

**CHILDHOOD PERTUSSIS
&
GLOBAL PERTUSSIS INITIATIVE**

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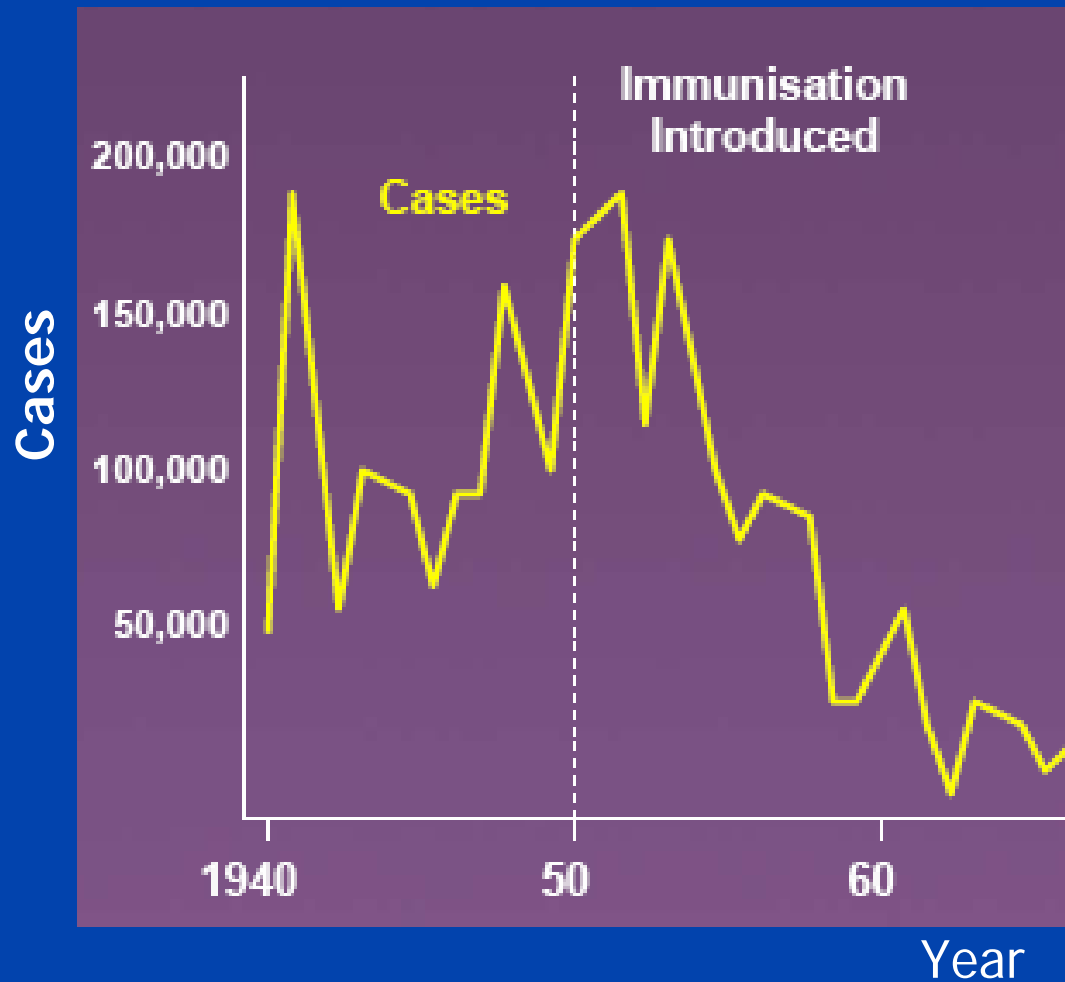
President,

Pediatric Infectious Diseases Society of Thailand



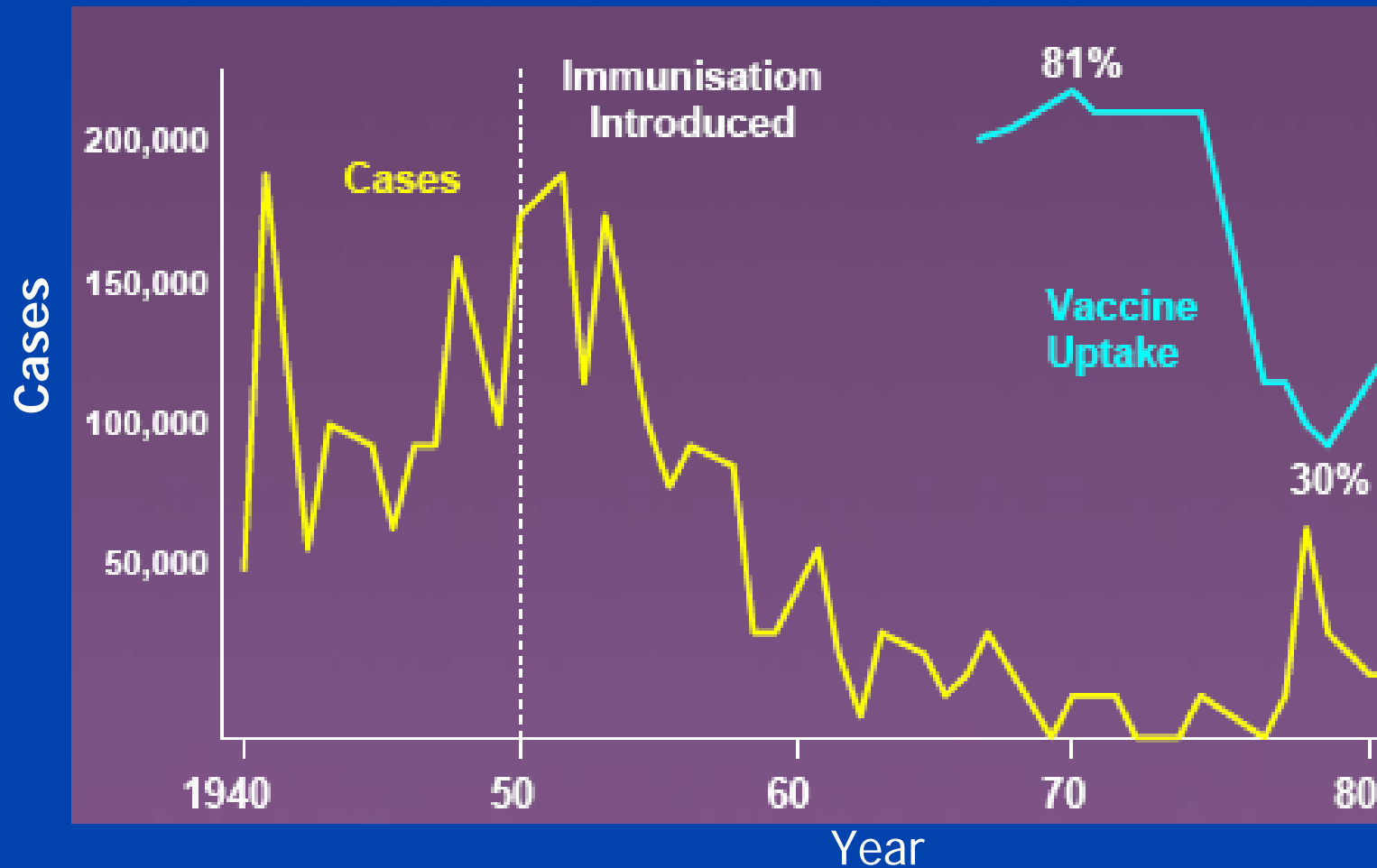
Some consequences of interrupting vaccination programs

Whooping cough notifications: cases and deaths, England and Wales 1940–1993



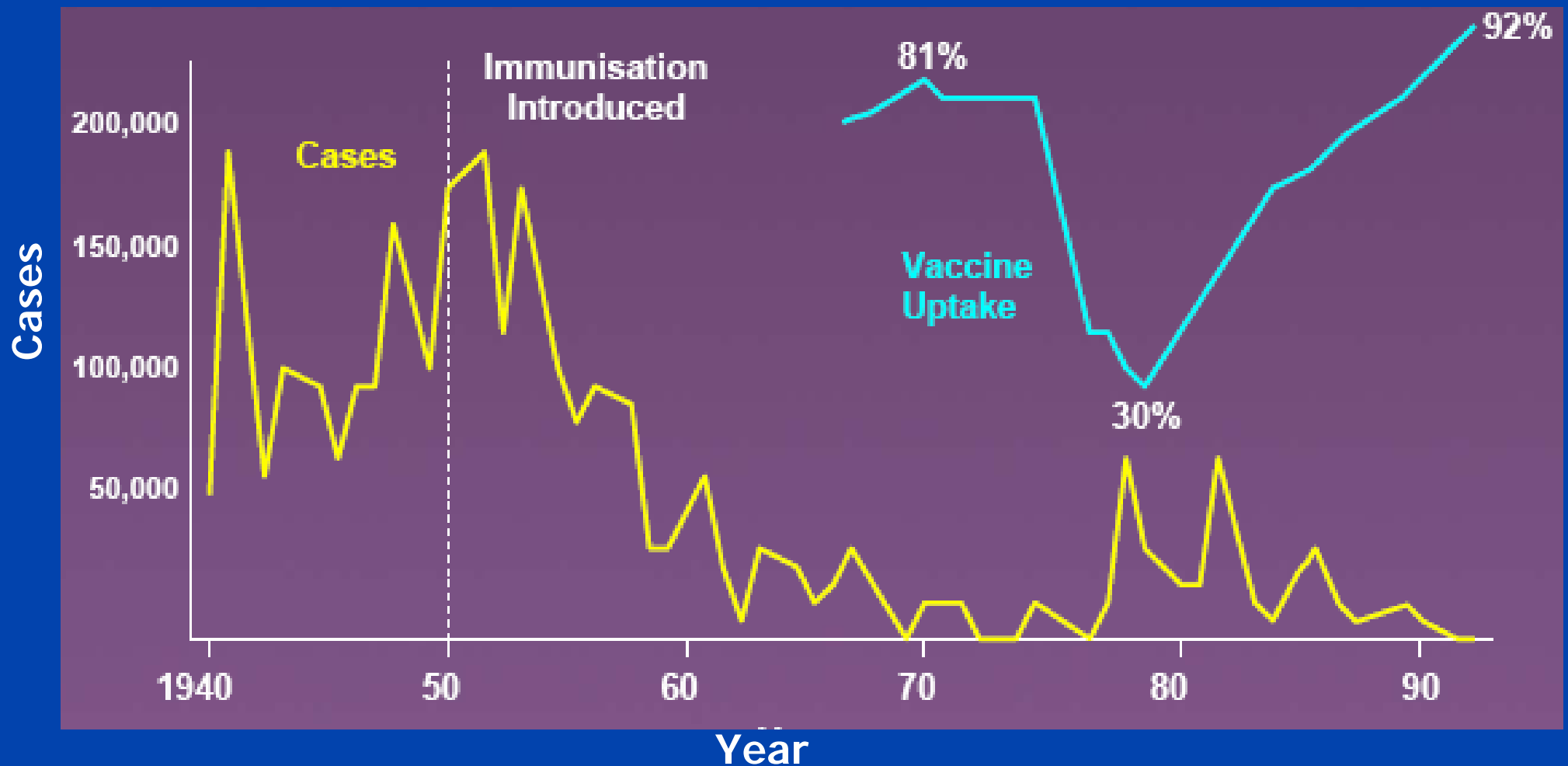
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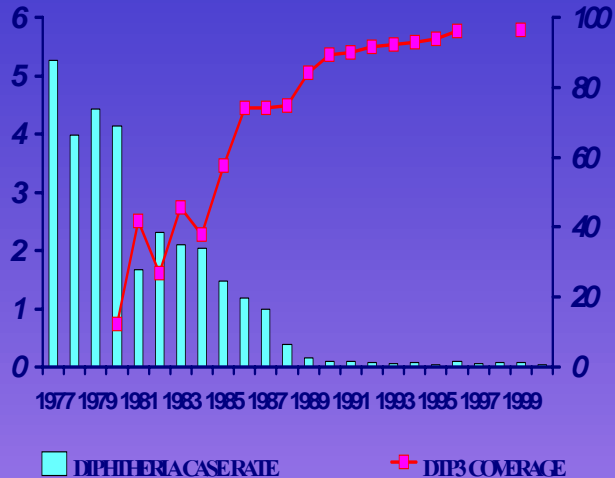


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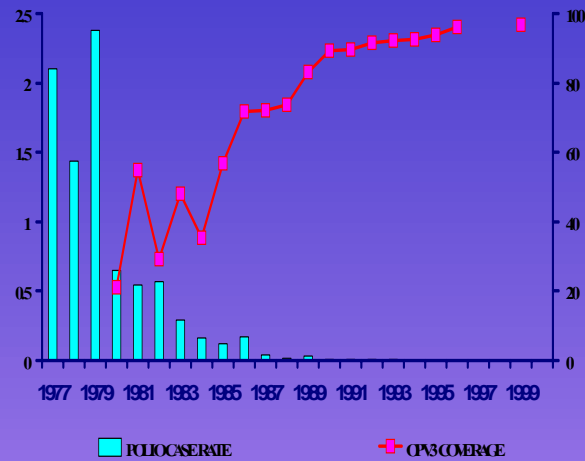
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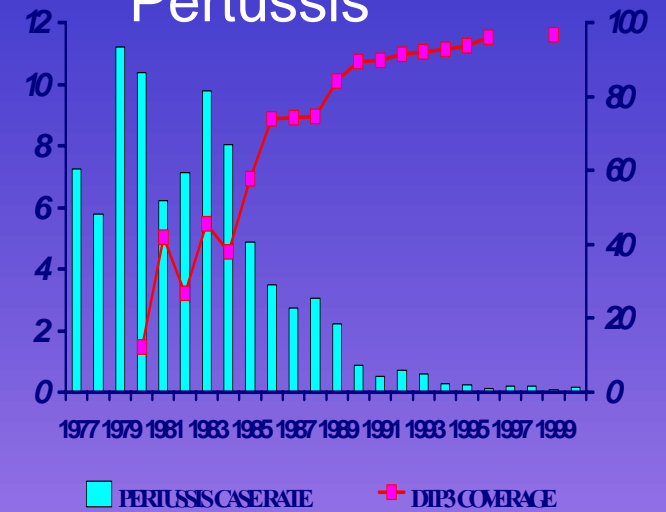
Diphtheria



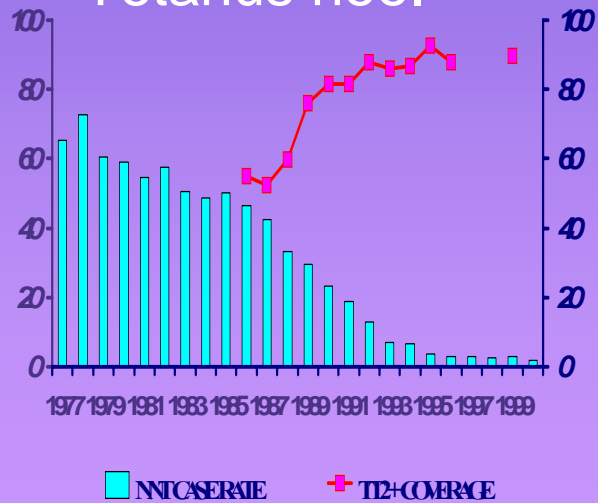
Polio



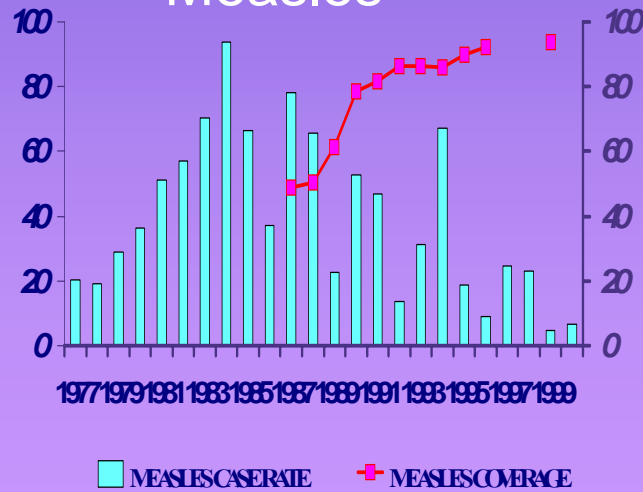
Pertussis



Tetanus neo.



Measles



HB

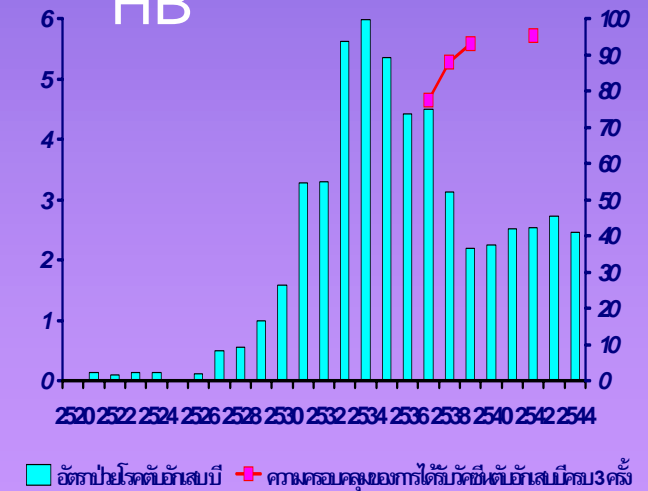


Fig 1 Reported Cases of Pertussis per 100,000 Population , by Year, Thailand, 1999 – 2008

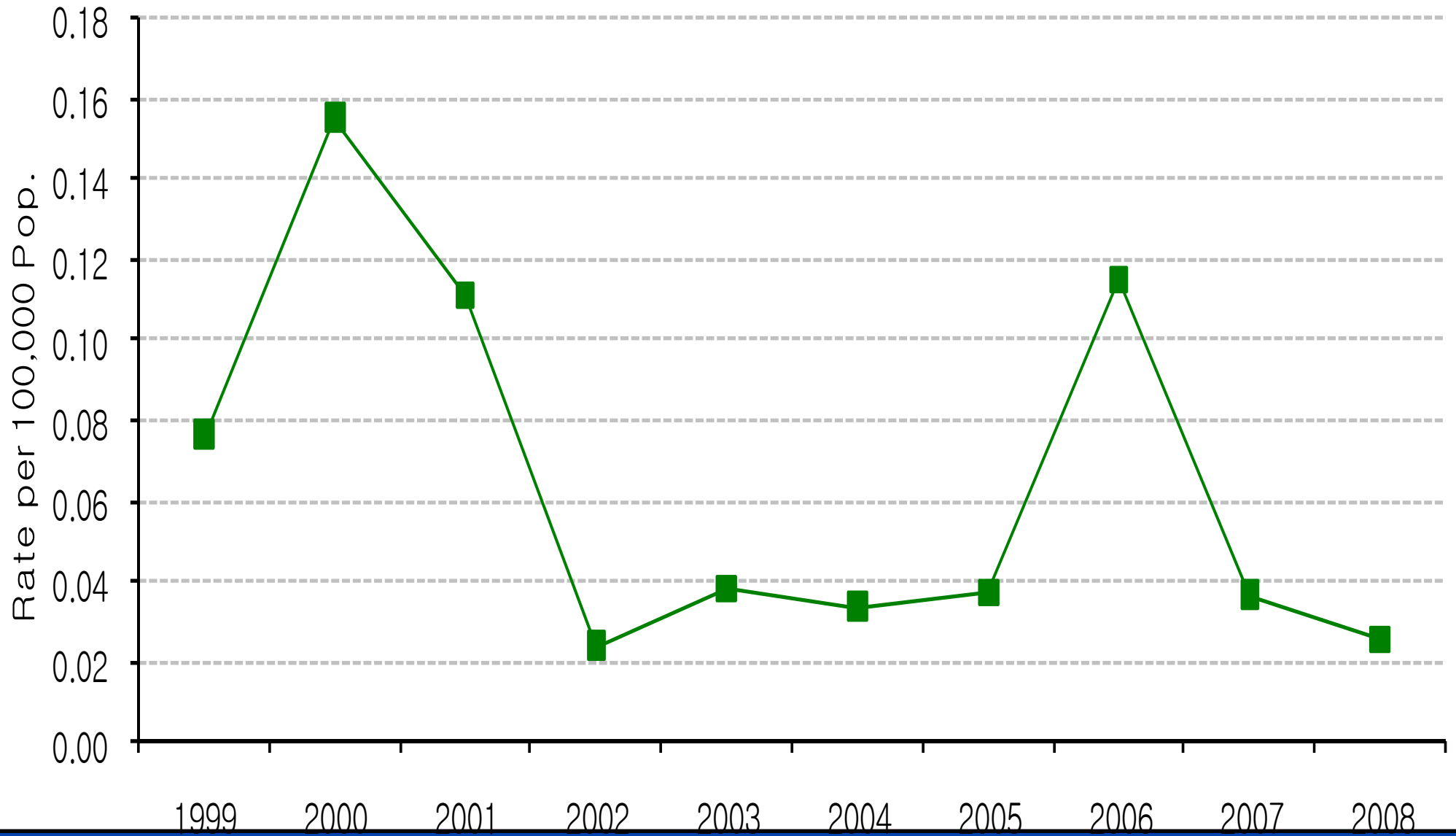
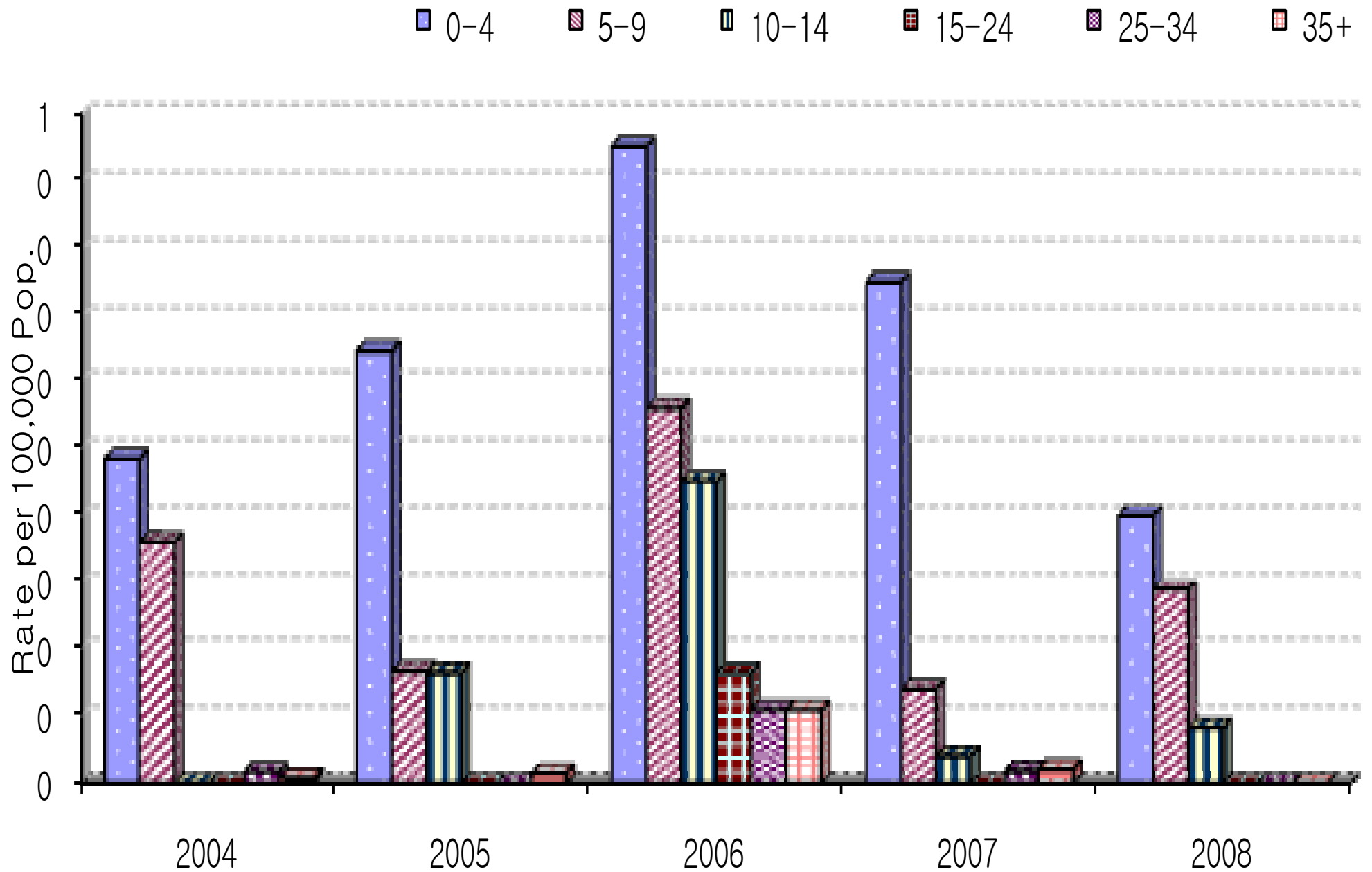
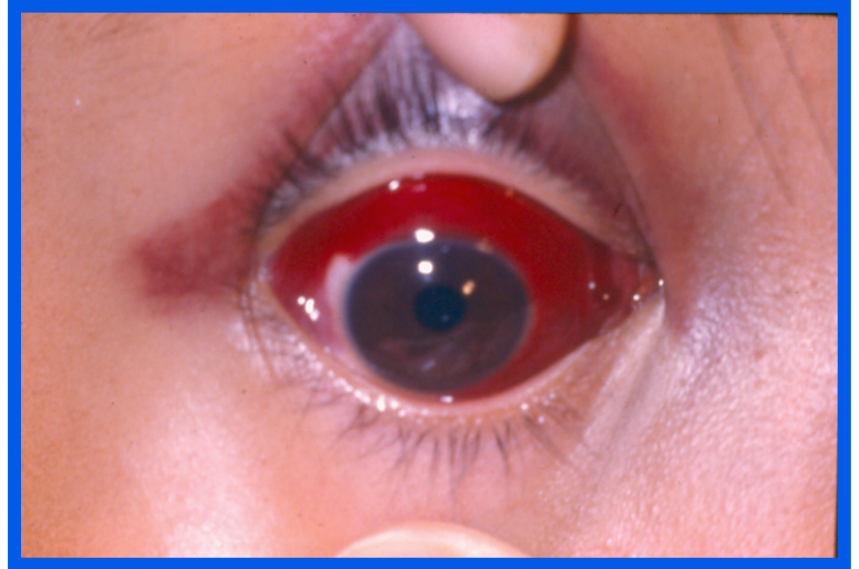
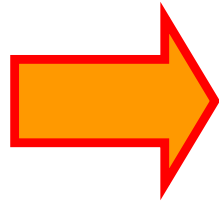


Fig 4 Reported Cases of Pertussis per 100,000 Population , by Age-group,



Pertussis Disease in Asia

- Recognized to be a public health problem however incidence of disease is largely unknown
 - Awareness of disease is highly variable, especially in adolescents and adults where disease is largely unrecognized
 - Diagnosis is almost exclusively made clinically
 - Laboratory methods for confirmation is very limited
 - Not a reportable disease in most Asian countries and reporting is voluntary
 - Surveillance systems either are not established or data collected is sparse
- Vaccine schedules differ among countries



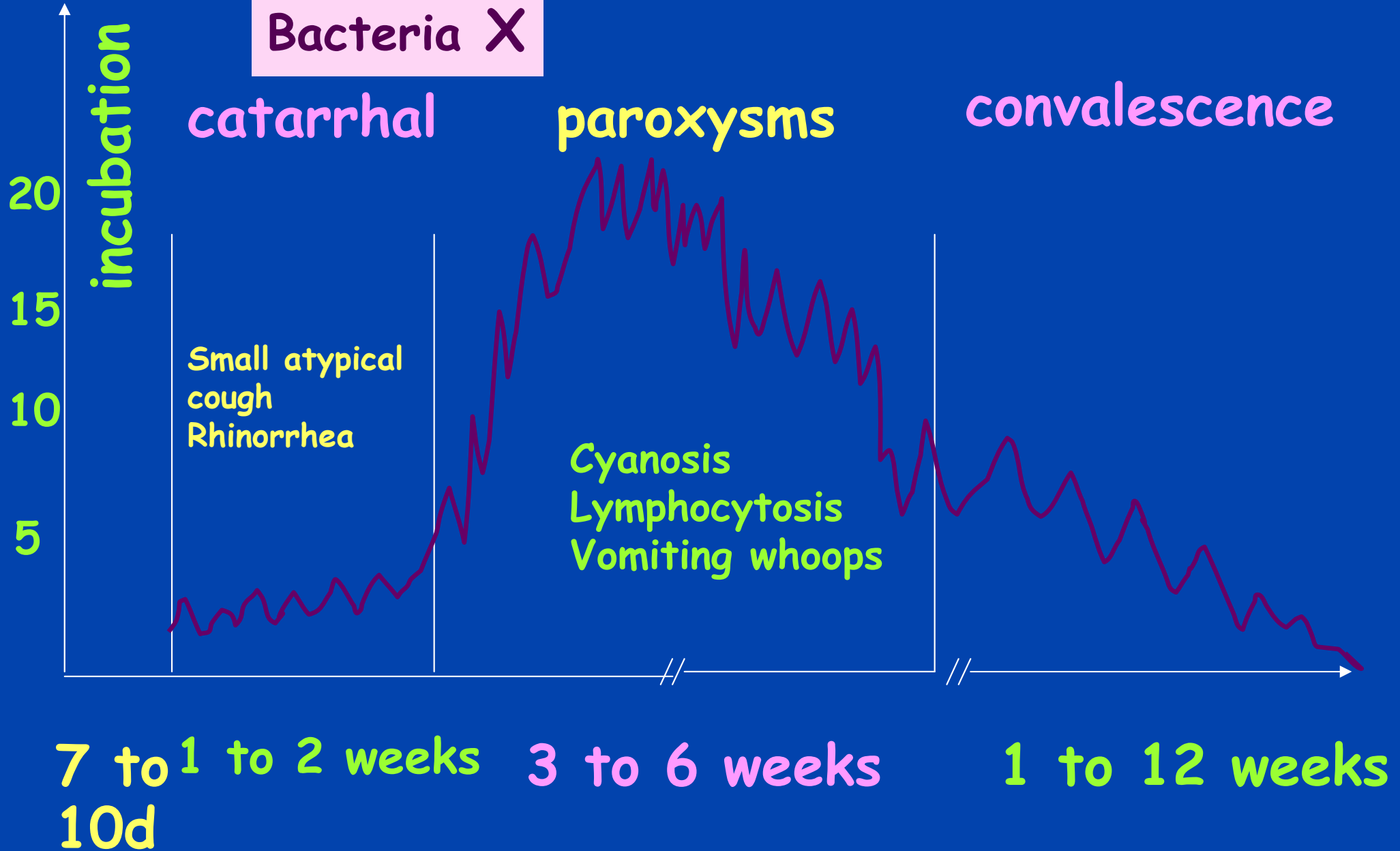
Clinical diagnosis

coughs

DNA detection

Antibodies detection

Bacteria X



**PERTUSSIS:
DIVERSITY OF CLINICAL
PRESENTATION**

**Different presentations
according to age**



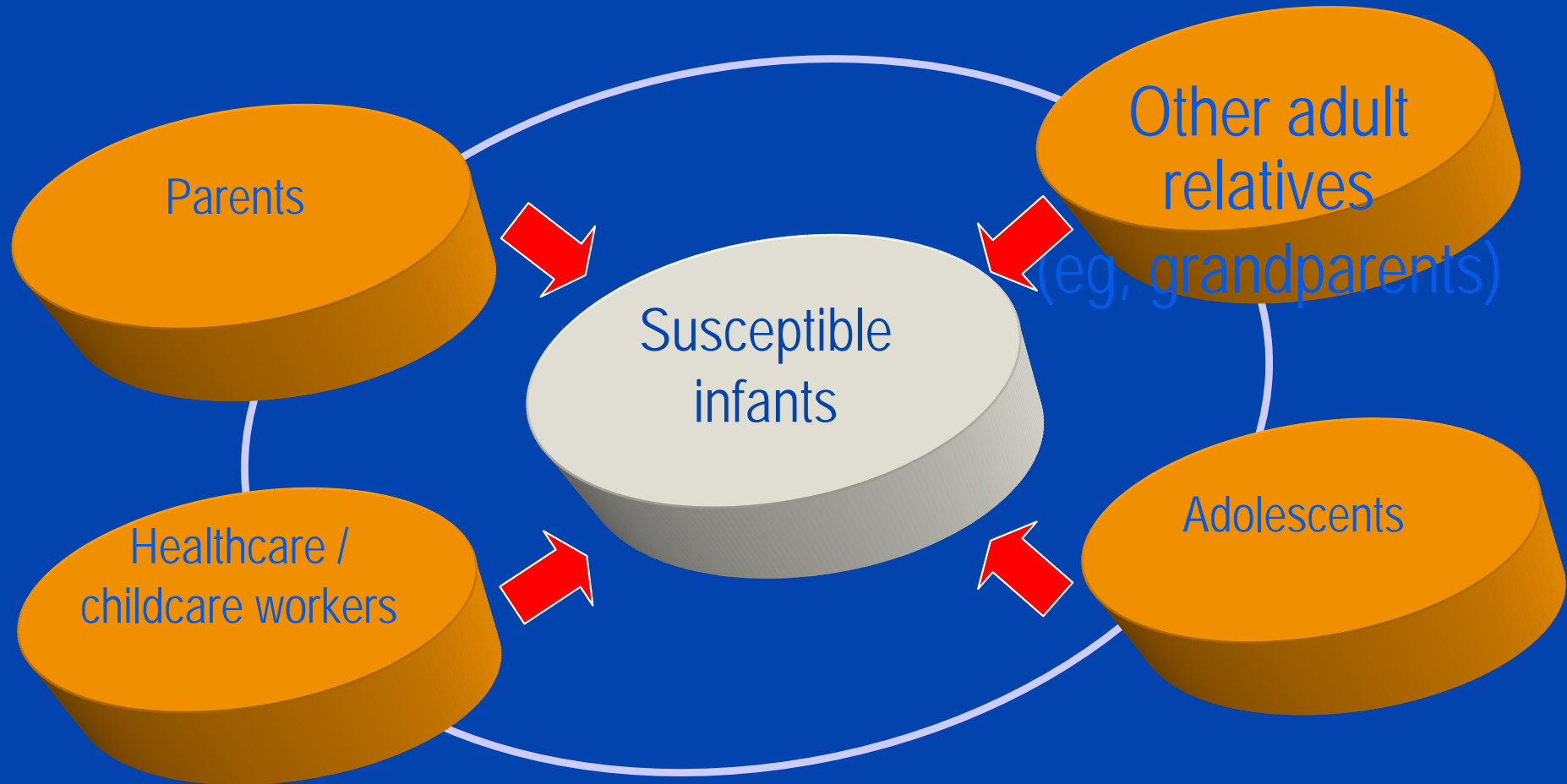
**Pertussis in
Infants is
Severe**

PERTUSSIS IN OLDER CHILDREN, ADOLESCENT & ADULTS

- **Problems in obtaining biological samples**
- **Biological diagnosis is necessary for effective surveillance system since clinical diagnosis can be atypical**
- **Detection of suspected cases in appropriate populations using appropriate techniques**

The global problem

Adolescents / adults a major source of B. pertussis infection for infants

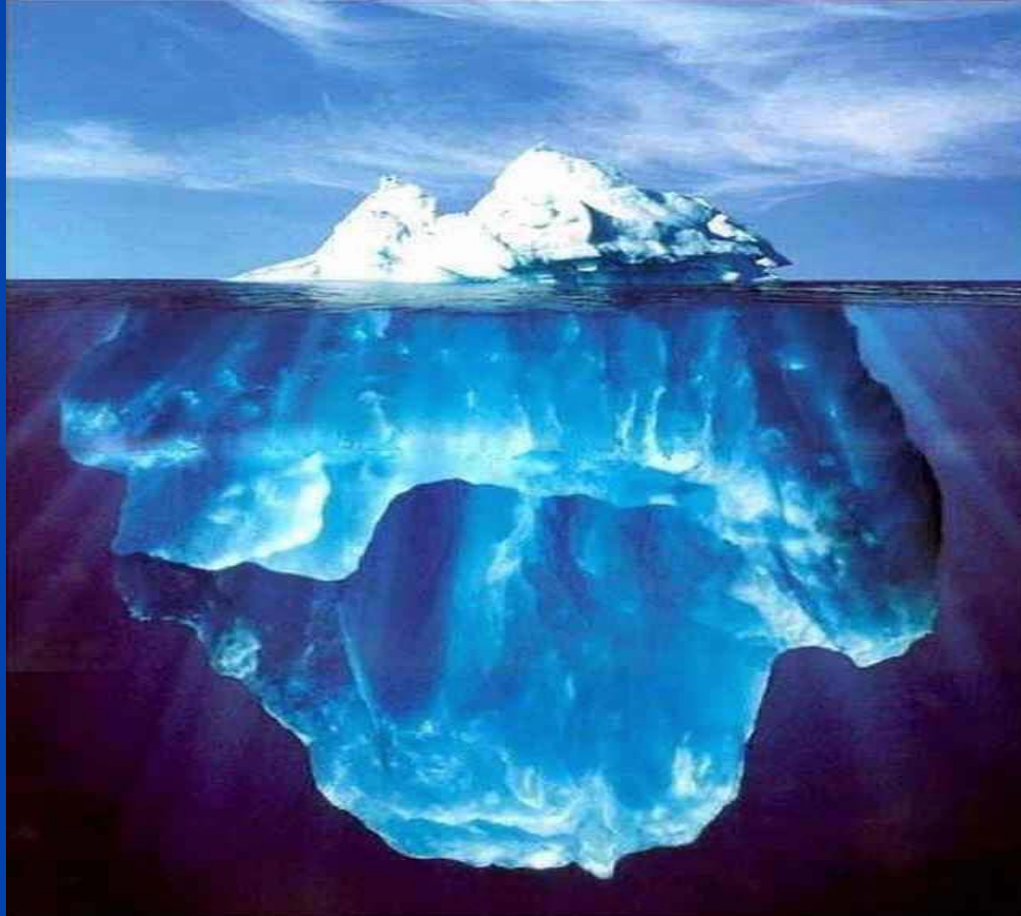


1. Baron et al, 1998
2. Cattaneo et al, 1996
3. Deen et al, 1995

4. Izurieta et al, 1996
5. Gehanno et al, 1999
6. Wirsing von König et al, 1998

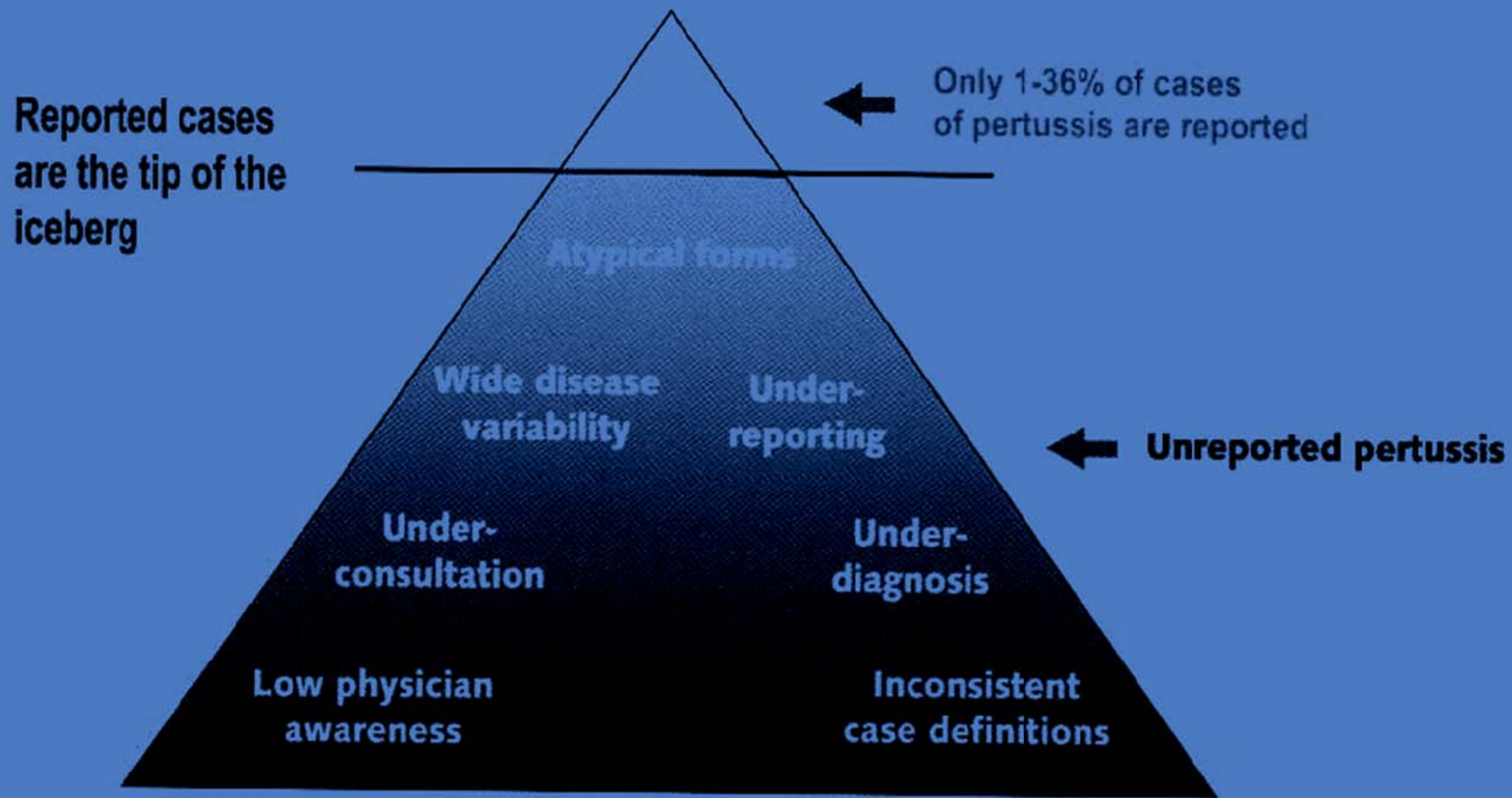
7. Bisgard, K. et al., 2004

The incidence of pertussis infection represent only the “tip of ice berge”



Reported infection could be up to **160-fold less** than actual infection¹

Reasons for under-reporting of pertussis ^{21,28}



TRUE PERTUSSIS PREVALENCE & ECONOMIC BURDEN

- **Not fully characterized both developed and developing countries**
- **The true prevalence determines the true economic cost**
- **Cost effectiveness of vaccine strategy can then be assessed**

PERTUSSIS SURVEILLANCE

- Only a small part of the burden of pertussis is captured by surveillance systems
- Health economics try to take into account the under-reporting, but there is no consensus on the best approach
- Consequently, the cost-effectiveness of the pertussis vaccination may be underestimated; in particular, for adolescents and young adults for whom under-reporting is the highest

IMPROVED PERTUSSIS SURVEILLANCE

- **Standardization of culture**
- **Standardization of real time PCR**
- **Serology: How to harmonize and standardize**



**G L O B A L
P E R T U S S I S
I N I T I A T I V E**

Global Pertussis Initiative

What are our aims?

To raise the profile of pertussis as an important and preventable disease that warrants greater global public health attention

To improve understanding of the increasing incidence of reported pertussis

To develop effective immunization strategies for pertussis control

The Global Problem

Increasing incidence in older age groups

- Age distribution of pertussis seems to have shifted toward older children, adolescents, and adults in countries with high vaccine coverage^{1,2}
 - Waning naturally induced and vaccine-induced immunity, and increased recognition, are thought to be responsible
- Pertussis illness in groups beyond the current immunization age range is a major public health concern
 - They represent important conduits of infection to infants
 - Infants not yet fully vaccinated are vulnerable to severe disease, complications, and mortality
 - The role of these groups as potentially major sources of infection for infants is widely under-recognized

1. Tan T et al, 2005

2. Schellekens J et al, 2005

The Global Problem

Improved clinical diagnosis of pertussis needed

- Several clinical case definitions for pertussis exist but lack consistency because
 - Pertussis expression is heterogeneous
 - Definitions are designed for application in various settings (vaccine efficacy vs epidemiology studies) in which varying degrees of specificity or sensitivity are required
- Standard clinical case definitions by the WHO¹ and US Centers for Disease Control and Prevention (CDC)² have been developed, but
 - These are not universally applied so inter-country comparisons and global evaluations are difficult
 - Many adolescent/adult cases may not comply with the WHO definition, which was designed for use in vaccine efficacy trials
- Standardized case definitions for typical/atypical disease are needed

1. WHO, 2001

2. CDC, 1997

The Global Problem

Improved laboratory diagnosis of pertussis ongoing

- Laboratory pertussis diagnosis has been hampered by problems such as insensitive tests and non-standardized laboratory diagnostic techniques
- Improvements are being made
- Use of PCR must be standardized and increased
 - Successful real time PCR utilized in UK and France^{1,2}
- Progress in standardizing immunoassays
 - CDC held an international meeting in July 07 to standardize pertussis immunoassays worldwide²
 - The WHO has proposed a characterized serum to be the first international standard for pertussis human antiserum³

1. Fry NK et al, 2009

2. Caro J et al, 2009

3. Tondella ML, 2009

4. Xing D et al, 2009

5. www.EUVAC.net

The Global Problem

Mortality due to pertussis in infants (I)

- Pertussis continues to be a serious health burden in infants
- Infants suffer the greatest mortality
 - Estimated to be 280,000-300,000 deaths worldwide yearly, mostly in infants^{1,2}
 - 90% in developing countries
 - In the US, pertussis deaths increased from the 1990s. During 1999 to 2004 there were 91 infant deaths³⁻⁵
- Infant deaths may be under-reported due to misdiagnoses^{6,7} such as
 - Other respiratory illnesses
 - Sudden infant death syndrome (SIDS)
 - Very young infants may present with apnea alone, without cough

1. Forsyth K et al, 2004

2. WHO, 2005

3. Greenberg D et al, 2005

4. Vitek CR et al, 2003

5. Haberling DL et al, 2009

6. Crowcroft NS et al, 2002

7. Crowcroft N, Pebody R, 2006

The Global Problem

Morbidity due to pertussis in infants (II)

- Morbidity due to pertussis is greatest in infants
 - Infants (<6 months) have the highest reported rate of pertussis (69.9 cases per 100,000 population) in the US¹
 - Complication and hospitalization rates highest in infants
- Complications are numerous²
 - Pulmonary
 - Pneumonia, apnea, bronchitis, emphysema
 - CNS
 - Seizures, encephalopathy, hemiplegia nystagmus
 - Non-CNS
 - Cyanosis, bradycardia, epistaxis, malnutrition, severe weight loss

1. CDC, 2009

2. Greenberg D et al, 2005

Morbidity in adolescents and adults

- Pertussis is a health burden in adolescents and adults¹⁻³
- In these age groups:
 - Clinical manifestations often atypical (limited to mild cough or severe, persistent cough)^{4,5}
 - Symptoms sometimes typical (paroxysmal cough, post-tussive vomiting, inspiratory effort and whoop)^{6,7}
 - Pertussis causes a significant proportion of chronic cough illness⁶
 - Complications of pertussis may be frequent^{8,9}
- Hospitalization is highest for infants but is not infrequent among adolescents and adults^{10,11}
- Pertussis has an indirect burden on adults caring for a child with pertussis¹²

1. Cherry, 1999
2. Yih et al, 2000
3. Mertens et al, 1999
4. Aoyama et al, 1992

5. Yaari et al, 1999
6. Thomas et al, 2000
7. Rosenthal et al, 1995
8. Postels-Multani et al, 1995

9. Skowronski et al, 2003
10. Yih et al, 2000
11. Gil et al, 2001
12. Lee & Pichichero, 2000

Immunization strategies evaluated by the GPI

- Universal immunization of adults
- Selective immunization of new mothers, family, and close contacts of newborns
- Selective immunization of healthcare and childcare workers
- Universal immunization of adolescents
- Fourth or fifth booster dose for all pre-school children (4–6 years of age)
- Reinforce and/or improve current infant and toddler immunization strategies

Global Pertussis Initiative

Summary and conclusions

- The Global Pertussis Initiative is a large and in-depth process
 - 35 members from 16 countries; wide range of expertise
- The consensus was that pertussis is a global problem
 - Endemic, even in countries with high vaccine coverage
 - Under-recognized and under-reported
 - Pertussis in infants is a serious and growing public health concern
 - Pertussis poses a significant health burden in adolescents and adults, in whom it is increasingly recognized
 - Adolescents and adults are particularly of concern because they are sources of infection for unimmunized or incompletely immunized infants
- 2006-2008, GPI regional meetings to discuss problems and implementation of recommendations at a local level

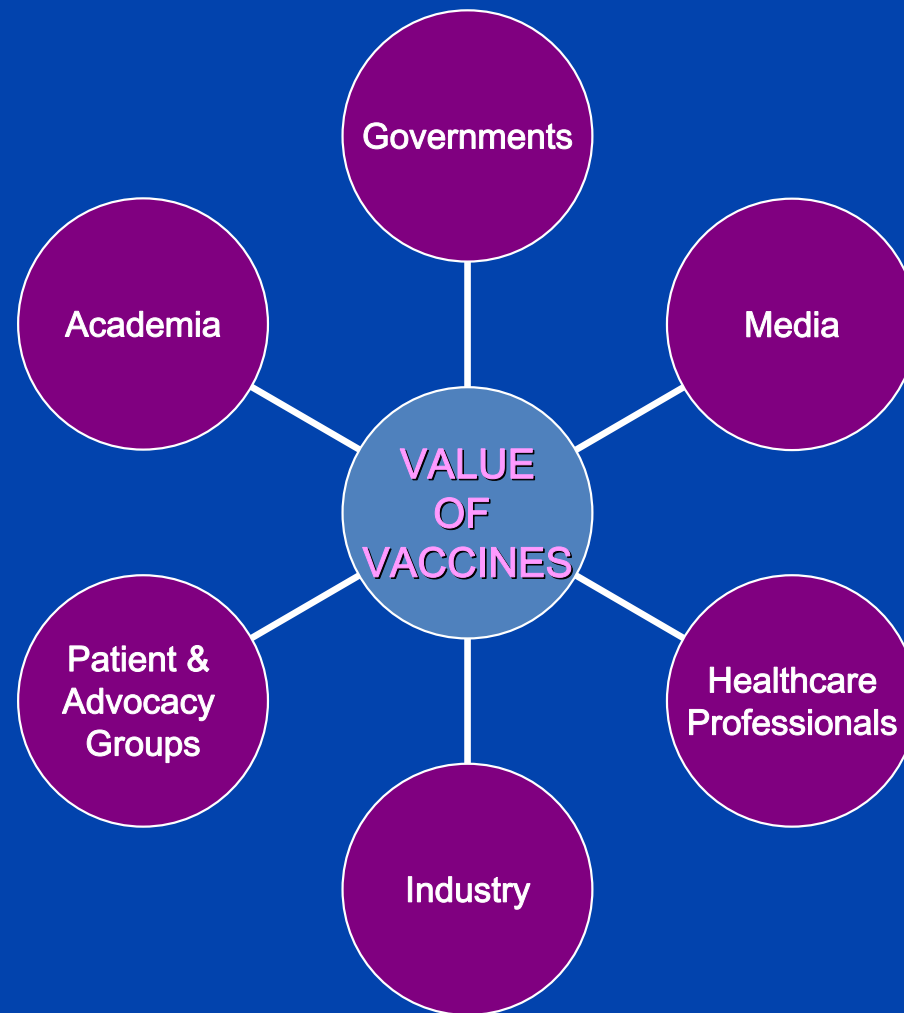
IPA MILLENNIUM CALL TO ACTION 2005-2015

- **MDG 1: Eradicate extreme poverty & hunger**
- **MDG 2: Achieve universal primary education**
- **MDG 3: Promote gender equality & empower women**
- **MDG 4: Reduce child mortality**
- **MDG 5: Improve maternal health**
- **MDG 6: Combat HIV/AIDS, malaria, & other diseases**
- **MDG 7: Ensure environmental sustainability**
- **MDG 8: Develop a global partnership for development**

MDG 4: REDUCE CHILD MORTALITY

- Address the major causes of under five & infant mortality
- Newborn survival and health
- Promote cost effective interventions to the major causes of child mortality
- **Childhood vaccination**

SUCCESS RELIES ON PARTNERSHIPS



All stakeholders have a role to play

CONCLUSION

We all acknowledge the role of vaccination in the control and prevention of childhood illnesses that claim the lives of millions of children each year especially children of the developing countries.

The value of vaccination should be focused as one of the tools that will contribute to the achievement of the 4th Millennium Development Goal.

Welcome to Thailand in October 2011 for the 9th International Congress of Tropical Pediatrics



Theme

“Global Partnerships and Networking for Child Health”



THANK YOU

