Vaccines
and their impact on public health

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Copenhagen, Denmark

Citizens in Europe advocate for vaccination
TRAINING SEMINAR

6th November 2018

Thon Hotel EU
Rue de la Loi 75, Brussels

World Health Organization
REGIONAL OFFICE FOR Europe

Organisation mondiale de la Santé
BUREAU RÉGIONAL DE L' Europe

Weltgesundheitsorganisation
REGIONALBÜRO FÜR Europa

Всемирная организация здравоохранения
Европейское региональное бюро

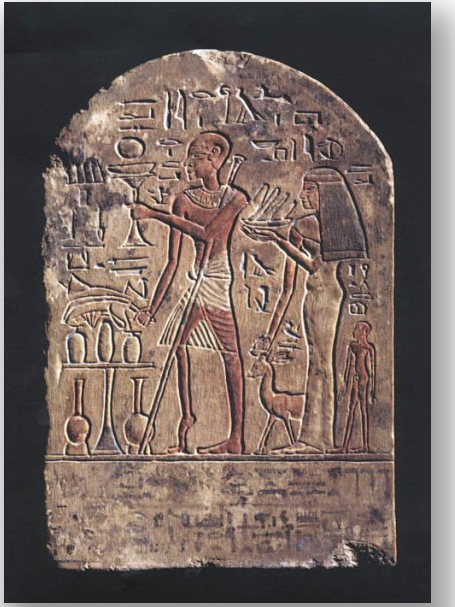
The pre-vaccination era

Smallpox: 3 out of every 10 persons who got it died

Traces of smallpox pustules found on the head of 3000 year-old mummy of Pharaoh Ramses V

Smallpox lesions

Poliomyelitis: Globally was a major cause of permanent disability



An Egyptian stele thought to represent a polio victim
18th Dynasty (1403-1365BC)

Poliomyelitis in the 20th century

1950s poliomyelitis epidemic in Boston, USA.

Theodore Roosvelt

Manual ventilation af polio patient

Diphtheria

1613: In Spain known as
El Año de los Garotillos
(strangulations)

Pseudo-membrane
covering tonsils

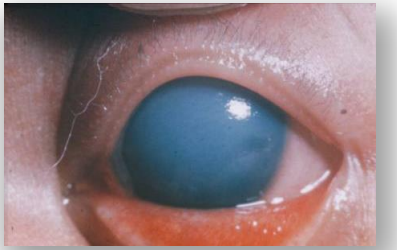
Measles

Measles rash

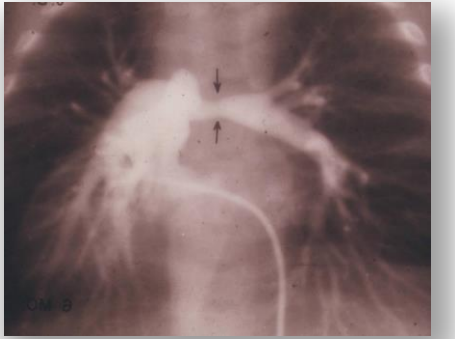
Sub-acute sclerosing encephalitis (SSPE)

Congenital rubella syndrome

Deafness



Eye defects



Heart deformities

1966

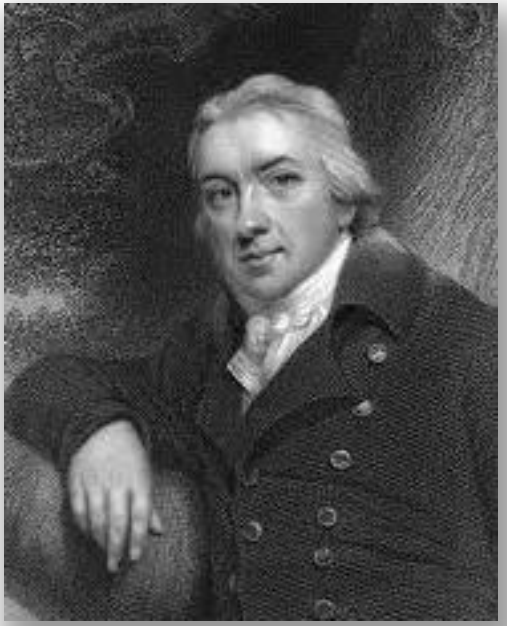
1970

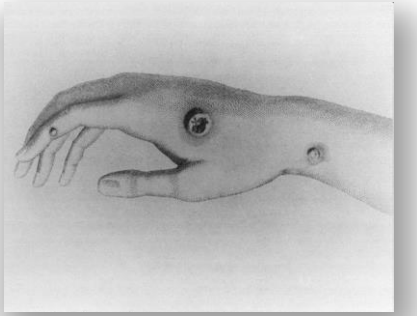
2005

Photos: courtesy of Dr Louis Z Cooper

Vaccines: an important public health tool

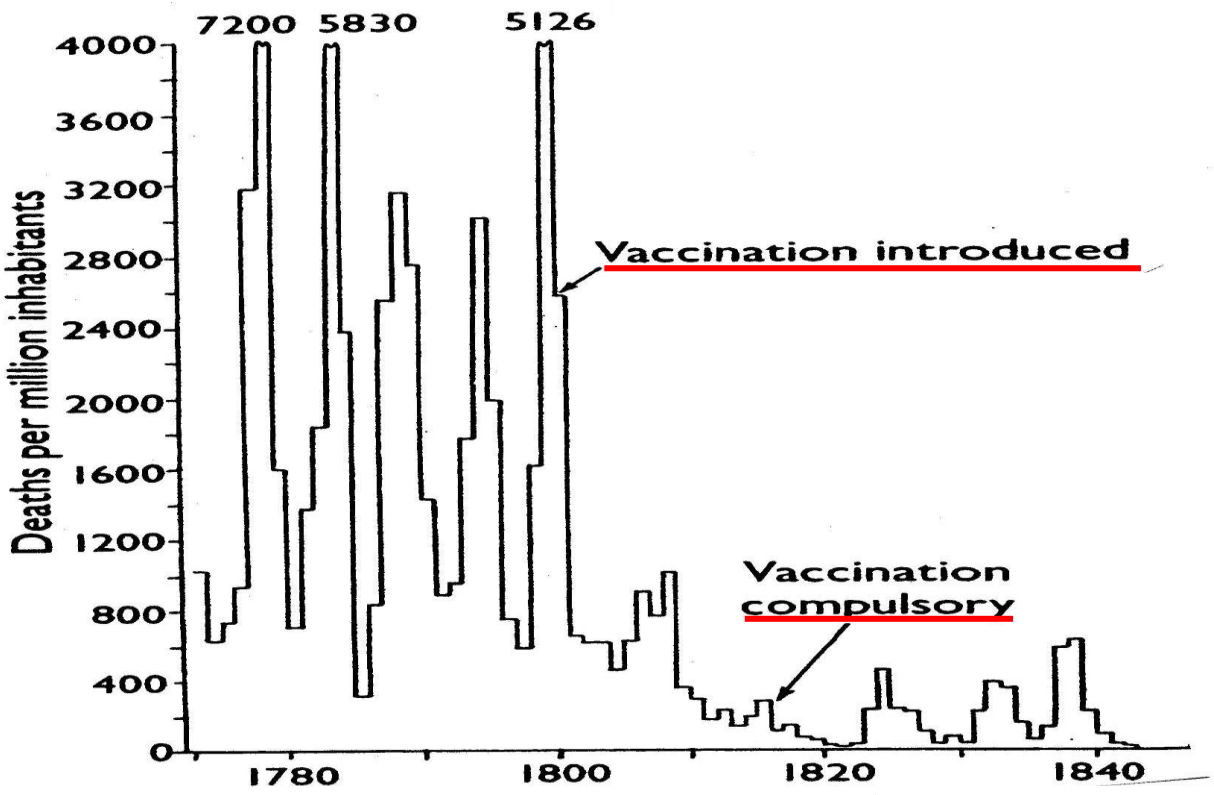
From variolation to cowpox vaccination





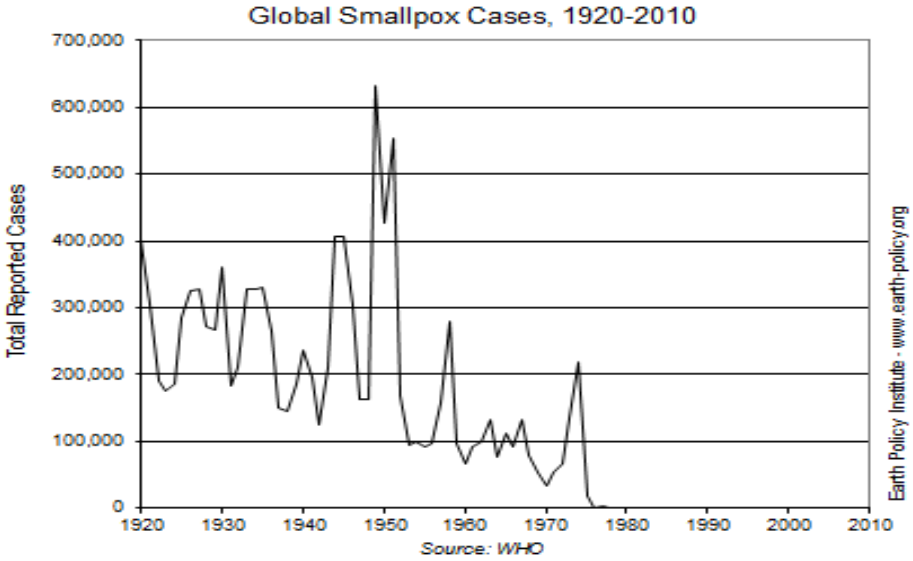
Dr. Edward Jenner in 1796
1749 –1823

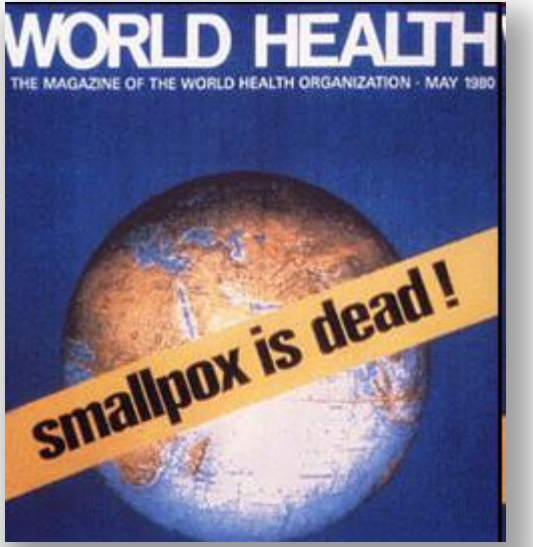
Mortality of smallpox in Sweden per million inhabitants, 1722–1843



Reference: F. Fenner, D. A. Henderson, I. Arita, 2. Ježek, I. D. Ladnyi. Smallpox and Its Eradication, WHO, Geneva, 1988.

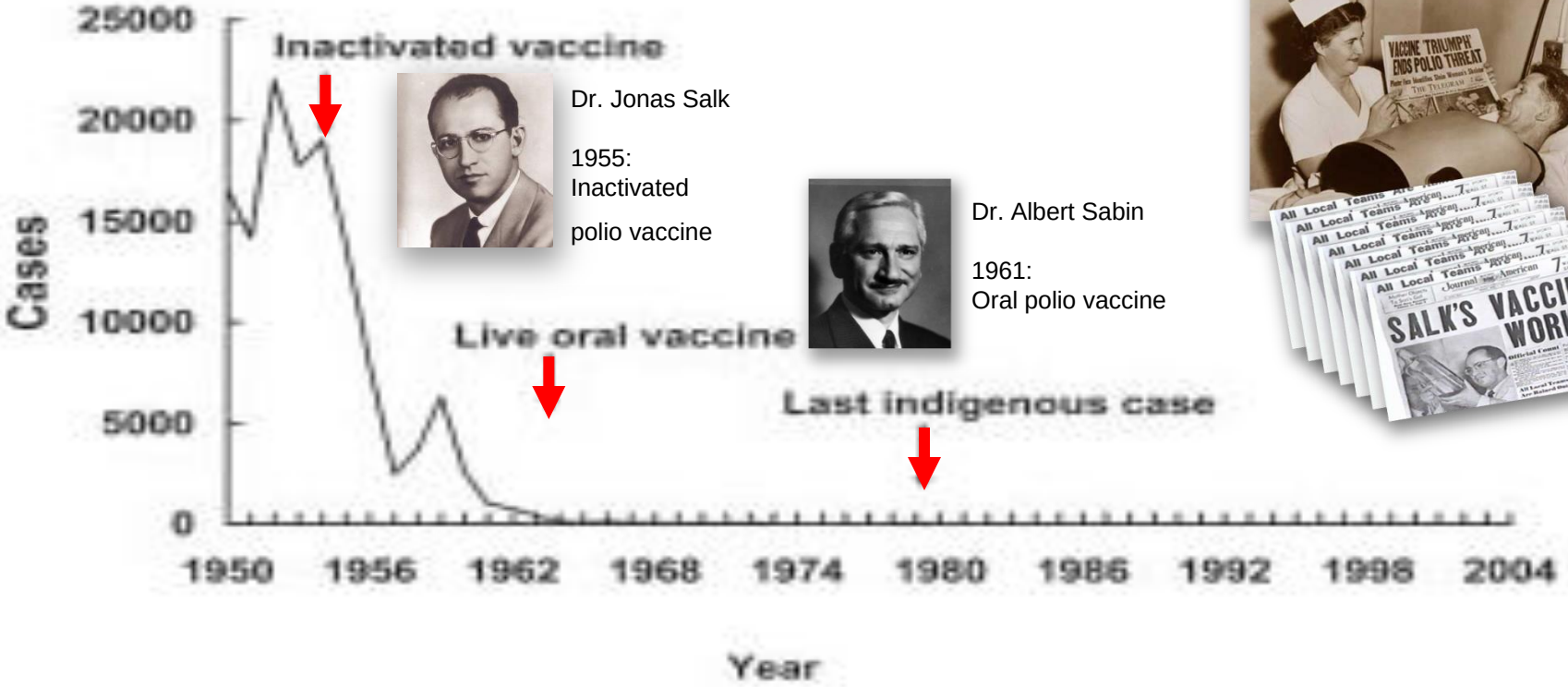
Smallpox eradication: A success story





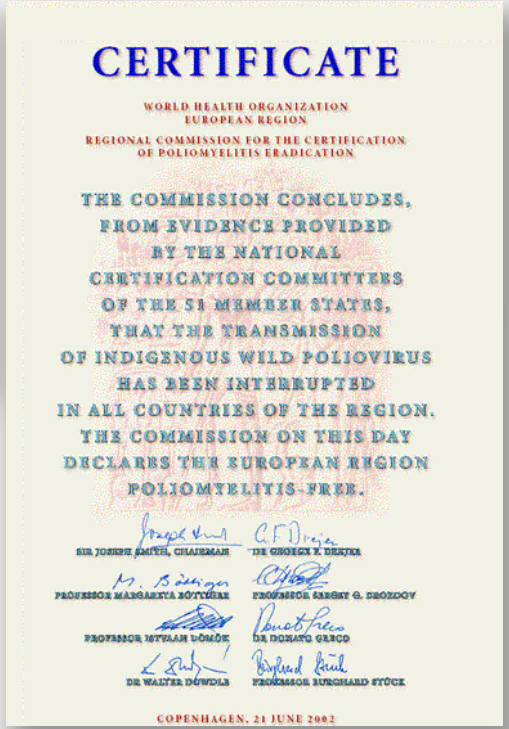
- **1977 Last naturally-acquired case**
- **1978 Laboratory-associated infection**
- **1979 WHO certifies global eradication**

Poliomyelitis: United States of America, 1959-2004



Poliomyelitis: Last cases in three WHO Regions

European Region
Melik Minas
Turkey 1998



CERTIFICATE

WORLD HEALTH ORGANIZATION
EUROPEAN REGION

REGIONAL COMMISSION FOR THE CERTIFICATION
OF POLIOMYELITIS ERADICATION

THE COMMISSION CONCLUDES,
FROM EVIDENCE PROVIDED
BY THE NATIONAL
CERTIFICATION COMMITTEES
OF THE 51 MEMBER STATES,
THAT THE TRANSMISSION
OF INDIGENOUS WILD POLIOVIRUS
HAS BEEN INTERRUPTED
IN ALL COUNTRIES OF THE REGION.
THE COMMISSION ON THIS DAY
DECLARES THE EUROPEAN REGION
POLIOMYELITIS-FREE.

SIR JOSEPH SMITH, CHAIRMAN
DR GEORGE K. DEKKER
PROFESSOR MARGARETA BÖTTIGER
PROFESSOR SERGEY G. DROZDOV
PROFESSOR ISTVÁN DÖMÖK
DR DONATO GRECO
DR WALTER DÖWDLE
PROFESSOR BURGHARD STÜCK

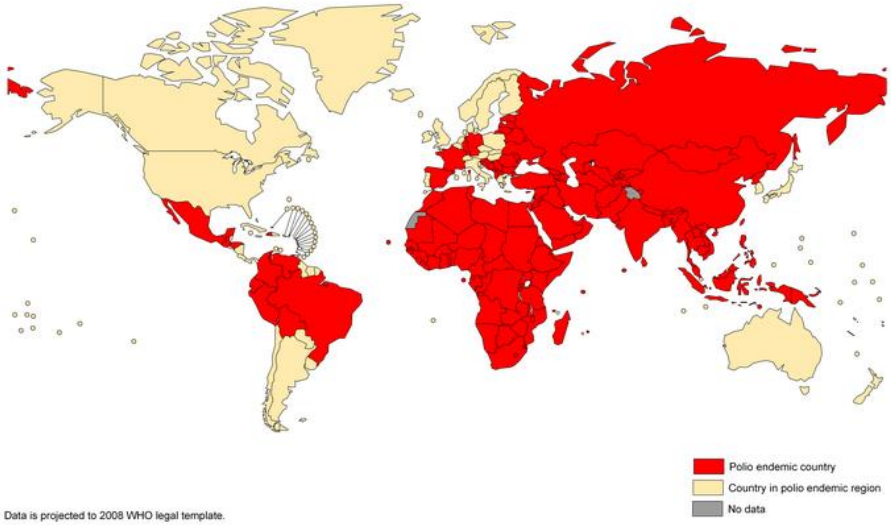
COPENHAGEN, 21 JUNE 2002

Americas Region
Luis Fermin Tenorio
Peru 1991

Western Pacific Region
Mum Chanty
Cambodia 1997

Polio-endemic countries

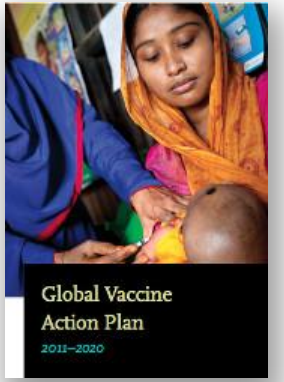
1988: >125

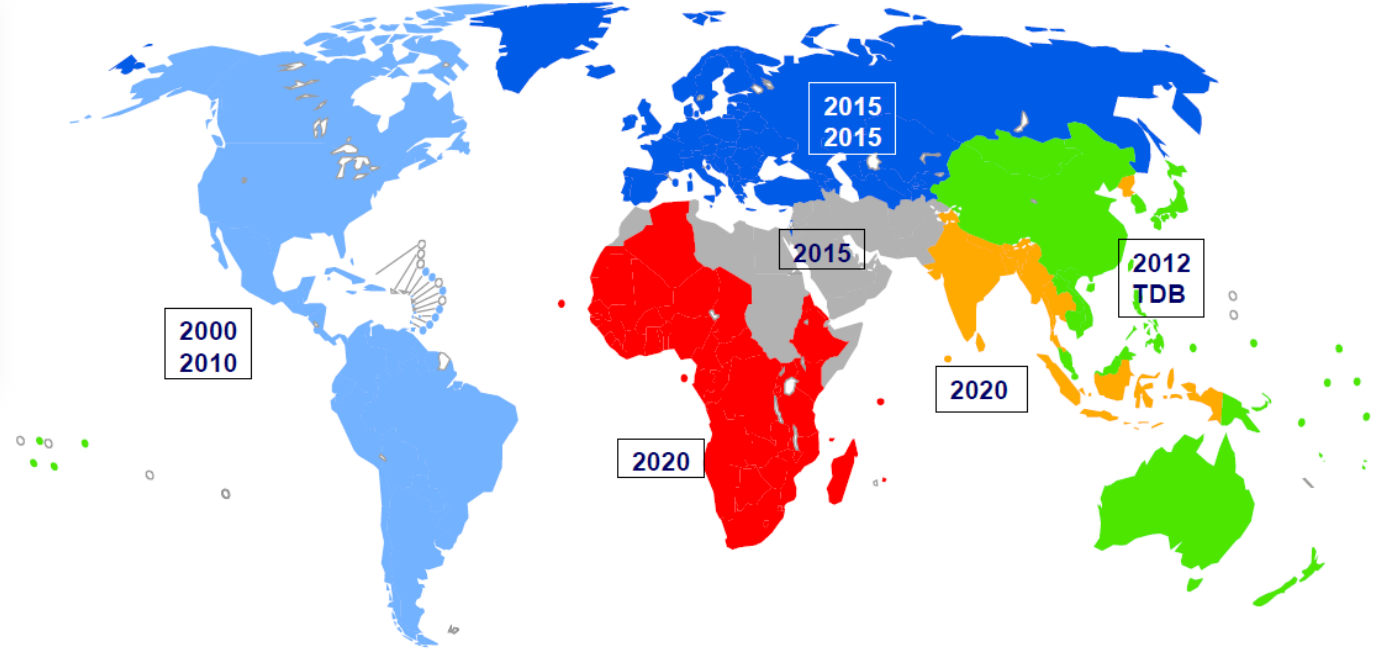


2018: 3

20 cases in 2018

All six WHO Regions have measles elimination goals





AFR – measles elimination by 2020

AMR – measles elimination by 2000 rubella by 2010

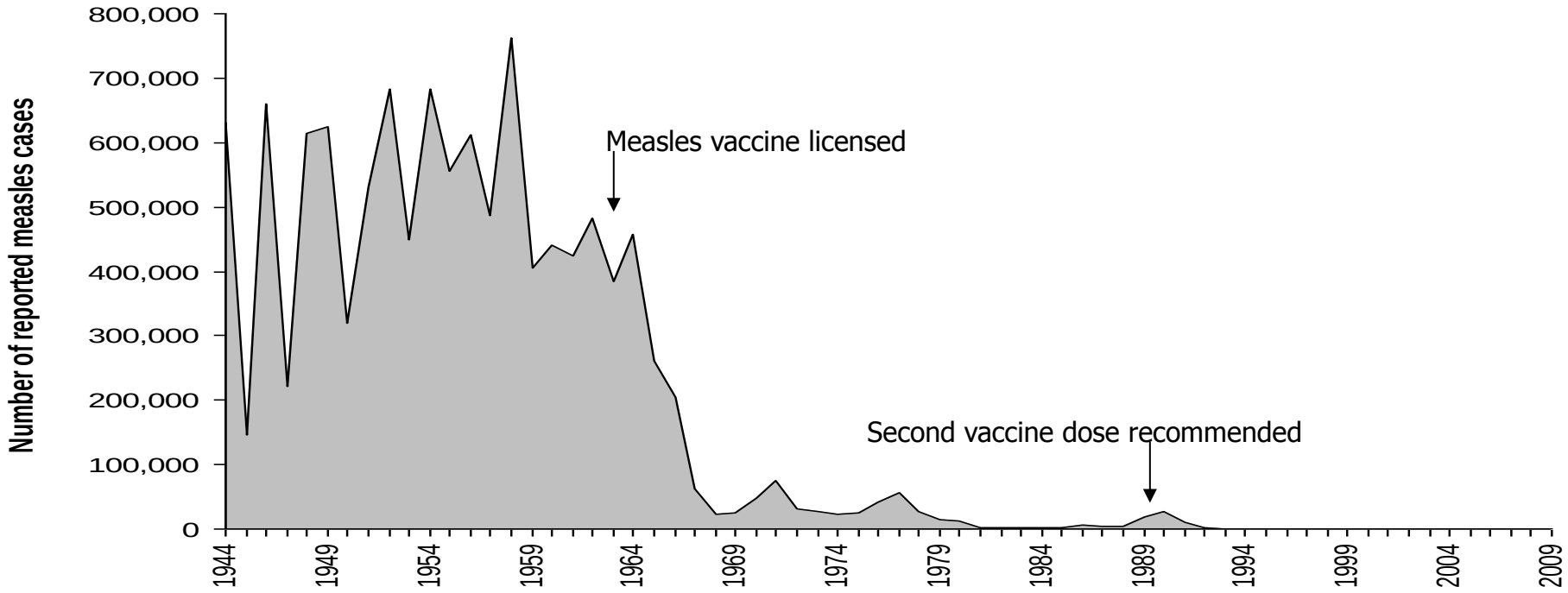
EMR – measles elimination by 2015

EUR – measles and rubella elimination by 2015

SEAR – measles elimination by 2020, rubella/CRS control by 2020

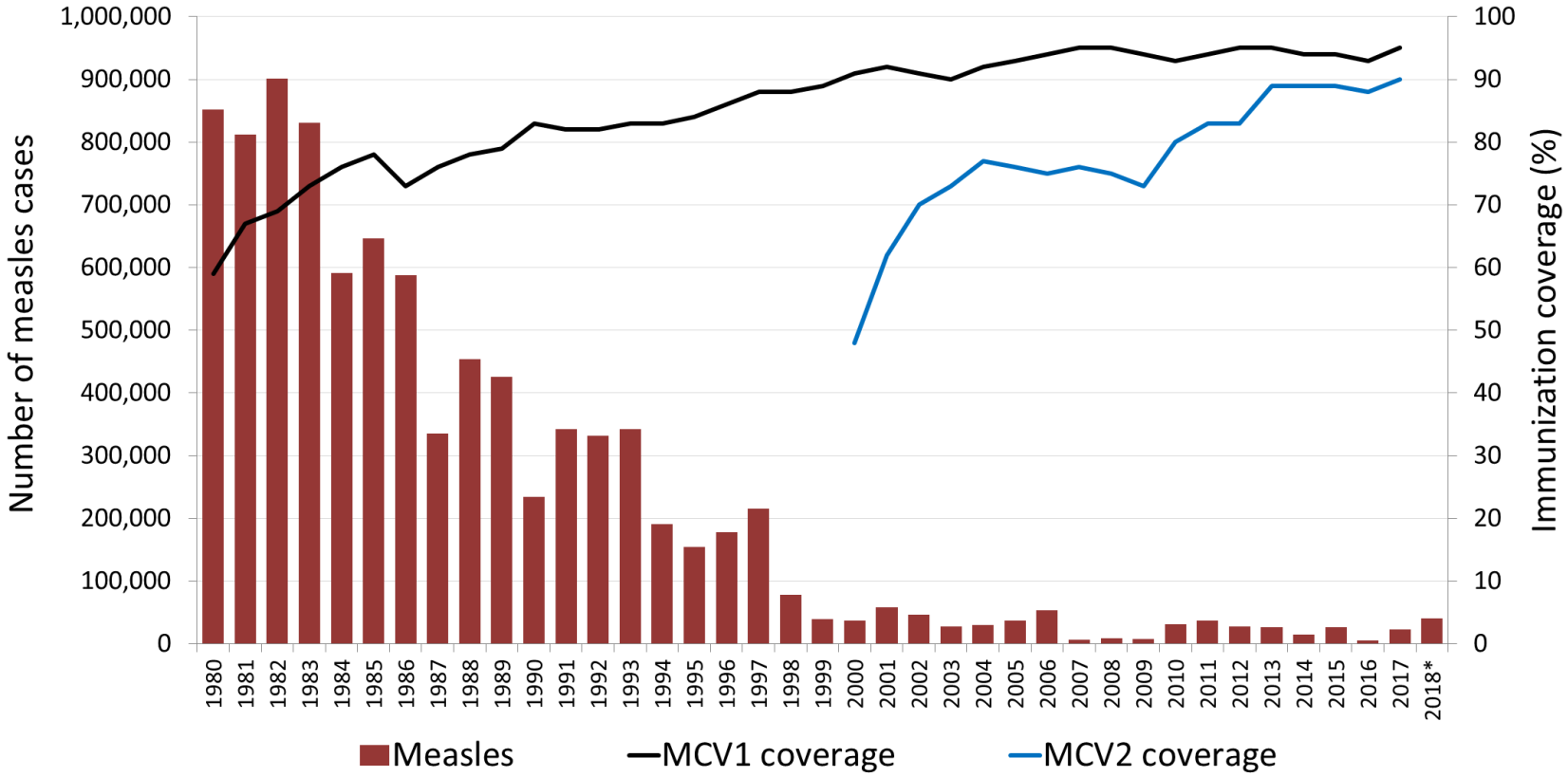
WPR – measles elimination by 2012, rubella elimination (target date still to be determined)

Reported measles cases in the United States, 1944-2009



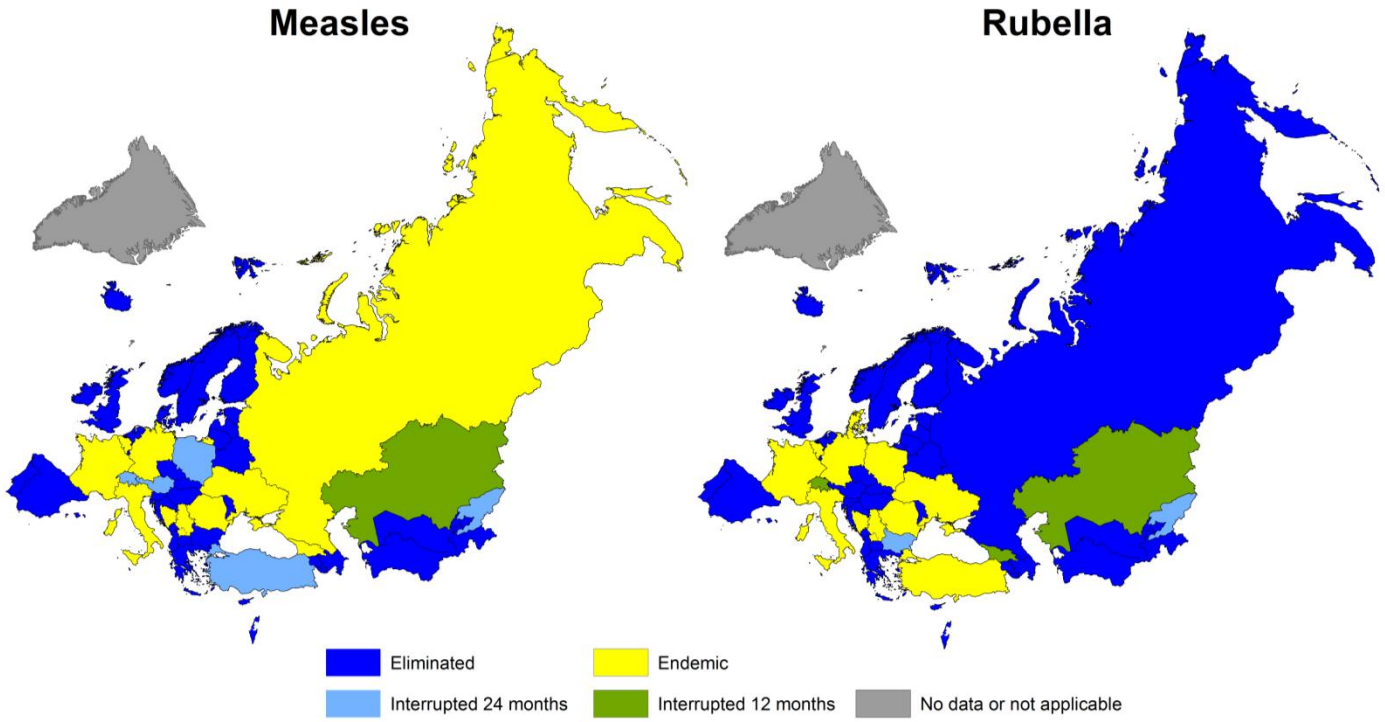
Data source: MMWR, CDC

Measles (1980-2018*) and coverage with measles-containing vaccine, WHO European Region



*Data source: Coverage data - WHO/UNICEF JRF, Cases – CISID * 2018 data is for Jan-May 2018*

Verification Status – Measles-Rubella Elimination, 2017

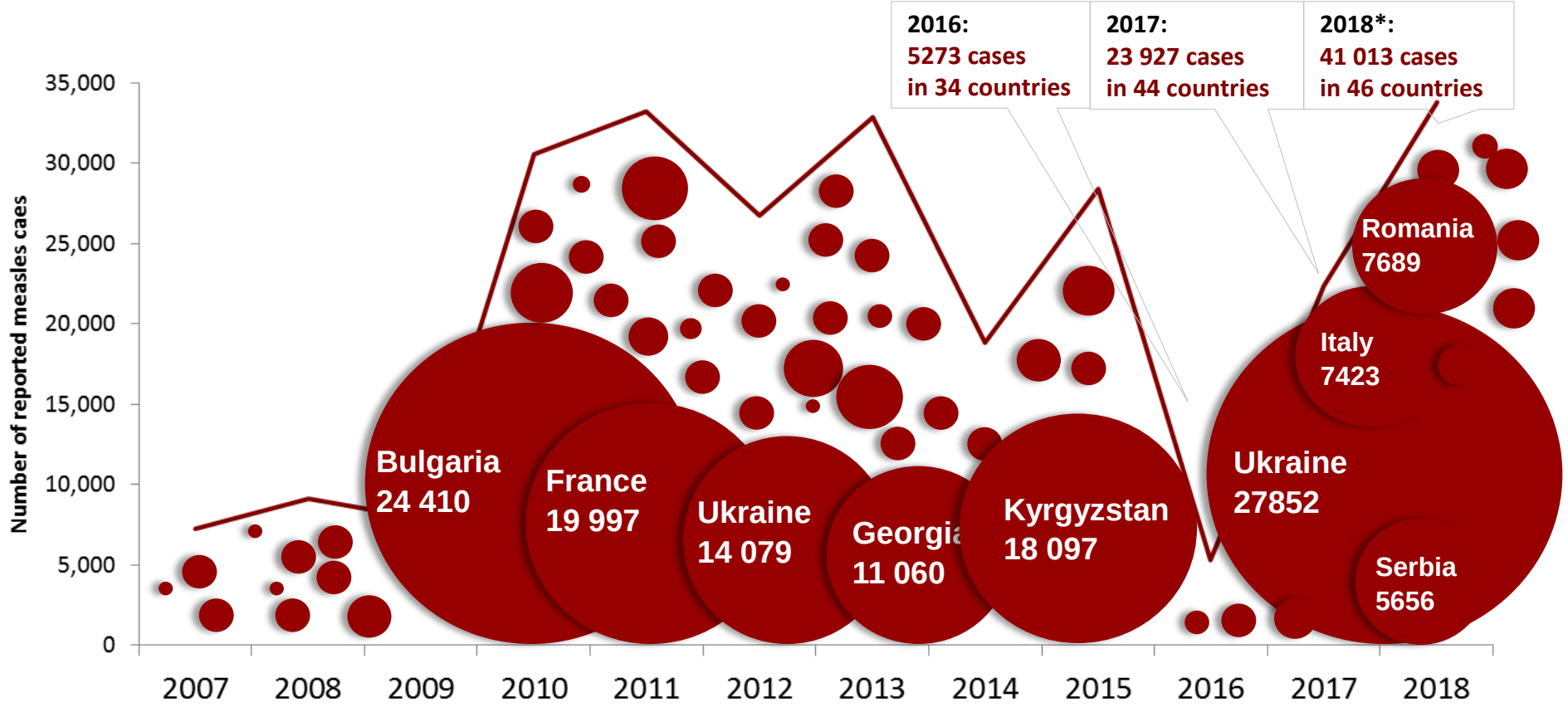


The boundaries and names shown and the designations used on this map do not imply the expression of any opinion whatsoever on the part of the World Health Organization concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. Dotted and dashed lines on maps represent approximate border lines for which there may not yet be full agreement.

Source: Regional Verification Committee Report 2017
Updated as of: 24 Aug 2018
Map Production: Vaccine-preventable Diseases and Immunization (VPI), Division of Health Emergencies and Communicable Diseases (DEC), World Health Organization Regional Office for Europe.

World Health Organization
REGIONAL OFFICE FOR Europe

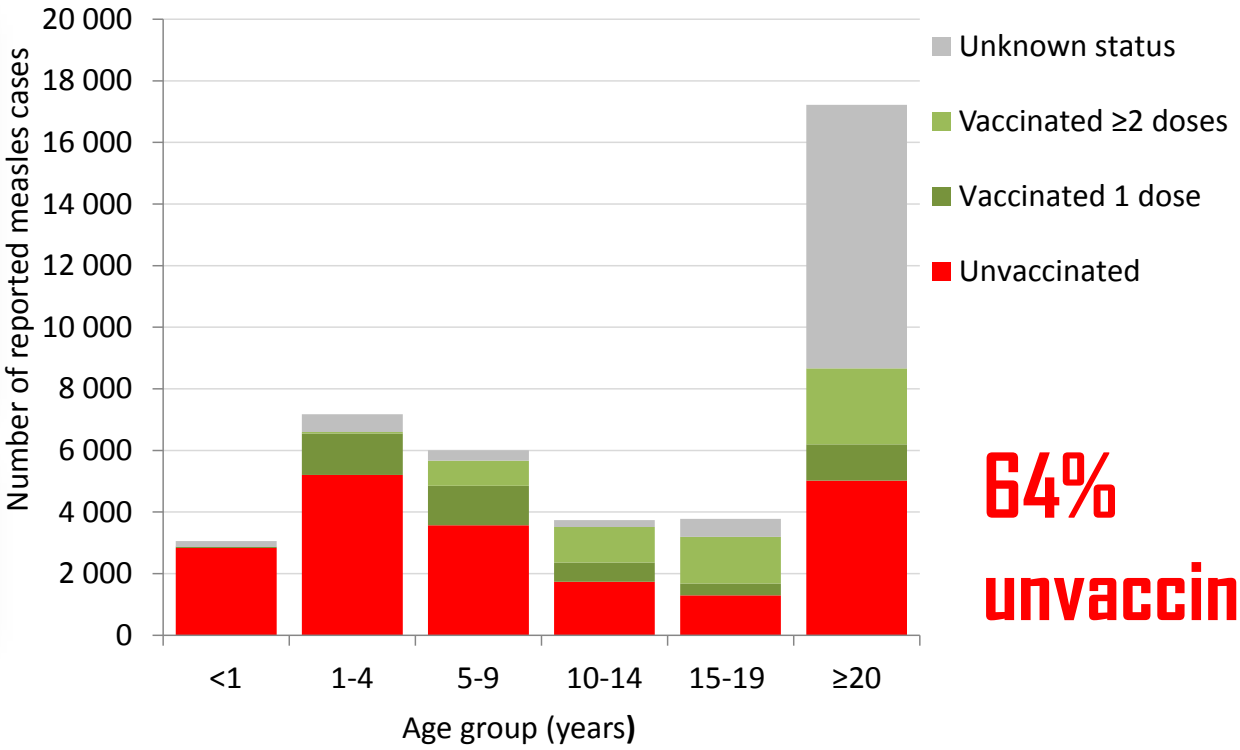
Number of measles in the WHO European Region, 2007-2018*



* Preliminary data for Jan-Jun 2018

Data source: CISID, extracted 1 August 2018

Age distribution and vaccination status of measles, WHO European Region, January-June 2018 *(n=30,511)*

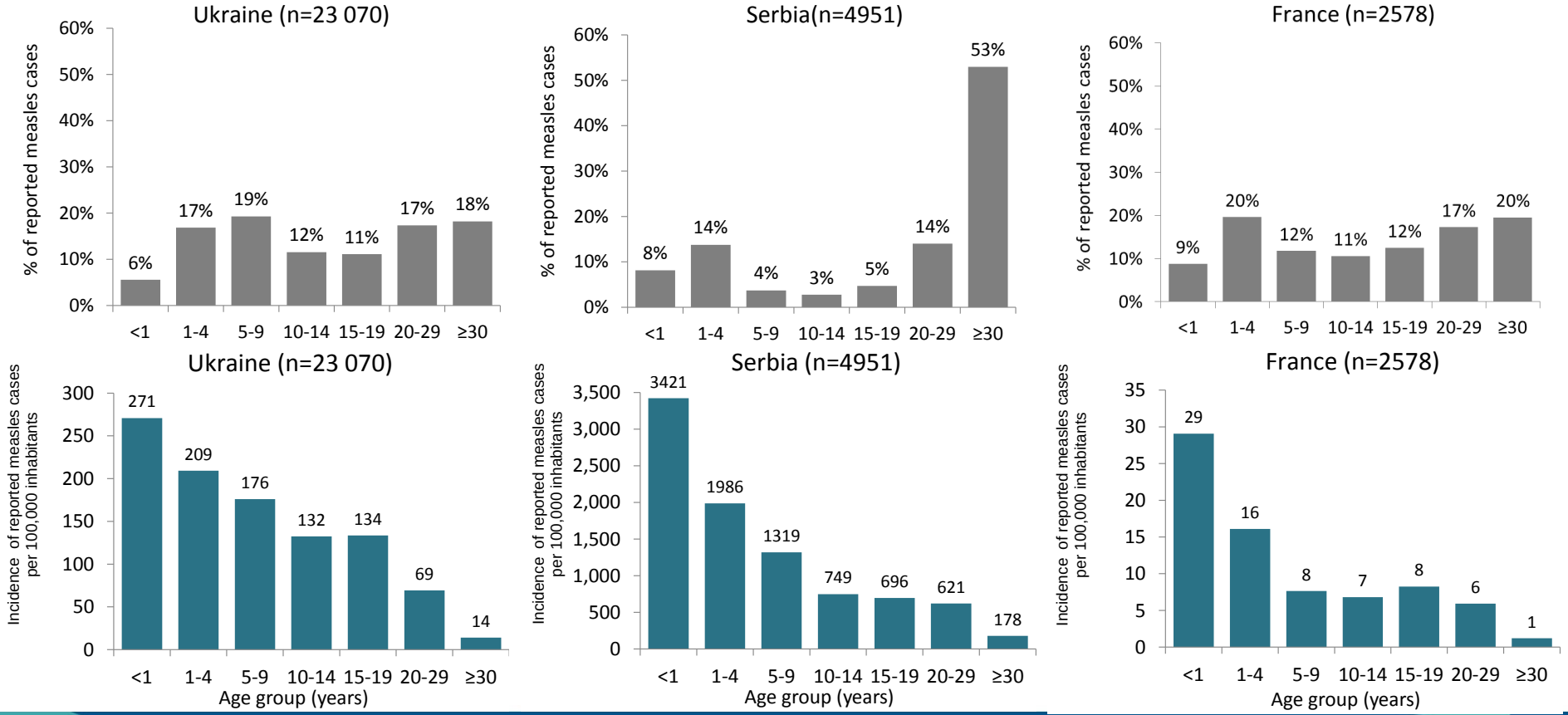


64% unvaccinated

Unknown status and age in 10,472 cases (26% of total)

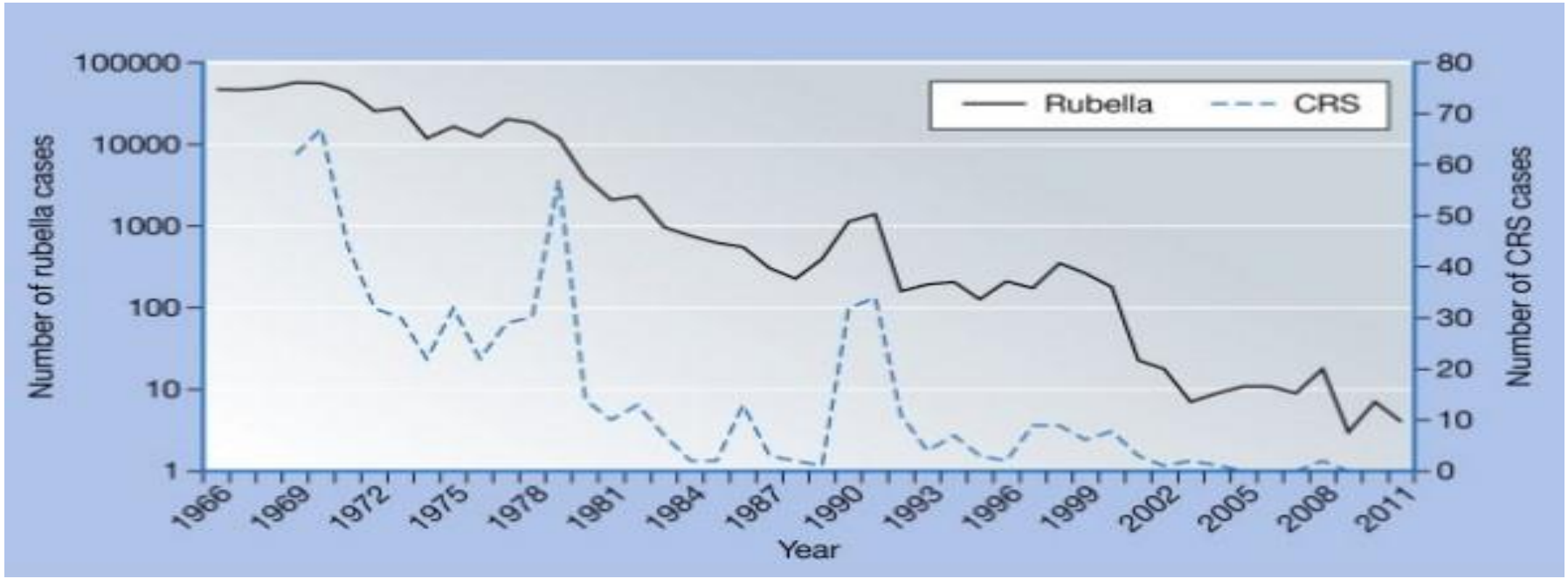
Data source: CISID 2, extracted 1 August 2018

Age distribution of measles in top 3 reporting countries of the WHO European Region, January-June 2018



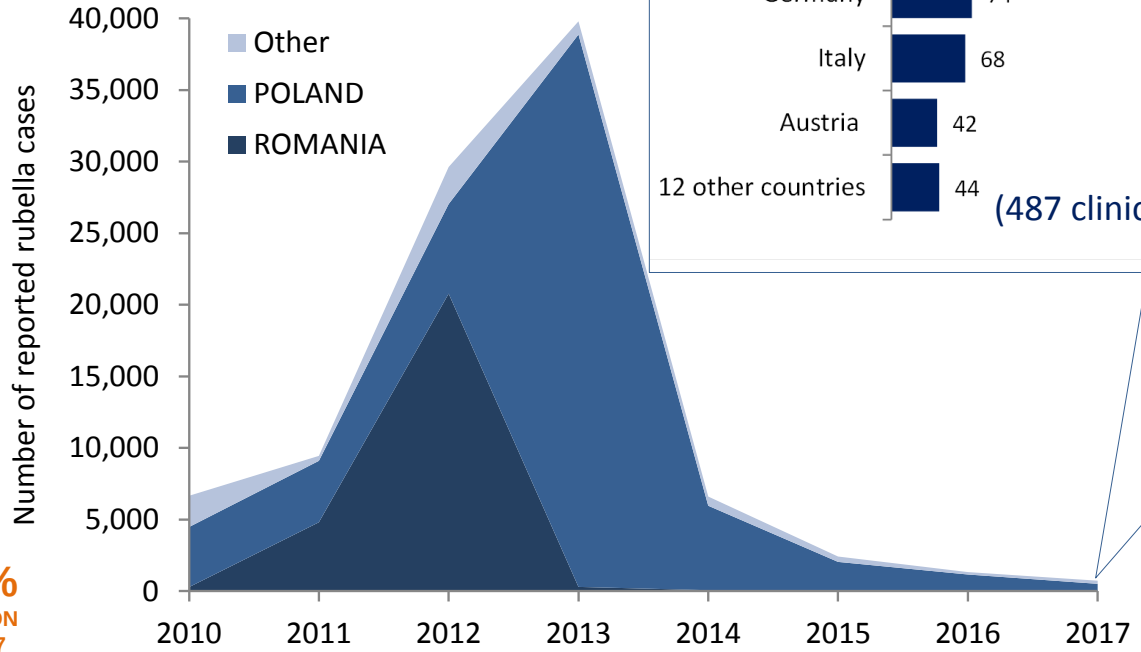
Data source: CISID, extracted 1 August 2018

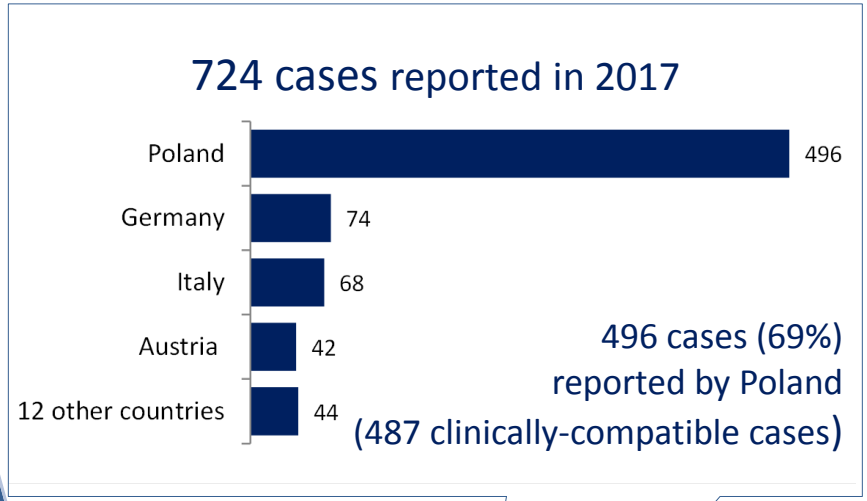
Reported rubella and congenital rubella syndrome (CRS) cases, United States, 1966 to 2011



Rubella in the WHO European Region, 2000 & 2010-2017

621 039
cases in 2000





88% of cases in the Region in **4** countries *(n=638)*

99.8%
REDUCTION
2000-2017

Data source: CISID, extracted 16 April 2018

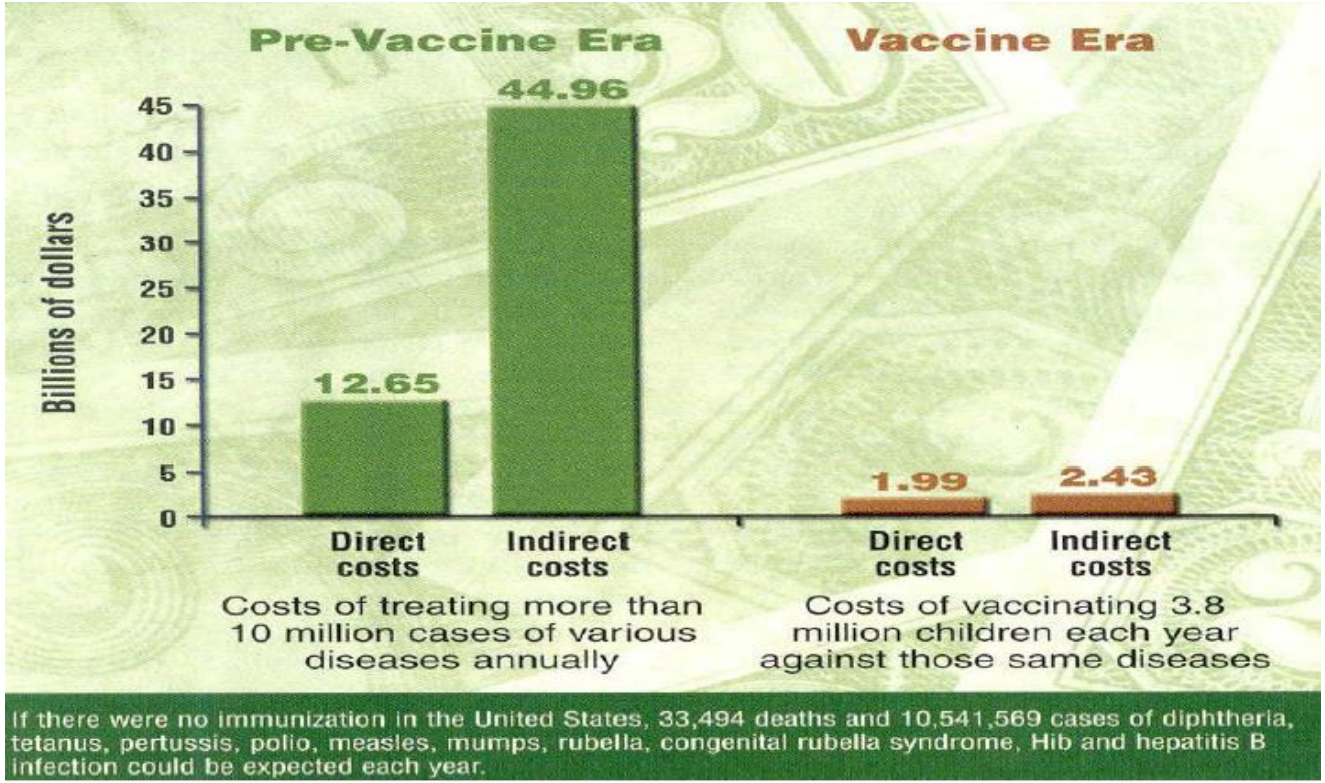
Outline of the development of human vaccines (1)

	Live-attenutated	Killed whole organisims or sub-unit	Purified proteins or polysaccharides
18th Century	Smallpox 1798		
19th Century	Rabies 1885	Typhoid 1896 Cholera 1986 Plague 1897	
20th Century (early)	BCG 1927 Yellow Fever 1935	Pertussis 1926 Influenza 1936	Diphtheria 1923 Tetanus 1927
20th Century (Post-World War II)	Polio (OPV) Measles Mumps Rubella Adenovirus Typhoid Ty21a Varicella Cholera CVD103 Zoster	Influenza Polio (IPV) Rabies (new) Anthrax Japanese encephalitis Hepatitis A Tick-borne encephalitis	

Outline of the development of human vaccines (2)

	Reassortants	Genetically engineered	Purified proteins or polysaccharides
20th Century **Post-World War II**		**Hepatitis B recombinant** **Cholera toxin** **Pertussis toxin**	**Pneumococcus** **Meningococcus** **Hepatitis B (plasma derived)** ***H. influenzae*** **Typhoid (Vi)** **Pertussis (acellular) *H. Influenzae (conjugate)***
21th Century	**Influenza** **(killed + live)** **Rotavirus**	**Papillomavirus**	**Pneumococcus *(conjugate)*,** **Meningococcus *(conjugate)***

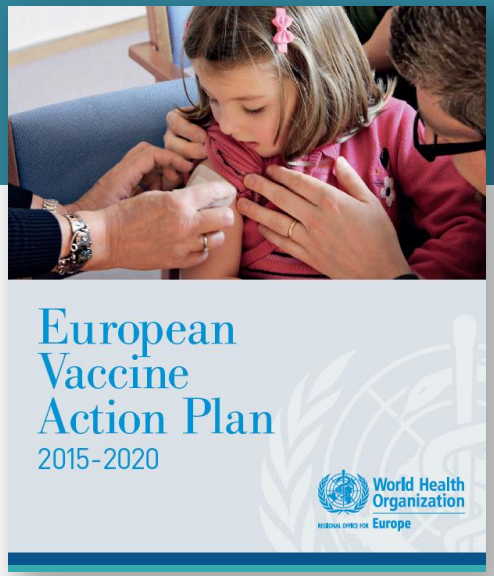
Economic benefits of immunization



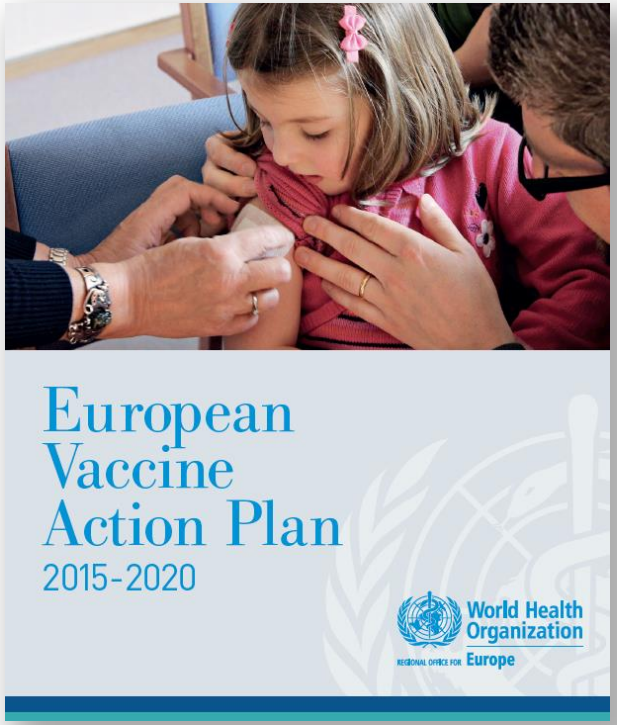
The benefits of immunization in preventing disease are well proven.

- **Save lives**
- **Reduce morbidity**
- **Cost-effective**

"A European Region **free** *of vaccine-preventable diseases, where all countries provide* **equitable** *access to* **high-quality**, **safe**, **affordable** *vaccines and immunization services throughout the* **life-course***"*



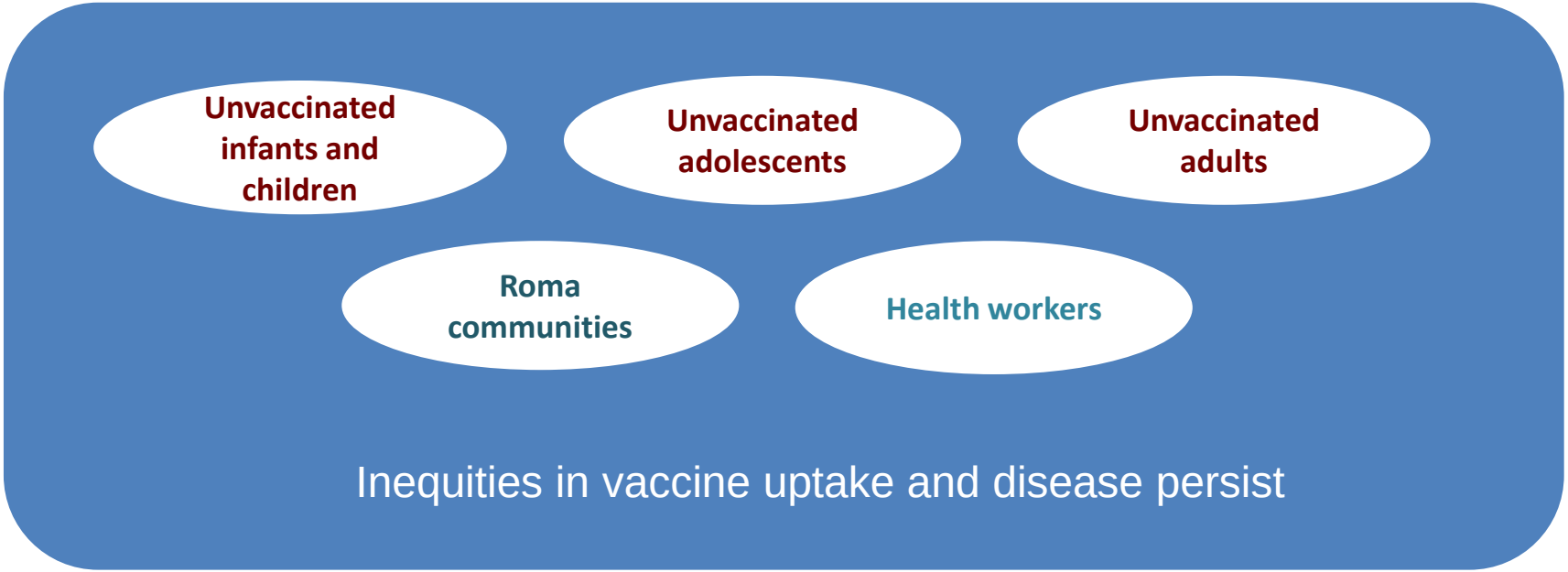
European Vaccination Action Plan (EVAP): GOALS



- Sustain polio-free status
- Eliminate measles and rubella
- Control hepatitis B
- Meet regional vaccination coverage targets
- Evidence-based decisions on introduction of new vaccines
- Immunization programmes are financially sustainable

The challenges

Measles outbreaks affected several susceptible populations

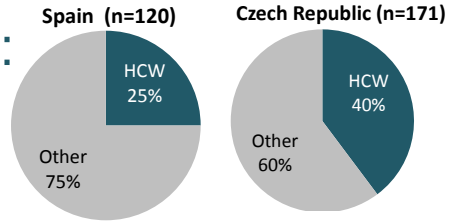


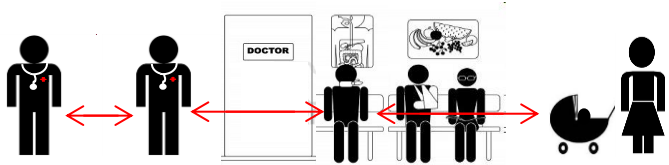
Main public settings for measles outbreaks

Health-care settings

12 countries reported nosocomial transmission in recent years

In 2014:





13-19 times higher risk of acquiring measles in susceptible HCWs than for the general public

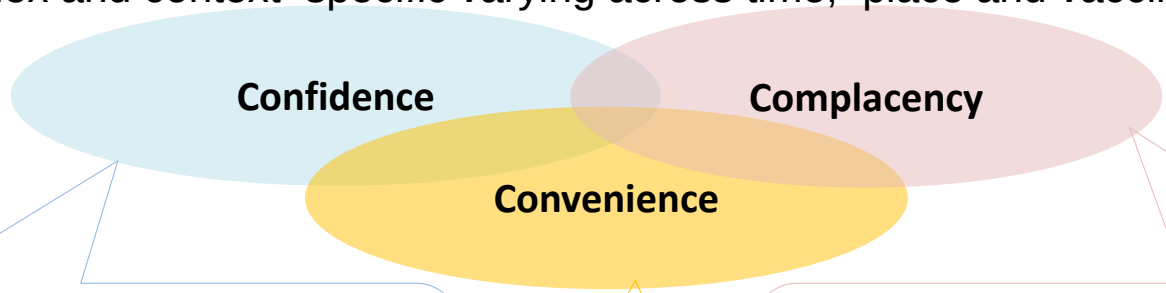
Educational facilities

- Day care centres
- Kindergardens
- Schools
- Anthroposophic Schools
- Universities

At least **8** countries have reported outbreaks in educational facilities in recent years

Vaccine hesitancy

- refers to delay in acceptance or refusal of vaccines despite availability of vaccine services
- complex and context specific varying across time, place and vaccines



Trust:
in safety and/or effectiveness of vaccines, in delivery system, in government.

Perceived risks:
Disease risk low; vaccination not deemed immediately or not at all necessary.

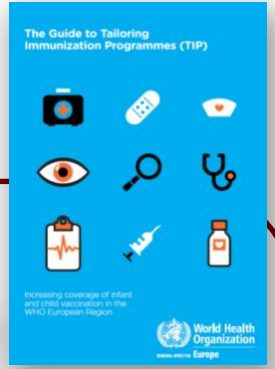
Access:
Geographical and time, affordability, appeal of services

Immunization programme limitations

- Lack of timely monitoring of coverage
- Limited ability to follow up unvaccinated individuals/groups
- Lack of communication strategies
- Health professionals not properly educated on vaccines
- Inflexibilty of vaccine services
- Vaccine supply issues
- Delayed outbreak response

Examples of activites and polices to reach and maintain high population immunity

- Vaccination registers with reminder systems
- Supplementary immunization activities
- Tailoring Immunization Programmes
- Opportunity vaccination
- Pre-school entry policies
- Pre-travel vaccination
- Health workers policies



Knowledge, Training and Advocacy

- Widespread misinformation and myths
- Lack of education and training on vaccines in medical curricula
- False contraindications
- Lack of information
- Lack of personal knowledge and disease awareness

- Web-based information on diseases and benefits of vaccines
- Medical and nursing curricula
- Continued medical education
- Training in communication
- Working with schools
- Health care workers to promote vaccines

Knowledge, Training and Advocacy

European Immunization Week

http://www.euro.who.int/en/media-centre/events/events/2018/04/european-immunization-week-2018/video-gallery

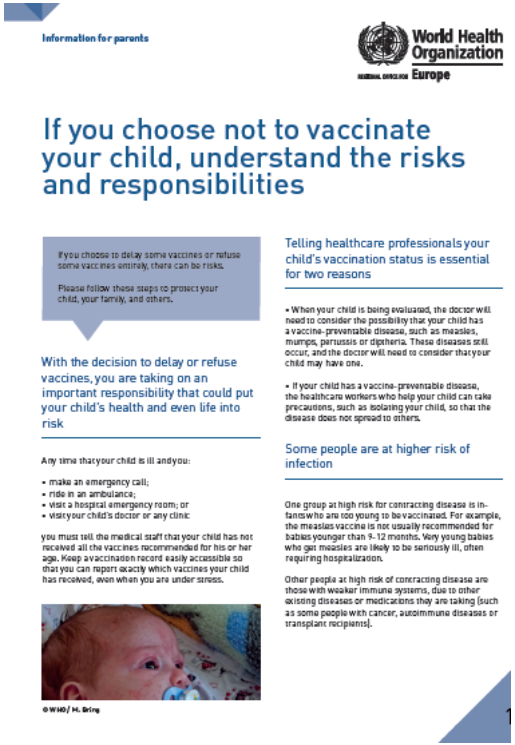
Communication and advocacy

http://www.euro.who.int/en/health-topics/disease-prevention/vaccines-and-immunization/activities/communication-and-advocacy

Knowledge, Training and Advocacy

Immunization Resource Centre

http://www.euro.who.int/en/health-topics/disease-prevention/vaccines-and-immunization/publications/communication-and-advocacy/immunization-resource-centre



http://www.euro.who.int/__data/assets/pdf_file/0004/160753/If-you-choose_EN_WHO_WEB.pdf?ua=1

Knowledge, Training and Advocacy

European Immunization Week in Republic of Moldova: addressing vaccine hesitancy

To mark European Immunization Week, the popular Moldovan parent online community “Ask a Mom” organized a web live-streamed event on 25 April 2018 in Chisinau, Republic of Moldova.

The objective of the event, which was viewed by over 14 000 visitors, was to address vaccine hesitancy by bringing together parents and health experts.

European Immunization Week

Prevent Protect Immunize

Conclusion

The benefits of immunization in preventing disease are well proven.

Vaccine-preventable diseases caused millions of deaths and/or disabilities before the introduction of vaccines.

Vaccines are one of the most important public health tools available for disease prevention.