

History and aims of immunisation

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Objectives

- To examine the history of immunisation
- To explain the aim of immunisation
- To develop an understanding of the role of the following agencies in relation to immunisation
 - The National Immunisation Advisory Committee (NIAC)
 - The Department of Health (DoH)
 - The Health Service Executive (HSE)
 - The National Immunisation Office (NIO)
 - The Health Protection Surveillance Centre (HPSC)
- To understand the importance of infectious disease surveillance in Ireland



Smallpox



Edward Jenner (1749 –1823)

Variola virus

Infected humans 10,000 years ago

Known in China 11th century BC

Inoculation described 6th century BC

1796 vaccinia virus isolated



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Smallpox



“More mites die
from vaccination
than from the
disease they are
supposed to be
inoculated against”

George Bernard
Shaw 1929

Smallpox



1977 Last reported case Somalia

1980 WHO declared eradication

CDC. Public Health Images Library (PHIL) id# 131. Source: CDC/Barbra Rice



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Polio

Endemic for thousands of years

1955 Inactivated polio vaccine

1962 Live oral polio vaccine

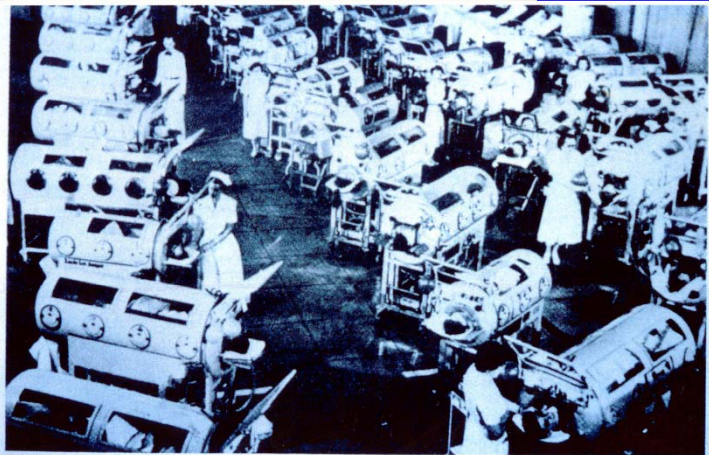
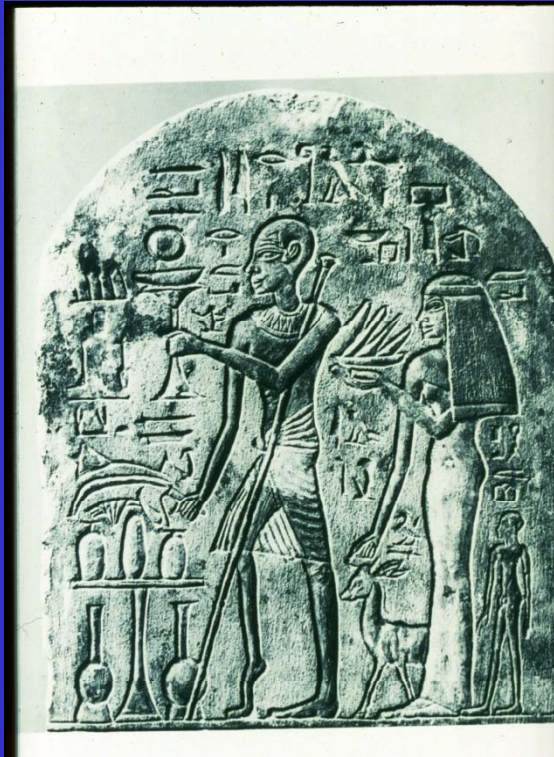


Figure 1.2 A ward of patients suffering from bulbar poliomyelitis



courtesy of www.polioeradication.org

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Polio

Immunisation campaigns in
Cuba and Eastern Europe

Wild polio virus eradicated
in large areas

Basis for eradication

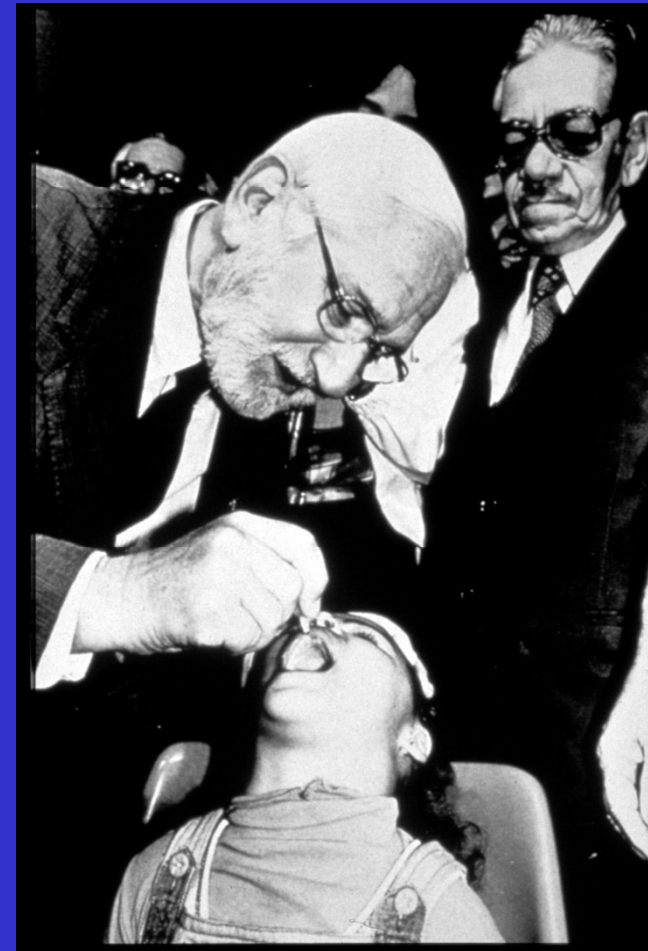


Photo courtesy of www.polioeradication.org



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Polio

POLIO GLOBAL
ERADICATION
INITIATIVE

every last child

[POLIO AND PREVENTION](#) | [KEY COUNTRIES](#) | [DATA AND MONITORING](#) | [POST-ERADICATION](#) | [RESEARCH](#) | [FINANCING](#) | [MEDIA ROOM](#)

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Polio this week

[Polio cases worldwide](#)

[Wild poliovirus list](#)

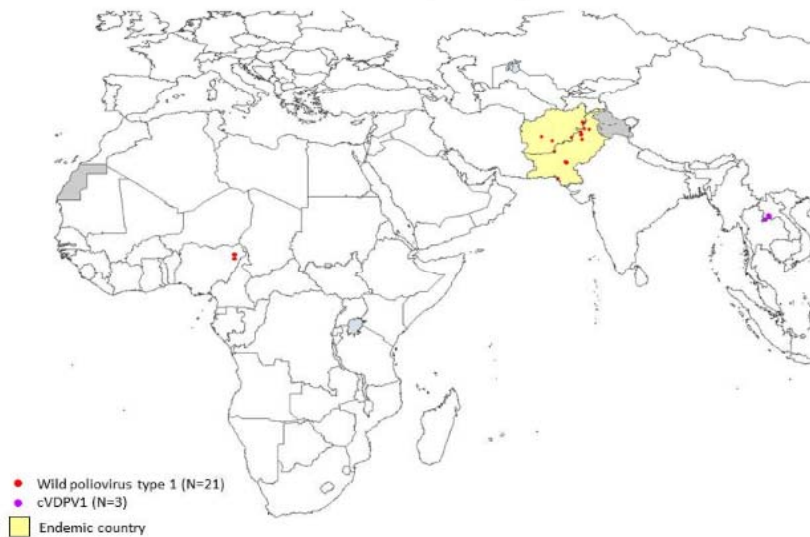
[Circulating vaccine-derived poliovirus](#)

[Surveillance](#)

[Polio eradication targets](#)

2016 2015 previous 6 months previous 12 months

Wild Poliovirus & cVDPV Cases¹, 2016
01 January – 16 August



¹Excludes viruses detected from environmental surveillance.

Data in WHO HQ as of 16 August 2016

Polio 2016

- 74 cases in 2015
- 21 cases to date in 2016
- 2 in non endemic countries
- Pakistan/ Afghanistan/ Nigeria

Global Polio
Eradication Initiative



This vaccine delivery in the mountains of Afghanistan illustrates the challenges to the cold chain.



Average USA Annual Morbidity Due to Vaccine Preventable Diseases in the 20th Century compared with Morbidity in 2013 (for pre-1990 vaccines)

Comparison of 20th Century Annual Morbidity & Current Morbidity

Disease	20 th Century Annual Morbidity*	2013 Reported Cases [†]	% Decrease
Smallpox	29,005	0	100%
Diphtheria	21,053	0	100%
Pertussis	200,752	28,639	86%
Tetanus	580	26	96%
Polio (paralytic)	16,316	1	>99%
Measles	530,217	187	>99%
Mumps	162,344	584	>99%
Rubella	47,745	9	>99%
CRS	152	1	99%
<i>Haemophilus influenzae</i>	20,000 (est.)	31 [§]	>99%

Sources:

* JAMA. 2007;298(18):2155-2163

† CDC. MMWR August 15, 2014;63(32):702-715. (MMWR 3013 final data)

§ *Haemophilus influenzae* type b (Hib) <5 years of age. An additional 10 cases of Hib are estimated to have occurred among the 185 reports of Hi (<5 years of age) with unknown serotype.



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Comparison of Pre-Vaccine Era Estimated Annual Morbidity with Current Estimate

Disease	Pre-Vaccine Era Annual Estimate	2013 Estimate (unless otherwise specified)	% Decrease
Hepatitis A	117,333 [*]	2,890 [†]	98%
Hepatitis B (acute)	66,232 [*]	18,800 [†]	72%
Pneumococcus (invasive)			
All ages	63,067 [*]	33,500 [¶]	47%
<5 years of age	16,069 [*]	1,900 [§]	88%
Rotavirus (hospitalizations <3 years of age)	62,500 [‡]	12,500 ^{**}	80%
Varicella	4,085,120 [*]	167,490 ^{††}	96%

Sources:

- * JAMA. 2007;298(18):2155-2163
- † CDC. Viral Hepatitis Surveillance – United States, 2011
- ¶ CDC. Active Bacterial Core surveillance Provisional Report; *S. pneumonia* 2013.
- § CDC. Unpublished, Active Bacterial Core surveillance
- ‡ CDC. *MMWR*. February 6, 2009 / 58(RR02); 1-25
- ** New Vaccine Surveillance Network 2013 data (unpublished); U.S. rotavirus disease now has biennial pattern
- †† CDC. Varicella Program 2013 data (unpublished)



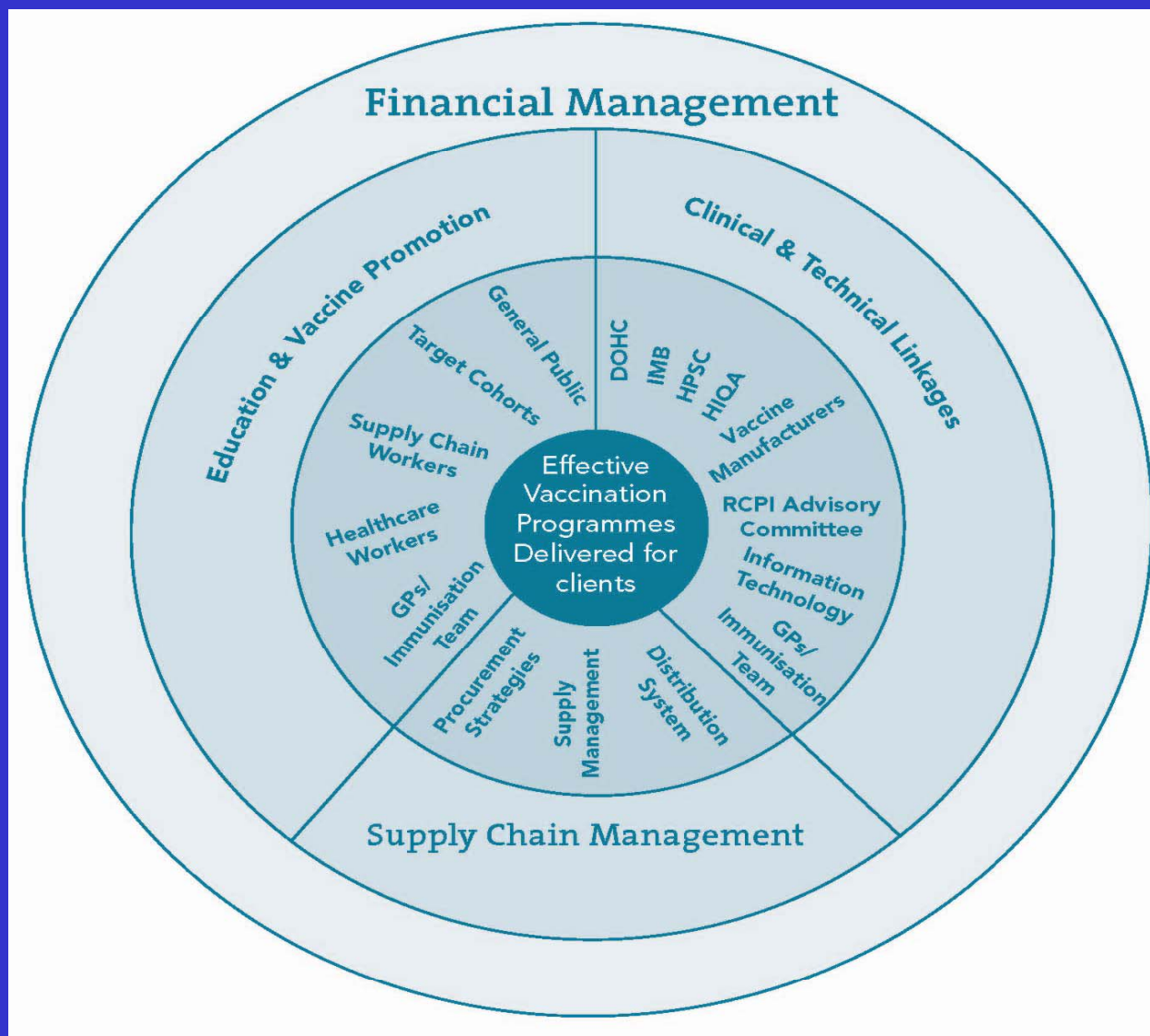
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Aim of immunisation

- The aim of immunisation is the prevention of disease in individuals or groups.
- Examples
 - 1980 elimination of smallpox (WHO)
 - 1991-Elimination of polio from the Americas
- Achieved by
 - a comprehensive immunisation programme achieving the World Health Organisation target uptake of 95% for childhood vaccines and 75% for influenza vaccines
 - intensive surveillance of these diseases



Multidisciplinary components of an immunisation system



The National Immunisation Advisory Committee (NIAC)

- Independent committee of the RCPI
- Variety of experts
- Advises the Department of Health and Children
- Produces the National Immunisation Guidelines for Ireland
 - Based on
 - best evidence regarding the safety and efficacy of vaccines
 - the disease burden
 - pharmacoeconomic analyses



The Department of Health (DoH)

- Responsible for making policy decisions regarding the immunisation programme including changes to the current immunisation programme

The Health Products Regulatory Authority (HPRA) (formerly the Irish Medicines Board)

- Regulatory body responsible for licensing of vaccines and ensuring their quality and safety and efficacy
- Responsible for monitoring and evaluation of adverse events following immunisation



HSE

- Responsible for the implementation of the primary childhood, school immunisation and seasonal influenza vaccination programmes
- Delivered by general practitioners (GPs), practice nurses, pharmacists, community health doctors and public health nurses and support staff



The National Immunisation Office (NIO)

Coordinating Unit

- Standardised implementation of all publicly funded immunisation programmes
- Protocols and immunisation training
- Information materials for the general public
- National immunisation website www.immunisation.ie
- Vaccine contracts and the HSE National Cold Chain delivery Service to provide vaccine deliveries to all GPs, hospitals and HSE clinics
- Development of a national IT database
 - Currently different PCI IT systems modified with any changes to schedule
 - School immunisation system

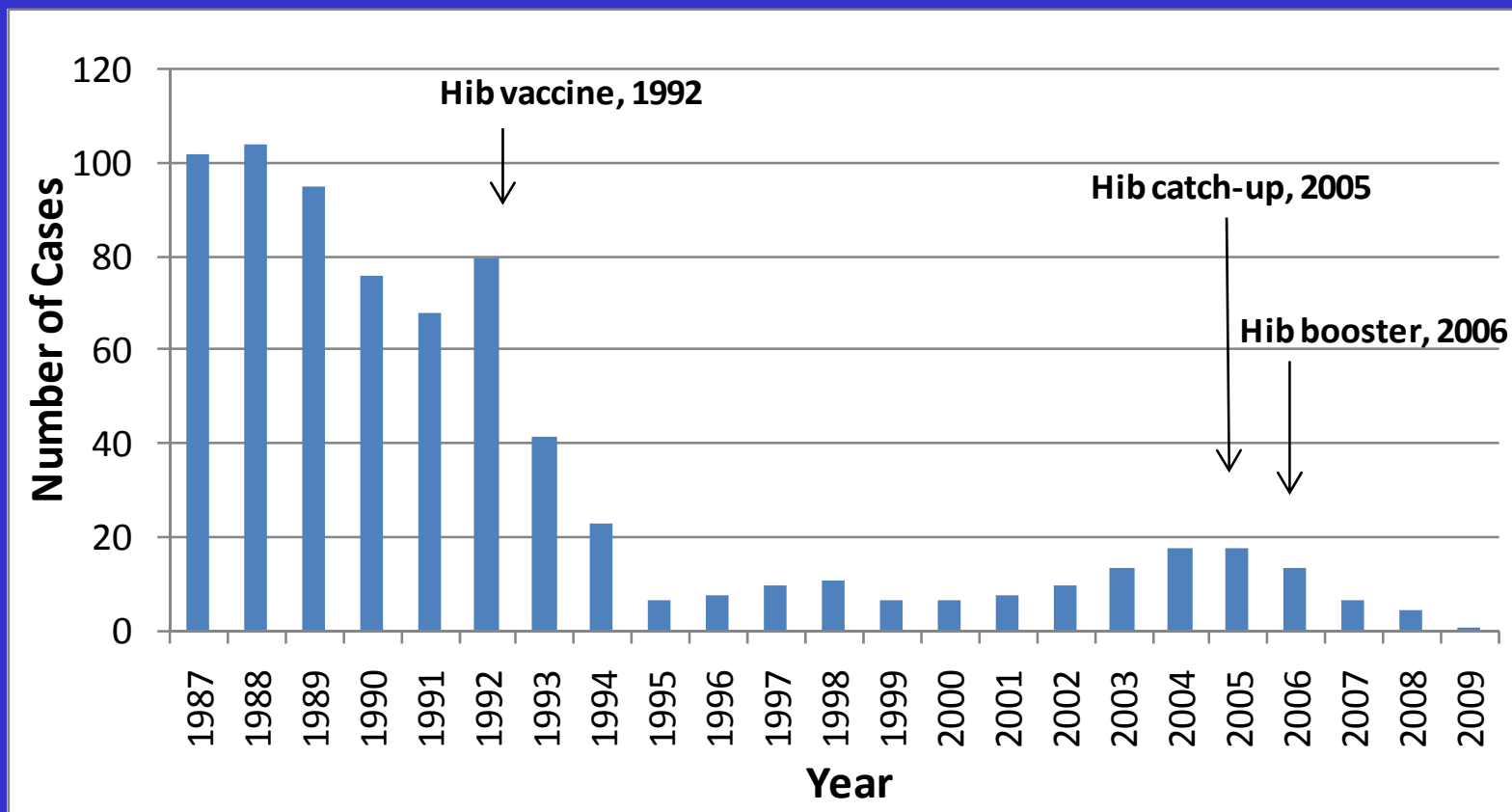


Health Protection Surveillance Centre (HPSC)

- Responsible for surveillance of vaccine preventable diseases
- Monitors immunisation uptake data from each HSE area and reports on uptake rates



Importance of surveillance - Hib catch up 2006

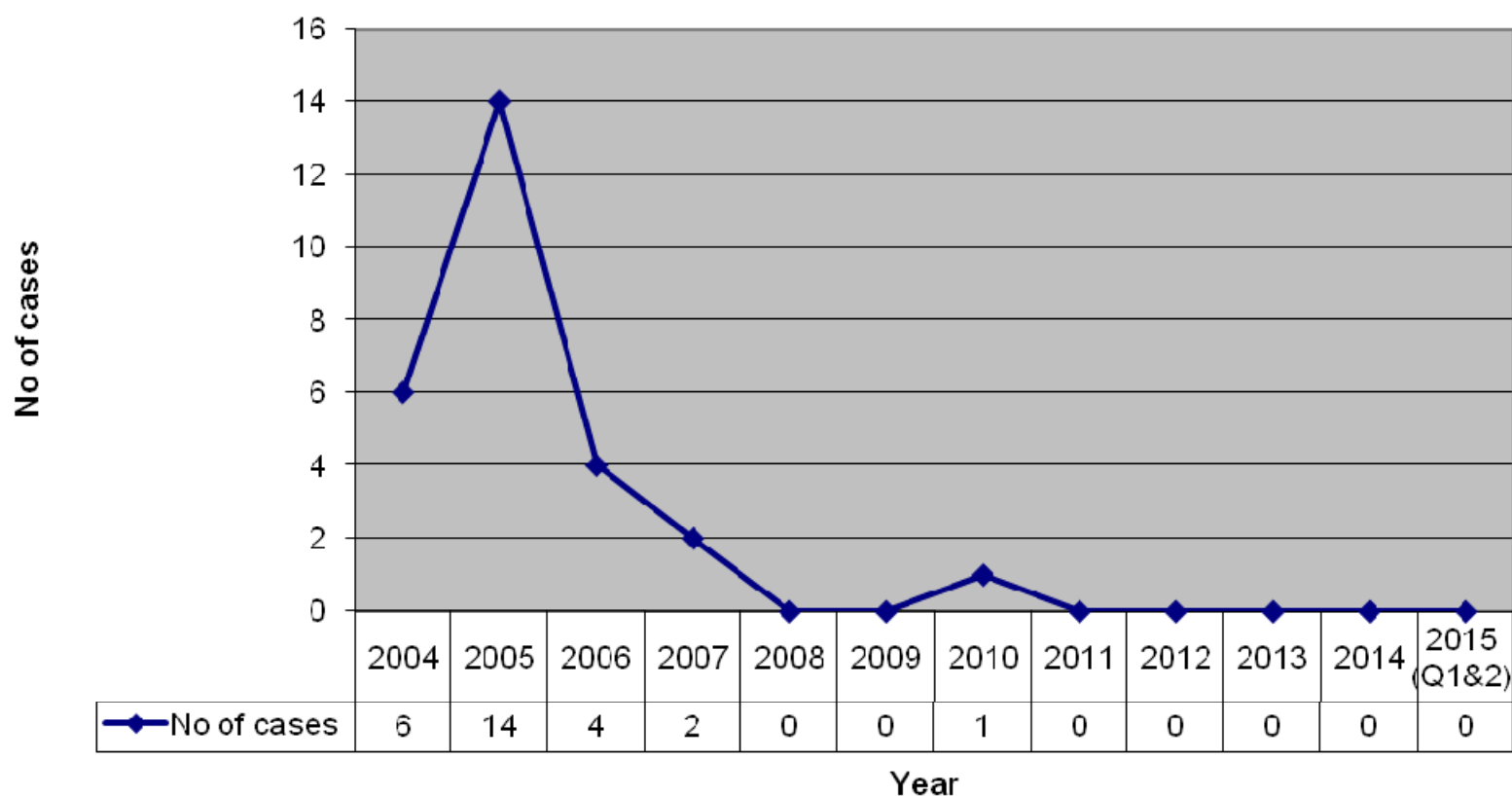


Source: HPSC



Impact of Hib campaign

Number of cases of Hib disease in fully vaccinated children 2004-2015



Source: HPSC



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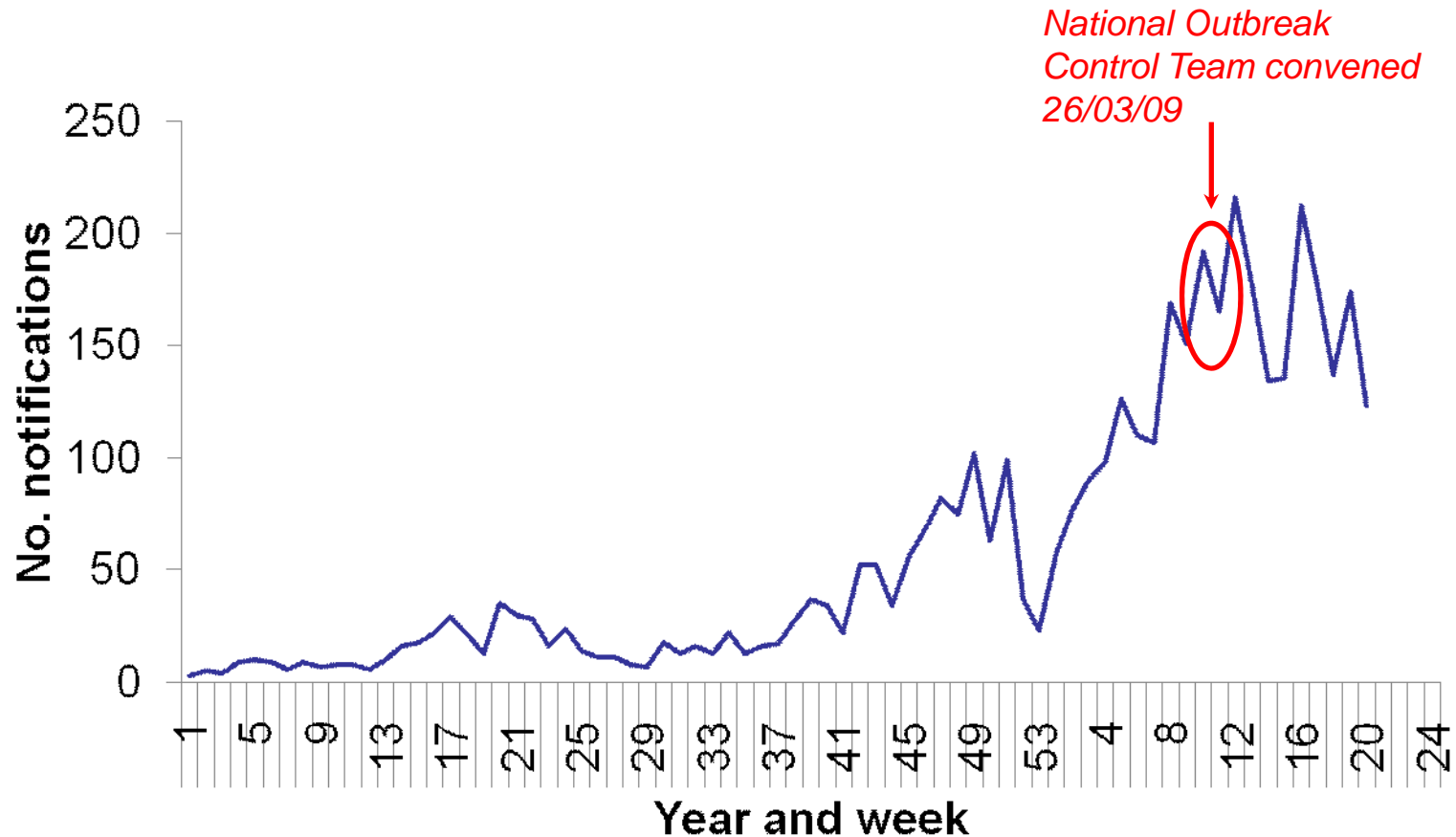


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Importance of surveillance

Mumps notifications, in Ireland

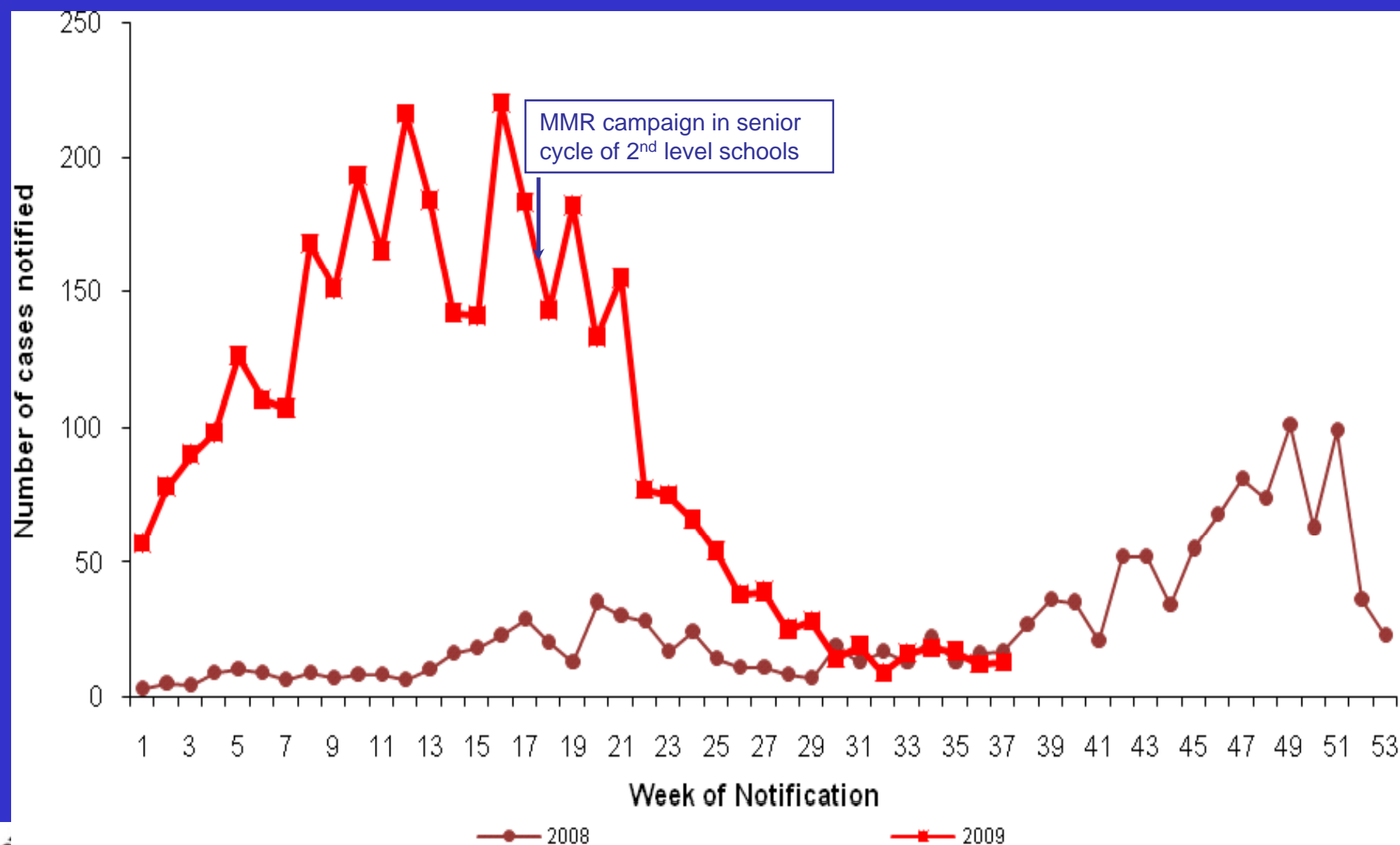
2008-week 20 2009*



Source: HPSC

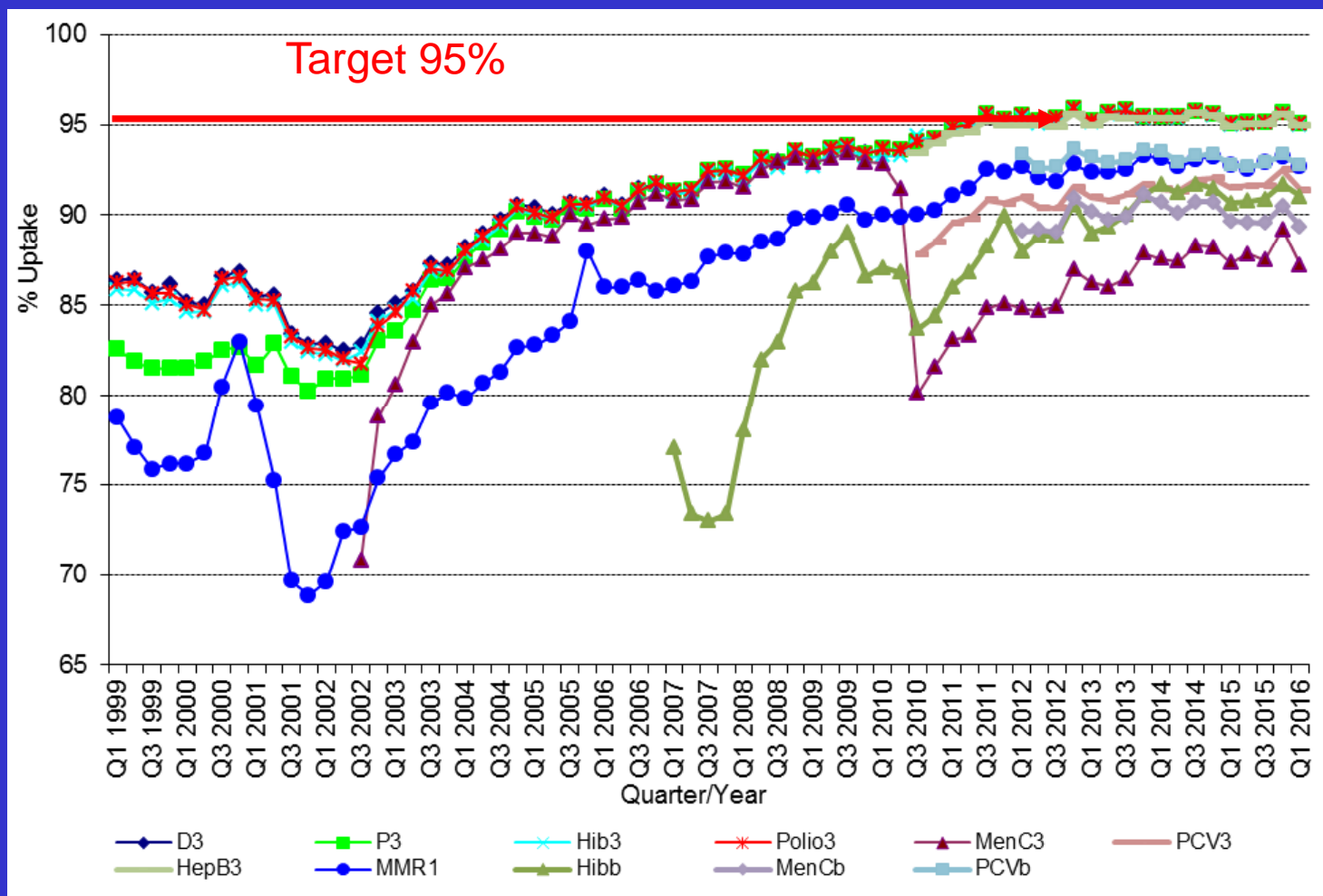


Mumps notifications 2008 and 2009



Data were extracted from the Computerised Infectious Disease Reporting (CIDR) system on the 25/09/2009. 2009 data are provisional.

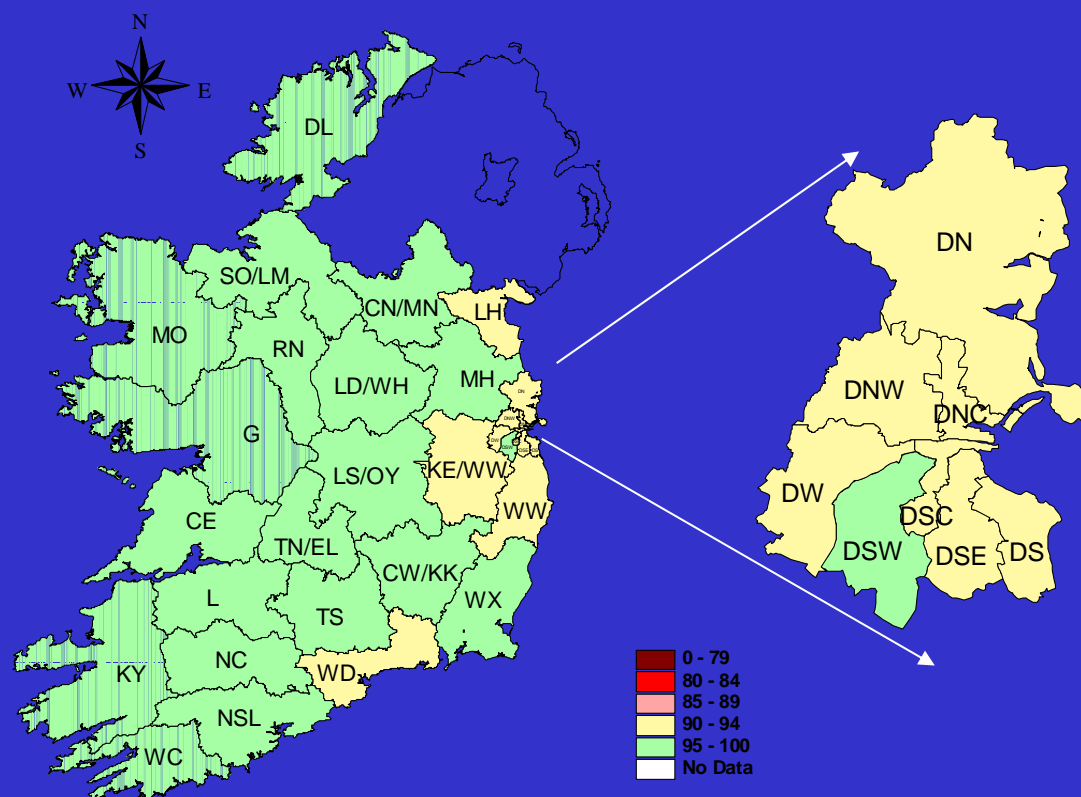
Vaccine uptake rate at 24 months 1999-2016



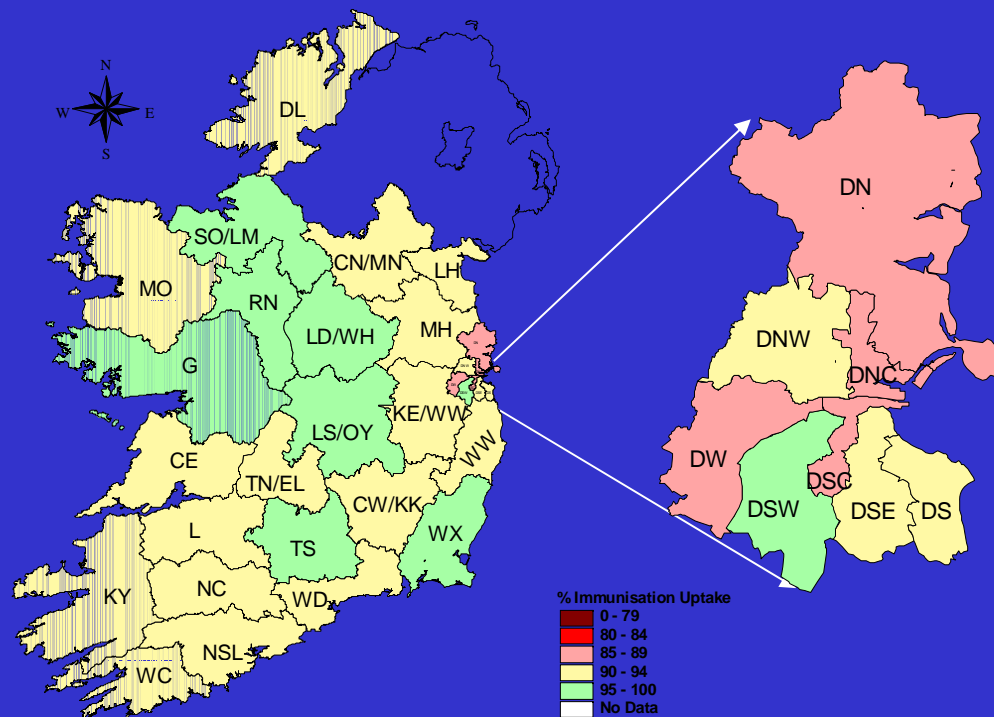
Source: HPSC



Quarter 1 2016 D3 immunisation uptake rates (%) by LHO, in those 24 months of age in Ireland and Dublin (source HPSC)

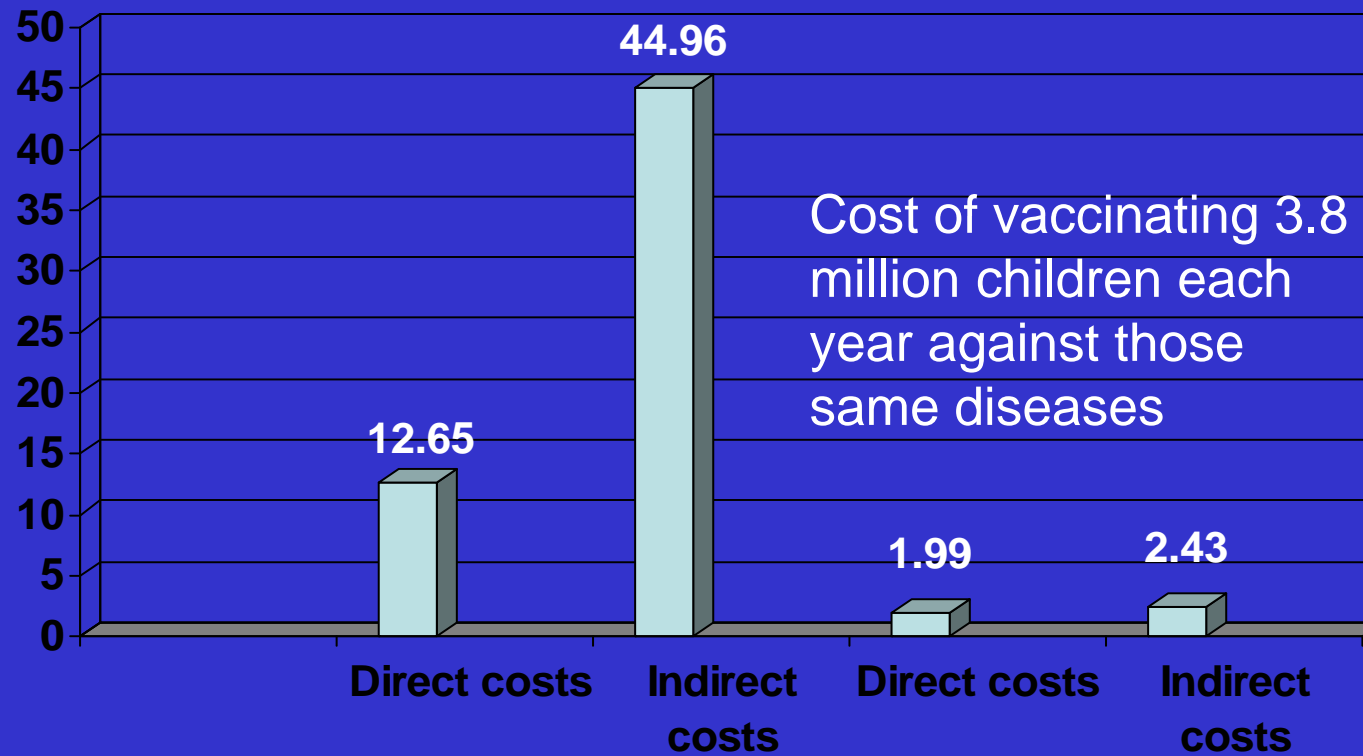


Quarter 1 2016 MMR immunisation uptake rates (%) by LHO, in those 24 months of age in Ireland and Dublin (source HPSC)



Economic benefits of immunisation

Cost of treating more than 10 million cases of various diseases annually



Infectious Diseases in Children, August 2003, p.19

www.immunisation.ie



Why Immunise?

- Immunisation is one of the most cost effective and safest of all health interventions
- Immunisation has saved more lives than any other public health intervention apart from the provision of clean water

