

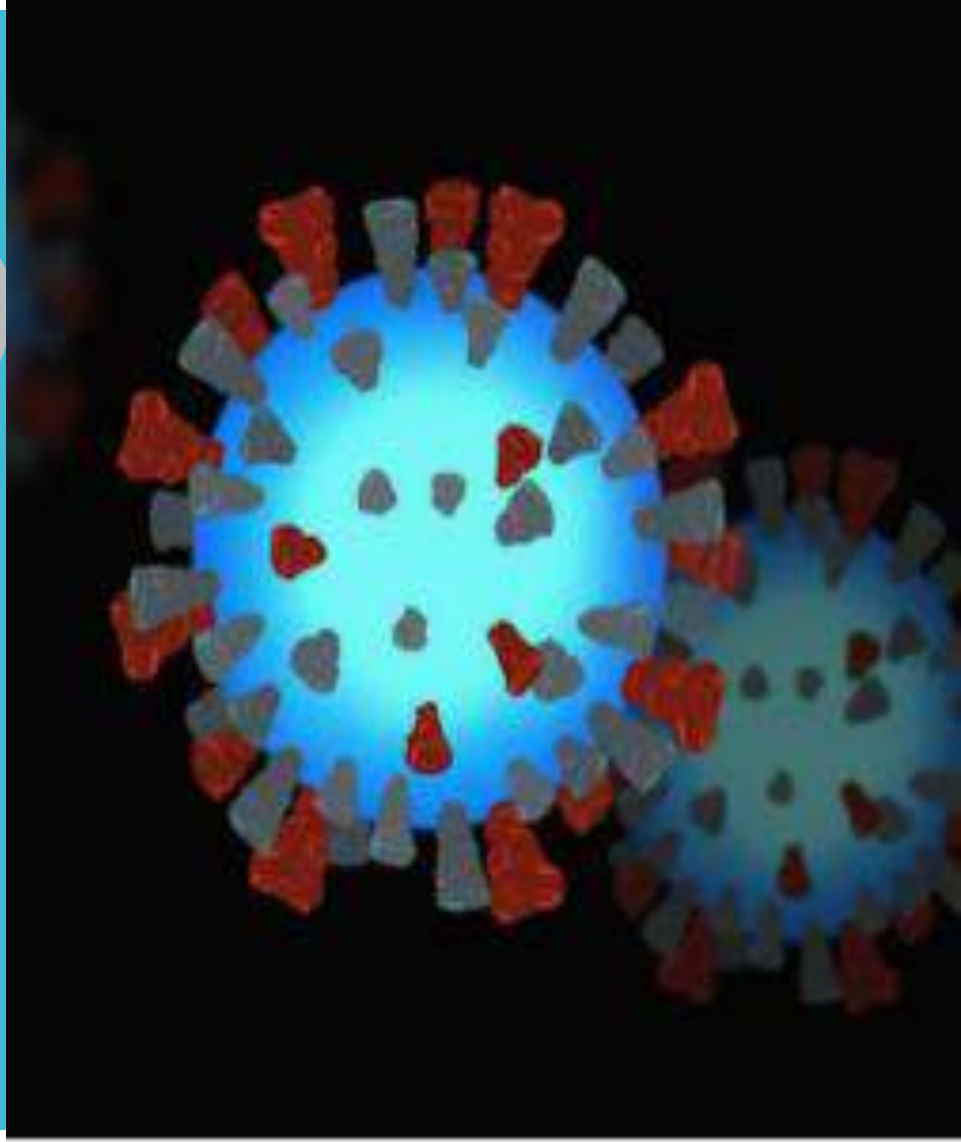
The Transmissibility 'Gold Medalist' virus: Measles

Sanya Tahmina-Sad

Dr. Sadia Afrin

Lecturer

Department of Microbiology



Acknowledgement and Gratitude

10th Century



- Abū Bakr Muhammad Zakariyyā Rāzī (known as Rhazes) distinguished measles from smallpox

1954



- **John F. Enders** and Dr. Thomas C. Peebles isolated the virus

1963



- John Enders and colleagues developed measles vaccine

A handwritten signature in the bottom right corner of the slide.

Historical background of measles outbreak in last 100 years

The Pre-Vaccine Era

(1926–1962)

- Outbreaks occurred in cyclical waves every 2 to 3 years.
- **Universal Infection**
- **High Mortality**
- **Global Impact**

The Vaccine Revolution

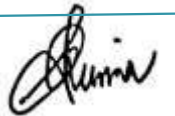
(1963–2000)

- First licensed measles vaccine introduced
- **Dramatic Reduction** over 95% in developed nations.
- **Elimination Milestone:**

Resurgence and Recent Outbreaks

(2001–Present)

- 2001-Regional measles elimination initiatives strengthened
- Resurgence of outbreaks in multiple regions due to immunity gaps



Introduction



- Also called as Rubeola meaning red spots
- Often mistakenly viewed as a simple childhood infection — a temporary rash and a fever
- In the world of virology, measles is known as one of the most ruthless and efficient pathogens in existence
- Occurs only in humans
- Has high morbidity and mortality in developing countries

Shima

Why Measles Still Matters?

One of the most contagious infectious diseases

Major cause of childhood mortality

One infected person can infect 12–18 susceptible individuals.

Vaccine-preventable

Causes frequent national and sub-national outbreaks due to declining vaccination

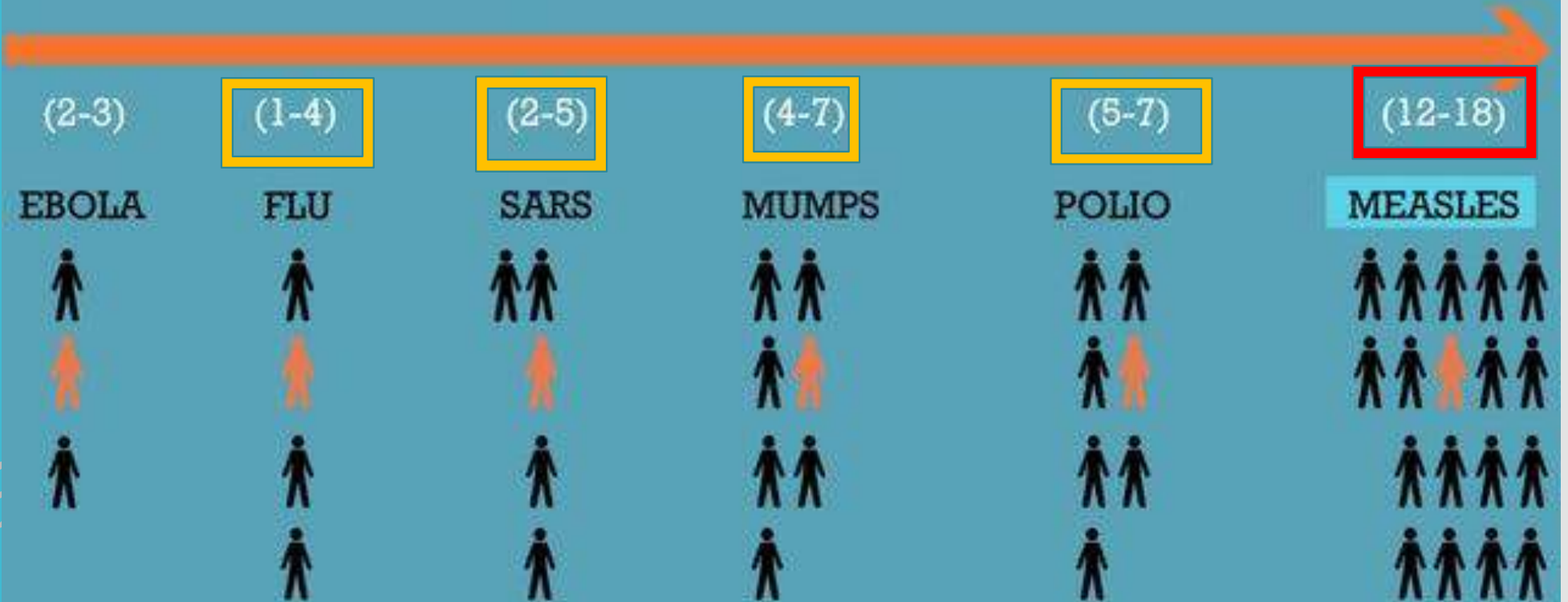
Sumia

This figure shows the infectiousness of measles in comparison to other common viral diseases

R_0

HOW CONTAGIOUS IS MEASLES?

R_0 = average number of people who will catch the disease from 1 infected person



Source: CDC / WHO

#CBSEveningNews

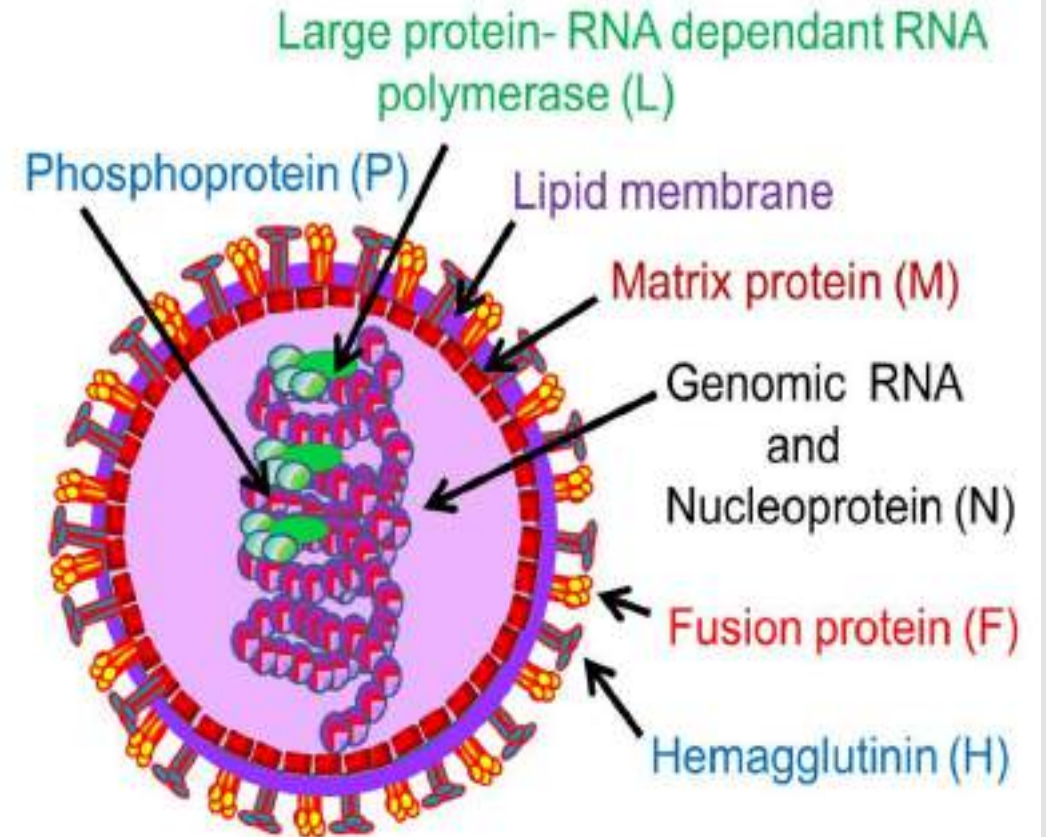
Etiologic Agent

- **Measles Virus**
- **Classification**
 - Family: Paramyxoviridae
 - Enveloped RNA virus
 - Genetically stable
 - B3 strain, the older, endemic variant of the measles virus is responsible for recent outbreak



Surface glycoproteins

- H protein
- Fusion (F) protein
- Matrix protein
- RNA polymerase



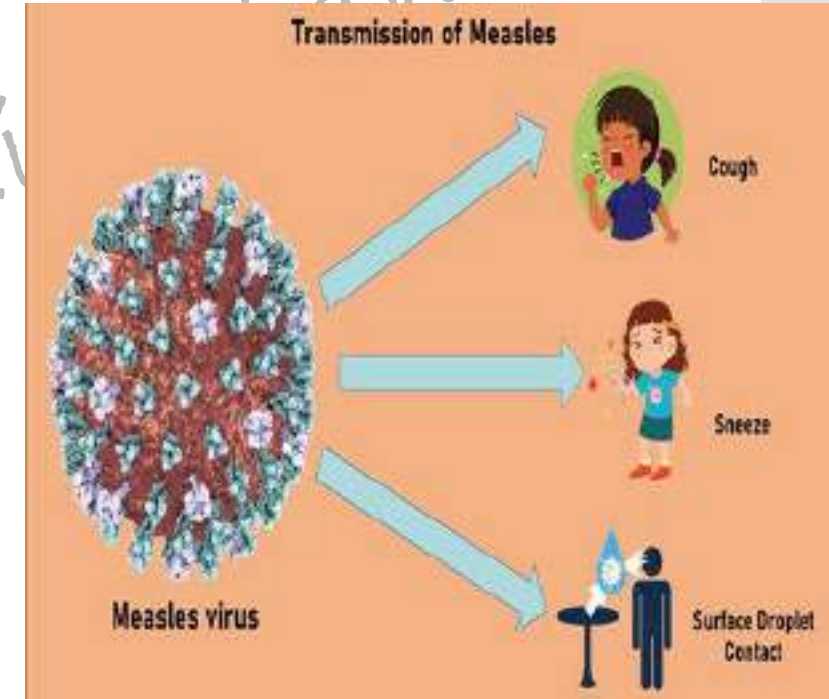
Suma

Transmission

“If there is a gold medalist in the category of transmissibility, it is measles”

- Virus remains viable in air for approximately 2 hours
- **Airborne droplets**
- **Aerosols**
- **Respiratory secretions**
- A person with measles can spread the virus to others for about eight days

The Two-Hour Ghost



Sumia

Clinical Features

Sanya



Symptoms of measles



High fever
(may last 3-5 days)



Red rash on the body
(starts on the face, then spreads all over)



Cough



Runny nose



Red or watery eyes



Loss of appetite or weakness

Your immediate action is critical to stop the spread of measles. Please practice these suggested/desired behaviours to protect your child. Share this information with your family and neighbors and encourage them to practice these desired behaviours.



World Health Organization
Bangladesh



Gavi
The Vaccine Alliance

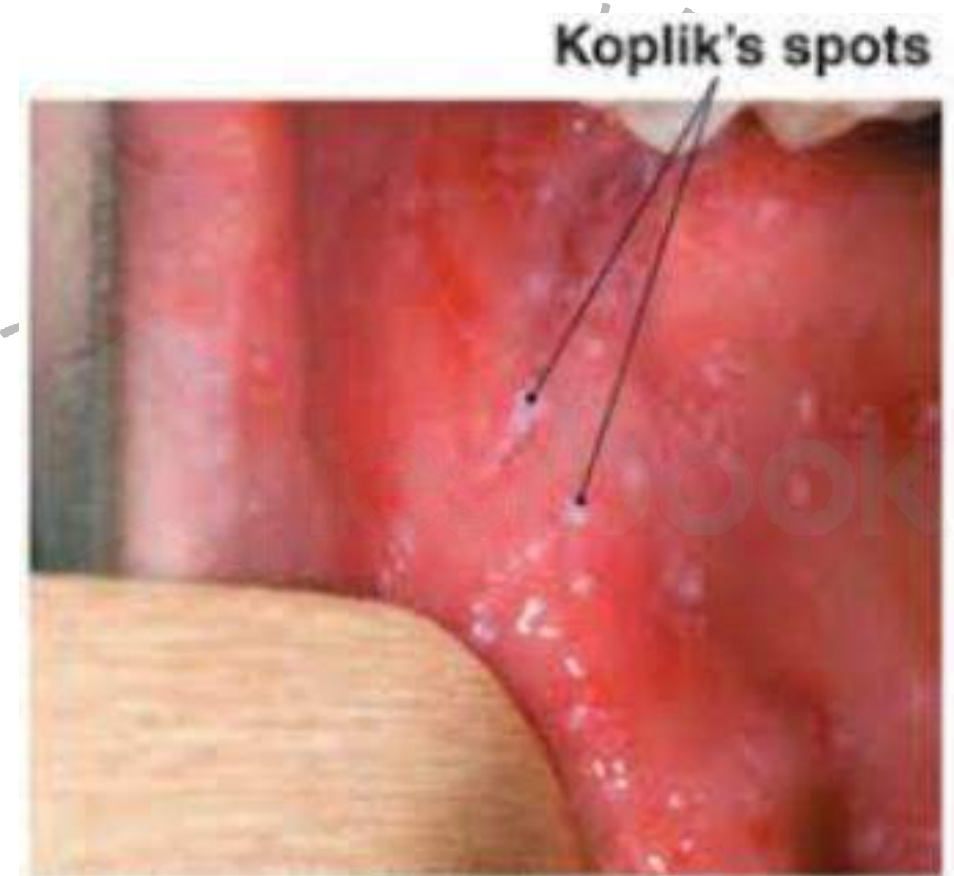


unicef
সকল শিশুর জন্য

Shumia

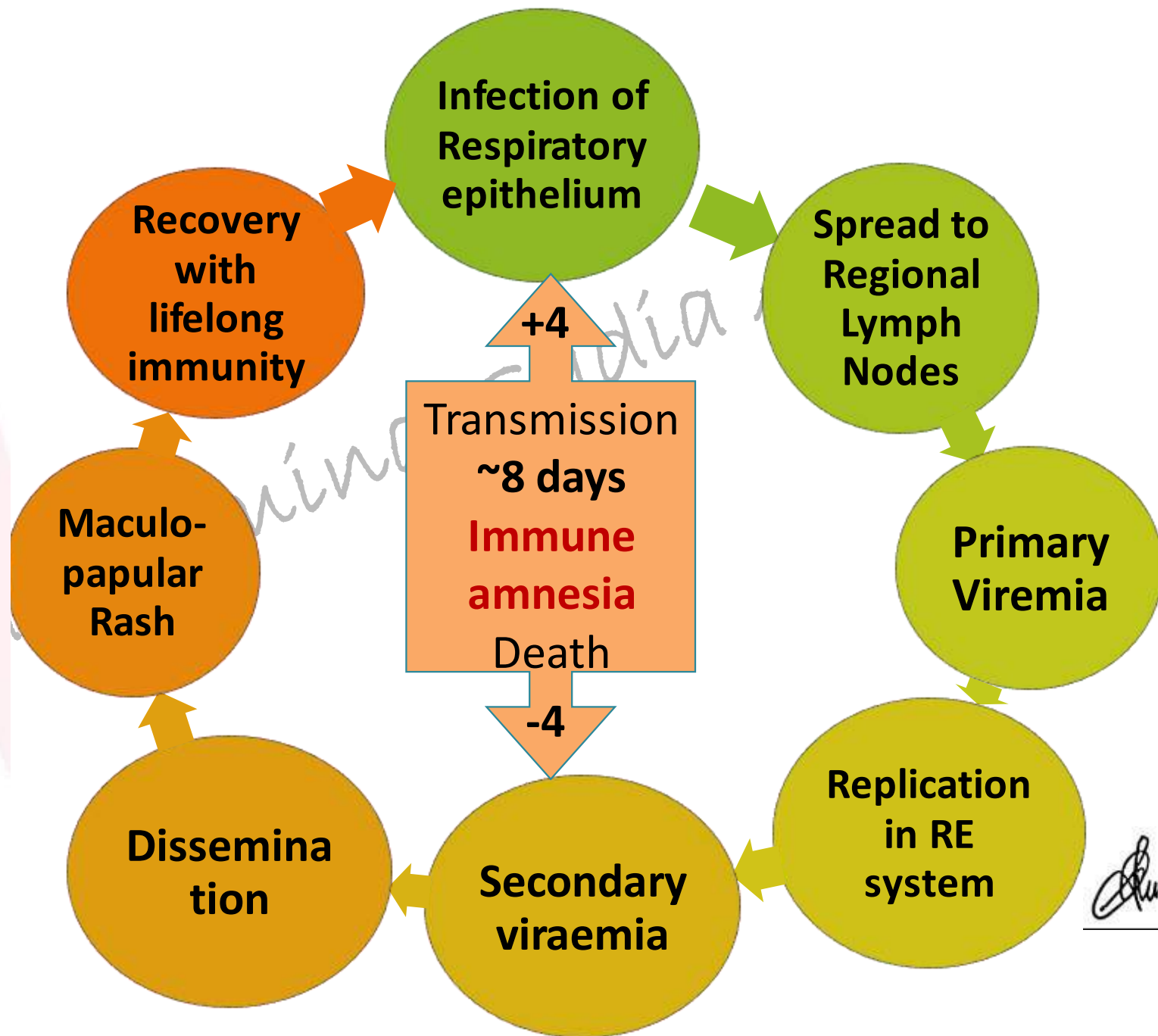
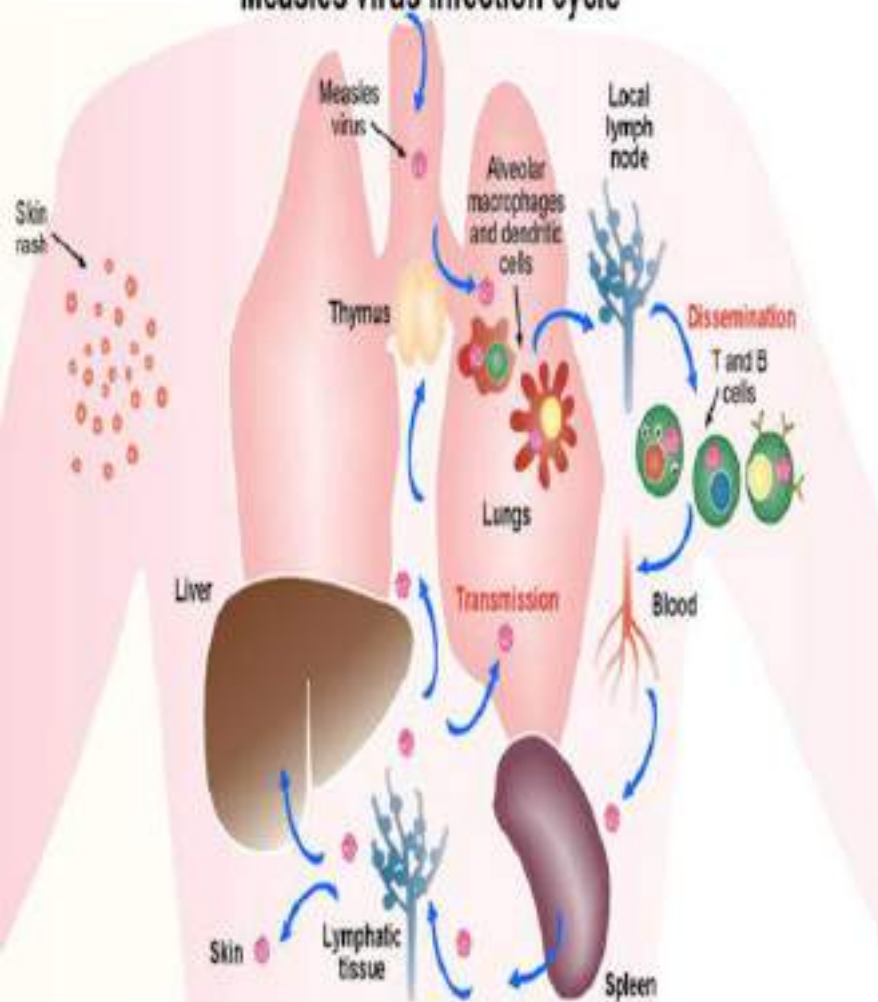
Koplik Spots

- Pathognomonic
- Buccal mucosa
- Appear before rash



Sanya Tammima

Measles virus infection cycle



**B & T CELL
MEMORY**

Phumia

Pathogenesis

**‘host-seeking’
mechanism is
incredibly
refined**

Measles virus is extraordinarily refined to invade human host cells.

1. Long-Range Transport: Exploiting Human Airflow

- Airborne droplets
- Aerosols
- Respiratory secretions

2. Surface glycoproteins

- The H Protein (Haemagglutinin)
- The F Protein (Fusion)



Smart Target Seeking behavior

H protein (Haemagglutinin):

H protein target two specific receptors in the human body

- **CD150 Receptors:**

- Found exclusively on immune cells
- The virus infects these first and replicate within them

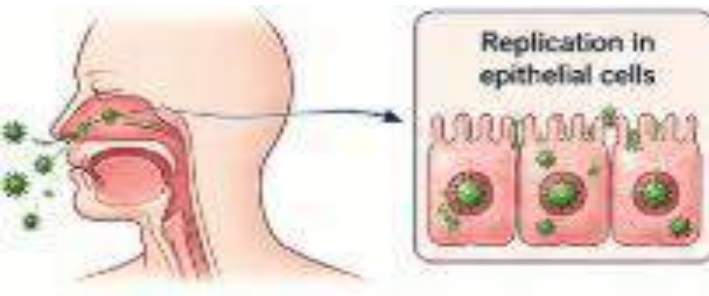
- **Nectin-4 Receptors:**

- helps in spread of the virus

F Protein (Fusion):

- Promotes viral entry into the host cells
- causes infected cells to fuse with neighbors, creating multinucleated giant cells





Pathogenesis-cont'd

Measles virus cause profound reversible loss of immune memory leading to vulnerability to many other unrelated infections

Hijacking the Guard cells



Infiltrating the Immune Command Center

Measles Virus Targets Immune Cells

MV has tropism for cells expressing SLAM (CD150) receptor.

- Memory B cells
- Naïve B cells
- Memory T cells
- Dendritic cells



Creating Collateral Damage

Infected cells are destroyed by body's immune forces

Immune Amnesia

The virus can erase 11% to 73% of a person's preexisting antibody memory

Complications

Measles: it's more than just a rash

A child who survives may suddenly contract other infections they were previously immune to.

Pneumonia and acute encephalitis:

The most common and critical life-threatening complications

Common Systemic complications

- Otitis media
- Diarrhea
- Ocular damage

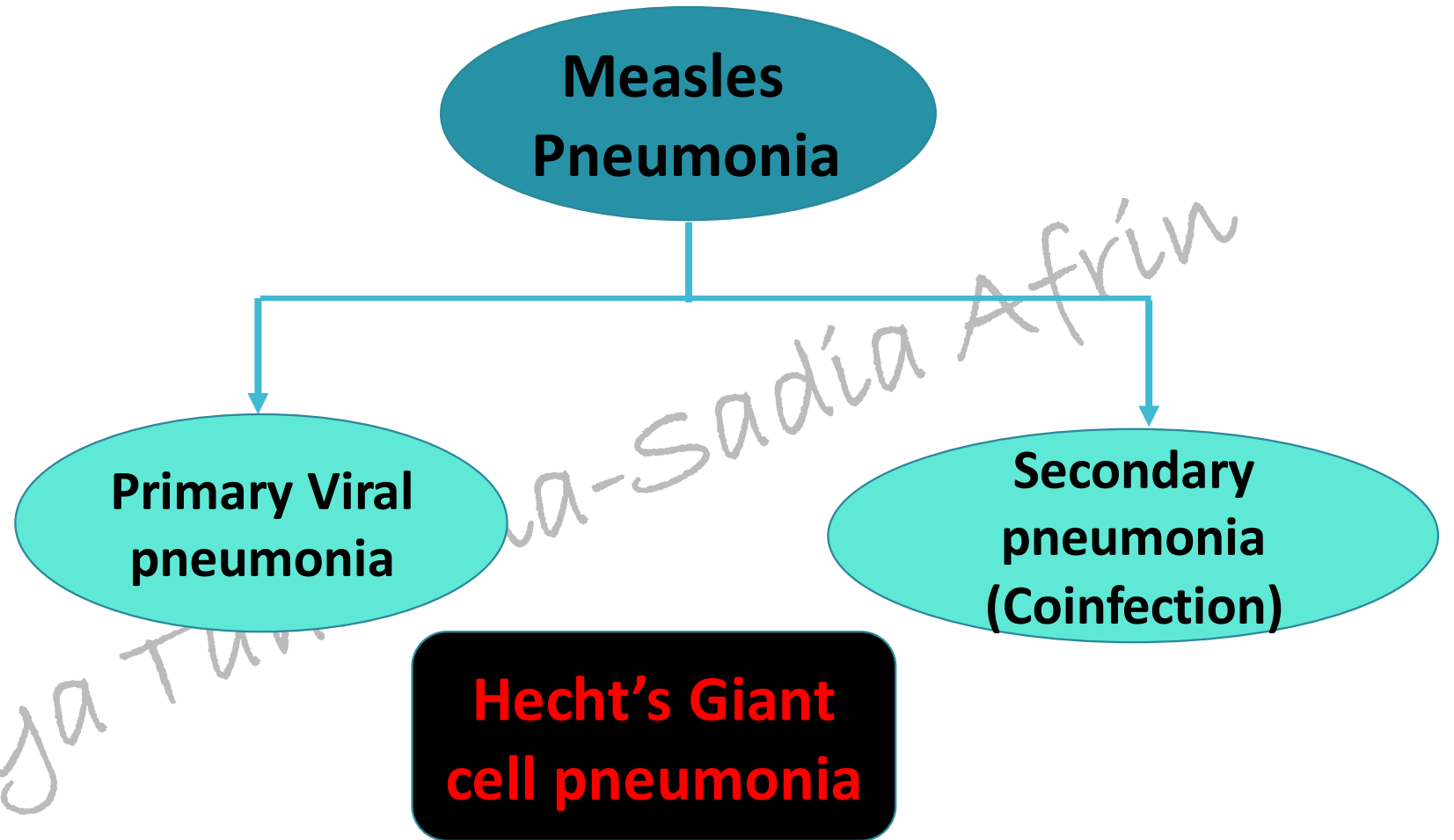
Rare but inevitably fatal

- SSPE

Death



Measles pneumonia



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Measles in Pregnancy

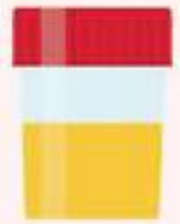
- Maternal morbidity
- Miscarriage
- Prematurity
- Low birth weight



Laboratory Diagnosis

- Specimens
 - Blood
 - Serum
 - Throat swab
 - Nasopharyngeal swab

Measles Tests

Acute Disease	PCR	Nasopharyngeal (NP) or Throat (OP) Swab	
	PCR	Urine	
	IgM	Serum	
Immunity	IgG	Serum	

Treatment

- No specific antiviral
- Supportive care
 - Hydration
 - Antipyretics
 - Nutrition
 - Vitamin A

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Prevention

- Vaccination
- Isolation
- Surveillance
- Outbreak response

Sanya Tammima-Sadia Afrin



Measles Vaccine

- A live attenuated vaccine
- Efficacy: 95% (range, 90%-98%)
- Duration of Immunity: Lifelong
- Storage: 2-8 degree Celsius
- Schedule: 2 doses
- Can be administered singly or as MR or MMR.



A handwritten signature in black ink, appearing to read 'Sadia Afrin', located in the bottom right corner of the slide.

Immunization Schedule

First dose

9–12 months

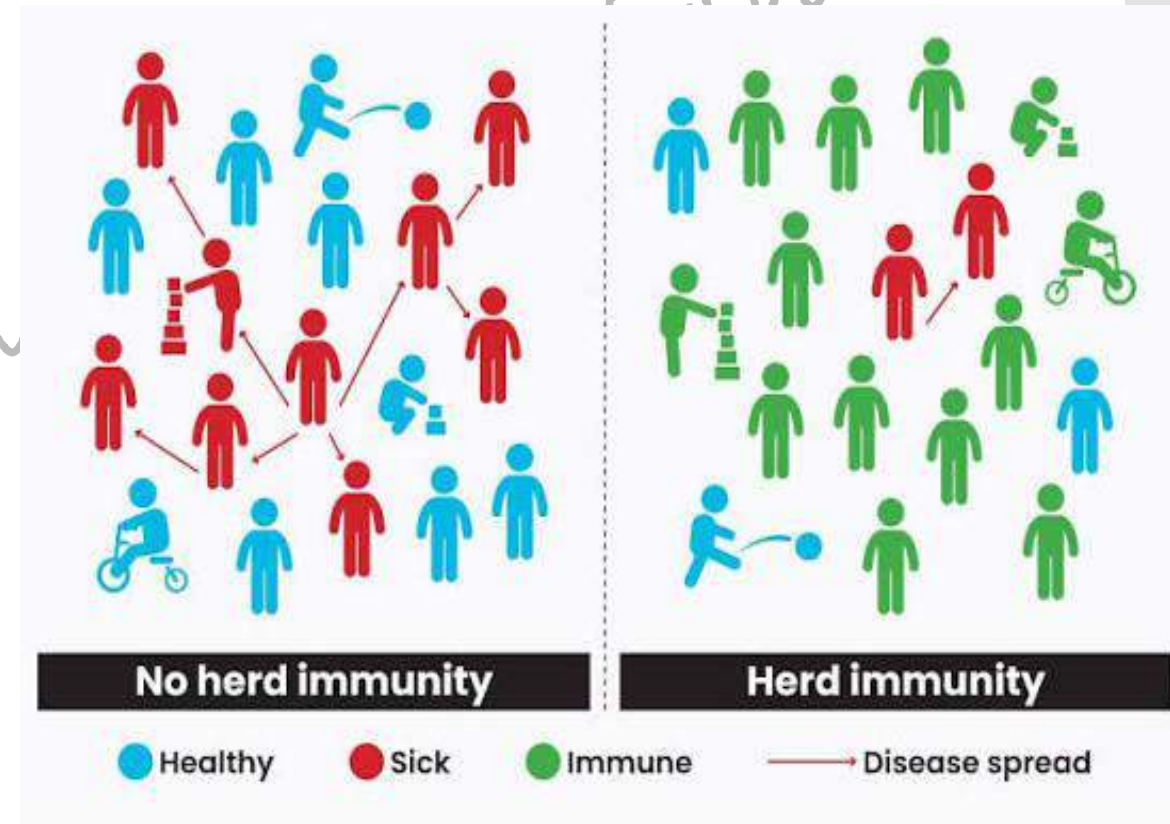
Second dose

15–18 months

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Herd Immunity

- Coverage required $\geq 95\%$



Sumia

Public Health Aspects of Measles Outbreak

Sanya Tahmina-Sadia

Prof. Sanya Tahmina
Professor and Head,
Department of Microbiology



**Measles outbreak turns
deadly in Bangladesh! Over
500 children lose their lives**



50th anniversary of the Expanded Programme on Immunization (EPI)

1 January – 31 December 2024 | Reading time: 3 min (794 words)

Background of measles outbreak

Year	Milestone
Early 1970s	Introduction of the MMR vaccine
1974	WHO Expanded Program on Immunization (EPI) launched globally
1979	Routine measles vaccination introduced in Bangladesh in 1979 under EPI
2001 onward	Regional measles elimination initiatives strengthened
2019–Present	Resurgence of outbreaks in multiple regions due to immunity gaps

Measles Is Surging in Many Countries

Measles incidence rate by country, 2025



Austria, Spain, and the UK lost measles-free status in 2026.



Canada lost its elimination status in 2026.

Note: Incidence rate is calculated as total confirmed cases per one million people. Data for 2025 is provisional as of April 2026.

Source: World Health Organization

cfr

Global Outbreaks

- Europe
 - Romania
 - United Kingdom
 - France
 - Italy
 - Austria
- USA
- Canada
- Africa
- South-East Asia

False data published in the late 1990s incorrectly **linked the MMR vaccine to autism**. This sparked vaccine hesitancy, lowering immunization coverage and triggering major outbreaks across Europe and North America in the 2010s

Why Are Measles Outbreaks Increasing?

Vaccine Hesitancy

1

Fear of vaccine side effects

Misinformation on social media

Religious or cultural beliefs

Reduced/increased public confidence

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Why Are Measles Outbreaks Increasing?

Conflict and Humanitarian Emergencies

Wars and disasters lead to

Disrupted vaccination

Damaged healthcare infrastructure

Population displacement

Overcrowded refugee camps

2

These conditions facilitate rapid measles transmission.



Why Are Measles Outbreaks Increasing?

COVID-19
Pandemic

3

Consequences
included:

Many countries
experienced
renewed
measles
outbreaks.

Significantly disrupted routine
immunization worldwide

Delayed vaccination
campaigns

Missed routine
immunizations

Reduced disease
surveillance

Accumulation of
susceptible children

Shumia

Why Are Measles Outbreaks Increasing?

International Travel

4

Because measles is highly contagious:

A single infected traveler can introduce the virus into susceptible communities.

Outbreaks can occur even in countries where endemic transmission has been eliminated.

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Canada has lost its measles elimination status after the pandemic

- Armenia
- Austria
- Azerbaijan
- Canada
- Spain
- The United Kingdom
- Uzbekistan



Why Are Measles Outbreaks Increasing?

5. Inadequate Surveillance

5

Delayed diagnosis and reporting can result in:

Late outbreak detection

Continued community transmission

Larger outbreaks before public health interventions begin

Why Are Measles Outbreaks Increasing?

- When people stop to take routine vaccination, measles is always the first disease to return because it is so incredibly efficient at finding a host

Decrease vaccine coverage

Travelers from regions with circulating measles

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Overview:

Measles control and elimination program of Bangladesh

1989

Measles control Framework

- The single-dose Measles Vaccine introduced into routine national immunization schedule

2003

Strengthen Surveillance

- Active case based field surveillance started along with VPD program

2014

First elimination goal

- To achieve Measles and Rubella elimination by 2020

2017

In 4th Sector program (4th HPNSP)

- Co-linked indicators, making routine vitamin A distribution explicitly attached to the core EPI program footprint



Measles outbreaks in Bangladesh

Save

Dead Sitakunda kids were suffering from measles: DGHS

17 JULY 2017, 12:23 PM • UPDATED 17 JULY 2017, 18:55 PM • COUNTRY

SHARE

Star Online Report

The "Invisible" Communities



Isolated pockets of ethnic minority groups—both inside the Chittagong Hill Tracts (CHT) and in adjacent hilly pockets like Sitakunda—have faced structural neglect and systemic exclusion from basic health rights

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The 2026 Measles Outbreak in Bangladesh

Department of Microbiology

8

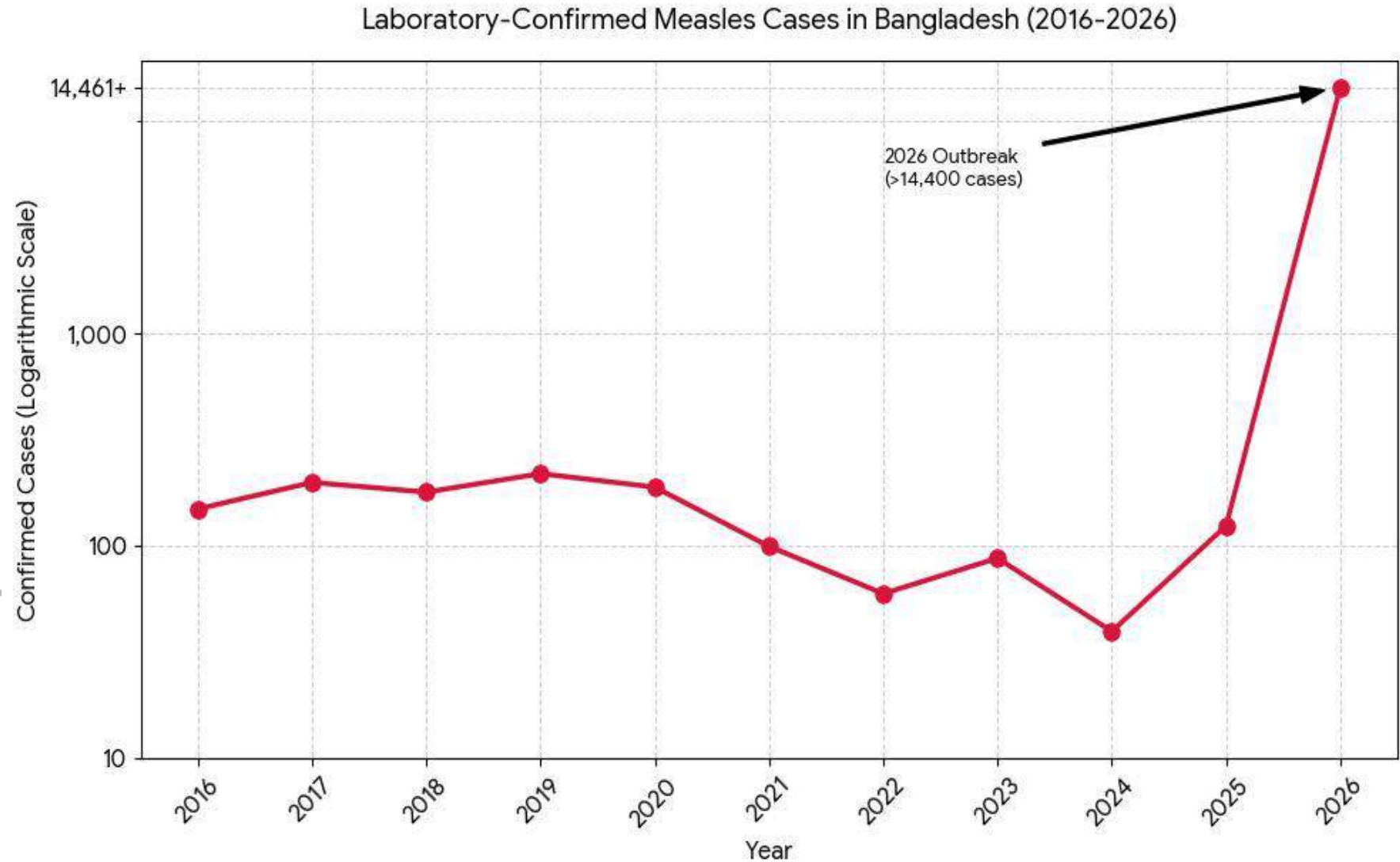
30 MARCH | 2026
Collage: TBS

Measles outbreak
raises alarm in Bangladesh



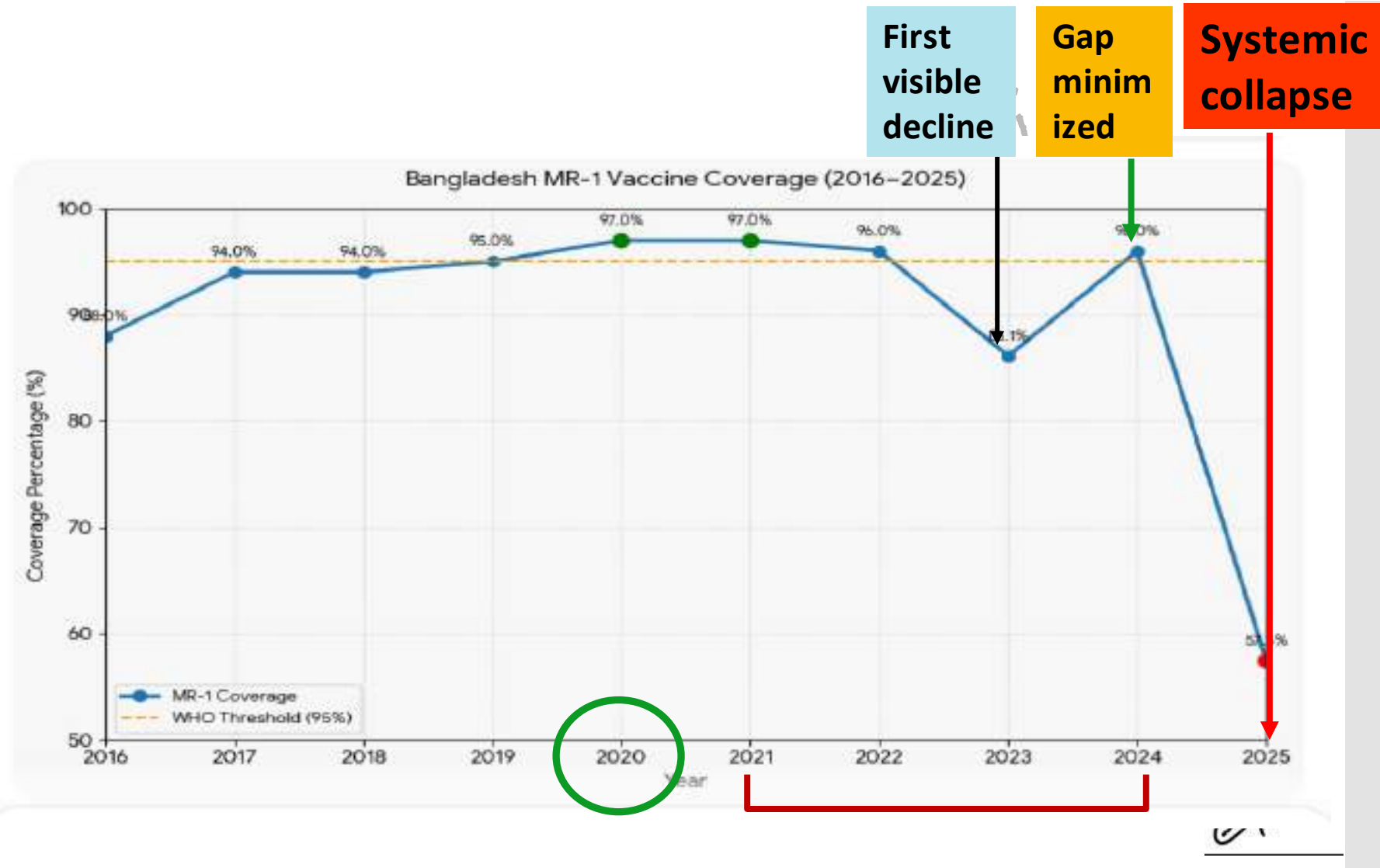
Laboratory confirmed measles cases 2016-2026

San



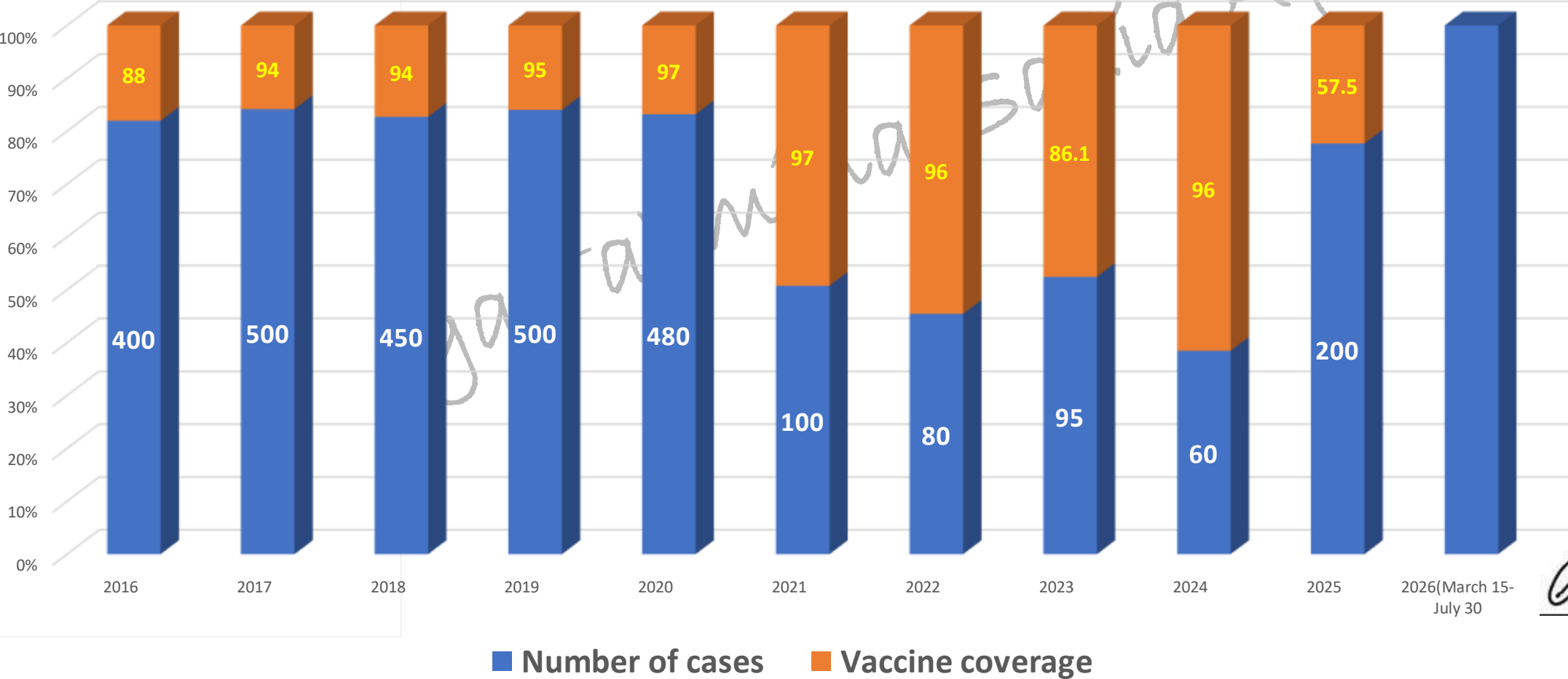
MR 1 Vaccine Coverage Bangladesh 2016-2025

Sam



MR 1 Vaccine Coverage and the number of confirmed cases of measles in Bangladesh(2016-2026)

Vaccine Coverage and the number of cases

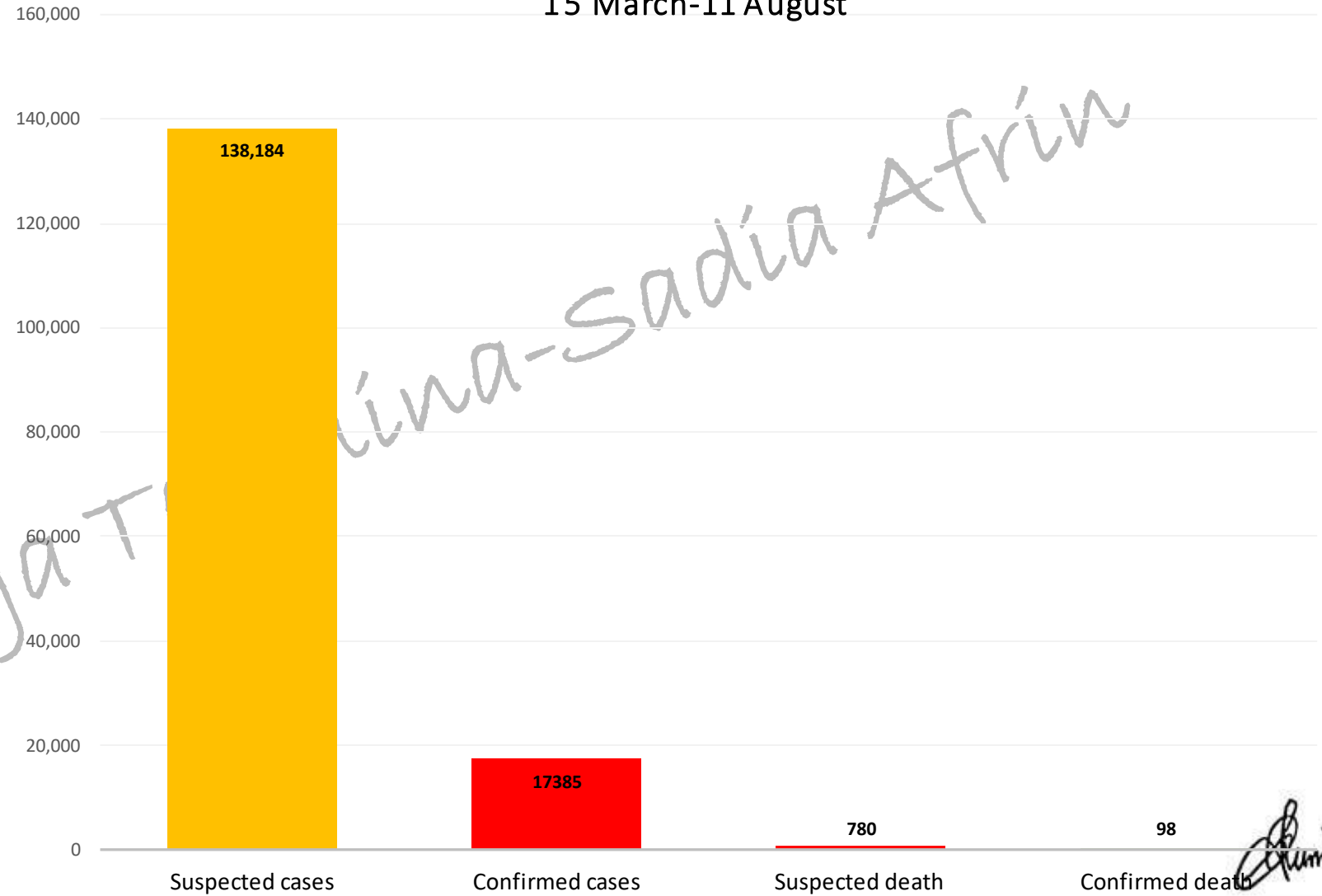




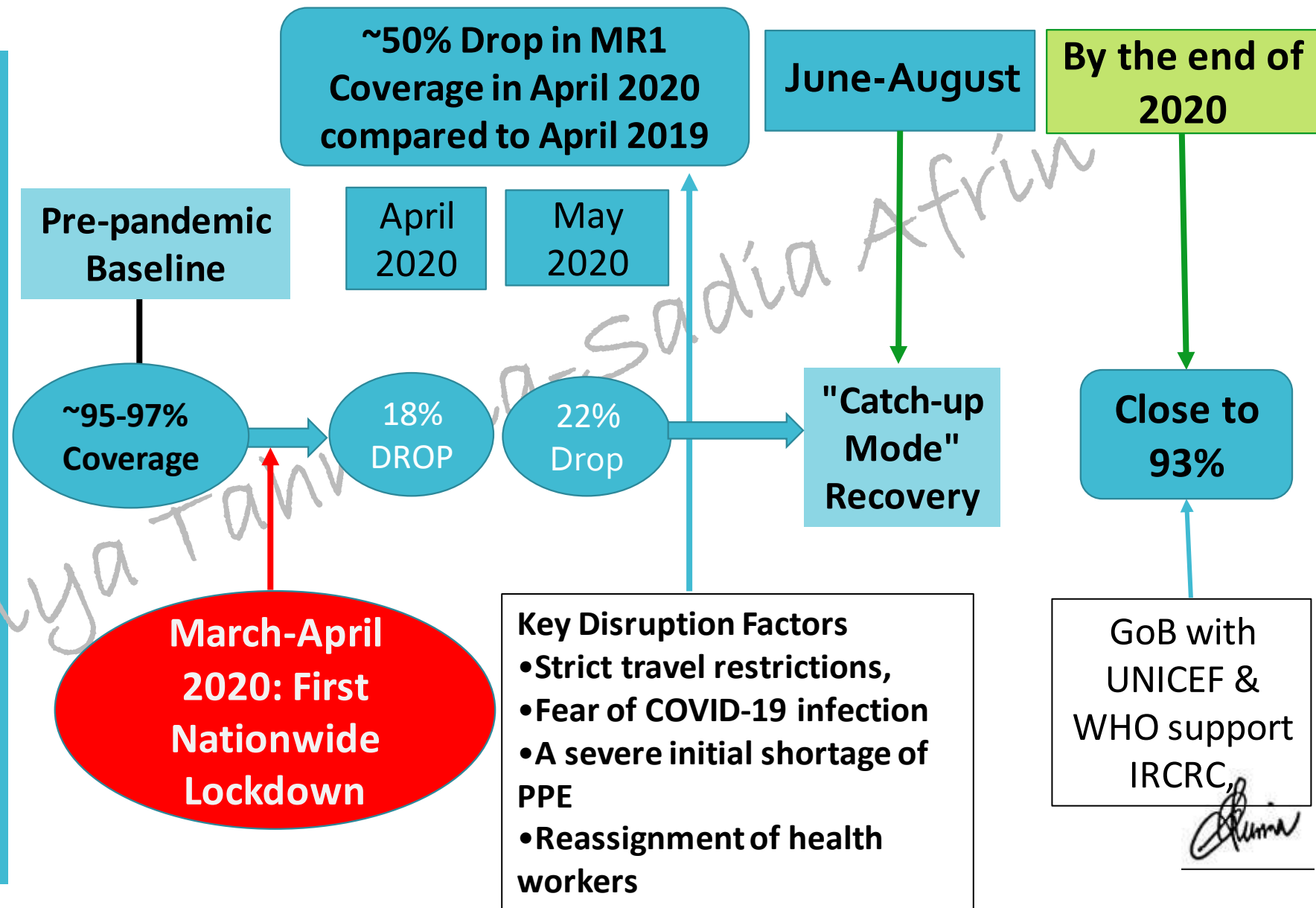
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স্বাস্থ্য ও পরিবার কল্যাণ মন্ত্রণালয়
স্বাস্থ্য সেবা বিভাগ
সমন্বিত নিয়ন্ত্রণ কেন্দ্র
স্বাস্থ্য অধিদপ্তর, মহাখালী, ঢাকা-১২১২।
ইমেইল: bdcoronasaver@gmail.com
স্বাস্থ্য অধিদপ্তরের আওতায় স্বাস্থ্য সংবাদ বিজ্ঞপ্তি
১১ আগস্ট ২০২৬
হাম সংক্রান্ত পরিস্থিতি

Measles Situation in Bangladesh 15 March-11 August 2026

Cases and Death of measles
15 March-11 August



Routine Immunization Fluctuations During the 2020 Pandemic



MR Campaign (2004-2020)

MR Campaign

- Bangladesh has a long history of conducting mass Measles-Rubella (MR) and standalone measles vaccination campaigns

Purpose

- To bridge immunity gap and control outbreak

Success

- The country has scaled up these public health initiatives to reach tens of millions of children nationwide

Shima

Timeline of Major Historical Campaigns

SA

2004

Country's very first massive structured campaign

Objective:
To reduce high child mortality rates caused by regular outbreaks

2005-2006

Catch up campaign
The largest measles vaccination drives
Globally

2010

A follow-up stand-alone measles vaccination campaign

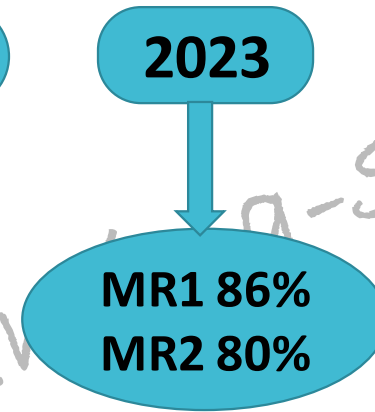
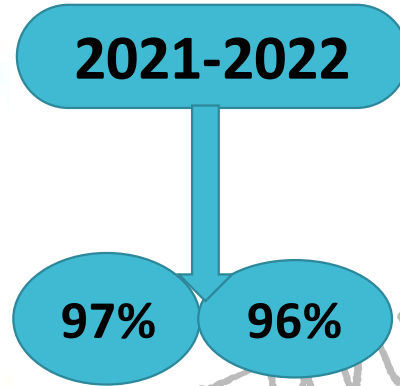
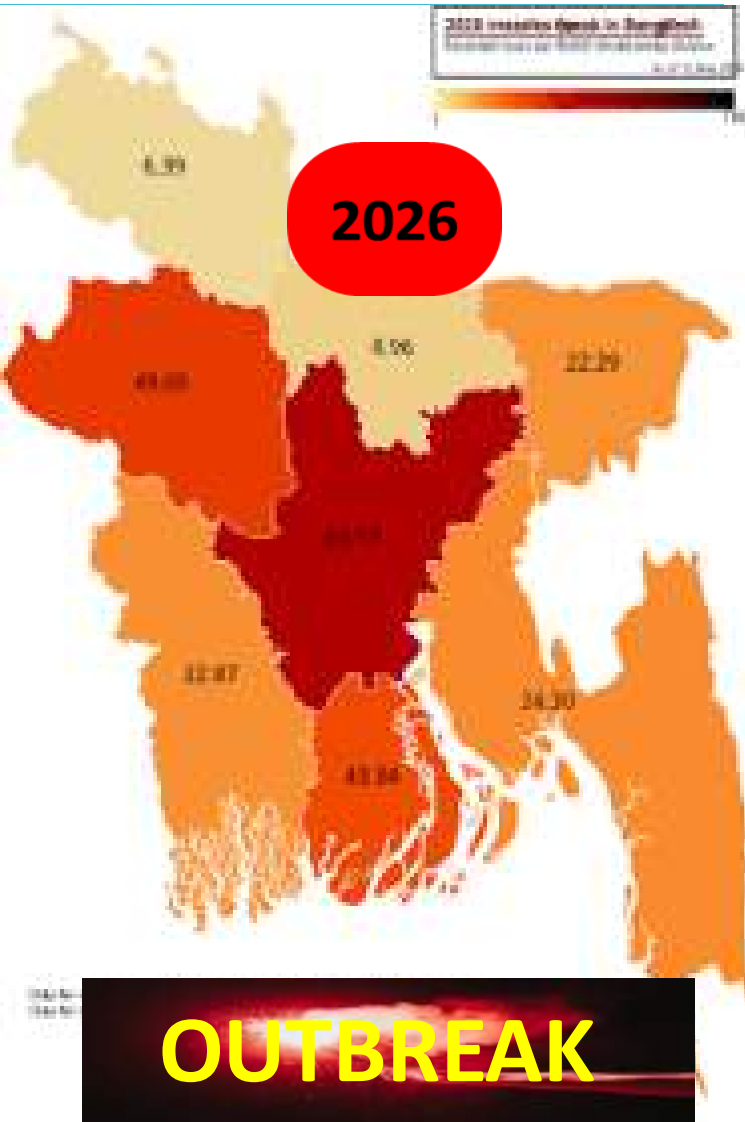
2014 - 2015

One of the largest campaigns
Target
9 months up to 14 years

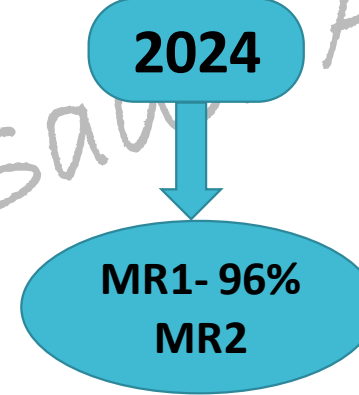
2020-2021

A major nationwide sweep targeting 34 million children
Target age: 9 months to under 10 years.

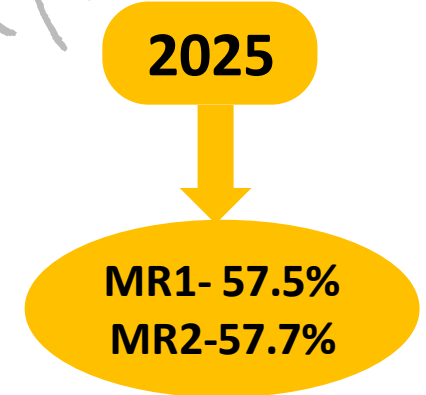
Post Pandemic Vaccine Coverage



First visible
decline below
the mandatory
95% target



Severe
stockouts
began in
late Q3/Q4



System
collapse

Shima

Disruption
of Health
Framework

Abrupt Vaccine Procurement Shifts

System collapse

>138,000

Late
2024

Early to
Mid 2025

Mid 2025

Late
2025

March
2026

April to
July
2026

Suspected cases:>138,000

Confirmed cases:> 17,000

Suspected Death: 780

Confirmed Death: 98

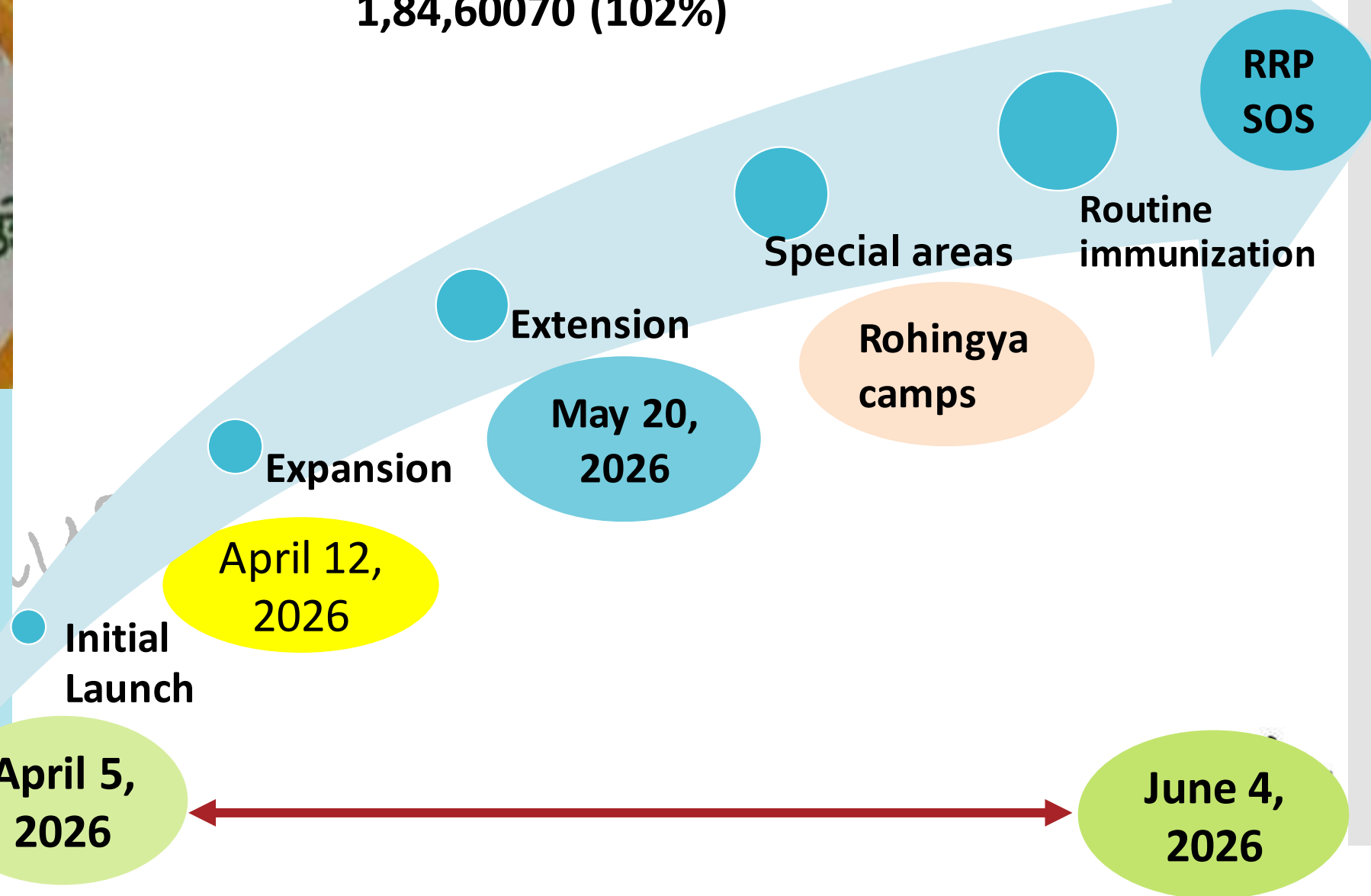
- Disruptions in MR1 and MR2 services despite repeated UNICEF appeals
- Bangladesh left large cohorts of children unprotected
- A dangerous accumulation of immunity gaps
- Fueled a rapid measles resurgence



2026 (April–June):
Following a nationwide resurgence of measles, the government launched an emergency nationwide MR vaccination campaign that successfully reached over **18 million** children

MR vaccination Campaign 2026 - National Report | Reporting period: 5 April to 4 June 2026

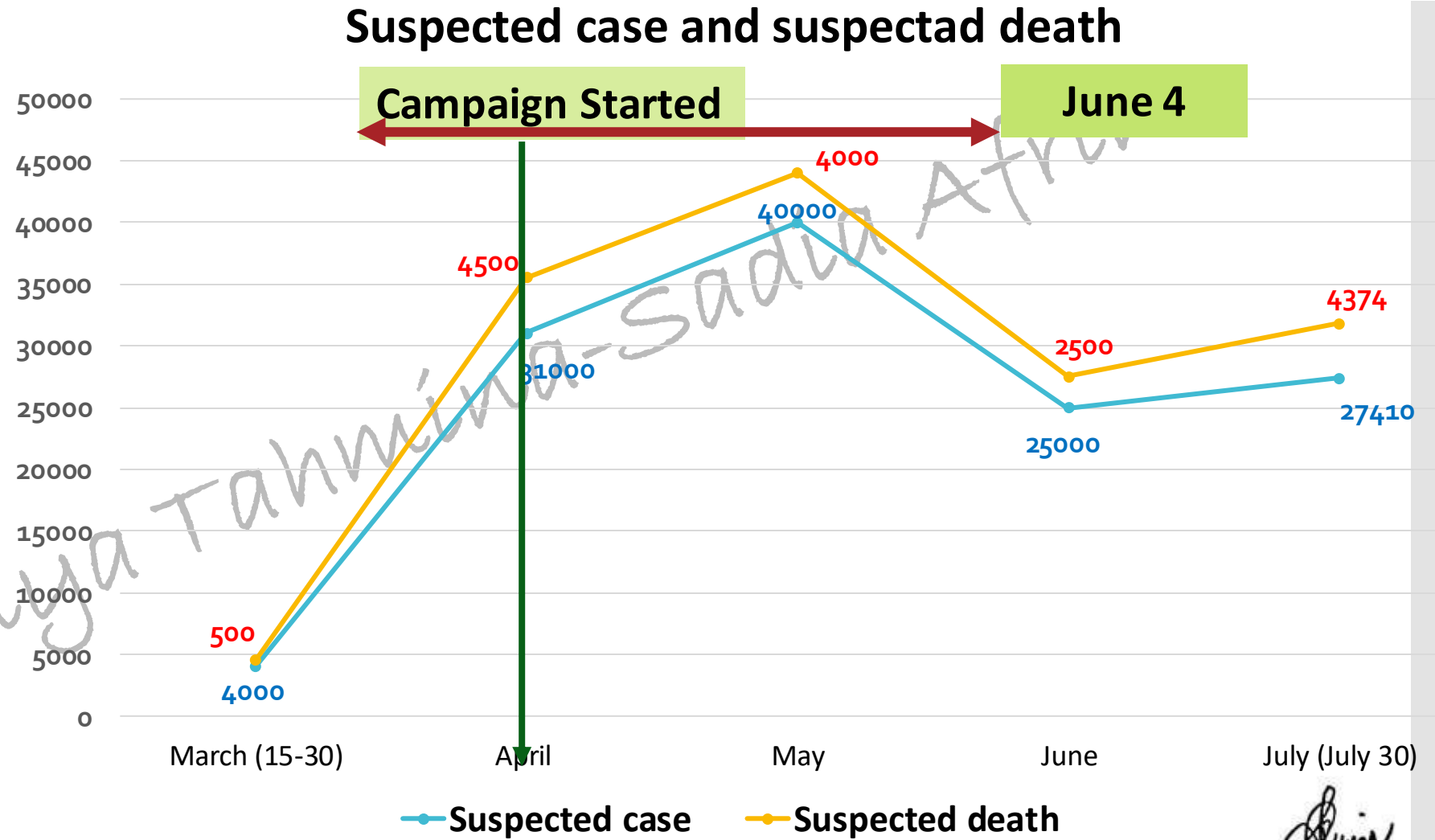
1,84,60070 (102%)



Current Measles Situation in Bangladesh (2026)



Cases and deaths are directly proportional





Facts behind the outbreak

- Despite the COVID-19 pandemic and disruptions in immunization services-
massive MR mass vaccination campaign during **2020–2021** over a seven-week period decreases the immunity gap
- Since early 2026, Bangladesh has experienced its largest measles outbreak in many years.
- WHO has classified the national public health risk as **High**

Signature

The True Drivers of the Bangladesh Outbreak

SAN

The Four-Year Campaign Gap

Accumulation of a massive cohort of susceptible children

Stockpile and Administrative Delays

1. Bureaucratic friction.
2. Funding shortages.
3. Shifting leadership
4. Disruption of procurement pipelines
5. Complete depletion of MR. vaccine stocks

The "Zero-Dose" Demographic

72% of infected individuals are zero-dose children

Another 16% are undervaccinated

The Vulnerability Shift

Significant percentage of cases are concentrated in infants under 9 months old

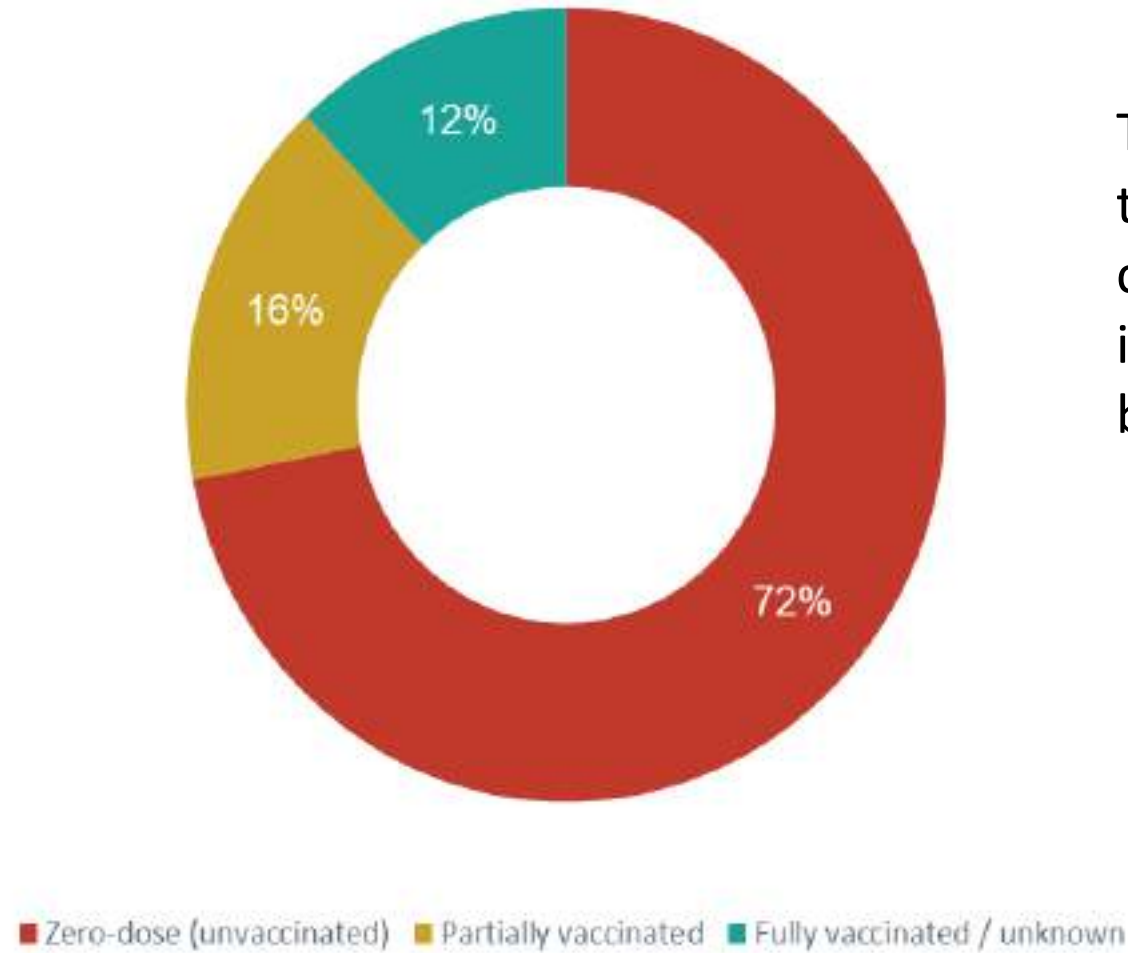
Most Affected Population

- Children under five years comprise approximately **79%** of reported cases.
- Highest risk groups
 - Infants
 - Unvaccinated children
 - Malnourished children
 - Children living in urban slums
 - Refugee populations
 - Immunocompromised patients
- Children below 9 months remain particularly vulnerable because they are generally too young for routine immunization.


Sadia Afrin

Vaccination Status Among Reported Cases

Sam



rin

This pattern confirms the outbreak is concentrated in the immunity gap created by declining coverage.



Leading Causes of NICU Admission & Death in Measles

Severe pneumonia

- Single leading cause of both hospitalization and death in young children with measles

Acute encephalitis

- Occurs roughly in 1 in 1,000 cases
- A major driver of NICU/PICU critical care need

Severe dehydrating diarrhea

- Common in malnourished infants.

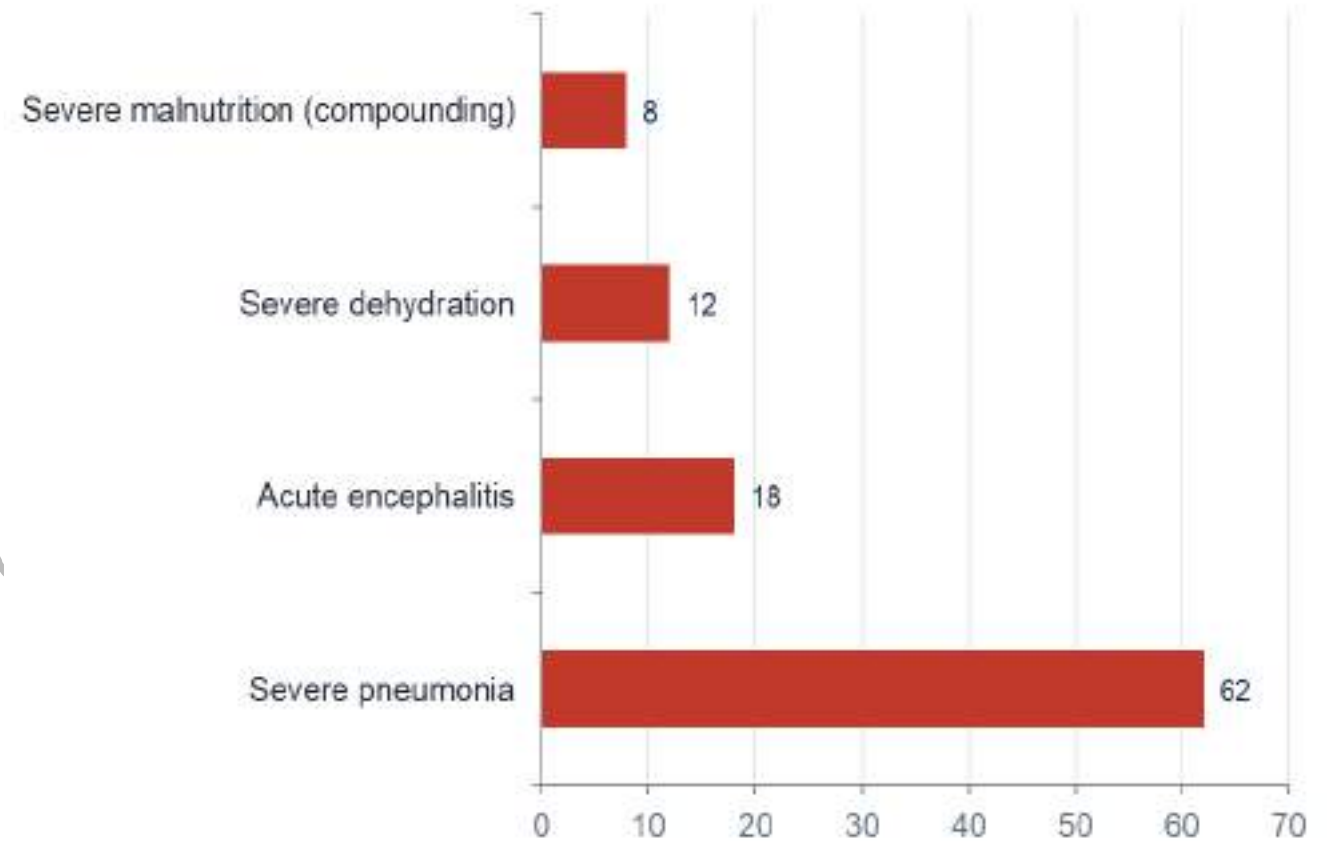
Severe Acute Malnutrition (SAM)

- Pre-existing SAM is consistently the strongest risk factor identified for NICU admission and death among Bangladeshi measles cases

Shumia

NICU Admissions by Clinical Cause

- Pneumonia: **62%** of admissions
- Encephalitis: highest CFR (~**25%**)
- Accounts for **18%** of admissions but carries the highest case-fatality rate of any single complication recorded



Source: DGHS Epidemiological Briefing 2024–2026, clinical case-series data

Secondary viral infections

Saw

প্রথম আলো



জকসু ও ছাত্রশক্তির সঙ্গে
ছাত্রদের সংঘর্ষে আহত...

সর্বশেষ বাংলাদেশ রাজনীতি বিশ্ব বাণিজ্য মতামত খেলা বিনোদন চাকরি জীবনযাপন 1

বাংলাদেশ

এডিনো ভাইরাস বাড়াচ্ছে হামের রোগীর ঝুঁকি

প্রকাশ: ০৩ আগস্ট ২০২৬, ০৮: ৩৩



Sumia



Wednesday, May 13, 2026

DT

Suspected measles cases surpass 50,000 in Bangladesh

[Read More](#) →

Source : www.dhakatribune.com

Government Response

The Ministry of Health with support from WHO, UNICEF and GAVI has initiated

- Emergency Measles-Rubella vaccination campaign
- Campaign targeting children aged **6–59 months**
- Integrate Vitamin A distribution and nutritional programs
- Enhanced laboratory surveillance
- Rapid response teams
- Case investigation
- Hospital preparedness
- Community awareness activities





Summery



1. One of the most contagious
2. Severe complications are relatively common
3. Hidden complications can emerge months or years later
4. No specific treatment
5. Vaccination coverage needs to be unusually high
6. Some people can't be immunized or aren't fully protected by vaccines
7. Measles disrupts communities

Conclusion

- **Measles is a syndemic crisis** where infectious disease and nutritional insecurity feed into each other to multiply child mortality
- Malnutrition fuels the mortality rate
- The critical Vitamin A gap left millions of children completely unprotected
- Declining breastfeeding rates have stripped infants of early, vital maternal antibodies and baseline nutritional protection

Take Home Message

- Infectious diseases do not wait
- They cannot be ignored
- Vaccination is the only shield
- No past success in public health justifies complacency
- Health system disruptions have immediate consequences

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A teal-colored brushstroke background, resembling a watercolor or paint splatter, centered on a white page. The brushstrokes are layered and have irregular, feathered edges.

Thank
you