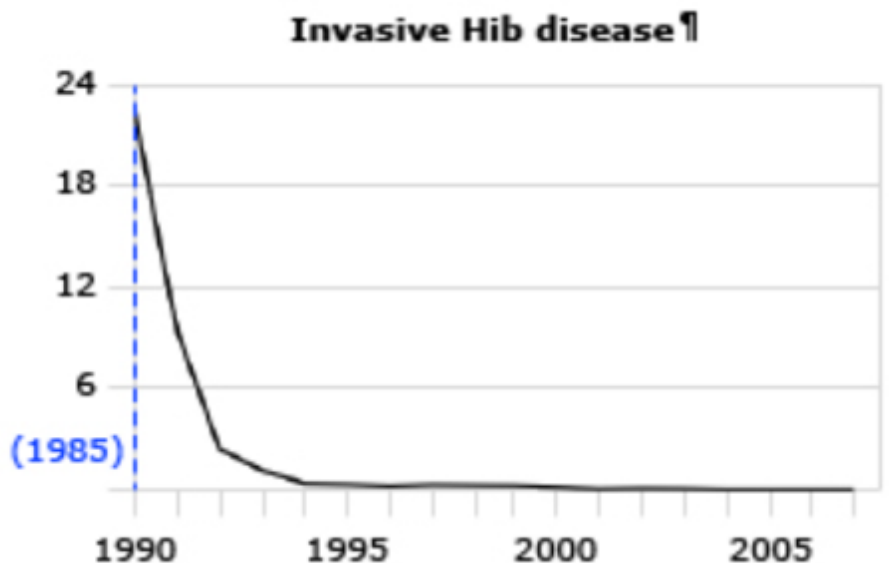
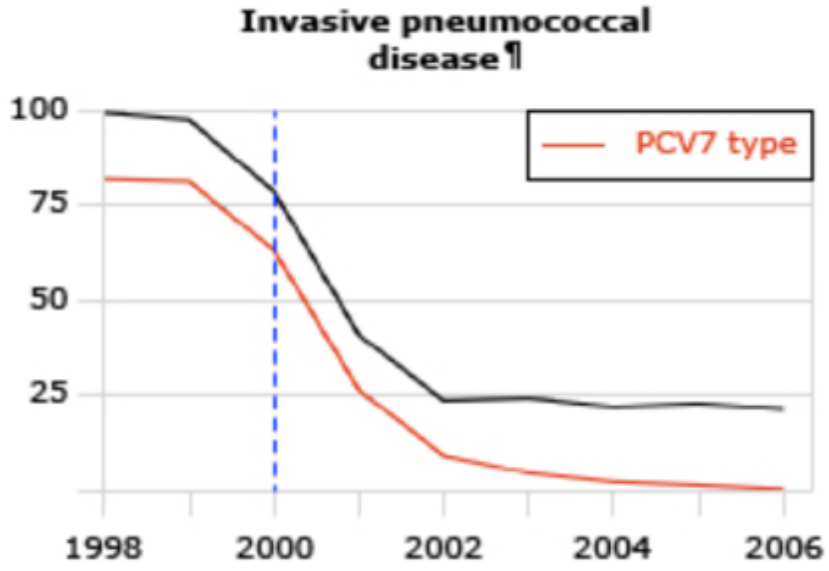
AŞILARLA AŞAMADIKLARIMIZ

MENENJİT, DİFTERİ, BOĞMACA

Dr. Anıl Aktaş Tapısız





Bağışıklama en etkili koruyucu sağlık önlemlerinden biridir

Bağışıklama

- Aşılama programları, **aşılanmış bireye doğrudan fayda** sağlar

- Ayrıca **toplum ("sürü") bağışıklığı** yoluyla **aşılanmamış kişilere de dolaylı olarak fayda sağlar**

Toplum Bağışıklığı

- Enfeksiyona karşı **bağışık olan nüfus oranının, duyarlı kişiler arasında bulaşma riskini azaltacak kadar büyük olması** durumunda ortaya çıkar

- **Nüfusun çoğunluğunun rutin olarak önerilen aşıları alması önemlidir**

- **Kapsayıcılığın yüksek oranda sürdürülmesi ile doğru orantıldır**

Ulusal Çocukluk Dönemi Aşılama Takvimi (2025)

	DOĞUM	2. AY SONU	4. AY SONU	6. AY SONU	9. AY SONU	12. AY SONU	18. AY SONU	24. AY SONU	48. AY	13 YAŞ
Hep-B	I									
BCG		I								
KPA		I	II			RAPEL				
DaBT - İPA- Hib - HepB		I	II	III			RAPEL			
OPA				I			II			
Suçiçeği						I				
KKK					EK DOZ	I			II	
Hep-A							I	II		
DaBT-İPA									RAPEL	
Td										RAPEL

- Hep-B: Hepatit B Aşısı
- BCG: Verem Aşısı
- KPA: Konjuge Pnömokok Aşısı
- DaBT-İPA-Hib-HepB: Difteri, asellüler Boğmaca, Tetanos, inaktif Polio, Hemofilus influenza tip b, Hepatit B Aşısı
- OPA: Oral Polio Aşısı
- KKK: Kızamık, Kızamıkçık, Kabakulak Aşısı
- Hep-A: Hepatit A Aşısı
- Td: Erişkin Tetonos difteri Aşısı
- Rapel: Pekiştirme Doz Aşısı

Aşı Detayları için QR Kodu Okutunuz

ERİŞKİN DÖNEMİ AŞI UYGULAMALARI

TÜRKİYE CUMHURİYETİ SAĞLIK BAKANLIĞI

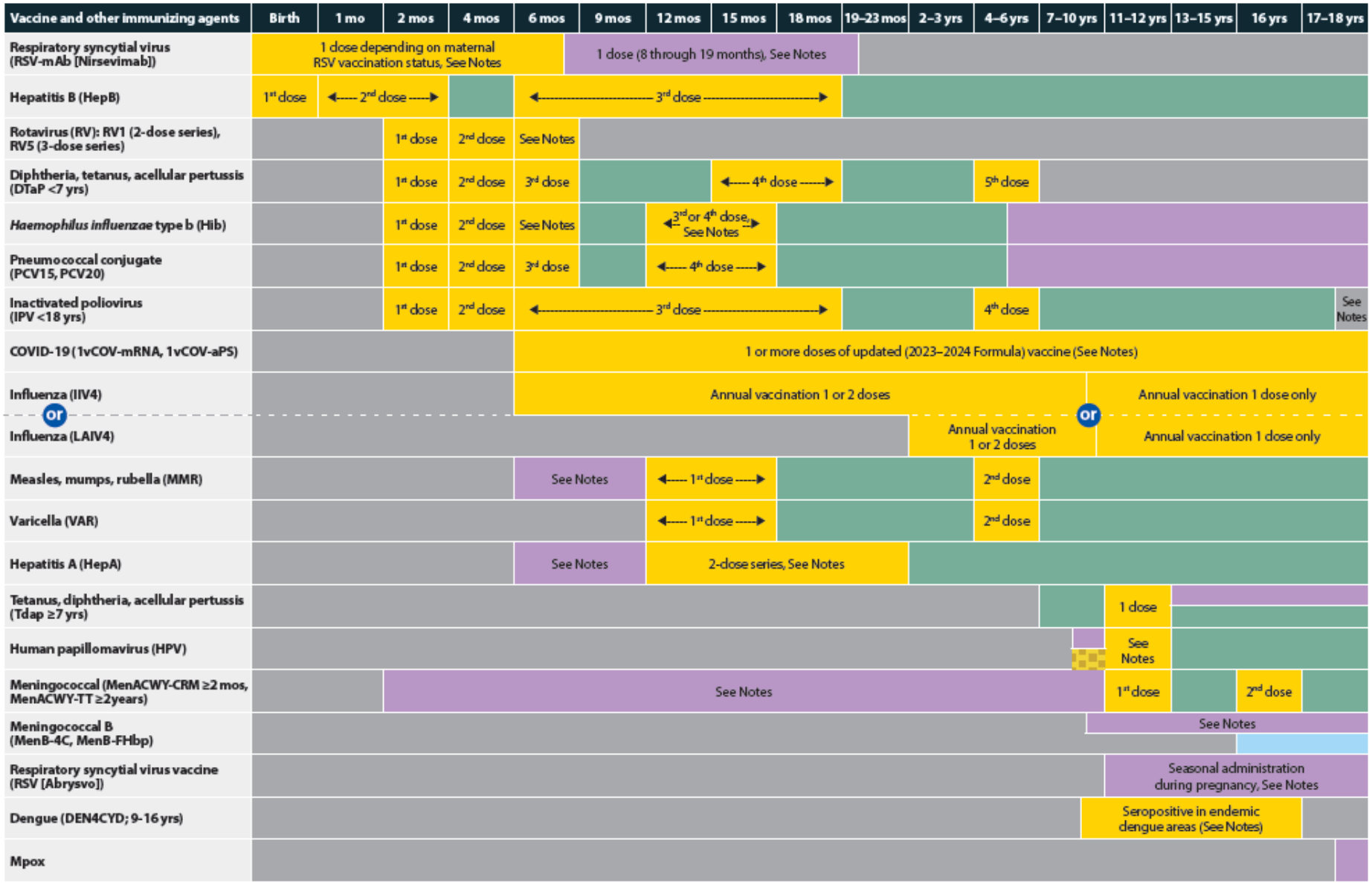
Sağlıklı Erişkinlere Önerilen Aşılar	Risk Grubunda Yer Alan Erişkinlere Önerilen Aşılar
> Td: Erişkin Tetanos difteri	> Hepatit B > Hepatit A > Pnömokok > Grip > Meningokok > Suçiçeği > KKK: Kızamık, Kızamıkçık, Kabakulak
GEBELER	
> Tdab: Erişkin Tetanos, difteri, asellüler boğmaca > Td: Erişkin Tetanos difteri > Grip	
65 YAŞ ve ÜZERİ	
> Pnömokok > Grip	

Bilgi için doktorunuza başvurunuz.

asi.saglik.gov.tr

Table 1 Recommended Child and Adolescent Immunization Schedule for Ages 18 Years or Younger, United States, 2024

These recommendations must be read with the notes that follow. For those who fall behind or start late, provide catch-up vaccination at the earliest opportunity as indicated by the green bars.
To determine minimum intervals between doses, see the catch-up schedule (Table 2).



Önerilen aşılama programlarına ve aşılama zamanlamasına uyulması yaşamı tehdit eden hastalıklara karşı savunmada temeldir

Menenjit

- İnsan yaşamını tehdit eden en ciddi enfeksiyonlardan biridir
- Tedavisiz bırakıldığında ölümcül ve sekellerle seyreder

Aşı ile Korunulabilen Bakteriyel Menenjit Etkenleri

- *Streptococcus pneumoniae*
- *Neisseria meningitidis*
- *Haemophilus influenzae*

**Sıklık yaşa, altta yatan risk faktörlerine ve coğrafik bölgeye göre değişir

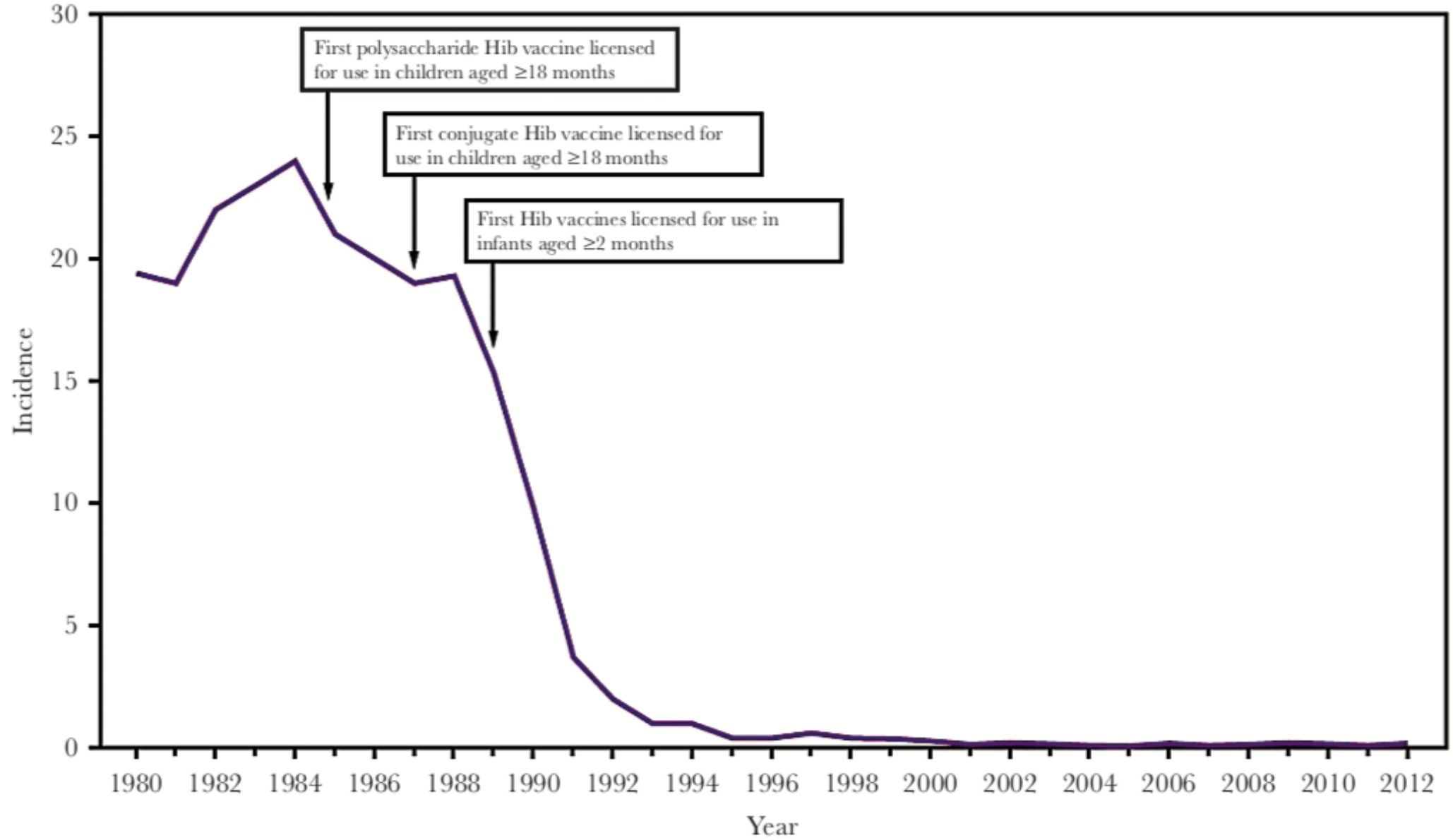
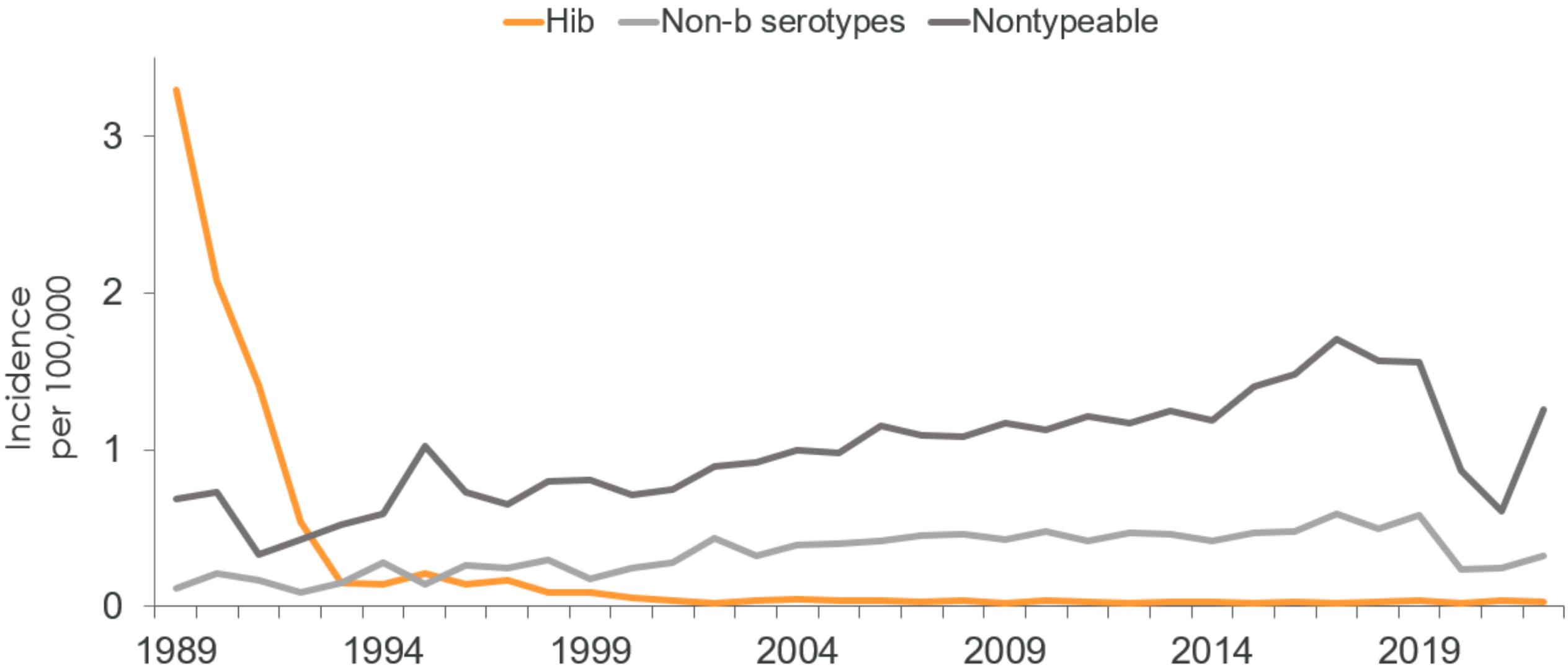
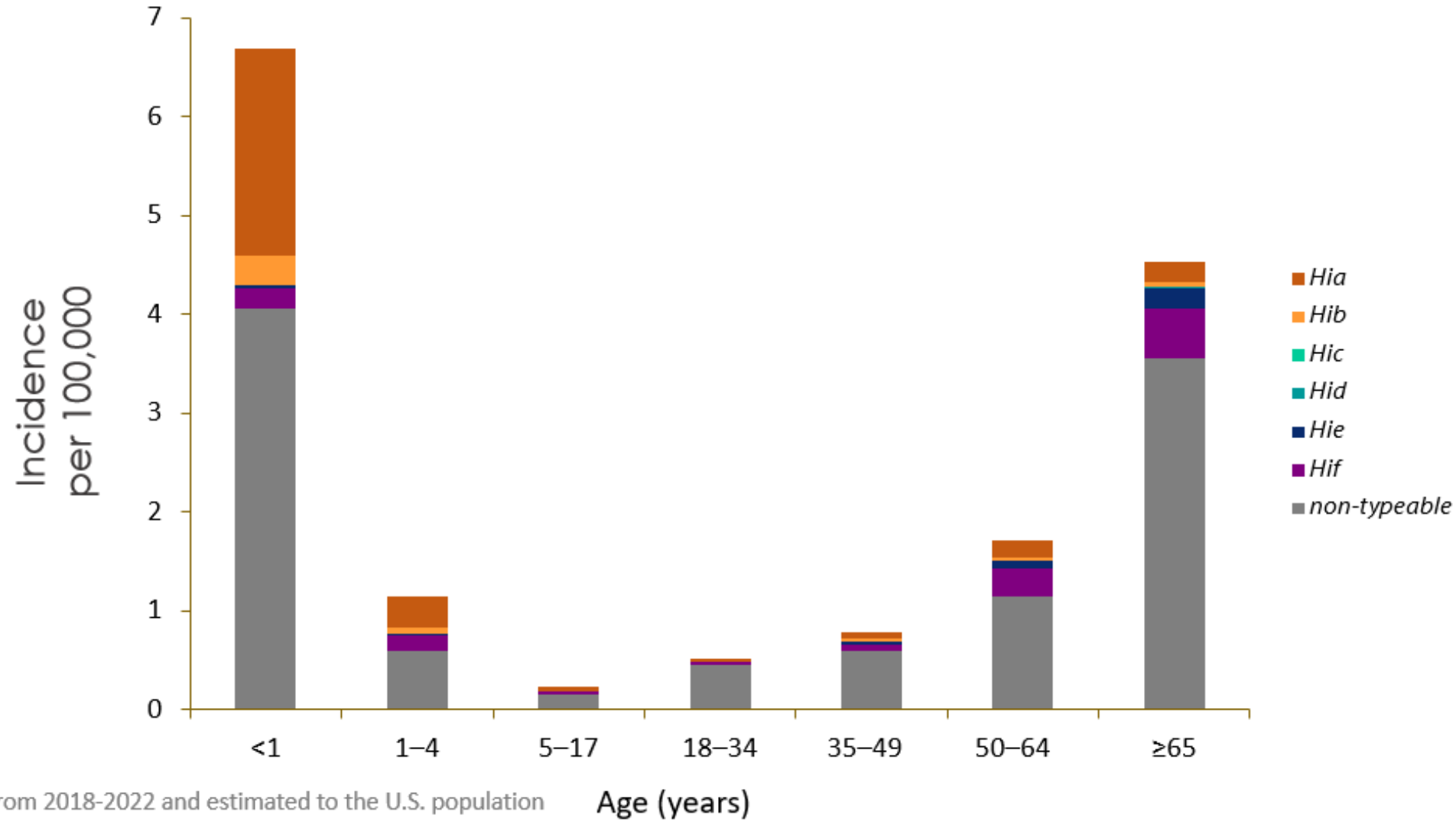


Figure 1. Impact of *Haemophilus influenzae* type b (Hib) vaccines on incidence per 100 000 children <5 years old in the United States, 1980–2012 [29].

Incidence of invasive *H. influenzae* disease, United States



Estimated U.S. incidence of invasive *H. influenzae* disease by age group and serotype



ABCs cases from 2018-2022 and estimated to the U.S. population

*2022 data are preliminary

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REVIEW

Invasive *Haemophilus influenzae* Infections after 3 Decades of Hib Protein Conjugate Vaccine Use

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[f]Medical Research Council Unit, The Gambia at LSHTM, Fajara, The Gambia
[g]Murdoch Children's Research Institute, Parkville, Victoria, Australia
[h]Medical Sciences Division, Northern Ontario School of Medicine, Lakehead University, Thunder Bay, Ontario, Canada

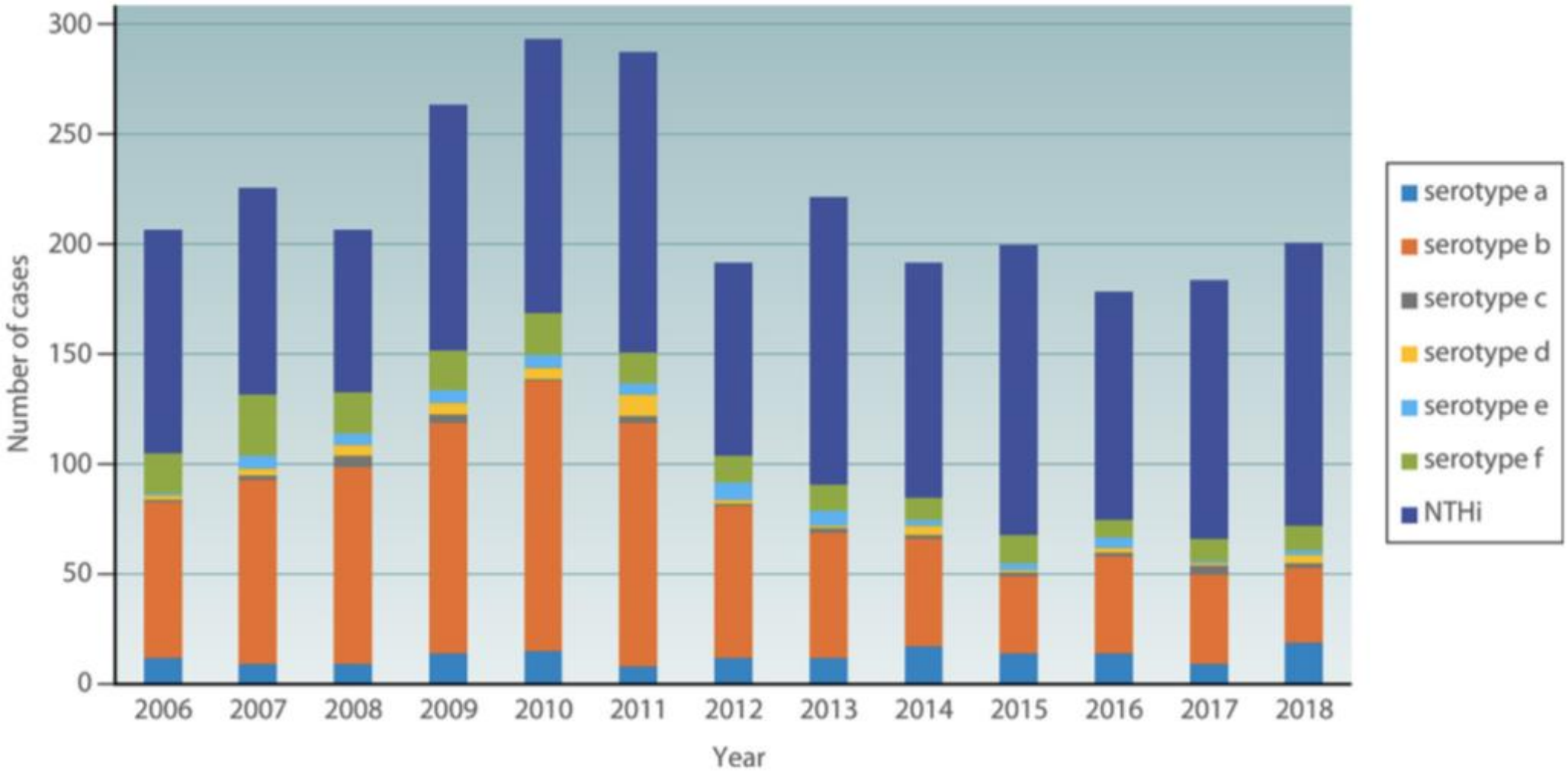

FIG 5 Number of cases of invasive *Haemophilus influenzae* infection, by serotype, reported to National Institute of Communicable Diseases (NICD), South Africa, 2006 to 2018 (from GERMS-SA Annual Reports, 2006 to 2018, with permission from Anne von Gottberg, NICD, Johannesburg, South Africa) (139, 227–237).

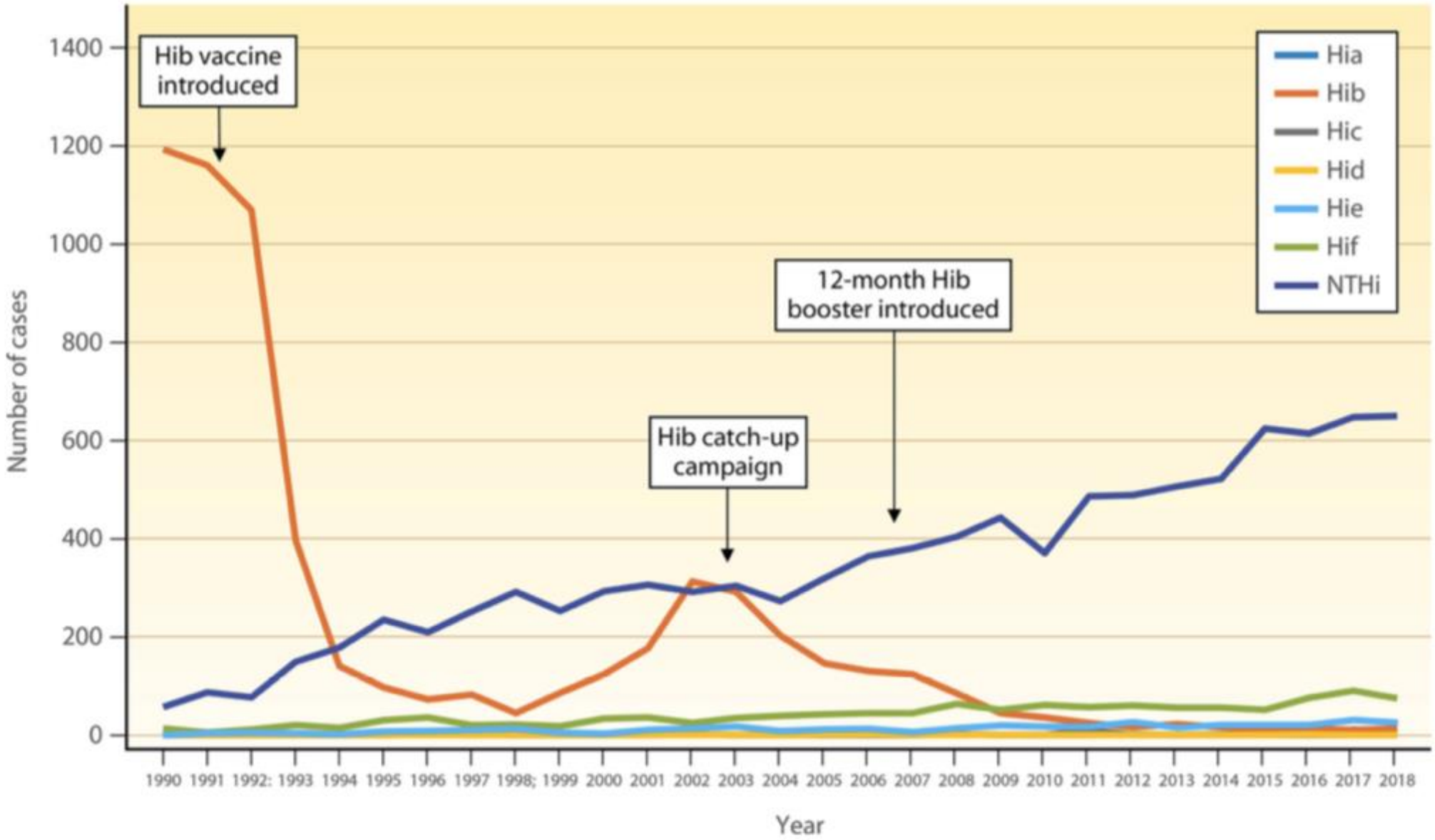

FIG 4 Number of cases of invasive *Haemophilus influenzae* infections in England, 1990 to 2018, by serotype (unpublished data from Public Health England, with permission from Shamez Ladhani).

Global, regional, and national burden of meningitis and its aetiologies, 1990–2019: a systematic analysis for the Global Burden of Disease Study 2019

*GBD 2019 Meningitis and Antimicrobial Resistance Collaborators**

Summary

Background Although meningitis is largely preventable, it still causes hundreds of thousands of deaths globally each year. WHO set ambitious goals to reduce meningitis cases by 2030, and assessing trends in the global meningitis burden can help track progress and identify gaps in achieving these goals. Using data from the Global Burden of Diseases, Injuries, and Risk Factors Study (GBD) 2019, we aimed to assess incident cases and deaths due to acute infectious meningitis by aetiology and age from 1990 to 2019, for 204 countries and territories.

Methods We modelled meningitis mortality using vital registration, verbal autopsy, sample-based vital registration, and mortality surveillance data. Meningitis morbidity was modelled with a Bayesian compartmental model, using data from the published literature identified by a systematic review, as well as surveillance data, inpatient hospital admissions, health insurance claims, and cause-specific meningitis mortality estimates. For aetiology estimation, data from multiple causes of death, vital registration, hospital discharge, microbial laboratory, and literature studies were analysed by use of a network analysis model to estimate the proportion of meningitis deaths and cases attributable to the following aetiologies: *Neisseria meningitidis*, *Streptococcus pneumoniae*, *Haemophilus influenzae*, group B *Streptococcus*, *Escherichia coli*, *Klebsiella pneumoniae*, *Listeria monocytogenes*, *Staphylococcus aureus*, viruses, and a residual other pathogen category.

Findings In 2019, there were an estimated 236 000 deaths (95% uncertainty interval [UI] 204 000–277 000) and 2·51 million (2·11–2·99) incident cases due to meningitis globally. The burden was greatest in children younger than 5 years, with 112 000 deaths (87 400–145 000) and 1·28 million incident cases (0·947–1·71) in 2019. Age-standardised mortality rates decreased from 7·5 (6·6–8·4) per 100 000 population in 1990 to 3·3 (2·8–3·9) per 100 000 population in 2019. The highest proportion of total all-age meningitis deaths in 2019 was attributable to *S pneumoniae* (18·1% [17·1–19·2]), followed by *N meningitidis* (13·6% [12·7–14·4]) and *K pneumoniae* (12·2% [10·2–14·3]). Between 1990 and 2019, *H influenzae* showed the largest reduction in the number of deaths among children younger than 5 years (76·5% [69·5–81·8]), followed by *N meningitidis* (72·3% [64·4–78·5]) and viruses (58·2% [47·1–67·3]).

Interpretation Substantial progress has been made in reducing meningitis mortality over the past three decades. However, more meningitis-related deaths might be prevented by quickly scaling up immunisation and expanding access to health services. Further reduction in the global meningitis burden should be possible through low-cost multivalent vaccines, increased access to accurate and rapid diagnostic assays, enhanced surveillance, and early treatment.

Lancet Neurol 2023; 22: 685–711

See Comment page 646

*Collaborators are listed at the end of the Article

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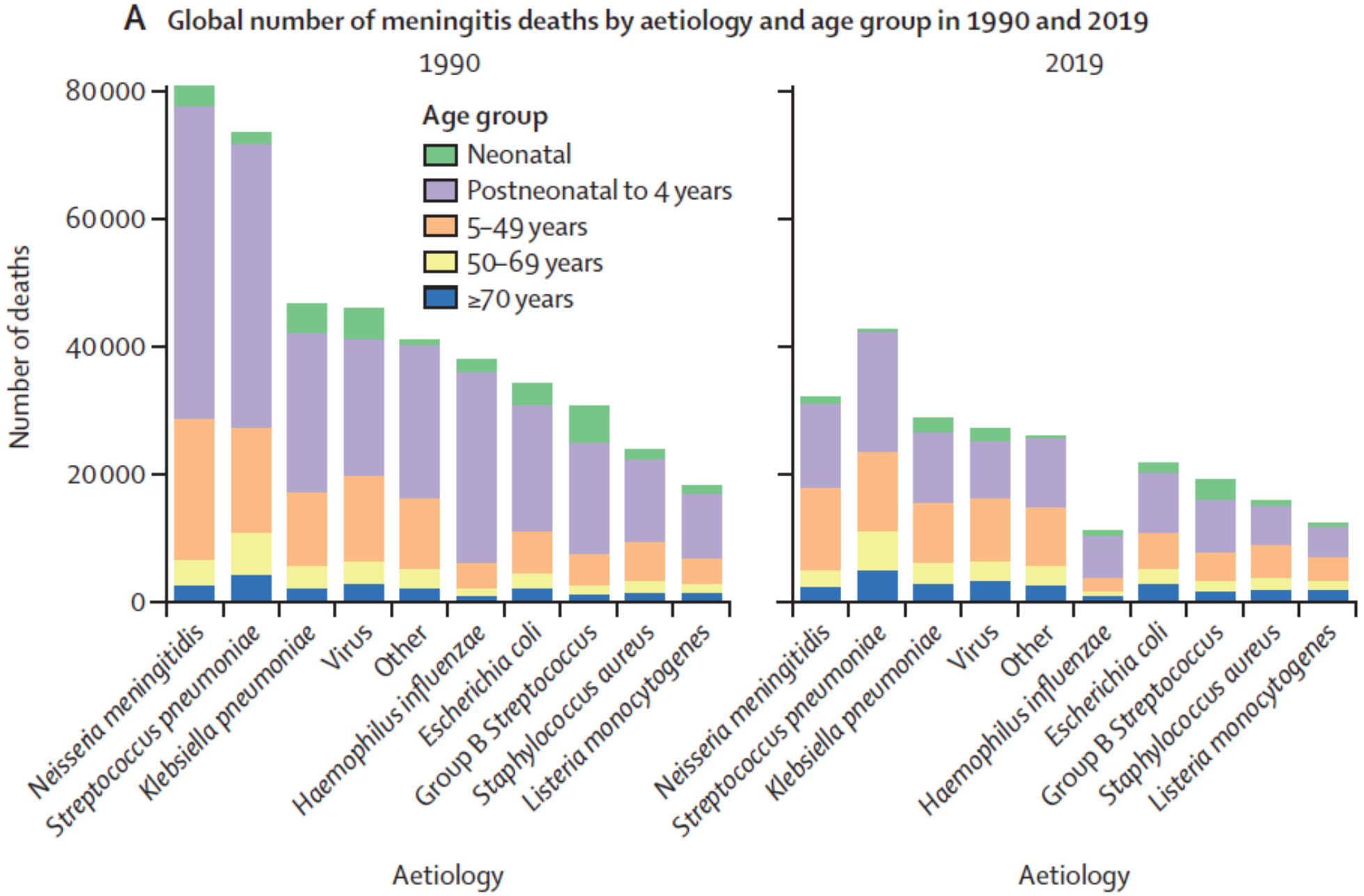
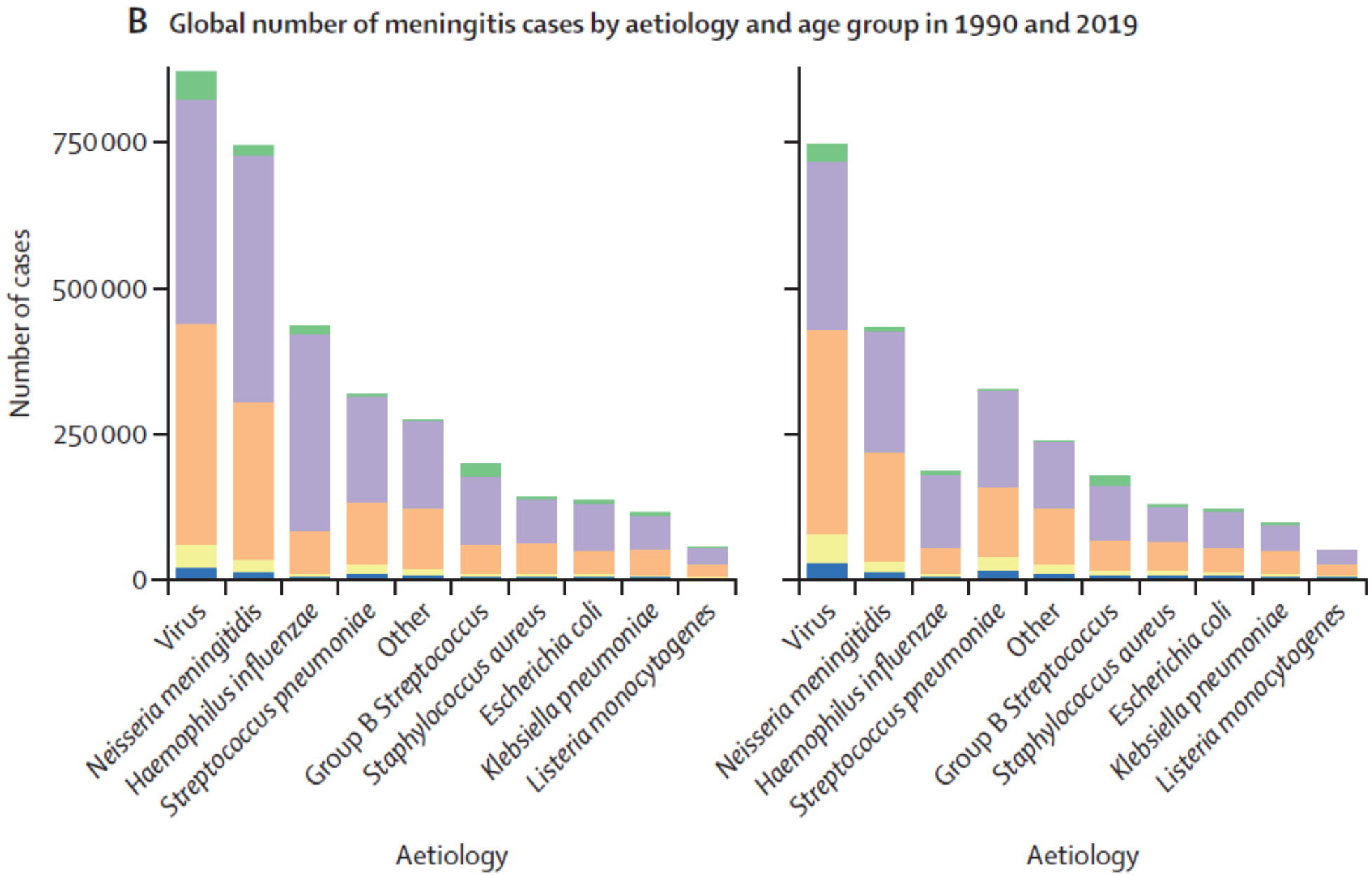
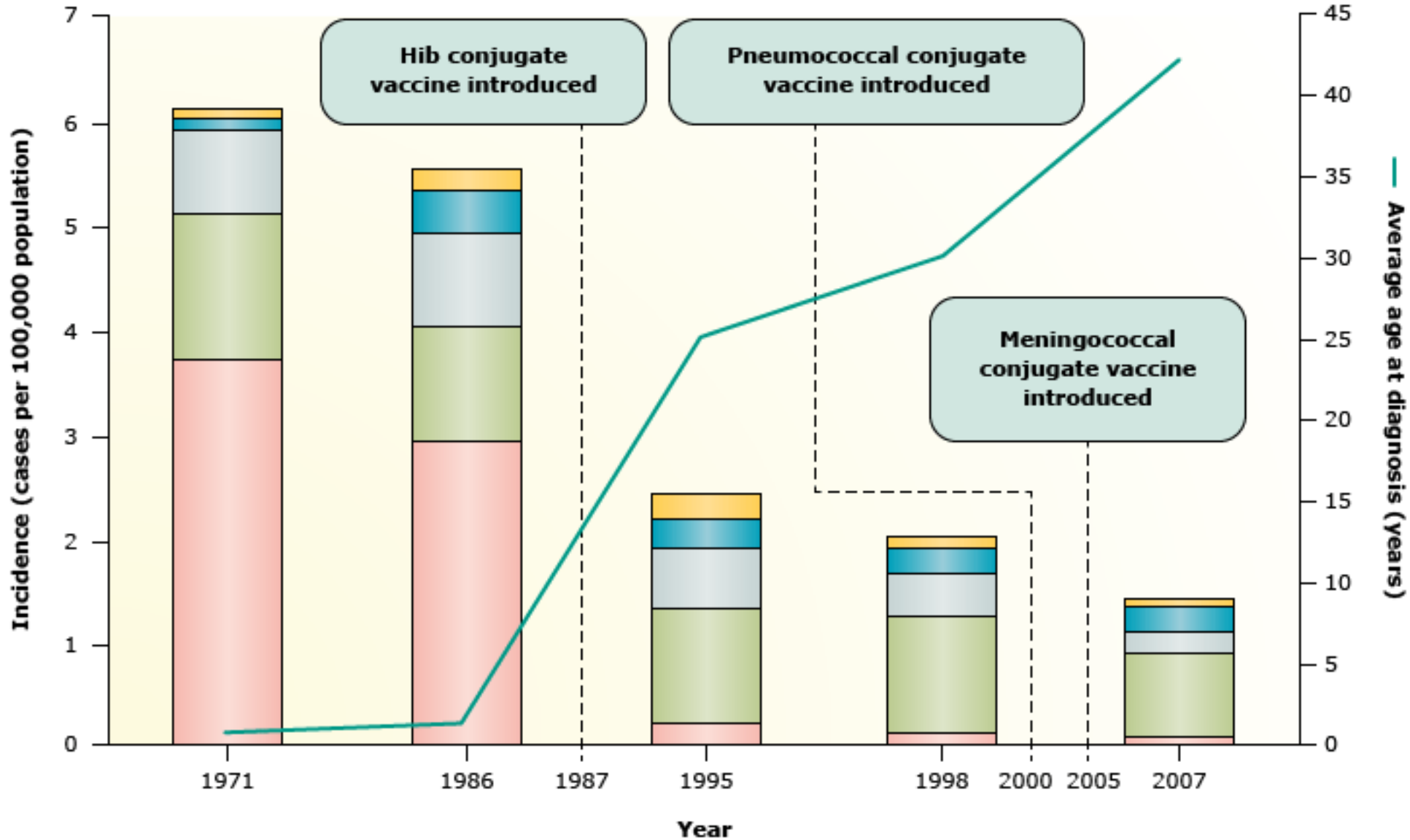


Tüm menenjit etkenlerine bağlı ölümlerde her yaşta azalma var


B Global number of meningitis cases by aetiology and age group in 1990 and 2019
Number of cases
750000
500000
250000
0
Virus
Neisseria meningitidis
Haemophilus influenzae
Streptococcus pneumoniae
Other
Group B Streptococcus
Staphylococcus aureus
Escherichia coli
Klebsiella pneumoniae
Listeria monocytogenes
Aetiology
Aetiology



Ortanca yaş <5 yaştan 30-40 yaşa kaymış, insidans <2 aylık bebeklerde en yüksek olmaya devam ediyor

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Bacteria and Bacterial Diseases

Global impact of 10- and 13-valent pneumococcal conjugate vaccines on pneumococcal meningitis in all ages: The PSERENADE project

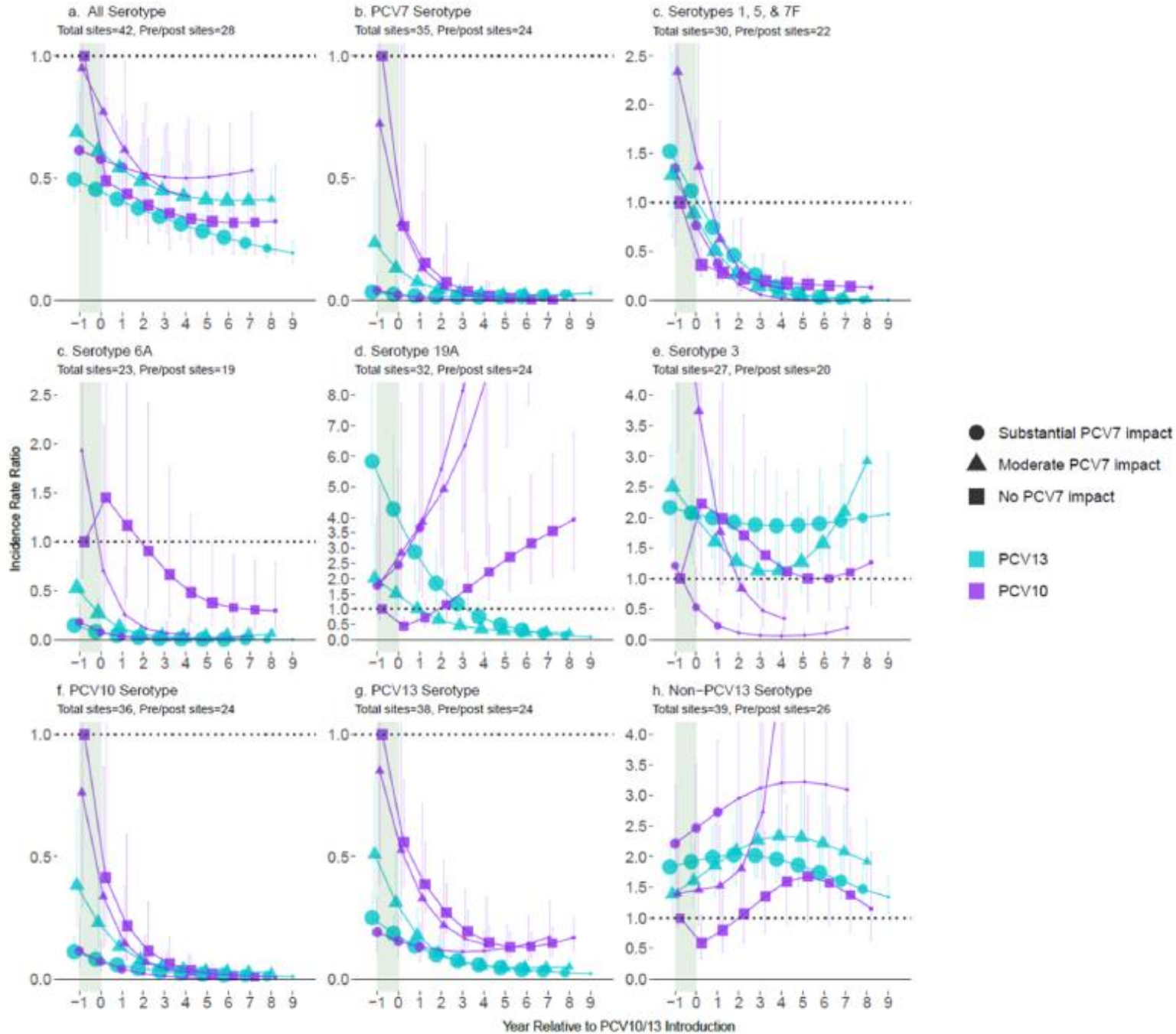
SUMMARY

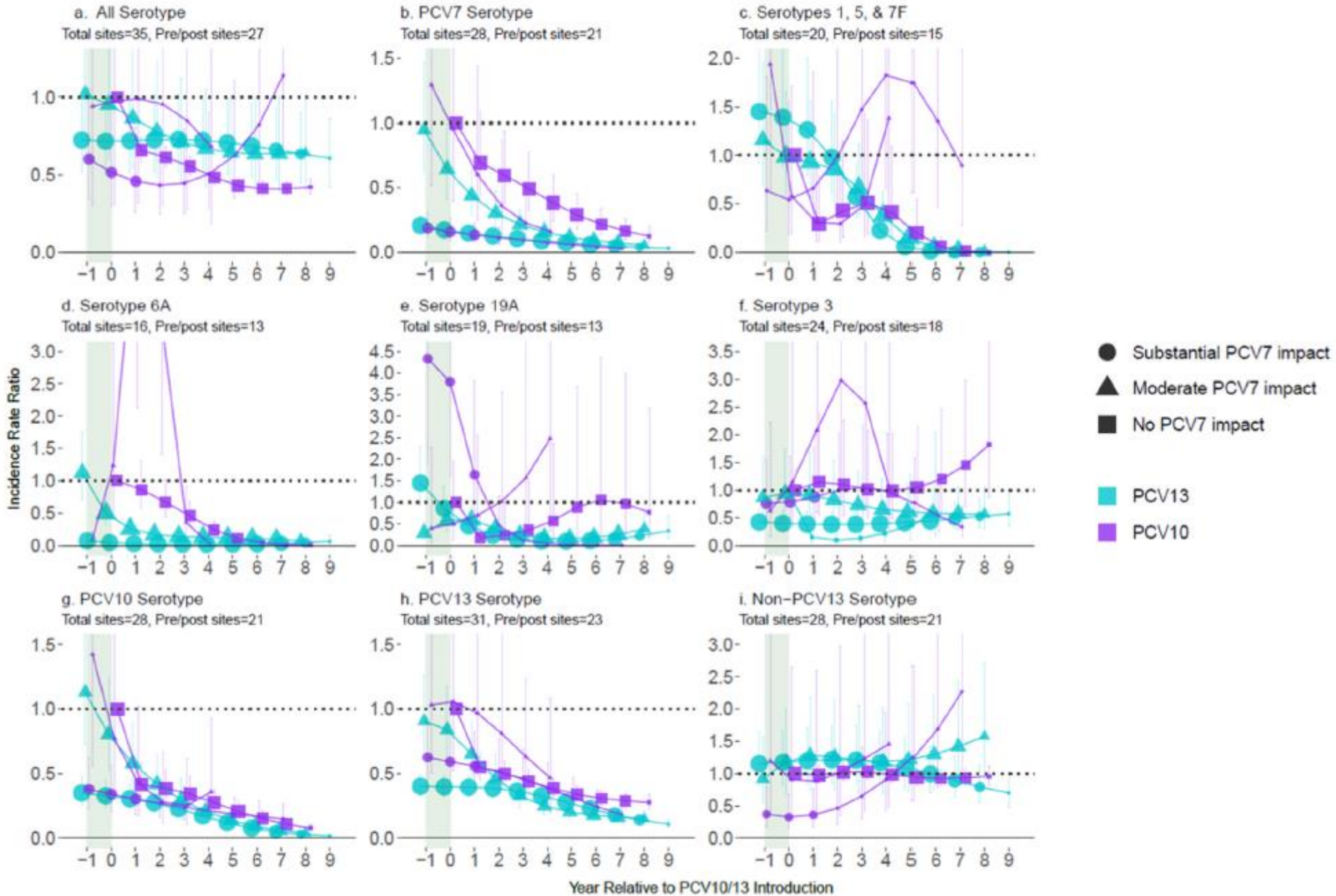
Background: Pneumococcal conjugate vaccines (PCVs) introduced in childhood national immunization programs lowered vaccine-type invasive pneumococcal disease (IPD), but replacement with non-vaccine-types persisted throughout the PCV10/13 follow-up period. We assessed PCV10/13 impact on pneumococcal meningitis incidence globally.

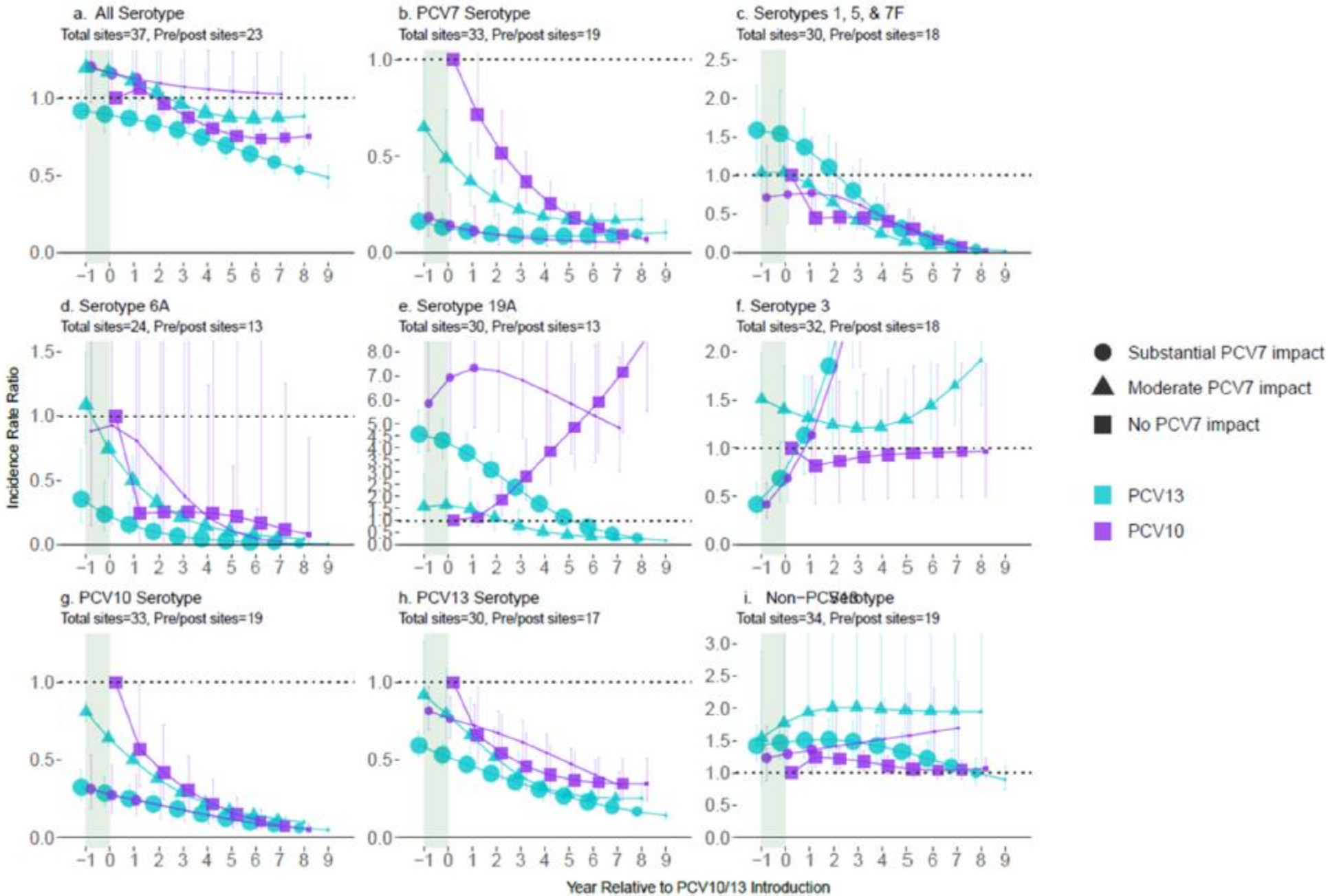
Methods: The number of cases with serotyped pneumococci detected in cerebrospinal fluid and population denominators were obtained from surveillance sites globally. Site-specific meningitis incidence rate ratios (IRRs) comparing pre-PCV incidence to each year post-PCV10/13 were estimated by age (< 5, 5–17 and ≥18 years) using Bayesian multi-level mixed effects Poisson regression, accounting for pre-PCV trends. All-site weighted average IRRs were estimated using linear mixed-effects regression stratified by age, product (PCV10 or PCV13) and prior PCV7 impact (none, moderate, or substantial). Changes in pneumococcal meningitis incidence were estimated overall and for product-specific vaccine-types and non-PCV13-types.

Results: Analyses included 10,168 cases < 5 y from PCV13 sites and 2849 from PCV10 sites, 3711 and 1549 for 5–17 y and 29,187 and 5653 for ≥18 y from 42 surveillance sites (30 PCV13, 12 PCV10, 2 PCV10/13) in 30 countries, primarily high-income (84%). Six years after PCV10/PCV13 introduction, pneumococcal meningitis declined 48–74% across products and PCV7 impact strata for children < 5 y, 35–62% for 5–17 y and 0–36% for ≥18 y. Impact against PCV10-types at PCV10 sites, and PCV13-types at PCV13 sites was high for all age groups (< 5 y: 96–100%; 5–17 y: 77–85%; ≥18 y: 73–85%). After switching from PCV7 to PCV10/13, increases in non-PCV13-types were generally low to none for all age groups.

Conclusion: Pneumococcal meningitis declined in all age groups following PCV10/PCV13 introduction. Plateaus in non-PCV13-type meningitis suggest less replacement than for all IPD. Data from meningitis belt and high-burden settings were limited.


a. All Serotype
Total sites=42, Pre/post sites=28
b. PCV7 Serotype
Total sites=35, Pre/post sites=24
c. Serotypes 1, 5, & 7F
Total sites=30, Pre/post sites=22
c. Serotype 6A
Total sites=23, Pre/post sites=19
d. Serotype 19A
Total sites=32, Pre/post sites=24
e. Serotype 3
Total sites=27, Pre/post sites=20
f. PCV10 Serotype
Total sites=36, Pre/post sites=24
g. PCV13 Serotype
Total sites=38, Pre/post sites=24
h. Non−PCV13 Serotype
Total sites=39, Pre/post sites=26
Incidence Rate Ratio
Year Relative to PCV10/13 Introduction
Substantial PCV7 impact
Moderate PCV7 impact
No PCV7 impact
PCV13
PCV10


a. All Serotype
Total sites=35, Pre/post sites=27
b. PCV7 Serotype
Total sites=28, Pre/post sites=21
c. Serotypes 1, 5, & 7F
Total sites=20, Pre/post sites=15
d. Serotype 6A
Total sites=16, Pre/post sites=13
e. Serotype 19A
Total sites=19, Pre/post sites=13
f. Serotype 3
Total sites=24, Pre/post sites=18
g. PCV10 Serotype
Total sites=28, Pre/post sites=21
h. PCV13 Serotype
Total sites=31, Pre/post sites=23
i. Non−PCV13 Serotype
Total sites=28, Pre/post sites=21
Incidence Rate Ratio
Year Relative to PCV10/13 Introduction
Substantial PCV7 impact
Moderate PCV7 impact
No PCV7 impact
PCV13
PCV10


a. All Serotype
Total sites=37, Pre/post sites=23
b. PCV7 Serotype
Total sites=33, Pre/post sites=19
c. Serotypes 1, 5, & 7F
Total sites=30, Pre/post sites=18
d. Serotype 6A
Total sites=24, Pre/post sites=13
e. Serotype 19A
Total sites=30, Pre/post sites=13
f. Serotype 3
Total sites=32, Pre/post sites=18
g. PCV10 Serotype
Total sites=33, Pre/post sites=19
h. PCV13 Serotype
Total sites=30, Pre/post sites=17
i. Non-PCV Serotype
Total sites=34, Pre/post sites=19
Incidence Rate Ratio
Year Relative to PCV10/13 Introduction
Substantial PCV7 impact
Moderate PCV7 impact
No PCV7 impact
PCV13
PCV10

Pnömokok Aşıları

- Pnömokokal menenjit insidansında <5 y %48-74, 5-17 y %35-62, ≥18 % 0-36 azalma

- Aşı serotiplerine bağlı menenjit insidansında belirgin azalma (<5 y %96-100, 5-17 y %77-85, ≥18 y %73-85) sağlamıştır

- PCV7'den PCV13'e geçildikten sonra tüm yaş gruplarında aşı dışı serotiplere bağlı menenjit insidansında hafif düzeyde bir artış olmuştur

Invasive Pneumococcal Disease in

TABLE 2 Sites of IPD for PCV13 Versus Non-PCV13 Serotype Isolates at 8 US Children's Hospitals, 2014–2017

Site of Infection	PCV13 Serotypes[a], *N* = 115, *n* (%)	Non-PCV13 Serotypes, *N* = 367, *n* (%)
Bacteremia	25 (21.7)	182 (49.6)
Pneumonia	50 (43.5)	69 (18.8)
Meningitis	12 (10.4)	70 (19.1)
Mastoiditis	22 (19.1)	12 (3.3)
Bone and joint	2 (1.7)	18 (4.9)
Peritonitis	0 (0)	4 (1.1)
Other[b]	4 (3.5)	12 (3.3)

ABD'de 13 valan aşı sonrası İPH tespit edilen çocuklardan izole edilen suş dağılımı menenjit vakalarının halen %10.4'ü aşı serotipi, %19.1'i aşı dışı serotipler olarak bulunmuştur

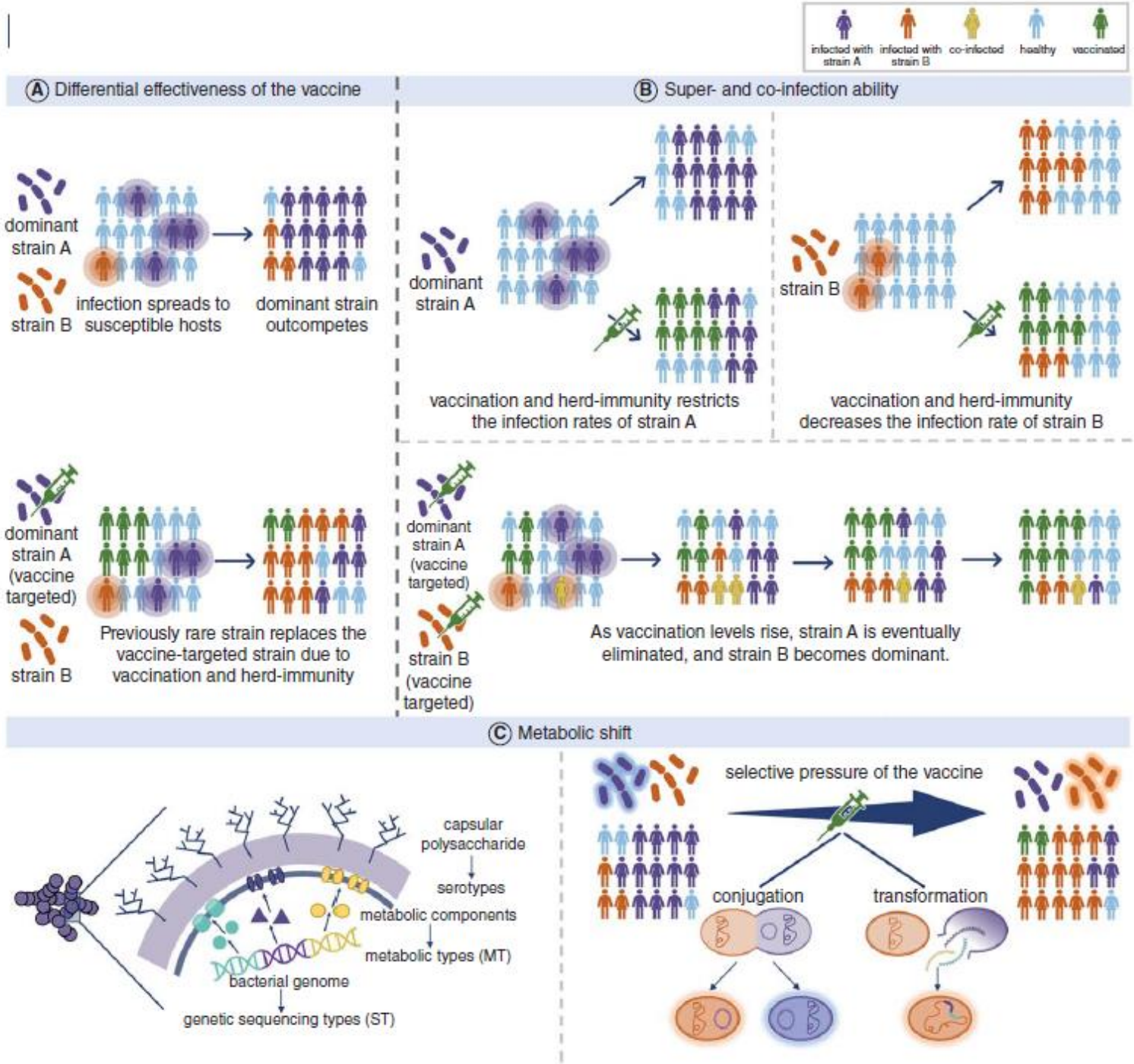
subperiosteal abscess 1, sinusitis with intracranial extension 1, and endocarditis 1.

in otherwise healthy children with PCV13 serotype IPD despite receiving ≥2 PCV13 doses did not identify an immunodeficiency.

Host immune defects predisposing to meningitis

Host problem	Organism favored	Frequency of defect actually leading to infection
Absence of opsonizing antibody	*Streptococcus pneumoniae*	Common in all age groups
	Haemophilus influenzae	Common in very young children
Asplenia: surgical or functional	*S. pneumoniae*	Rare
	Neisseria meningitidis	Very rare
Complement deficiency	*N. meningitidis*	Very rare
Glucocorticoid excess	*Listeria monocytogenes*	Rare
	Cryptococcus neoformans	Rare
HIV infection	*C. neoformans*	About 5 percent eventually get cryptococcal meningitis
	S. pneumoniae	Common presenting illness
	L. monocytogenes	Rare
Bacteremia/endocarditis	*Staphylococcus aureus*; various gram-negative rods	Rare
Basilar skull fracture	*S. pneumoniae*; other upper respiratory tract flora	Very rare

HIV: human immunodeficiency virus.


infected with strain A
infected with strain B
co-infected
healthy
vaccinated
A Differential effectiveness of the vaccine
dominant strain A
strain B
infection spreads to susceptible hosts
dominant strain outcompetes
dominant strain A (vaccine targeted)
strain B
Previously rare strain replaces the vaccine-targeted strain due to vaccination and herd-immunity
B Super- and co-infection ability
dominant strain A
vaccination and herd-immunity restricts the infection rates of strain A
strain B
vaccination and herd-immunity decreases the infection rate of strain B
dominant strain A (vaccine targeted)
strain B (vaccine targeted)
As vaccination levels rise, strain A is eventually eliminated, and strain B becomes dominant.
C Metabolic shift
capsular polysaccharide
serotypes
metabolic components
metabolic types (MT)
bacterial genome
genetic sequencing types (ST)
selective pressure of the vaccine
conjugation
transformation

Journal of Infection 81 (2020) 483–498

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Review

The everchanging epidemiology of meningococcal disease worldwide and the potential for prevention through vaccination

Sydel R. Parikh[a], Helen Campbell[a], Julie A. Bettinger[b], Lee H. Harrison[c], Helen S Marshall[d], Federico Martinon-Torres[e], Marco Aurelio Safadi, MD, PhD[f], Zhujun Shao[g], Bingqing Zhu[g], Anne von Gottberg[h], Ray Borrow[i], Mary E Ramsay[a], Shamez N Ladhani[a,j,*]

Yüksek fatalite ve sekel oranları, salgın potansiyeli

İnvaziv meningokokal hastalıktan sıklıkla sorumlu olan serogruplar (A, B, C, W, X, Y)

SUMMARY

Neisseria meningitidis is a major cause of bacterial meningitis and septicaemia worldwide and is associated with high case fatality rates and serious life-long complications among survivors. Twelve serogroups are recognised, of which six (A, B, C, W, X and Y) are responsible for nearly all cases of invasive meningococcal disease (IMD). The incidence of IMD and responsible serogroups vary widely both geographically and over time. For the first time, effective vaccines against all these serogroups are available or nearing licensure. Over the past two decades, IMD incidence has been declining across most parts of the world through a combination of successful meningococcal immunisation programmes and secular trends. The introduction of meningococcal C conjugate vaccines in the early 2000s was associated with rapid declines in meningococcal C disease, whilst implementation of a meningococcal A conjugate vaccine across the African meningitis belt led to near-elimination of meningococcal A disease. Consequently, other serogroups have become more important causes of IMD. In particular, the emergence of a hypervirulent meningococcal group W clone has led many countries to shift from monovalent meningococcal C to quadrivalent ACWY conjugate vaccines in their national immunisation programmes. Additionally, the recent licensure of two protein-based, broad-spectrum meningococcal B vaccines finally provides protection against the most common group responsible for childhood IMD across Europe and Australia. This review describes global IMD epidemiology across each continent and trends over time, the serogroups responsible for IMD, the impact of meningococcal immunisation programmes and future needs to eliminate this devastating disease.

Aşı seçenekleri/uygulamaları ve serotip dağılımı ülkeden ülkeye ve bölgeden bölgeye farklı

S.R. Parikh, H. Campbell and J.A. Bettinger et al./Journal of Infection 81 (2020) 483–498

Table 1
Currently licensed and available polysaccharide-conjugate and broad-spectrum meningococcal vaccines

Vaccine	Coverage (*N. meningitidis* serogroup)	Manufacturer	Protein conjugate
Protein conjugate vaccines			
Meningitec®	C	Nuron Biotech Inc., Exton, PA, USA	CRM197
Menjugate®	C	GlaxoSmithKline Biologicals SA, Rixensart Belgium	CRM197
NeisVac-C®	C	Pfizer Inc., New York, NY, USA	Tetanus toxoid
MenAfriVac®	A	Serum Institute of India Ltd., Pune, India	Tetanus toxoid
Menactra®	A, C, W, Y	Sanofi Pasteur SA, Lyon, France	Diphtheria toxoid
Menveo®	A, C, W, Y	GlaxoSmithKline Biologicals SA, Rixensart Belgium	Diphtheria cross
Nimenrix®	A, C, W, Y	Pfizer Inc., New York, NY, USA	Tetanus toxoid
Combination conjugate vaccines			
Menitorix®	C + *Haemophilus influenzae* type b	GlaxoSmithKline Biologicals SA, Rixensart Belgium	Tetanus toxoid
Subcapsular meningococcal antigen vaccines			
Bexsero®	B	GlaxoSmithKline Biologicals SA, Rixensart Belgium	-
Trumenba®	B	Wyeth Pharmaceuticals Inc., Philadelphia, PA, USA*	-

*a subsidiary of Pfizer Inc.

Meningokokal Menenjit

- Rutin aşılama yapan ülkelerde vaka sayısında dramatik azalma var
- Ancak aşı dışı serogruplar önem kazanmaya devam ediyor
- Son yıllarda hiçbir aşıda olmayan Men X serogrubu dikkat çekiyor
- Multivalan ucuz aşılara ihtiyaç var
- Aşılar pahalı, epidemiyolojik veri eksik

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Review

Cite this article: Maiden MCJ. 2013 The impact of protein-conjugate polysaccharide vaccines: an endgame for meningitis? Phil Trans R Soc B 368: 20120147.
http://dx.doi.org/10.1098/rstb.2012.0147

One contribution of 15 to a Theme Issue 'Towards the endgame and beyond: complexities and challenges for the elimination of infectious diseases'.

Subject Areas:
health and disease and epidemiology, immu-

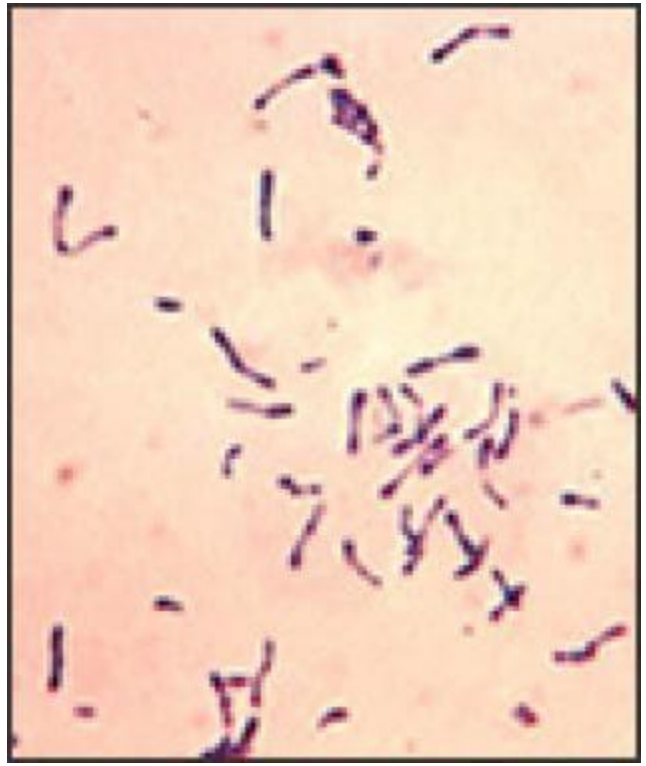
The impact of protein-conjugate polysaccharide vaccines: an endgame for meningitis?

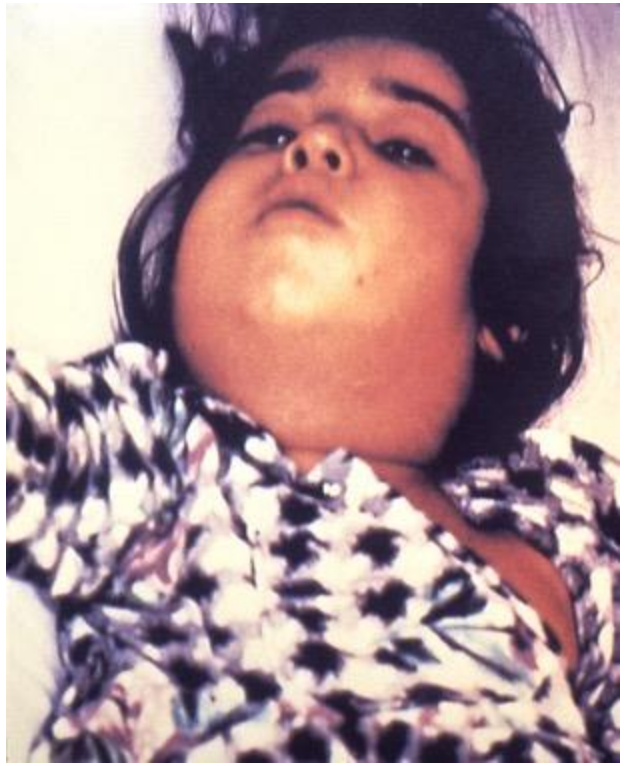
Martin C. J. Maiden

Department of Zoology, University of Oxford, South Parks Road, Oxford OX1 3PS, UK

The development and implementation of conjugate polysaccharide vaccines against invasive bacterial diseases, specifically those caused by the encapsulated bacteria *Neisseria meningitidis*, *Haemophilus influenzae* and *Streptococcus pneumoniae*, has been one of the most effective public health innovations of the last 25 years. These vaccines have resulted in significant reductions in childhood morbidity and mortality worldwide, with their effectiveness due in large part to their ability to induce long-lasting immunity in a range of age groups. At the population level this immunity reduces carriage and interrupts transmission resulting in herd immunity; however, these beneficial effects can be counterbalanced by the selection pressures that immunity against carriage can impose, potentially promoting the emergence and spread of virulent vaccine escape variants. Studies following the implementation of meningococcal serogroup C vaccines improved our understanding of these effects in relation to the biology of accidental pathogens such as the meningococcus. This understanding has enabled the refinement of the implementation of conjugate polysaccharide vaccines against meningitis-associated bacteria, and will be crucial in maintaining and improving vaccine control of these infections. To date there is little evidence for the spread of virulent vaccine escape variants of the meningococcus and *H. influenzae*, although this has been reported in pneumococci.

Difteri





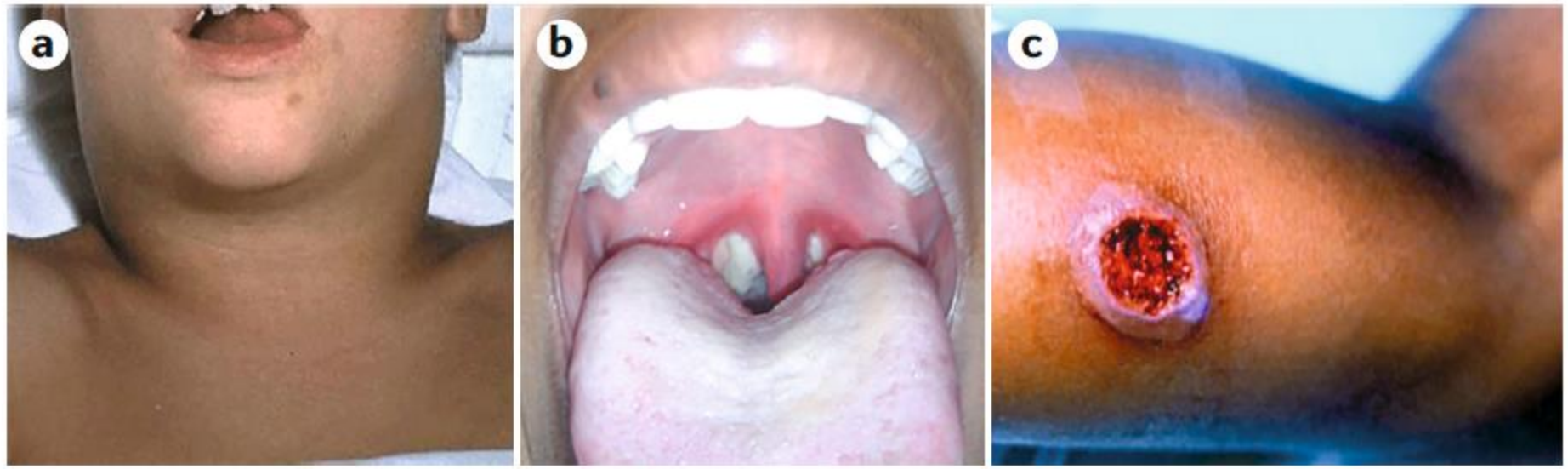


Fig. 4 | **Clinical presentations of diphtheria. a** | Characteristic bull neck caused by enlarged lymph nodes. **b** | Thick pseudomembrane in the posterior pharynx. The pseudomembrane is a layer of bacteria and debris from necrosis of the surrounding tissues due to diphtheria toxin. **c** | Cutaneous lesion caused by *Corynebacterium diphtheriae*.

Difteri

- İlk olarak MÖ 5. yüzyılda Hipokrat tarafından tanımlanmıştır
- Üst solunum yolu veya deri enfeksiyonu olarak ortaya çıkar
- Enfeksiyon genellikle ilkbahar veya kış aylarında görülür
- **Antibiyotik tedavisi olmaksızın 2-6 hafta boyunca bulaşıcıdır**
- **Aşılanmamış veya düşük antikor düzeyi olanlar risk altındadır**

Difteri Aşıları

- 1930 ve 1940'larda başlanan rutin çocukluk aşılaması sayesinde neredeyse tamamen ortadan kalkmışken son yıllarda vaka artışları bildirilmektedir

- Ülkemizde son vaka 2011 yılında bildirilmişir

Rutin Aşılama Sonrası Difteri Salgınları

- Aşı programlarının yaygın olarak uygulanmasından bu yana kaydedilen en büyük salgın, **1990-1995 yılları arasında Rusya Federasyonu'nda** ortaya çıktı
- DSÖ raporlarına göre bu salgın **157.000'den fazla vakaya ve 5.000 ölüme** neden oldu
- **40 yaş üstü bireylerde orantısız derecede yüksek ölüm oranları gözlemlendi**
- Bu salgın, o dönemde dünya çapında bildirilen vakaların %80'ini oluşturuyordu

Rutin Aşılama Sonrası Difteri Salgınları

- 1993-2003 yılları arasında Letonya’da 10 yıl süren bir salgın, 1359 difteri vakası ve 101 ölümle sonuçlandı

- 1995-2002 yılları arasında Birleşik Krallık'ta toksijenik suşlardan kaynaklanan 17 kutanöz difteri vakası bildirildi

- **2011-2015** yılları arasında **Hindistan**, beş yılda toplam **18.350 vaka** bildirimi ile her yıl en fazla vaka bildiren ülke olmuştur

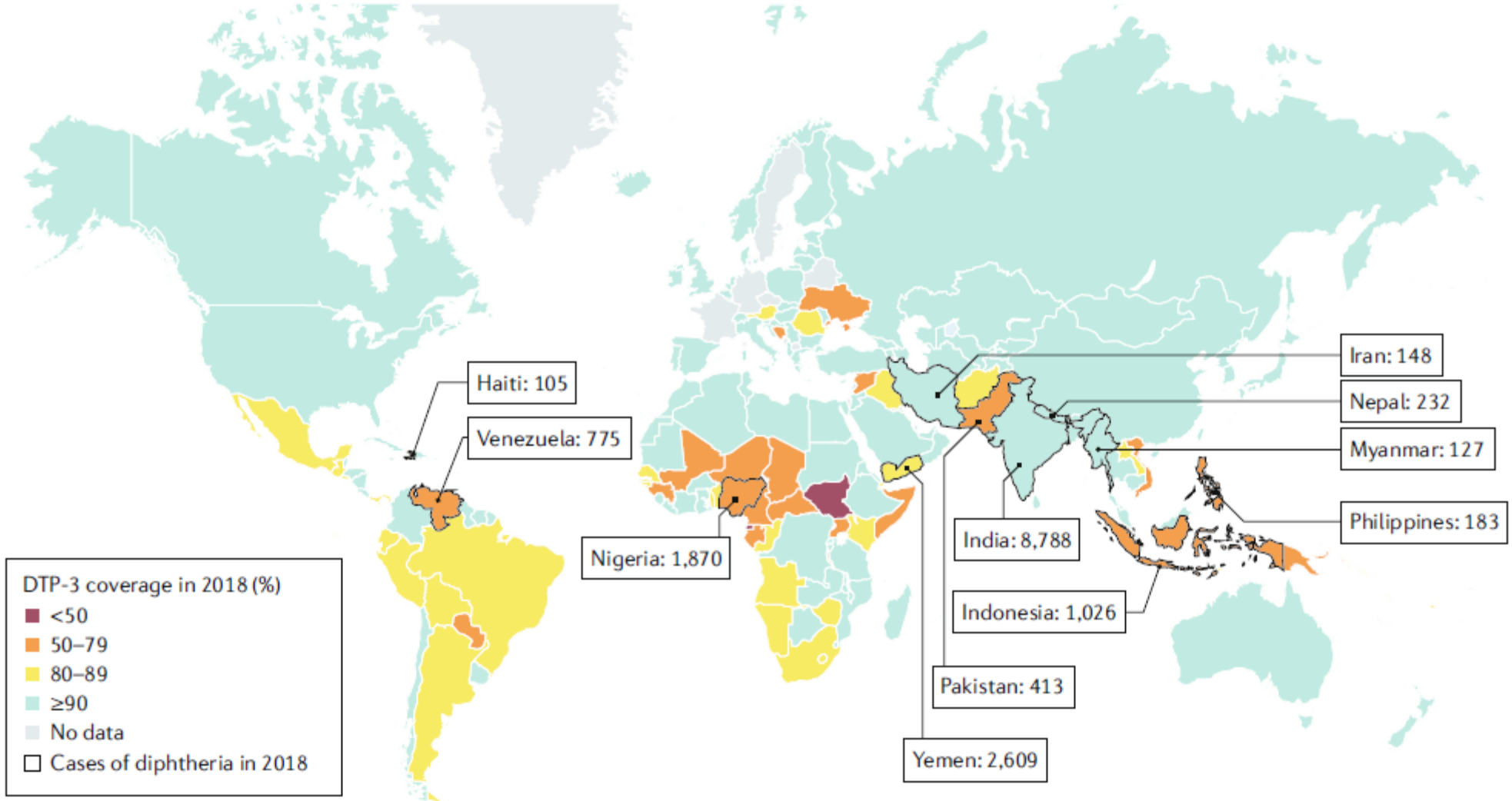
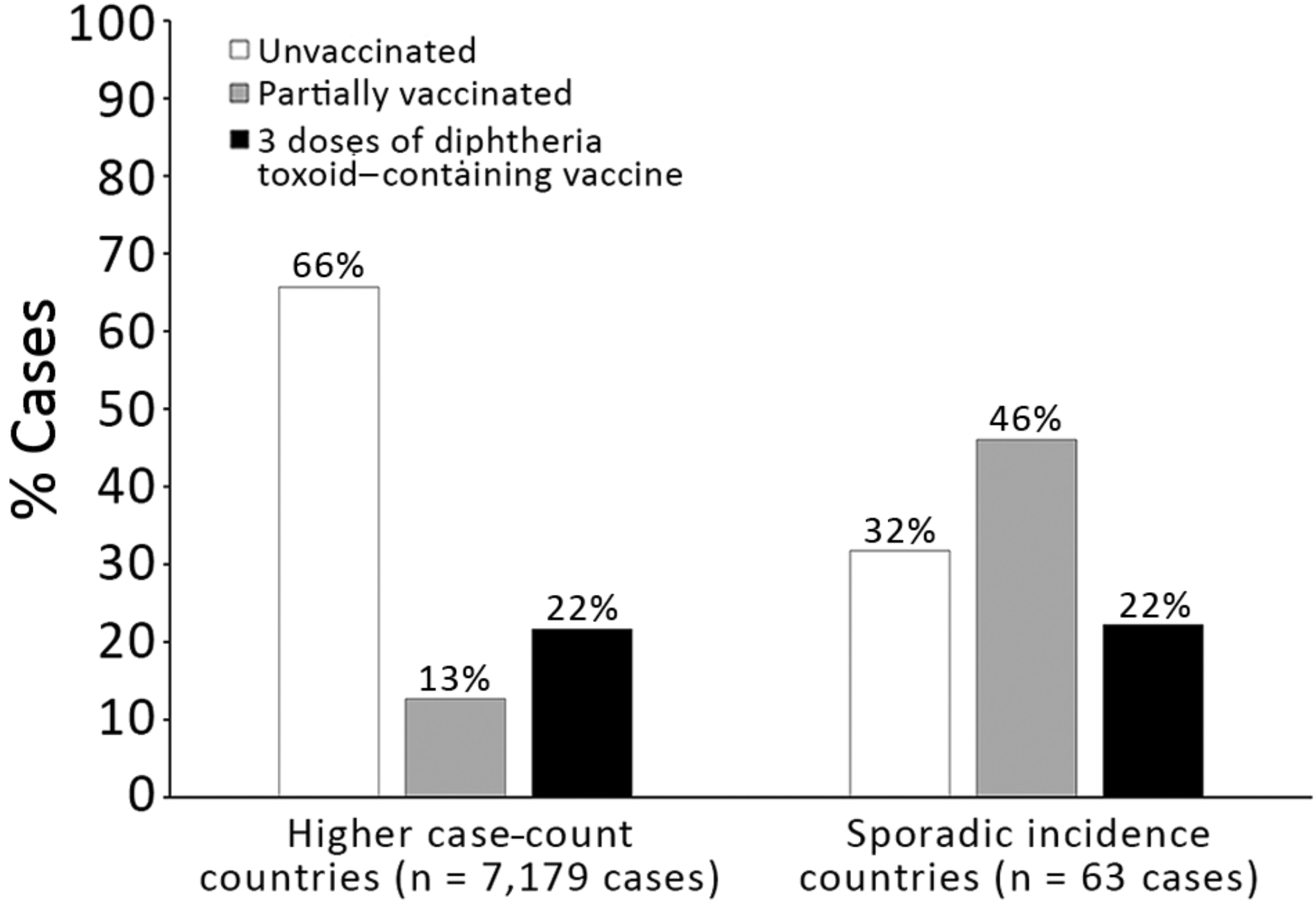
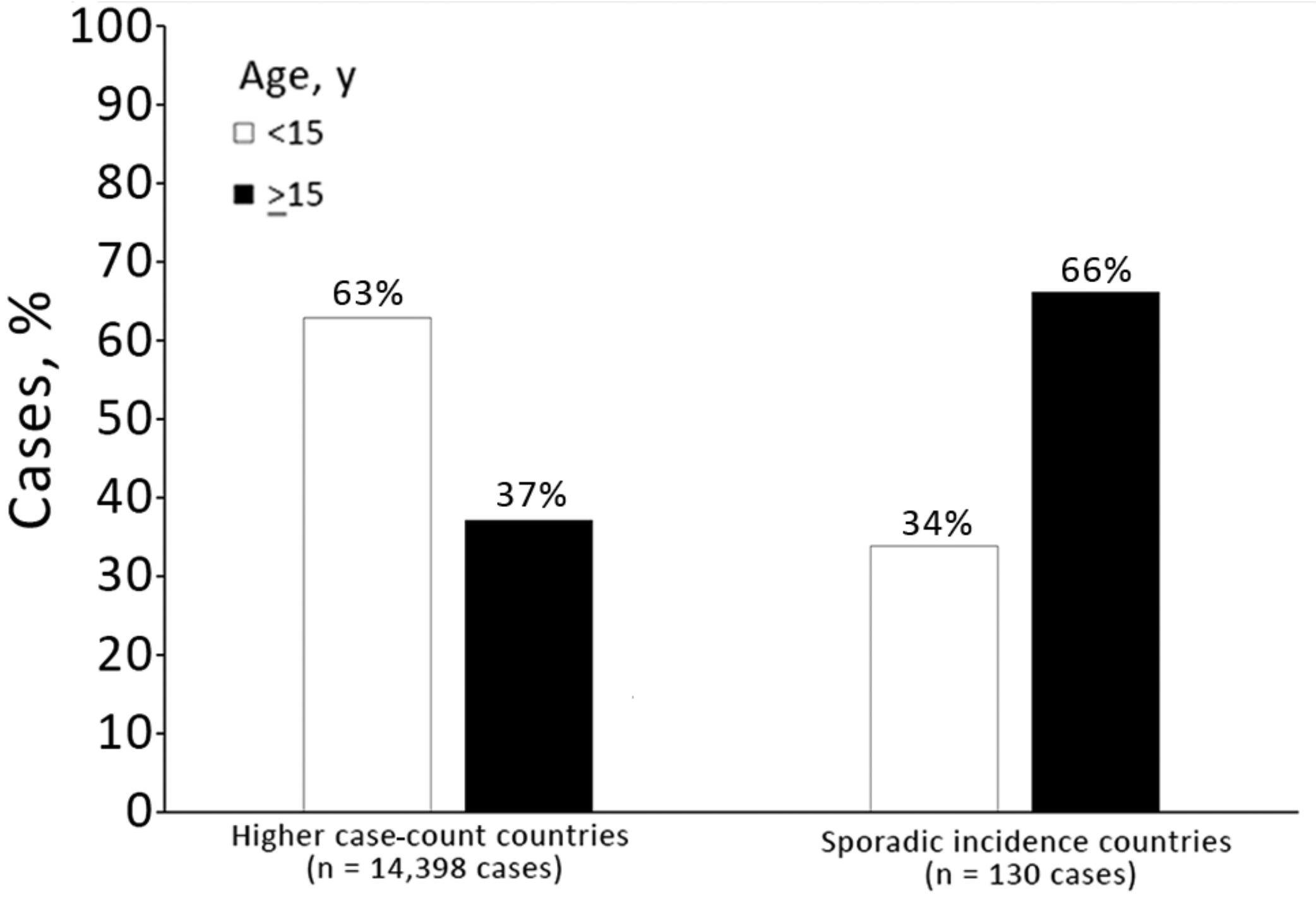


Fig. 2 | **Global DTP vaccine coverage and number of cases of diphtheria.** The map shows the coverage of the third dose of the vaccine for diphtheria, tetanus and pertussis (DTP-3) in 2018. The number of cases of diphtheria reported in the same year is shown for countries with >100 reported cases. DTP, diphtheria, tetanus and pertussis. Data from WHO Reported estimates of DTP-3 coverage and Diphtheria reported cases.

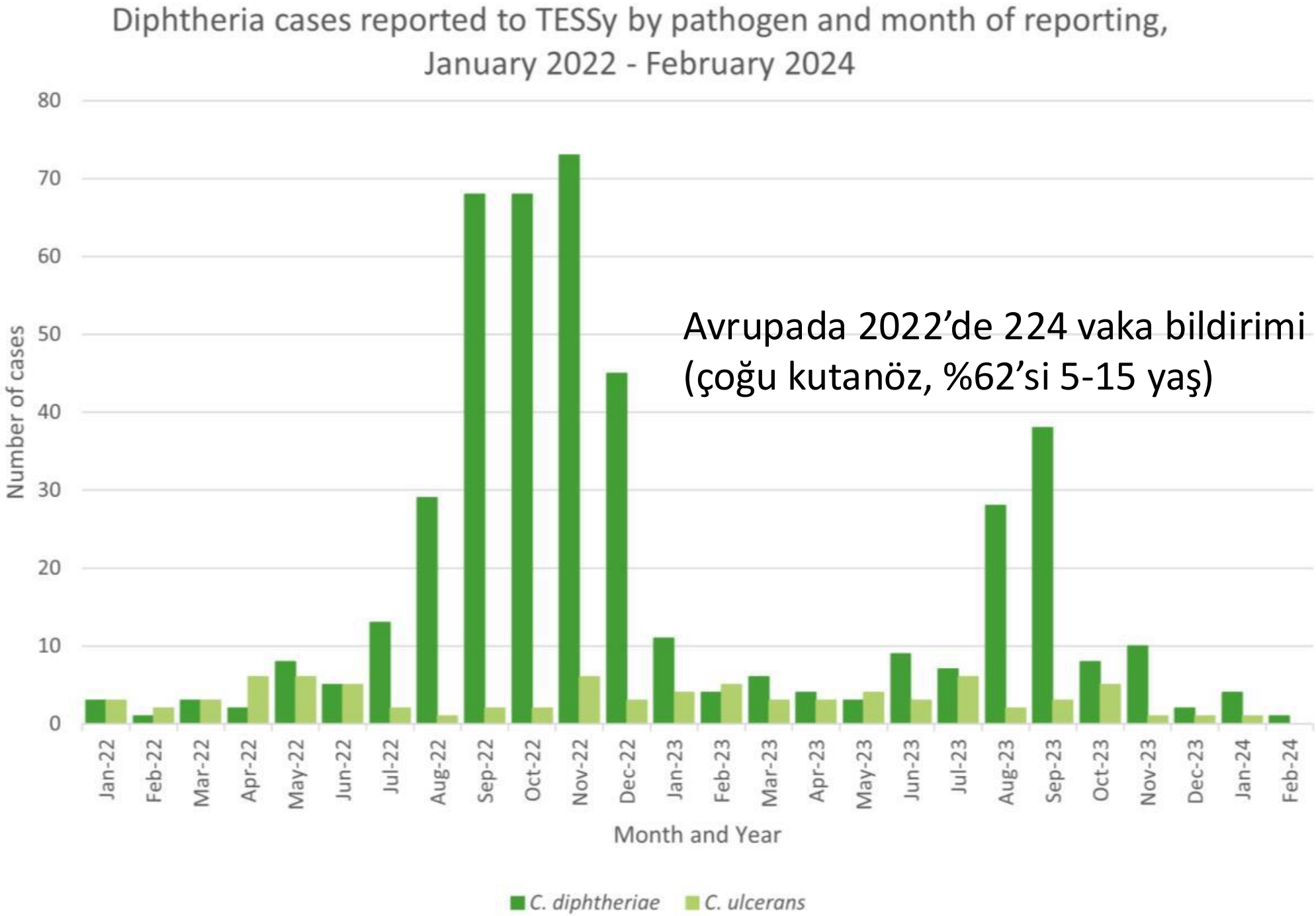

100
90
80
70
60
50
40
30
20
10
0
% Cases
Unvaccinated
Partially vaccinated
3 doses of diphtheria toxoid–containing vaccine
66%
13%
22%
32%
46%
22%
Higher case-count countries (n = 7,179 cases)
Sporadic incidence countries (n = 63 cases)


Age, y
<15
≥15
Cases, %
100
90
80
70
60
50
40
30
20
10
0
63%
37%
34%
66%
Higher case-count countries
(n = 14,398 cases)
Sporadic incidence countries
(n = 130 cases)

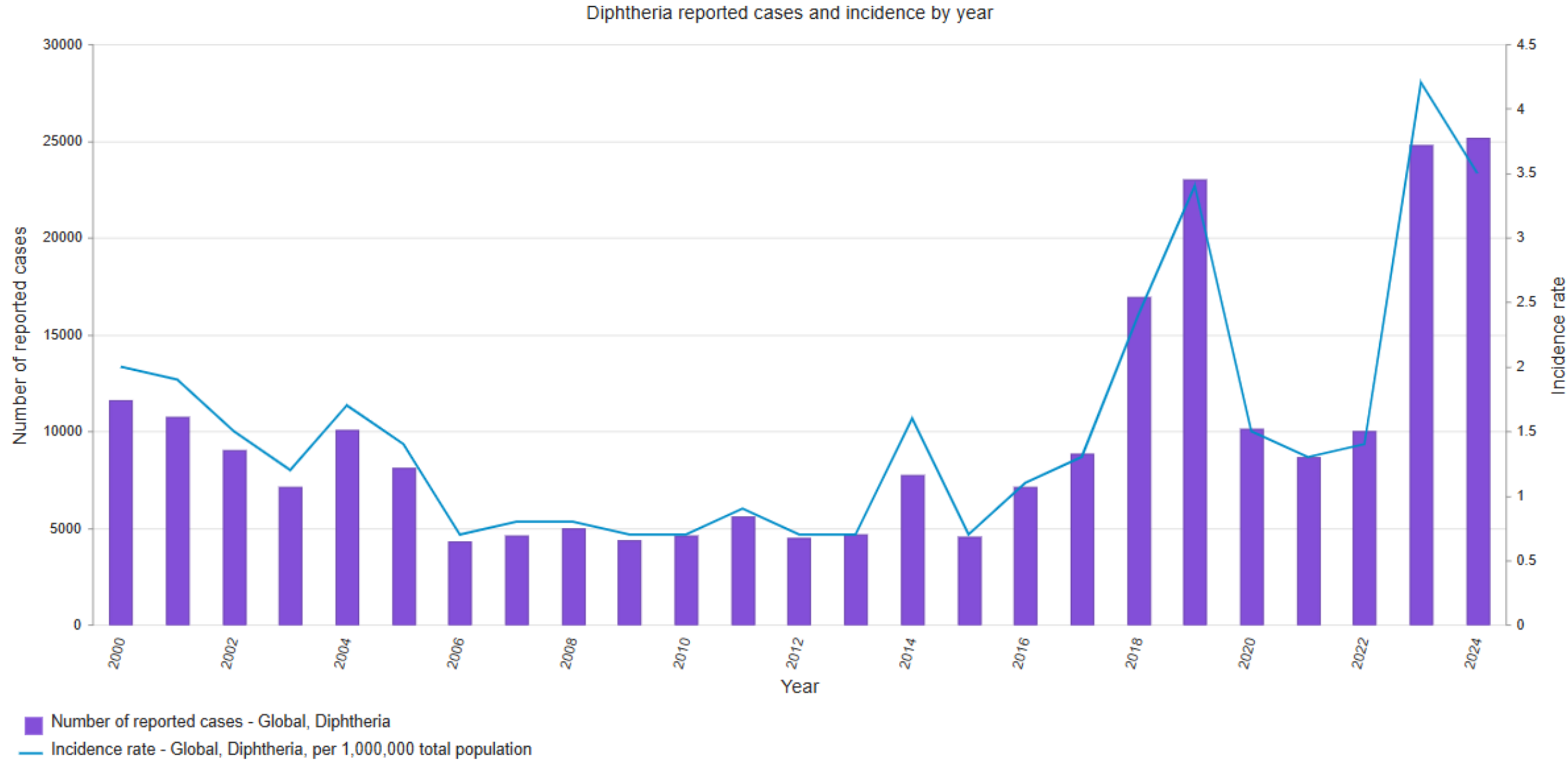
Rutin Aşılama Sonrası Difteri Salgınları

- Literatürdeki pek çok vaka raporunda Sahra Altı Afrika, Doğu Akdeniz, Güneydoğu Asya, Fransa, Hindistan ve Amerika Birleşik Devletleri'ndeki salgınlar bildirilmiştir

  - Yemen'de 2015-2020'de 5701 vaka 330 ölüm
  - Bangladeş'te 2017'de 9321 vaka ve 50 ölüm
  - Venezüella'da 2016-2019'da 1612 vaka ve 280 ölüm (fatalite %6)
  - Haiti'de 2014-2021'de 406 vaka 80 ölüm



Avrupada 2022'de 224 vaka bildirimi (çoğu kutanöz, %62'si 5-15 yaş)



Source: WHO Immunization Data portal

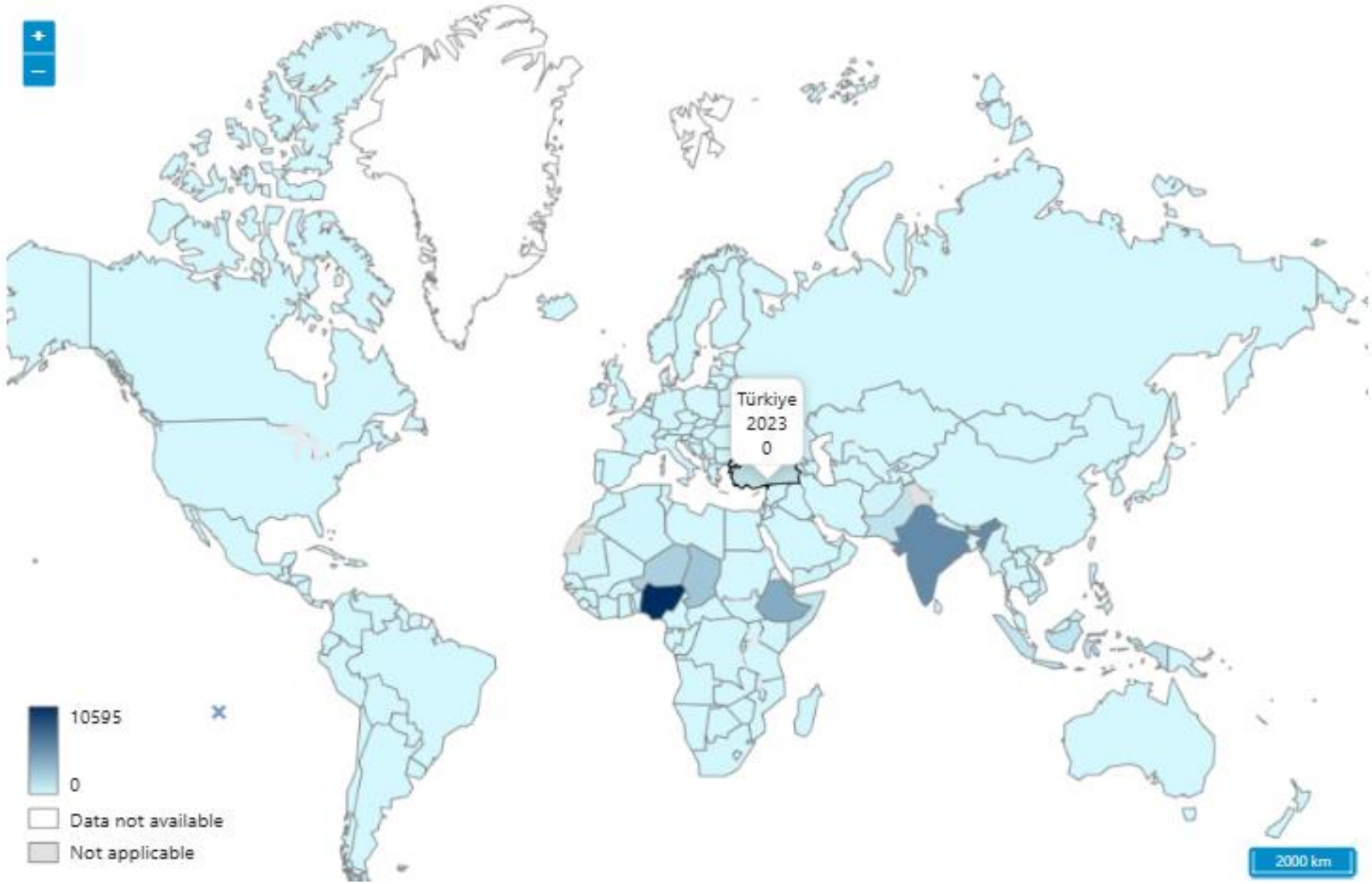
Country / Region	Disease	2024	2023	2022	2021	2020	2019	2018
Global	Diphtheria	25.149	24.782	10.027	8.659	10.137	22.989	16.911

Diphtheria - number of reported cases

FILTERS

Year

Latest



Difteri

- Difteri salgınları gelişmekte olan ülkelerde bir sağlık tehdidi olmaya devam ediyor

- Bağışıklığın sürdürülmesi için çocukluk çağından sonra güncellenmiş bir hatırlatma aşısı önemli (en az 10 yılda bir Tdap veya Td aşısı)

Difteri

- Asemptomatik enfeksiyon, difterinin hem bulaşmasında hem de kontrolünde kritik bir rol oynar
- Aşılama semptomatik hastalığı önlemede oldukça etkili ancak asemptomatik enfeksiyonu önlemede etkisiz
- Yalnızca aşılama yoluyla salgınların kontrol altına alınması zor

Difteri

- Asemptomatik bulaşma nedeniyle, etkili salgın müdahalesi için aşılamanın diğer müdahalelerle birlikte yürütülmesi gerekir

- Tam aşılama kapsamı, salgın bölgelerinin yalnızca %27'sinde bulaşmayı durdurmaya yeterli olmuştur

- Semptomatik vakaların %90'ının antibiyotikle hızlı tedavisiyle bu oran %70'e çıkmaktadır

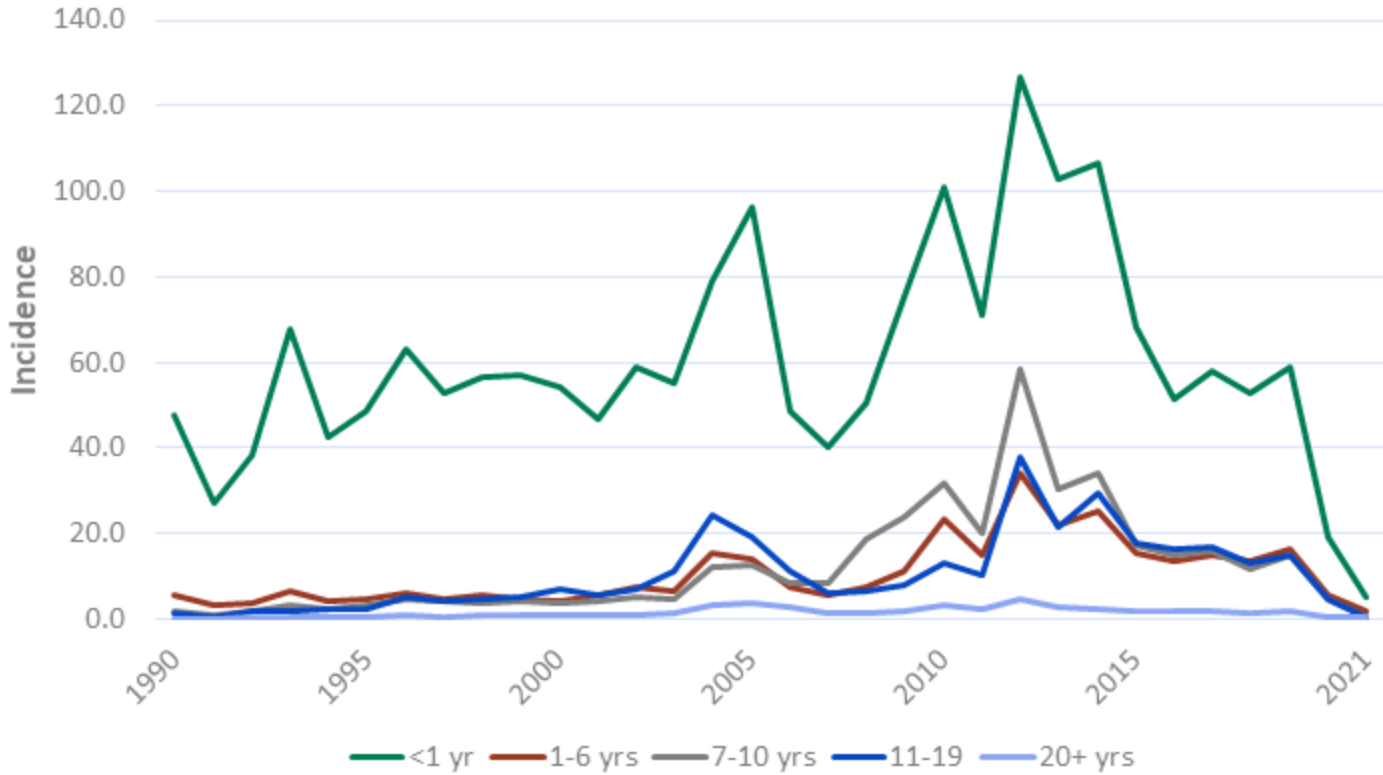
Boğmaca

- Tarihte çok sayıda salgınlara neden olmuş önemli bir enfeksiyon hastalığı
- Aşı öncesi dönemde bildirilen vakaların >%90'ı <10 yaşta
- 1990'lardan sonra vakaların yarısı ergen ve yetişkinler

Hastalık Neden Önemli

- Oldukça bulaşıcı
- Uzun bir hastalık periodu var (6-10 hafta-100 gün hastalığı)
- Belirtiler erişkinde genellikle bebek ve çocuklara göre daha az şiddetli
- Tanınamayan boğmacalı ergenler ve yetişkinler bebekler için rezervuar
- Bebekler ve küçük çocuklar hastalığı asemptomatik enfeksiyonu olan büyüklerden alabilirler

Reported pertussis incidence by age group: 1990-2021



SOURCE: CDC, National Notifiable Diseases Surveillance System

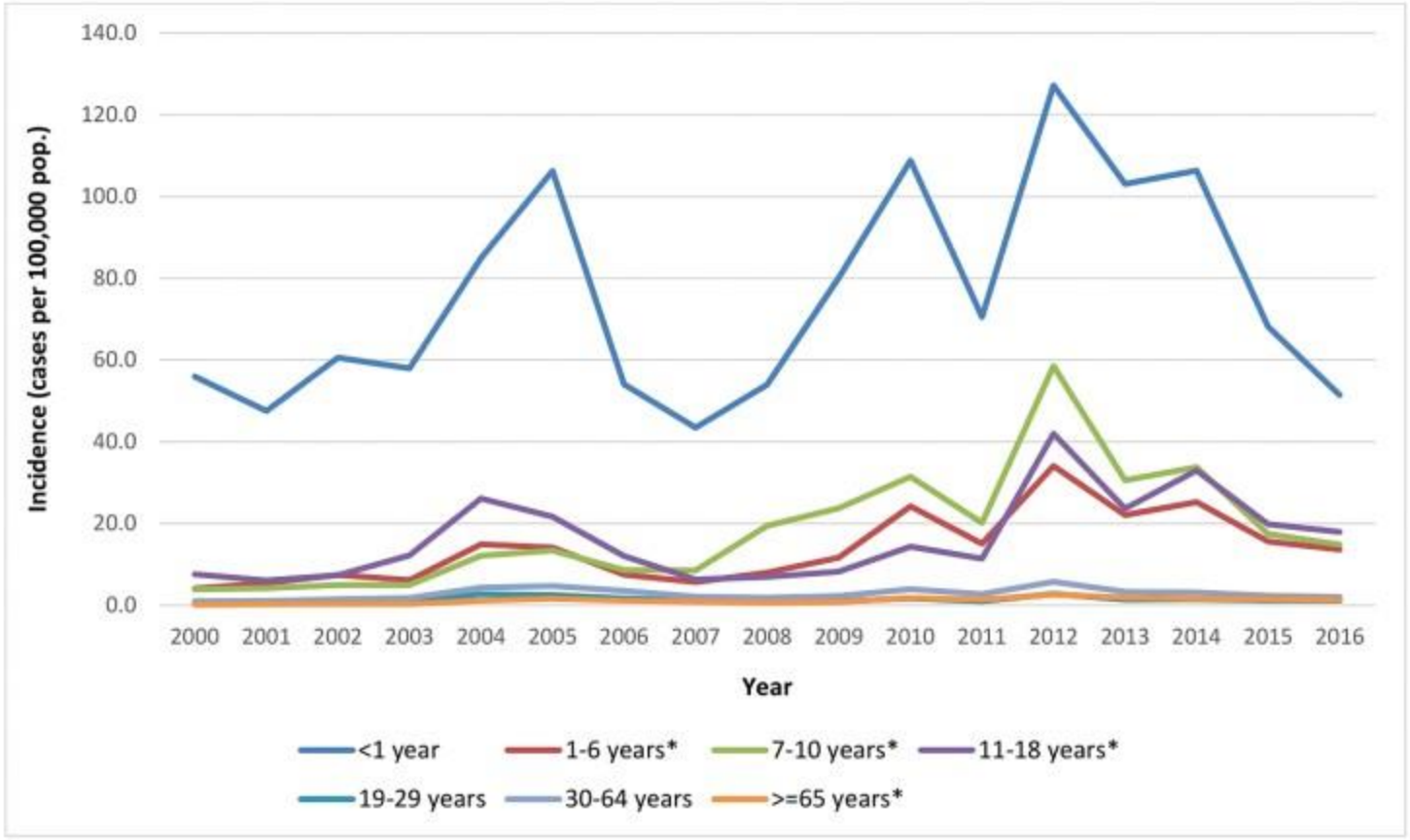
Boğmaca Epidemiyoloji

- Global bir halk sağlığı problemi
- 2-5 yılda bir siklik epidemiler var
- Hastalığı geçirmek de aşılanmak da ömür boyu koruculuk sağlamıyor

- Pandemi ile birlikte birçok ülkede aşı kapsayıcılığının azalması sonucunda boğmaca vakaları 2023-2024'te önemli ölçüde arttı

- **2024'te** Amerika'da >35 bin (2023'te 7 bin)
  Birleşik Krallık'ta 14.894
  Global 941.565 vaka bildirimi

2007	10,454
2008	13,278
2009	16,858
2010	27,550
2011	18,719
2012	48,277
2013	28,639
2014	32,971
2015	20,762
2016	17,972
2017	18,975
2018	15,609
2019	18,617
2020	6,124
2021	2,116



*p<0.05

Figure 2. Annual US incidence of reported pertussis by age group, 2000–2016. *$P < .05$.

Hastalık her yaşı etkilese de hastaneye yatış ve ölümlerin çoğu küçük bebeklerde
Günümüzde en yüksek insidans <2ay bebeklerde (200/100.000), ölüm oranı 6.8/1000

Cases reported through the National Notifiable Diseases Surveillance System between 1 January 2000 and 31 December 2016.

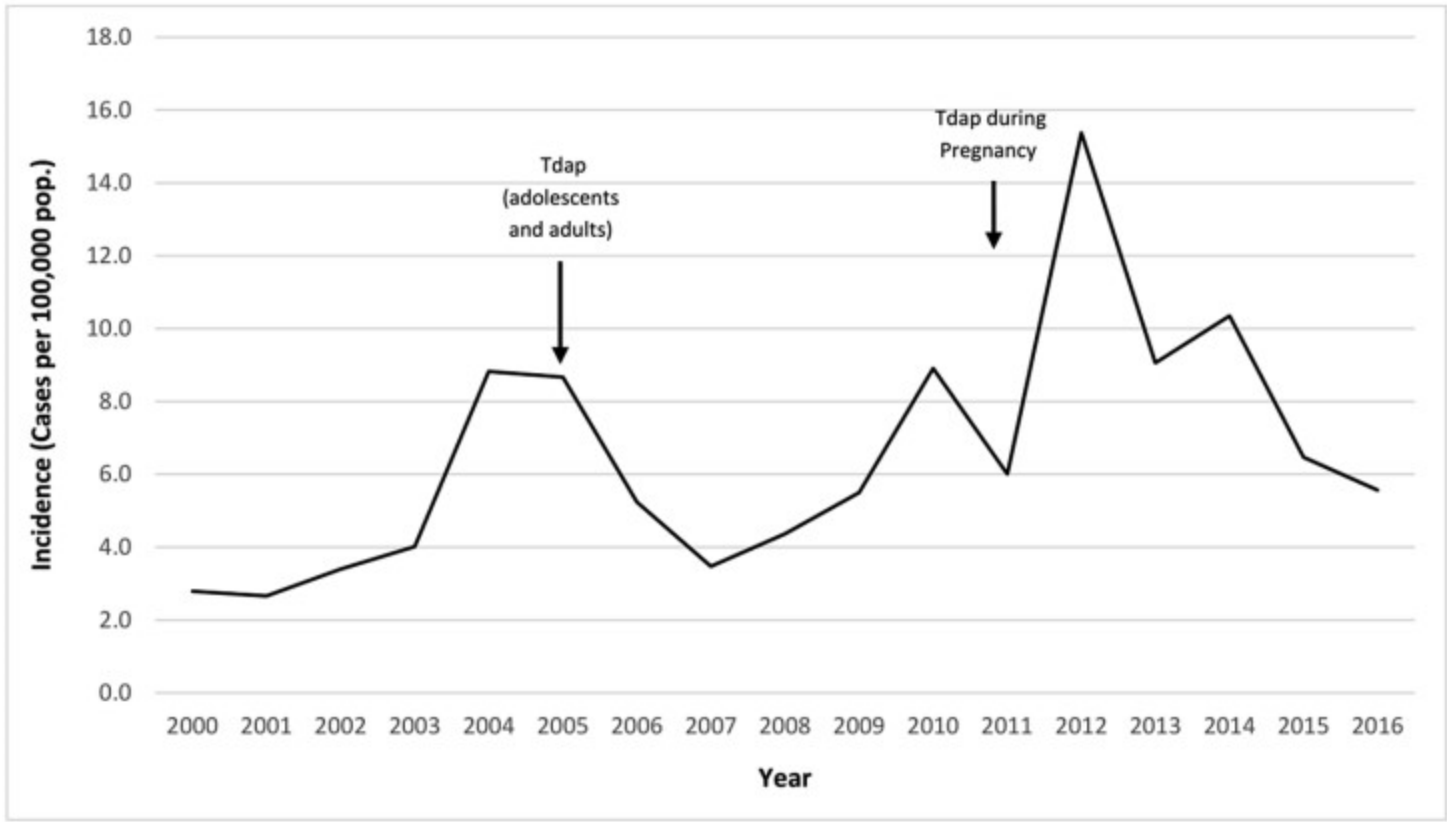


Figure 1. Overall annual US incidence of reported pertussis, 2000–2016. Abbreviation: Tdap, tetanus toxoid, reduced diphtheria toxoid, and acellular pertussis.

339 420 pertussis cases

Ulusal Çocukluk Dönemi Aşılama Takvimi (2025)

	DOĞUM	2. AY SONU	4. AY SONU	6. AY SONU	9. AY SONU	12. AY SONU	18. AY SONU	24. AY SONU	48. AY	13 YAŞ
Hep-B	I									
BCG		I								
KPA		I	II			RAPEL				
DaBT - İPA- Hib - HepB		I	II	III			RAPEL			
OPA				I			II			
Suçiçeği						I				
KKK					EK DOZ	I			II	
Hep-A							I	II		
DaBT-İPA									RAPEL	
Td										RAPEL

- Hep-B: Hepatit B Aşısı
- BCG: Verem Aşısı
- KPA: Konjuge Pnömokok Aşısı
- DaBT-İPA-Hib-HepB: Difteri, asellüler Boğmaca, Tetanos, inaktif Polio, Hemofilus influenza tip b, Hepatit B Aşısı
- OPA: Oral Polio Aşısı
- KKK: Kızamık, Kızamıkçık, Kabakulak Aşısı
- Hep-A: Hepatit A Aşısı
- Td: Erişkin Tetonos difteri Aşısı
- Rapel: Pekiştirme Doz Aşısı

Aşı Detayları için QR Kodu Okutunuz

ERİŞKİN DÖNEMİ AŞI UYGULAMALARI

TÜRKİYE CUMHURİYETİ SAĞLIK BAKANLIĞI

Sağlıklı Erişkinlere Önerilen Aşılar	Risk Grubunda Yer Alan Erişkinlere Önerilen Aşılar
> Td: Erişkin Tetanos difteri	> Hepatit B > Hepatit A > Pnömokok > Grip > Meningokok > Suçiçeği > KKK: Kızamık, Kızamıkçık, Kabakulak
GEBELER	
> Tdab: Erişkin Tetanos, difteri, asellüler boğmaca > Td: Erişkin Tetanos difteri > Grip	
65 YAŞ ve ÜZERİ	
> Pnömokok > Grip	

Bilgi için doktorunuza başvurunuz.

asi.saglik.gov.tr

Adölesan ve gebe aşılaması ülkemizde rutin olarak uygulanmıyor

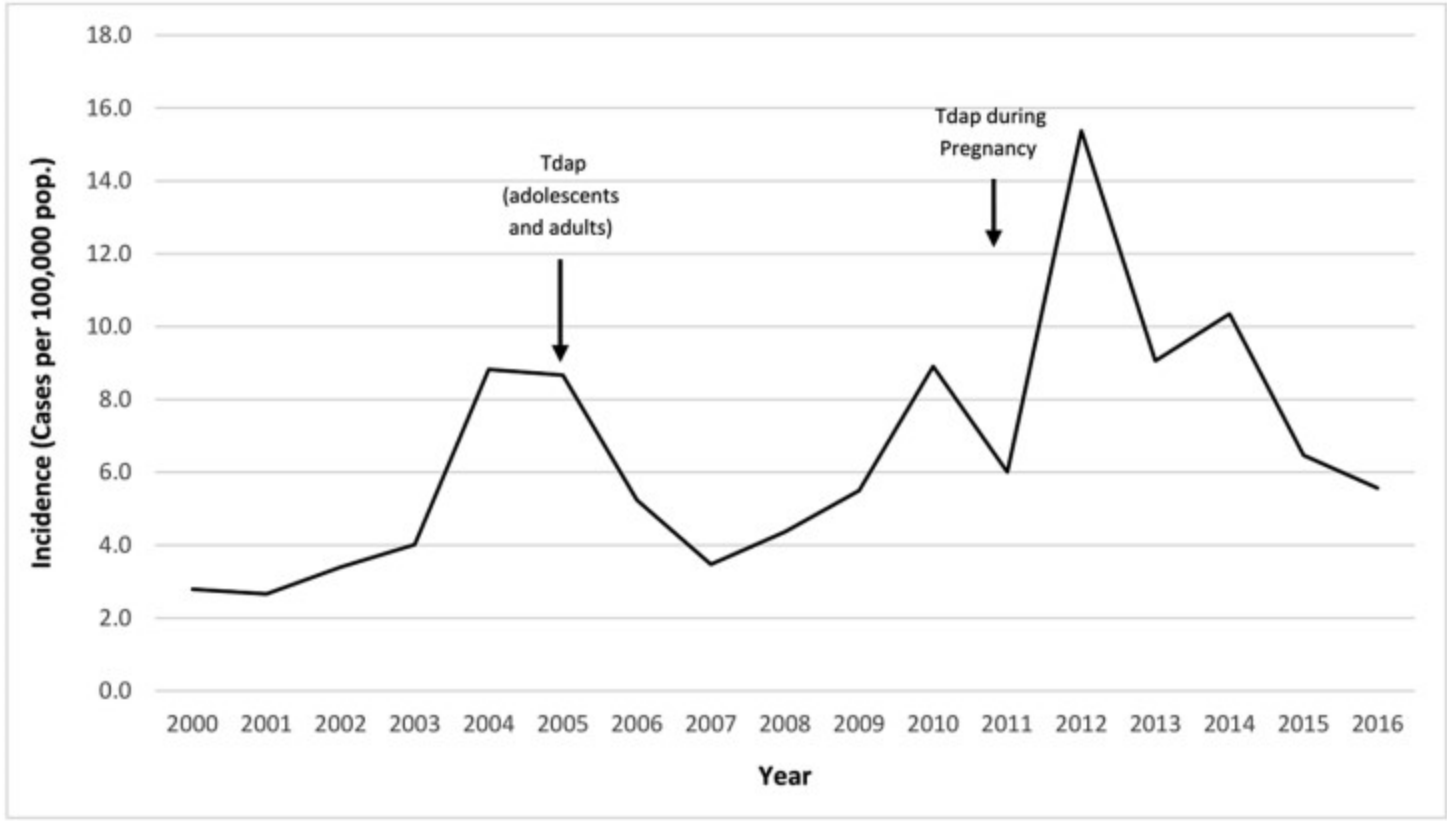
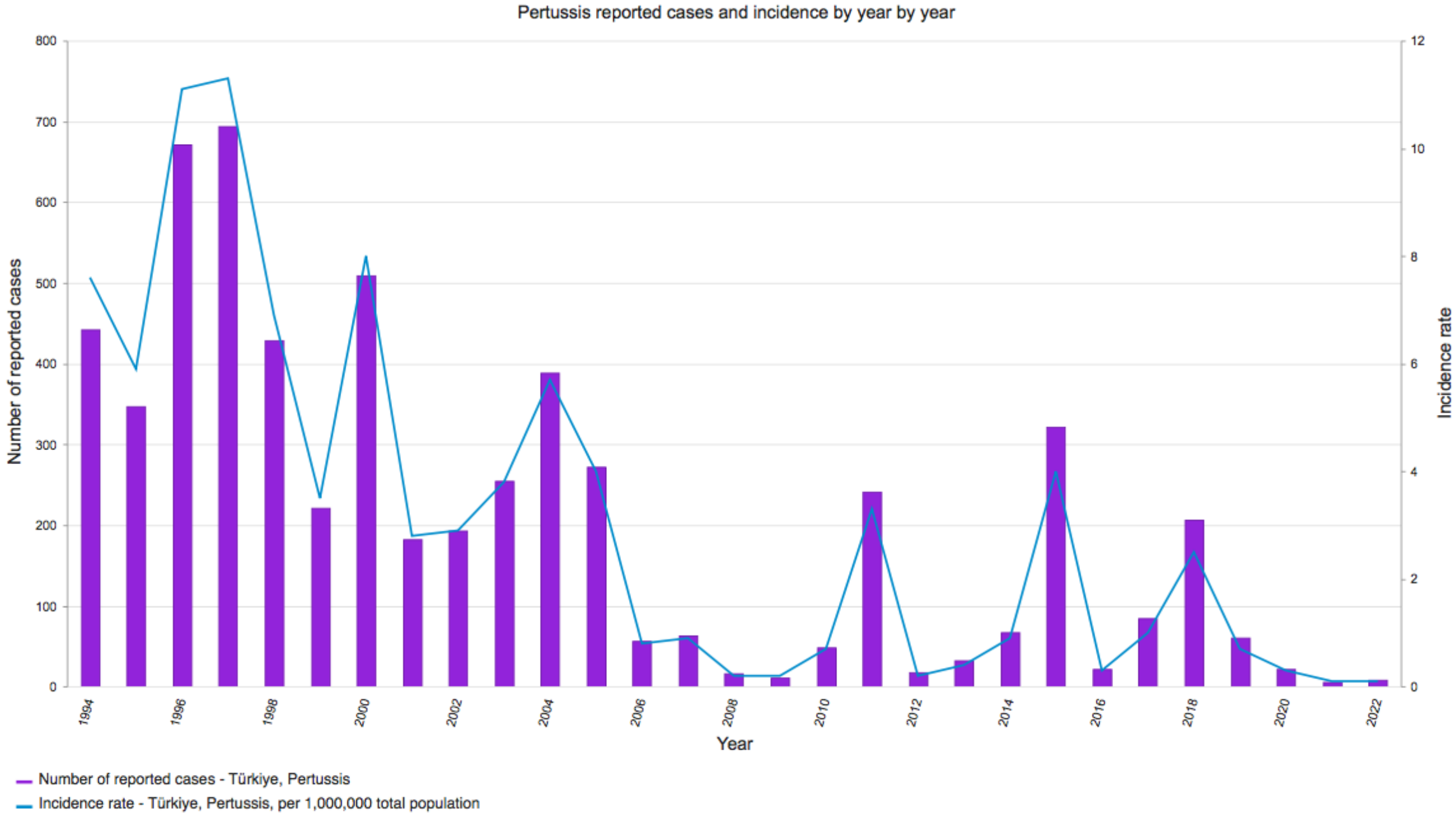


Figure 1. Overall annual US incidence of reported pertussis, 2000–2016. Abbreviation: Tdap, tetanus toxoid, reduced diphtheria toxoid, and acellular pertussis.



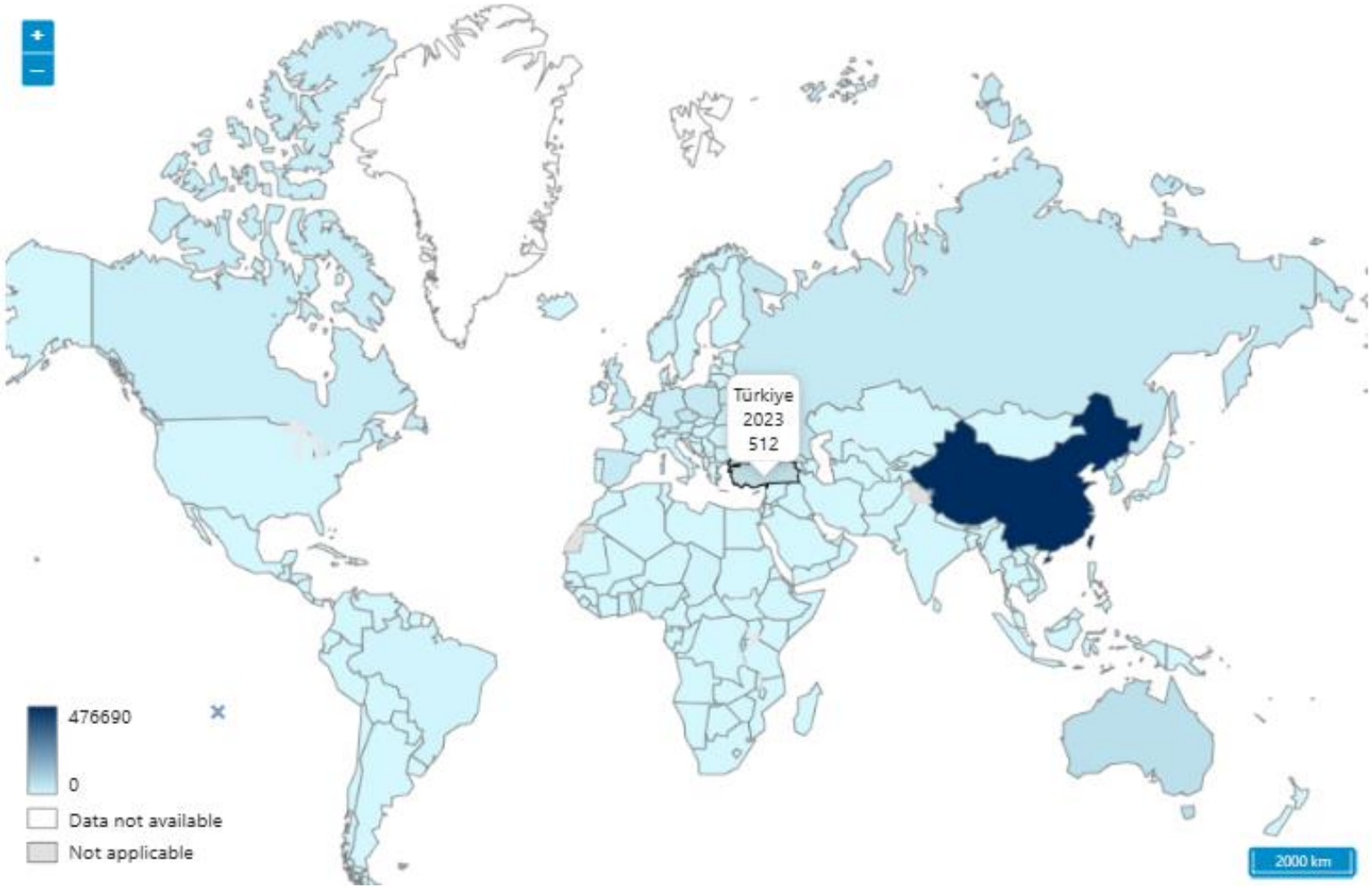
Source: WHO Immunization Data portal

Pertussis - number of reported cases

FILTERS

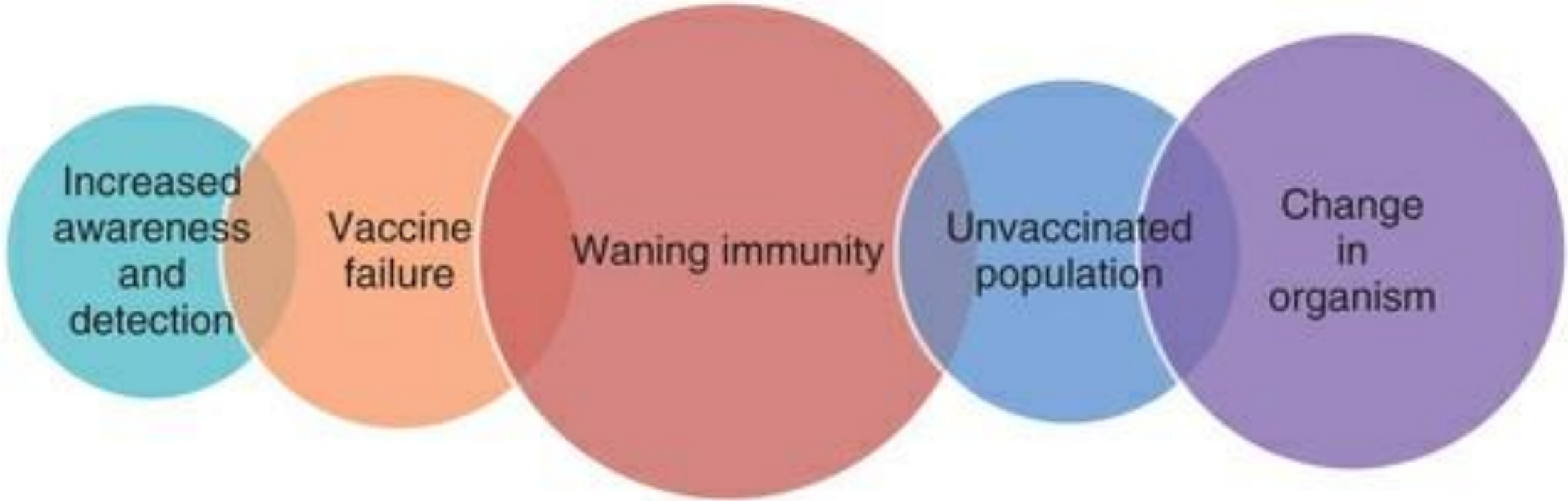
Year

Latest



Last updated: 2025-07-14

Indicator	Pertussis - number of reported cases													
Location	2024	2023	2022	2021	2020	2019	2018	2017	2016	2015	2014	2013	2012	2011
Suriname	0	0	33	0	4	1			0	0	13	3	1	0
Sweden	2545	138	13	11	269	782	739	805	679	603	703	237	289	177
Switzerland							3950	8833	8276	6970	9349	10 094		4700
Syrian Arab Republic	135	121	343	197	224	302	101	0	20	29		35	4	90
Türkiye		512	8	6	22	60	207	85	22	322	68	33	18	242
Tajikistan	665	595	74	0	13	112	0	36	6		6	2	5	56
Thailand	2477	737	10		90	99	79	55	84	51	14	24	14	12
Timor-Leste	0	0	0	0	5	7	0	1	6	5	0	0	0	4
Togo	0	209			3	55	27		11	23	38	30	32	34
Tokelau	0					0	0						0	0
Tonga	0	0					0	0	0			0	4	0
Trinidad and Tobago	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tunisia	252	148	5	2	11	125	143	14	7	4	145	88	0	0
Turkmenistan	0	0	0	0	0	8	0	0	2	0	0	0	0	0
Turks and Caicos Islands	0	0	0	0	0	0	0	0						
Tuvalu													0	0
Uganda			0	382										
Ukraine	7545	707	32	91	1041	2314	2214	2480	3132	2426			2286	2937
United Arab Emirates	37	91	0	40	24	12	29				18		61	
United Kingdom of Great Britain and Northern Ireland	26 277	942	79	54	1226	4613	3423	5097	7085	5207	4046	6090	11 980	1243
United Republic of Tanzania												0	0	0
United States of America		3044	2115	612	18		15 609	18 975	17 972	20 679	32 971	28 639	48 277	18 719


Increased awareness and detection
Vaccine failure
Waning immunity
Unvaccinated population
Change in organism

Boğmaca Epidemiyoloji

- **Boğmaca insidansı klinik olarak rapor edilen insidanstan önemli ölçüde daha yüksek**

- **≥1 hafta öksürüğü olan ergen ve yetişkinlerin %13 ila 20'sinde boğmaca olduğu saptanmış** (çoğu vakada >3 hafta öksürük)

Boğmaca Aşılarının Koruyuculuğu

- Primat verileri, **aselüler boğmaca aşılarının klinik hastalıktan koruduğu, ancak asemptomatik veya subklinik enfeksiyonunaşıya rağmen gelişebileceğini ve duyarlı bireylere yayılmasıyla sonuçlanabileceğini** göstermektedir

- Aselüler boğmaca aşılarının uygulamaya konulmasına rağmen, **son on yılda dünyanın çoğu yerinde boğmaca vakaları artıyor**

- **Vakaların küçük çocuklardan ergenlere ve yetişkinlere doğru kaymasının esas nedeni kalıcı bağışıklığın olmaması**

Boğmaca Aşılarının Koruyuculuğu

Table 3. Efficacy Studies of the Tetanus Toxoid–Reduced Diphtheria Toxoid–Acellular Pertussis, Adsorbed (Tdap) Vaccine.

Study	Study Type	Study Participants	Calculated Efficacy (95% Confidence Interval)
Ward et al.[32]	Randomized, controlled	2781 participants 15–65 yr of age	92% (32 to 99)
Rank et al.[33]	Cohort	167 participants 12–19 yr of age	78.0% (60.7 to 87.6) for clinically diagnosed or laboratory-diagnosed cases of pertussis; 85.4% (83.0 to 87.5) for only laboratory-diagnosed cases of pertussis
Wei et al.[34]	Cohort	266 grade-school students ≥11 yr of age	65.6% (–38.8 to 91.3) for confirmed or probable cases of pertussis; 70.5% (–110.3 to 95.9) for only confirmed cases of pertussis

Reported DTaP Vaccine Status of Children with Pertussis, Ages 6 months through 6 years

Age	Vaccine History Unknown	Unvaccinated	Undervaccinated (1-2 doses)	Completed Primary DTaP Series (3+ doses)	Total
	No. (%)	No. (%)	No. (%)	No. (%)	No.
6-11 mo	36 (39.6)	4 (4.4)	8 (8.8)	43 (47.3)	91
1-4 yrs	153 (41.2)	11 (3.0)	21 (5.7)	186 (50.1)	371
5-6 yrs	28 (33.7)	5 (6.0)	3 (3.6)	47 (56.6)	83
Total	**217 (39.8)**	**20 (3.7)**	**32 (5.9)**	**276 (50.6)**	**545**

Footnote: CDC recommends all children receive at least 3 doses of DTaP by age 6 months. DTaP coverage in the United States is very high. Over 95% of all children 19-35 months of age have received at least 3 doses of DTaP. This table illustrates a similar trend among the pertussis cases reported during 2022—the majority have received at least 3 doses of DTaP. Because protection from DTaP wanes over time, even children who are up to date with their pertussis vaccines may contract pertussis. Unvaccinated children are more likely to contract pertussis and have more severe disease than those who are fully vaccinated. These data cannot be used to interpret vaccine effectiveness or to assess risk, as the data are incomplete and there is no healthy comparison group.

Aşılama ile Aşamadıklarımız-Boğmaca

- Geçmişteki aşıya rağmen ortaya çıkan salgın deneyimleri
- Halen etkenin dolaşımda olması (aşıya rağmen)
- Zaman içinde azalan koruyuculuk (doğal enfeksiyon ya da aşıya bağlı)
- İlave pekiştirme dozları ve koza stratejisinin tam olarak uygulanmaması
- Kapsayıcılıktaki durum?

People of all ages need WHOOPING COUGH VACCINES

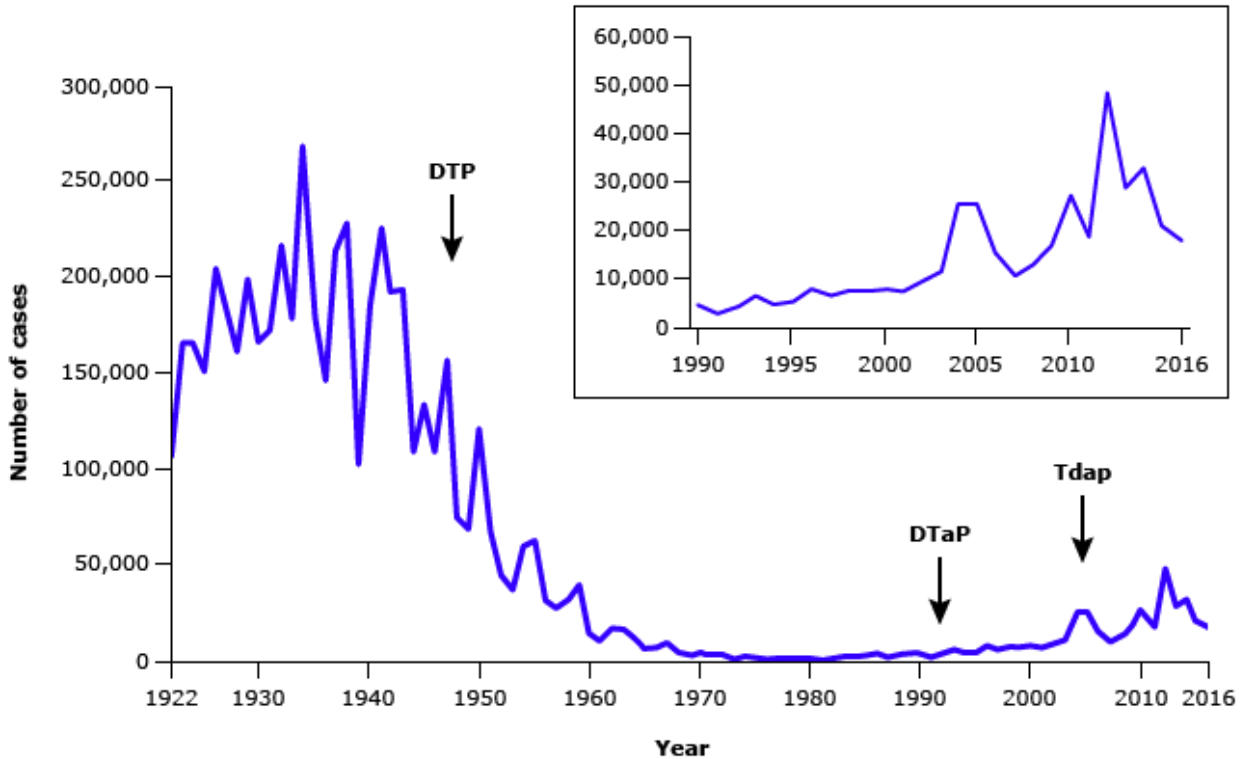
DTaP for young children	Tdap for preteens	Tdap for pregnant women	Tdap for adults
✓ 2, 4, and 6 months ✓ 15 through 18 months ✓ 4 through 6 years	✓ 11 through 12 years	✓ During the 27-36th week of each pregnancy	✓ Anytime for those who have never received it

www.cdc.gov/whoopingcough

TEŞEKKÜRLER

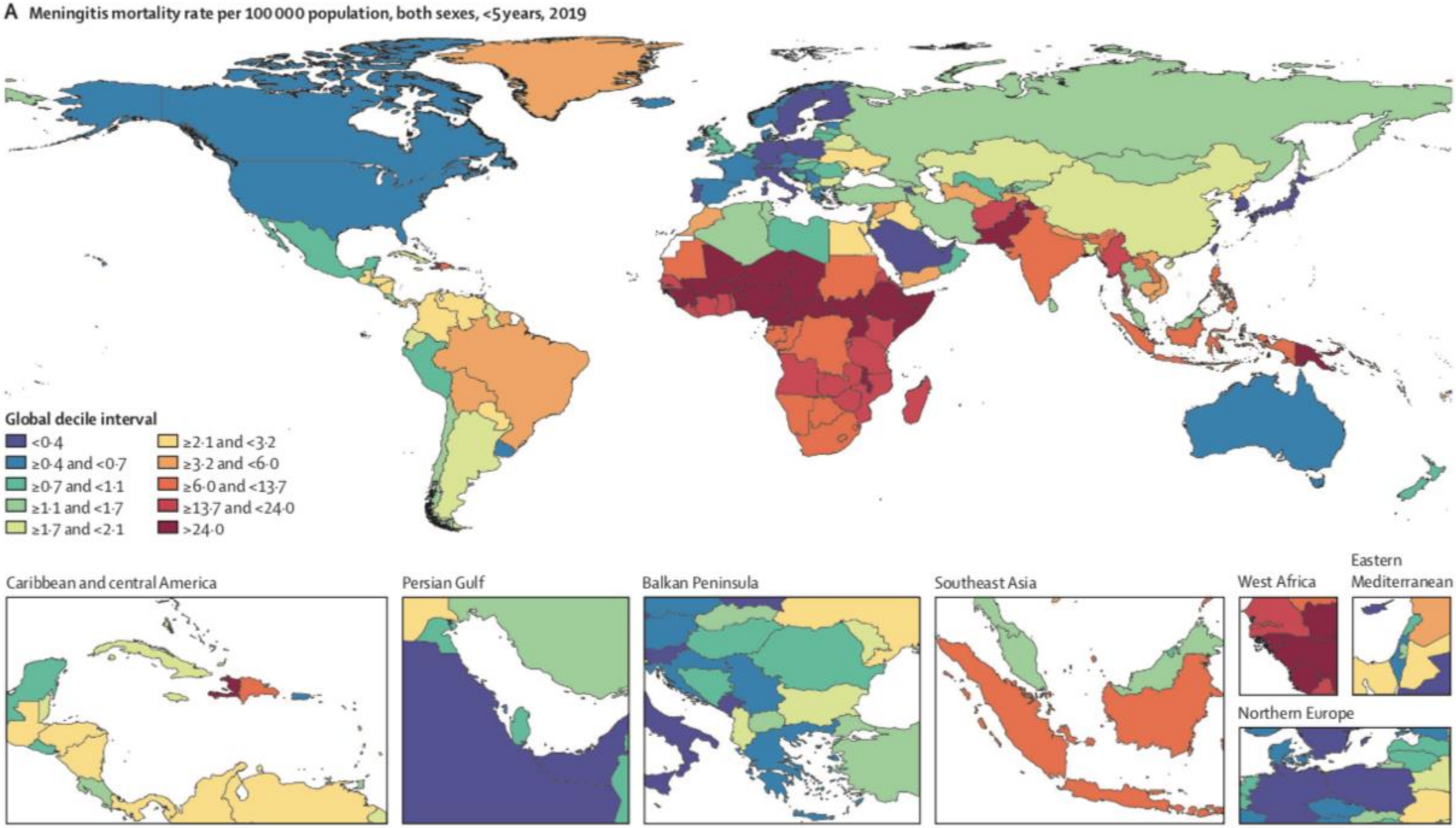
- Kelebek etkisi bir sistemin başlangıç verilerindeki küçük değişikliklerin büyük ve öngörülemez sonuçlar doğurabilmesine verilen addır

Reported pertussis cases, United States, 1922 to 2016



DTP: diphtheria, tetanus toxoids, and pertussis vaccine; DTaP: diphtheria, tetanus toxoids, and acellular pertussis vaccine; Tdap: tetanus toxoid, reduced diphtheria toxoid, and acellular pertussis vaccine.

Reproduced from: Centers for Disease Control and Prevention. Pertussis (Whooping Cough): Surveillance & Reporting. National Notifiable Diseases Surveillance System and Supplemental Pertussis Surveillance System and 1922-1949, passive reports to the Public Health Service. Available at: http://www.cdc.gov/pertussis/surv-reporting.html (Accessed on November 27, 2018).


A Meningitis mortality rate per 100 000 population, both sexes, <5 years, 2019
Global decile interval
<0·4
≥0·4 and <0·7
≥0·7 and <1·1
≥1·1 and <1·7
≥1·7 and <2·1
≥2·1 and <3·2
≥3·2 and <6·0
≥6·0 and <13·7
≥13·7 and <24·0
>24·0
Caribbean and central America
Persian Gulf
Balkan Peninsula
Southeast Asia
West Africa
Eastern Mediterranean
Northern Europe

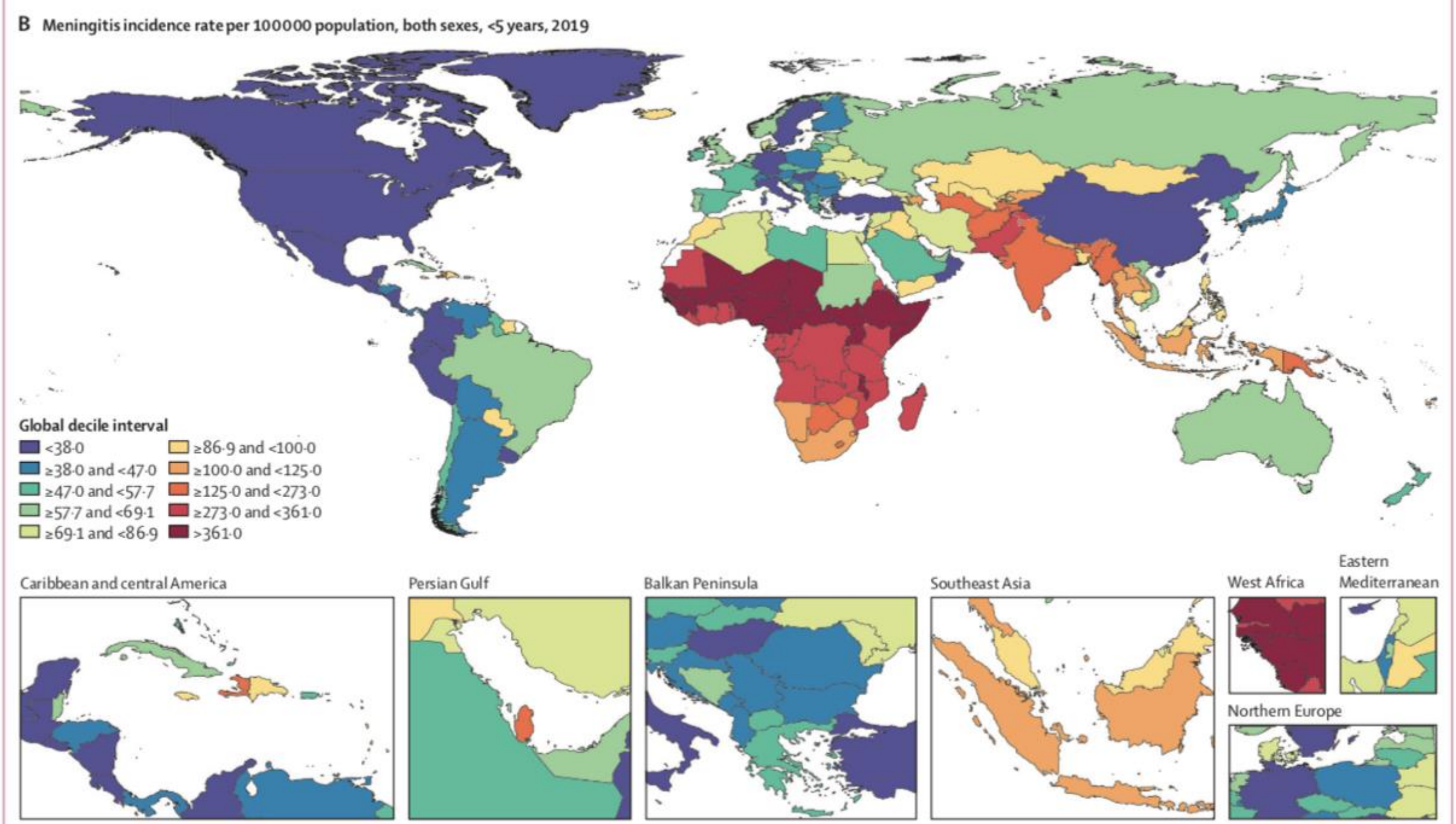


Figure 1: Meningitis mortality (A) and incidence (B) rates per 100 000 population among children younger than 5 years in 2019