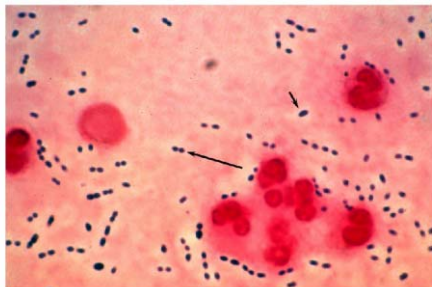
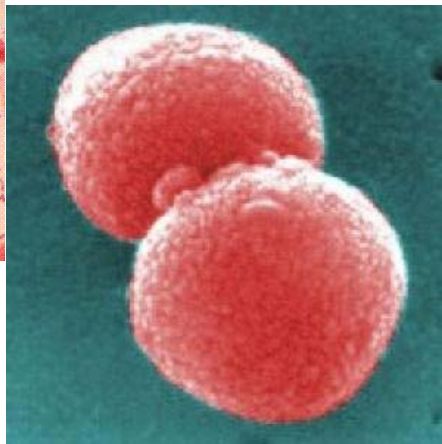
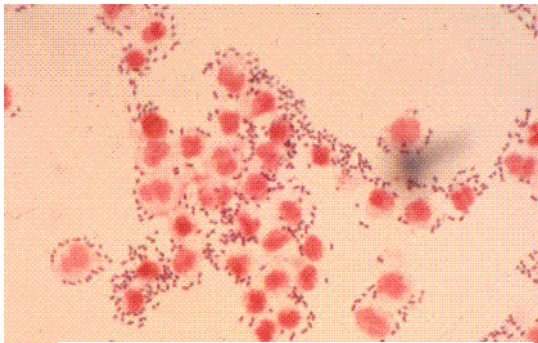




Prevention of Pneumococcal Pneumonia in Thailand



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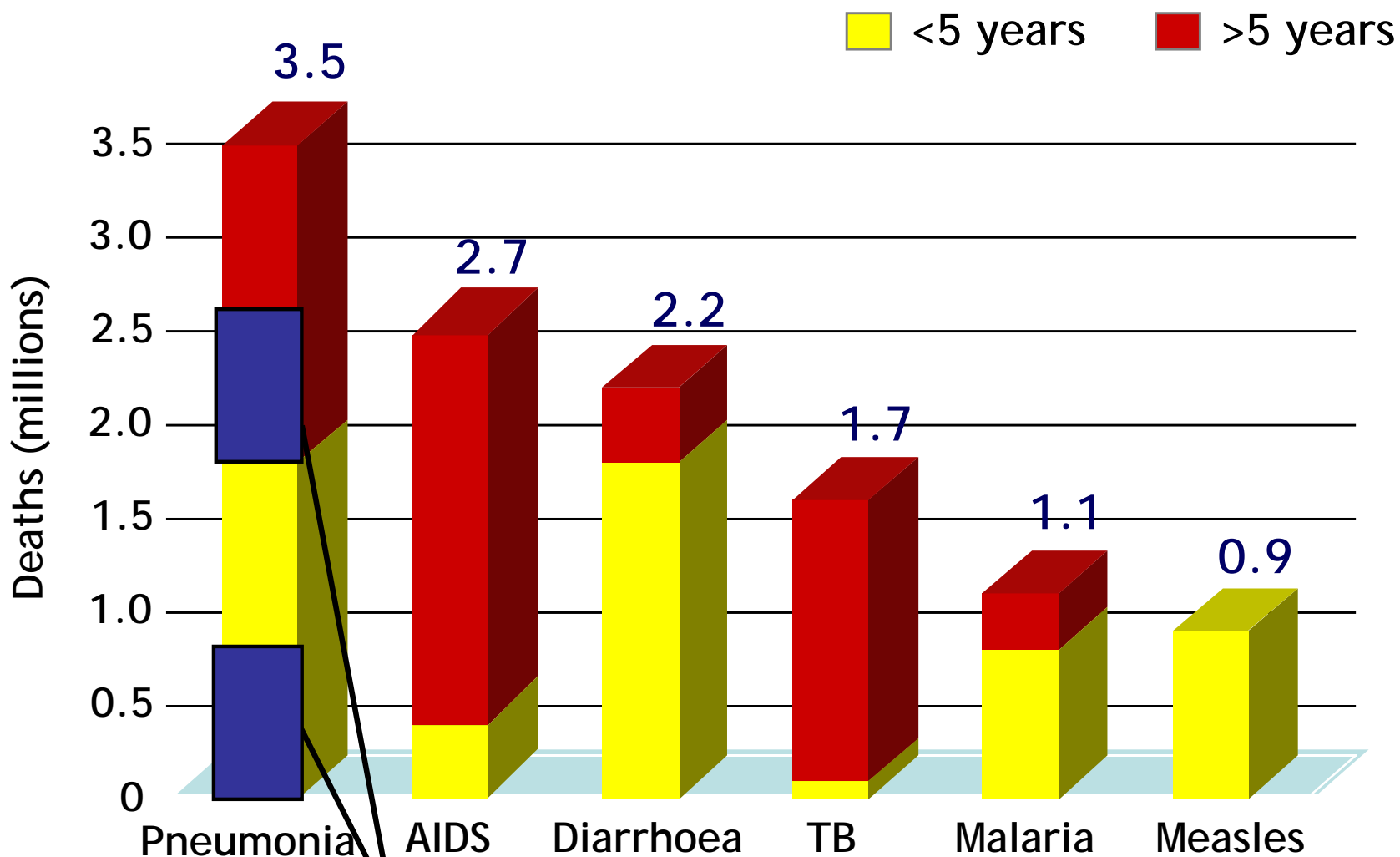


Outline

- ★ Situation of Pneumococcal diseases in Thailand: Pneumonia, Bacteremia
- ★ Serotypes of *S. pneumoniae*
- ★ PCV in Thai children
- ★ Prevention of pneumonia

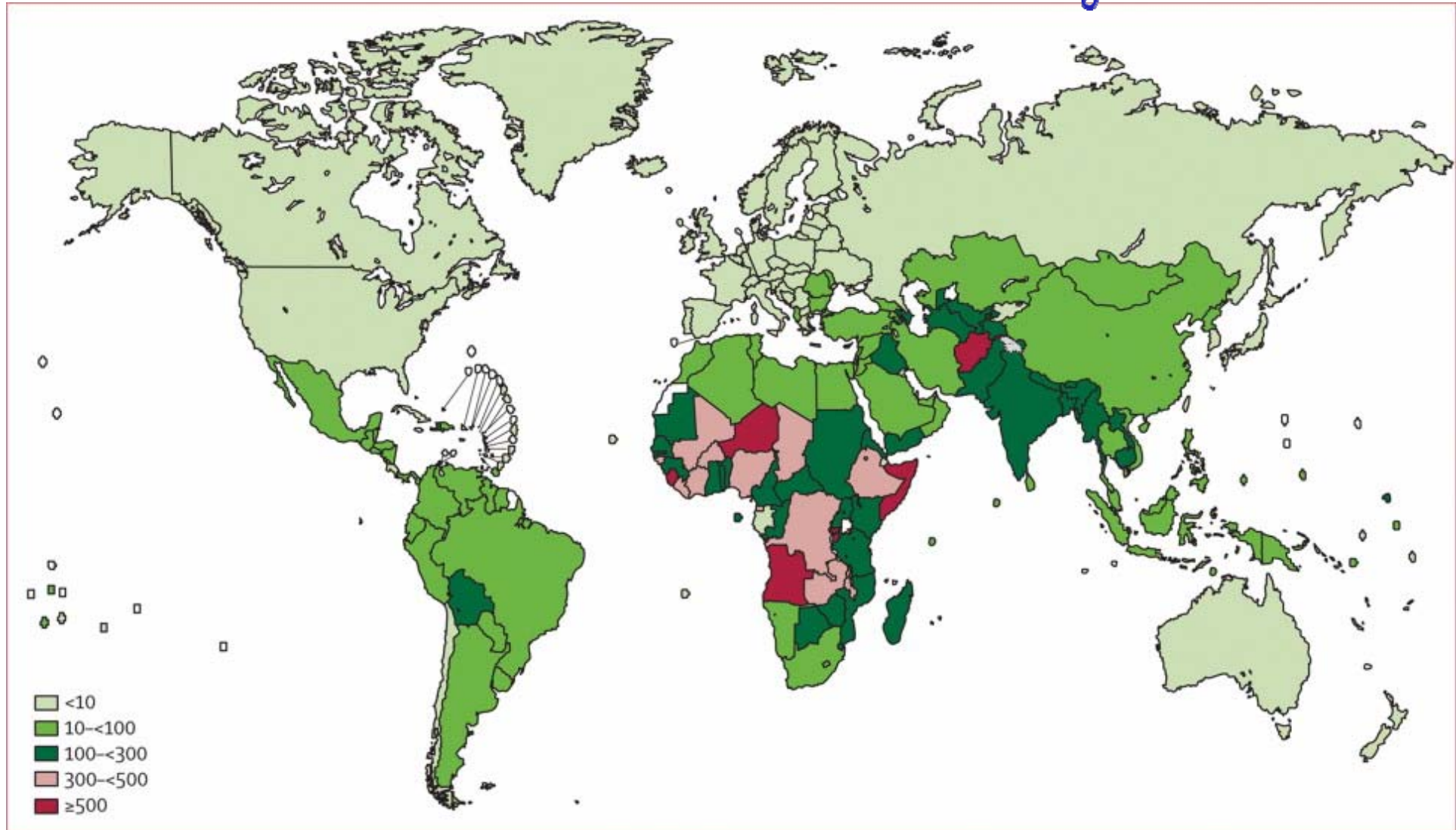


Leading Infectious Causes of Global Mortality



S. pneumoniae:
~1.6 million deaths, including
~800,000 child deaths

Pneumococcal mortality rate



Age U₅

O'Brien KL, et al. *Lancet* 2009;374:893-902.



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<http://intl.elsevierhealth.com/journals/ijid>

A comparison of population-based pneumonia surveillance and health-seeking behavior in two provinces in rural Thailand

Hannah T. Jordan^{a,b}, Prabda Prapasiri^c, Peera Areerat^d, Shuchi Anand^e,
Birgit Clague^f, Saithip Sutthirattana^f, Shadi Chamany^g, Brendan Flannery^b,
Sonja J. Olsen^{h,*}

International Emerging Infections Program, US Centers for Disease Control and Prevention-Thailand Ministry of Public Health Collaboration

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^fInternational Emerging Infections Program, US Centers for Disease Control and Prevention–Thailand Ministry of Public Health Collaboration, Nonthaburi, Thailand

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Incidence of community-acquired pneumonia in children under 5 years of age in Thailand

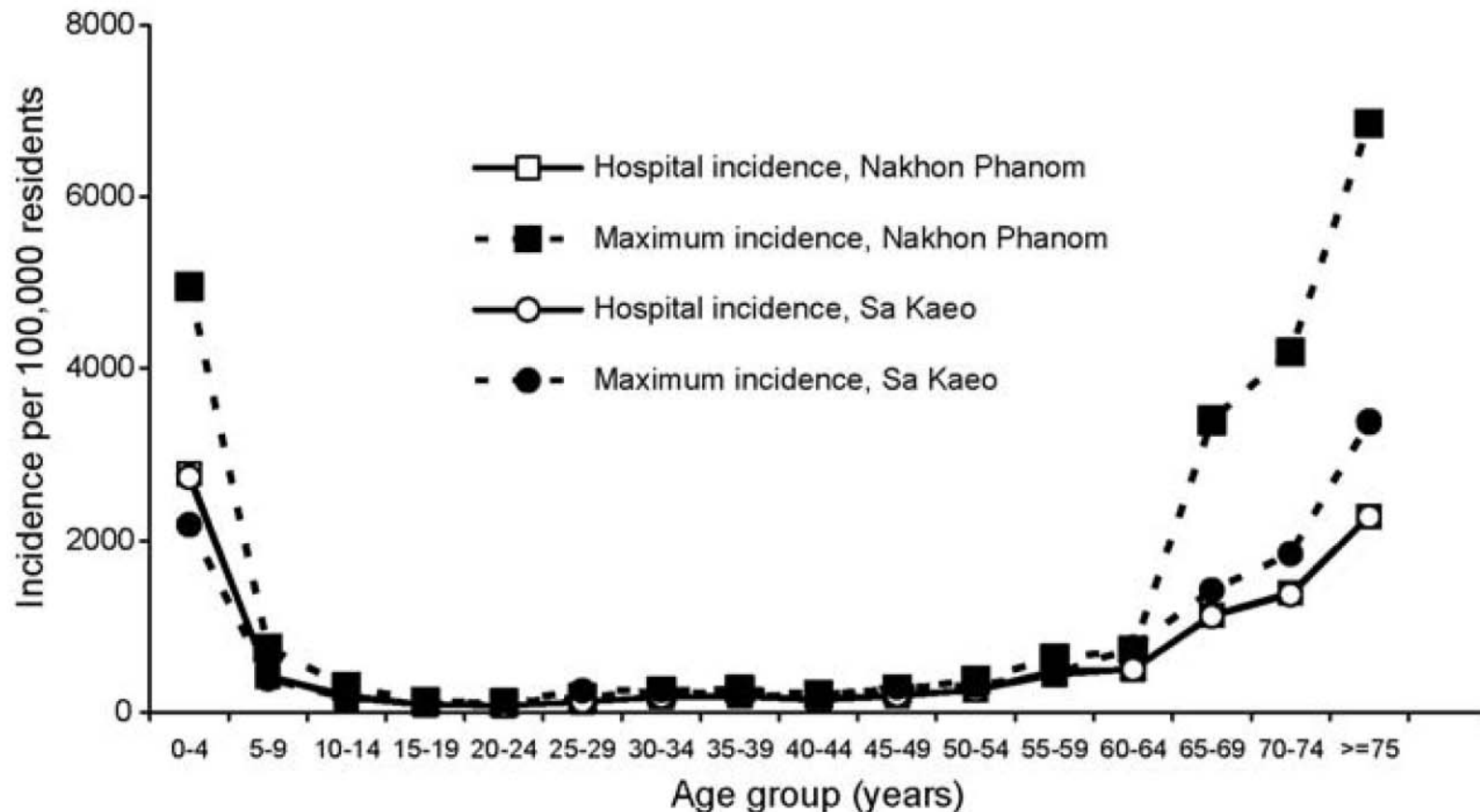
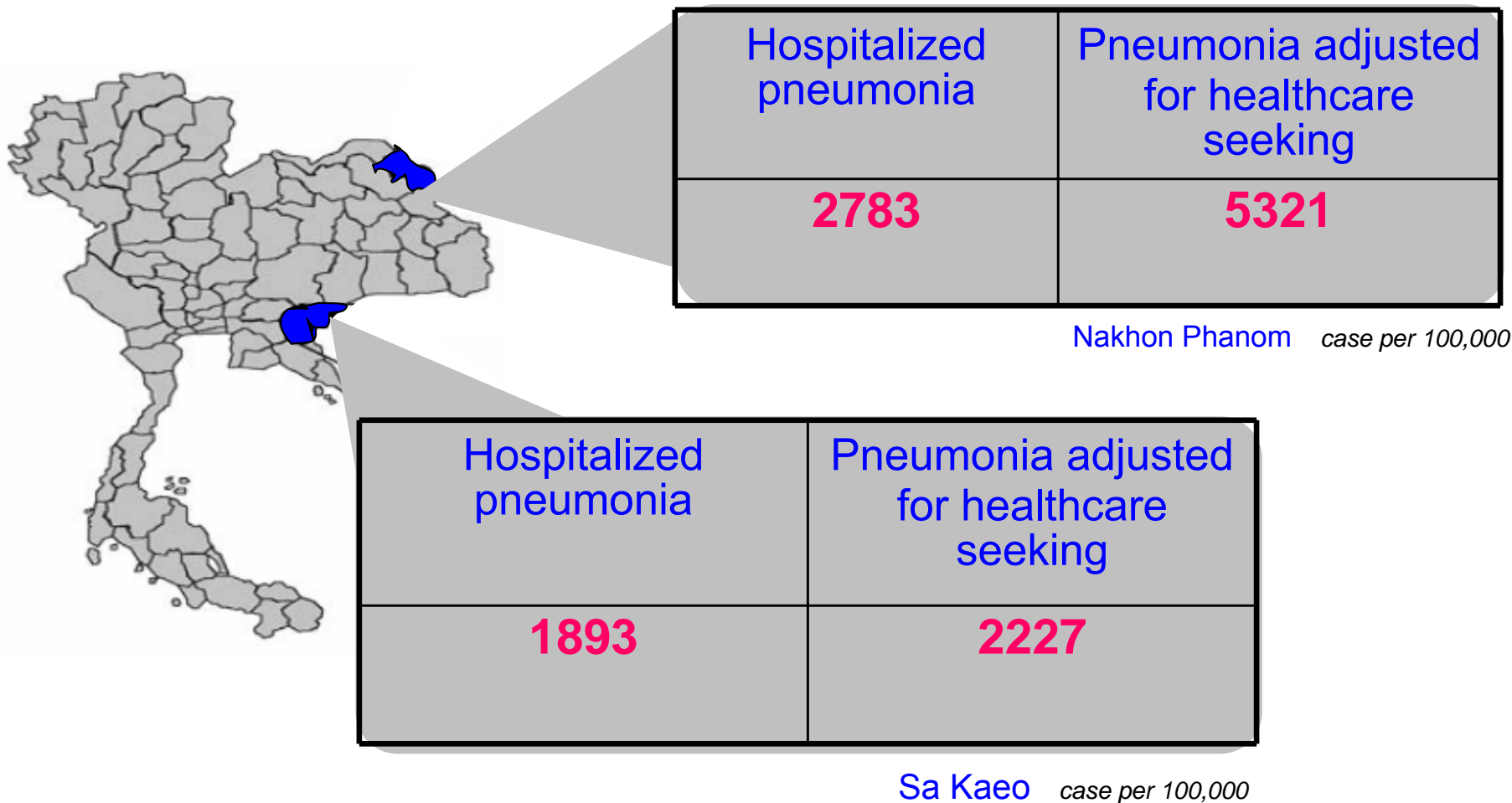


Figure 2 Comparison of pneumonia incidences in Nakhon Phanom (September 1, 2003–August 31, 2004) and Sa Kaeo (September 1, 2002–August 31, 2003),⁹ Thailand.



Incidence of community-acquired pneumonia in children under 5 years of age in Thailand

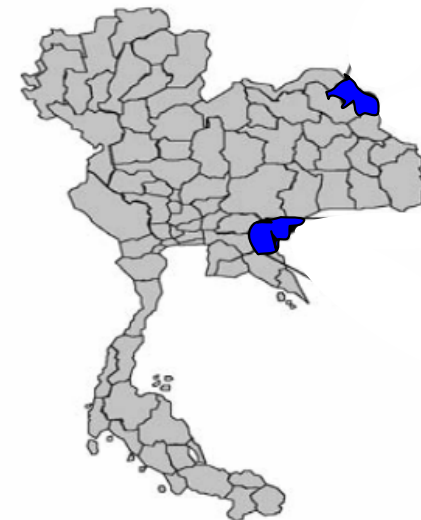




Incidence of Pneumococcal Bacteremia Requiring Hospitalization in Rural Thailand

Henry C. Baggett,^{1,a} Leonard F. Peruski,^{1,a} Sonja J. Olsen,⁷ Somsak Thamthitawat,¹ Julia Rhodes,¹ Surang Dejsirilert,² Wanna Wongjindanon,¹ Scott F. Dowell,⁷ Julie E. Fischer,¹ Peera Areerat,⁵ Denchai Sornkij,⁶ Possawat Jorakate,¹ Anek Kaewpan,¹ Prabda Prapasiri,¹ Sathapana Naorat,¹ Leelawadee Sangsuk,² Boonchuay Eampokalap,³ Matthew R. Moore,⁷ Gloria Carvalho,⁷ Bernard Beall,⁷ Kumnuan Ungchusak,⁴ and Susan A. Maloney¹

¹International Emerging Infections Program, Thailand Ministry of Public Health–US Centers for Disease Control and Prevention Collaboration, and ²National Institute of Health, ³Bamrasnaradura Infectious Diseases Institute, and ⁴Bureau of Epidemiology, Thailand Ministry of Public Health, Nonthaburi, ⁵Sa Kaeo Provincial Health Office, Thailand Ministry of Public Health, Sa Kaeo, and ⁶Nakhon Phanom Provincial Health Office, Nakhon Phanom, Thailand; and ⁷Centers for Disease Control and Prevention, Atlanta, Georgia





Population-Based Pneumonia Surveillance (IEIP US CDC and Thai MOPH collaboration) at Sakaew and Nakorn Phanom (May 2005 - June 2007)

Blood stream Infection Surveillance

- ★ Patients considered to have an indication for blood culture (BacT/ALERT 3D automated culture system)
 - Hospitalized for pneumonia
 - Aged <5 years with possible sepsis
(based on hospital logs)
 - Clinician requested a culture

- ★ Media from alarm-positive blood cultures with no growth on subculture were tested by Binax NOW[®] (Pneumococcal antigen testing)



Frequency of Blood Cultures among those with Indication, May 2005–June 2007

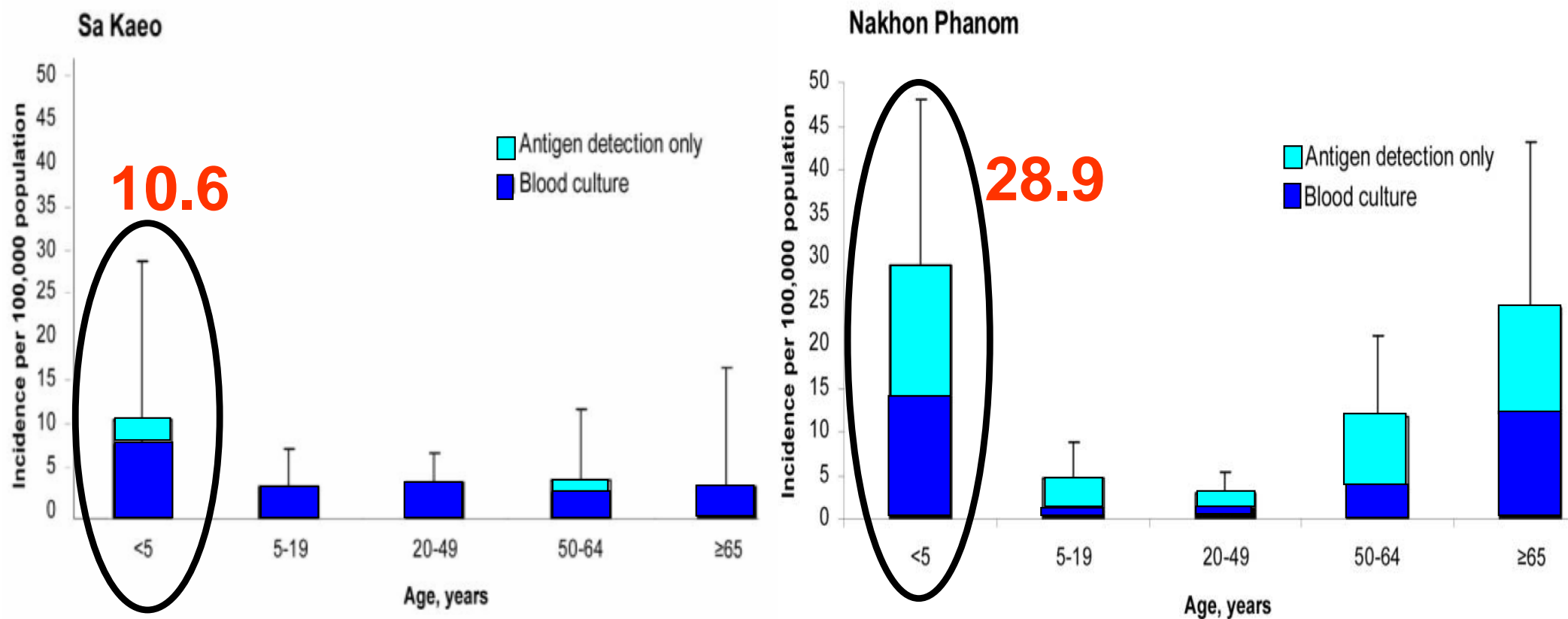
	Sa Kaeo and Nakhon Phanom	
	Indication	Culture done (%)
Total	36,141	23,853 (66)
<5 years	15,572	7,319 (47)

116 Cases of pneumococcal bacteremia requiring hospitalization

- 72 (62%) cases by *S. pneumoniae* isolation
- 44 (38%) confirmed only by Binax on liquid culture media
- ★ 27 (23%) occurred in children <5 years, including 9 by Binax only



The incidence of pneumococcal bacteremia cases requiring hospitalization among children aged <5 years had a range of *10.6 - 28.9* cases per 100,000 persons (May 2005-June 2007, *N=116*)



Note. *Antigen detection only*. Patients with alarm-positive blood cultures that failed to grow a pathogen on subculture but had media positive by pneumococcal antigen testing (Binax NOW®).



These findings substantially underestimate the true incidence of pneumococcal bacteremia (and IPD)

- ★ Especially among young children, who typically experience high rates of outpatient pneumococcal bacteremia

Additional limitations of the true incidence of hospitalized case of pneumococcal bacteremia

- ★ Blood culture specimens were collected on the basis of clinician judgment and culturing practices varied
- ★ Documented extensive use of antibiotics before obtainment of blood specimens and previously found that *S. pneumoniae* was isolated in culture >5 times more often from patients without prior antibiotic treatment than from patients with prior antibiotic treatment



Estimated incidence of IPD in U₅ in Thailand per 100,000 population

- A. <5
- B. 5-10
- C. 15
- D. 10.6-28.9
- E. >28.9



The incidence of IPD in children aged <5 years per 100,000 persons

	Pneumococcal Bacteremia	All cases of IPD
Thailand (Sa Kaeo & Nakhon Phanom) May 2005-June 2007	28.9	28.9 + meningitis ?
USA (before NIP)	31.4	96
Australia (before NIP)		47.3

The estimates, which are close to estimates of the incidence of hospitalized case of pneumococcal bacteremia in the USA before introduction of PCV
The true IPD incidence in Thailand is likely similar USA
Pneumococcal bacteremia is as common in Thailand

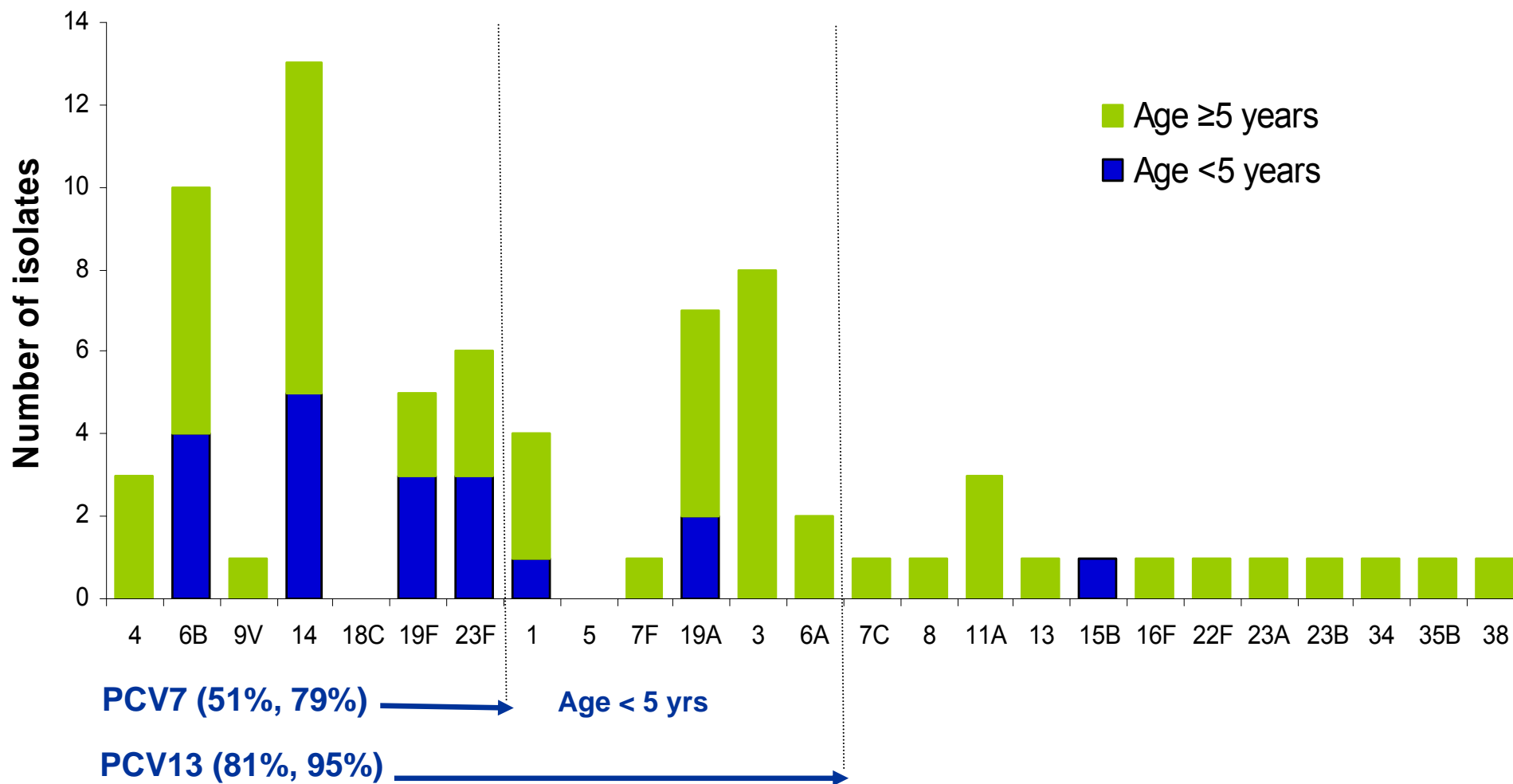


Outline

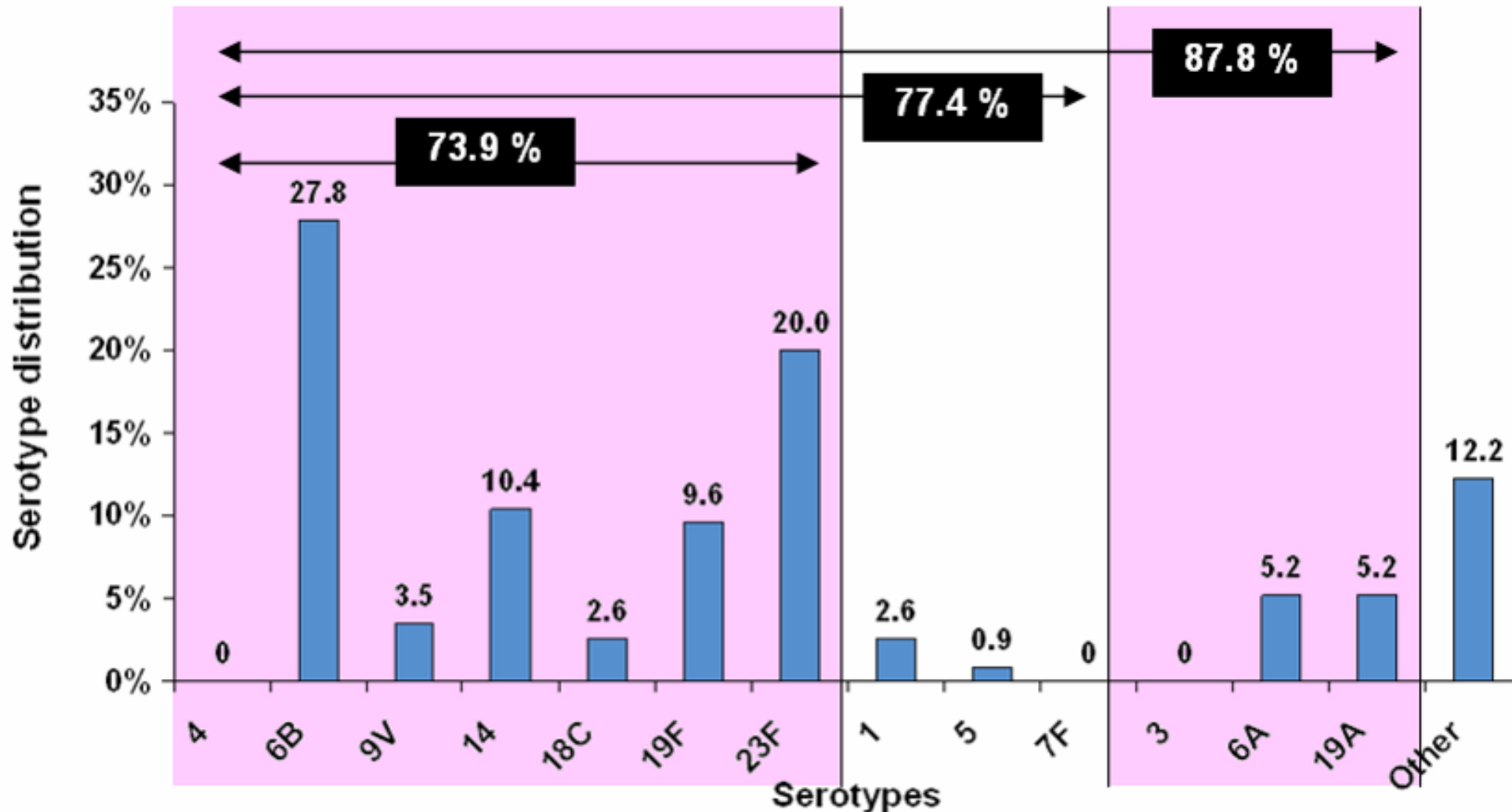
- ★ Situation of Pneumococcal diseases in Thailand: Pneumonia, Bacteremia
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Serotype distribution of pneumococcal bacteremia isolates



Serotype distribution of invasive pneumococcal disease in Thai children under 5 years old (2000-2005, N=115)





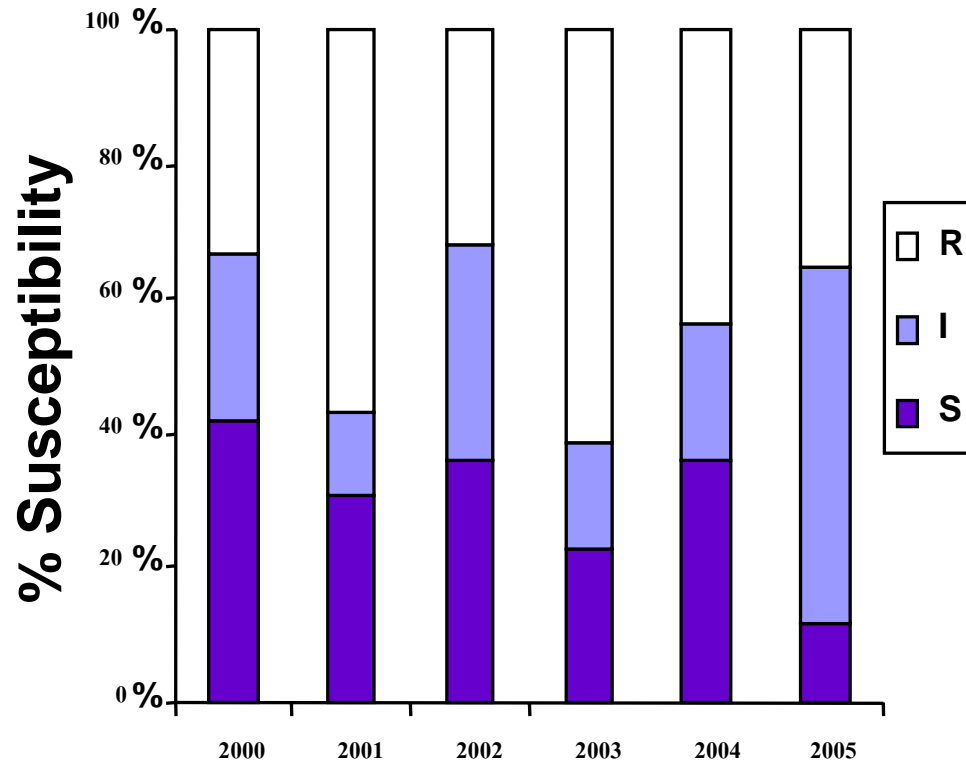
Common serotype distribution of pneumococcal isolates in Thailand include

- A. 1, 5
- B. 6B, 14
- C. 19F, 23F
- D. 6B, 14, 19F, 23F
- E. All of the above

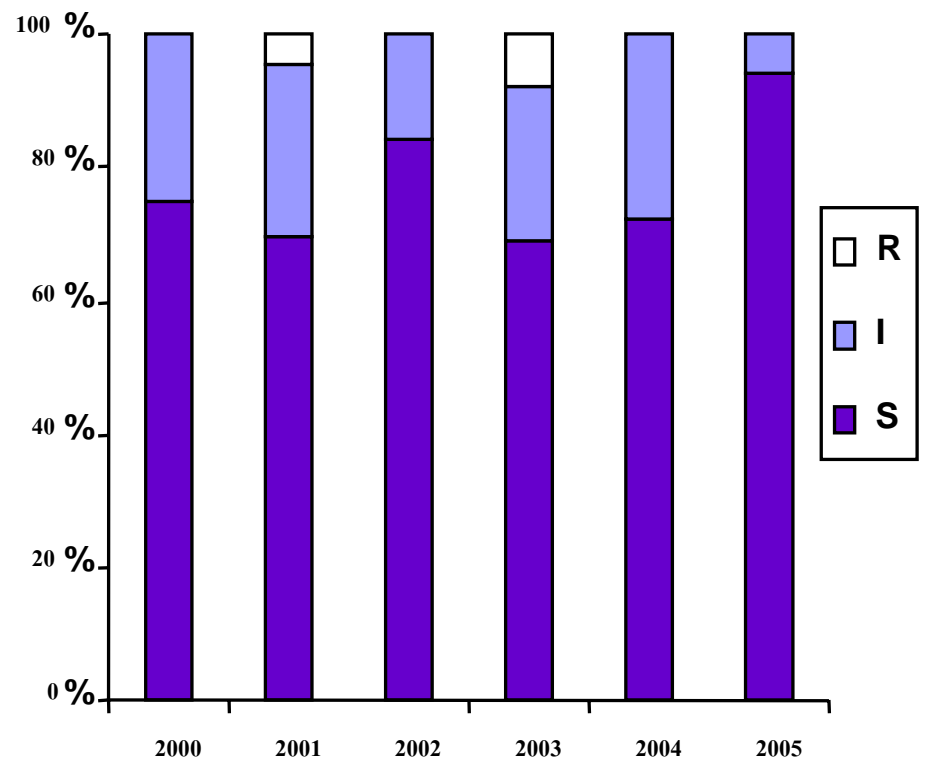
Carriage rate and the prevalence of penicillin nonsusceptible strains of pneumococci among children from 11 countries

Country	PRSP %	
	Of carriage isolates	Of clinical isolates
Taiwan	91.3	38.7
Korea	85.8	79.7
Sri Lanka	76.5	41.2
Vietnam	70.4	60.8
Saudi Arabia	50.0	NA
Singapore	46.3	23.1
Thailand	45.6	57.9
China	13.4	9.8
Malaysia	13.3	9.0
India	12.8	3.8
Philippines	2.1	NA
Total	35.8	34.5

Antimicrobial Susceptibility of IPD Isolates from Children <5 Years Old, 2000 to 2005.



Penicillin



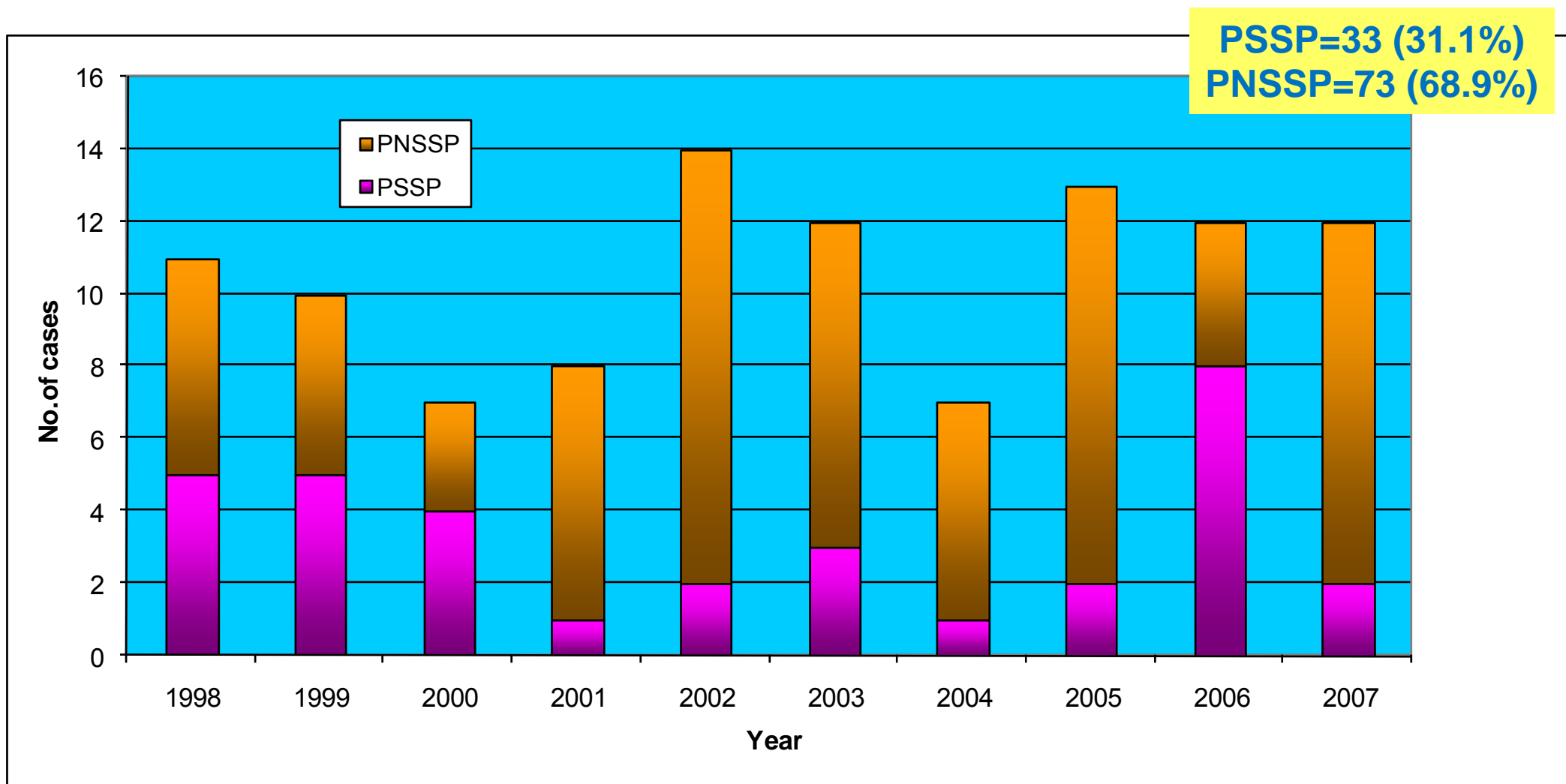
Cefotaxime

S : susceptible I : intermediate R : resistant.

Susceptibility of *S. pneumoniae* to various antimicrobials, 29 hospitals in Thailand 2006

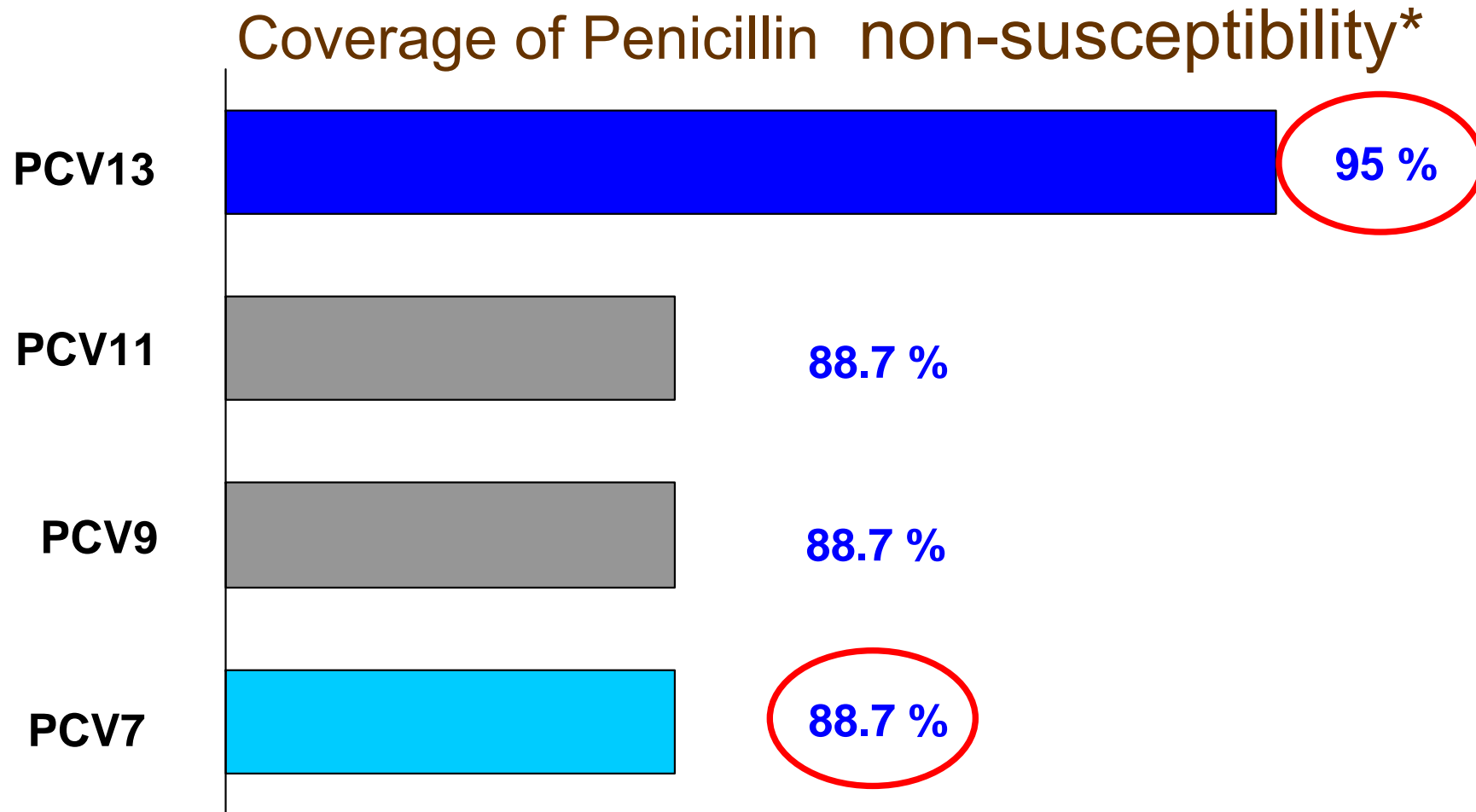
	Sterile sites	Non-sterile sites	All isolates
Penicillin	59	48	51
Erythromycin	71	56	62
Cotrimoxazole	43	42	41
Chloramphenicol	87	85	86
Clindamycin	79	80	81
Vancomycin	99	100	100
Ofloxacin	100	96	98

INVASIVE PNEUMOCOCCAL INFECTION IN CHILDREN: A 10-YEAR REVIEW *Queen Sirikit National Institute of Child Health*

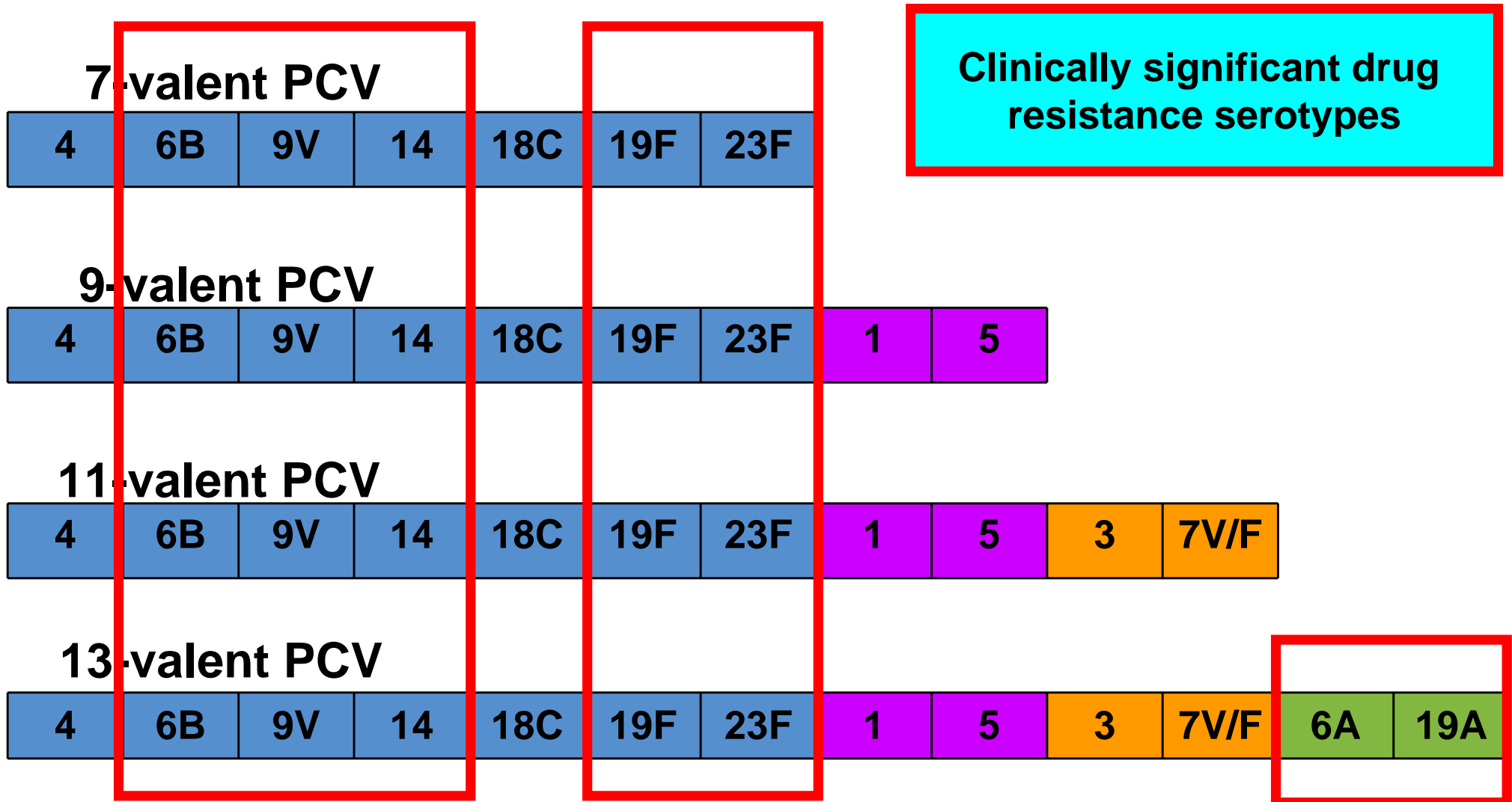


Supichaya Netsawang, 1st National Pneumococcal symposium, Bangkok Thailand

Coverage of PCVs of IPD isolate in children younger than 5 years of age



Vaccine Serotypes



al-Swailem AM, et al. *Curr Ther Res.* 2004;65:423-432.

Greenberg D, et al. *J Clin Microbiol.* 2003;41:5541-5545.

CDC. *Epidemiology and Prevention of Vaccine-preventable Diseases.* 8th ed. 2004:233-245.



WHO Recommendations

WHO Recommends PCV for Children

- **PCV7**
 - WHO categorizes pneumococcal disease and malaria as very high-priority vaccine-preventable diseases
 - Introduction of PCV7 into NIPs is a priority
 - Introduction of PCV7 into NIPs of developing countries is a high priority
 - PCV7 can be integrated easily into routine vaccination schedules
 - PCV7 should be initiated before 6 months of age and may start as early as 6 weeks*
 - Initiate catch-up vaccination up to 5 years of age with the first year of introduction

*Early PCV7 initiation if due to earlier peak disease

NIP=National Immunization Program; PCV=pneumococcal conjugate vaccine

WHO. *Wkly Epidemiol Rec.* 2007;82:93-104.



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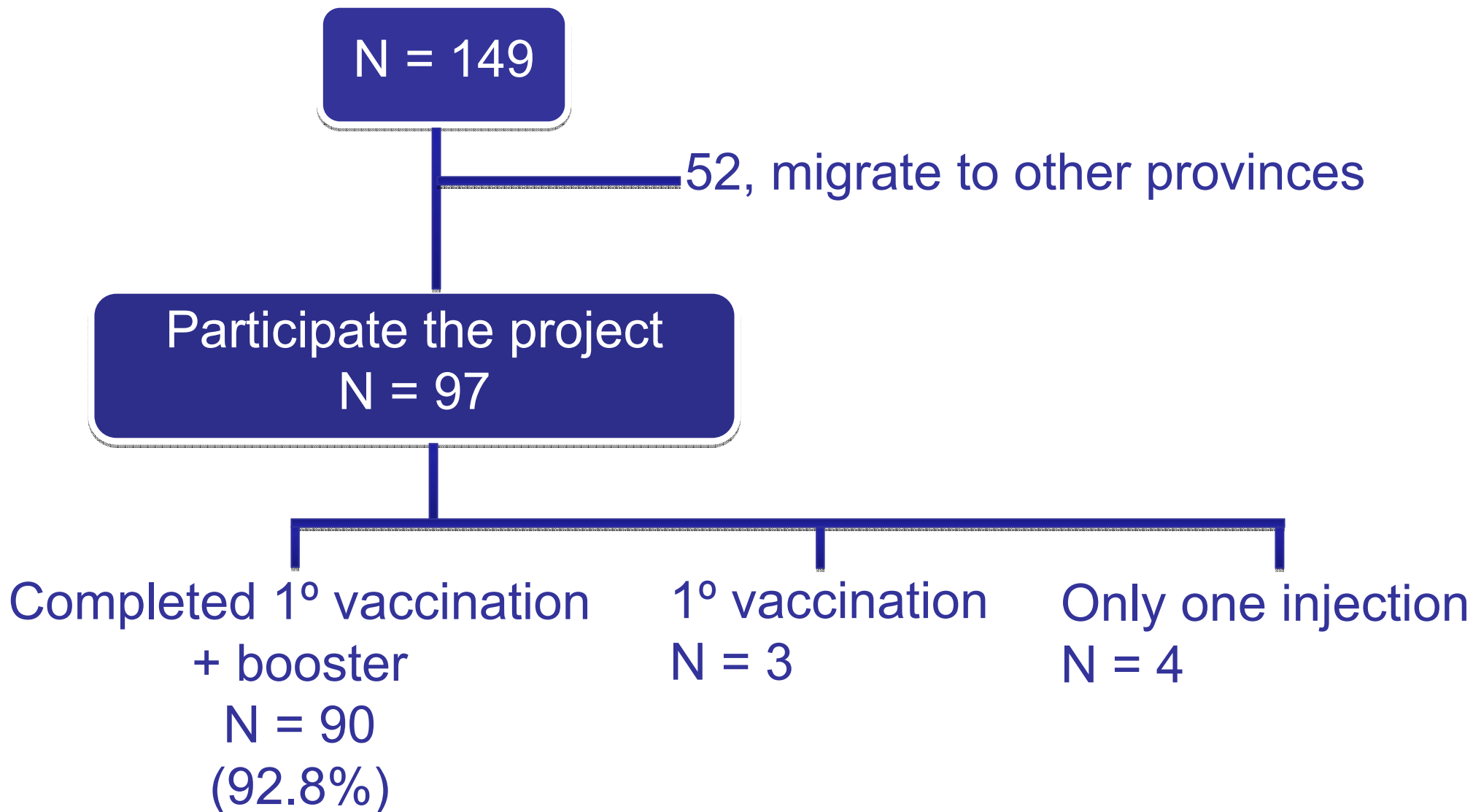
**In honor of the auspicious occasion
of
His Majesty King Bhumibol Adulyadej's
80th Birthday Anniversary**

**Prevention of Invasive Pneumococcal
Disease in Children**

**Organized by Bangkok Metropolitan
Administration**



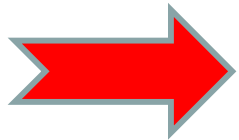
Children born on December 05, 2007





Result

- ★ 2 children had low grade fever (within 24 hr) after 1st dose
- ★ After follow-up \bar{q} 2 mo (1st 6 mo) and \bar{q} 3 mo thereafter



No IPD

Conclusion

- ★ Primary immunization followed by a booster dose of PCV7 seemed to be acceptably safe and efficacious in prevention of IPD in Thailand



Risk Factors for IPD

Age¹	Underlying Medical Conditions^{2,3}	Demographic Features^{3,4}
<ul style="list-style-type: none">• Children ≤ 2 years of age• Adults ≥ 65 years of age	<ul style="list-style-type: none">• Congenital or acquired immunodeficiency• Sickle cell disease, asplenia, HIV• Pulmonary disease• Chronic heart disease• Chronic renal insufficiency, nephrotic syndrome• Diabetes• Cerebrospinal fistula• Existing or cochlear implants	<ul style="list-style-type: none">• Day care attendance• Ethnicity

• **Age is the most important risk factor for pneumococcal disease¹**

1. CDC. *Morb Mortal Wkly Rep.* 1997;46(RR-8):1-24.
2. Pickering LK. *Red Book.* 26th ed; 2003.
3. CDC. *Morb Mortal Wkly Rep.* 2000;49(RR-9):1-35.
4. Levine OS, et al. *Pediatrics.* 1999;103:1-5.



Project of PCV vaccination in High Risk children supported by BMA

**To monitor -efficacious & adverse events
of the vaccine**

Inclusion Criteria

- ★ Age 2 mo – 8 yr
- ★ < 5 years, n = 1060
- ★ 5-8 years, n = 221



	2 mo - <5 yr	5-8 yr	Total
Maternal HIV ⊕ children	350	96	446
Congenital Cardiac Anomalies	249	61	310
Thalassemia	102	28	130
VLBW (BW <1,500 g)	359	36	395
Total	1,060	221	1,281



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Achieving Millennium Development Goal 4:

↓ by 2/3 mortality among U5 by 2015

[~ 2 M deaths from pneumonia in children]

- ★ Appropriate case management
- ★ Reduction of exposure to known risk factors:
indoor pollutants, tobacco smoke, premature weaning,
nutritional deficiencies
- ★ Vaccination:
Pneumococcal & Hib vaccines, Measles, pertussis



The most effective measure for prevention pneumococcal pneumonia is

- A. Exclusive breastfeeding**
- B. Reduce LBW**
- C. Pneumococcal vaccination**
- D. Hand washing**
- E. Adequate nutrition**



Protecting children from pneumonia is possible

- ★ Exclusive breastfeeding
 - ↓ rate of pneumonia among young infants by 15-23%
- ★ Adequate nutrition
 - malnutrition weakens children's immune system
 - Zn supplementation: ↓ pneumonia in children by 14-25%
- ★ Reduce LBW
 - LBW & preterm infants are 2.6 times than normal birth weight & term infants
- ★ Reduce indoor air pollution
 - cigarette smoking, cooking, home heating
- ★ Hand washing



Conclusion

- ★ *S. pneumoniae* is a significant global cause of morbidity and mortality.
- ★ The incidence of IPD is highest at the extremes of age.
- ★ Antibiotic-resistant pneumococci are an increasing global problem.
- ★ Effective measures for prevention and treatment are crucial to ensure a healthy life for children in Asia.
- ★ Immunization of PCV 7 seemed to be acceptably safe and efficacious in prevention of IPD in Thai children
- ★ Pneumococcal vaccination in high risk children is ongoing by Bangkok Metropolitan Administration.



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