

Meningococcal Meningitis (Cerebrospinal Fever)

Dr. Yan Lin Aung

Medical Officer

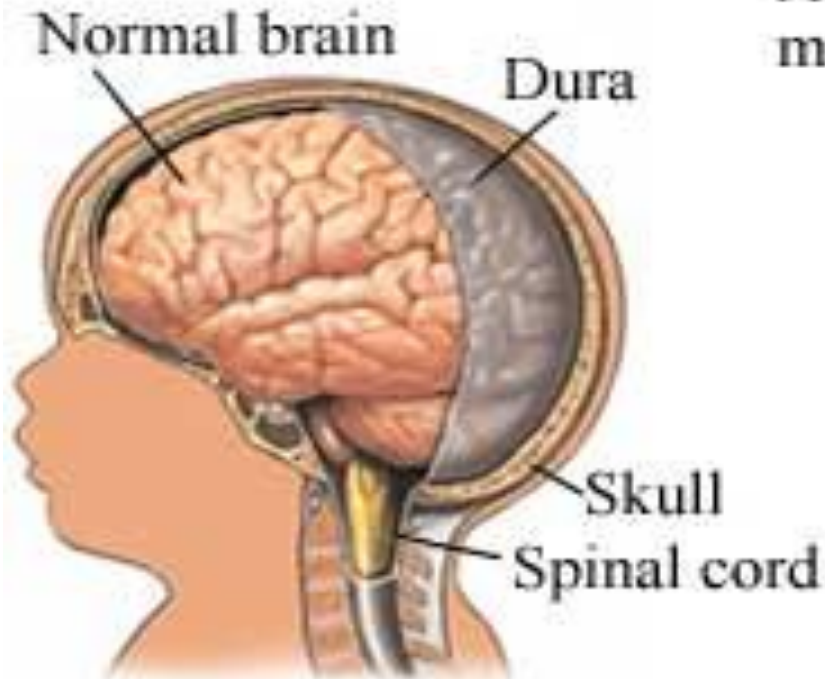
Central Epidemiology Unit

Department of Public Health

Meningococcal Disease:

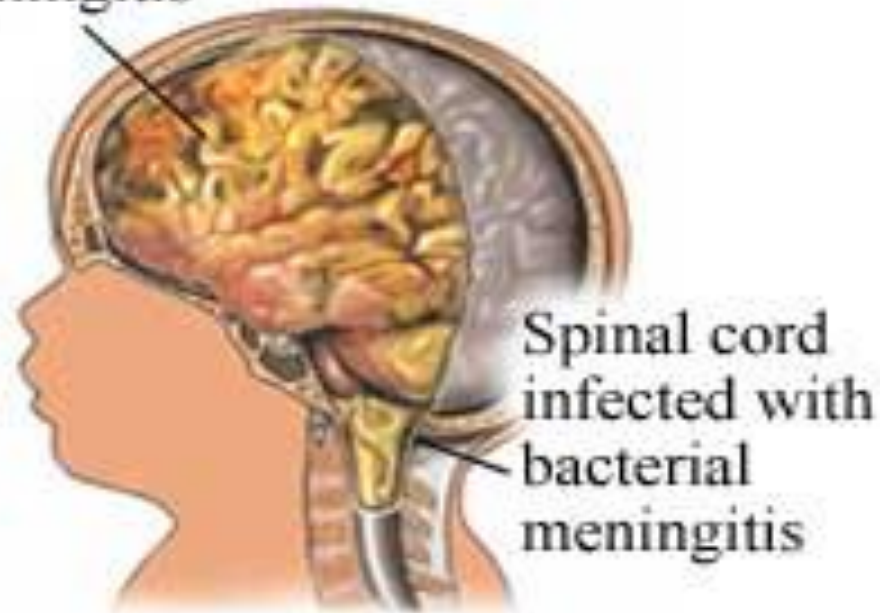
**Overview of a Rare but
Potentially Deadly Infection**

Meningitis



Normal anatomy of brain and spinal cord

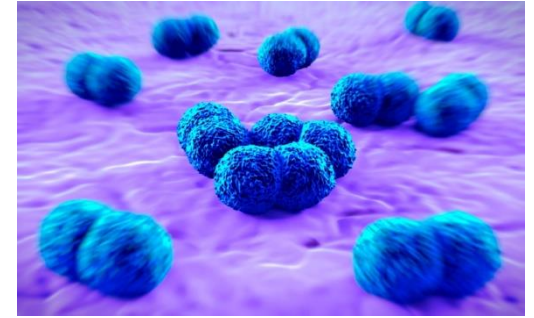
Advanced bacterial meningitis



Brain and spinal cord with bacterial meningitis

Meningococcal Disease

- ❑ A bacterial infection
 - *Neisseria meningitidis*
- ❑ An unpredictable disease
 - 98% of cases are sporadic; fewer than 2% are related to outbreaks
 - Typically occurs among previously healthy children and adolescents
- ❑ Approximately 2100-3400 cases occurred annually in the 1990s
 - Approximately 370-1000 per year during 2009-2015



Getty Images/ROYALTYSTOCKPHOTO

Causal Organism

- Several different bacteria can cause meningitis
 - *Neisseria meningitidis* is the one with the potential to cause large epidemics
 - Twelve serogroups of *N. meningitidis* have been identified, six of which (A, B, C, W135, X and Y) can cause epidemics
 - Groups A, B and C accounts for at least 90% of cases worldwide
 - Group B and C in most European and many Latin American countries
 - Group A is the main cause in Africa and Asia
 - Geographic distribution and epidemic potential differ according to serogroup.

Neisseria meningitidis

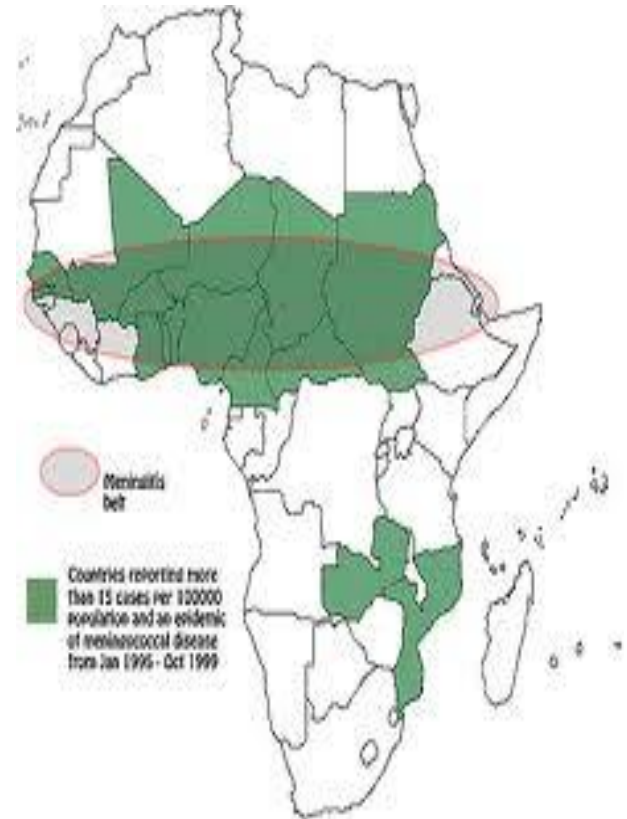


- Family - Neisseriaceae
- Gram-negative
- Non-spore forming
- Non-motile
- Encapsulated
- Non acid-fast diplococci
- Kidney bean shape under microscope
- At least 12 serogroups
- Invasive: serogroups A, B, C, W-135, and Y

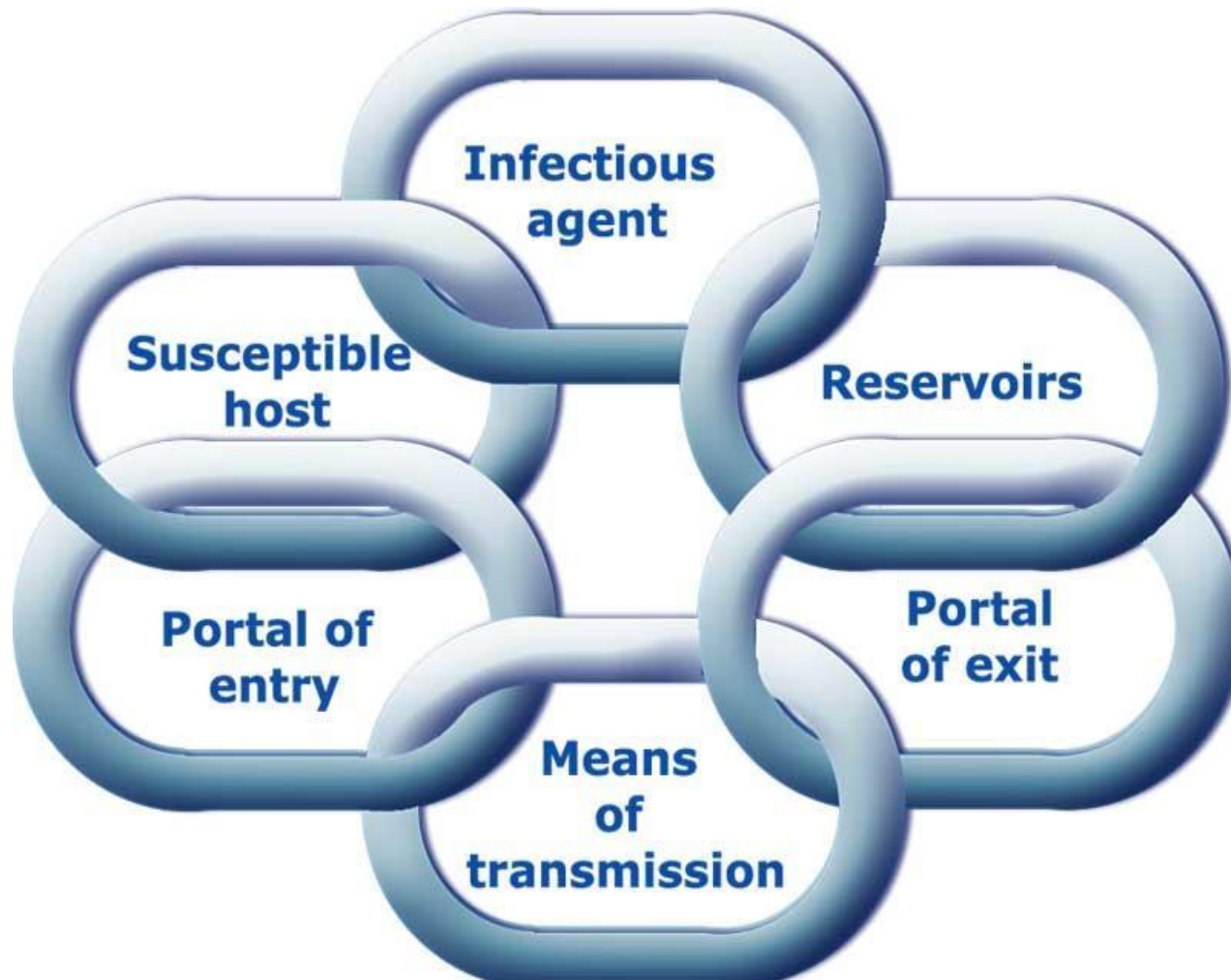
Epidemiology

Bacterial form of meningitis

- ❑ Serious infection of the meninges that affects the brain membrane
- ❑ It can cause severe brain damage
- ❑ Fatal in 50% of cases if untreated
- ❑ Meningitis belt of sub-Saharan Africa
 - Gambia, Senegal, Mali, Burkina Faso, Ghana, Niger, Nigeria, Cameroon, Chad, Central African Republic, Sudan, South Sudan, Uganda, Kenya, Ethiopia, Eritrea



Dynamics of Disease Transmission



Rash in Meningitis



Meningococccacemia – rash

Tumbler Test

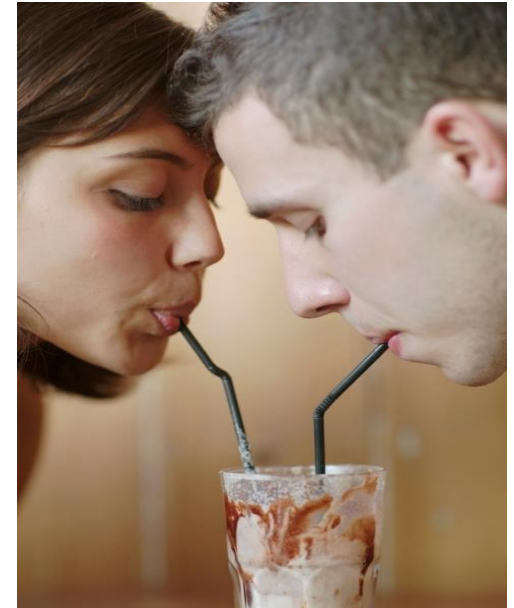
Meningitis the rash can be very scanty or even absent

Look for the rash, and a non-blanching rash should therefore be treated as an emergency



Modes of Transmission

- ❑ Spread through respiratory and throat secretions
 - Coughing, Sneezing
 - Kissing
 - Sharing eating utensils, water bottles, etc
- ❑ Crowded settings facilitate transmission
 - College dormitory
 - Crowded household
 - Military barracks
 - Nightclubs, bars



Risk groups

- ❑ Household contacts of case patients, Military recruits, College freshmen who live in dormitories, Microbiologists, Persons traveling to a country where meningococcal disease is epidemic or highly endemic, and Patients without spleens or with terminal complement component deficiencies.
- ❑ Infants less than one year of age and adolescents ages 16 through 21 years have higher rates of disease than other age groups, but cases occur in all age groups including the elderly.

Carrier

- ❑ Reservoir - Humans
- ❑ The bacteria can be carried in the throat and sometimes-
- ❑ It is believed that 10% to 20% of the population carries *Neisseria meningitidis* in their throat at any given time
- ❑ However, the carriage rate may be higher in epidemic situations
- ❑ The mean duration of temporary carriers is about 10 months
- ❑ During epidemics, the carrier rate may go up to 70 – 80 percent

Incubation Period

- ❑ Incubation period – 3-4 days (2-10 days)
- ❑ *Neisseria meningitidis* only infects in humans;
- ❑ There is no animal reservoir

Symptoms

- ❑ Commonest: High Fever, Stiff neck, sensitivity to Light, Confusion, Headaches and Vomiting
- ❑ Diagnosed early and adequate treatment is started - 5% to 10% of patients die
 - typically within 24 to 48 hours after the onset of symptoms
- ❑ A less common but even more severe (often fatal) form of meningococcal disease is meningococcal septicaemia,
 - characterized by a haemorrhagic rash and rapid circulatory collapse.

Signs & Symptoms

- Rash (8-9 hrs)
- Shock
- Septicemia
- Impair consciousness
- Neck stiffness
- Sign of meningism

Symptoms of Meningitis

Central
- Headache
- Altered mental status

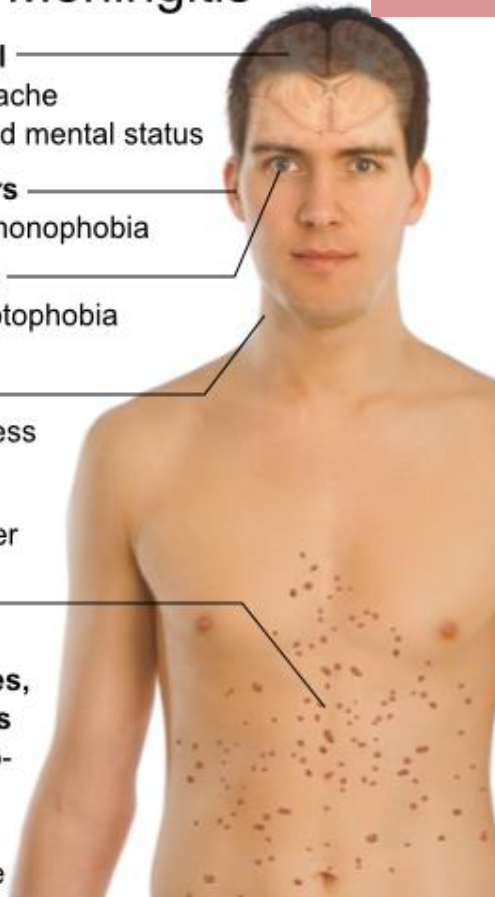
Ears
- Phonophobia

Eyes
- Photophobia

Neck
- Stiffness

Systemic
- High fever

Trunk, mucus membranes, extremities
(if meningococcal infection)
- Petechiae



COMMON SYMPTOMS OF MENINGITIS & SEPTICAEMIA

BABIES & TODDLERS



Fever – cold hands & feet



Refusing food or vomiting



Fretful or dislike being handled



Pale blotchy skin



Blank, staring expression



Drowsy, difficult to wake



Stiff neck, arched back



High pitched cry

CHILDREN & ADULTS



Fever – cold hands & feet



Vomiting



Headache



Stiff neck



Dislike bright lights



Joint or muscle pain



Drowsy, difficult to wake



Confusion

If you are concerned get medical help IMMEDIATELY

Time Is of the Essence

- ❑ Early symptoms are nonspecific
 - Fever, Headache, Nausea, Vomiting, Loss of Appetite
 - Mimic symptoms of common Viral illnesses
- ❑ Characteristic symptoms occur later
 - Hemorrhagic rash, neck stiffness, photophobia
 - Typically develop approximately 12-15 hours after symptoms begin
- ❑ Rapid progression
 - Death may occur within 24 hours of symptom onset



Diagnosis

- ❑ Initial diagnosis - Clinical Examination followed by Lumbar Puncture (LP)
- ❑ LP- purulent spinal fluid (CSF)
- ❑ The bacteria can sometimes be seen in microscopic examinations of the spinal fluid.
- ❑ Confirmed by growing the bacteria from specimens of spinal fluid or blood - by agglutination tests or by Polymerase Chain Reaction (PCR).
- ❑ Serogroups and susceptibility testing to antibiotics - important

Differential Diagnosis??

- Acute Disseminated Encephalomyelitis
- Aseptic Meningitis
- Haemophilus Meningitis
- Herpes Simplex Encephalitis
- Intracranial Epidural Abscess
- Lyme Disease
- Neonatal Meningitis
- Staphylococcal Meningitis
- Subdural Empyema
- Tuberculous Meningitis
- Viral Meningitis

Treatment

- ❑ Potentially fatal & Medical emergency
- ❑ Admission to a hospital or health centre is necessary
- ❑ Isolation of the patient is not necessary
- ❑ Respiratory isolation for 24 hours after start of chemotreatment
- ❑ Appropriate antibiotic treatment must be started as soon as possible, ideally after LP
- ❑ Penicillin, Ampicillin, Chloramphenicol and Ceftriaxone
 - Benzylpenicillin **1200 mg** (Adult & aged 10 or older)
 - Child 1-9 years: **600 mg**
 - Infant: **300 mg**

Outcomes Can Be Severe, Even with Treatment

- ❑ Serious outcomes include meningitis (most common clinical presentation) and meningococemia (bloodstream infection)
- ❑ Death rate of 10%-15%, even with antibiotic therapy
 - Death rate even higher (up to 50%) for patients who develop meningococemia
 - Up to 20% of people who survive meningococcal disease suffer lifelong disability
 - Amputation of arms or legs, hearing loss, brain damage



Courtesy of National Meningitis Association

Prevention

☐ Cough etiquette

- Cover your mouth and nose with a tissue when you cough or sneeze.
- Put your used tissue in the waste basket.
- If you don't have a tissue, cough or sneeze into your upper sleeve or elbow, not your hands.

☐ Respiratory Hygiene

- You may be asked to put on a facemask to protect others.
- Wash your hands often with soap and warm water for 20 seconds.
- If soap and water are not available, use an alcohol-based hand rub.

Chemoprophylaxis

- ❑ Close contact (>8hrs + <3feet)
- ❑ Standard regimens for antimicrobial prophylaxis: Ciprofloxacin, Ceftriaxone, and Rifampin
- ❑ Adults - single oral dose of 500 mg of Ciprofloxacin
- ❑ 250 mg of Intramuscular (IM) Ceftriaxone
- ❑ Under age 15 - a single dose of 150 mg of IM Ceftriaxone.

Vaccination

- ❑ Polysaccharide vaccines have been available to prevent the disease for over 30 years.
- ❑ Bivalent (groups A and C)
- ❑ Trivalent (groups A, C and W)
- ❑ Tetravalent (groups A, C, Y and W135)
- ❑ For group B, polysaccharide vaccines cannot be developed, due to antigenic mimicry with polysaccharide in human neurologic tissues.

Epidemic response

- ❑ Prompt and appropriate case management with only Chloramphenicol or Ceftriaxone
- ❑ Reactive mass vaccination of populations not already protected through vaccination.

Key Points which should be taken to your home

- ✓ Meningococcal disease is rare but potentially deadly for people
- ✓ You are at increased risk from your mid-to-late teens into your early 20s
- ✓ Disease can come on suddenly, without warning, and can quickly become life-threatening
- ✓ The disease can result in severe, lifelong disability, such as hearing loss, amputation of arms or legs, and brain damage
- ✓ Meningococcal vaccine is safe and effective
- ✓ For routine vaccination, 2 doses are recommended

Principles of Outbreak Investigations

❑ Be systematic!

- Follow the same steps for every type of outbreak
- Write down case definitions
- Ask the same questions of everybody

❑ Stop often to re-assess what you know

- Line-listing and epidemic curve provide valuable information;

❑ Coordinate with partners (e.g., environmental and epidemiology)

10 Steps of an Outbreak Investigation

- Identify investigation team and resources
- Establish existence of an outbreak
- Verify the diagnosis
- Construct case definition
- Find cases systematically and develop line listing
- Perform descriptive epidemiology/develop hypotheses
- Evaluate hypotheses/perform additional studies as necessary
- Implement control measures
- Communicate findings
- Maintain surveillance

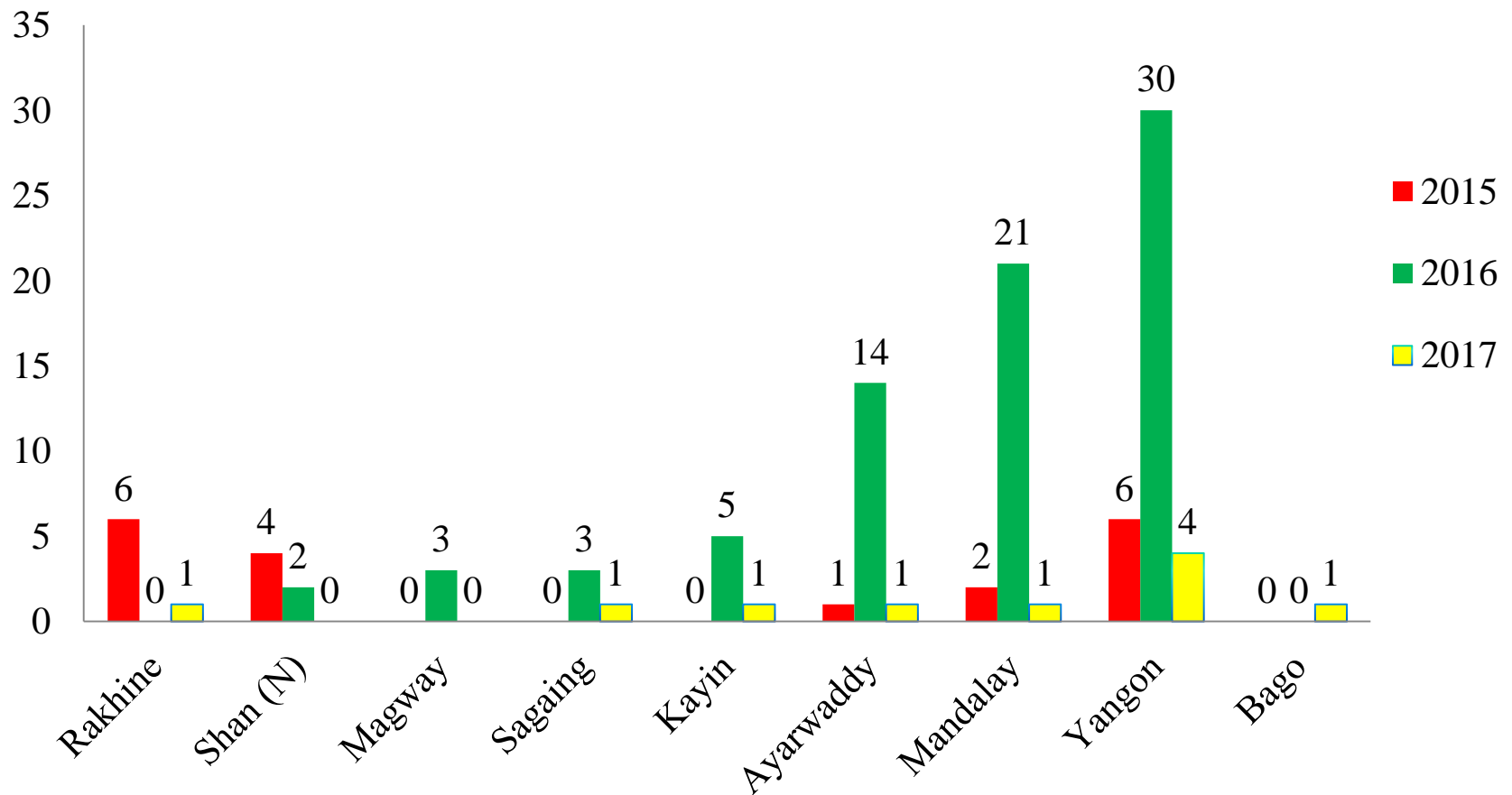
Threshold

- ❑ A threshold approach according to the epidemiology of the country is used in many countries to differentiate endemic disease from outbreaks
- ❑ Alert threshold: 5 cases per 100,000 population or increased in relation to previous non-epidemic years.
- ❑ Once the alert threshold is reached: mandatory investigation, confirmation of agent, reinforcing of surveillance, enhancing of preparedness, and treatment of patients

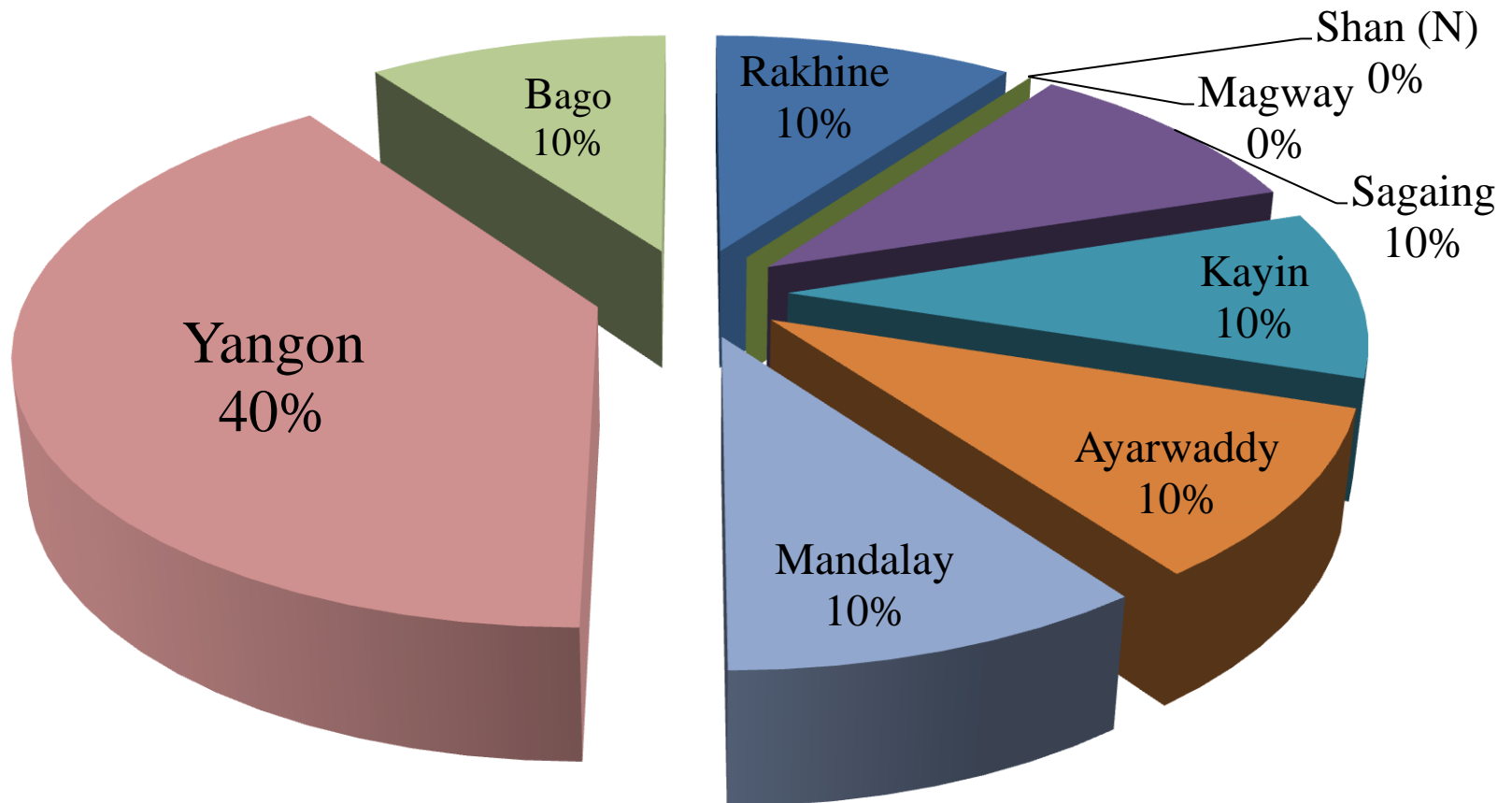
Threshold (cont.)

- ❑ Epidemic threshold: 10 cases per 100,000 population or 15 cases per 100,000 population or weekly doubling of cases each week or 2 cases at a mass gathering or among refugees or displaced persons
- ❑ Once epidemic threshold is reached: mass vaccination, provision of drugs to health units, treatment of cases, and public education

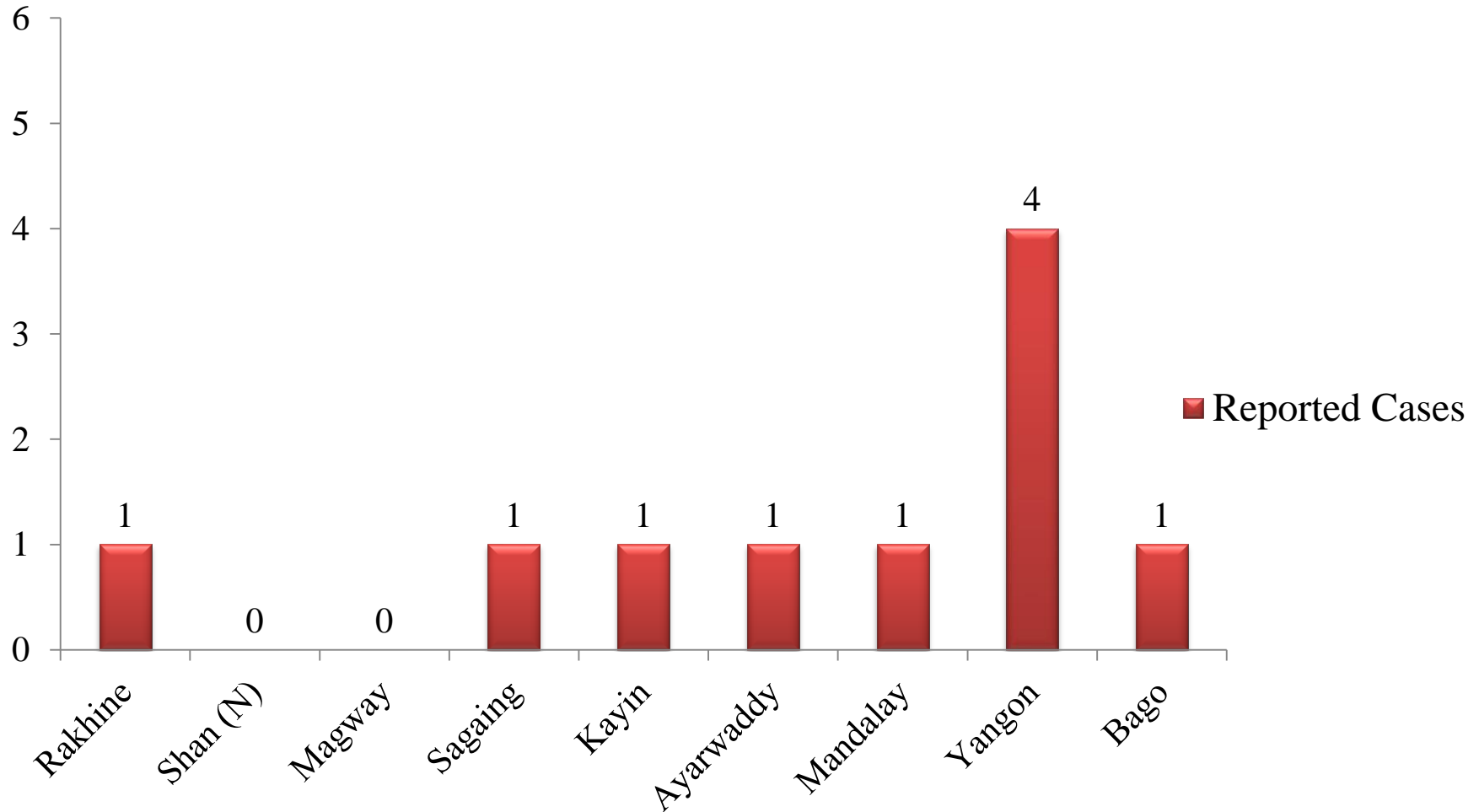
Distribution of Reported Meningococcal Meningitis by State and Region (2015, 2016 and 2017)



Percent Distribution of Reported Meningococcal Meningitis by State and Region (2017)



Distribution of Reported Meningococcal Meningitis by State and Region (2017)



Thank You
For
Your Kind Attention