Epidemiology of Melioidosis

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Contents

Case Definition according to CDC

Melioidosis can be defined as **an infectious disease caused by *Burkholderia pseudomallei***, characterized by a wide spectrum of clinical manifestations ranging from **localized abscesses to severe pneumonia and septicemia**, often mimicking tuberculosis or other bacterial infections. Diagnosis is confirmed by **isolation of *B. pseudomallei* from clinical specimens** such as blood, sputum, pus, or urine.

https://ndc.services.cdc.gov/case-definitions/melioidosis-burkholderia-pseudomallei-2023/

ICD -10 classification

ICD-10 Code: A24

- **A24.0** – Glanders
- **A24.1** – Acute and fulminating melioidosis
- **A24.2** – Subacute and chronic melioidosis
- **A24.3** – Other melioidosis
- **A24.4** – Melioidosis, unspecified

http://icd.who.int/browse10/2019/en#/A24

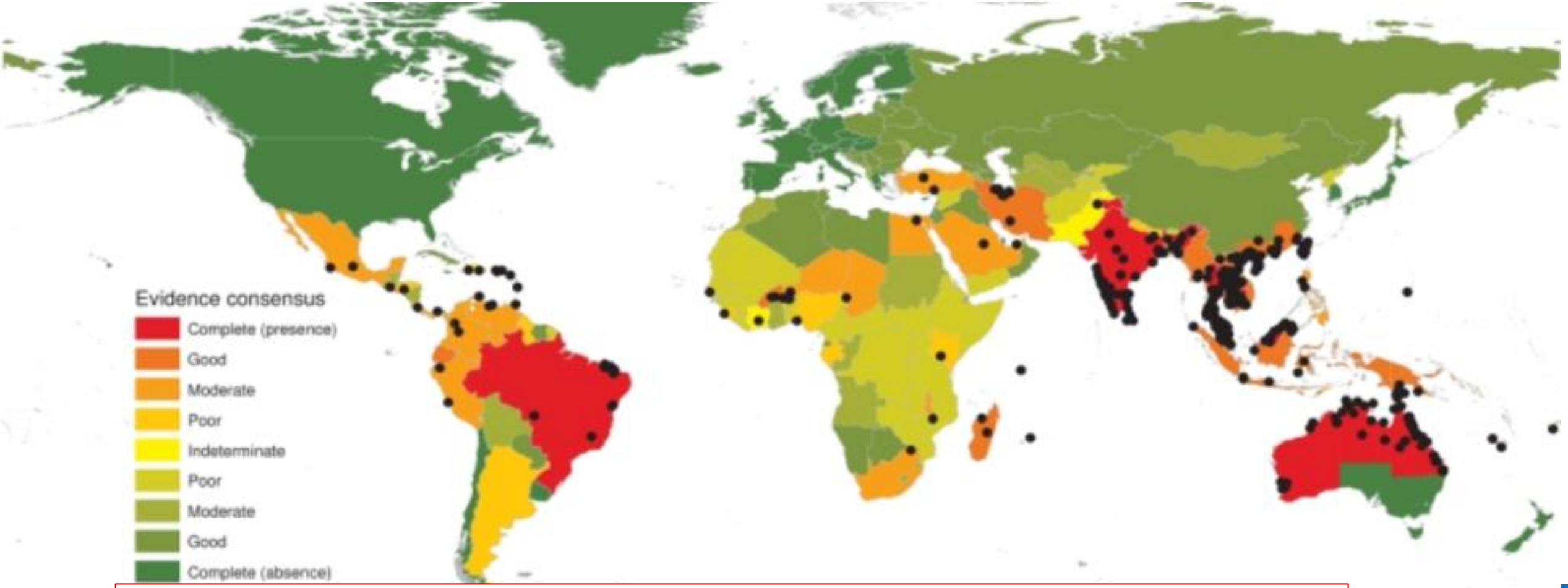
Global Burden of Melioidosis

Melioidosis is estimated to cause **~165,000 cases and ~89,000 deaths annually worldwide**, with a **case fatality rate (CFR) of 10–40%**, rising to **up to 80% in septic shock without treatment**. The disease is underdiagnosed due to:

- Limited microbiological facilities
- Misdiagnosis as tuberculosis or sepsis
- Low awareness among clinicians

It is endemic in **tropical and subtropical regions**, particularly Southeast Asia and Northern Australia.[3]

Global Burden



*** Black spots indicates Melioidosis occurrences, https://pubmed.ncbi.nlm.nih.gov/26877885/**

Countries with high prevalence

Thailand reports the **highest documented incidence**, with:

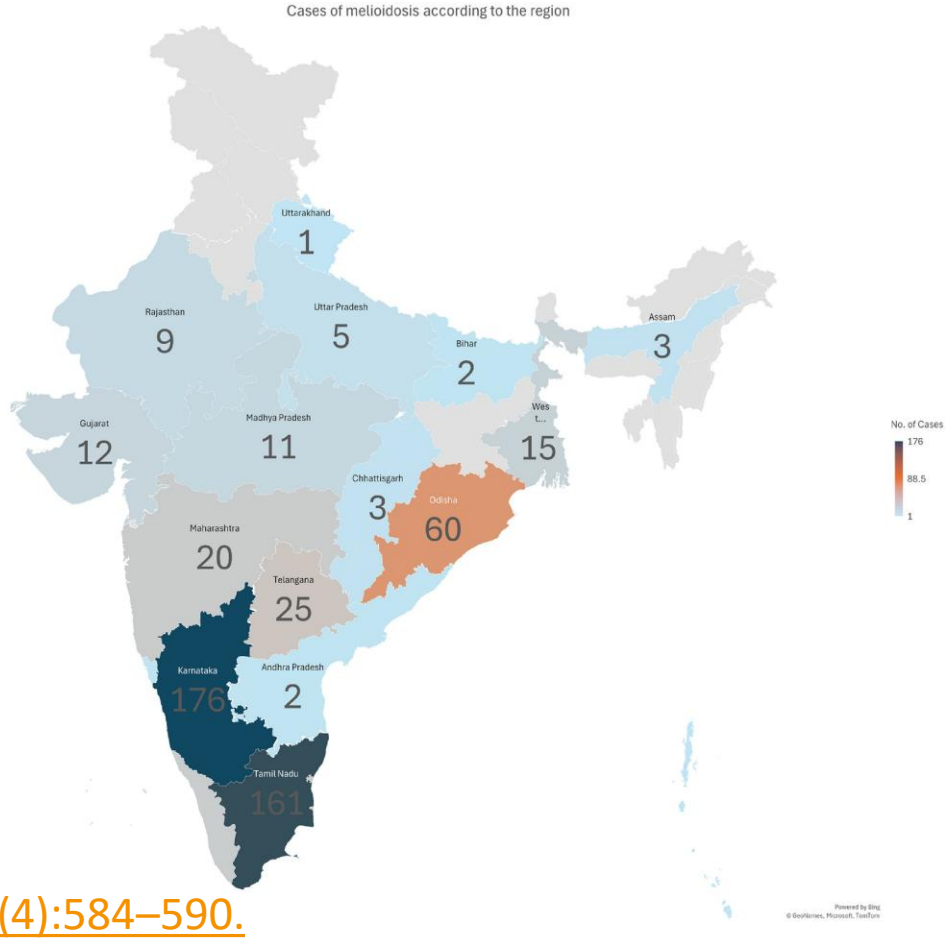
- Incidence: **12–50 per 100,000 population per year**
- CFR: **35–40%**

Northern Australia reports lower incidence but better outcomes due to early diagnosis.

https://publications.ersnet.org/content/erj/22/3/542

Melioidosis in India

- First Indian case reported in **1991 (Chennai)**.
- India is increasingly recognized as **endemic for melioidosis**, with cases reported from:
  - Tamil Nadu
  - Karnataka
  - Kerala
  - Maharashtra
  - Odisha
  - Andhra Pradesh
- Increasing outbreaks reported post-2000, especially in South India.



Chakravorty A, et al. Melioidosis in India. Indian J Med Res. 2014;139(4):584–590.

Melioidosis in Andhra Pradesh

- Sporadic outbreaks reported from **Coastal and Rayalaseema regions in AP post-monsoon**.
- No documented large-scale epidemic, but **clusters following floods** have been observed.
- Most cases occur among **farmers and diabetics**, especially during monsoon seasons.

Causative Agent

- ***Burkholderia pseudomallei***
- Gram-negative, aerobic, motile bacillus
- First described in **1911** by **Alfred Whitmore and Krishnaswami** in Rangoon (Myanmar).
- Environmental saprophyte found in **soil and surface water**
- Genetically diverse strains exist
- No antigenically distinct serotypes of public health significance

Natural Existence in the Environment?

- Naturally present in **Soil** (especially wet clay and loamy soil), **Surface water and Rice paddies**
- It is **not dependent on humans or animals** for survival.
- Can persist **>10 years in soil,** Months in stagnant water
- Thrives in:
  - Temperature: **25–40 °C**
  - pH: **5–8**
  - High rainfall areas

Infection/ Disease

Stage	Approximate Proportion
Environmentally exposed	100% (reference)
Infected (serological evidence)	20–60%
Symptomatic disease	**1–5%**
Severe disease (sepsis)	**0.2–0.5%**
Death	**0.05–0.2%**

Pathogenesis

- Enters through:
  - Skin abrasions
  - Inhalation
  - Ingestion
- Survives intracellularly → causes **latent infection**
- Induces:
  - Septicemia
  - Abscess formation in multiple organs

Latent infection/ Reactivation

B. pseudomallei can remain latent for **years to decades**

Reactivation occurs with:

- Onset of diabetes
- Renal failure
- Immunosuppression

Known as **“Vietnam time-bomb phenomenon”**

Why Do Only a Few Develop Disease?

Host Factors	Effect
Diabetes mellitus	4–12× increased risk
Chronic kidney disease	Impaired innate immunity
Alcoholism	Neutrophil dysfunction
Age >40 years	Immune senescence
Immunosuppression	Failure to contain infection

*** >40–60% of clinical cases have diabetes.**

*** Farmers and construction workers are at risk population**

Environmental factors

- Wet soil
- Rice paddies
- Monsoon rainfall
- Flooding
- Poor drainage systems
- The organism survives for years in moist soil.

Seasonal/ Cyclic trend

- **Strong seasonal trend present**
- Peak incidence during **Monsoon and post-monsoon (June–October)**
- Outbreaks linked to:
  - Heavy rainfall
  - Cyclones
  - Floods

Complications

Complication	Prevalence
Septicemia	40–60%
Pneumonia	50%
Multiple organ abscesses	30–40%
Neuromelioidosis	3–5%
Relapse	5–10%

Prevention at Individual level

Individual Level
- Use footwear during farming
- Cover skin wounds
- Avoid stagnant water exposure

Village Level
- Flood control measures
- Safe water supply
- Health education campaigns

Family Level
- Early healthcare seeking for fever
- Support treatment adherence

District Level
- Strengthen laboratory capacity
- Clinician training
- Mandatory reporting in endemic areas

Early Diagnosis

Early Diagnosis possible **7–10 days before complications** if:

- Blood cultures done early
- Clinical suspicion present

Often delayed due to nonspecific presentation

Different countries strategies

Thailand implemented:

- Early sepsis recognition
- Laboratory strengthening → reduced Case Fatality Rate

Australia established:

- Melioidosis registry → improved outcomes

Thailand Risk-Assessment Questionnaire

Early identification of **suspected melioidosis among febrile patients** in endemic areas.

Section A: Demographic Details

1. Age (years): ___
2. Sex: ☐ Male ☐ Female
3. District / Province: _____
4. Residence: ☐ Rural ☐ Urban
5. Occupation:
   - ☐ Farmer
   - ☐ Construction worker
   - ☐ Laborer
   - ☐ Other (specify): _____

Section B: Environmental & Occupational Exposure (Past 30 Days)

6. Regular contact with soil or mud? ☐ Yes ☐ No
7. Worked in rice fields or wet agricultural land? ☐ Yes ☐ No
8. Worked barefoot in fields? ☐ Yes ☐ No
9. Exposure to flood or stagnant water? ☐ Yes ☐ No
10. Exposure increased during monsoon season? ☐ [illegible] ☐ No

Thailand Risk-Assessment Questionnaire

Section C: Host Risk Factors

11. Known diabetes mellitus? ☐ Yes ☐ No

- If yes, duration: ___ years

12. Chronic kidney disease? ☐ Yes ☐ No

13. Chronic lung disease? ☐ Yes ☐ No

14. Alcohol consumption >40 g/day (men) or >20 g/day (women)? ☐ Yes ☐ No

15. Long-term steroid or immunosuppressive therapy? ☐ Yes ☐ No

Section D: Clinical Symptoms

16. Fever duration >7 days? ☐ Yes ☐ No

17. Pneumonia not responding to routine antibiotics? ☐ Yes ☐ No

18. Skin or soft-tissue abscess? ☐ Yes ☐ No

19. Abdominal pain or organ abscess suspected? ☐ Yes ☐ No

20. Features of sepsis? ☐ Yes ☐ No

Thailand Risk-Assessment Questionnaire

Section E: Clinical Decision Rule (Thailand)

Suspected Melioidosis if:

- Fever >7 days **AND**
- ≥1 environmental exposure **AND**
- ≥1 host risk factor

→ **Blood culture for *Burkholderia pseudomallei* recommended**

Limmathurotsakul D, et al. Clinical epidemiology of melioidosis in northeast Thailand. *Clin Infect Dis*. 2010;50(1):49–56.

Summary

- Melioidosis can be defined as an infectious disease caused by *Burkholderia pseudomallei*, characterized by a wide spectrum of clinical manifestations ranging from localized abscesses to severe pneumonia and septicemia.
- Presence of comorbid conditions like uncontrolled diabetes, chronic kidney problems, immunosuppression will cause complications.
- **Early diagnosis by creating awareness among clinicians, improving the health seeking behavior in Diabetic patients to get adequate treatment, creating registry for Neglected Tropical diseases can reduce the problem.**

Thank you…