

# **TRAINING FOR IMPROVED PRACTICE: Public Health and Nutrition in Emergencies**

## **Vaccine Preventable Diseases in Emergencies<sup>1</sup>**

### **UNICEF Core Corporate Commitments Training**

In collaboration with:

**Feinstein International Famine Center, Tufts University  
Mailman School of Public Health, Columbia University  
International Emergency and Refugee Health Branch,  
Centers for Disease Control and Prevention**

<sup>1</sup>Excluding measles!

# Vaccine preventable diseases in emergencies – Priorities?

## • Measles!!

- Tuberculosis (BCG vaccine)
- Polio (OPV)
- Diphtheria, pertussis, tetanus (DTP vaccine)
- Yellow fever
- Meningitis

# Establishing priorities for vaccination in emergencies

- Measles is almost always the first priority
- Measles vaccination should not be delayed in order to add additional antigens

# Tuberculosis (BCG vaccine)

- WHO schedule: at birth
- Efficacy:
  - Only prevents spread from lungs
  - Doubtful for adults (0-80%)
  - Better in preventing disseminated disease in children (56%-90%)

# Polio (oral polio vaccine [OPV])

- WHO schedule: Birth, then 6, 10, and 14 weeks
  - Birth dose does NOT count
- Target population in emergency settings 0-59 months
- Importance in emergency settings
  - Emergency-affected populations may constitute a high risk group
- Efficacy: three doses 95%
  - Seroconversion rates after three doses lower in tropical countries, due to competing enteroviruses

# Diphtheria, pertussis, tetanus (DPT vaccine)

- WHO schedule: 6, 10, 14 weeks
- Target population in emergency-affected populations 6 wks - 5 years
  - Minimum of four weeks between doses
- Importance in emergency settings
  - Not in emergency phase, but implement as soon as possible
  - Must be able to deliver three doses
- Efficacy: three doses 90%

# Neonatal tetanus (tetanus toxoid vaccine)

- At least 2 doses prior to delivery
  - Second dose 4 weeks after first, 3rd dose after 6 months, delivery, 4th and 5th dose after 1 and 2 years
- Target population in emergency settings: all women aged 15-49 years
- Importance in emergency settings?
  - Not in emergency phase, but a high priority immediately afterwards
  - Do not include in mass measles campaign
  - Neonatal tetanus is targeted for elimination
- Efficacy:
  - Five doses confers lifelong protection

# UNICEF Core Corporate Commitments in Emergencies

Provide tetanus toxoid and such other critical inputs as vaccines, cold-chain equipment, syringes, training, and financial support for advocacy, and for the immunization of pregnant women, as well as adolescent girls.

Include in mass campaigns?



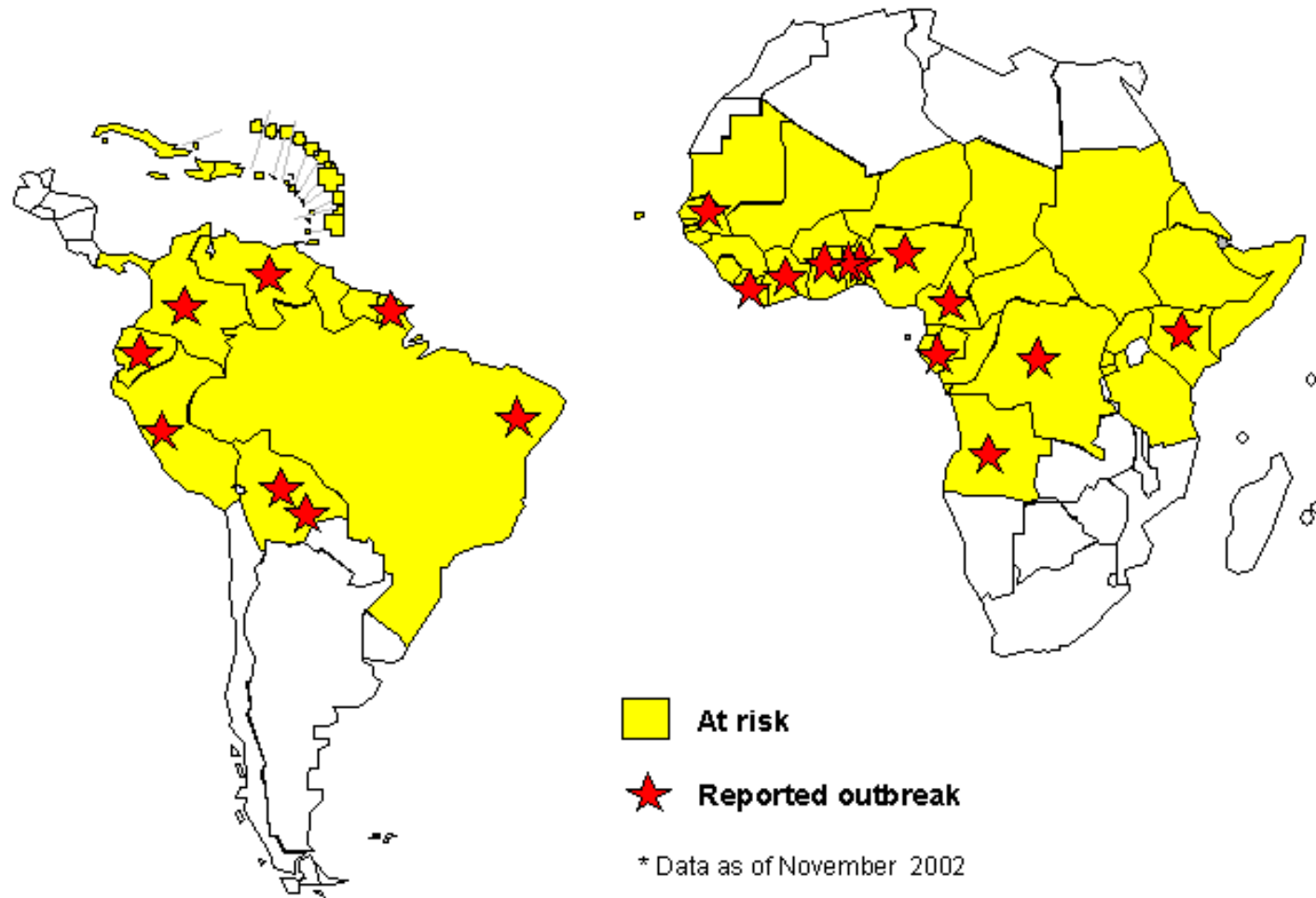
# Vaccine preventable diseases with outbreak potential

- Yellow fever
- Meningitis
- Are there others?

# Yellow fever

- 200,000 cases per year
- 30,000 deaths per year
- Endemic in 34 countries in Africa
  - Population of 468 million
- Epidemic potential
- Incidence is increasing

## Countries at risk for yellow fever and having reported at least one outbreak, 1985-2002\*



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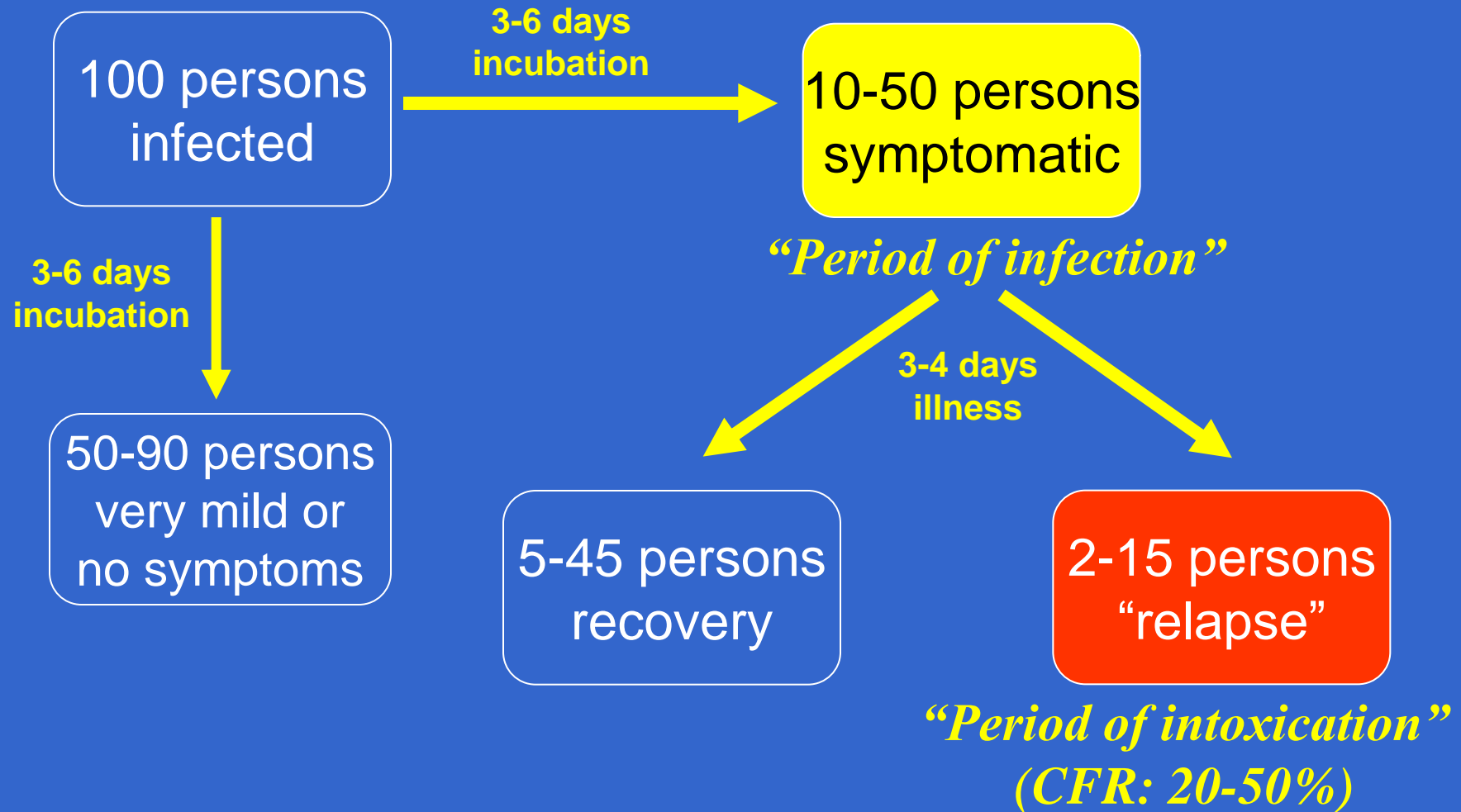


# Yellow fever - Vector



*Aedes aegypti*

# Yellow fever – Natural history



**"Classic YF" is tip of the iceberg**

# Yellow fever - Surveillance

## WHO recommended case definition

- Acute onset of fever, followed by jaundice within two weeks of onset of symptoms
- AND one of the following:
  - Bleeding from the nose, gum, skin or GI tract OR
  - Death within 3 weeks of illness onset

## International health regulations

- Mandatory reporting of all suspected and confirmed cases to WHO within 24 hours

# Yellow fever - Disease prevention

- Environmental control
  - Eliminate breeding conditions of *Aedes aegypti*
  - Kill adult mosquitoes
- Personal protective behaviors
  - Mosquito repellants
  - Protective clothing
- Household protective behaviors
  - Cover water sources
- Vaccination

# Yellow fever vaccine – 17D

- One dose protective immunity 95% within 10 days
- Safe vaccine: Local & mild reactions 2-5% recipients within 10 days
- 35 African nations, WHO-UNICEF recommends co-administration with measles at 9 months
- Rare severe reactions
- Fatal encephalitis in 12 of 21 infants < 4 months
- Contraindicated in children < 9 months old except in children at very high risk; never less than 4 months



# Yellow fever - Summary

- YF endemic in Africa and South America
- Refugees and IDPs are at increased risk
- In 35 African countries, YF vaccination recommended part of routine EPI
- Be prepared and act immediately!

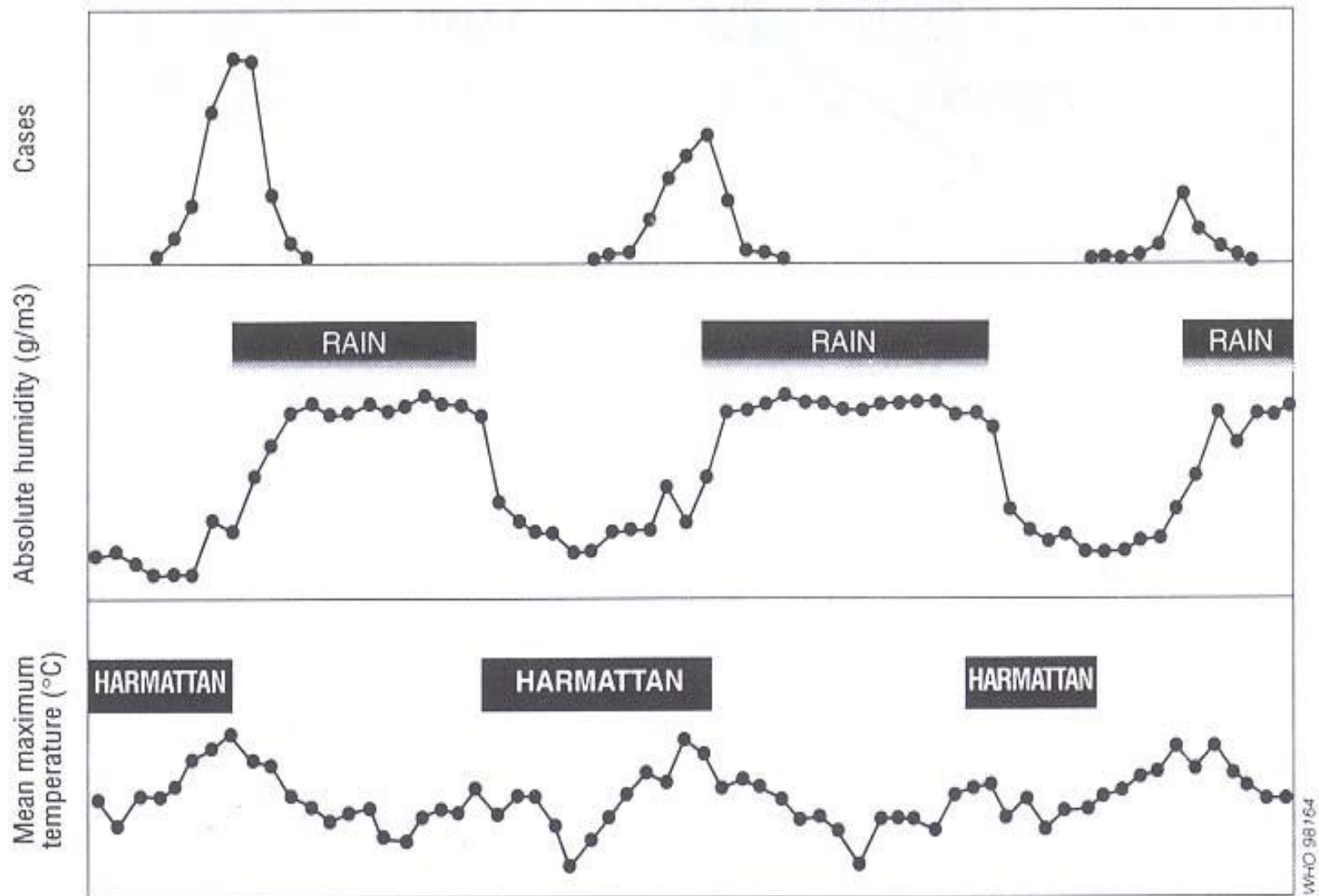
# Meningitis

- Meningococcal disease includes
  - Meningitis
    - Only form of epidemic disease
  - Septicemia

# Global epidemiology of meningococcal disease

- Incidence is highly seasonal
- Epidemics
  - Increased age including young adults
- High case fatality rate
  - 5 - 15%
  - In septicemia may exceed 15-20%

**Figure 8. Relation of seasonal climatic factors to hospital admissions for meningococcal disease in Zaria, Nigeria, during 1977-1979**





# Meningococcal disease in emergency settings

- Thailand, 1978 -- CFR 28%
- E. Sudan -- 1985
- S. Sudan -- 1988
- N. Uganda -- 1994
- Goma -- 1994 (attack rate about 100/100,000 over a 2 month period)
- Burundi, Rwanda, Tanzania -- 2002

# Population risk factors for meningococcal disease

- Household exposure
- Crowding
- Concurrent upper respiratory tract infections
- Active and passive smoking
- Indoor air pollution?

# Case definitions for meningitis

	Children < 12 months	Children above 1 year and adults
<b>Suspected acute meningitis</b>	Fever <b>AND</b> Bulging fontanel	Sudden onset of fever (> 38.5 C) <b>AND</b> Neck stiffness
<b>Probable bacterial meningitis</b>	Suspected acute meningitis <b>AND</b> Turbid CSF	
<b>Probable meningococcal meningitis</b>	Suspected acute meningitis <b>AND</b> Gram-negative diplococci <b>OR</b> Ongoing epidemic <b>OR</b> Petechial rash	
<b>Confirmed meningococcal meningitis</b>	Suspected or probable case <b>AND</b> Positive CSF antigen detection <b>OR</b> Positive culture	



# Treatment

- Early antibiotics!
  - Multiple antibiotics effective
  - Chloramphenicol still recommended in Africa
    - 1 dose IM
- Supportive therapy

# Epidemic thresholds

Intervention	Population >30,000	Population <30,000
Alert threshold	5 cases/100,000/week	2 cases in 1 week or Increase in cases compared to previous years
Epidemic threshold*	If no epidemic x 3yrs + vacc. coverage <80% or alert early in dry season 10/100,000,week Other situations: 15/100,000/week	5 cases in 1 week or Doubling of cases in 3 weeks or Decision based on specific situation**

\* If meningitis epidemic in neighboring area, alert threshold becomes the epidemic threshold

\*\*1) Early in dry season, before March

2) High population density

3) For mass gatherings, refugees and displaced persons, 2 confirmed cases in one week are enough to vaccinate the population

# What to do when thresholds exceeded?

- Alert threshold
  - inform authorities
  - investigate
  - confirm
  - treat cases
  - strengthen surveillance
  - prepare
- Epidemic threshold
  - **mass vaccination**
  - distribute treatment to health centers
  - treat according to epidemic protocol
  - inform the public

# Vaccination campaigns

- Campaigns can curtail an epidemic
- To be effective
  - Start as early and quickly as possible
  - Vaccine must match the serotype of the epidemic strain
- Target population
  - District level or refugee camp
  - Group with the highest age specific attack rate
  - Typically persons 2 - 30 years of age in serogroup A outbreaks (vaccine not effective below age 2 years)
  - May need to vaccinate entire population
- Objective is 100% coverage

# Meningococcal disease - Summary

- Epidemics occur suddenly
  - Common in emergencies
- Is fatal disease
- Prompt antibiotic treatment is crucial
- Mass vaccination can stop outbreaks
  - Must be done rapidly