Immunisation Advisory Centre
ĀRAINGA MATE
UNIVERSITY OF AUCKLAND

# Immunisation issues

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May 2010

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- Disease control and vaccine effectiveness
- The NZ schedule
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- Improving coverage
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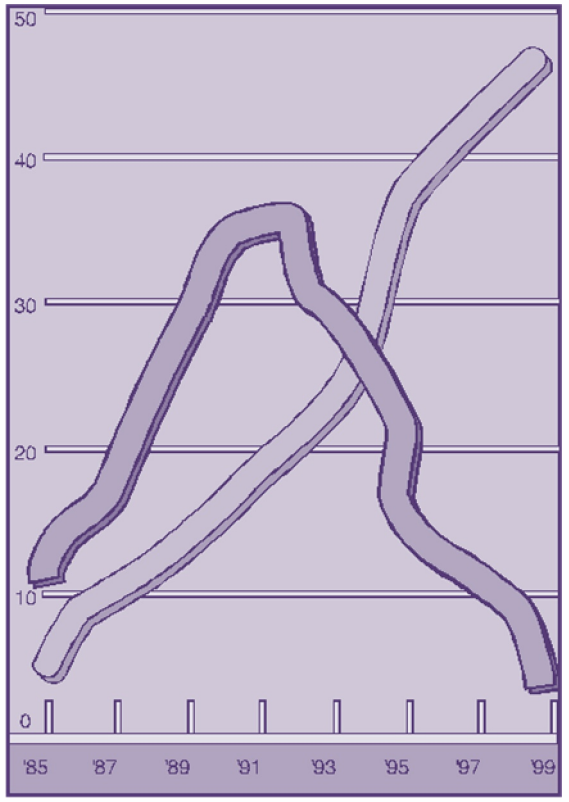
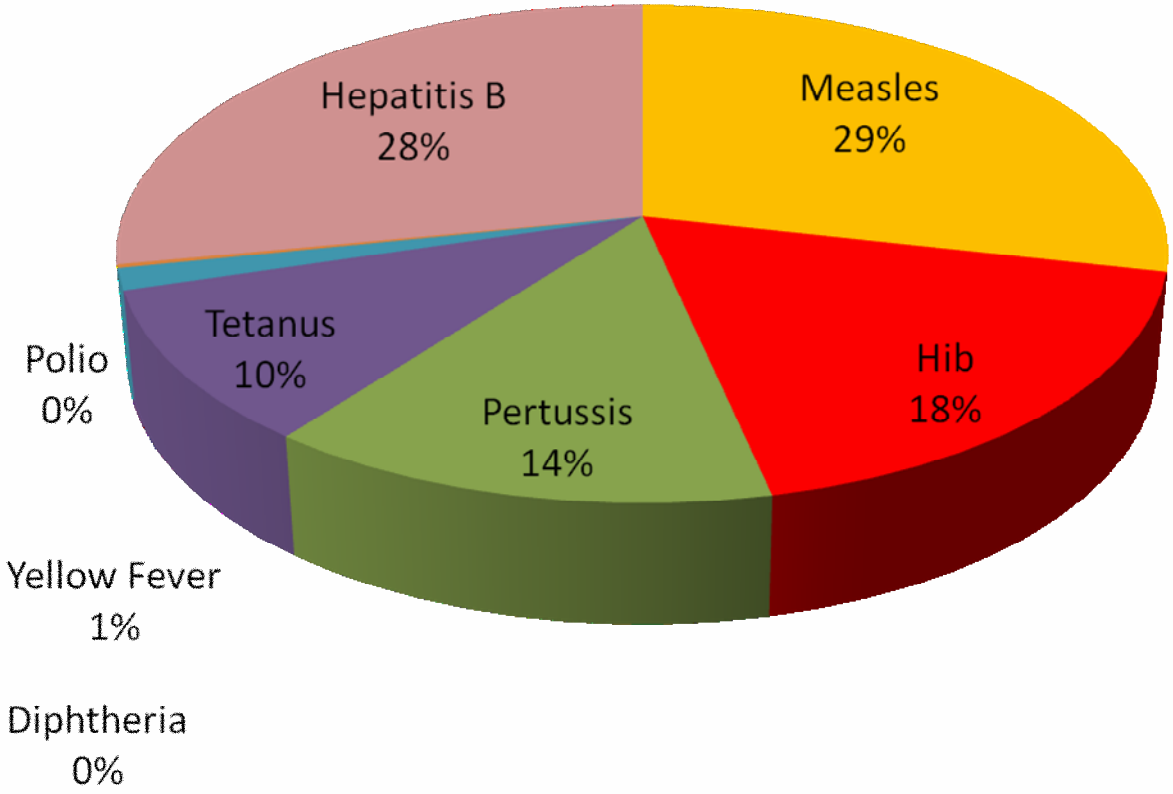



# DISEASE CONTROL AND VACCINE EFFECTIVENESS

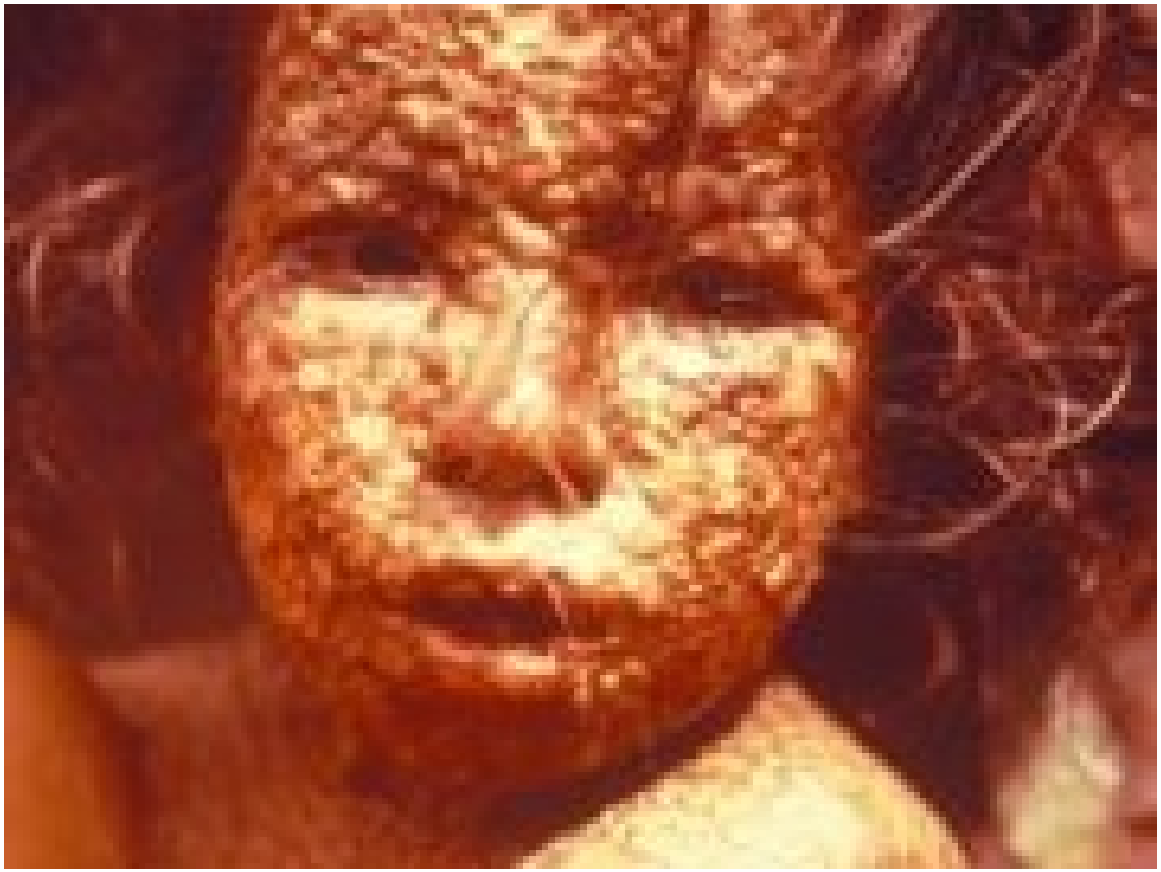
*“Only clean water and antibiotics have had an impact on childhood death and disease that is equal to that of vaccines”*

**World Health Organization**

# Global burden of VPD



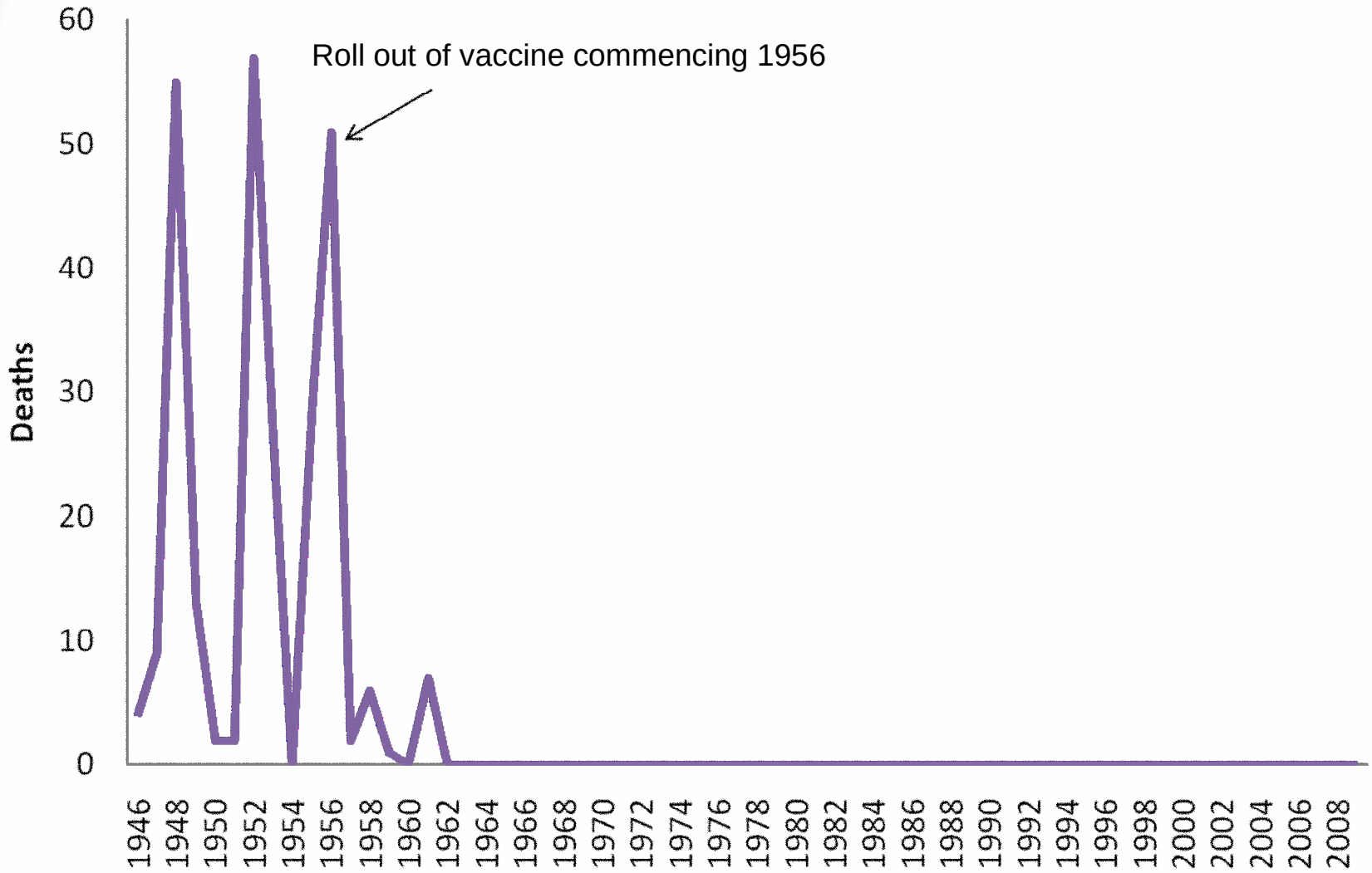

In 2002, WHO estimated that 1.4 million of deaths among children under 5 years were due to diseases that could have been prevented by routine vaccination. This represents 14% of global total mortality in children under 5 years of age .



## Smallpox

**Bangladeshi girl infected with smallpox (1973).**

# POLIO

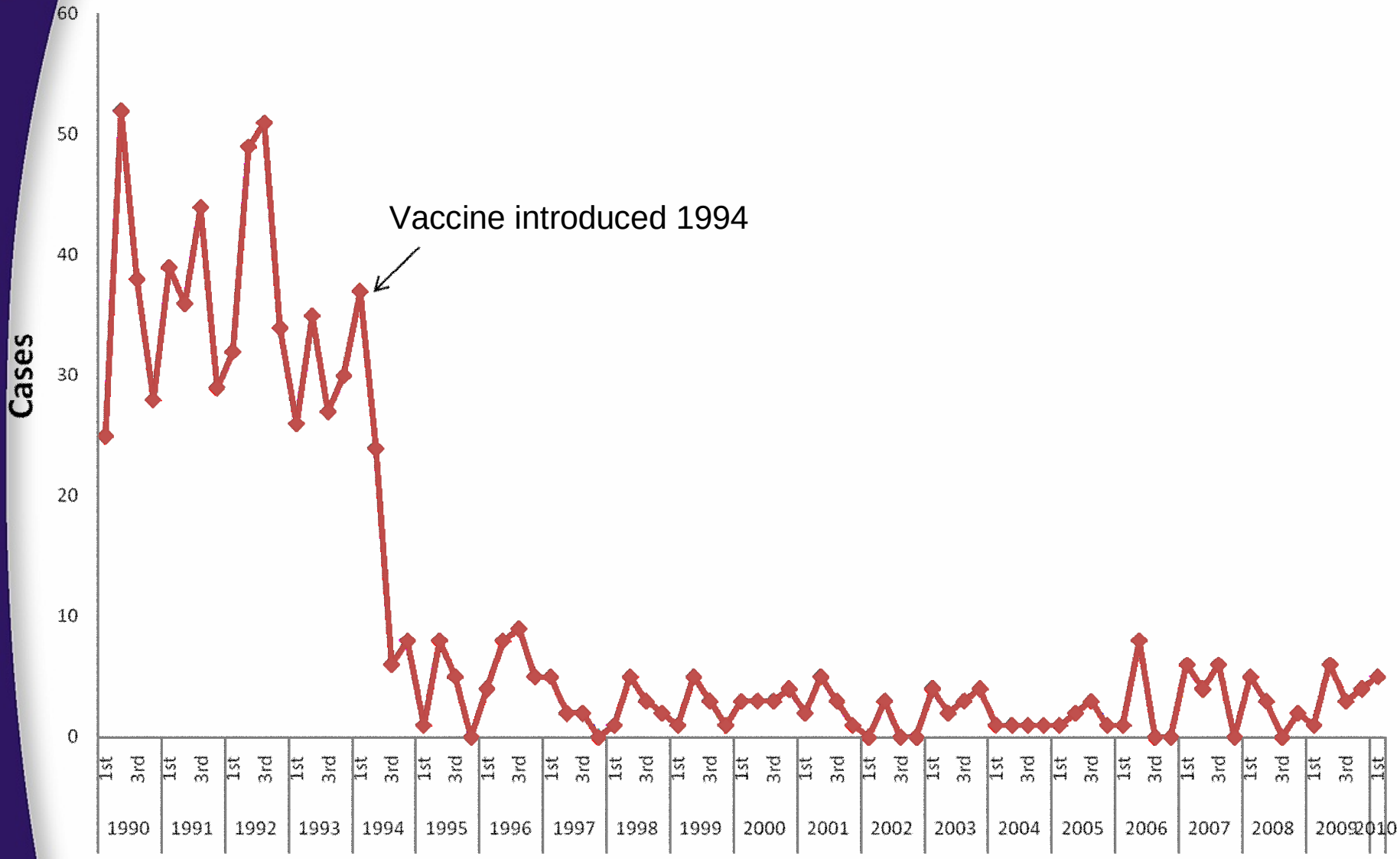


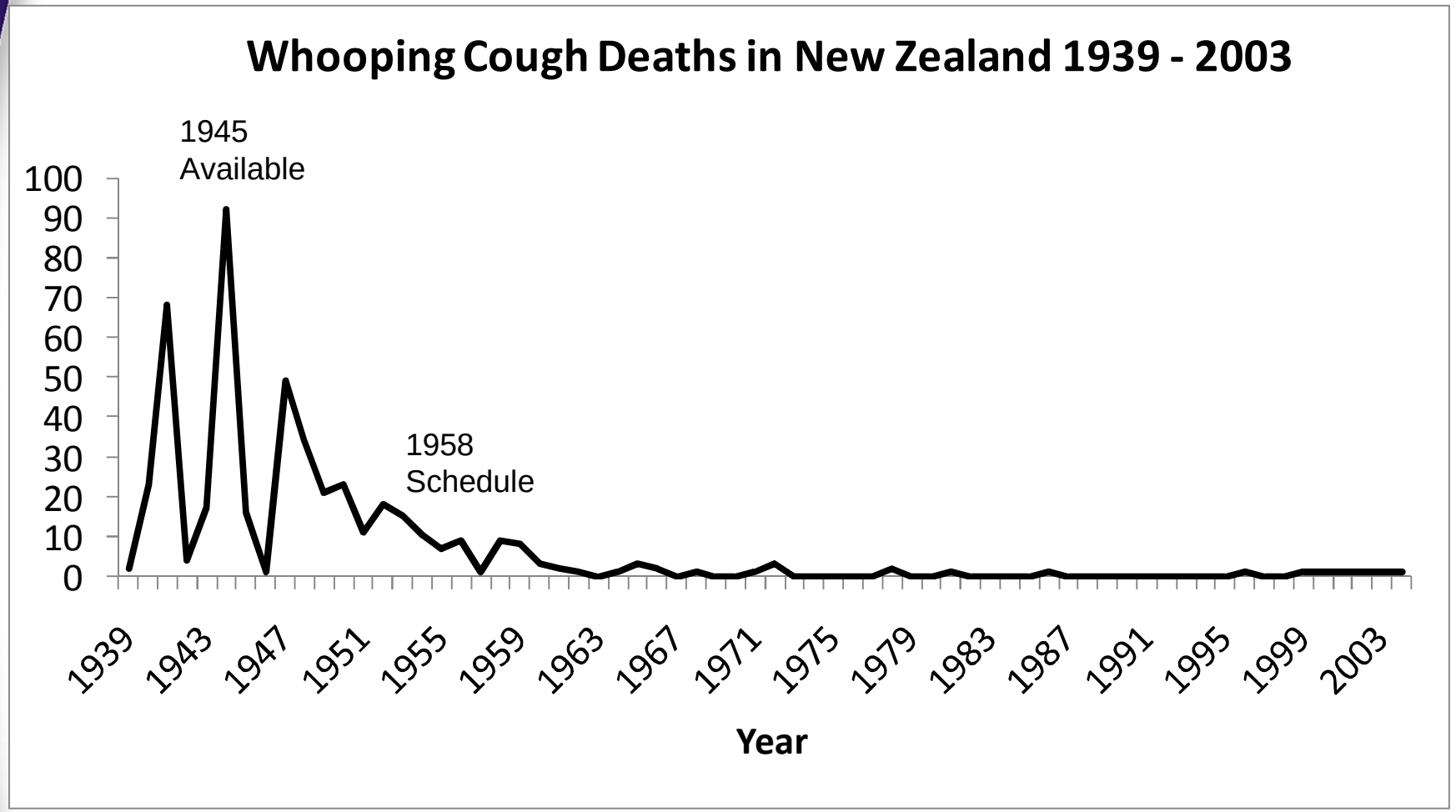

No cases of indigenously acquired poliomyelitis in New Zealand since the OPV mass immunisation campaigns in 1961 and 1962

Wilson Home for crippled children in Takapuna, Auckland, 1943.

Alexander Turnbull Library,
Photographer: John Pascoe Reference: 1/4-000643-F

# Hib laboratory confirmations 1990 - 1995 and notified cases 1996 - 2010




Whooping Cough Deaths in New Zealand 1939 - 2003
1945
Available
1958
Schedule
100
90
80
70
60
50
40
30
20
10
0
1939
1943
1947
1951
1955
1959
1963
1967
1971
1975
1979
1983
1987
1991
1995
1999
2003
Year

# Cluster Outbreaks examples:

- **Amish populations in USA 1985 – 1994**
  - 13 outbreaks of measles, 1200 cases, 9 deaths
- **1999 Netherlands unimmunised community**
  - 10 month long outbreak, 2961 cases
- **Colorado vaccine decliners 1987-1988**
  - 22.2 times more likely to acquire measles
  - 5.9 times more likely to acquire pertussis
- **Rubella outbreaks in decliners Netherlands, spreads to Canada**
  - Outbreak 2004/5, 309 lab confirmed cases, 23 in pregnant women: (at least 1 infant death, 9 severe handicap)
  - Travel: 214 cases in Canada, 5 in pregnant women

May T et al, Vaccine 21(2003) 1048-1051
Feikin D et al JAMA 284(2000)3145-3150
Eurosurveillance 2005;10(5):050519

# VACCINES ON THE NZ SCHEDULE

# 2008 Childhood Schedule (from Sept)

| | DTaP-IPV-Hib/HepB (IM) | PCV7 (IM) | Hib (IM) | MMR (S/C) | DTaP-IPV (IM) | dTap (IM) | HPV (IM) |
|---|---|---|---|---|---|---|---|
| 6 weeks | Infanrix®-hexa | Prevenar® | | | | | |
| 3 months | Infanrix®-hexa | Prevenar® | | | | | |
| 5 months | Infanrix®-hexa | Prevenar® | | | | | |
| 15 months | | Prevenar® | Hiberix™ | MMR-II® | | | |
| 4 years | | | | MMR-II® | Infanrix™-IPV | | |
| 11 years | | | | | | Boostrix® | |
| 12 years (School year 8 Starts in 2009) | | | | | | | Gardasil® |
| | | | | | | | Gardasil® 2 months after 1st dose |
| | | | | | | | Gardasil® 4 months after 2nd dose |

# Key Schedule Changes 1 June 2008

## Pneumococcal

- Conjugate vaccine added
- Pneumococcal high-risk programme extended to more people with high-risk conditions

## Infanrix®-hexa

- Replaces two vaccines
- DTaP-IPV and Hib/Hep B
- These antigens are combined into one vaccine so only up to 3 injections are needed per visit

## Boostrix®

- Replaces Boostrix®-IPV at Year 7
- 4th dose of polio now given at age 4 years

## MeNZB

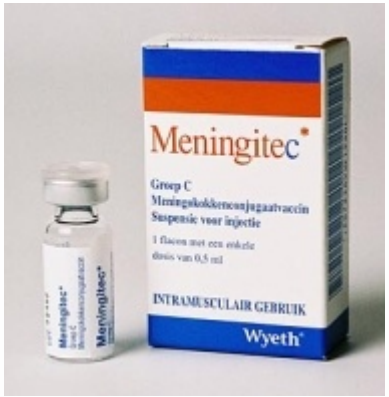
- MeNZB to infant schedule stopped

# VACCINES ON THE HORIZON

# Private market vaccines to consider



- **Varicella**
  - Zoster (soon)
- **Rotavirus**
- **Conjugate meningococcal vaccines**

# The schedule : What is next.....

- **Conjugate pneumococcal vaccines**
  - 10 and 13 serotypes
- **Next vaccines recommended for the schedule, but not yet.....**
  - Rotavirus
  - Varicella

# Slightly more distant horizon

- **Better adjuvants**
- **Delivery mechanisms**
  - Intranasal eg live influenza vaccine
  - Aerosol eg measles, rubella
  - Oral eg transgenic plants
  - Transcutaneous eg hepB, anthrax
  - More thermostable
- **New targets…..**

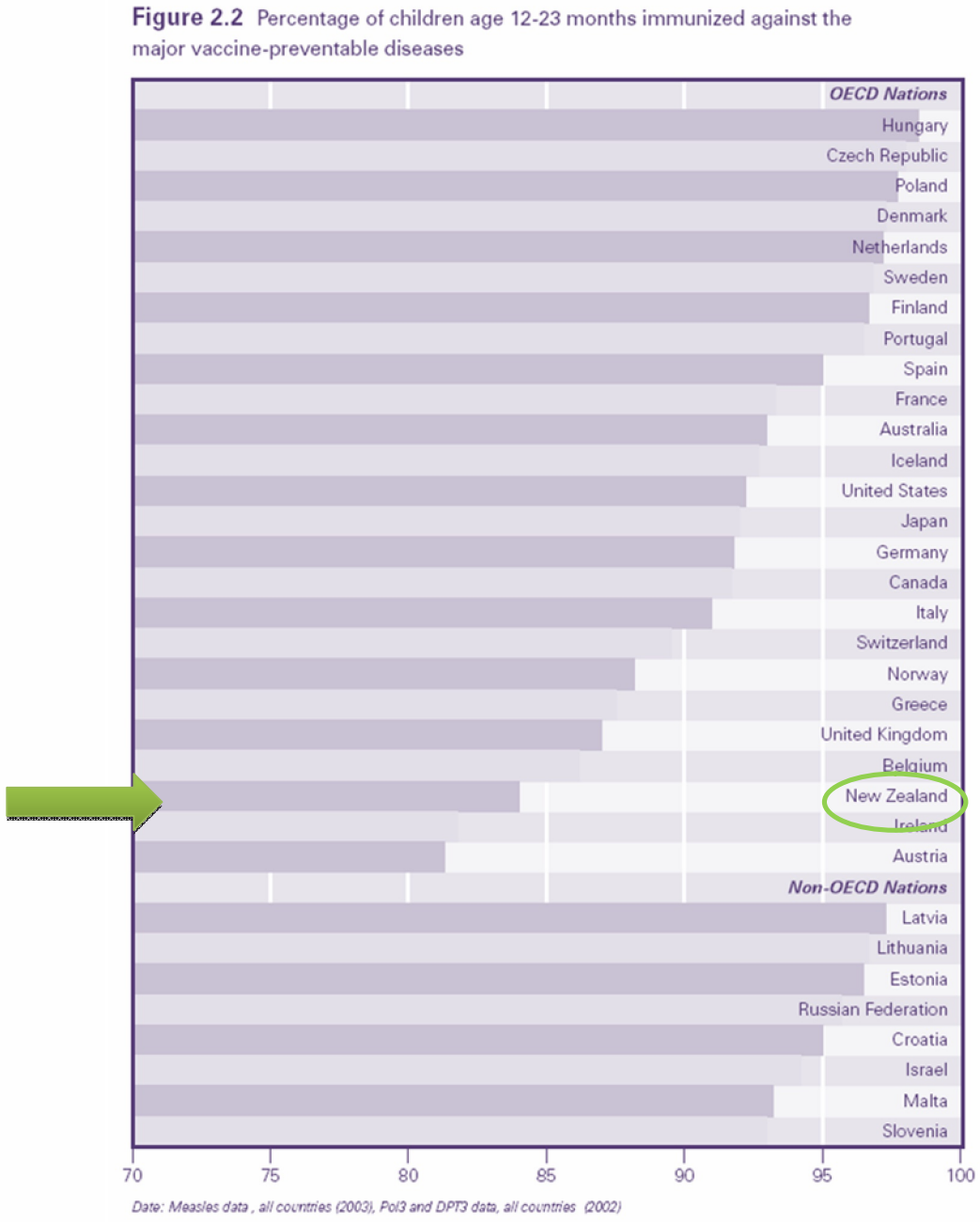
# New target groups for vaccination

| Groups | Vaccines |
|---|---|
| Infants | Combination vaccines |
| Adolescents | Tetanus, adult diphtheria dose, acellular pertussis, CMV, HPV, HSV-2 |
| Adults | Zoster, HSV-2 |
| Hospital patients | Staphylococcal, Candida |
| Pregnant women | Group B Streptococcus, RSV |
| Civil defense workers | New vaccinia, anthrax, plague, Ebola, etc. |
| Individuals with noninfectious diseases | Cancer, Alzheimer disease, dental caries, autoimmune disorders, drug addiction |
| Individuals with chronic infections | HIV, HPV<br>(Therapeutic vaccines) |

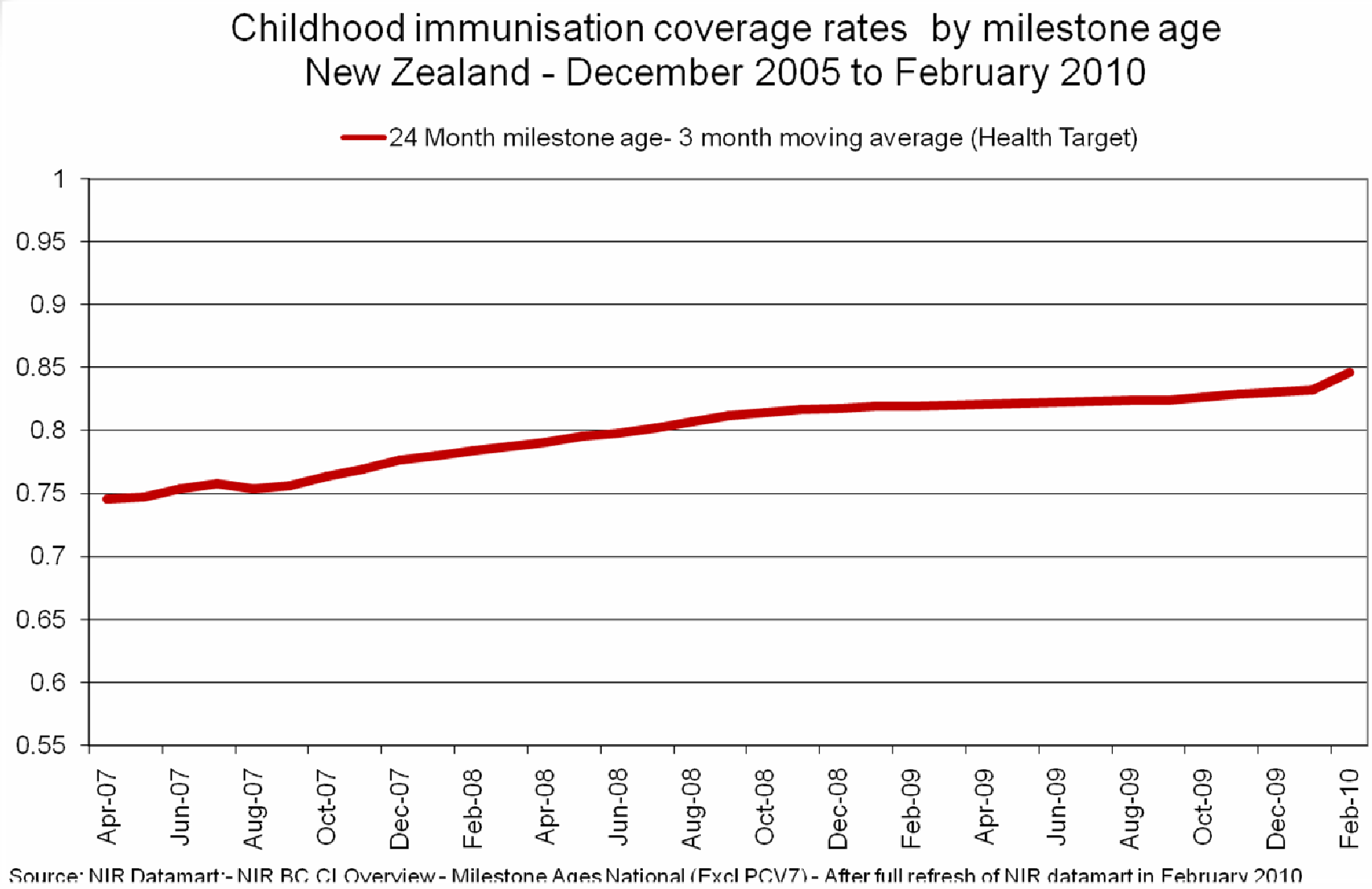
# IMPROVING COVERAGE

# International coverage

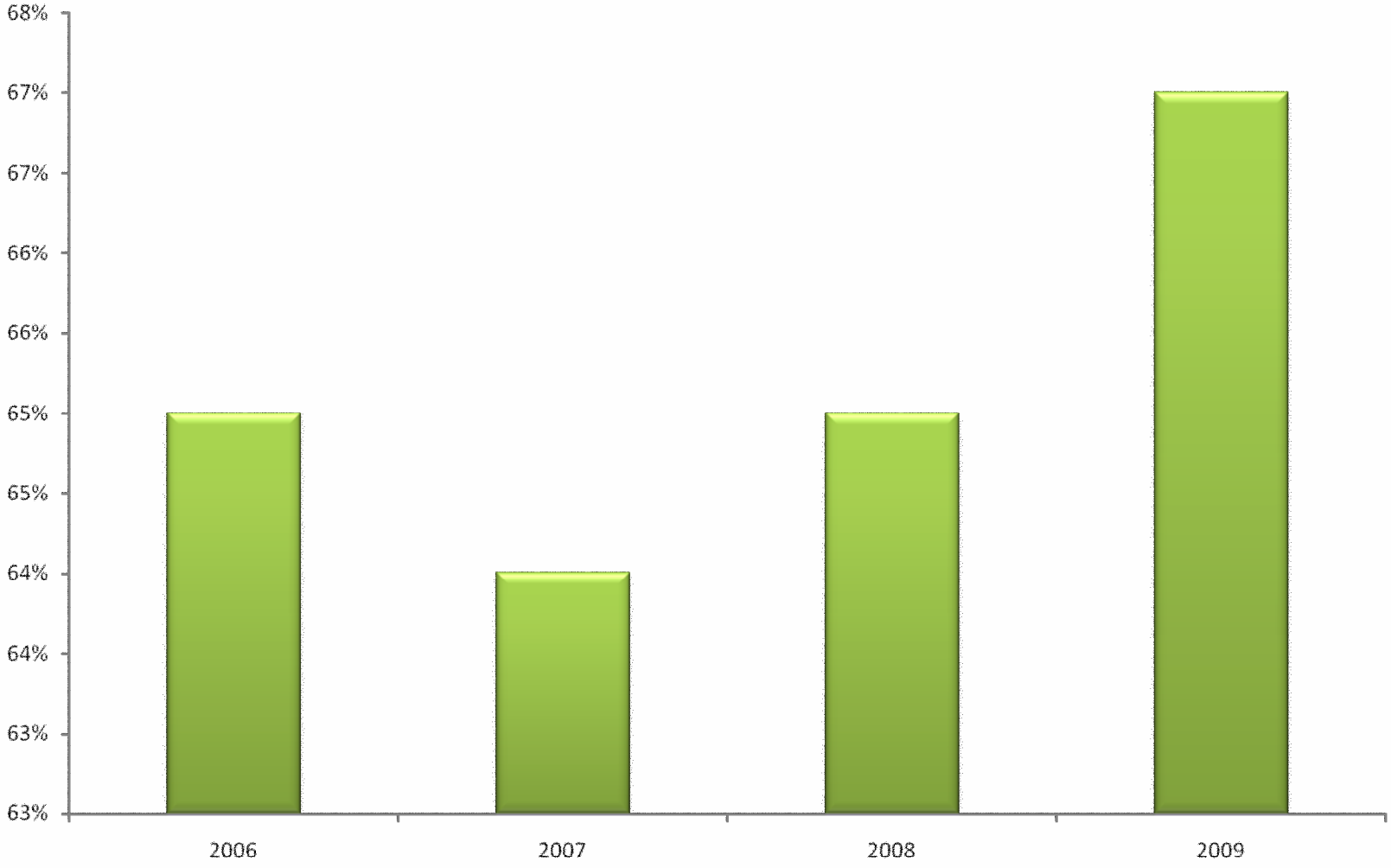
**In order to prevent the transmission of whooping cough and measles 95% of the population needs to be immune.**



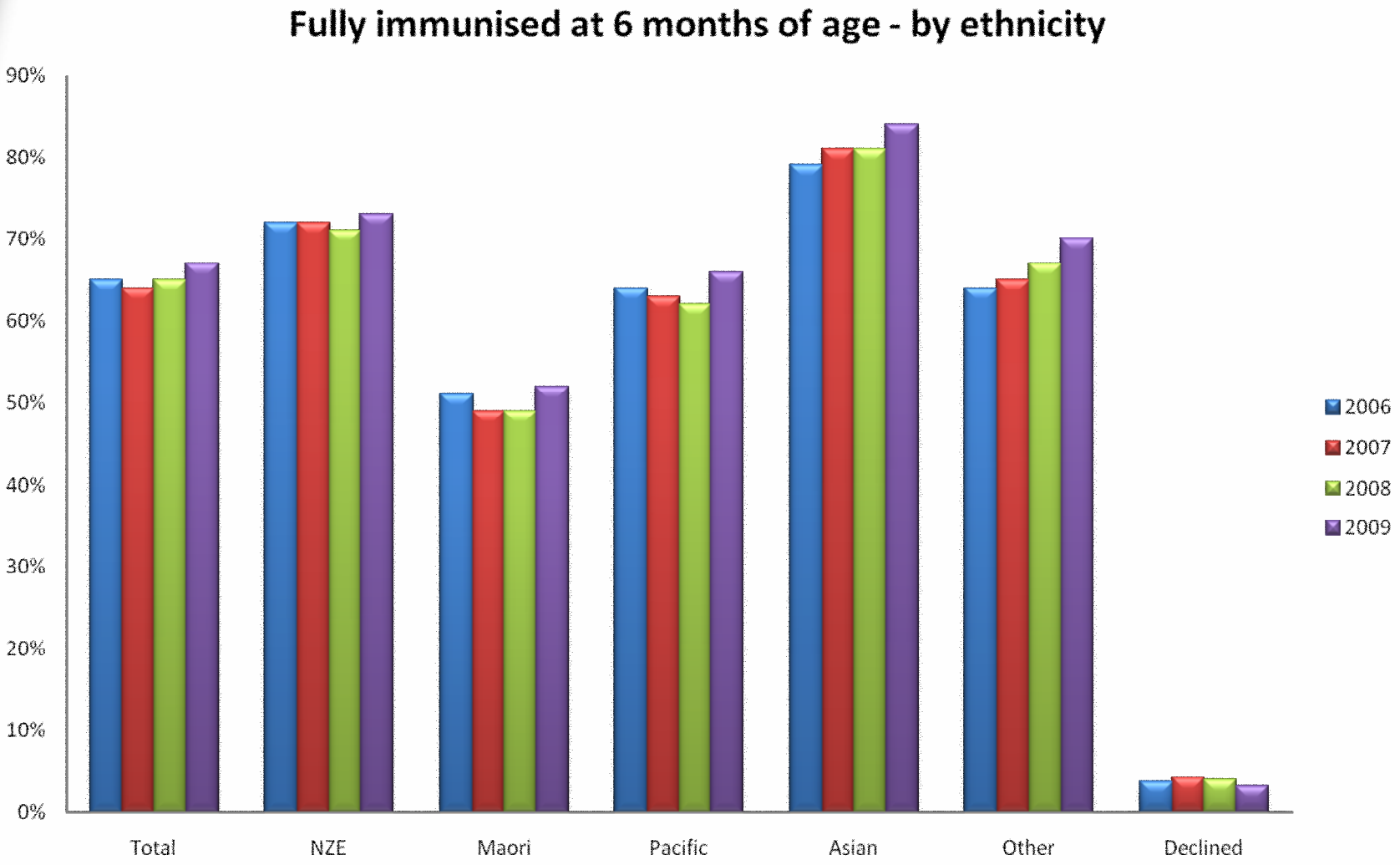

From: UNICEF: Innocenti Report Card 7, UN Childrens Fund 2007


Childhood immunisation coverage rates by milestone age
New Zealand - December 2005 to February 2010
24 Month milestone age- 3 month moving average (Health Target)
1
0.95
0.9
0.85
0.8
0.75
0.7
0.65
0.6
0.55
Apr-07
Jun-07
Aug-07
Oct-07
Dec-07
Feb-08
Apr-08
Jun-08
Aug-08
Oct-08
Dec-08
Feb-09
Apr-09
Jun-09
Aug-09
Oct-09
Dec-09
Feb-10
Source: NIR Datamart:- NIR BC CI Overview - Milestone Ages National (Excl PCV7) - After full refresh of NIR datamart in February 2010

## Fully immunised at 6 months of age

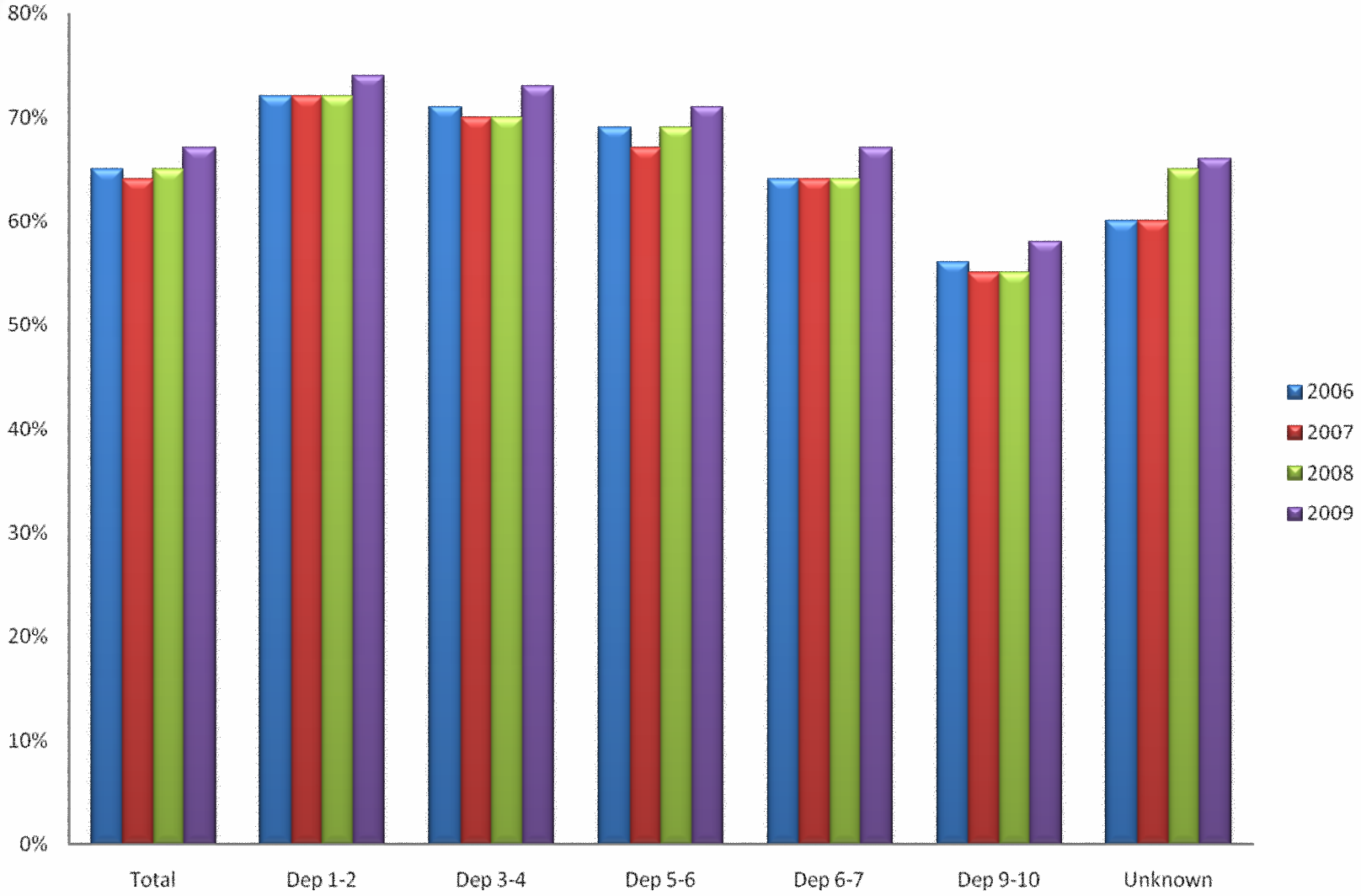



Data source: National Immunisation Register 2010




Data source: National Immunisation Register 2010

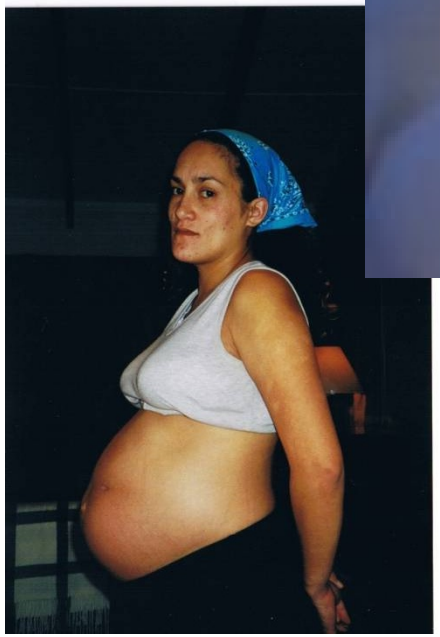
## Fully immunised at 6 months of age - by deprivation




Data source: National Immunisation Register 2010


Key areas that can make a difference

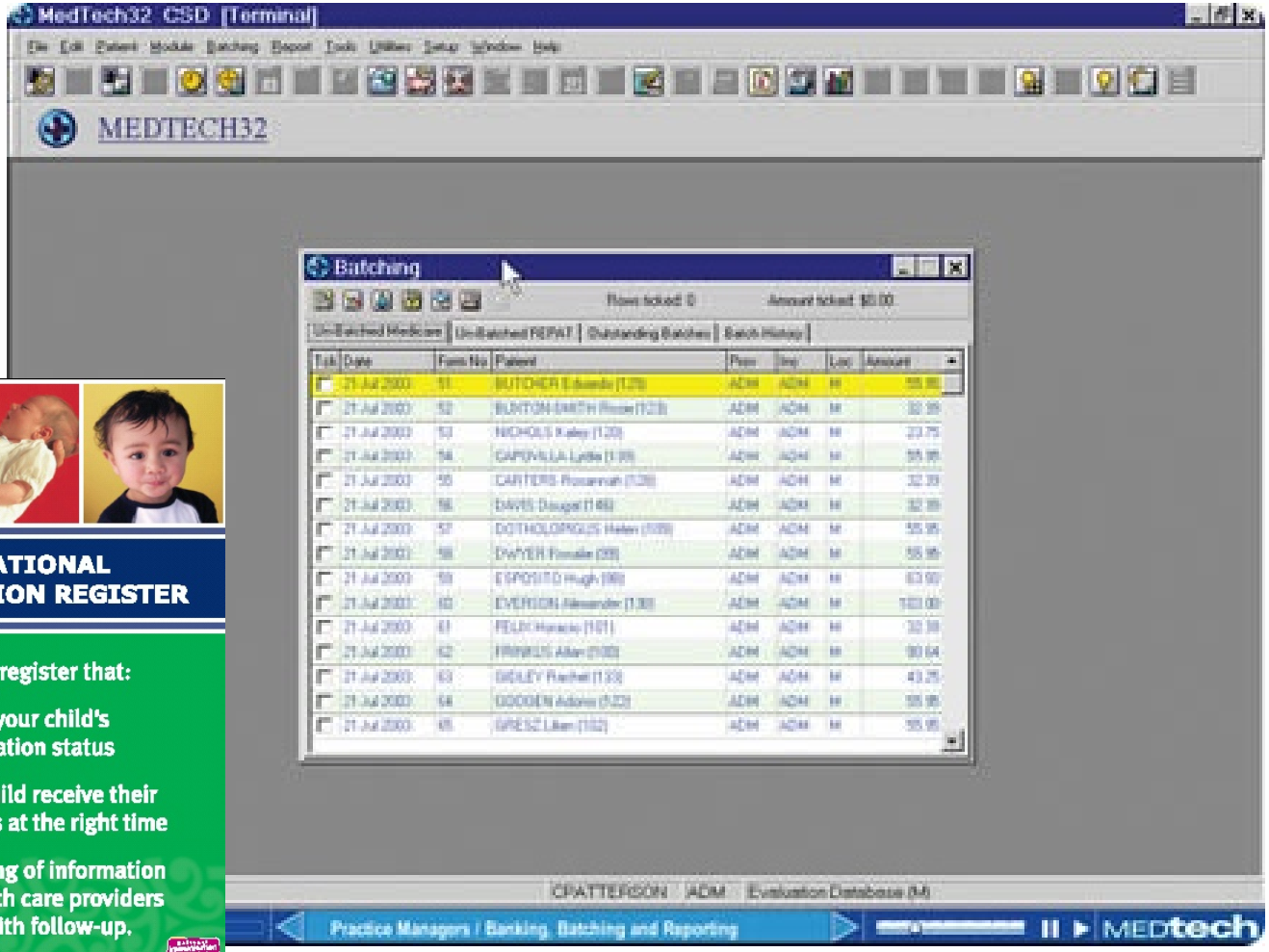
# HOW TO IMPROVE



# Early engagement

# Trusting relationships

# Practice System issues





# Prioritisation

# Missed Opportunities to Immunise

# High coverage and timeliness: Practice Characteristics

- **Higher socioeconomic status of the enrolled population**
- **Early enrollment**
- **Stable practices (less staff turnover)**
- **GP and PN confidence and engagement**
- **PN time and resources**
- **Practice systems**
  - Type
  - Use
- **Parents not given discouraging information antenatally**

# Parental Decision-making

# Provider support and improving systems

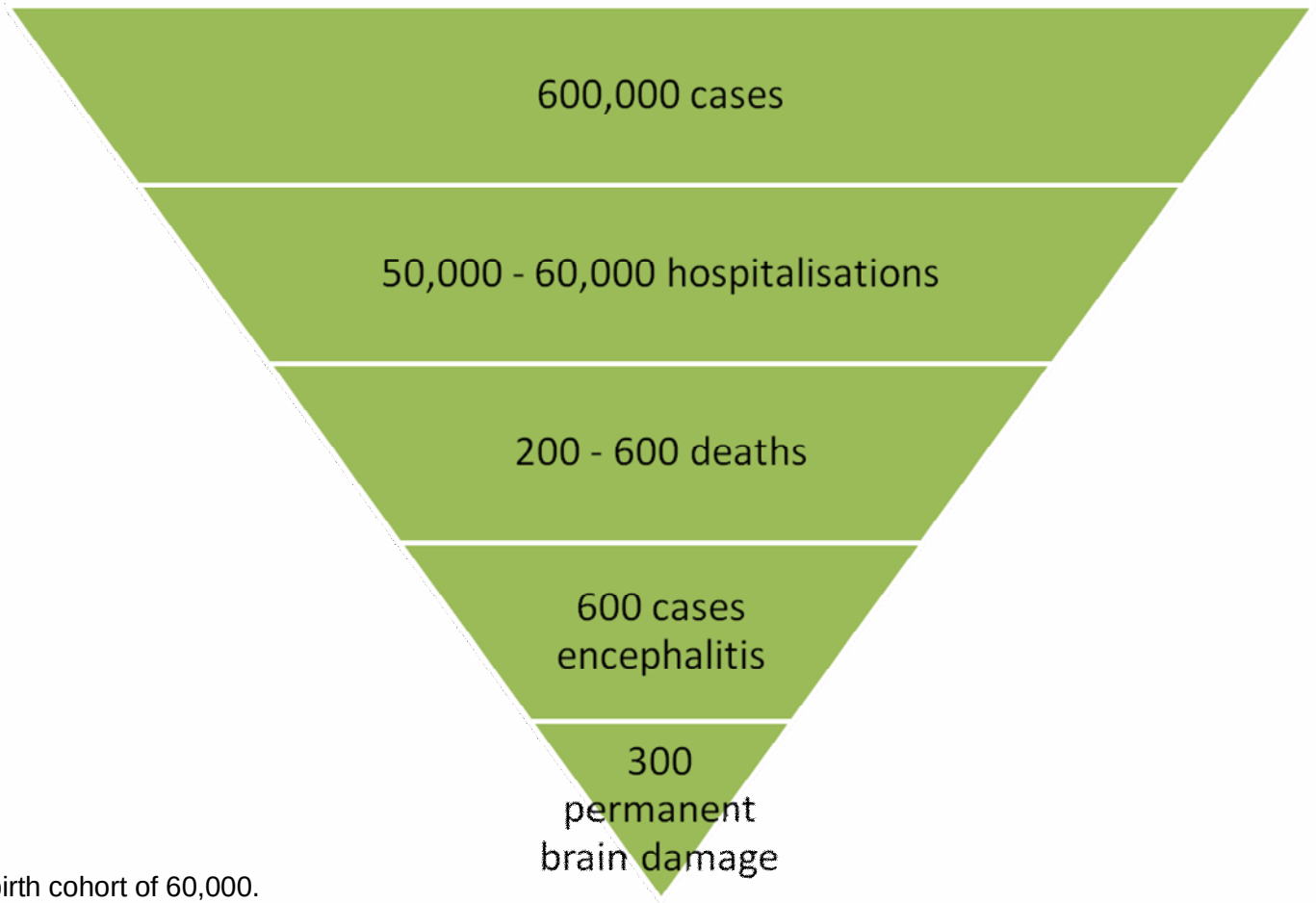
- Quality systems:
  - enrolment/registration
  - early  engagement ?antenatal
- Effective precall/recall
  - chasing DNAs, use of OIS
- Opportunistic efforts/flags/awareness
- Practice champions
- Immunisation/child health a higher priority

## . Community level

- Selling the science
- Engaging the community
- Fight the myths
  - Anecdote/opinion is not equal weighting to careful peer reviewed research:
    - Scientific basis to vaccines
  - Always correct falsehoods e.g.
    - MMR/autism
    - Multiple vaccines overwhelm the immune system
    - Infants too young
    - Vaccines cause asthma, autoimmunity, all world ills…
    - No long term data

# Out of sight out of mind: Absence of disease is a very hard product to sell

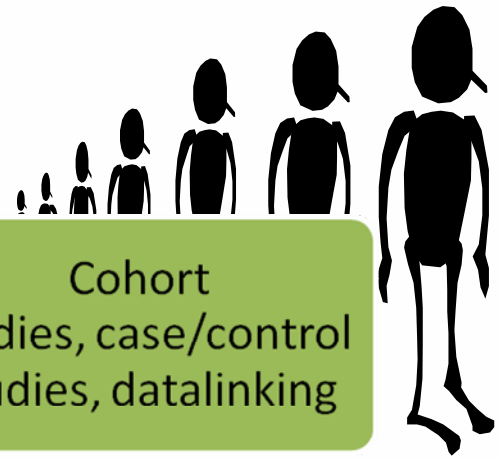
Estimated incidence of severe measles reactions expected over a 10 year period in NZ in the absence of a measles vaccine.




*Based on a birth cohort of 60,000.

# VACCINE SAFETY SURVEILLANCE

# Vaccine Safety



| Clinical Trials | Post marketing surveillance | Cohort studies, case/control studies, datalinking |
|---|---|---|
| Compares events between vaccine and no vaccine | Collect reports of adverse events following immunisation | Looks at incidence of adverse events in vaccinated compared with unvaccinated |
| Tells us if the vaccine contributes to events. **Causality.** | **Cannot tell us if the vaccine caused the event** | Tells us if the vaccine increases the risk of a particular event - **Causality** |
| E.g. local pain, redness etc, fever, serious events up to 1/10,000 | Early warning system for rare or unexpected events | Method used to evaluate possible concerns |

# Passive safety surveillance systems

| Advantages | Disadvantages |
| --- | --- |
| • Highly sensitive<br>• Detects rare serious events<br>• An early warning system e.g. Rotashield ®and interssusception | • Not very specific<br>• Common less severe reports underreported<br>• Cannot provide causality e.g. febrile convulsions and flu vaccination in children<br>• Does not have a denominator |

# Misuse/misunderstanding of passive data

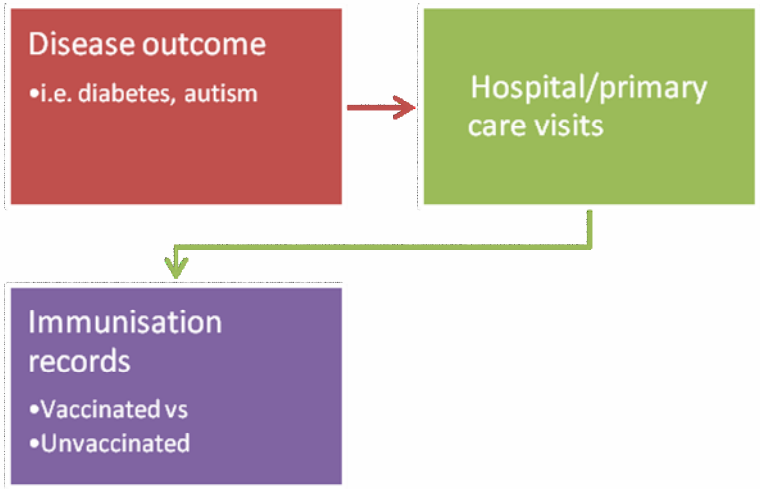
"***Girls given the Gardasil HPV vaccine are at least 16 times more likely to have a serious adverse reaction to it than to develop terminal cervical cancer, which critics say raise doubts about the increasingly controversial vaccine.***

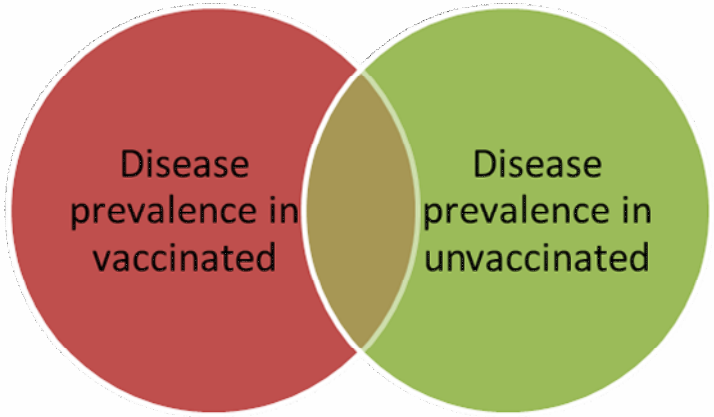
***Information released under the Official Information Act shows the death rate for cervical cancer between 2002 and 2005 was 1.95 deaths per 100,000 women. This compares with 31 serious adverse reactions for the 90,000 girls who have been vaccinated with Gardasil so far.***
***The reactions include the death of an 18-year-old woman in September 2009, and reports of epilepsy, Bells Palsy and collapses"***

Timaru Herald, 9 March 2010

# Examples of vaccine safety monitoring mechanisms

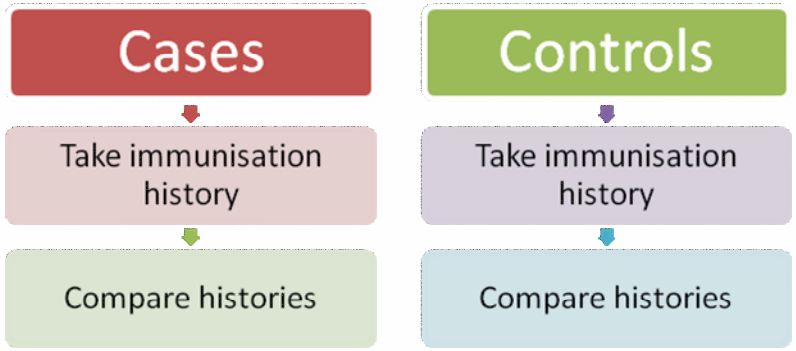
- **Vaccine safety datalinks**
  - US CDC and HMOs collaboration
    - autism/MMR,
    - rotavirus/interssusception,
    - HepB/MS,
    - Thiomersal, encephalopathy
  - Matching hospital records to immunisation records
    - UK MMR/autism
- **Prevalence studies**
  - MMR autism, Denmark, whole birth cohort



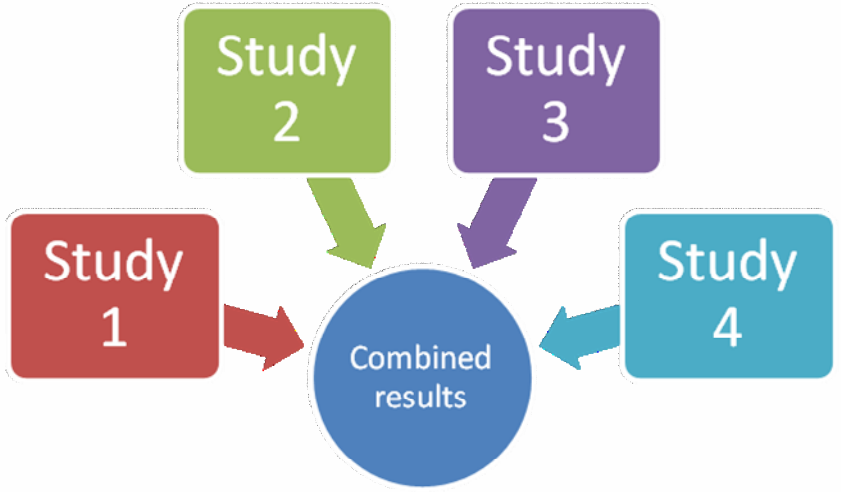



# Examples of vaccine safety monitoring mechansisms

- **Case control**
  - neurological damage and pertussis vaccine (UK)




- **Independent reviews and meta analysis e.g. IOM reviews**
  - Thiomersal, multiple antigens, influenza vaccine / neurological disorders….



# "Importance of background rates of disease in assessment of vaccine safety during mass immunisation with pandemic H1N1 influenza vaccines"

Among 10 million individuals vaccinated with a hypothetical vaccine, medical events that would be expected to occur within 6 weeks post vaccination:

- 21.5 cases of Guillain-Barré Syndrome
- 5.75 cases of sudden death

In a cohort of 1 million vaccinated pregnant women, within 1 day of hypothetical vaccination:

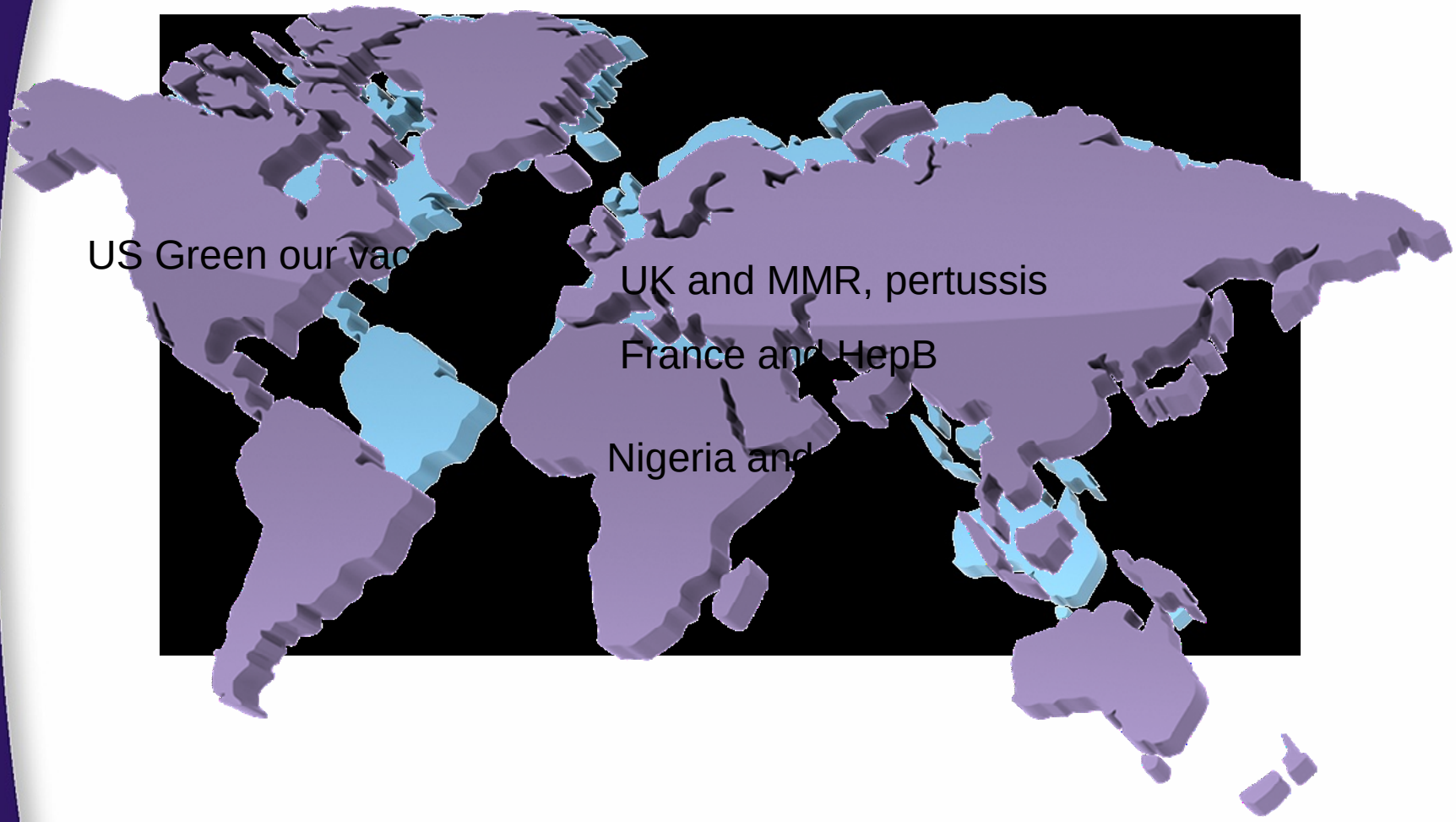
- 397 would be predicted to have a spontaneous abortion

Black S, Eskola J, Siegrist C-A, Halsey N, MacDonald N, Law B, et al. *The Lancet* 2009 2010/1/1/;374(9707):2115-22.


# COMMON MYTHS


The Cow-Pock — or — the Wonderful Effects of the New Inoculation! — Vide. the Publications of y^e Anti-Vaccine Society

# International examples of myths leading to reduction in coverage



A global scare resting on the claims of parents of 8 children

# THE MMR/AUTISM STORY

## Dr Andrew Wakefield

**Gastroenterologist. London.**

# The Wakefield "Study"

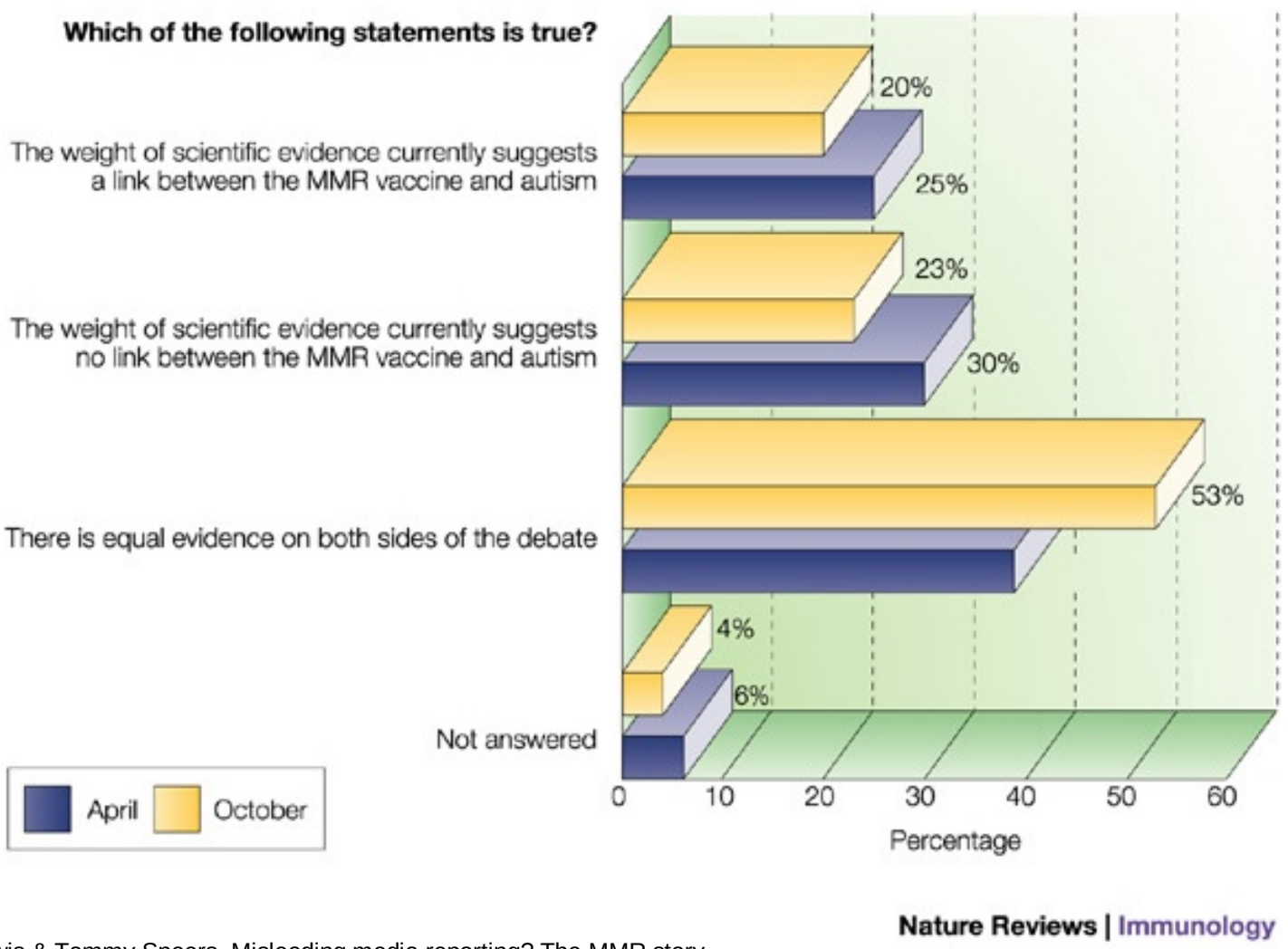
- ***Theory*: The MMR vaccine induces a series of events that includes bowel problems and subsequent development of autism.**
- ***Study design*: 12 children (8 with autism) in the United Kingdom who recently received the MMR vaccine.**
  - 5/8 of those children clients of personal injury lawyer
  - That lawyer paid Dr Wakefield, not disclosed.

# Unintended consequences

- **The day after the publication, Wakefield seized the headlines with his contention that the MMR vaccine caused autism.**
- **This statement was picked up by all major newspapers in the United Kingdom.**


1998

# 2002 Public opinion on the amount of research for and against the link between the MMR vaccine and autism



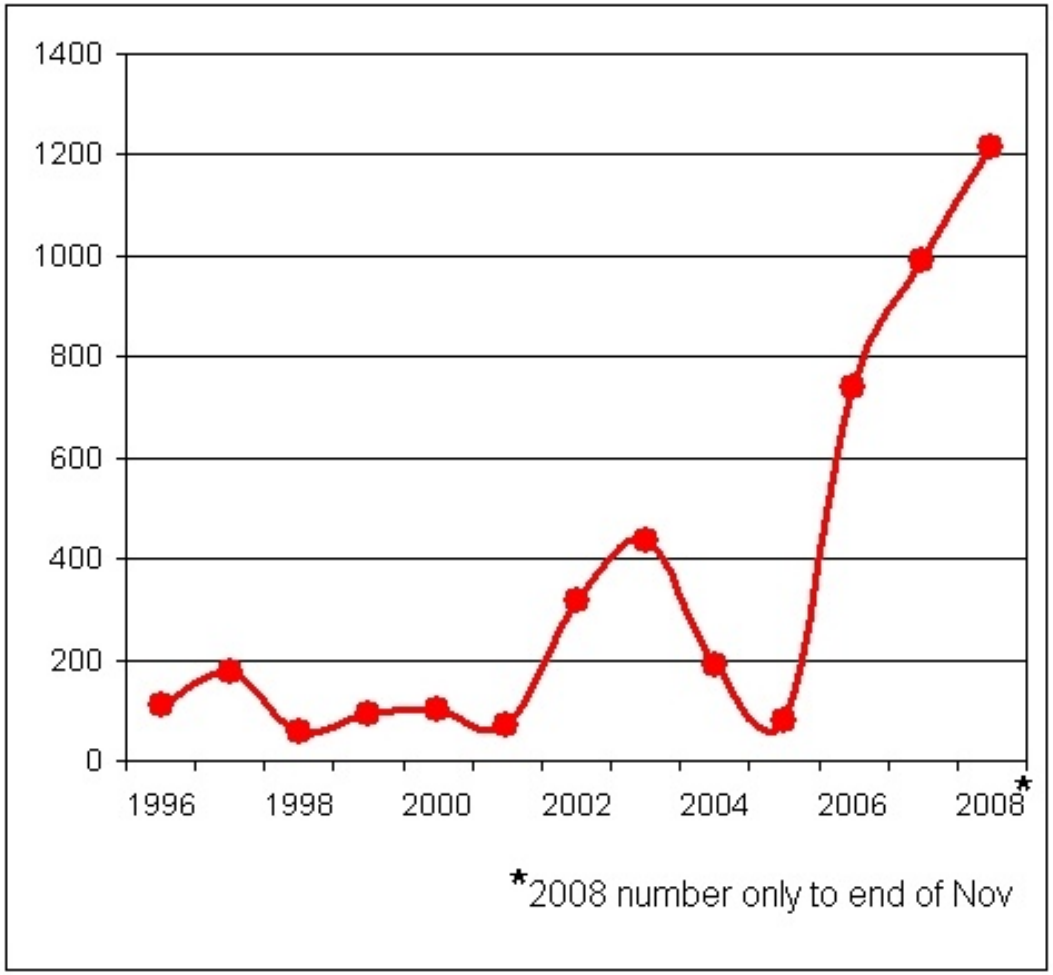

Justin Lewis & Tammy Speers. Misleading media reporting? The MMR story. *Nature Reviews Immunology* **3**, 913-918 (November 2003)

# The legacy of Wakefields' "study"

**Recent outbreaks of measles in the United Kingdom. Three children in Ireland died of measles.**

**In the United States some parents still refuse the MMR vaccine for their children or ask that the vaccine be separated into its component parts.**

Measles in the UK

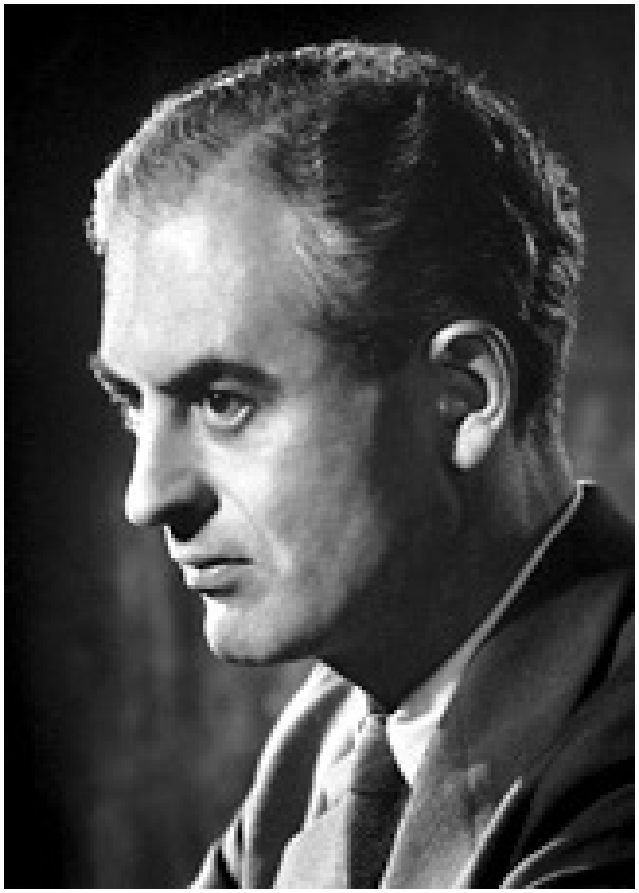



Health Protection Agency

## Sir Peter Medawar - Nobel Prize in Physiology or Medicine 1969

***"I cannot give any scientist of any age better advice than that the intensity of the conviction that a hypothesis is true has no bearing on whether it is true or not".***

**1973**



# VACCINES CONTAIN TOXIC INGREDIENTS

# Nasty toxic poisons in vaccines…

## Aluminium (adjuvant)

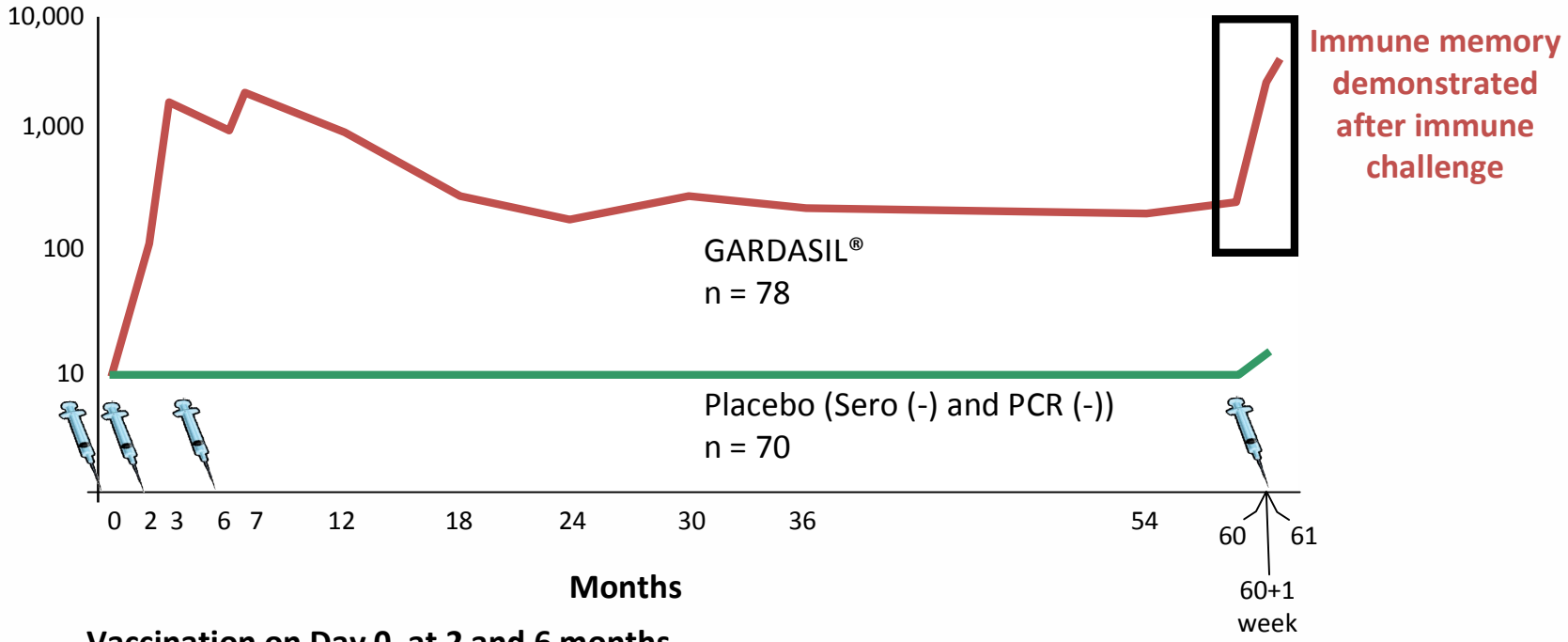
- 8th most abundant element on earth, most common metallic element.
- Found in the blood of all animals, including humans, constantly exposed
- Average daily intake 10-15mg
- Hep B vaccine has 0.235mg of aluminium.
- Average water has about 0.2mg of aluminium per litre
- The amount of aluminium in one dose of HepB = to aluminium in a litre of water - or 1 day worth of baby formula (infant formula has increased aluminium).

- Excreted in urine via kidneys

# IMMUNITY TO HPV VACCINE ONLY 5 YEARS

# Demonstration of immune memory with an antigen challenge at month 60

**HPV 16 responses in 16 to 23 year-old females through 5 years of follow-up and evidence of anamnestic response to immune challenge**




**Vaccination on Day 0, at 2 and 6 months**
**Immune challenge at 60 months**

# COINCIDENCE VS CAUSALITY

# Coincidence vs. Causality

**“Regardless of what the research tells us, I know what I saw.”**

**Dr. Kathy Pratt, April 25th, 2001, during a hearing by the Office of Government Reform to investigate MMR and autism**

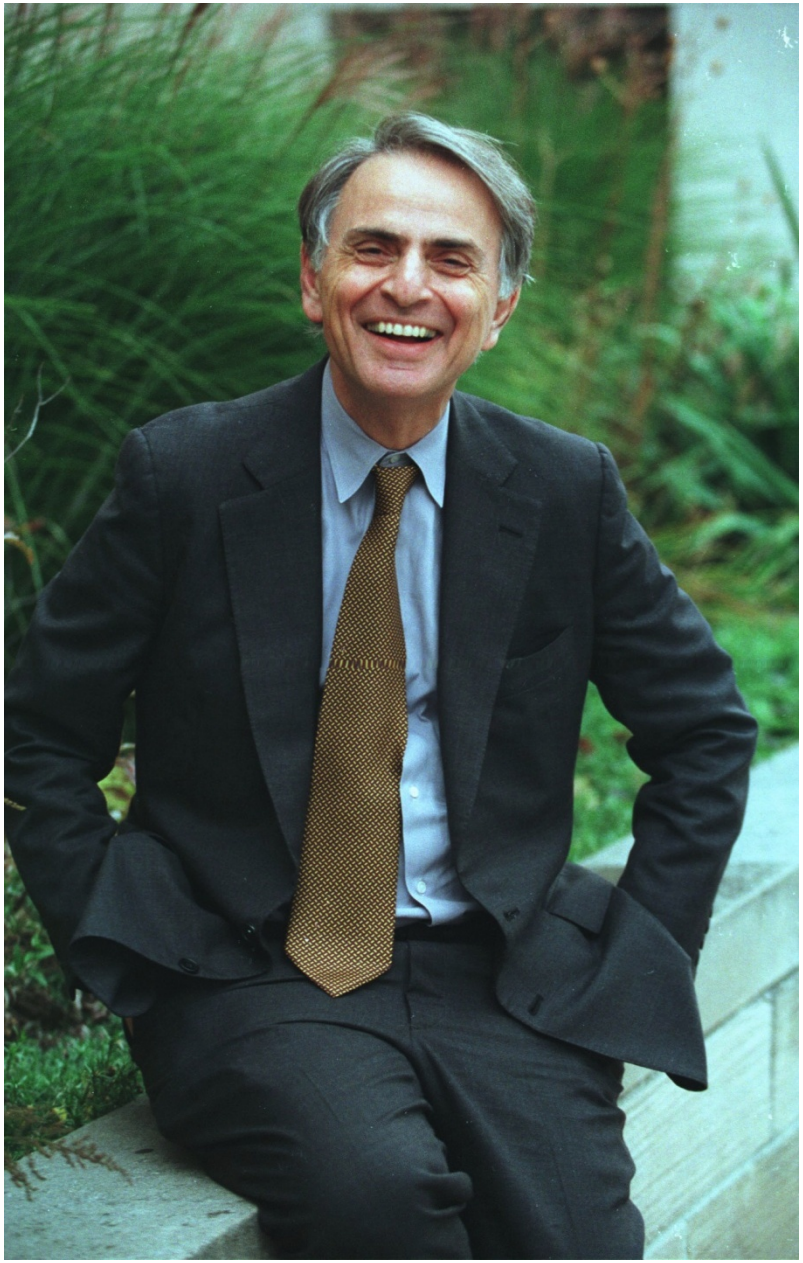
## GARDASIL killed my daughter

***I don't know about you ..... but I am sick and tired of hearing and reading usual propaganda from the Ministry of Health. Just because the reactions or side-effects don't match those expected that fall into the so-called category for that particular pharmaceutical product.***

*http://www.offtheradar.co.nz/vaccines/108-gardasil-killed-my-daughter-rhonda-renata.html (accessed May 2010)*

## Carl Sagan (1934-1996)

***"Extraordinary claims should be backed up by extraordinary evidence"***



**Credit** 1994 by Michael Okoniewski

Overloading the infant immune system

# TOO MANY VACCINES

# US 2008

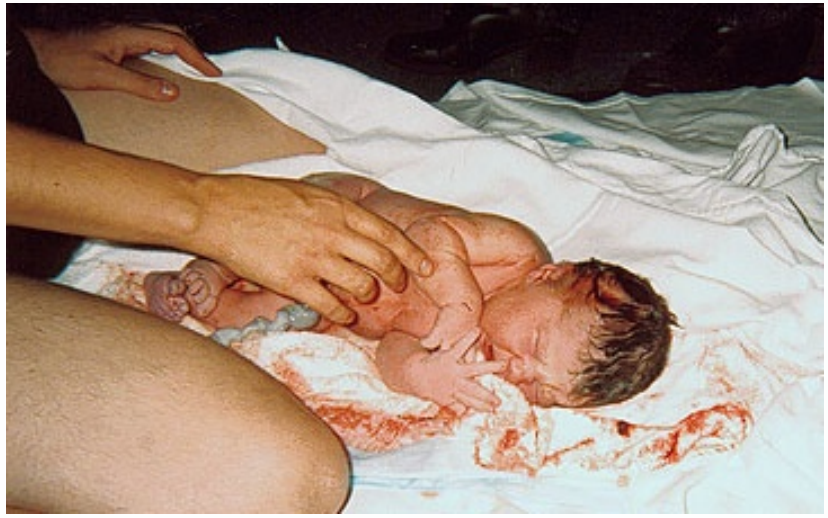

"with the escalation of shots, is the escalation of autism. Literally"


TOO MANY
TOO DUMB
www.safevaccines.org

# Overloading the infant immune system

- Infants are too young
- Can’t handle multiple vaccines
- Too many antigens in each vaccine

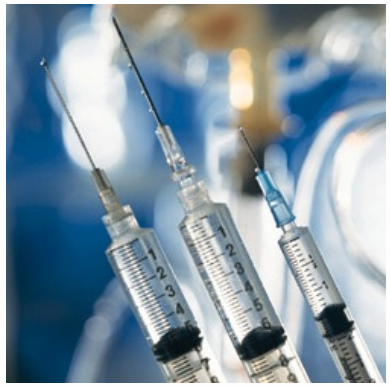
# Do multiple vaccines overload the infant immune system?



- More T and B cells per cc of blood than adults
- $10^{16}$ possibilities!
- Huge Capacity

- **Genital tract flora – 18 species**
- **Faecal flora – 400 species**
- **Breast milk – 8 species**
- **= > $10^6$ different foreign proteins**

# Multiple vaccines



| Year | Antigens | |
|---|---|---|
| – 1900 | ~200 | Smallpox vaccine |
| – 1960 | ~3217 | Included smallpox vaccine and whole cell Pertussis |
| – 1980 | ~3041 | Included whole cell pertussis |
| – 2000 | ~50 | Change to acellular pertussis |

Infants receiving NZ scheduled vaccines now receive around 50 different antigens at one time, previously it was well over 3000.

# VACCINES DON’T WORK

# Vaccinated children can still get disease

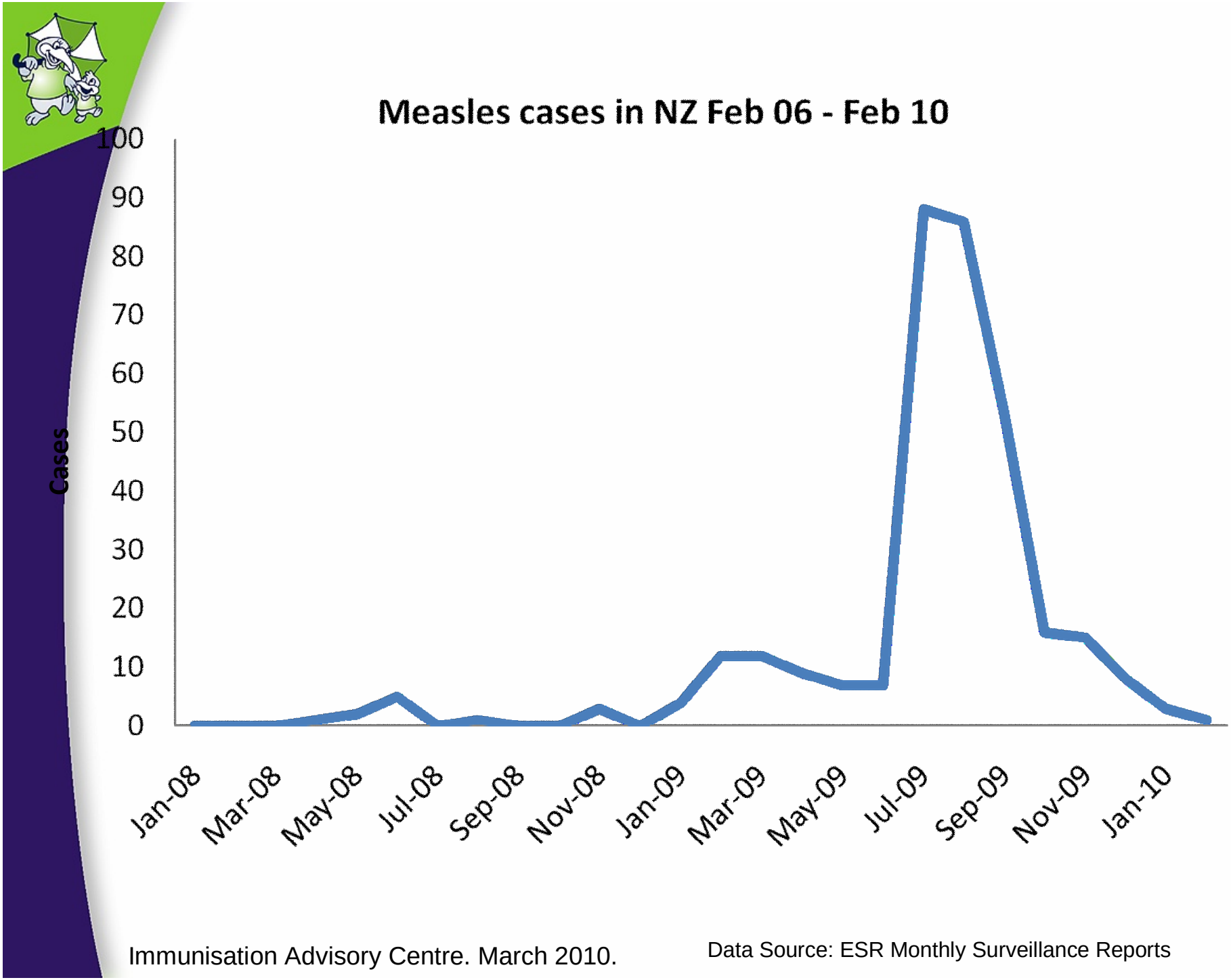
- **No vaccine is 100% effective.**
- **As the proportion of children who are immunised increases, so the proportion of disease cases that are immunised will increase.**
- **Obviously absolute numbers are much lower**

# 100 school kids exposed to measles which is 100% infective with a 95% effective vaccine

| % Immunised | Number of measles cases | % Cases Immunised |
|---|---|---|
| **100%** | 5 | 100% |
| **90%** | 10 + 5 | 33% |
| **80%** | 20 + 4 | 17% |
| **50%** | 50 + 3 | 6% |
| **0%** | 100 | 0% |


"Thanks to the internet it is now possible to be extremely well informed and completely wrong at the same time!"

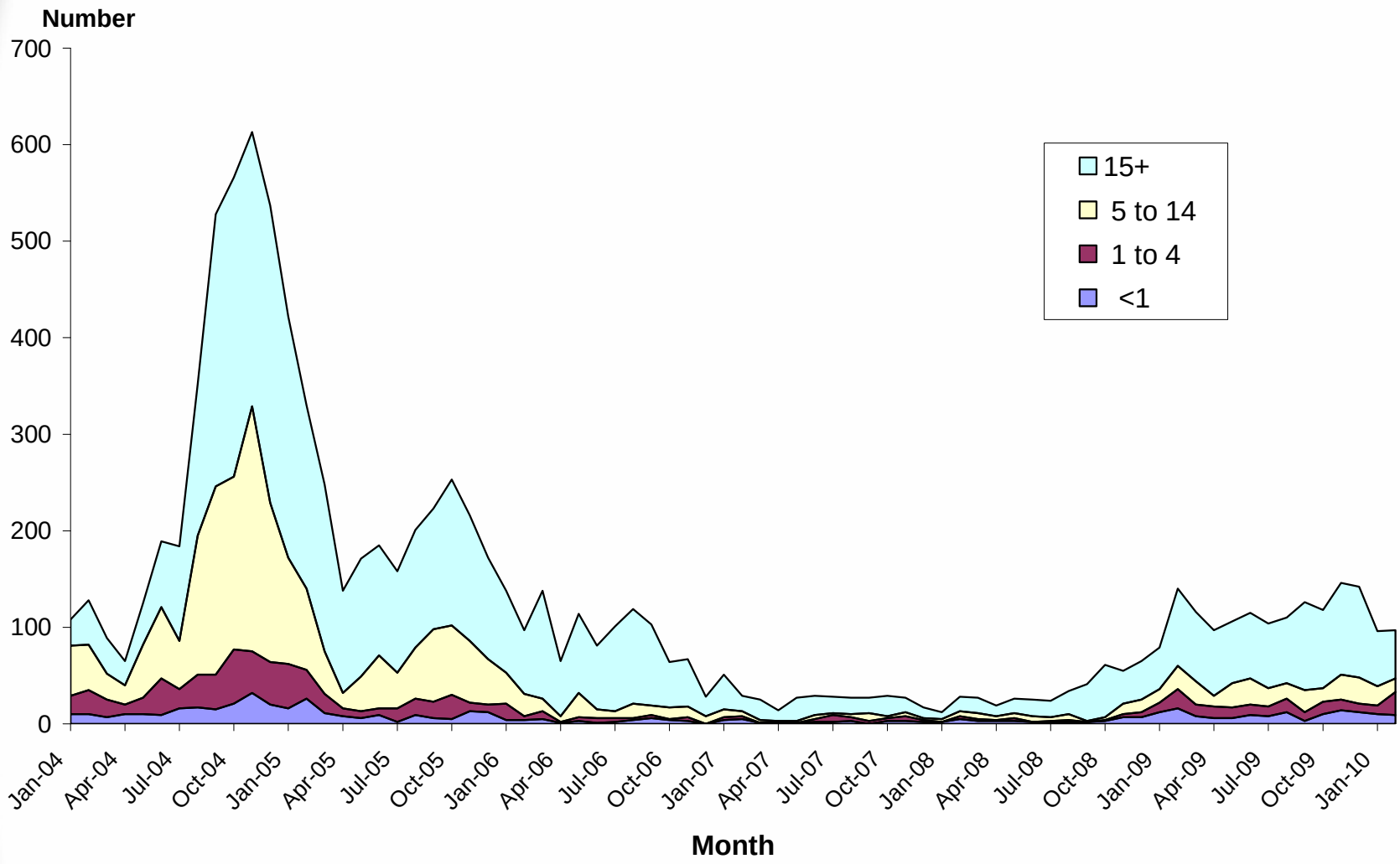
# RECENT ISSUES






Data Source: ESR Monthly Surveillance Reports

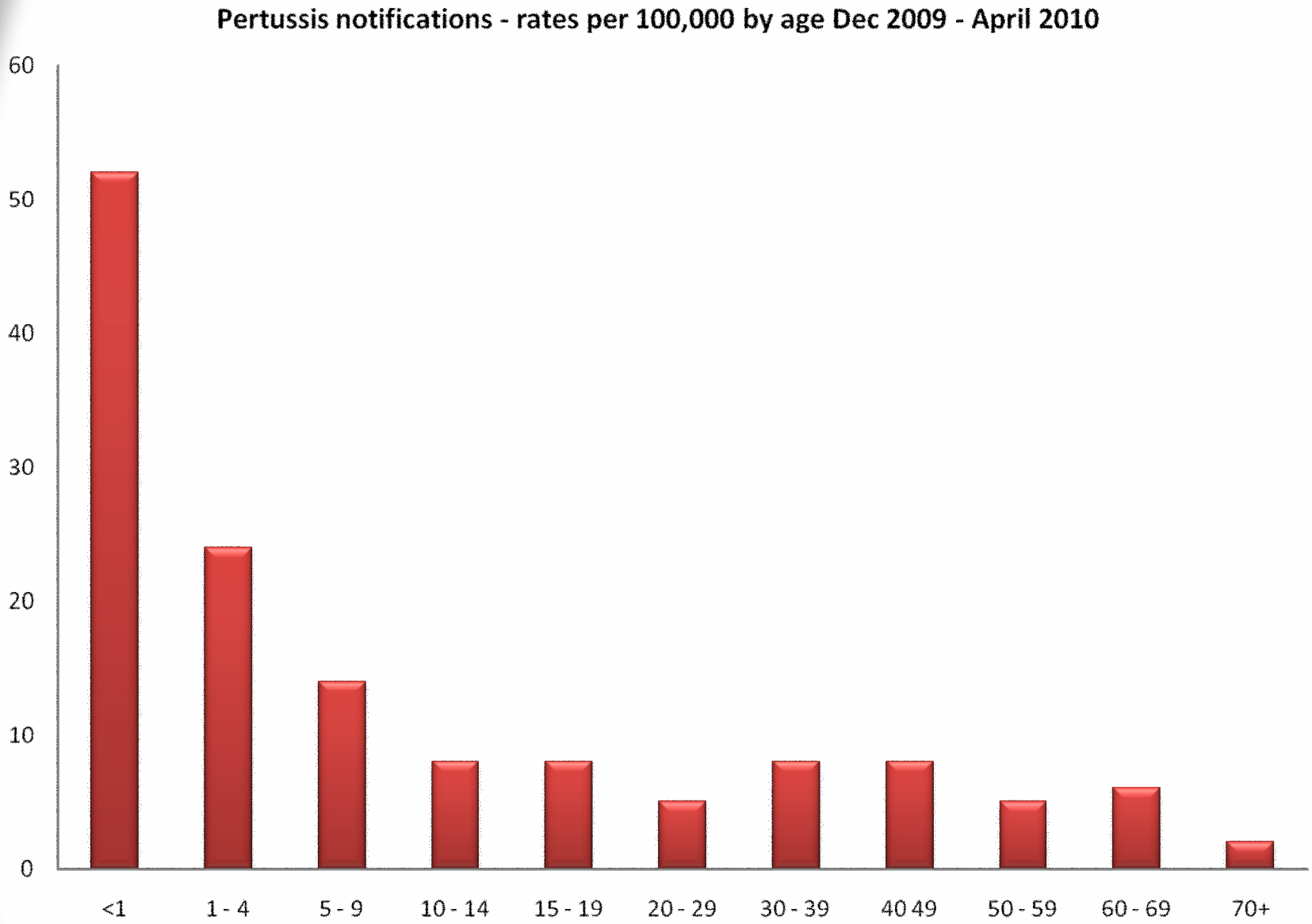
# Monthly whooping cough notifications by age group January 2004 – February 2010



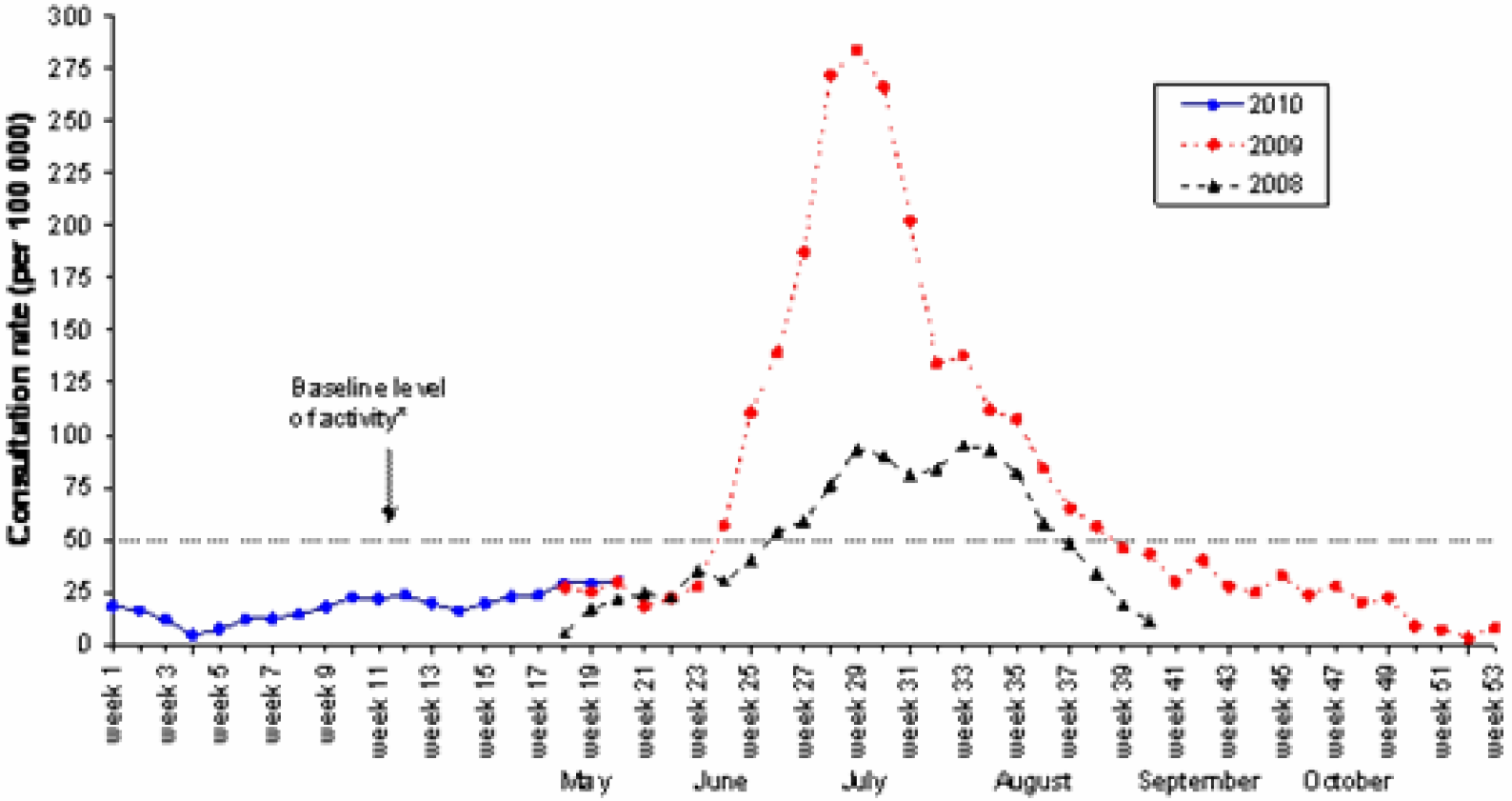
# Pertussis control

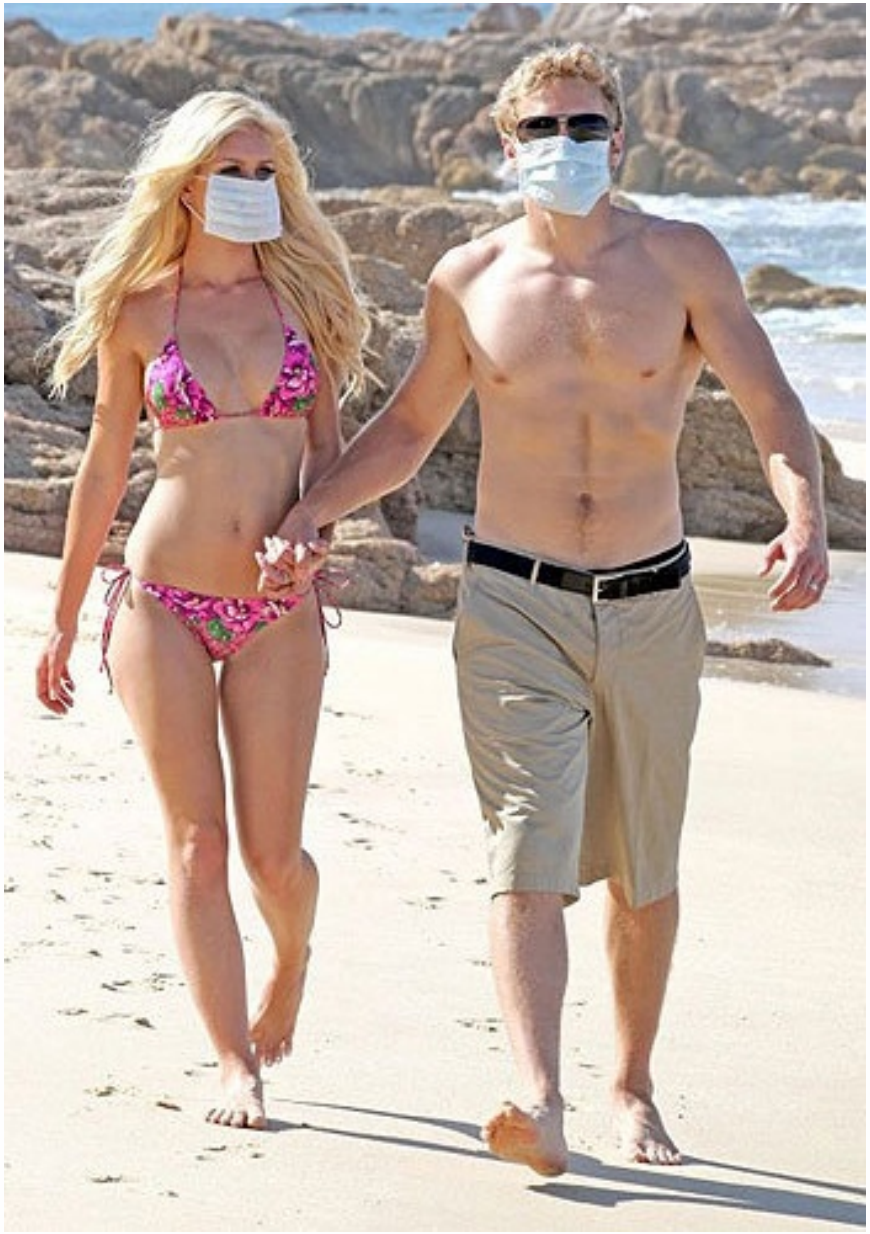
- **Vaccination**
  - Completeness
  - Timeliness
- **Protection of infants too young to be fully vaccinated**
  - Contact with coughing older children/adults
  - Vaccination: teenagers, adults, healthcare workers, teachers, childcare workers….
- **Future directions**

  ….?maternal, neonatal vaccination


Pertussis notifications - rates per 100,000 by age Dec 2009 - April 2010
60
50
40
30
20
10
0
<1
1 - 4
5 - 9
10 - 14
15 - 19
20 - 29
30 - 39
40 49
50 - 59
60 - 69
70+

# Weekly consultation rates for influenza-like illness in New Zealand, 2008-2010





# The use of antipyretics

- **No place for routine use**
  - No evidence that antipyretics reduce febrile convulsions
  - Some evidence that antipyretics may blunt immune response

*Ref: Prymula R et al Effect of prophylactic paracetamol administration at time of vaccination on febrile reactions and antibody responses in children: two open-label, randomised controlled trials.Lancet. 2009 Oct 17;374(9698):1339-50.*

- **It is not necessary to treat fever unless....**
  - For distress or pain
- **But always check for cause of fever - do not just assume it is vaccine related**

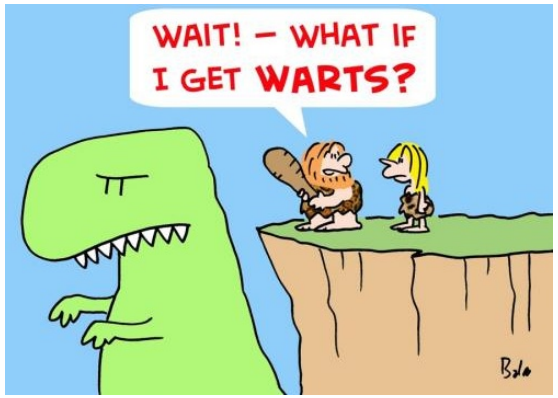
# COOL NEW RESEARCH

# Could flu vaccines with pandemic H1N1 increase the risk of Guillain-Barré syndrome (GBS)?

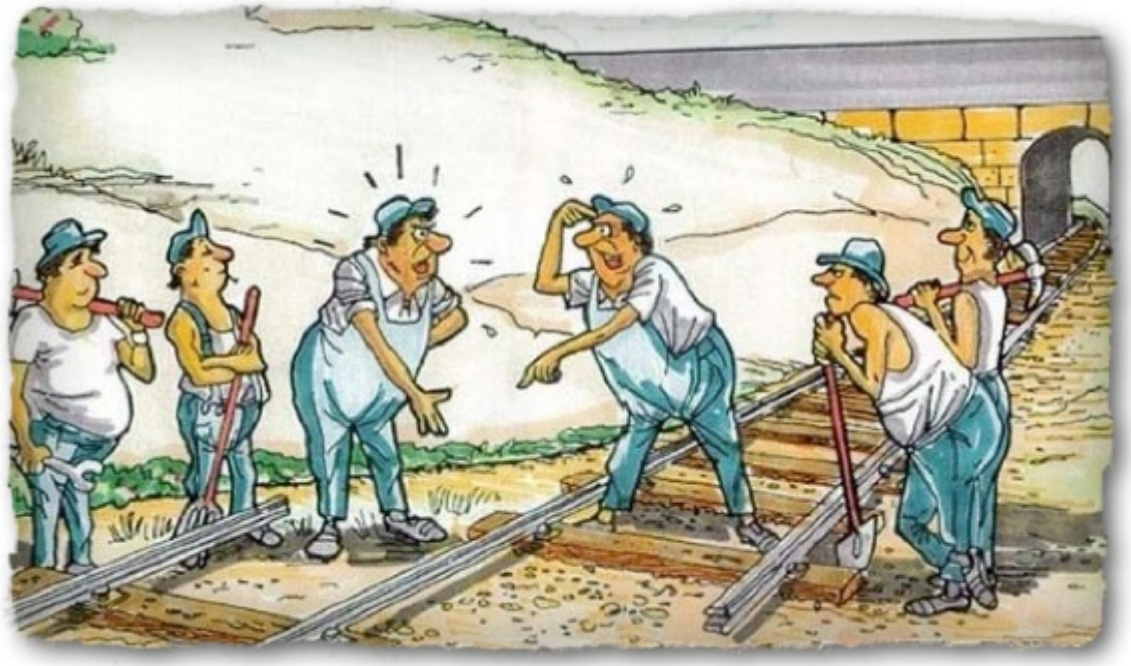
- **Unlikely, but rare so hard to estimate:**
- **Annual incidence 10 – 20 cases per million adults**
- **1970s a specific swine flu immunisation campaign in US observed increased rate to approx 1/100,000**
- **Epidemiological studies cannot show definitely increased link with seasonal flu vaccines**
- **Large UK study relative incidence of GBS:**
  - Within 90 days of vaccine no increase
  - within 90 days of flu-like illness 7 times higher rate

Stowe J et al Am J Epidemiol. 2009;169(3):382-8

# Reduction in Genital Warts




- **Melbourne – >50% reduction in genital warts in women <28 years since 2007 (Fairly C 2009)**
  - New Clients to the Melbourne Sexual Health Clinic 2004-2008
  - Genital warts diagnosed in 3826 (10.6%)
  - Decrease of 25% each quarter in women under 28 years during 2008
  - From 2004 – 2007 this had been increasing by 2% per quarter
  - Also 5% reduction in heterosexual men but not homosexual men or women older than 28 years.



# COMMUNICATION CHALLENGES

## The media needs controversy (feed the beast)

- *"Our job is to be interesting. If the story also happens to be true — great."* **Junior producer, NBC's *Dateline***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Keep it Kiwi 100% NZ OWNED
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NEW YEAR NEW BODY WORKOUT
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"What not to feed the children"
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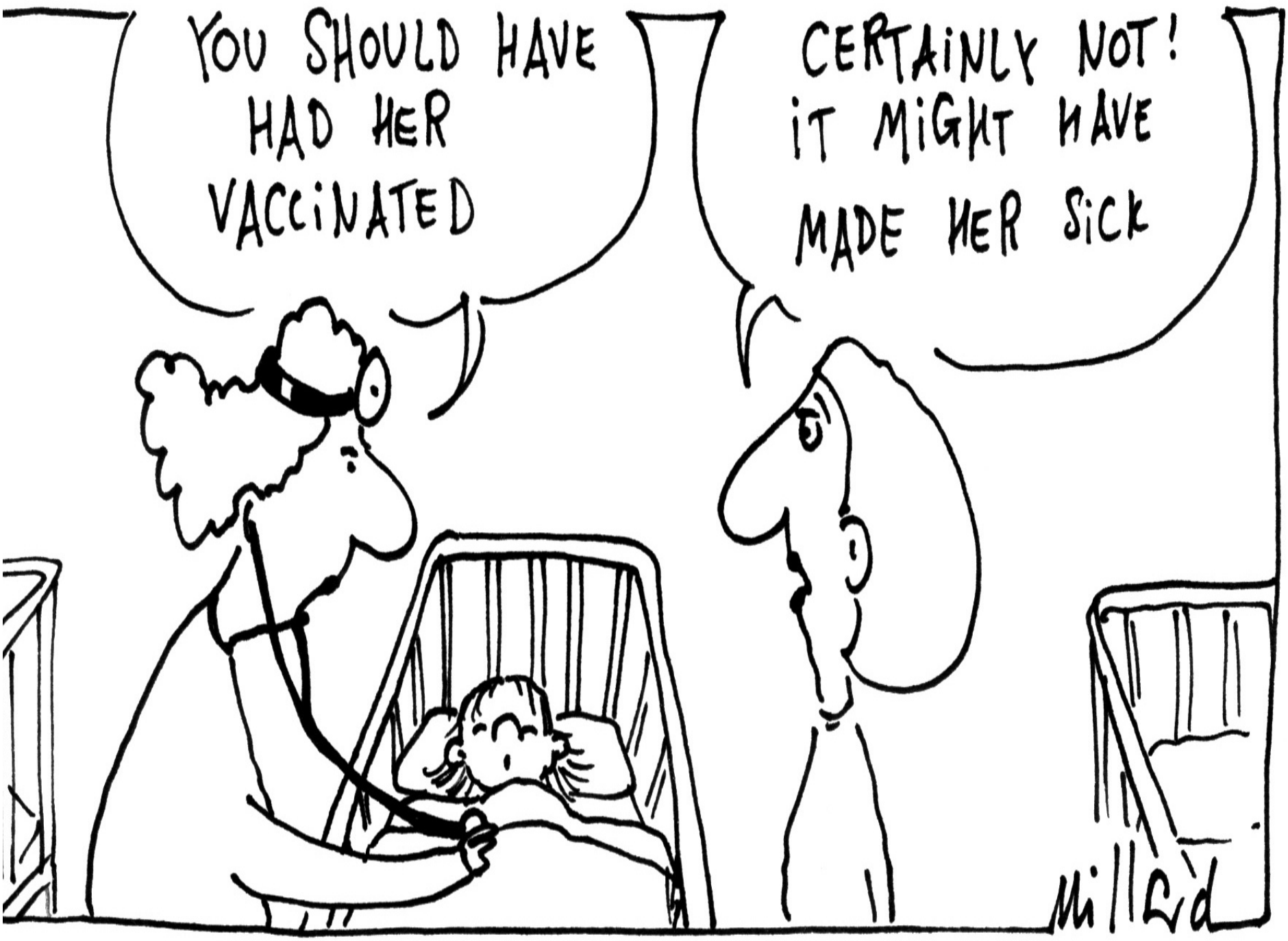
www.fitnesslife.co.nz
NUTRITION - HEALTH - WEIGHT-LOSS - FITNESS - MOTIVATION - SUCCESS - MIND & BODY


YOU SHOULD HAVE HAD HER VACCINATED
CERTAINLY NOT! IT MIGHT HAVE MADE HER SICK
Millard

# Communicating …….

*"I do not believe in vaccines"*

**1st: open approach…… e.g.**

- ***Have you got any specific concerns around vaccines you wish to discuss?***
- ***Would you like to talk further or receive further information***

**2nd if appropriate raise a bit of dissonance**

- ***Do you have any concerns about any of these diseases***
- ***Are you aware XXX will need to show an immunisation certificate when they start preschool/school***
- **3rd if hitting a brick wall stop digging (precontemplator)**

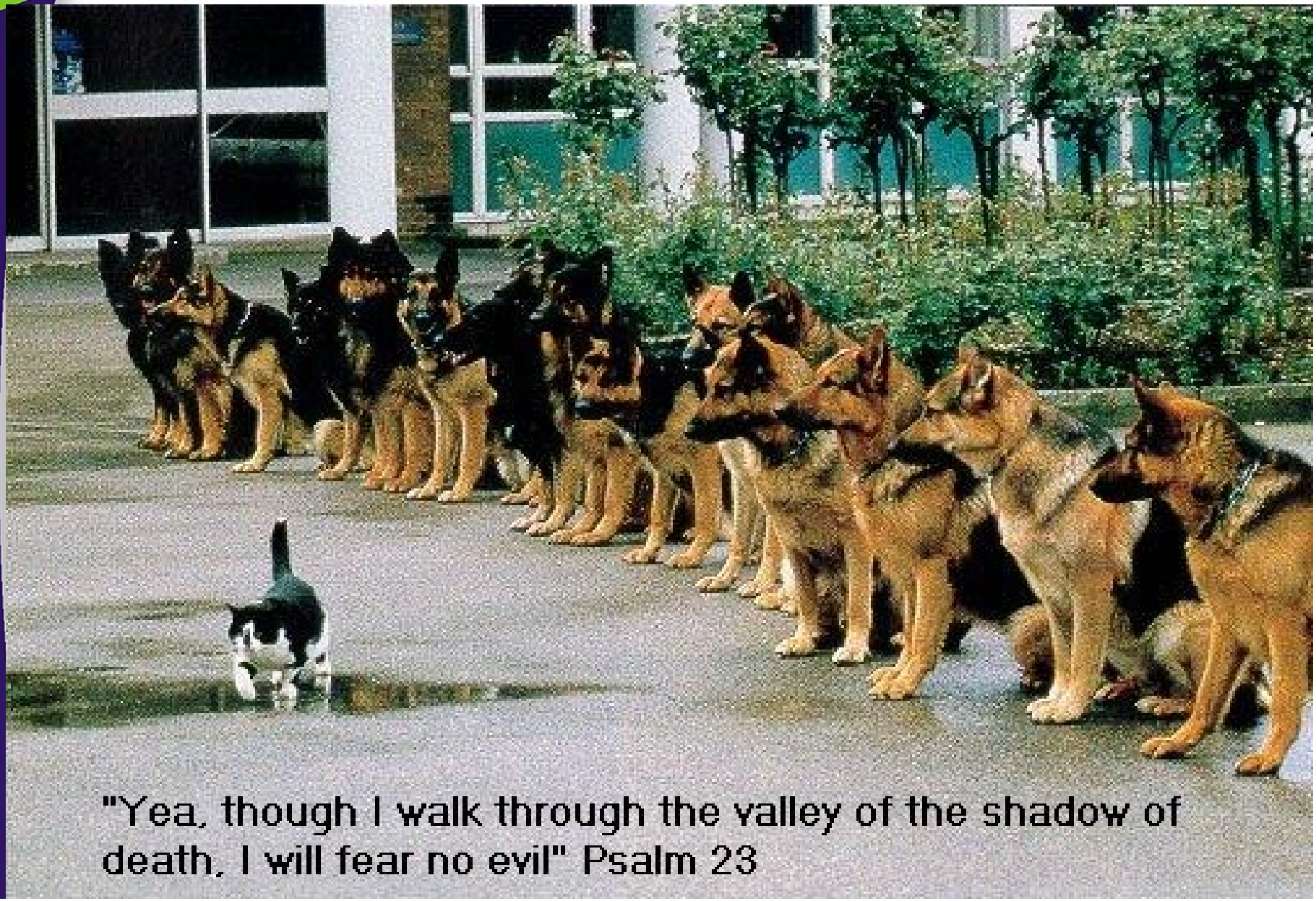
# Key points

- **Good engaged relationship: <u>TRUST</u>**
- **Clear and confident in our professional advice**
- **Extra resources when needed**
  - 0800 IMMUNE
  - www.immune.org.nz

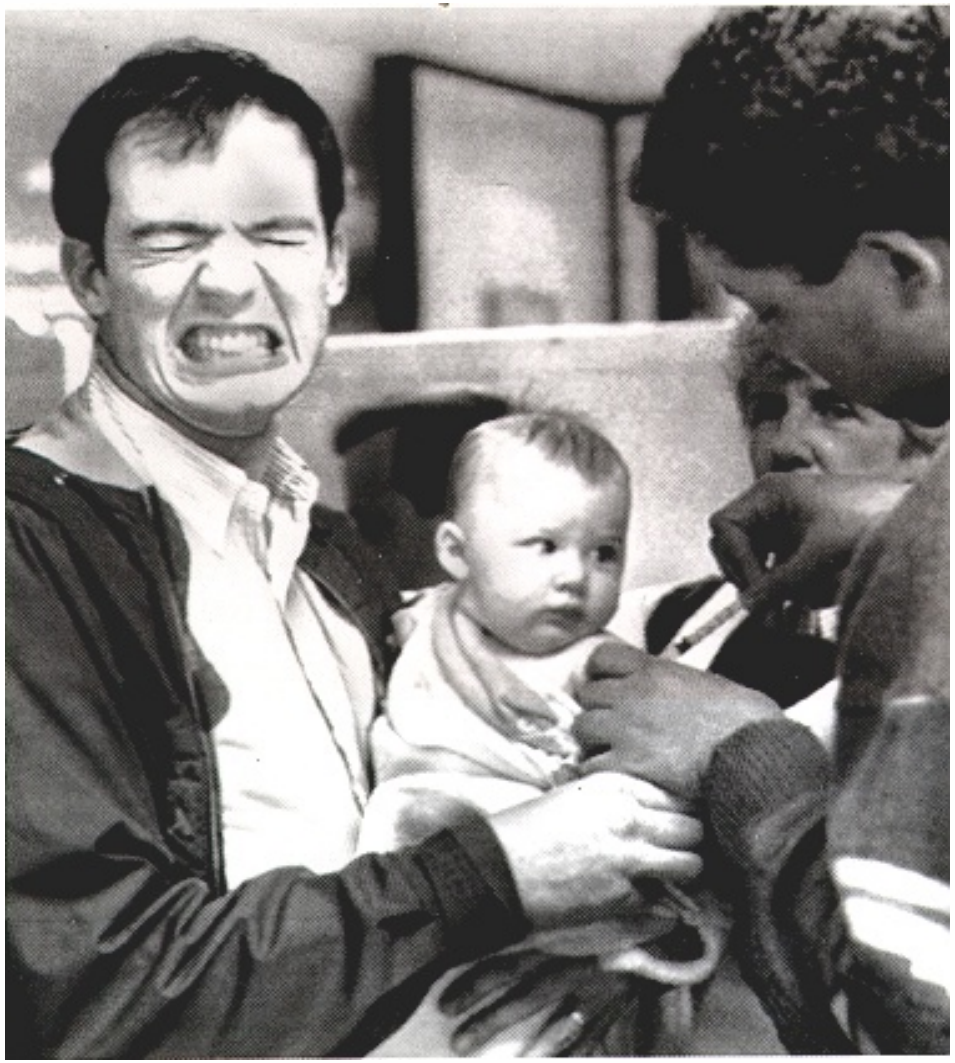
## If the science is so strong why are we so mixed in our messages?


- **Ethics of not promoting the national schedule vaccines?**
- **Declination forms?**

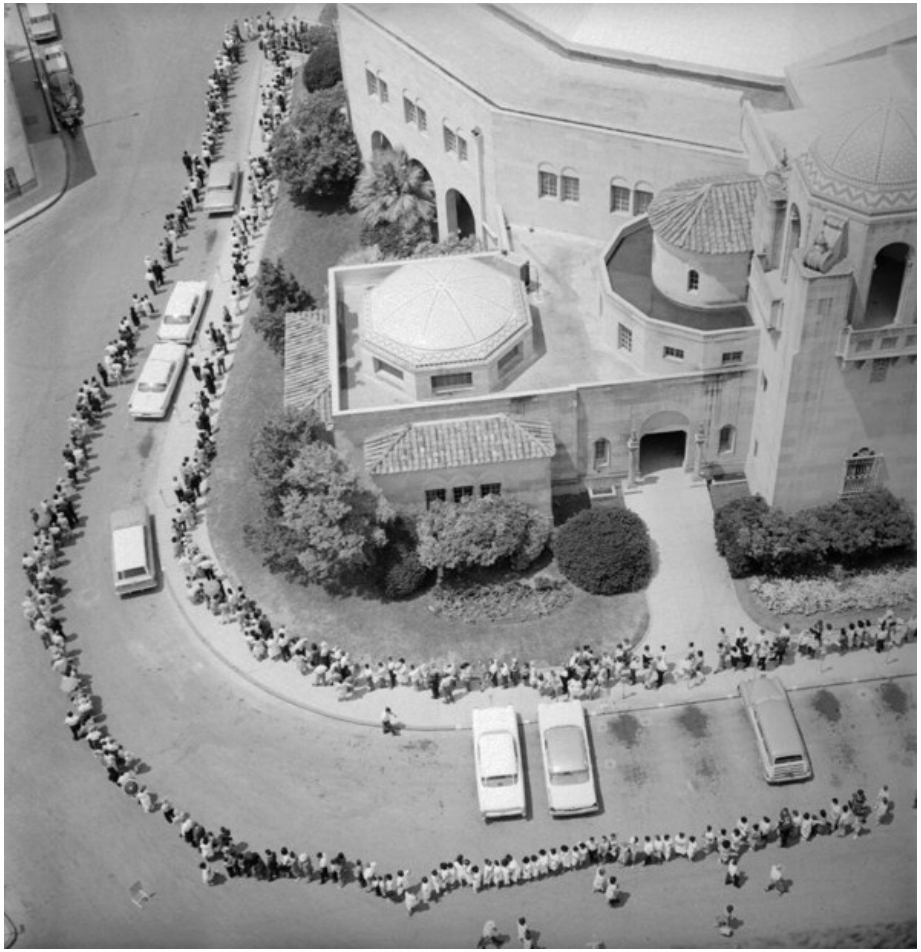
# Attitude!


"Yea, though I walk through the valley of the shadow of death, I will fear no evil" Psalm 23

# Or is it all a deep-rooted fear of needles!



# Waiting for polio immunisation USA 1962

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