Counter anti-vaccination myths and build the vacci(Nation)

Hannelie Meyer [BPharm; MSc(Med); PhD]
Rose Burnett [BTech; MPH; PhD]

Email: hannelie.meyer@smu.ac.za

School of Pharmacy
South African Vaccination and Immunisation Centre
Sefako Makgatho Health Sciences University

S A Pharmaceutical Regulatory Affairs Association
Bytes Conference Centre, Midrand
17 August 2018
Declaration

No conflict of interest to declare
No payment or other sponsorships received for the purpose of this talk
Outline of presentation

- Key issues to increase vaccination uptake
  - Advocacy
  - Social mobilisation
  - Communication

- Vaccine communication in practice
  - How to build trust
  - Different types of explanations and when they should be used
  - How to counter anti-vaccination myths
KEY ISSUES CONCERNING ADVOCACY, SOCIAL MOBILISATION AND COMMUNICATION TO INCREASE VACCINATION UPTAKE
Vaccination advocacy

- **Influencing public opinion** to bring about social change
  - E.g. The Treatment Action Campaign brought about HIV/AIDS policy changes
- **Policy-related** vaccination advocacy
  - Public health officials & scientists
  - SA Department of Health fully supports EPI-SA
- **South African media advocacy** for vaccines
  - Influence way media reports on vaccination-related issues
  - Government officials, healthcare workers and academics

http://timeschangin.blogspot.com/2009_03_15_archive.html
Vaccination communication

- **Exchange / sharing** of information
- **Effective communication** → **mutual understanding**
  - Stakeholder education
  - Educating clients about vaccination risks and benefits
  - Media communication
- **Allocate** **time for health promotion**
  - Establish knowledge
  - Respect language and culture
  - Explain verbally
  - Don’t overwhelm with too much information
  - Adapt to individual and community needs
  - Ensure understanding


http://clipartmag.com/communication-images#communication-images-26.jpg
Vaccination communication
Essential information

- All side-effects that may occur
- Managing mild side effects at home
- Return to the clinic if more serious side effects occur
- The date and time of the next vaccination session
- The outstanding doses
- Importance of date to ensure timely completion of schedule
- Date and time of next vaccination session on Road to Health Book (RtHB)
- Use reference points if the caregiver is illiterate

Vaccination communication
Risk benefit communication

- Vaccination risks versus disease risks
- Vaccination benefits far outweigh risks
- Serious AEFIs rare
- Serious complications of diseases common
- Anti-vaccination misinformation on credible-looking websites

Advice given by healthcare workers highly regarded
- Be knowledgeable about the science
- Understand risks and benefits
- Communicate this information effectively

Social mobilisation

- Social mobilisation = **high demand** for vaccination.
- Beyond understanding and accepting need → demanding vaccination as a **human right** and vaccinating their children.
- All stakeholders convinced through effective advocacy and effective communication that vaccination is a **public good** that is **worth providing** and **worth receiving**.

Effective vaccination **advocacy + communication** = **Social mobilisation**

Increased vaccination uptake
Importance of advocacy, social mobilisation and communication regarding vaccination

- **Politicians**: well-considered, evidence-based decisions
- **Healthcare workers**: fully understand and promote vaccination
- **Teachers / community leaders**: influence others
- **General public**: demand vaccination as a human right
- **Media**: informed, responsible decisions about publication

https://www.slideshare.net/AlAlva1/social-mobilization-73070119
VACCINE COMMUNICATION IN PRACTICE
How to build trust
Building trust before delivering the message

• Health messages can be distressing
• **Stressed / uncomfortable** people unlikely to understand / accept
• **Confidence** and **full attention** first priority
• **Acknowledgement** of **concerns** gains attention
• Knowledgeable people judge information on merits
• **Unknowledgeable** people use peripheral cues to help them decide
  ▪ Are you likeable?
  ▪ Do you care about their concerns?
• Explaining **complex issues** at the outset may engender suspicion
  ▪ Effective communication will not occur
  ▪ Demonstrating importance of child’s health to you builds trust

• **Build self-confidence**
  - Don’t ridicule caregivers’ sources of vaccine misinformation
  - Endorse credible books, magazines and websites that you find helpful and interesting


**Website example**
http://www.vaccinesafetynet.org/
WHAT ARE VACCINES?
Vaccines are injections or drops given to decrease the chance of you or your family getting a disease. Vaccines help protect against diseases, but do not treat diseases.

Birth
- BCG - TB
- OPV - Polio Vaccine

6 Weeks
- OPV
- RV(1)
- PCV(1)
- DTap-IPV-Hib-HBV(1)

10 Weeks
- DTap-IPV-Hib-HBV(2)

14 Weeks
- RV(2)
- PCV(2)
- DTap-IPV-Hib-HBV(3)

6 Months
- Measles

9 Months
- PCV (3)

12 Months
- Measles (2)

18 Months
- DTap-IPV-Hib-HBV(4)

6 & 12 years
- Td Vaccine

Example
Example

Vaccination schedule reminder: Fridge magnet
VACCINE COMMUNICATION IN PRACTICE

Different types of explanations and when they should be used
Explaining complex subject matter

- Three main **obstacles prevent understanding** complex subject matter:
  - Distinguishing **essential meanings of terms** from meanings associated by lay people with these terms
  - Visualising **complex human anatomical or physiological** phenomena or pathology
  - Understanding ideas that contradict **lay beliefs**

- Three different **types of explanations** to overcome these obstacles
  - **Elucidating** explanations
  - **Quasi-scientific** explanations
  - **Transformative** explanations

---

Elucidating explanations

Clarify terms - useful for:

- Introducing vaccines
- Increasing uptake
- Allaying public fears

Best when there is no causal relationship:

“following” ≠ “caused by”

Example:

• Explaining what a vaccination is, and what it is not

**When can this kind of explanation be used?**

• When caregivers *do not have the basic knowledge* about vaccination
• When caregivers have asked if they can rather give their babies *alternative types of vaccination*
• Also suitable for
  ▪ Parenting / baby magazine
  ▪ Talk show slot on radio or TV
  ▪ Website on parenting
A vaccination is when a **healthy person** is given a vaccine to **prevent** them from getting a specific **disease**.

A vaccine is **made** from the **germ** that causes the disease – it can be made of parts of the germ that **can’t cause disease**, or whole killed germs, or a live germ that has been stripped of its disease-causing ability.

The vaccine makes the person **build up resistance to the germ**, so that if the person is ever exposed to the real live germ, they are highly unlikely to get the disease that the germ causes – this is called **immunity**, which is why vaccinations are sometimes also called immunisations.

For **example**, vaccination against **polio** starts **when babies are born**, before they have a chance to be exposed to polio germs. The polio vaccine is then also given at 6, 10 and 14 weeks, and again at 18 months, to allow the baby to build up full immunity to polio. Polio vaccination can be done by using polio drops in the mouth, or it can be given by injection.
A vaccination is **not a medicine**, and the vaccines we use in infant immunisation programmes cannot be given to sick people to make them better.

**Homeopathic** “vaccines” are **not vaccines** at all, since they don’t contain any vaccine material and can’t produce immunity.

Nor can your baby be vaccinated by playing with children who have the disease at so-called **“immunisation parties”**.

In fact your baby stands a very high chance of catching the disease at such parties.

Although the **disease** may be **mild** in most children, it can be **very severe** in others, and can result in long-term illness and suffering for your baby, and sometimes even death.

Vaccines are the most **effective** way to **protect** your child from dangerous diseases and the best way to keep your child **healthy**.
Quasi-scientific explanations

- Communication may fail because people cannot visualise information
- Quasi-scientific explanations help visualising complex issues
- Simple images in words or graphics create images in the mind
- Headlines show how content is organised
- Comparisons organise the message further
- Help to make written communication effective
  - Headings
  - Sub-headings
  - Captions
  - Signalling phrases

Concerned about formaldehyde in vaccines? Consider the pear...

A 200 g pear contains up to 12,000 µg of formaldehyde, naturally.

Vaccines contain up to 100 µg, or 0.83% of the formaldehyde in a pear.

The amount of formaldehyde in a vaccine is so tiny that it doesn't even affect the naturally occurring levels of formaldehyde in a child's blood.

Source: http://tinyurl.com/foodCH20

Best for explaining causal relationship

Useful for:

- Introducing vaccines
- Increasing uptake
- Allaying public fears


https://za.pinterest.com/pin/296463587949786509/
Quasi-scientific explanation

Example:

• Explaining **vaccine-associated paralytic poliomyelitis (VAPP)**, following vaccination with the oral polio vaccine.

When can this kind of explanation be used?

• Suitable for the **print media**, and could also be **depicted with graphics**.

• Should be combined with an **elucidating explanation** about polio and polio vaccines, being “boxed” to highlight it as the “**take-home**” message

Note:

• If there is already a lot of negative publicity, then a **transformative explanation** would be more suitable
**What does the oral polio vaccine contain?**
- The oral polio vaccine contains live polio viruses (the germ that causes polio paralysis) that have been weakened and stripped of their ability to cause disease.

**How does the oral polio vaccine work?**
- The weakened polio viruses prevent polio by causing the body to make polio antibodies, which are the body’s weapons to fight polio when the body is exposed to real live polio viruses in the environment.

**Can these live oral polio vaccines cause polio?**
- In extremely rare cases, the weakened polio virus undergoes a change (mutation) that restores its strength and ability to cause disease. When this happens, polio paralysis can develop.

**How often does this happen?**
- 1 case per 2.7 million doses globally

**What is the risk of getting polio paralysis if you are exposed to the real live polio virus, and are not vaccinated?**
- 1 in 200


Transformative explanations

Four steps help to understand ideas that contradict lay beliefs:

1. State lay view
2. Acknowledge plausibility of lay view
3. Create dissatisfaction with lay view
4. State scientifically endorsed view; show why this is better

Best for countering anti-vaccination messages


http://www.who.int/immunization/hpv/communicate/en/
Example:

• Explanation that there is no link between vaccines and autism

When can this kind of explanation be used?

• When a caregiver is reluctant to accept
  ▪ MMR vaccine
  ▪ Vaccines that contain additives
  ▪ Multivalent vaccines

• It is also suitable for
  ▪ Parenting / baby magazine
  ▪ Talk show slot on radio or TV
  ▪ Website on parenting
Step 1: State the lay theory

- **Despite** the fact that Dr Wakefield has been found guilty of falsifying his results in the original report that linked vaccination to autism, many people still believe that vaccines cause autism.
- Some say that this is because of the viruses in the vaccine, others say that vaccine preservatives are to blame, while others say it is because children are getting too many vaccines at once.

Step 2: Acknowledge the plausibility of the lay view

- It is not only lay people who hold this view.
- A few scientists support it, and have come up with causal pathways to support their claims that are biologically plausible to themselves at least, and which are convincing to many well educated members of the public.

Step 3: Show how the lay view does not hold up to scrutiny

However, these claims are discredited for several reasons. First, Wakefield had **not designed** his study in a way that **could show cause** – it lacked both a statistically powerful sample size and a comparison group.

The findings were on **only 8 of 12 autistic children**, all 8 having received MMR (falsified at the time of publication as “before developing autism”; we now know it was “after” in some cases). At the time MMR coverage in Britain was 92%, thus most children aged between 1 to 2 years would have received MMR.

As it happens, **autism** is usually **diagnosed** at this **age**, so it is not surprising that these children were diagnosed at around the same age as MMR vaccination.

---

Second, **preservatives** have **never** been used in MMR – it is a **live vaccine**, and preservatives are used only in killed vaccines.

Third, **babies** are **exposed** to **numerous organisms** every day, and suffer many viral infections each year, which they clear.

Besides, babies who are vaccinated respond just as well to infections that are not vaccine-preventable, as babies who are not vaccinated.

When vaccinated with multivalent vaccines (i.e. vaccines that act against a number of organisms), babies respond with antibody titres just as high as when vaccinated with the individual vaccines separately.

---

Step 4: State the scientifically endorsed view and show how this explains the phenomenon better than the lay view

- Most compellingly, since Wakefield’s original report in 1998, over 1 million children have been studied using statistically powerful epidemiological study designs.

- No link between vaccination and autism has been found in any of these studies.

- Studies to show cause (i.e. to rule out coincidence) must always consist of at least 2 groups:
  - Those vaccinated and those not vaccinated
  - Further sub-divided into those with autism and those without autism in each group for comparison by statistical analysis.

Furthermore, these studies have to have statistically powerful sample sizes in order to be representative of the target population.

Let us look at a simple example

If you study only one group (children with autism) and you find that all of them have brown eyes, you cannot conclude that there is a link between brown eyes and autism.

Unless you study a group of children without autism, and you can show that most of the children who don’t have autism have blue or green eyes, and very few have brown eyes.

And even if you do find this to be true, if you have only studied 10 or twenty children with autism, your finding may be purely due to chance, since such a small sample cannot represent all children with autism.

The “real” cause of autism: Organic food


Distinction between correlation and causation

How susceptible are you to ...

- logical fallacies?
- cognitive biases?
- extracting what you believe is meaningful?
Inappropriate statistical analysis

Does eating ice cream cause shark attacks?  OR Do shark attacks cause more ice creams to be eaten?

- Linear regression analysis (correlation) used instead of measures of association
  - because only one group has been investigated and comparison between groups is thus not possible
VACCINE COMMUNICATION IN PRACTICE

How to counter anti-vaccination myths
Cowpox vaccine

“Unnatural” and “ungodly”
Vaccinated - would grow body parts of cows

“Anti-vaccination movement”

1967:
2.7 million deaths
20%-40% case fatality
100% permanent facial scarring

1980:
Global eradication of smallpox
Thanks to the smallpox vaccine!


Countering anti-vaccination myths

• *Misguided quest* to *help* other parents
• *Financial* interests
• Parents exposed to misinformation and are *concerned*:
  - “*Vaccine hesitancy*”
    - They are not anti-vaccination
    - Deserve empathy and understanding
• Need effective communication leading to acceptance of vaccination

https://www.youtube.com/watch?v=7Wp4eZr0d7g
MYTH

“Vaccines are not safe” OR “Vaccines are harmful”
MYTH: Vaccines cause autism!

Water causes headaches! BAN WATER!

How to protect yourself from getting autism?

Do not vaccinate ... so

CAN'T GET AUTISM

IF YOU DIE FROM POLIO

https://me.me/i/cant-get-autism-if-you-die-from-polio-none-13174593
1998 - Andrew Wakefield revived anti-vaccination movement

**Lancet:** Claimed association between measles mumps rubella (MMR) vaccine and developing autism

There was no scientific basis for the claim

Medical license revoked by Britain's General Medical Council
Wakefield et al. 1998
Lack of scientific validity

<table>
<thead>
<tr>
<th></th>
<th>Autism positive</th>
<th>Autism negative</th>
</tr>
</thead>
<tbody>
<tr>
<td>MMR received</td>
<td>8</td>
<td>No data</td>
</tr>
<tr>
<td>MMR NOT received</td>
<td>4</td>
<td>No data</td>
</tr>
</tbody>
</table>

- Tiny sample size: Only **12 children with autism studied**
  - 8 of whom it was claimed **developed autism** shortly after receiving MMR = later found to be a **false claim**
- **No comparison** group
- The **temporal sequence** was found to be **reversed** in most cases (i.e. autism signs and symptoms preceded MMR)
- The **causal mechanism** was **not biologically plausible**
HOW THE CASE AGAINST THE MMR VACCINE WAS FIXED

In the first part of a special BMJ series, Brian Deer exposes the bogus data behind claims that launched a worldwide scare over the measles, mumps, and rubella (MMR) vaccine, and reveals how the appearance of a link with autism was manufactured at a London medical school.

When I broke the news to the father of child 11, at first he did not believe me. “Wakefield told us my son was the 13th child they saw,” he said, gazing for the first time at the now infamous research paper which linked a purported new syndrome with the measles, mumps, and rubella (MMR) vaccine.1 “There’s only 12 in this.”

That paper was published in the Lancet on 28 February 1998. It was retracted on 2 February 2010.2 Authored by Andrew Wakefield, John Walker-Smith and 11 others from the Royal Free Hospital and School of Medicine, London, it reported on 12 developmentally challenged children, and triggered a decade long public health scare.

Onset of behavioural symptoms was associated by the parents with measles, mumps, and brain and bowel diseases. Child 11 was the penultimate case.

Running his finger across the paper’s tables, over coffee in London, Mr 11 seemed reassured by his anonymised son’s age and other details. But then he pointed at table 2—headed “neuropsychiatric diagnosis”—and for a second time objected.

“That’s not true.”

Child 11 was among the eight whose parents apparently blamed MMR. The interval between his vaccination and the first “behavioural symptom” was reported as 1 week. This symptom was said to have appeared at age 15 months. But his father, whom I had tracked down, said this was wrong.

“The regulator’s main focus was whether the research was ethical. Mine was whether it was true.”

Closed £150 (€180; $230) an hour through a Norfolk solicitor named Richard Barr, he had been confidentially put on the payroll for two years before the paper was published, eventually grossing him £435 643, plus expenses.3

Curiously, however, Wakefield had already identified such a syndrome before the project that would reputedly discover it. “Children with enteritis/disintegrative disorder [an expression he used for bowel inflammation and regressive autism] form part of a new syndrome,” he and Barr explained in a confidential grant application to the UK government’s Legal Aid Board,4 before any of the children were investigated. “Nonetheless the evidence is undeni-

FACTS AGAINST MYTH:
Example of vaccine safety being a priority

- **Whole cell pertussis vaccine**
  - Killed vaccine associated with high fever.
  - Highly effective for many years

- **Acellular pertussis vaccine**
  - Contains only the proteins which elicit the immune response
  - Not as effective as whole cell pertussis vaccine


FACTS AGAINST MYTH: Information needed to prove that a vaccine has caused an adverse event

- Experimental studies to test the safety and efficacy of vaccines – typically involve **two groups** of children

<table>
<thead>
<tr>
<th></th>
<th>Experienced adverse event / developed disease</th>
<th>No adverse event / no disease</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Vaccinated</strong></td>
<td>Total vaccinated with the outcome</td>
<td>Total vaccinated without the outcome</td>
</tr>
<tr>
<td><strong>Not vaccinated</strong></td>
<td>Total not vaccinated with the outcome</td>
<td>Total not vaccinated without the outcome</td>
</tr>
</tbody>
</table>

- Over 60,000 children included in the latest rotavirus vaccine trials
  - Still not large enough to detect a very rare adverse event
  - 1 in a million children

- **Post-marketing surveillance** to detect very rare adverse events
  - Possible **rare adverse events** flagged and fully investigated
  - **Observational studies** - children who have been vaccinated / not vaccinated in normal course of their lives - not under trial conditions.
Untrue and dangerous claims about vaccines

Donald J. Trump
@realDonaldTrump
Healthy young child goes to doctor, gets pumped with massive shot of many vaccines, doesn't feel good and changes - AUTISM. Many such cases!
5:35 am - 28 Mar 2014

13,001 Retweets 11,040 Likes

justhere @KFerrugia · Feb 23
Replying to @realDonaldTrump @LevequeThots
Our foods? All day, all the time. Our bodies can't handle it.

1 in 4 of Donald Trump’s tweets contains fake news

"YOU ARE FAKE NEWS"
Vaccine debate – which side are you on?

Andrew Wakefield
anti-vaccination activist

"I did not have sexual relations with that woman"

Still more truthful than "VAXXED"
Scared of the flu shot?

**FACT:** You already caught the virus but was not showing symptoms when vaccinated.

**MYTH:** Flu shots can give you the flu.
MYTH: Vaccines are not safe

If someone has to wear a hazmat suit to handle vaccines in a laboratory, it should not be injected!

FACT: Independent assessment of each individual lot of a licensed vaccine batch before release onto the market

Retesting in case of adverse events

National Control Laboratory
UFS
Vaccines ARE safe

Serious adverse events following immunisation are extremely rare

1 in 12,000
Chance of being struck by lightning in your lifetime

1 in 352,113
Chance of being injured by a vaccination

https://globalvax.wordpress.com/2015/04/06/10-important-reasons-to-be-vaccinated/
MYTH

“Vaccines are ineffective”
MYTH: Vaccines are ineffective

Why would my unvaccinated kids be a threat to your vaccinated kids?

... if you are so sure that vaccines work?
Parents choosing NOT TO VACCINATE their children

How it should be...

Yes, you're free to reject vaccinations for your child... but he must wear this suit whenever he leaves the house.

Supply child with personal protective wear

Vaccinate mother with common sense

My family believes vaccines do more harm than good.

This isn't for your child... it's a shot of common sense for you.
FACTS AGAINST MYTH: “Vaccines are ineffective”

- When **vaccination coverage is high** the majority of people who get the disease may have been vaccinated.

- **Perception** that vaccines are ineffective.

- No vaccine is **100% effective**; most are 85–95% effective.

FACTS AGAINST MYTH:
CDC example of vaccine effectiveness

- Of 1000 children never exposed to natural measles, 995 vaccinated
- All 1000 exposed to measles
- All 5 unvaccinated children (100%) get measles
- 7 of the 995 vaccinated children (0.7%) get measles
- Thus 58.3% (7/12) of measles cases were vaccinated!
- But the vaccine was 99.3% (988/995) effective

<table>
<thead>
<tr>
<th>Information provided by anti-vaxxers to show the measles vaccine is not effective</th>
<th>Measles cases (n=12)</th>
<th>% of total cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Previously vaccinated against measles</td>
<td>7</td>
<td>58.3%</td>
</tr>
<tr>
<td>Previously not vaccinated against measles</td>
<td>5</td>
<td>41.7%</td>
</tr>
</tbody>
</table>

FACTS AGAINST MYTH: Vaccine efficacy testing must be ethically conducted

• Efficacy is measured by testing for antibodies, and comparing the levels of antibodies between vaccinated and unvaccinated children.

• It would be **unethical to expose** the children to the causative organism as part of the experiment.

• The anti-vaccination lobby claim that because scientists do not do this, they have no proof of efficacy.
MYTH

“Vaccines are not responsible for the decline in infectious diseases”
FACTS AGAINST MYTH: “Vaccines are not responsible for the decline in infectious diseases”

http://www.cdc.gov/vaccines/vac-gen/6mishome.htm

Decline in number of measles cases after introduction of the vaccine
FACTS AGAINST MYTH: “Vaccines are not responsible for the decline in infectious diseases”

CRS = Congenital rubella syndrome

Decline in number of rubella cases after introduction of the vaccine

http://www.cdc.gov/vaccines/vac-gen/6mishome.htm
FACTS AGAINST MYTH: “Vaccines are not responsible for the decline in infectious diseases”

Decline in number of Hib cases within 3 years after introduction of the vaccine

Incidence* of Invasive Hib Disease, 1990-2010

*Rate per 100,000 children <5 years of age

http://www.cdc.gov/vaccines/vac-gen/6mishome.htm
FACTS AGAINST MYTH: “Vaccines are not responsible for the decline in infectious diseases”

MYTH

“Vaccination is profit driven”
FACTS AGAINST MYTH:
“Vaccination is profit driven”

For every $1 spent on a vaccine in the US...

- DTaP saves $27
- MMR saves $26
- Perinatal Hepatitis B saves $14.70
- Inactivated Polio (IPV) saves $5.45
- Varicella saves $2.73

...with routine vaccination the US saves $13.5 billion in direct costs and $68.8 billion in societal costs.
Who profits from vaccination?

The expenses to TREAT a vaccine-preventable disease are much higher than providing the vaccination.

https://vaxplanations.wordpress.com/tag/herd-immunity/
Who profits from vaccination? (2)

- **EPI-SA vaccines** are provided **free of charge** in the public sector.

- **Private sector clinics** in South Africa generally provide the vaccine **at cost**, and charge only a **small administration fee**.

- Vaccination clearly does NOT provide huge profits for South African healthcare workers.
Do scientists profit from vaccination?

• **Independent scientists** who develop and test vaccines are sometimes accused of being in “the pockets” of the vaccine industry
  - E.g. Paul Offit, the inventor of the rotavirus vaccine
• Independent scientists who obtain funding, produce validated findings of vaccine safety and efficacy in numerous studies
• **Universities** do not have funds for their scientists to develop and test vaccines
  - When funding is obtained, they remain employees of their university, not the funder
Do governments profit from vaccination?

- Most countries - independent national technical advisory bodies
  - Guide national policymakers and programme managers on immunisation policies and programmes
- South Africa: National Advisory Group on Immunisation (NAGI)
  - Independence of NAGI is unquestionable
- All vaccines in EPI-SA – selected based on scientific evidence
The anti-vaccination lobby profits from discrediting vaccines

- **Sponsors** of websites and blogs **discrediting vaccines** often have a profit motive.
- These organisations **sell products** that claim to be “natural alternatives” to vaccination.
- In 2009 this industry was worth USD 60 billion.
- In 2013 the global vaccine market was worth only USD 24 billion.


For the record ...

There's no vaccine against stupidity.
References

• Burnett RJ, Baleta A, Moola S (2013). Vaccination and the media. 5th Regional WHO Vaccinology Course.
• CDC (2011). Some common misperceptions about vaccination and how to respond to them Available from http://www.cdc.gov/vaccines/vac-gen/6mishome.htm


NOVA (2014). Season 42 episode 1. Vaccines: Calling the shots https://www.youtube.com/watch?v=wqbH40Y9XJw


References (3)


The Vaccine Confidence Project. London School of Hygiene and Tropical Medicine http://www.vaccineconfidence.org/about/


Thank you

Visit: [http://www.savic.ac.za/](http://www.savic.ac.za/)
Twitter: @SAVICinfo
Facebook: SAVICinfo
South African Vaccination and Immunisation Centre

Twitter: @SMU_PHPM
Facebook: SMU Public Health Pharmacy
Department of Public Health Pharmacy and Management