4	<1	8
Percent of suspected measles cases with adequate investigation			≥80 %	0	<80 %	4
Percent of suspected measles cases with adequate specimen collection (within 28 days of rash onset)			≥80 %	0	<80 %	4
Percent of suspected measles cases with timely availability of laboratory results			≥80 %	0	<80 %	4

2. Surveillance quality cont;

1. Non-measles discarded rate

- Calculate yearly discarded rate for the previous year.
- Yearly discarded rate equals the number of discarded cases divided by the population, per 100,000.
- For countries that have introduced rubella vaccine, use non-measles, non-rubella discarded rate.
- Yearly discarded rate (per 100,000) = $\frac{\text{Number of discarded cases}}{\text{Population}}$ x 100,000

2. Surveillance quality cont;

2. Percent with adequate investigation

- An adequate investigation is defined as a case investigated within 48 hours of notification AND includes all 10 core variables listed below.
- To calculate the time between case notification and investigation, use variables for the date the health facility was notified and either the date the investigation form was sent to the district or the date of specimen collection.
- If no investigations were conducted in a district, then give the maximum score.
- Percent with adequate case investigation = Number with adequate investigation/Total number of suspected measles cases

2. Surveillance quality cont;

3. Percent with adequate specimen collection (within 28 days of rash onset)

Assign risk points based on the previous year.

Among suspected measles cases, the percent who had an adequate blood specimen collected within 28 days of rash onset.

Percent with adequate specimen collection = Number with specimen collected within 28 days /Suspected measles cases - epidemiologically-linked cases

2. Surveillance quality cont;

4. Percent with timely availability of laboratory results

Assign risk points based on the previous year.

Availability of laboratory report of results within 10 days of the date of specimen collection.

Percent with timely availability of laboratory results = Number with laboratory results available within 10 days/Suspected measles cases with specimens collected

WHO standards for Surveillance

- **Sentinel surveillance** involves notifications from a limited number of carefully selected reporting sites (usually refer all hospitals), with a high probability of seeing cases of the disease in question, good laboratory facilities, and experienced well-qualified staff.

- **Active surveillance (Accelerated Disease Control)** involves visiting health facilities, talking to health-care providers and reviewing medical records to identify suspected cases

WHO standards for Surveillance cont;

National passive surveillance

- involves passive notification through regular reporting of disease data by all facilities that see patients or test specimens.
- **Passive surveillance is the most common method used to detect VPDs**, the least expensive, and covers the widest geographical areas; however it can be difficult to ensure completeness and timeliness of data collection.
-

3.Program Delivery Performance

Total possible points = 16

Program Delivery Performance Indicators: Cut-offs and Risk Points.

Program Delivery Performance (16%)	Cut-off	Risk point	Cut-off	Risk point	Cut-off	Risk point
Trends in MCV1 coverage	Increasing or same	0	≤10% decline	2	>10% decline	4
Trends in MCV2 coverage	Increasing or same	0	≤10% decline	2	>10% decline	4
MCV1-MCV2 dropout rate			≤10%	0	>10%	4
DPT1-MCV1 dropout rate			≤10%	0	>10%	4

3. Program Delivery Performance cont;

1. MCV1 coverage trend

- Trend in administrative MCV1 vaccination coverage from the past three years by fitting a straight line. Risk points are assigned based on the slope of the trend line in the past three years.

2. MCV2 coverage trend

- Trend in administrative MCV2 vaccination coverage from the past three years by fitting a straight line. If MCV2 was introduced in the past three years, then use only the years with reported coverage. If MCV2 has not been introduced, then give the maximum score. Risk points are assigned based on the slope of the trend line in the past three years.

3. Program Delivery Performance cont;

3. MCV1-MCV2 dropout rate

- MCV1-MCV2 dropout rate = $\frac{\text{MCV1 coverage} - \text{MCV2 coverage}}{\text{MCV1 coverage}}$

4. DPT1/Penta1-MCV1 dropout rate

- DPT1-MCV1 dropout rate = $\frac{\text{DPT1 coverage} - \text{MCV1 coverage}}{\text{DPT1 coverage}}$

The Risk Indicators cont;

4. **Threat assessment**
   - **factors that might influence the risk for measles virus exposure and transmission in the population**
   - **Total possible points = 24**

Threat Assessment Indicators: Cut-offs and Risk Points.

Threat Assessment (24%)	Cut-off	Risk point	Cut-off	Risk point	Cut-off	Risk point	Cut-off	Risk point	Cut-off	Risk point
≥1 measles case reported in past year among those aged <5 years	No	0	Yes	4						
≥1 measles case reported in past year among those aged 5-14 years	No	0	Yes	3						
≥1 measles case reported in past year among those aged ≥15 years	No	0	Yes	3						
Population density (per km^2)	0-50	0	51-100	1	101-300	2	301-1000	3	>1000	4
≥1 measles case reported in a bordering district in past year	No	0	Yes	2						
Presence of vulnerable population groups	No vulnerable groups			0	One risk point for each vulnerable group			up to max of 8 (1-8)		

4.Threat assessment cont;

1. Evidence of recent measles cases among children <5 years of age

- One or more confirmed or measles compatible case reported in a district within the past calendar year among children <5 years of age.
- Include lab-confirmed, epidemiologically-linked, and clinically compatible cases. Exclude discarded cases.

2. Evidence of recent measles cases among children 5-15 years of age

One or more confirmed or measles compatible case reported in a district within the past calendar year among children 5-15 years of age.

Include lab-confirmed, epidemiologically-linked, and clinically compatible cases. Exclude discarded cases.

4.Threat assessment cont;

3. Evidence of recent measles cases among those >15 years of age

- One or more confirmed or measles compatible case reported in a district within the past calendar year among those >15 years of age.
- Include lab-confirmed, epidemiologically-linked, and clinically compatible cases. Exclude discarded cases.

4. Population density

- Data source: Administrative data from National Statistics Office or local knowledge
- Population density can be calculated from recent population data divided by geographic area (km^2) for each district.

Risk Scoring

. Risk categories are defined by the 50th, 75th, and 90th percentiles of this distribution. Using fixed cut-off points based on the distribution allows for standardization of risk assignments and comparisons across countries and regions, as well as within a country over time.

Risk Categories	Total risk points
Low risk	≤ 47
Medium risk	48-54
High risk	55-60
Very high risk	≥ 61

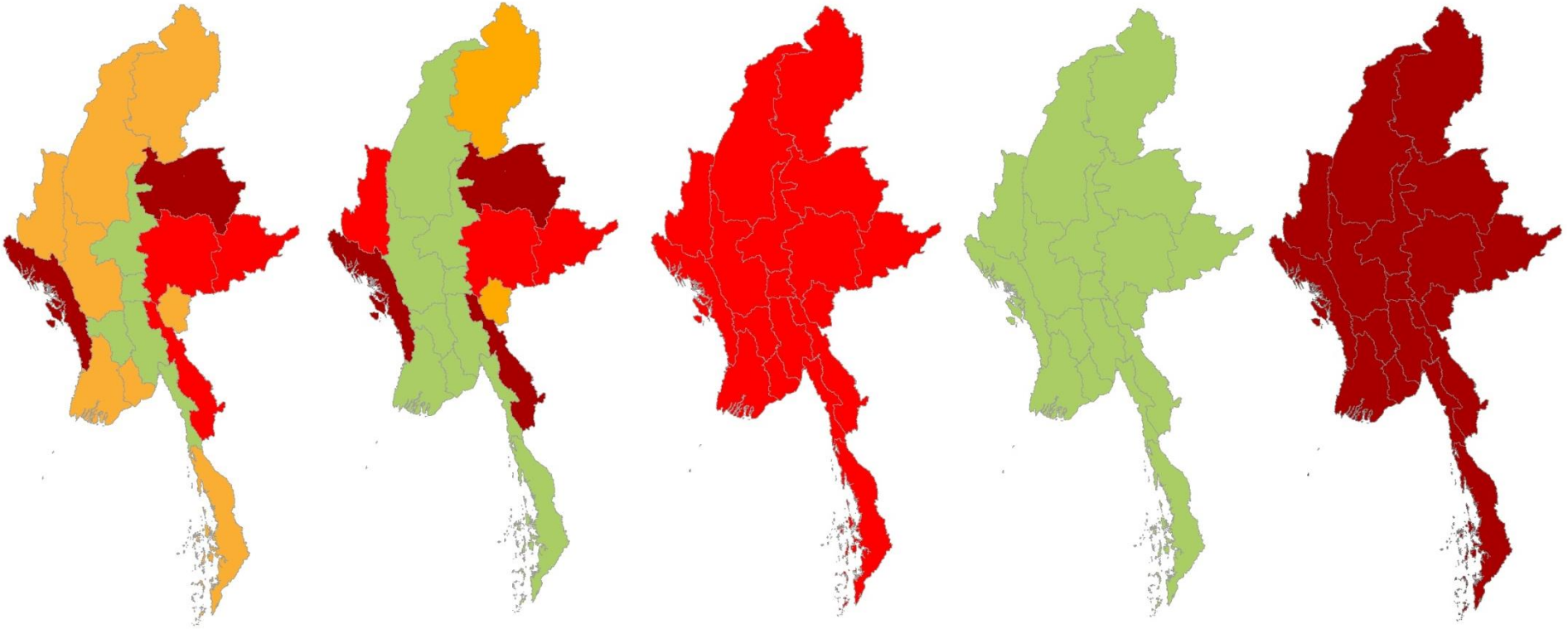
Risk Assessment cont;

- **The Risk Assessment Tool is not meant to be used for predicting outbreaks,**
- **<u>but rather for preventing them</u>.**
- **Results from the Risk Assessment Tool should not be used for planning measles SIA campaigns, but rather to strengthen a country's immunization and surveillance programs.**

Risk Assessment cont;

- The required data inputs include readily-available and routinely collected data from the immunization and surveillance programs.
- **Results are shown in table and map formats, with districts color-coded by risk category**. In addition, district risk scores can be displayed by indicator category, facilitating better understanding of programmatic weaknesses that are driving the overall risk score.

Measles Risk Assessment 2017-Myanmar



OVER ALL RISK STATUS | Population Immunity | Surveillance Quality | Program Delivery | Threat Assessment

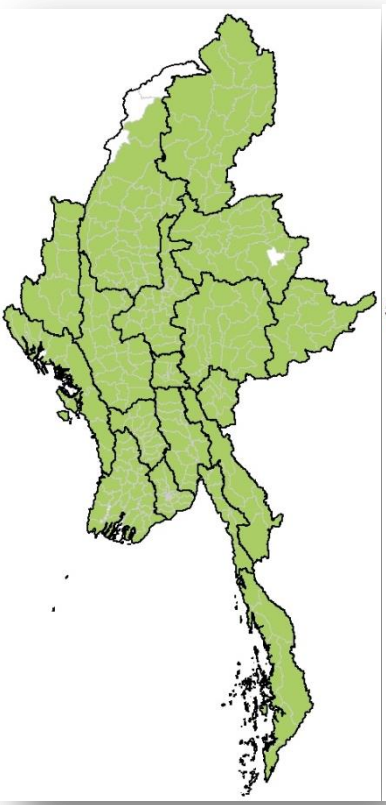
- Very High Risk
- High Risk
- Medium Risk
- Low Risk

Sub-national risk assessment

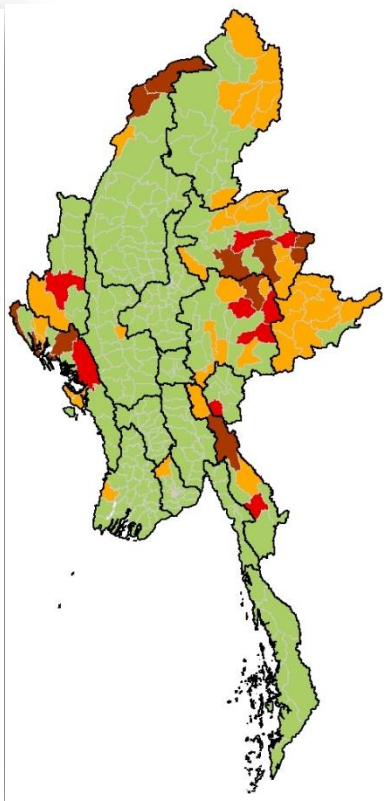
- Assessment based on the WHO Risk assessment tool- at least for the first sub-national level

	OVER ALL RISK STATUS (All categories)		Population Immunity	Surveillance Quality	Program Delivery	Threat Assessment
AREA	*Status*	*Points (100)*	*Status*	*Status*	*Status*	*Status*
Enter name of Provinces						
AYEYARWADY	MR	47	LR	HR	LR	VHR
BAGO	LR	45	LR	HR	LR	VHR
CHIN	MR	54	HR	HR	LR	VHR
KACHIN	MR	51	MR	HR	LR	VHR
KAYAH	MR	52	MR	HR	LR	VHR
KAYIN	HR	60	VHR	HR	LR	VHR
MAGWAY	MR	48	LR	HR	LR	VHR
MANDALAY	LR	46	LR	HR	LR	VHR
NAY PYI TAW	LR	45	LR	HR	LR	VHR
MON	LR	41	LR	HR	LR	VHR
RAKHINE	VHR	64	VHR	HR	LR	VHR
SAGAING	MR	48	LR	HR	LR	VHR
SHAN EAST	HR	55	HR	HR	LR	VHR
SHAN NORTH	VHR	65	VHR	HR	LR	VHR
SHAN SOUTH	HR	58	HR	HR	LR	VHR
TANINTHARYI	MR	47	LR	HR	LR	VHR
YANGON	MR	47	LR	HR	LR	VHR
TOTAL						
VHR (Very High Risk)	2	3.1%	3	0	0	17
HR (High Risk)	3	4.7%	3	17	0	0
MR (Medium Risk)	8	12.5%	2	0	0	0
LR (Low Risk)	4	6.3%	9	0	17	0

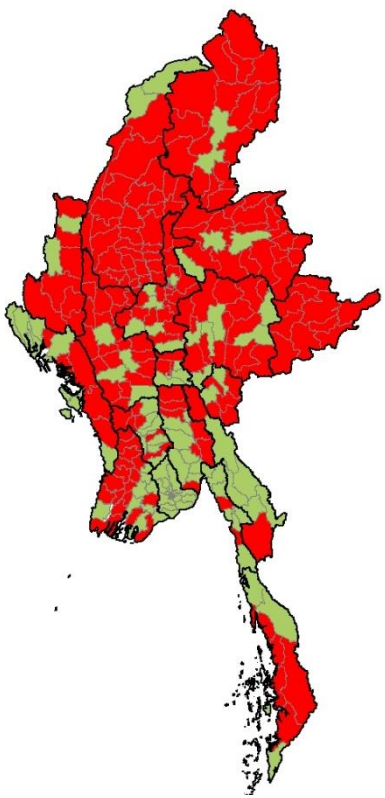
Measles Risk Assessment 2017-Myanmar



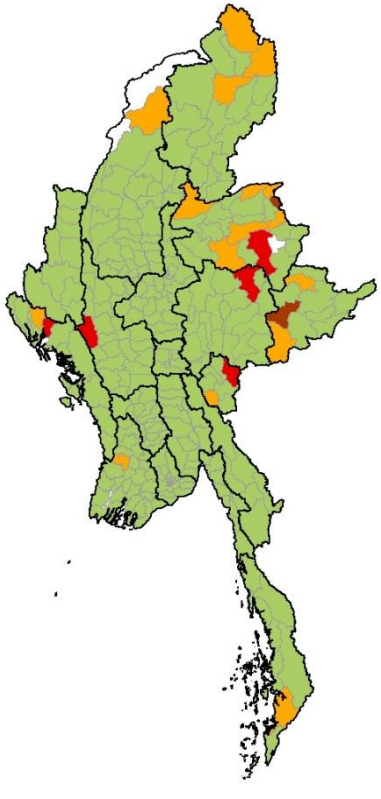
OVER ALL RISK STATUS



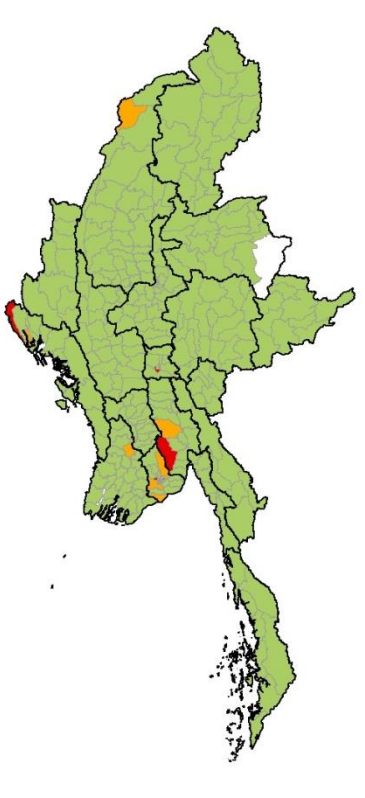
Population Immunity



Surveillance Quality



Program Delivery



Threat Assessment

	OVER ALL RISK STATUS (All categories)	Population Immunity	Surveillance Quality	Program Delivery	Threat Assessment
Very High Risk	0	14	0	3	1
High Risk	0	9	206	5	4
Medium Risk	0	45	0	17	14
Low Risk	326	262	124	301	306

POLIOMYELITIS

- According to 13th IHR declaration, May 2017 Myanmar is defined as country of no longer infected by (WPV1) wild polio virus or circulating Vaccine Derived Polio Virus (cVDPV), but which remain vulnerable to re-infection by WPV or cVDPV.

Risk assessment in polio free areas

SUSCEPTIBILITY	SURVEILLANCE	RISK FACTOR
Pol3 trend Non polio AFP children With <-3 doses, zero doses Importation WPV Emergence of cVDPV or aVDPV	Non-polio AFP rate % with adequate stool specimens(14 days) Not meeting two primary indicators	Population density Presence of vulnerable / high risk / underserved population groups, mobile groups Porous international border Probability of importation: direct air links to polio infected areas Access to Improve water Access to improve sanitation Proportion of under five diarrhoea during last 2 weeks

POLIOMYELITIS

1. **Acute Flaccid Paralysis AFP Surveillance**

   - **investigated within 48 hours**

     – This system was developed to detect AFP cases to find wild polio virus circulation ,identify high ris areas and certify absence of polio

     – AFP has sudden onset ,leads to loss of muscle tones and causes weakness and loss of voluntary movement

     – Surveillance is conducted for all AFP cases and not just that caused by polio

     – Goal is to find at least 2 case of non Polio AFP / 100,000 in children < 15 year in each township.

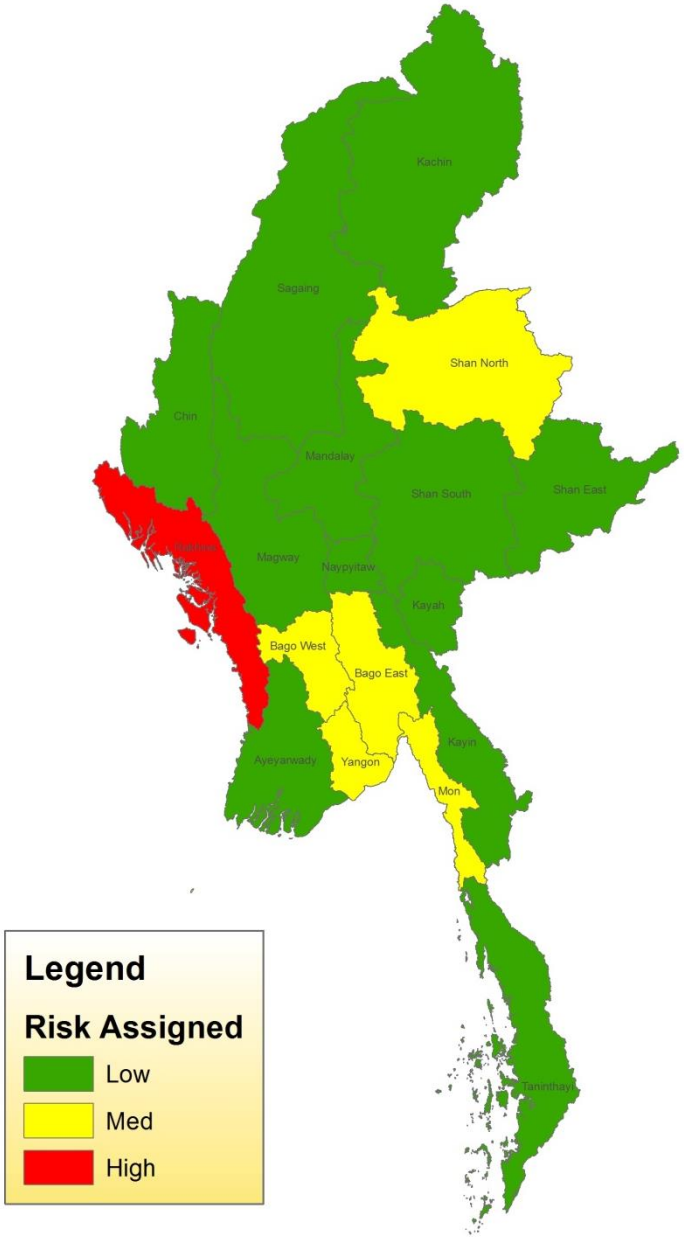
POLIOMYELITIS cont;

AFP case definition

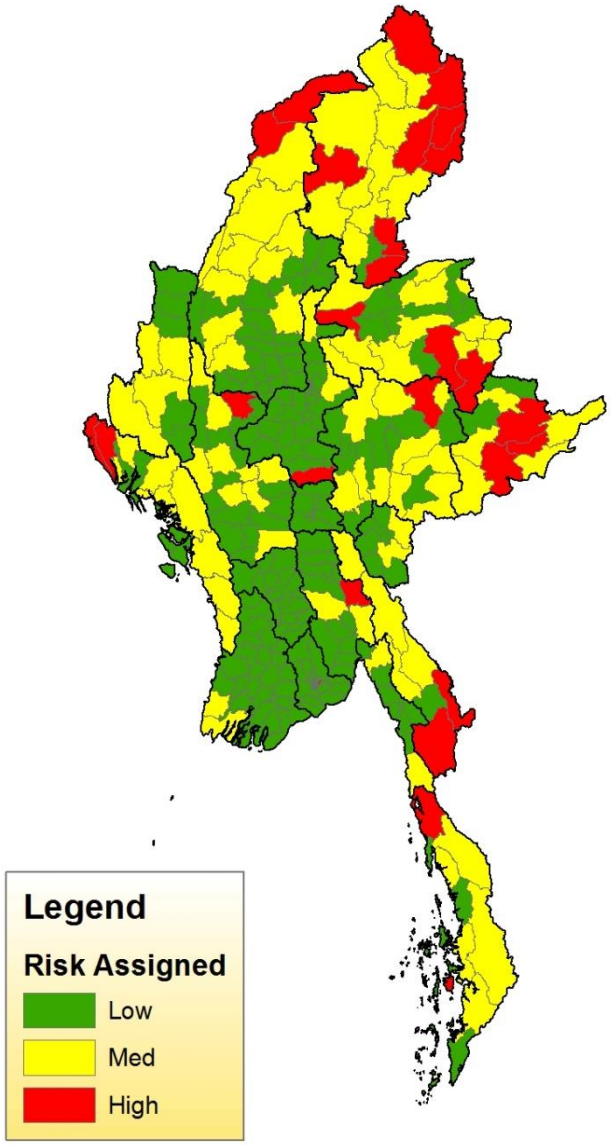
Any case of Acute Flaccid Paralysis in a child aged less than 15 years, including Guellin-Baree syndrome and transverse myelitis

2. **Environmental surveillance**
   - Conducted by Bangladesh, India, Indonesia;
   - No prescribed reporting format
   - Planned for Myanmar, Nepal and Thailand
   - Only in selected sewerage sites

Myanmar Risk Assessment, 2014



Township Risk Assessment, 2014

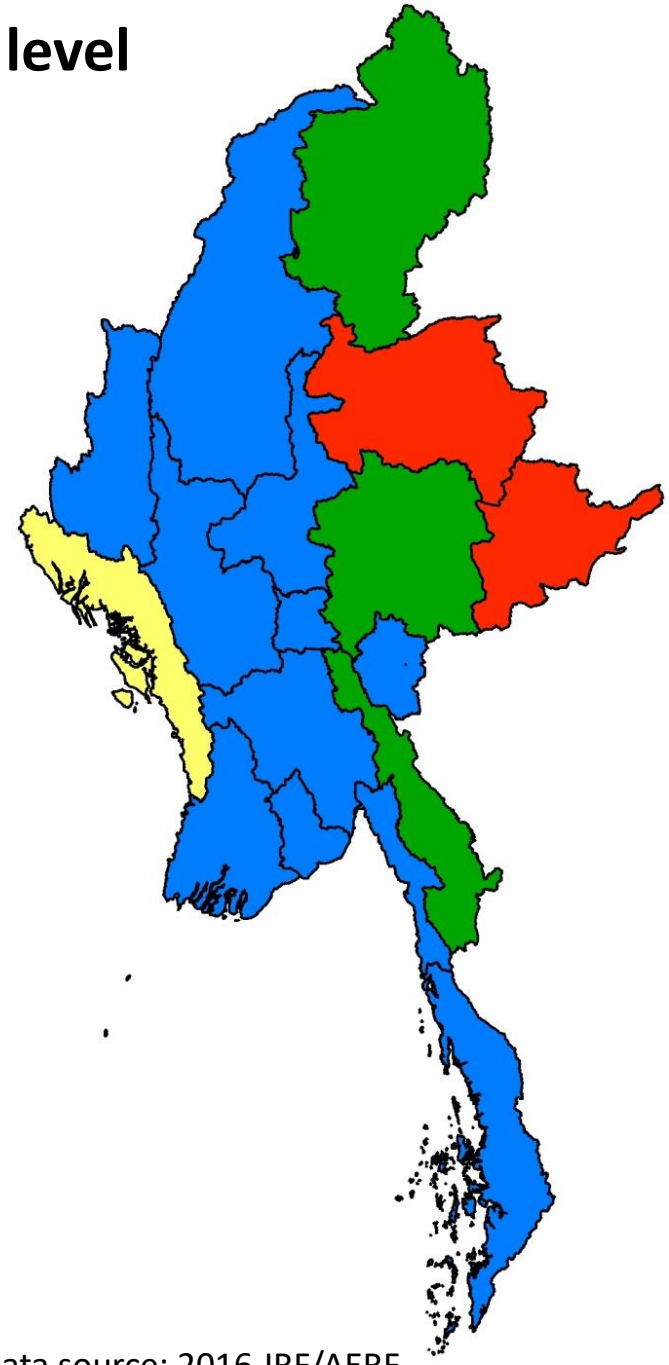


	Township	
	(#)	(%)
High	27	8%
Medium	89	27%
Low	214	65%

OPV3 coverage by first administrative level

Myanmar, 2016

Province Name	Number of Districts	2016 Number of Live Births	OPV3 %	IPV1 %
Ayeyarwady	26	119901	94	72
Bago	28	89720	91	72
Chin	9	13788	95	90
Kachin	18	36317	89	80
Kayah	7	7198	96	77
Kayin	7	39183	80	77
Magway	25	71027	98	73
Mandalay	28	111164	96	73
Mon	10	40315	95	87
Nay Pyi Taw	8	20144	93	86
Rakhine	17	82032	74	55
Sagaing	37	100191	93	72
Shan East	10	16694	68	53
Shan North	24	58455	65	62
Shan South	21	49904	89	61
Tanintharyi	10	32738	93	91
Yangon	45	121022	94	77
Total	330	1009793	89	72

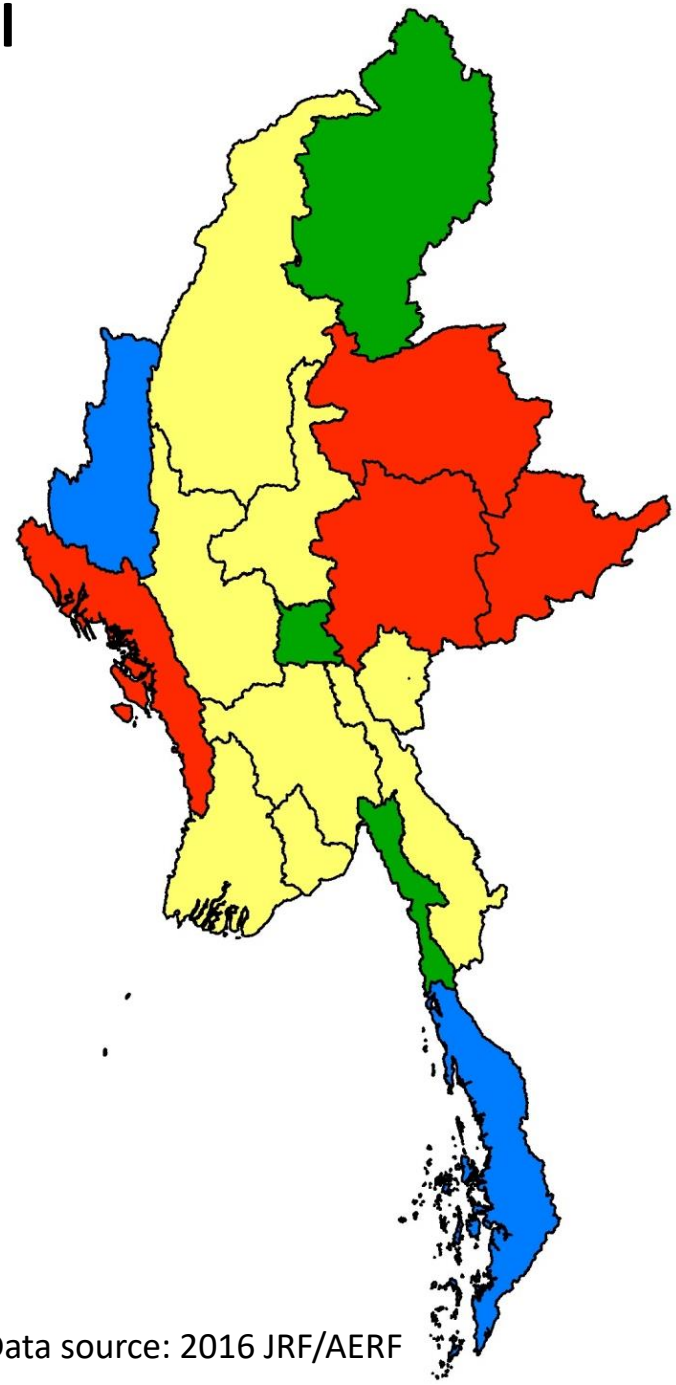


Data source: 2016 JRF/AERF

IPV coverage by first administrative level

Myanmar, 2016

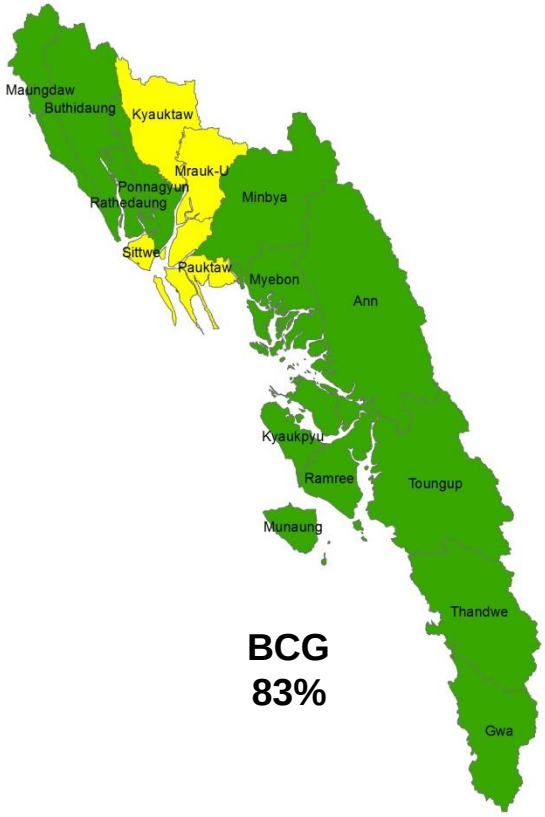
Province Name	Number of Districts	2016 Number of Live Births	OPV3 %	IPV1 %
Ayeyarwady	26	119901	94	72
Bago	28	89720	91	72
Chin	9	13788	95	90
Kachin	18	36317	89	80
Kayah	7	7198	96	77
Kayin	7	39183	80	77
Magway	25	71027	98	73
Mandalay	28	111164	96	73
Mon	10	40315	95	87
Nay Pyi Taw	8	20144	93	86
Rakhine	17	82032	74	55
Sagaing	37	100191	93	72
Shan East	10	16694	68	53
Shan North	24	58455	65	62
Shan South	21	49904	89	61
Tanintharyi	10	32738	93	91
Yangon	45	121022	94	77
Total	330	1009793	89	72



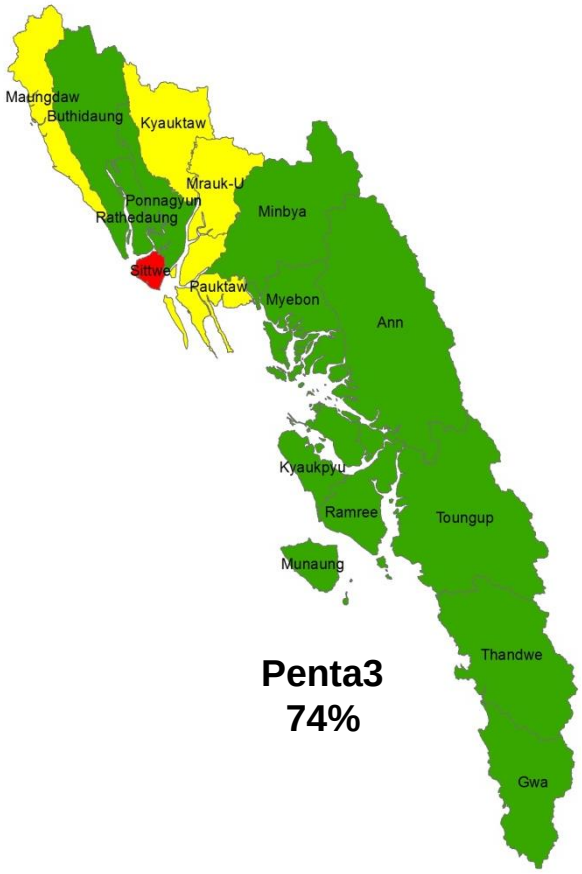
<70% 70% - 79% 80% - 89% ≥90%

Data source: 2016 JRF/AERF

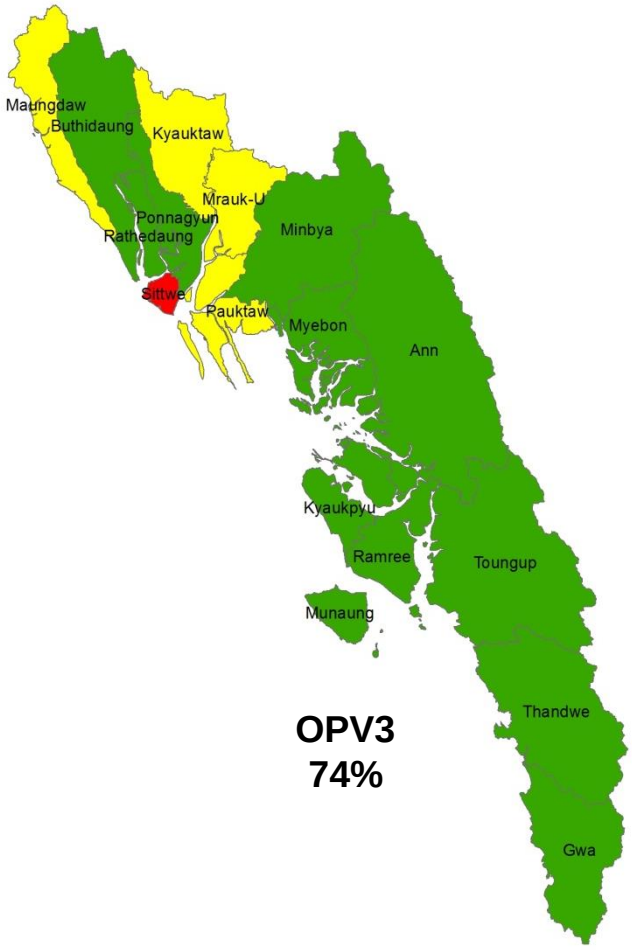
Routine Immunization Coverage 2016, Rakhine



BCG
83%



Penta3
74%



OPV3
74%

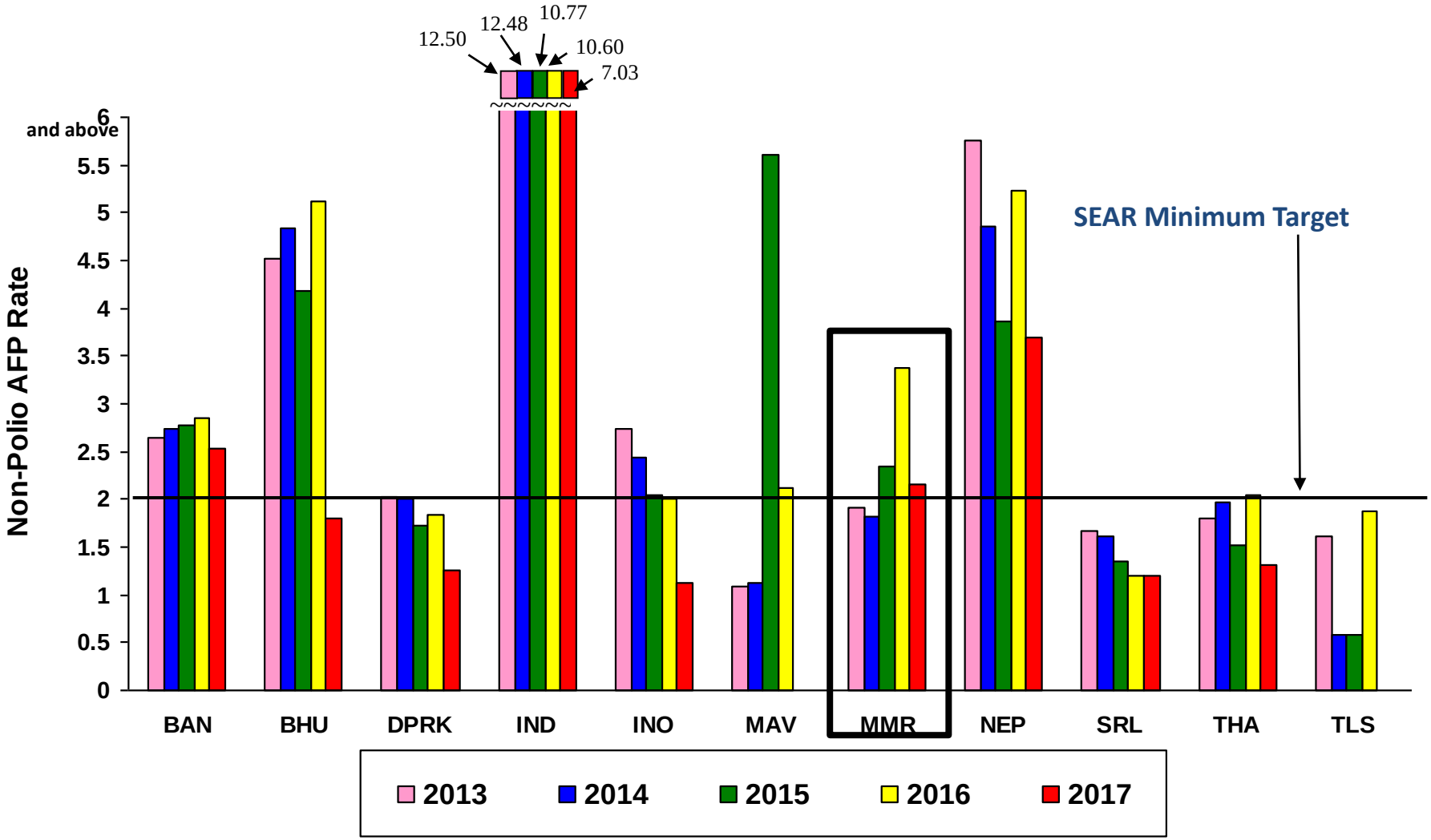
0-59%

60% - 79%

80% or above

No data

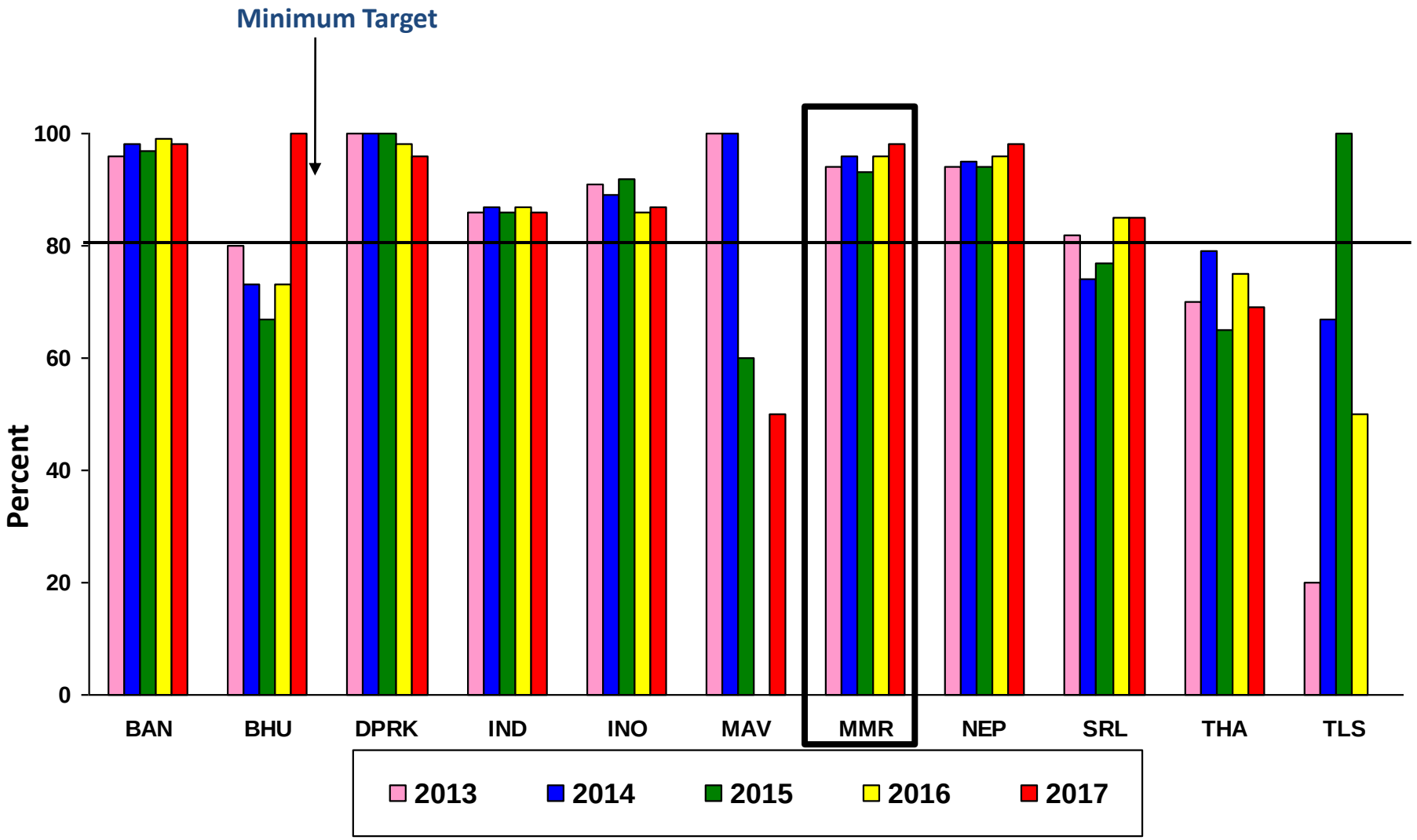
Non-polio AFP Rate* SEAR, 2013–2017



* Number of discarded AFP cases per 100,000 children under 15 years of age

Data as of 04 September 2017

Percent Adequate Stool Specimen Collection* SEAR, 2013-2017

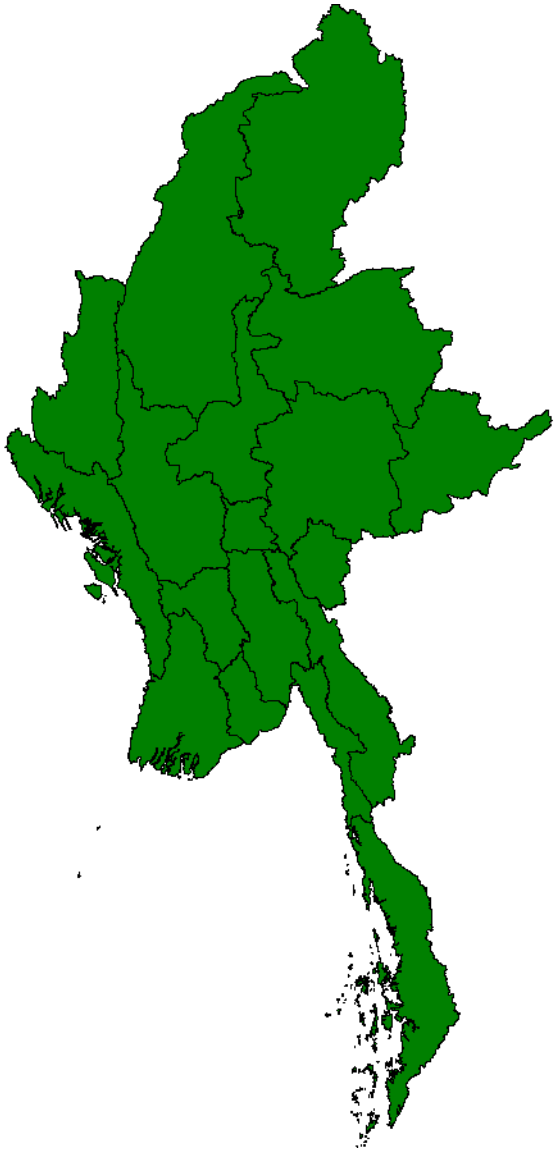


*Percentage with 2 specimens 24 hours apart and within 14 days of paralysis onset.

Data as of 04 September 2017

Non-polio AFP Rate by First Administrative Level

Myanmar 2016



Non-Polio AFP Rate

- < 1
- 1 – 1.99
- ≥2
- No Non-Polio AFP Case

Total AFP Cases = 466
Non-Polio AFP Rate = 3.38
Adequate Stool specimen = 96%
Provinces reporting AFP cases = 18 (100%)

* Number of discarded AFP cases per 100,000 children under 15 years of age.
** Percentage with 2 specimens 24 hours apart and within 14 days of paralysis onset.

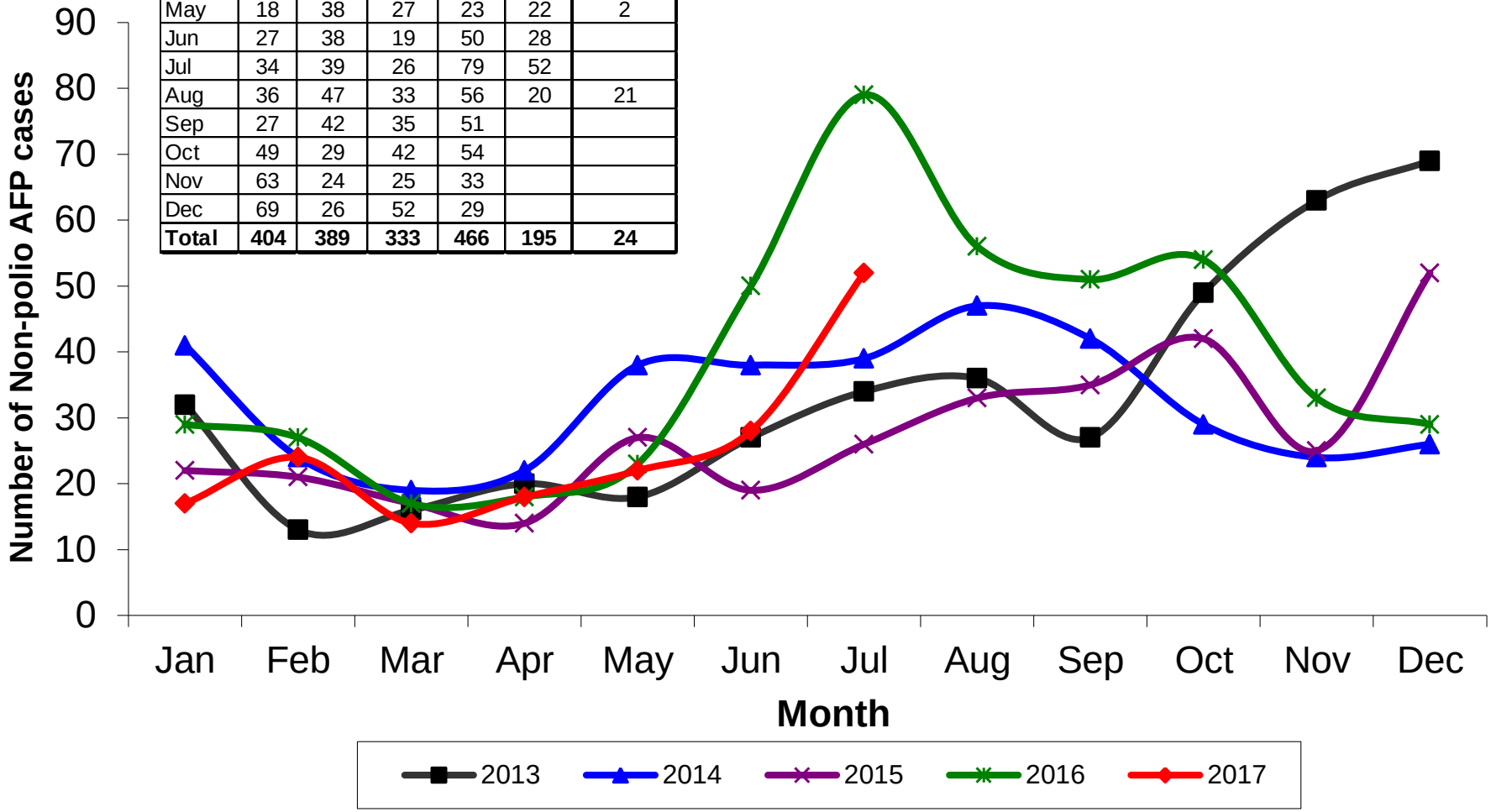
.

The boundaries and names shown and the designations used on this map do not imply the expression of any opinion whatsoever on the part of the World Health Organization concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. Dotted lines on maps represent approximate border lines for which there may not yet be full agreement.
© WHO 2015. All rights reserved

Data as of 04 September 2017

Non-polio AFP Cases by Month of Onset
Myanmar, 2013-2017

Month	2013	2014	2015	2016	2017	2017 Pending
Jan	32	41	22	29	17	1
Feb	13	24	21	27	24	
Mar	16	19	17	17	14	
Apr	20	22	14	18	18	
May	18	38	27	23	22	2
Jun	27	38	19	50	28	
Jul	34	39	26	79	52	
Aug	36	47	33	56	20	21
Sep	27	42	35	51		
Oct	49	29	42	54		
Nov	63	24	25	33		
Dec	69	26	52	29		
Total	**404**	**389**	**333**	**466**	**195**	**24**



Data as of 04 September 2017

Polio Risk Assessment slides

Japanese Encephalitis

AES surveillance

- In high endemic areas of countries in the Region
- Laboratory supported Sentinel Site surveillance in 9 out of 11 countries
- JE/AES cases are reported as part of Monthly aggregated VPD reporting (by 15th of each month)
- JE lab results are reported in monthly aggregated report (by 10th of each month)
- Annually JE/AES cases are also reported in WHO/UNICEF JRF (by 31st of March)

THANK YOU