

2017 myRESEARCH™
Science Internship Program:
Pharmacy

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Science Internship Program:
Pharmacy

The Global and Individual Benefits of Immunizations

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History of Immunizations

- What does eradication mean?
- Smallpox is the only human disease to be eradicated, declared in 1979
 - The World Health Organization (WHO) called for the global eradication of smallpox in 1959
 - Last cases worldwide were in Somalia and Kenya in 1977

History of Immunizations (cont.)

- Smallpox (cont.):
 - Vaccine was created by Edward Jenner in 1796
 - No animal source for smallpox
 - Few laboratory outbreaks have been documented
- Guinea worm and rinderpest have been eradicated in animals

How Immunizations Work

- Live vaccines are living, weakened viruses that encourage the immune system to build up defense
 - Mumps, measles and rubella (MMR) vaccine and varicella vaccine
- Inactivated vaccines are killed viruses that activate the immune system in a smaller way
 - Polio vaccine

How Immunizations Work (cont.)

- Toxoid vaccines fight bacteria that cause toxins and teach the body to fight natural toxins
 - DTaP vaccine
- Subunit vaccines contain only the antigens of a virus/bacteria that activate a bodily response
 - Pertussis component of DTaP

How Immunizations Work (cont.)

- Conjugate vaccines help the body recognize bacteria with a polysaccharide coating
 - Hib vaccine

Benefits

- Herd protection
- Individual is protected because the body is trained to fight off viruses more readily
- Safer travel
- There is less child mortality, which leads women to have less children

The Article That Started the Controversy

- AJ Wakefield wrote an article in *The Lancet* in which he tried to link behavioral disorders and gastrointestinal disorders to the MMR vaccine
 - He used falsified information and the article was retracted
 - Falsified one of his studies to justify the other
 - Later charged with fraud

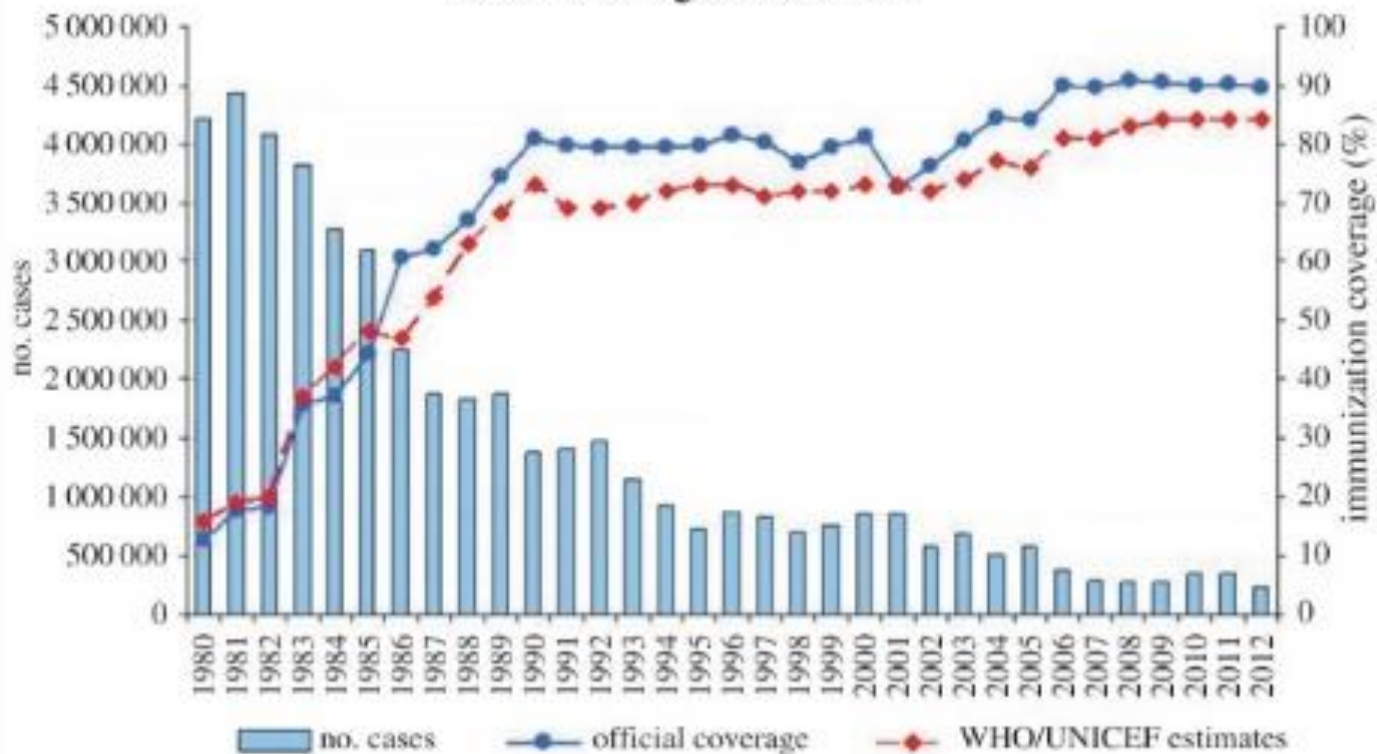
Why the Article Was Incorrect

- Improperly obtained blood samples
- Subjected autistic children to tests without a review board
- Didn't disclose a patent for a vaccine to compete with MMR
- Started a child on an experimental product
- Didn't have a medical license
- Was being paid to advise lawyers

What Happens When Not Everyone Is Vaccinated

- The immunocompromised are put in danger
- Nearly eradicated viruses can break out again
- Eradication would be much harder to achieve
- More people get ill and die at younger ages
- People who are vaccinated are more likely to contract the disease

measles global annual reported cases and MCV coverage, 1980–2012



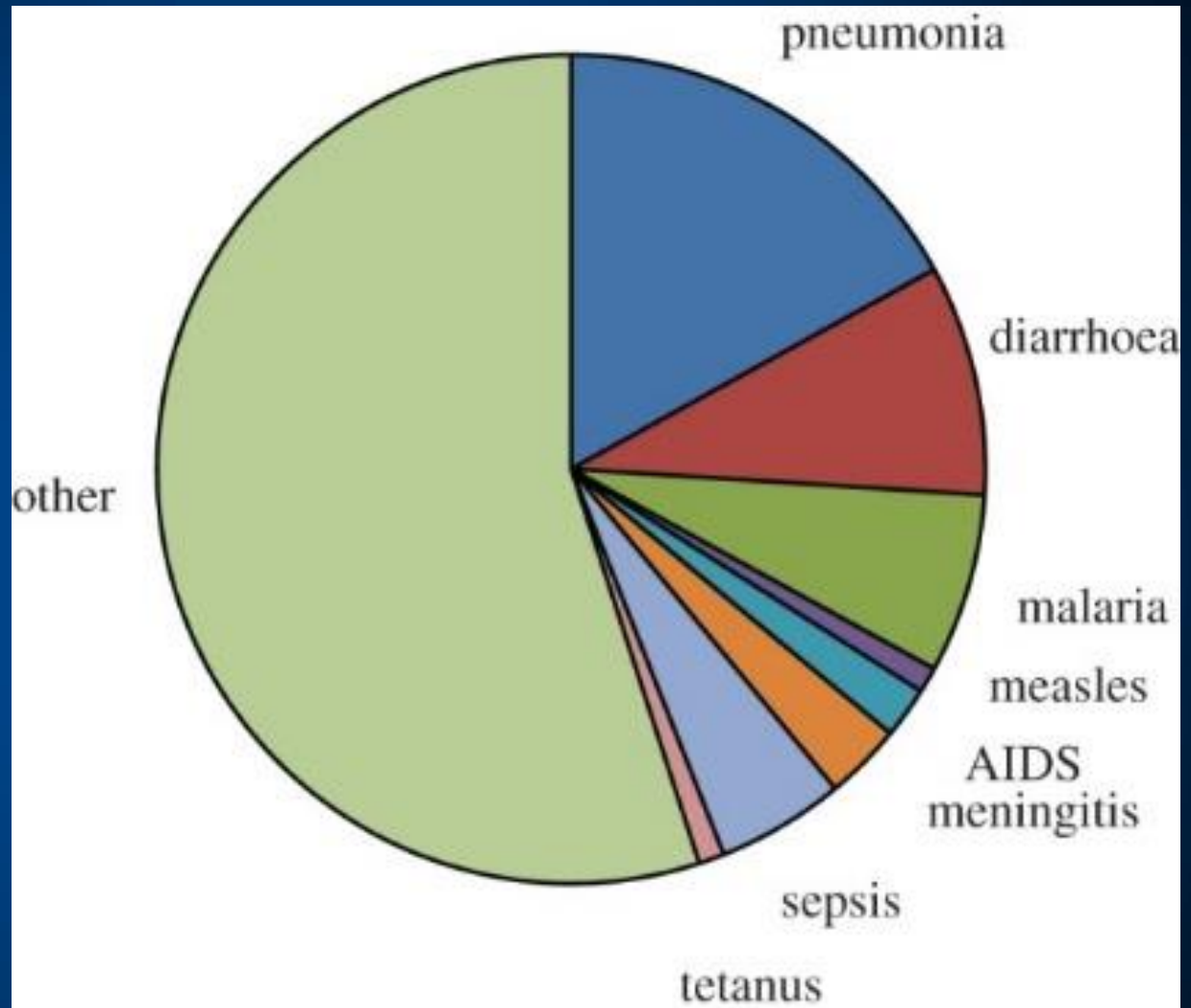
Source: WHO/IVB database, 2013
194 WHO Member States.
Data as of July 2013

Data of slide: 12 July 2013



Measles vaccination coverage
versus amount of cases per year

Infectious and potentially preventable cases of child mortality in 2012

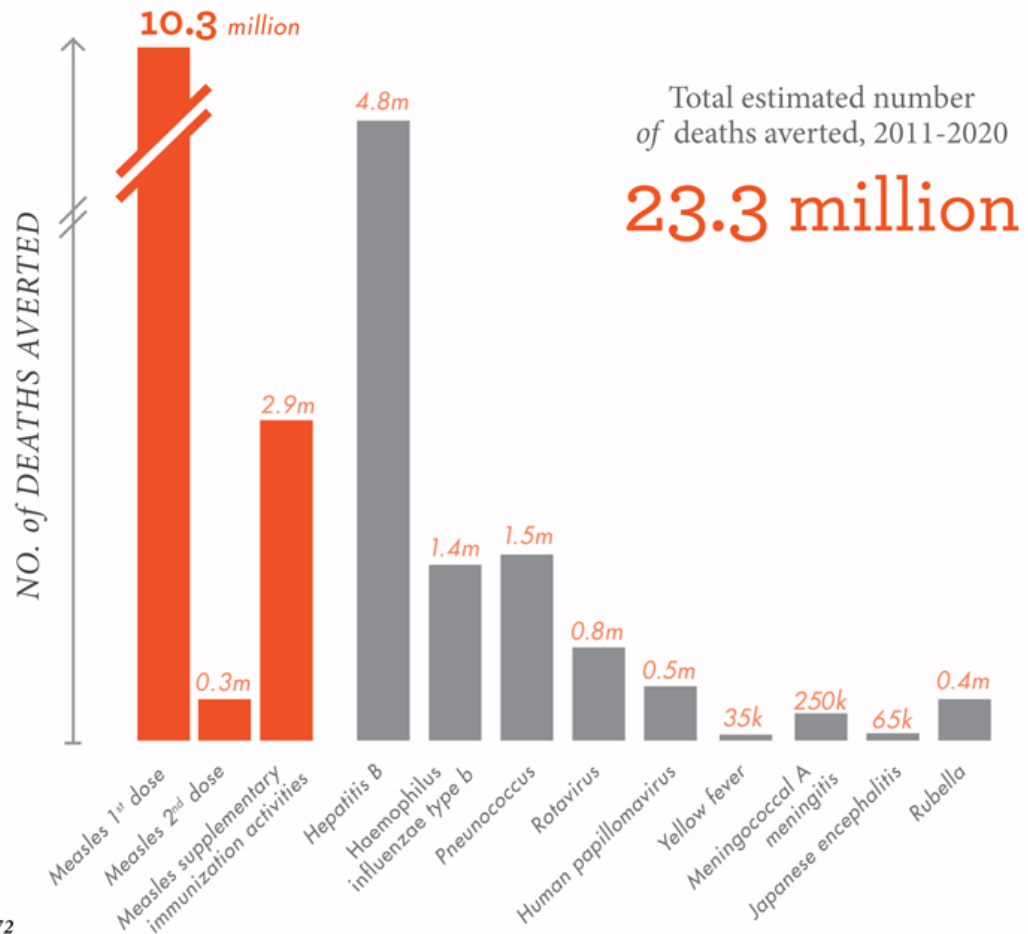


Greenwood, Brian. "The Contribution of Vaccination to Global Health: Past, Present and Future." *Philosophical Transactions of the Royal Society B: Biological Sciences* 369.1645 (2014): 20130433. PMC. Web. 13 July 2017.

2011-2020

Estimated deaths averted with vaccines in low-income countries

- Measles vaccine
- Diseases with new or underutilized vaccines



Source: *Vaccine* 2013; 18;31 (Suppl 2): B61-72
Figure: 5

Conclusions

- Immunization is good for the individual and society
- Medical expenses would be lowered
- Everyone is protected, no matter the immune system status
- Eradication of disease
- Reduces child mortality considerably

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