# History and aims of immunisation

Dr Anna Clarke
Department of Public Health
Dr. Steevens' Hospital
Dublin 8

# 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

Variola virus

Edward Jenner (**1749 –1823)**

Infected humans 10,000 years ago

Known in China 11$^{th}$ century BC

Inoculation described 6$^{th}$ century BC

1796 vaccinia virus isolated

In 1798 Jenner showed that inoculation with cowpox virus produced protection against smallpox.

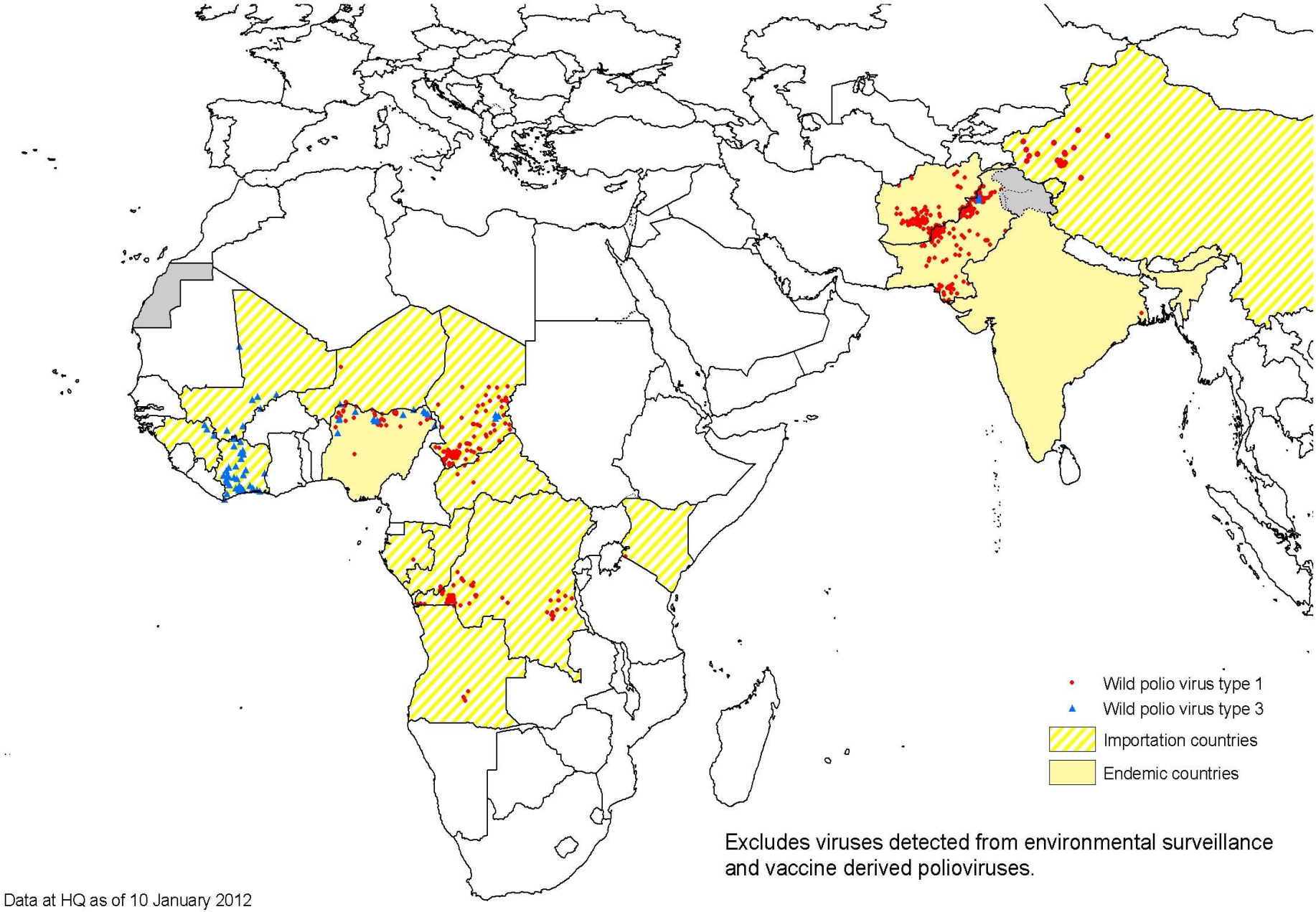
# Smallpox

1977 Last reported case Somalia

1980 WHO declared eradication

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

# Wild Poliovirus - 2011




Excludes viruses detected from environmental surveillance and vaccine derived polioviruses.

Data at HQ as of 10 January 2012

# The Development of Human Vaccines

| Vaccine | Year |
|---|---|
| Smallpox | 1798 |
| Rabies | 1885 |
| Typhoid | 1896 |
| Cholera | 1896 |
| Plague | 1897 |
| Diphtheria | 1923 |
| Pertussis | 1926 |
| BCG (Tuberculosis) | 1927 |
| Tetanus | 1927 |
| Yellow Fever | 1935 |
| Influenza | 1936 |
| Polio (IPV) | 1955 |
| Polio (OPV) | 1962 |
| Measles | 1964 |
| Mumps | 1967 |
| Rubella | 1970 |
| Hepatitis B | 1981 |

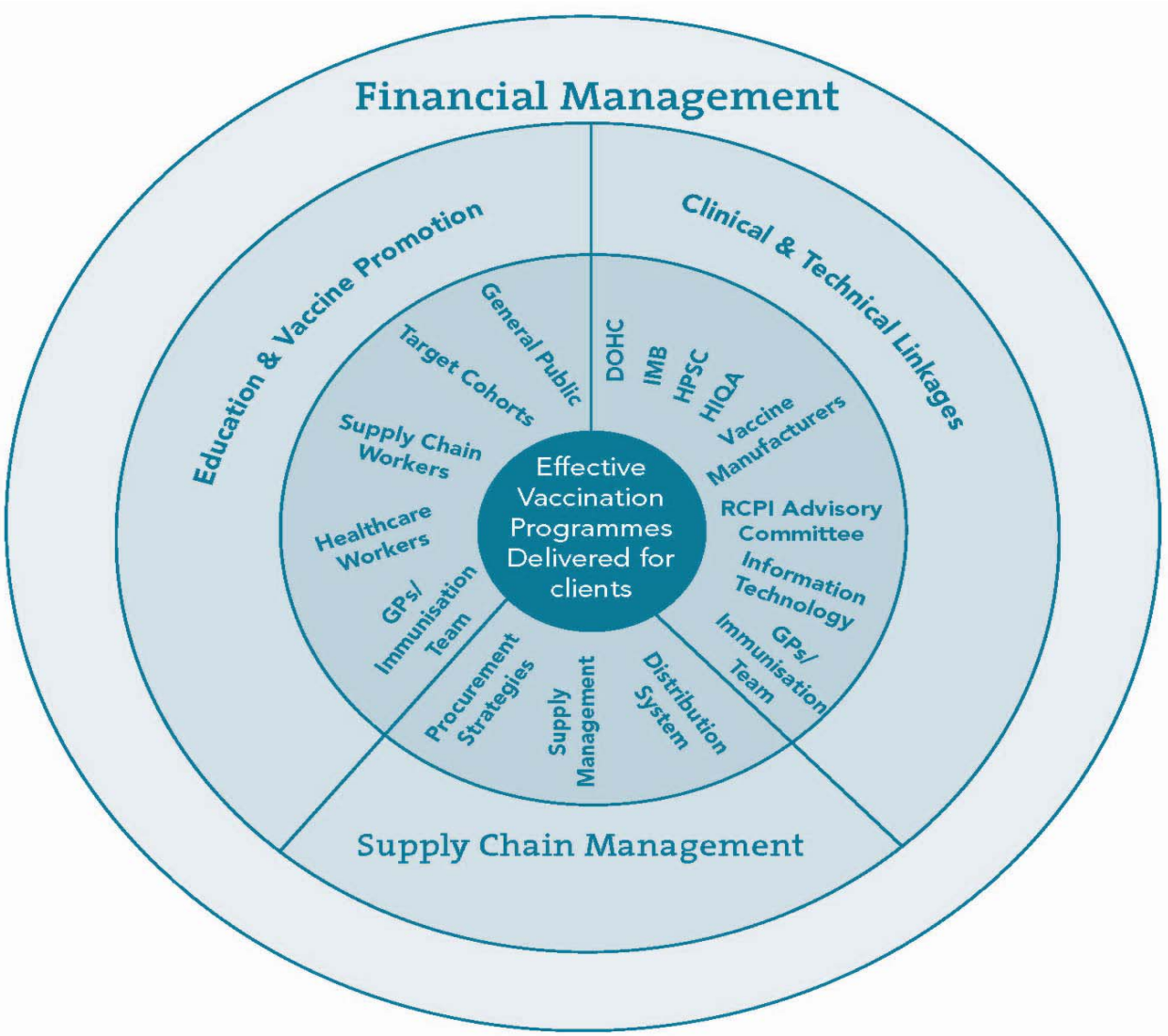
**Comparison of annual morbidity from vaccine-preventable diseases during the 20th century and 2010**

| Disease | 20th Century* | 2010 | % Reduction |
|---|---|---|---|
| Diphtheria | 21,053 | 0 | 100 |
| *Haemophilus influenzae* type b in children aged <5 yrs. | 20,000 | 240 | 99 |
| Measles | 530,217 | 63 | >99 |
| Mumps | 162,344 | 2,612 | 98 |
| Pertussis | 200,752 | 27,538 | 86 |
| Poliomyelitis, paralytic | 16,316 | 0 | 100 |
| Rubella | 47,745 | 5 | >99 |
| Congenital rubella syndrome | 152 | 0 | 100 |
| Smallpox | 29,005 | 0 | 100 |
| Tetanus | 580 | 26 | 96 |

# 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 70% for influenza vaccines
  - intensive surveillance of these diseases

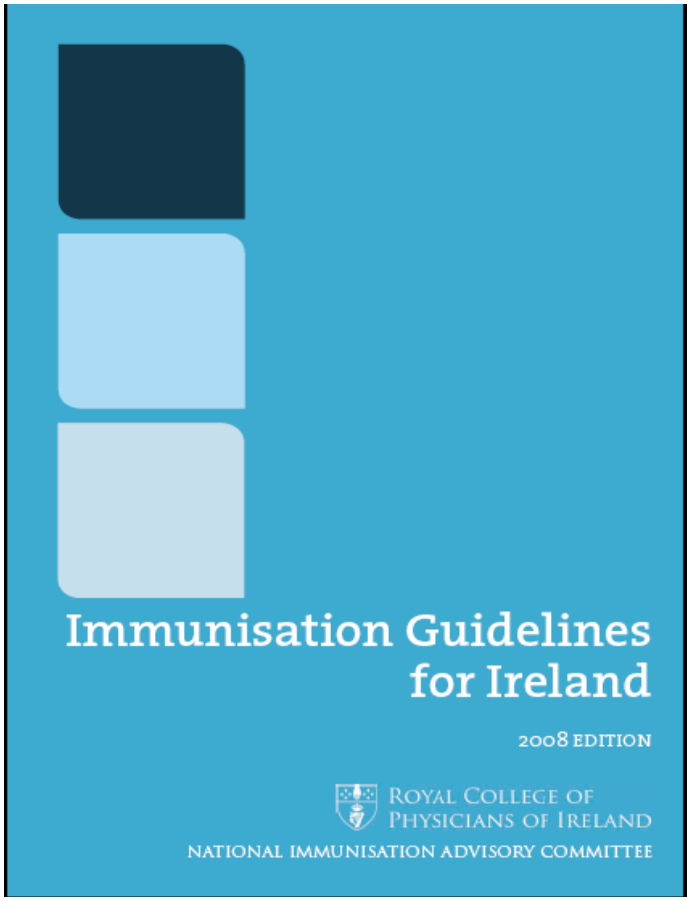
# Multidisciplinary components of an immunisation system



# The National Immunisation Advisory Committee (NIAC)

- Independent committee of the RCPI
- Variety of experts
- Advises the Department of Health
- 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 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, 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 IT systems modified with any changes to schedule

# 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

- HPSC website www.hpsc.ie

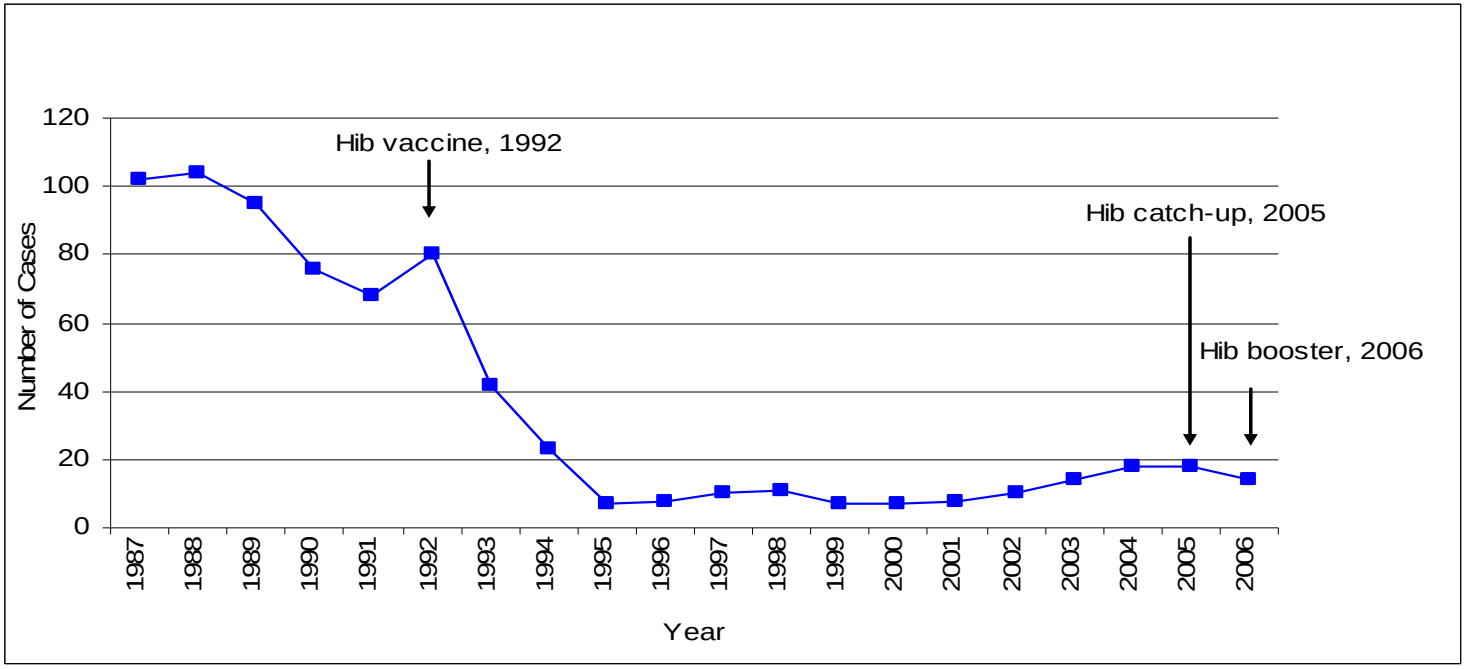
# Infectious Disease Surveillance

- ***Public health surveillance is the systematic collection, collation, analysis and dissemination of data so that action can be taken.***

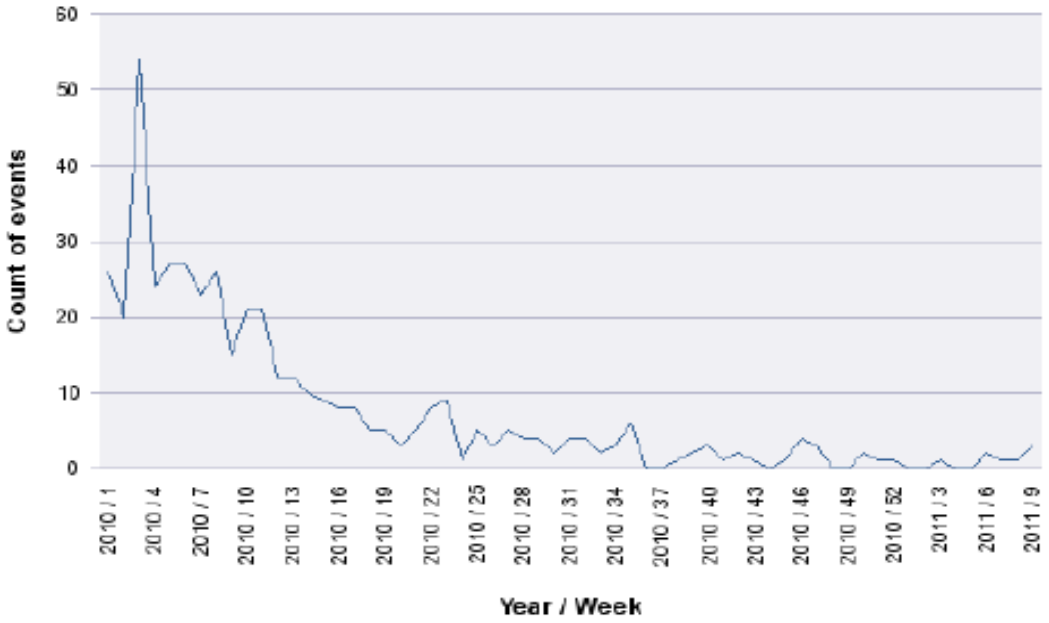
# Importance of surveillance

- Monitor the epidemiology of the disease. Epidemiology can be defined as the study of the distribution and determinants of disease (who, where, when and how) in different populations
- Monitor trends in disease incidence
- Detect outbreaks and enable effective control mechanisms to be put in place
- Monitor the effectiveness of interventions and evaluate programmes
- Identify high risk groups and risk factors
- Identify gaps in existing services and set priorities for allocation of resources
- Facilitate research.

# Importance of surveillance-Hib



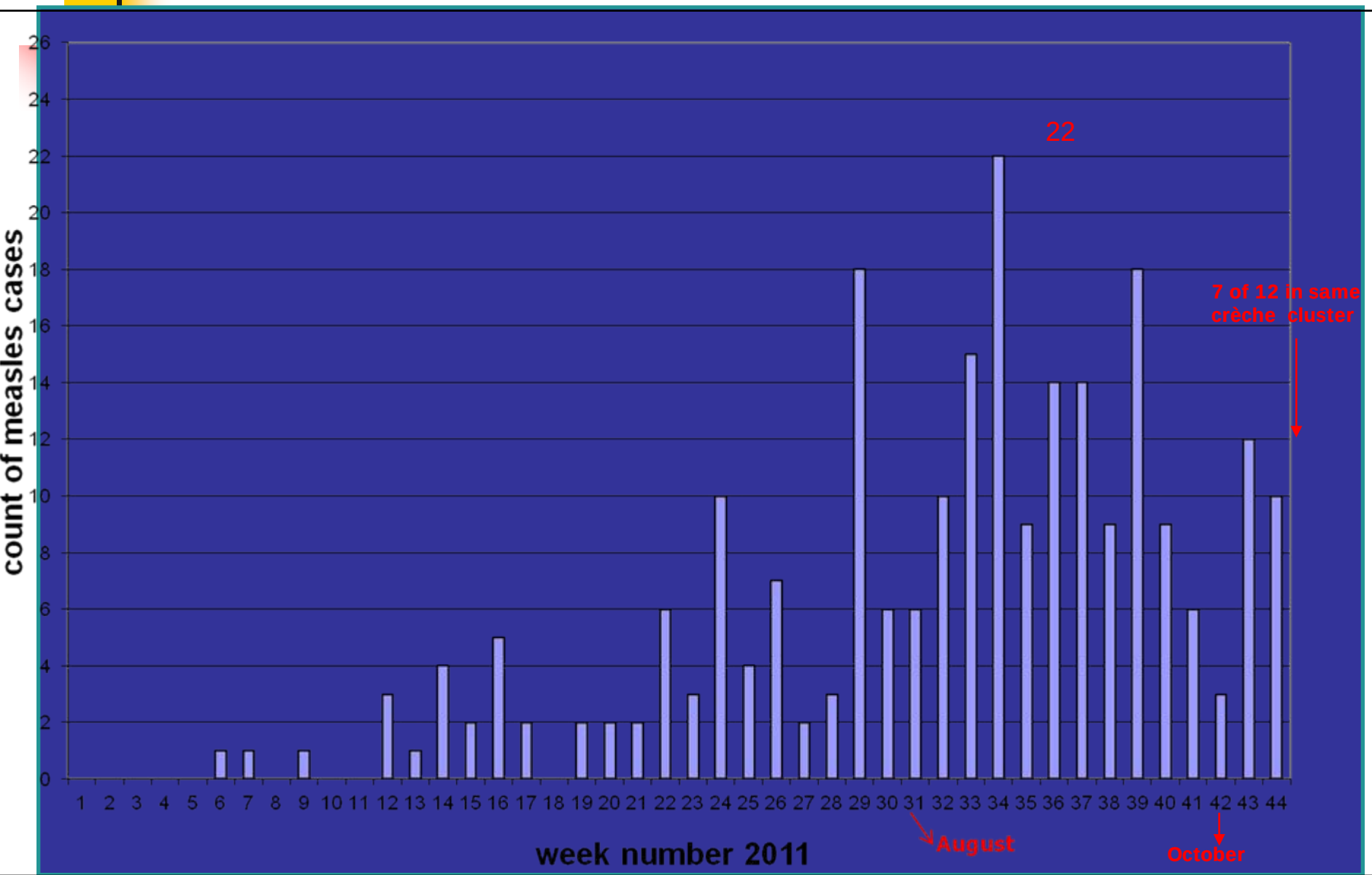
# Measles Event by week 2010-2011



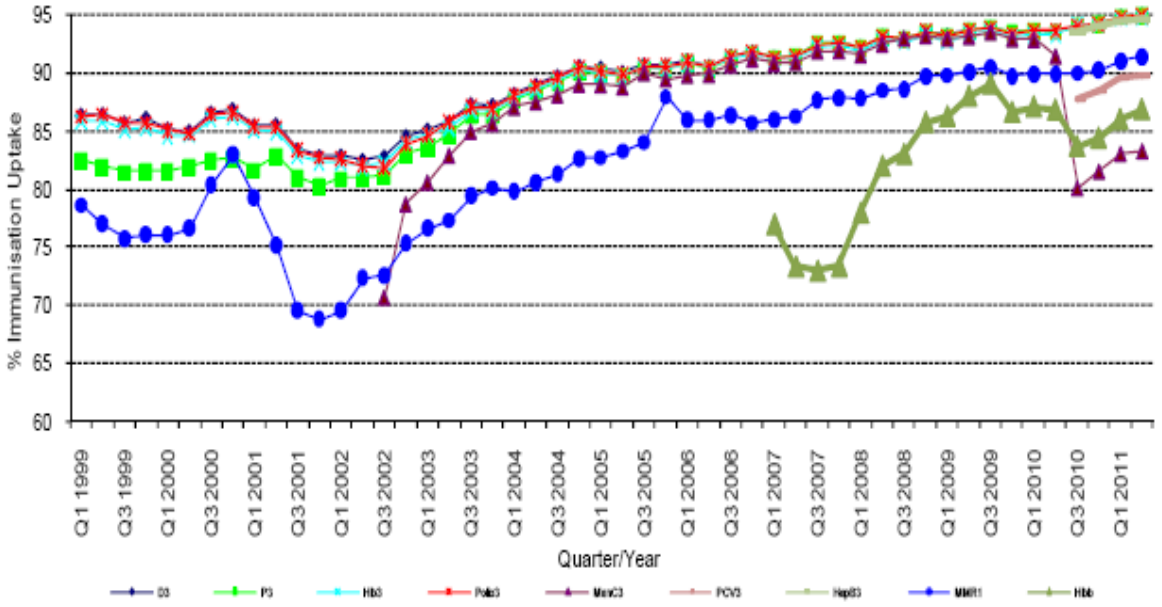

Health Protection Surveillance Centre

# Measles cases, week 1 - 44, HSE-E, 2011

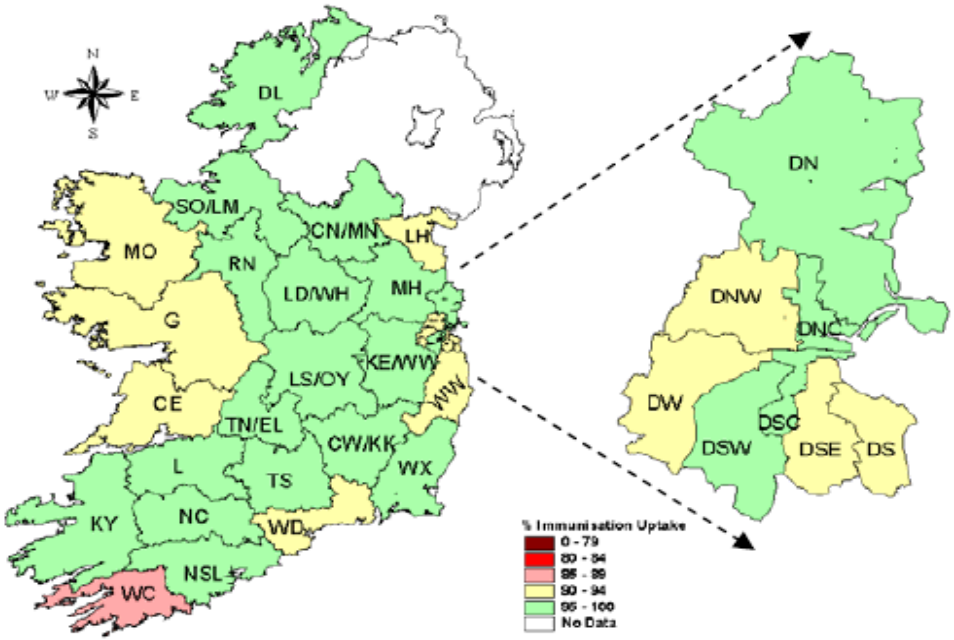
## (N = 242)



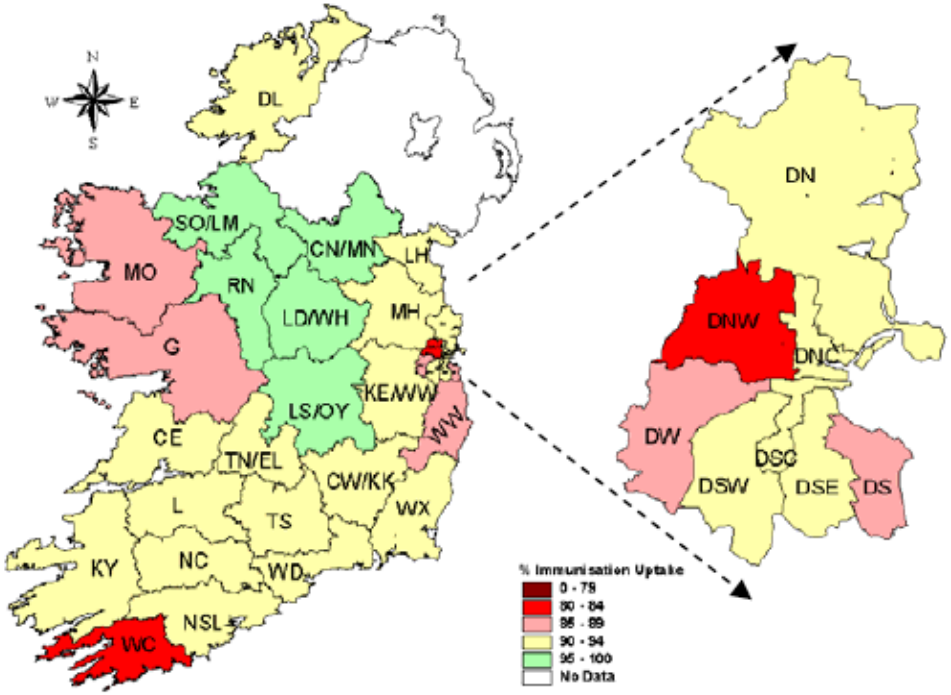
# Vaccine Uptake Rates at 24 months 1999-2011



# Quarter 2 2011 D3 Immunisation Rates at 24 months Ireland and Dublin



# Quarter 2 2011 MMR Immunisation Rates at 24 months Ireland and Dublin



# Why Immunise?

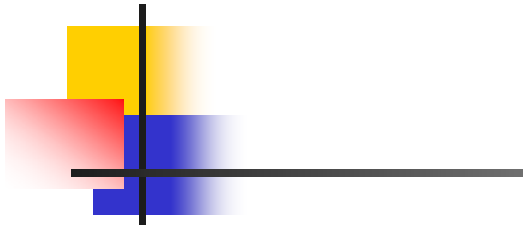
- Immunisation is one of the most cost effective and safest of all health interventions

- Immunisation has saved more lives than any other public health intervention apart form the provision of clean water

# Immunisation Successes

- Meningococcal C Campaign (Reduced incidence of cases by 90% since October 2000)
- Eradication of smallpox
- ? Near eradication of poliomyelitis
- Control of others, e.g. Hib, diphtheria, pertussis

- Successful immunisation - more attention to vaccine related illness



- Thanks to NIO and HPSC for data