

**Do Your Part for Vaccine Safety —
Report to
VAERS**
Vaccine Adverse Event Reporting System
A National Program for Monitoring Vaccine Safety



NIRAJ KC

Target audiences

**HEALTHCARE
WORKERS**

-Health care workers interacts with families and patients

The goal and objective of vaccine safety communications

Communicating about vaccine safety is always important. It is essential in at least the following situations:

- explaining properly the benefits and risks of a recommended vaccine.
- addressing public concerns and upcoming or persistent rumors about vaccine safety.
- preparing to address vaccine safety crises if and when they occur.
- The goal of vaccine safety communication is to make people aware of vaccines and to make their maximum participation in the vaccinations which will ultimately make them free from vaccine-preventable diseases.

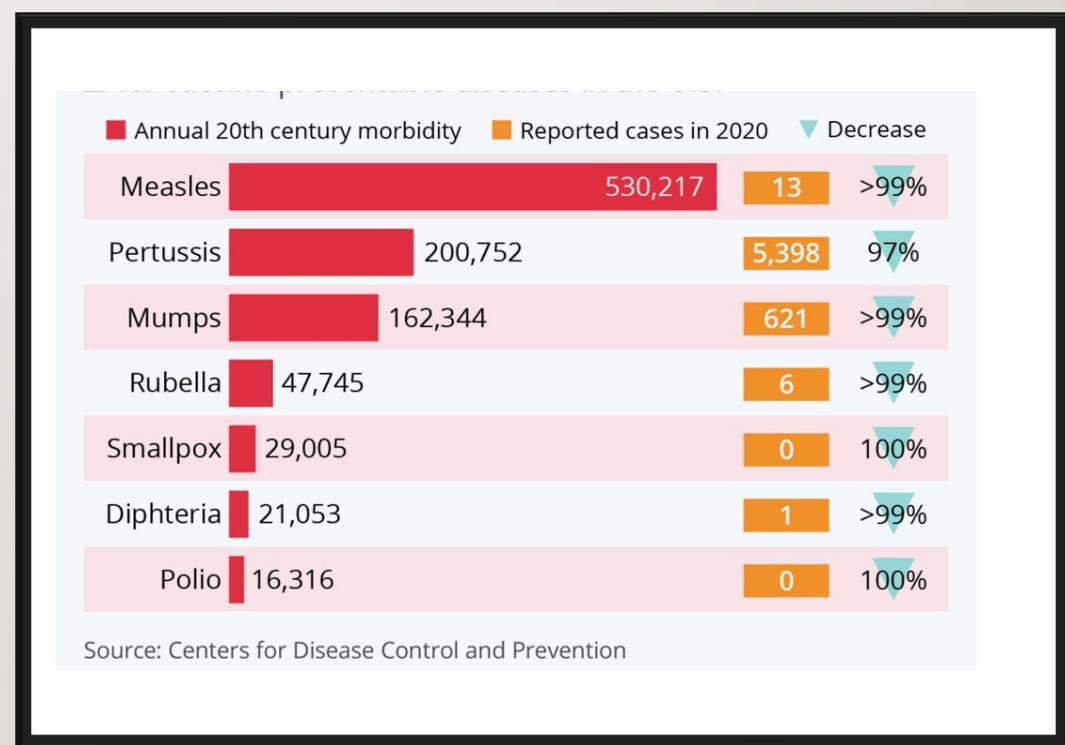
Health care workers

Healthcare workers include

- -doctors,
- nurses,
- dentists,
- medical students,
- pharmacists, etc.

How effective vaccines have been against major diseases in America

- Vaccines prevent diseases.
- Healthcare workers should educate patients.



Source: Center for Disease control and prevention

Healthcare workers' roles

Healthcare workers work in fields:

- Deals with patients.
- Should educate patients/lay public about the importance of vaccines.
- Should notice the adverse events of vaccines.
- Should play a vital role in public health.
- Healthcare professionals should have adequate knowledge about vaccines, their adverse events, and their benefits.

Importance of vaccines safety

- Produce antibodies against harmful diseases.
- Universally accepted for controlling the disease.
- Minor reactions VS Overall Protections.
- Decrease in pandemics like polio, covid19, etc., due to vaccines.
- Helps control community spread of pandemics.

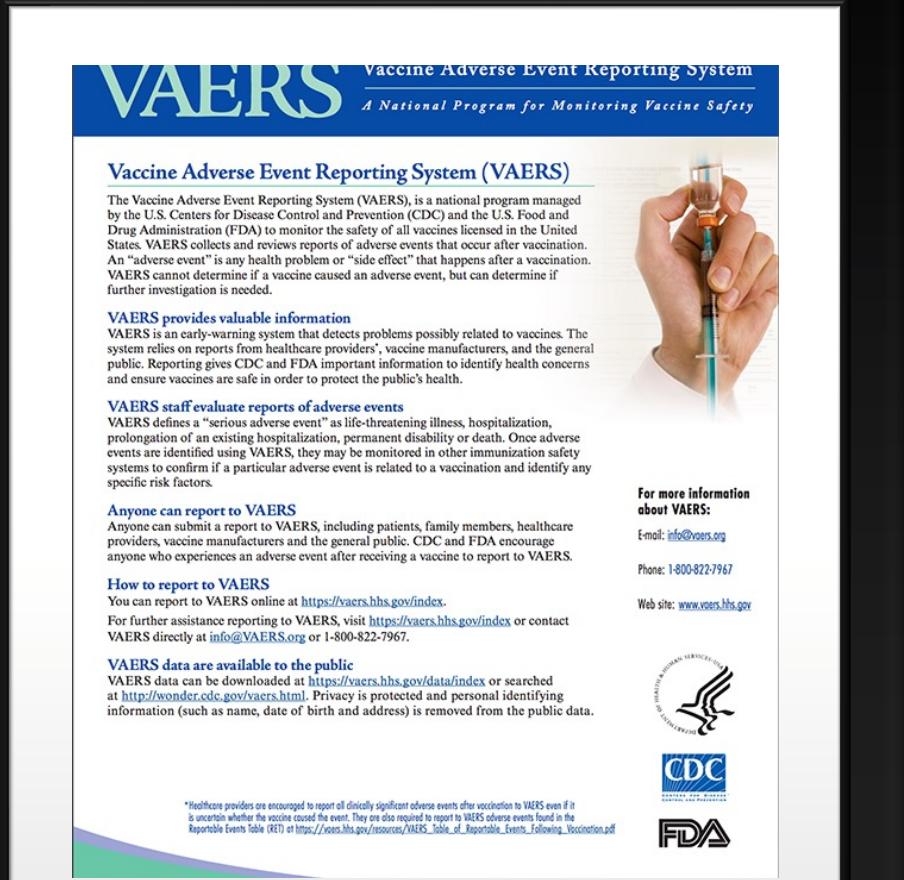
Clinical assessment of vaccine safety pre-licensure

Process of the first stage in assessing vaccine safety, Phase I, before introducing adverse events (AEs) are-

- The first studies were conducted on Animals.
- Then clinical trials in humans begin.
- The new vaccine is administered to healthy volunteers for the first time
- All adverse events are collected and assessed as to whether they are deemed to be related to the vaccine or not.
- Later tested in thousands before being allowed into the market.

Safety assessment post-licensure

- Identify rare or novel adverse event
- Estimate their rate of occurrence
- Distinguish those that are causally related to vaccination
- Identify vaccines lots with adverse events.
- Monitors regularly.



The image shows the homepage of the VAERS (Vaccine Adverse Event Reporting System) website. The header features the VAERS logo and the text "Vaccine Adverse Event Reporting System" and "A National Program for Monitoring Vaccine Safety". Below the header, there are several sections of text and links:

- Vaccine Adverse Event Reporting System (VAERS)**: A brief description of the program.
- VAERS provides valuable information**: Information about how VAERS detects problems related to vaccines.
- VAERS staff evaluate reports of adverse events**: Details on what constitutes a serious adverse event and how VAERS monitors them.
- Anyone can report to VAERS**: Instructions for reporting adverse events.
- How to report to VAERS**: Contact information for reporting.
- VAERS data are available to the public**: Information on how to download VAERS data.

On the right side of the page, there is a photograph of a hand holding a syringe and a vial, and a sidebar with contact information:

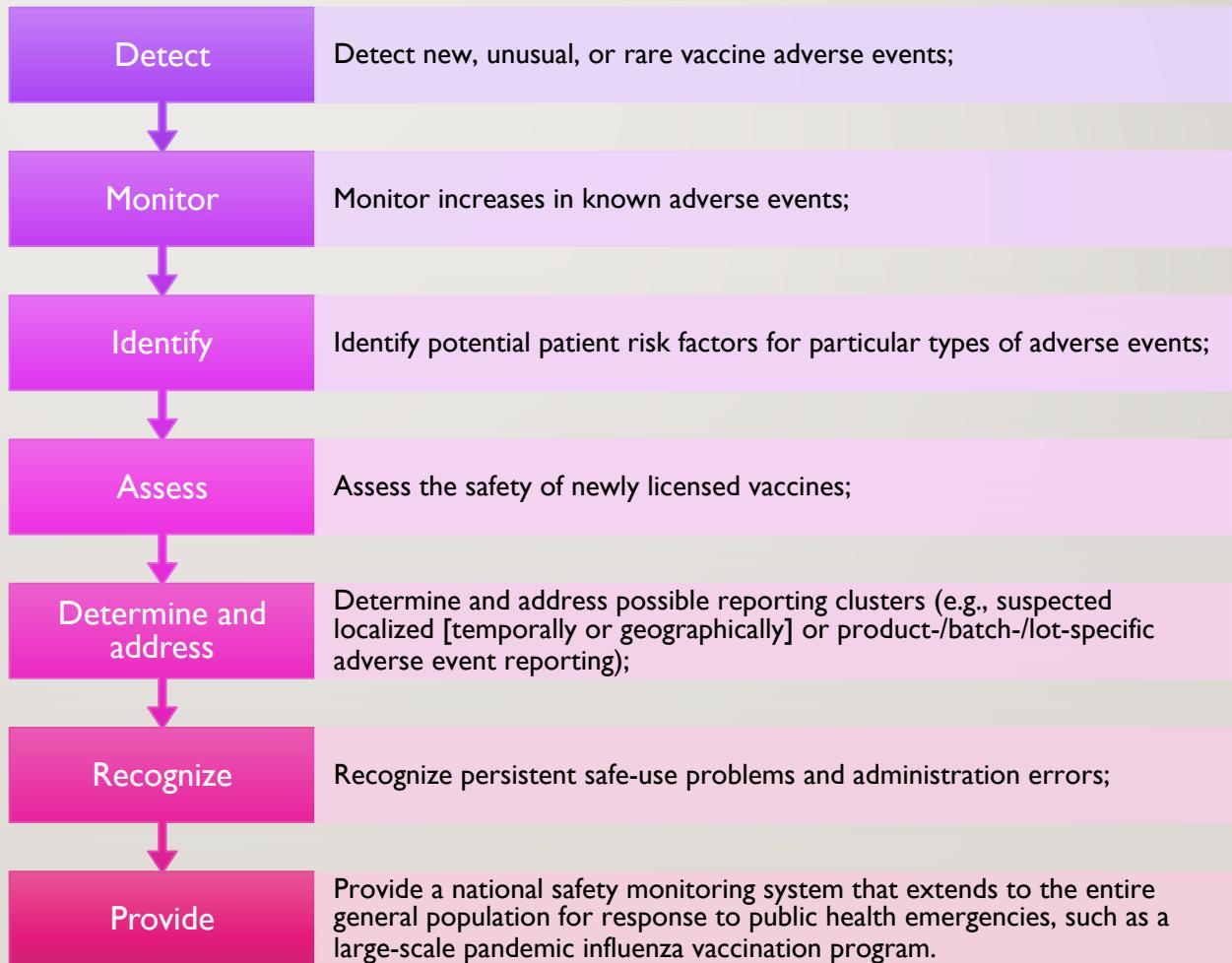
For more information about VAERS:
Email: info@vaers.org
Phone: 1-800-822-7967
Web site: www.vaers.hhs.gov

At the bottom left, there is a note about reporting requirements and logos for CDC and FDA.

What is VAERS?

- VAERS provides valuable information
- VAERS evaluates adverse events
- Anyone report to VAERS
- VAERS data available to public

Objectives of VAERS



Communication strategies to boost vaccine acceptance by NIPs(NATIONAL IMMUNIZATION PROGRAM)

Encouraging people to report adverse events.

Identify adverse events or rumors in the media.

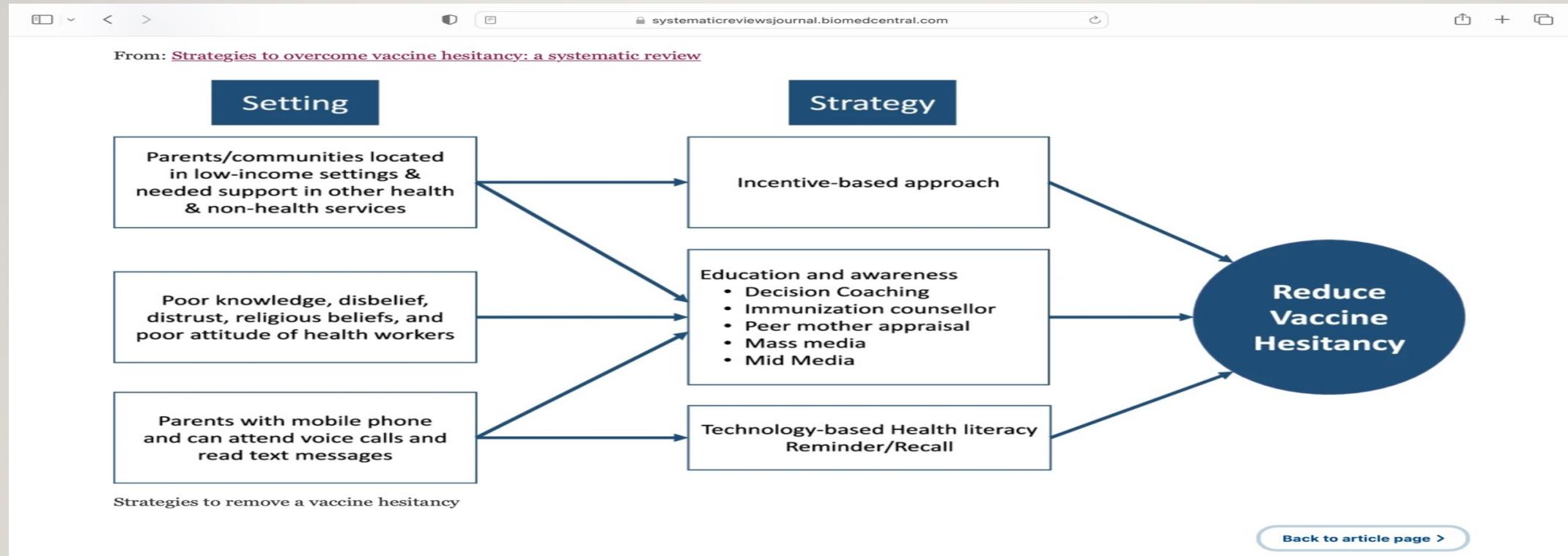
Temporary suspensions of vaccines.

Research about adverse events causing vaccines

Vaccines recall

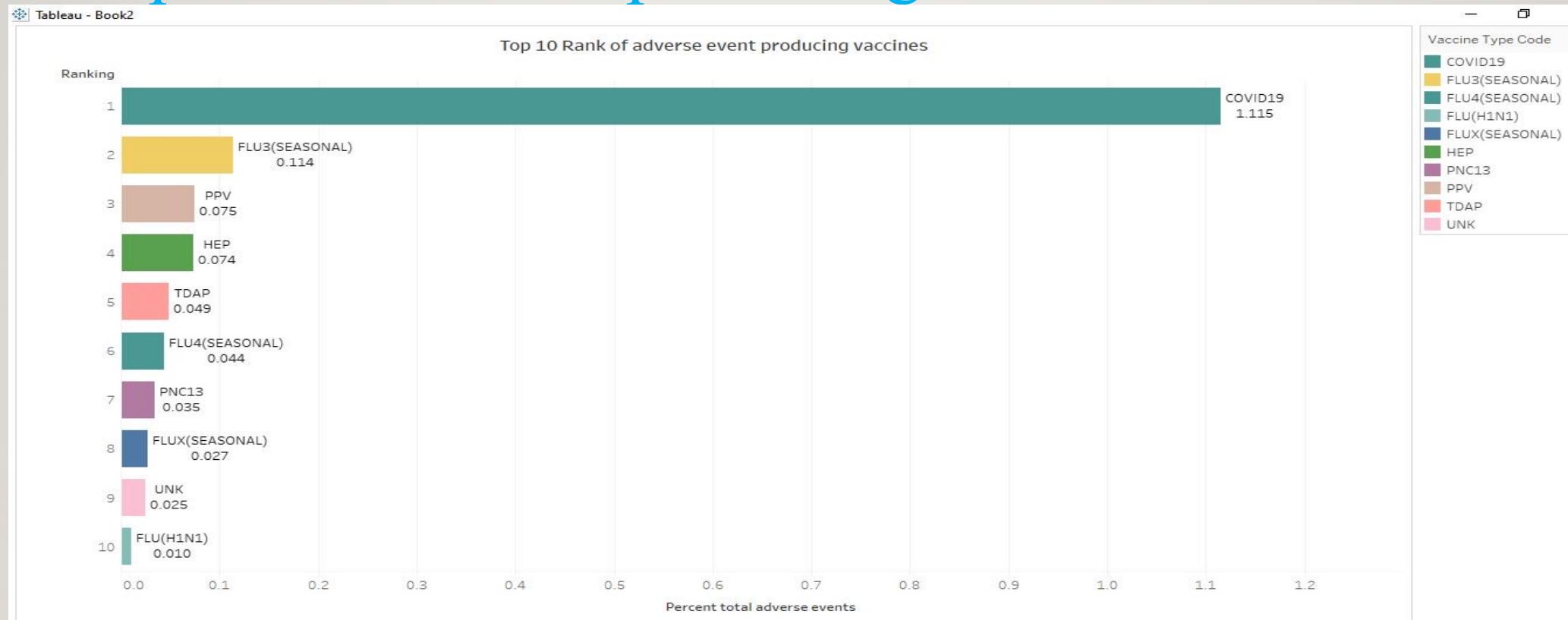
Replacement of vaccines if needed.

BEST PRACTICES TO OVERCOME VACCINE



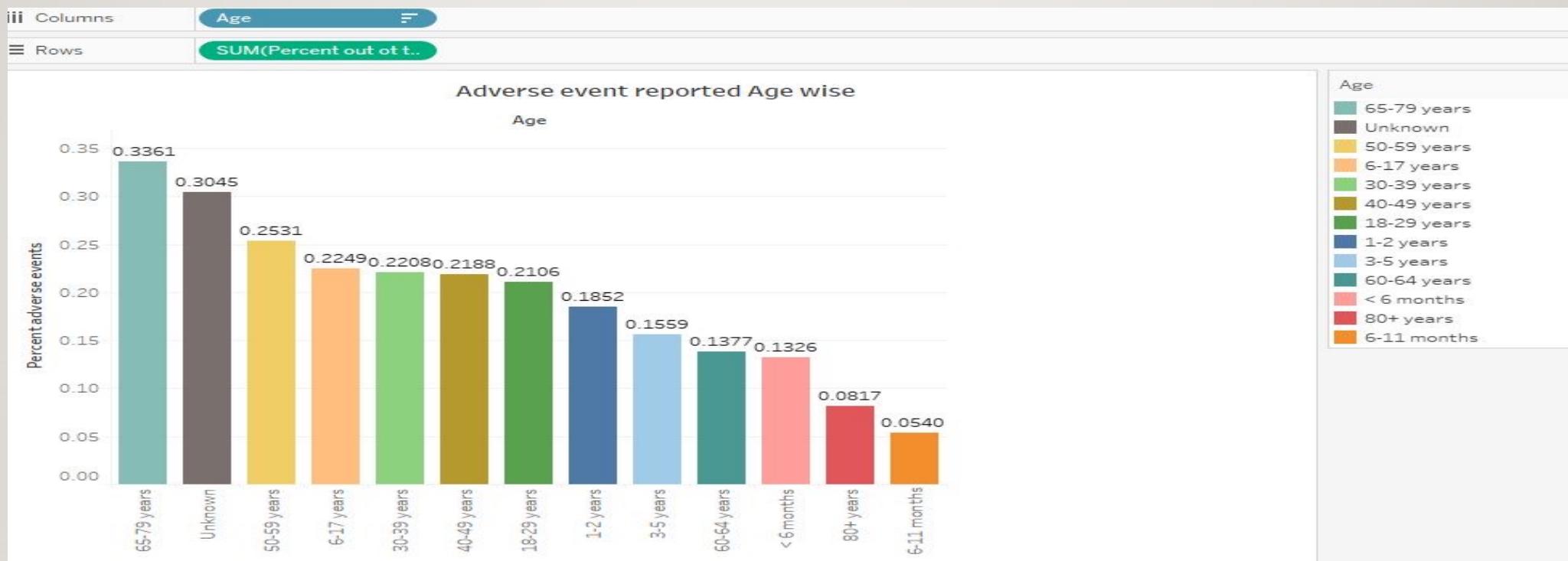
(Source: <https://systematicreviewsjournal.biomedcentral.com/articles/10.1186/s13643-022-01941-4/figures/2>)

Top adverse event-producing vaccines



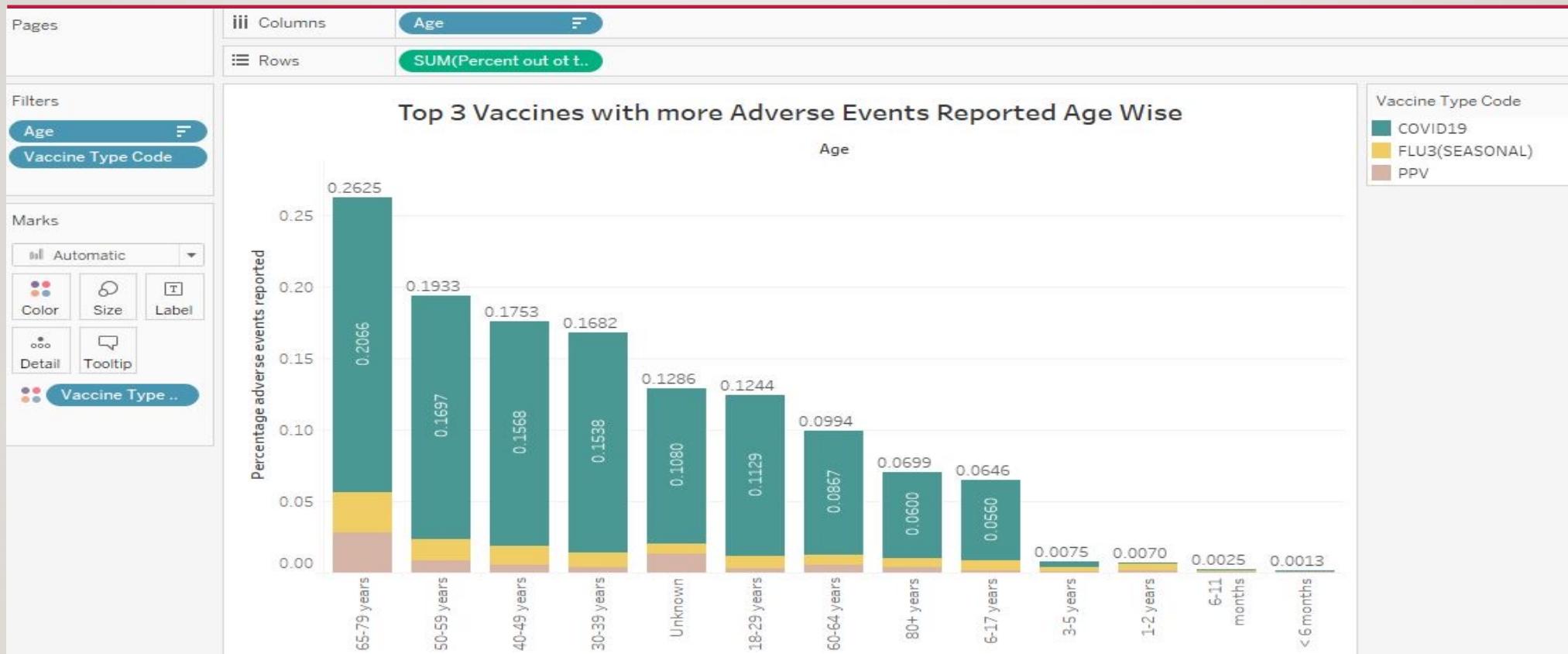
Source of data: <http://wonders.cdc.gov/vaers.html>

Adverse events reported age wise



source of data: CDC website: <http://wonders.cdc.gov/vaers.html>

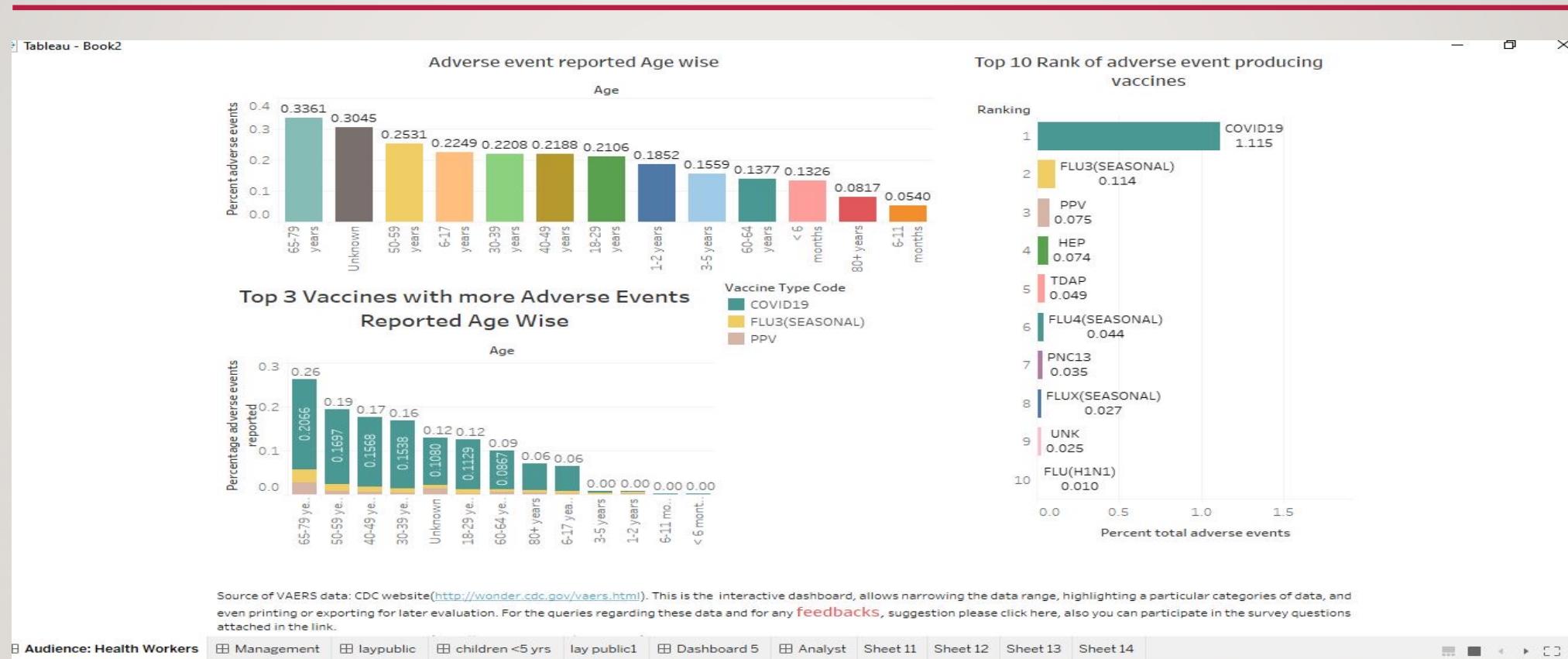
Top 3 vaccines with adverse events age wise



Interactive dashboard for the healthcare workers

source of data: CDC website: <http://wonders.cdc.gov/vaers.html>

Interactive Feedback sections from healthcare workers at the bottom of the dashboard.



Target audiences

LAY PUBLIC:

- less sophisticated audiences
- less knowledge, education
- less aware about vaccines and their child health care.

CHILDREN:



Vaccines for children

Vaccines for Children Protecting America's children every day



The Vaccines for Children (VFC) program helps ensure that all children have a better chance of getting their recommended vaccines. VFC has helped prevent disease and save lives.

CDC estimates that vaccination of children born between 1994 and 2018 will:

prevent **419 million** illnesses
(26.8 million hospitalizations)



help avoid **936,000** deaths



save nearly **\$1.9 trillion** in total societal costs
(that includes \$406 billion in direct costs)



Updated 2018 analysis using methods from "Benefits from Immunization during the Vaccines for Children Program Era—United States, 1994–2018"



U.S. Department of
Health and Human Services
Centers for Disease
Control and Prevention

www.cdc.gov/features/vfcprogram

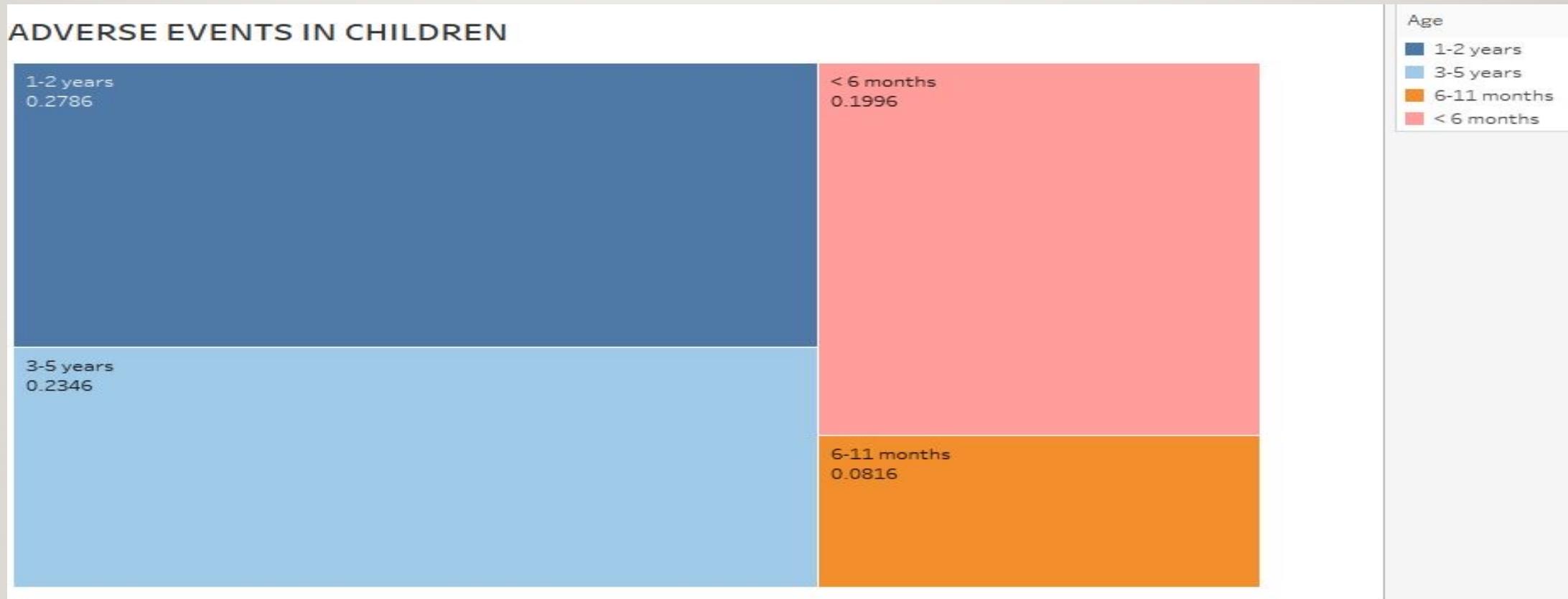
- Saves millions of children's life between 1994 to 2018.

Five important reasons to vaccinate your child

- Immunizations can save your child's life.
- Vaccination is very safe and effective, adverse events are very less in total.
- Immunization protects others you care about.
- Immunizations can save your family time and money
- Immunization protects future generations.

Immunizing children is safe

While analyzing VAERS data from CDC collected on Sept 12, 2022, the odds of getting adverse events is only 0.08% in children less than 1 year age children. Parents should be confident to immunize their children by seeing data.



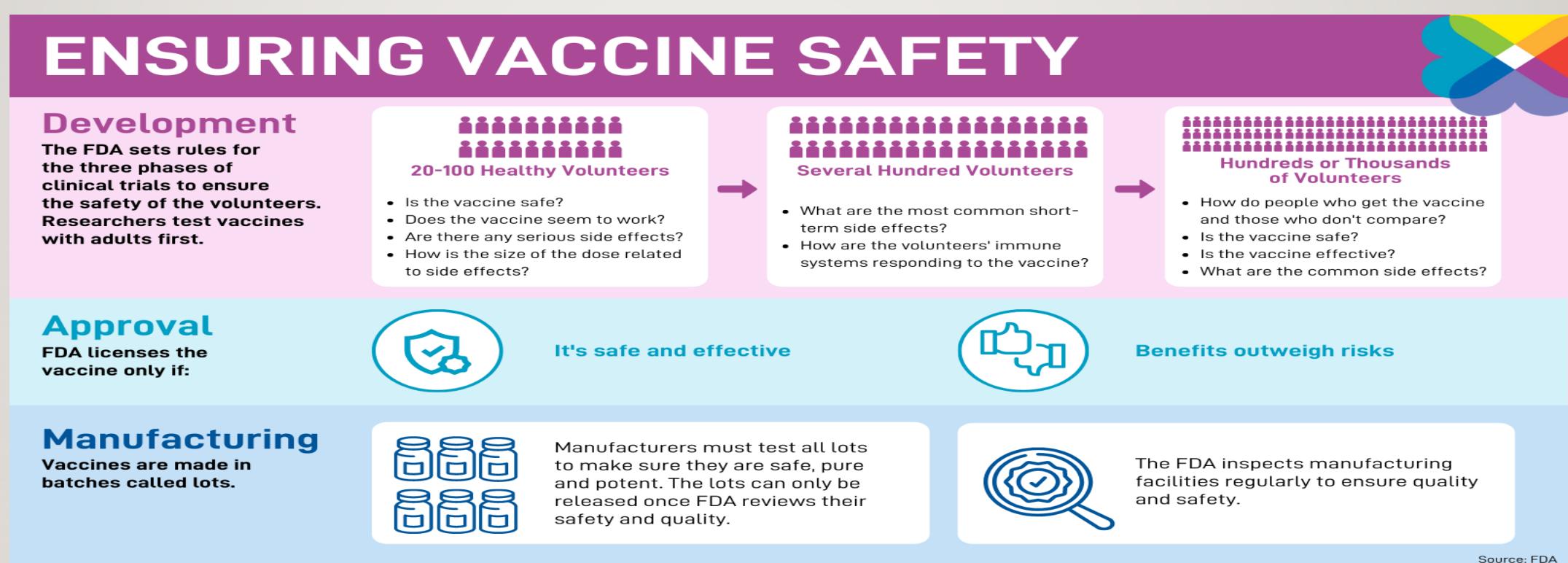
Source of data: CDC website: <http://wonders.cdc.gov/vaers.html>

Fact of vaccines

- EFFECTIVE
- SAFE
- NECESSARY
- RESULTS OF INTENSIVE TRIALS AND STUDIES.



Method employed to make vaccines safe



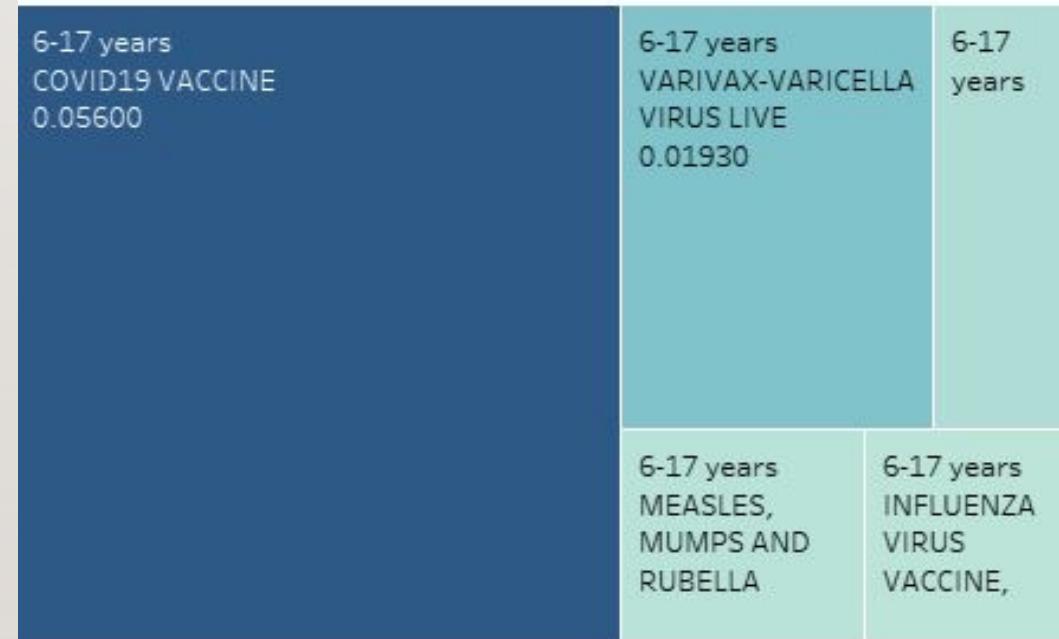
Vaccines ensure healthy life for school-going children

- For school-going children also adverse events in very low.
- Covid 19 has the highest number of adverse events, but that is also too low 0.05%. From VAERS data collected on Sept 12th, 2022, vaccines are safe for school-going children, people should have no doubt in mind while immunizing children. Vaccines save a life.

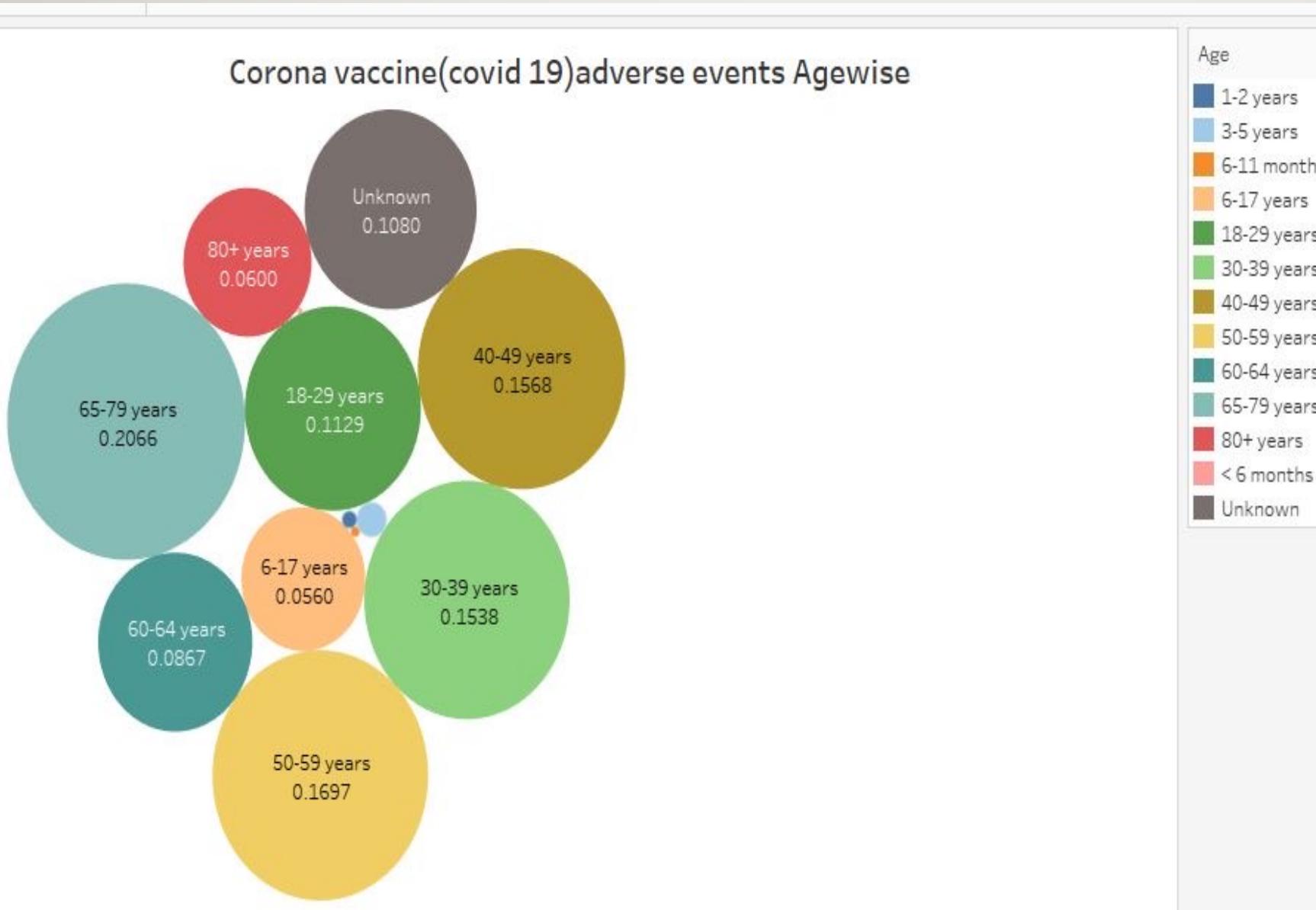
source of data: CDC website from 12th sept 2022:

<http://wonders.cdc.gov/vaers.html>

Percentage of adverse event reported in top 5 vaccines for **School going Children(6-17) years**



Its time to make decision?



- Data speaks.
- source of data: CDC website from 12th sept 2022:
<http://wonders.cdc.gov/vaers.html>
- The adverse event is very low in all age groups.
- Quite interestingly adverse events in much lower for children.

Wants to move towards healthy life ?

Audience: Lay public

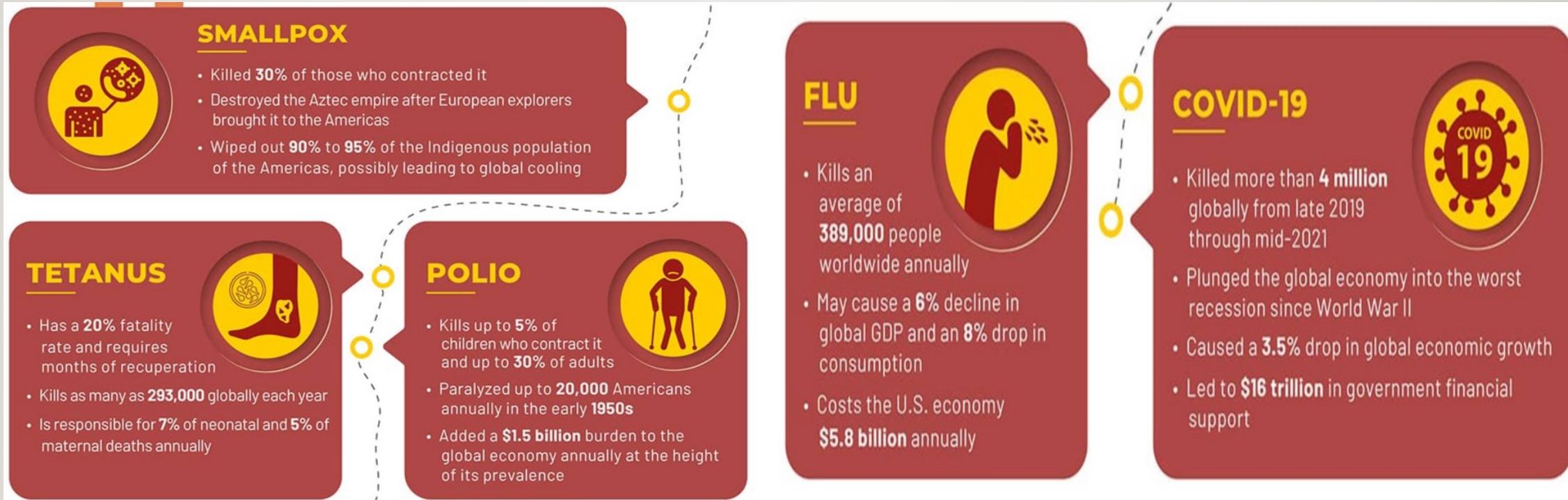
season ----> pandemic .

Knows where to get vaccines including covid *vaccine*

Be aware of RUmors , Vaccines have very low adverse events

Consult doctors before vaccination, if you have pre-disease conditions.

Important vaccines in the history



WHY VACCINATE?

- Vaccines are tested to ensure that they are safe and effective for children to receive at the recommended ages.
- provide immunity before children are exposed to potentially life-threatening diseases.
- Without vaccines, your child is at risk for serious illness or even death from diseases like measles and whooping cough.
- The United States had **more than 1,200 cases of measles in 2019**. This was the greatest number of cases reported in the U.S. since 1992 and since measles was declared eliminated in 2000.
- vaccines protect against 14 diseases by age two.
- The MMRV vaccine combines the MMR (for measles, mumps, and rubella) vaccine with the chickenpox vaccine, really effective, with one shot protects from different disease.

(Source:<https://www.cdc.gov/vaccines/schedules/easy-to-read/child-easyread.html>)



Recommended vaccinations for infants and children

source: <https://www.cdc.gov/vaccines/schedules>

Birth	1 month	2 months	4 months	6 months	12 months	15 months	18 months	19-23 months	2-3 years	4-6 years		
HepB	HepB				HepB							
	RV	RV	RV									
	DTaP	DTaP	DTaP			DTaP				DTaP		
	Hib	Hib	Hib		Hib							
	PCV13	PCV13	PCV13		PCV13							
	IPV	IPV		IPV						IPV		
				Influenza (Yearly)*								
				MMR						MMR		
				Varicella						Varicella		
				HepAS								

Types of audience

Management

- Policymakers
- Hospital managers oversee the general administration of hospitals and other provider facilities.
- Their central goals are to prioritize patient safety, as well as to ensure the financial and operational sustainability of the sites they manage.

Vaccination policy for healthcare workers

- Management team policies help healthcare workers understand the importance of vaccines.
- Healthcare workers include all the staffs that work in hospital-physicians, nurses, laboratory technicians, medical students, etc.
- The policy includes seminars and training courses for these staff to make them understand vaccines.
- The policy also includes free vaccinations for their staff and patients by consulting with the stakeholders.

Managers role for policy making

For making policies Management team should understand the vaccines statistics of the country. For this presentation with clear and simple visuals help manager to understand. So policy makers can consult with the city, state, and governmental to do necessary steps for better vaccines policies.

Policy makers should make policy to sustain their hospital .Also, they need to take care of the community health too by providing free services, talking low cost in vaccines and for the services they provide.

Objectives:

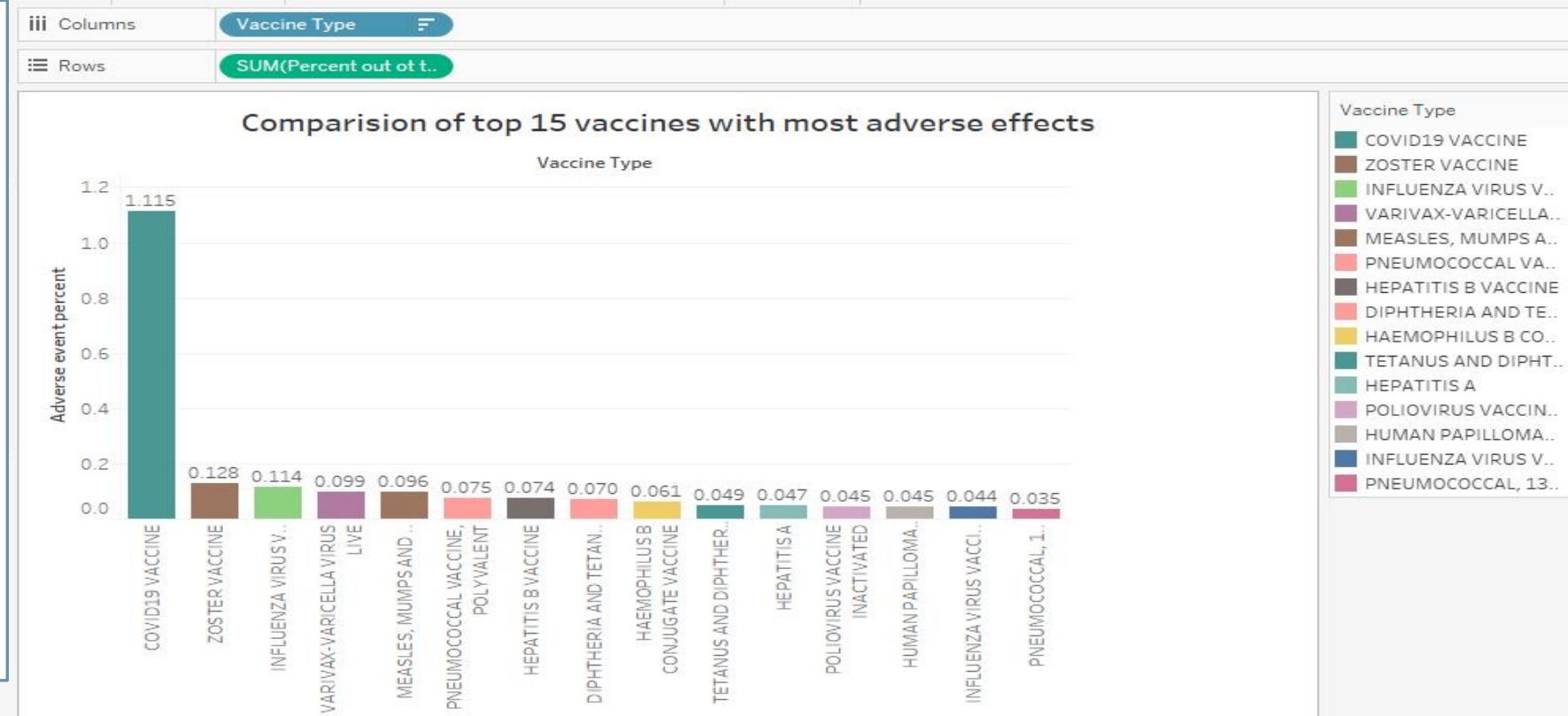
- To make makers better understand the vaccine statistics so that they can make better policies.
- Make them understand the importance of vaccines and poor vaccination rates.
- Help them to make decisions on how to make vaccines free for the lay public, and their staff.
- To make them better aware of the vaccination situations and its effectiveness
- To make them realize, what they can do to increase the overall health of people from vaccinations.

Hospital management policy

OBJECTIVES:

- . to allocate the budget to study which vaccines produce adverse effect
- . to notify the local government about the adverse events of vaccines
- .to educate health staff about the importance of vaccines to safe lives
- .to make plans to sustain the hospital and maximize the profit by selling the vaccines.
- .to train the staff professionally which will help to increase customers(patients).

- High incidence rate in covid vaccines (1.115%), this is because lots of people get covid 19 vaccines during pandemic.
- Adverse events on other vaccines is low



source of data: CDC website: <http://wonders.cdc.gov/vaers.html>

In the USA alone, 98,777,220 people get infected with coronavirus, and a total of 1,077,303 people died until 7 Dec 2022.

Corona virus is highly contagious and easily spread within the community through air, food, and water.

Covid 19 vaccines save millions of lives in the USA and around the whole world.

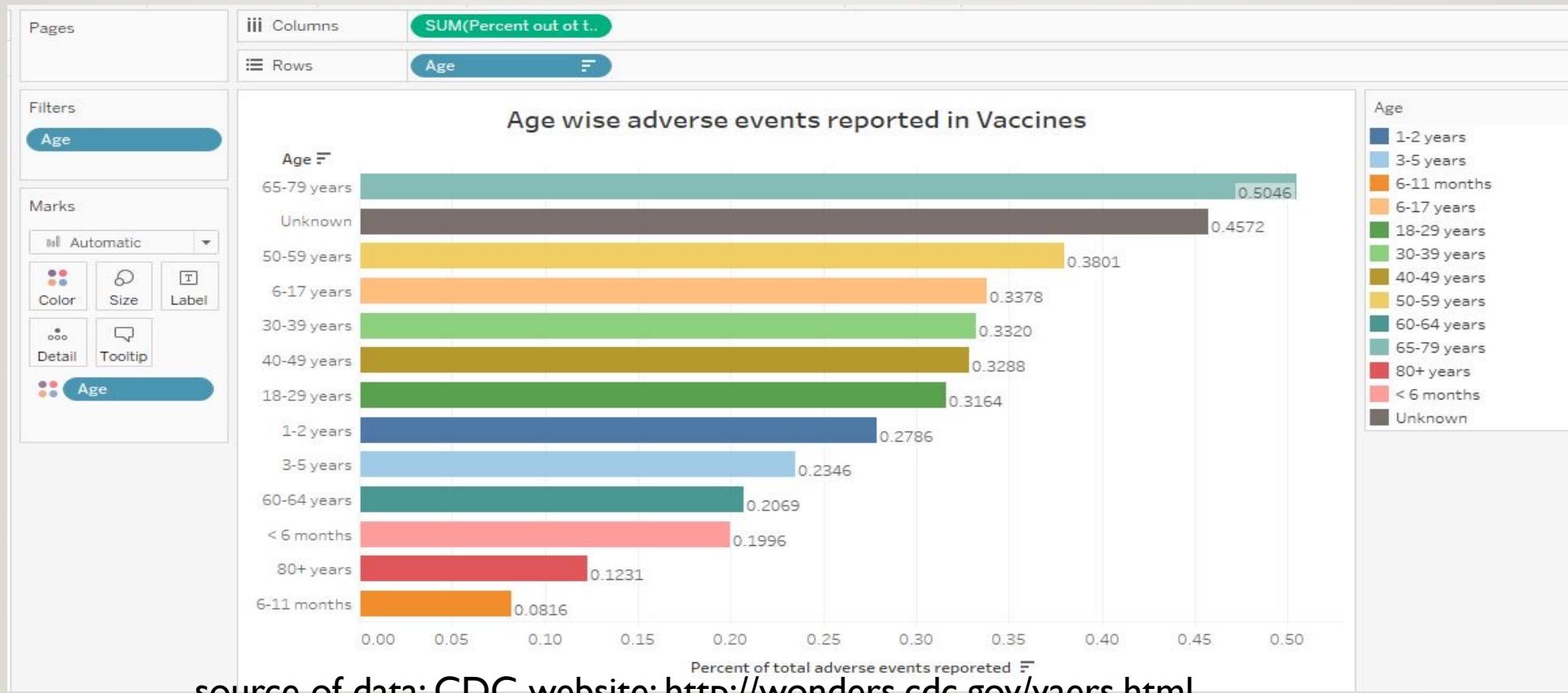
In a study conducted in The Lancet Infectious Diseases, it is estimated that covid vaccines save around 19.8 million lives in one year.

Source: [CDC](#) | Data as of December 7, 2022

Age-wise adverse events in vaccines

.The top two of the adverse events age groups are older age groups.

.Policymakers should focus on providing free medicines to these age groups while vaccinating them, and for this managers should incorporate with the governments and health insurance companies for providing free medicines so that adverse events could be reduced.



Policy for immunization of health-care workers

- Vaccine recommendation programs can assist hospital administrators, infection control practitioners, employee health physicians, and HCWs in optimizing infection prevention and control programs. Background information for each vaccine-preventable disease and specific recommendations for use of each vaccine should be presented to them.
- Because of their contact with patients or infective material from patients, many health-care workers (HCWs)(e.g., physicians, nurses, emergency medical personnel, dental professionals and students, medical and nursing students, laboratory technicians, hospital volunteers, and administrative staff) are at risk for exposure to and possible transmission of vaccine-preventable diseases. Maintenance of immunity is therefore an essential part of prevention and infection control programs for HCWs. Optimal use of immunizing agents safeguards the health of workers and protects patients from becoming infected through exposure to infected workers

Covid adverse events gender wise

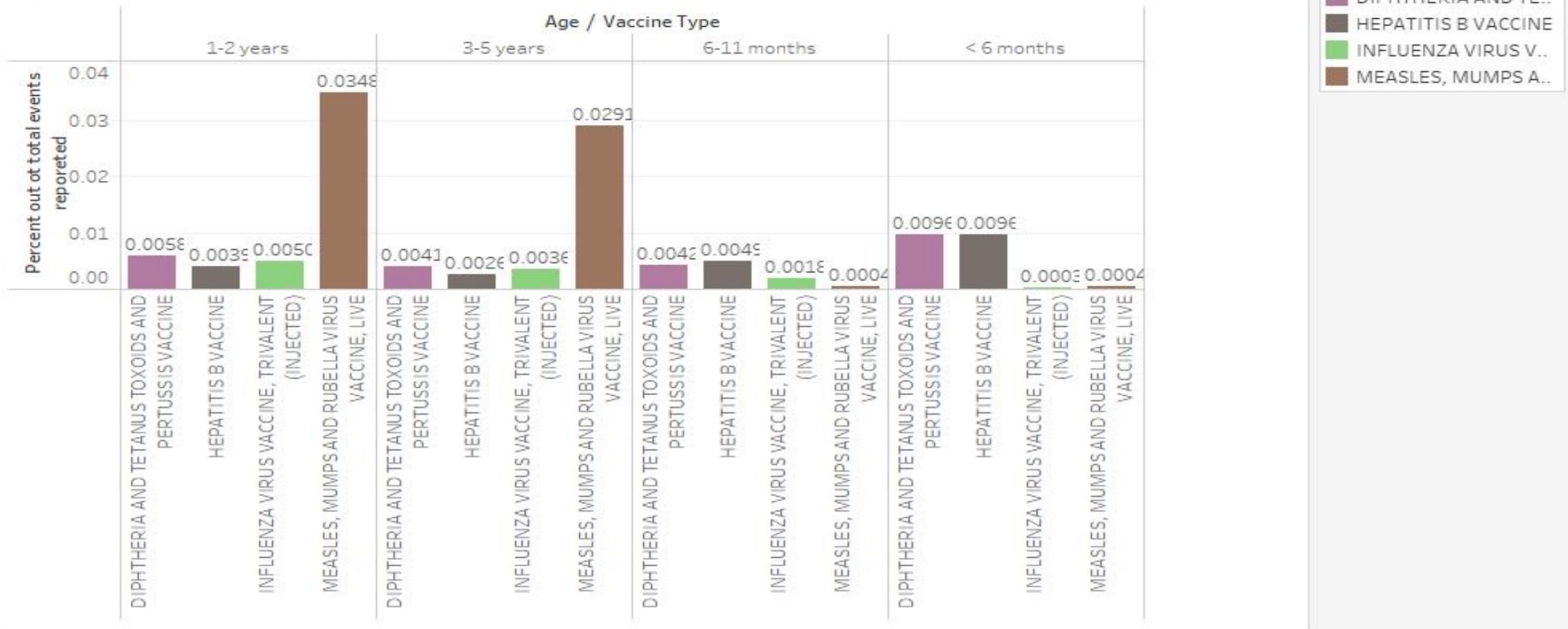
The adverse events due to covid vaccines are very low in all genders.

0.36% of cases in females and 0.17% in males report adverse events, due to the fact that a large number of people administrated covid vaccines. So, in total, the cases of adverse events are very low.



Best age to immunize children

Sheet 15



High risk exposure for kids <=5 & general >5 years of age

The top vaccines with the highest adverse events-covid19 were highest with 1.12%, flu3(seasonal) was second with 0.11% and third was PPV with 0.07%. When adverse events were seen age-wise, the Older age group 65-79 years of age have shown the highest incidence followed by the age group 50-59. It is obvious that when age increases, immunity of the body also decreases, so to be safe from different diseases, people may have administrated different vaccines.

continue....

- When adverse events were compared in the different age groups of children. The age group 1-2 years shows 0.27% incidence, followed by 0.23% by the age group 3-5 years, whereas the 6-11 month age group shows the least incidence 0.08% as a whole.
- For hepatitis B, it was seen that the best age group to immunize children was 3-5 years, and children <6 months had shown the most adverse events.
- For MMT vaccines, when administrated from 1-2 years, so adverse events were also showing more for this age group.

[continue....](#)

- For influenza, the recommended age group for vaccination was 6 months to 6 years of age, with children with 6-11 months showing fewer adverse events, so better to vaccinate at this age period.
- For DTaP, the children with <6 months were showing a high incidence rate, so better to omit DTaP vaccination during this period.

Immunization of health-care providers: necessity and public health policies

- Health-care providers (HCPs) are at increased risk for exposure to vaccine-preventable diseases (VPDs) in the workplace
- Recent studies from several countries indicate significant immunity gaps against many VPDs.
- Susceptibility rates of HCPs range from 4.6% to 17% for measles, 15.7% to 25% for mumps, 4.5% to 18.6% for rubella, 4.1% to 16.7% for varicella, 48.3% to 68.8% for pertussis, 22.6% to 35% for hepatitis B, and 21.2% to 64.3% for tetanus and diphtheria
- Source:<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5041048/>

Types of audience

- Analysts

About VAERS data

- VAERS data is accessible by downloading raw data in comma-separated value (CSV) files for import into a database, spreadsheet, or text editing program, or by using the CDC WONDER online search tool.
- VAERS accepts reports of adverse events that occur following vaccination. Anyone, including Healthcare providers, vaccine manufacturers, and the public can submit reports to the system. While very important in monitoring vaccine safety, VAERS reports alone cannot be used to determine if a vaccine caused or contributed to an adverse event or illness.

continue...

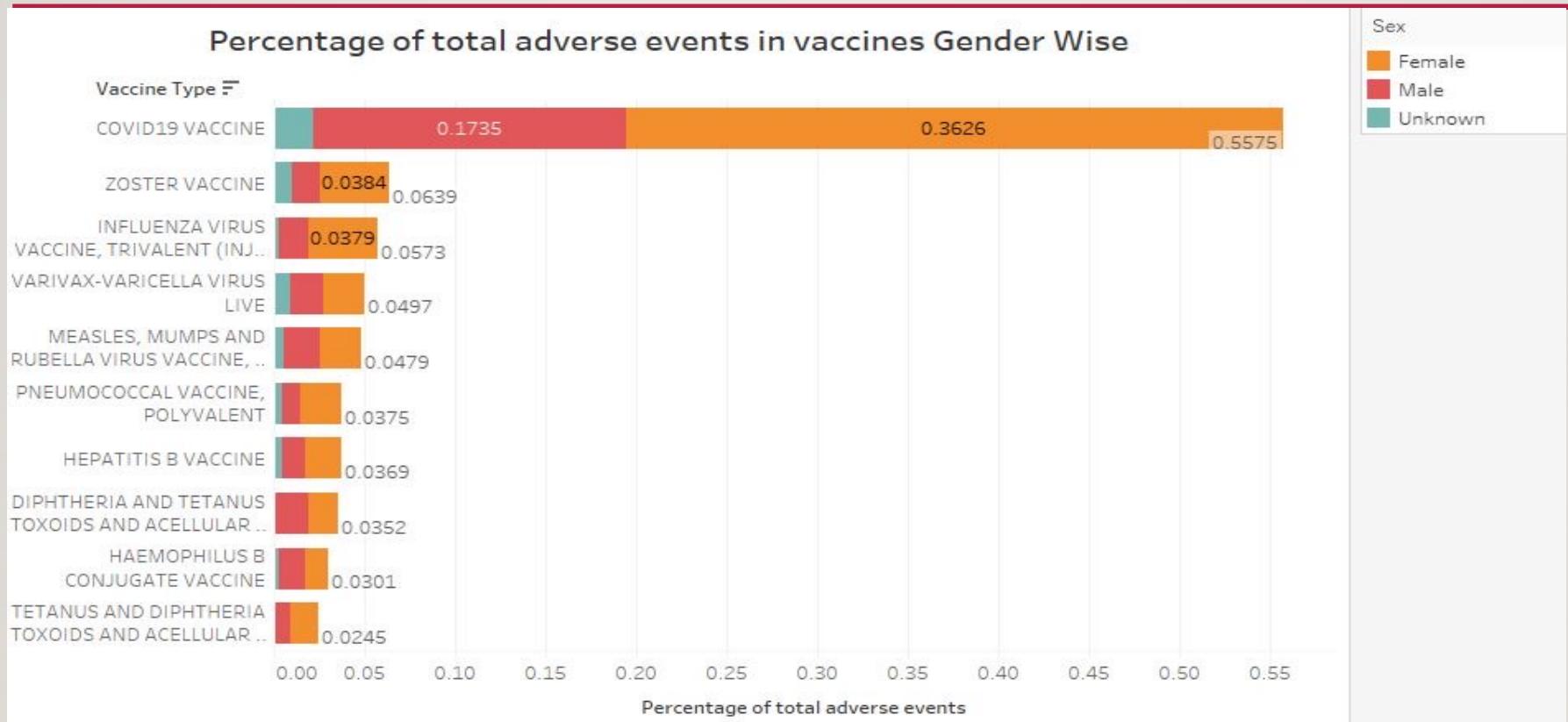
- VAERS data are limited to vaccine adverse event reports received between 1990 and the most recent date for which data are available.
- The number of reports alone cannot be interpreted as evidence of a causal association between a vaccine and an adverse event, or as evidence about the existence, severity, frequency, or rates of problems associated with vaccines.
- Adverse events reported in the VAERS data do not necessarily be the causality associated with the vaccines.

Presentation slides consists of following features:

- Percentage of adverse events reported from 1990-2022.
- Top adverse events causing vaccines
- The distribution reports by gender-wise.
- The distribution of adverse events by age-wise(children, general, elderly).
- Percentage of adverse events integrating age and gender.

Figure I

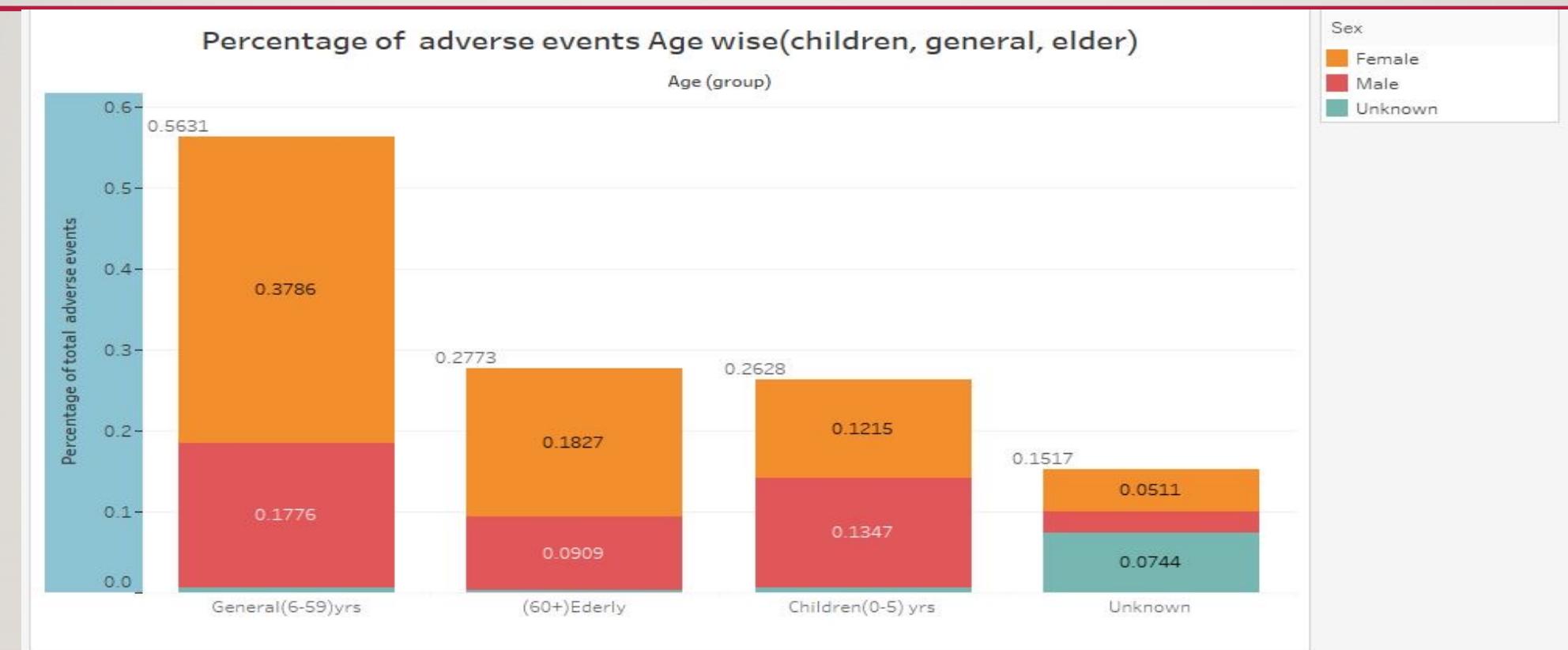
Percentage of adverse events in vaccines gender wise



source of data: CDC website: <http://wonders.cdc.gov/vaers.html>

Figure 2

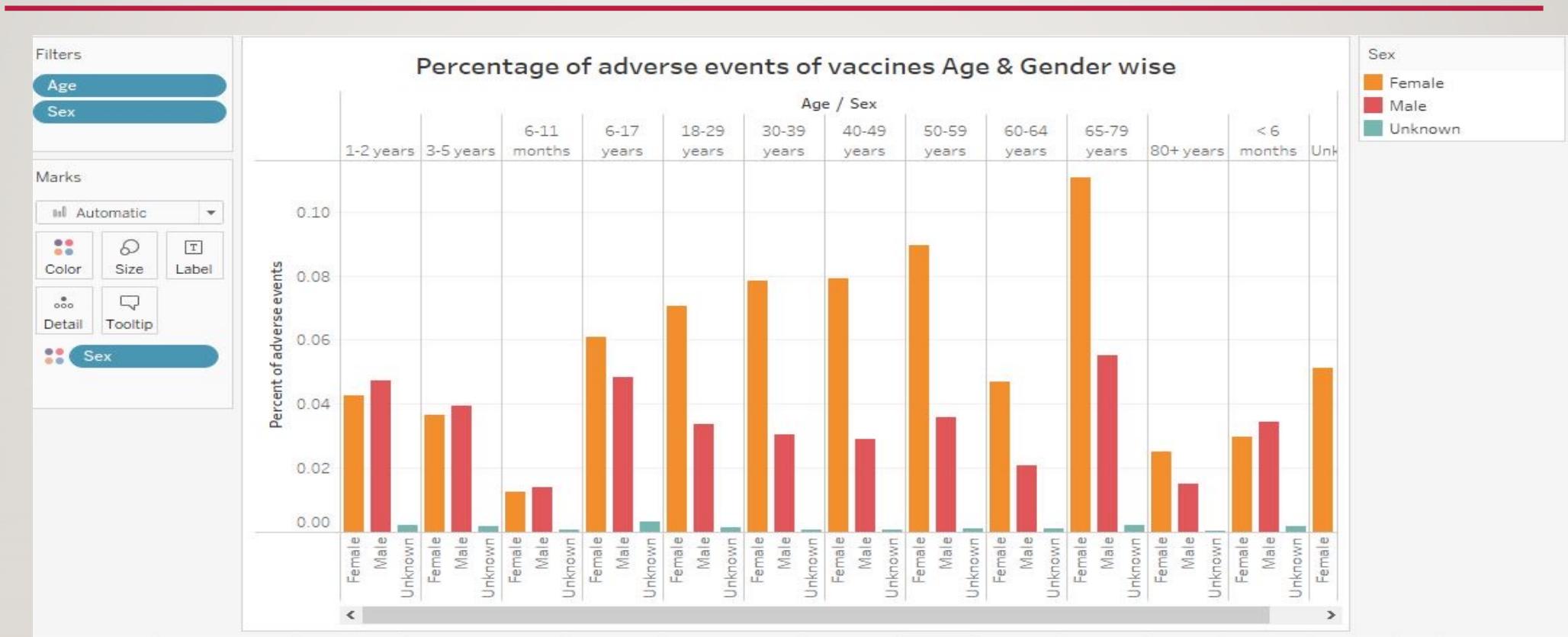
Percent adverse event age-wise



source of data: CDC website: <http://wonders.cdc.gov/vaers.html>

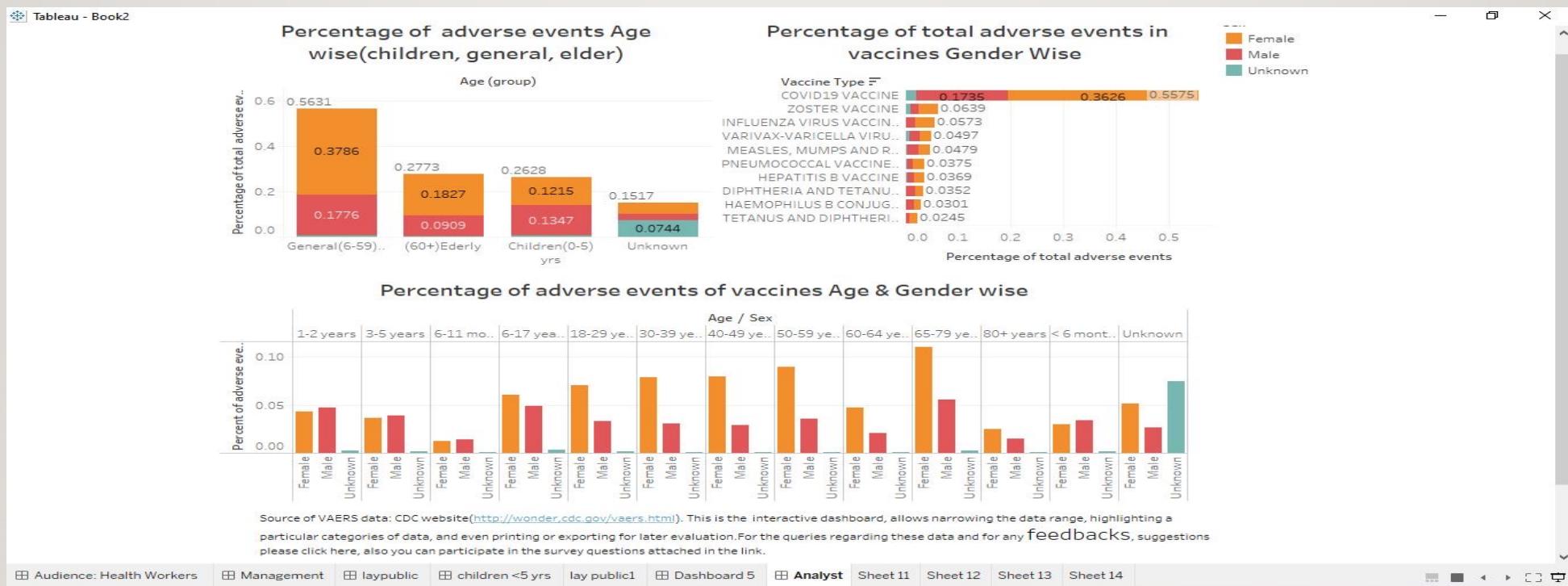
Figure 3

Age and gender-wise adverse events



source of data: CDC website: <http://wonders.cdc.gov/vaers.html>

Dashboard presentation for analyst



Source of data: CDC website: <http://wonders.cdc.gov/vaers.html>

The interactive Feedback section is present at the bottom of the dashboard for Analysts.

Results

- Figure 1 shows the top 10 vaccines with more adverse events in descending order. The chart also describes the gender-wise distribution of each vaccine with adverse events.
- Figure 2 shows the total percentage of adverse events of vaccines age-wise- children(0-5yrs), general(6-59) & elderly(60+).
- Figure 3 shows the distribution of the adverse events by age and gender-wise.

Conclusion

The VAERS data from CDC provides a huge dataset about the different lists of vaccines and their adverse events(symptoms). Even though the VAERS raw dataset contains errors, some useful valuable insights were seen after analyzing the data through different visualizations. The visualizations were created for the adverse events reported for the list of vaccines and their relationship with age and gender. These visualizations have provided opportunities for other analysts to do more research and find hidden insights from the provided data.

Feedbacks

- For getting feedback, different approaches were used for different audiences:

For Analysts: and Healthcare workers: Tableau is used as an interactive interface for exchanging feedback. Direct questions (about what they heard or the message they received from the presentation) were asked in SurveyMonkey. Any good suggestions should be incorporated in the visualizations and later presentation should be modified as per needs.

<https://www.surveymonkey.com/r/3YMRKSP>

For Management: Feedback mechanisms were included in the form of emails where questionnaires were asked and they could respond when they are free from their work. It will be easy and effective.

<https://www.surveymonkey.com/r/3YMRKSP>

For the lay public:

- Paper survey- Questions were distributed on the piece of paper, by asking specific questions about the presentation itself. The answer will help us to understand the audience's comprehension and retention of the presentation. For the educated lay people same questions were asked in SurveyMonkey too.
- By interacting directly with the lay audience about the key message and about the visualization

<https://www.surveymonkey.com/r/H5YV9FJ>

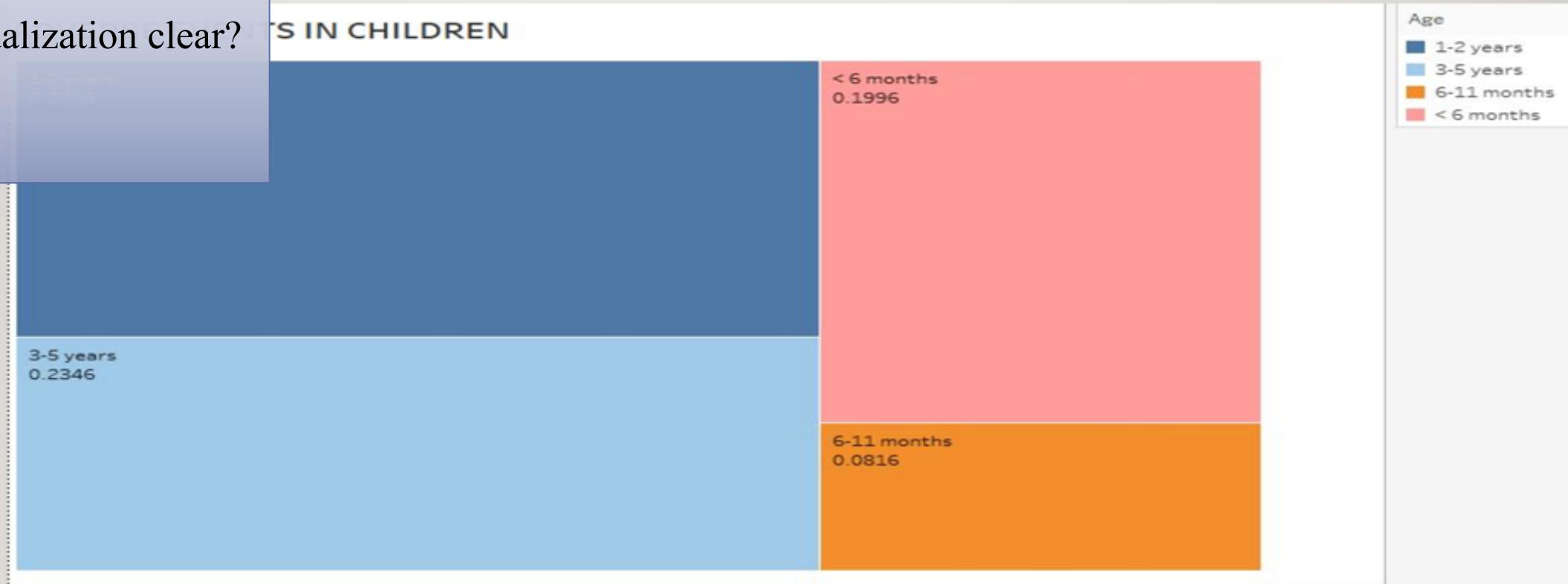
Feedback 1

IMMUNIZING CHILDREN IS SAFE

While analyzing VAERS data from CDC collected on Sept 12, 2022, the odds of getting adverse events is only 0.08% in children less than 1 year age children.

Parents should be confident to immunize their children by seeing data.

Is the visualization clear?



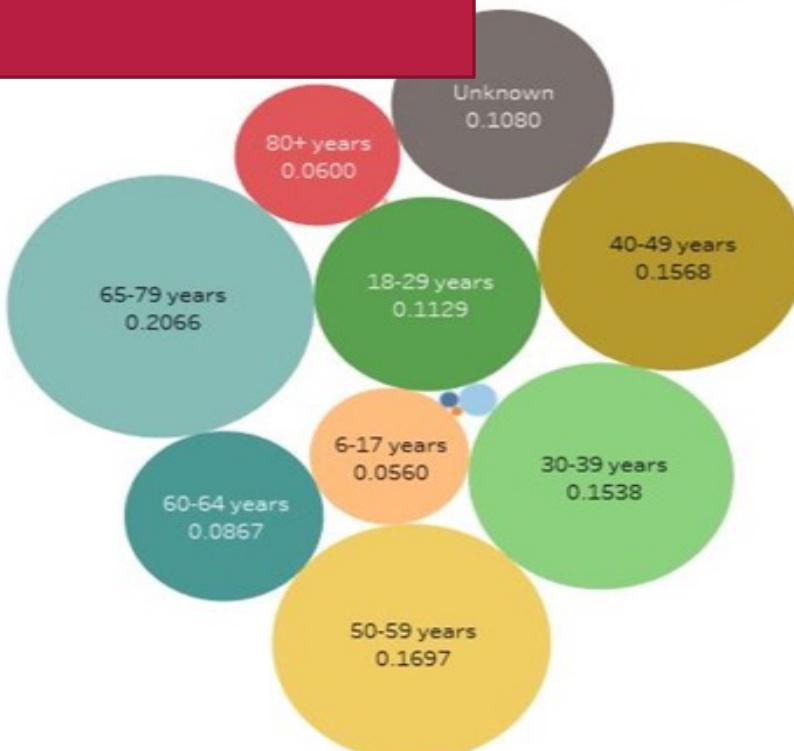
Source of data: CDC website: <http://wonders.cdc.gov/vaers.html>

Feedback 2

Is the bubbles size appropriate ?

make decision?

Covid vaccine(covid 19)adverse events Agewise



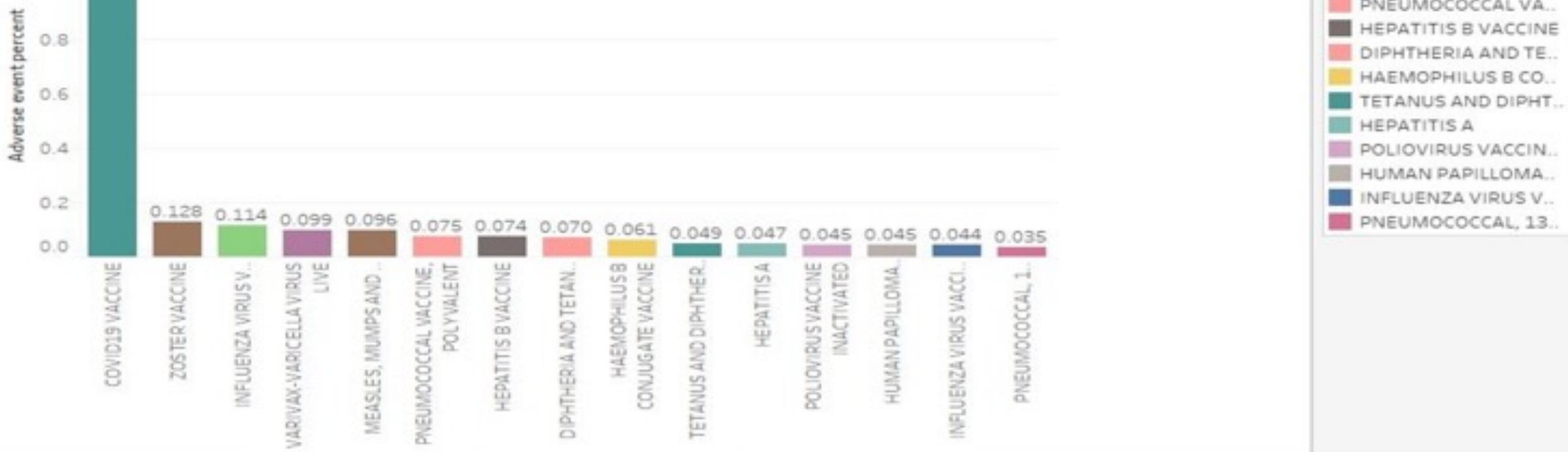
- Data speaks.
- source of data: CDC website from 12th sept 2022:
<http://wonders.cdc.gov/vaccine.html>
- The adverse event is very low in all age groups.
- Quite interestingly adverse events in much lower for children.

Feedback 3

Is the horizontal bar chart appropriate ?

vaccines with most adverse effects

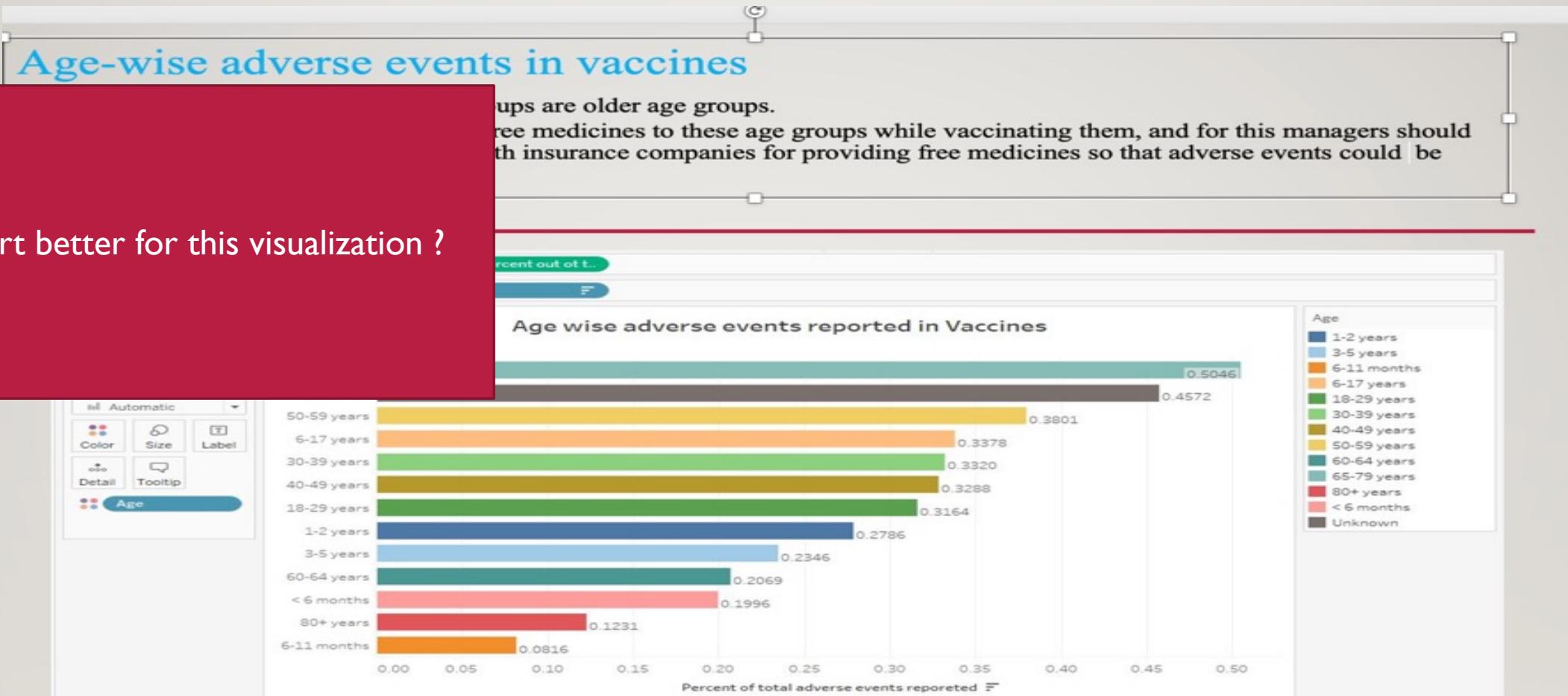
Vaccine Type



Vaccine Type

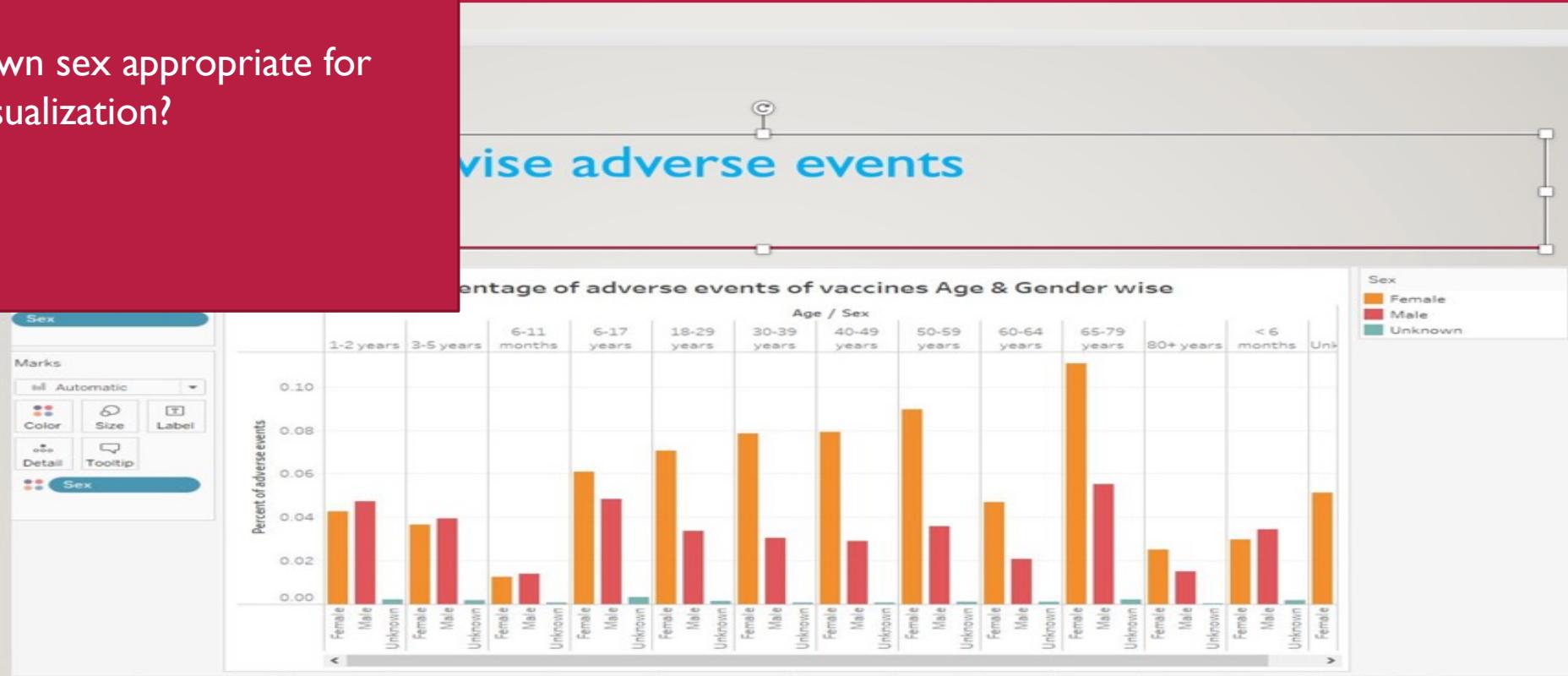
- COVID19 VACCINE
- ZOSTER VACCINE
- INFLUENZA VIRUS V...
- VARIVAX-VARICELLA..
- MEASLES, MUMPS A..
- PNEUMOCOCCAL VA...
- HEPATITIS B VACCINE
- DIPHTHERIA AND TE..
- HAEMOPHILUS B CO..
- TETANUS AND DIPHT..
- HEPATITIS A
- POLIOVIRUS VACCIN..
- HUMAN PAPILLOMA..
- INFLUENZA VIRUS V..
- PNEUMOCOCCAL, 13..

Feedback 4



Feedback 5

Is using unknown sex appropriate for visualization?



Feedback 6

Vaccines safety/adverse events survey

1. Are all the visuals clear?

Yes
 No

2. Do you understand the bubble chart?

Yes
 No

3. Are the labels in all the visuals used clear for you?

Yes
 No

4. Do you understand the bar chart?

Yes
 No

5. Does the language used clear for you?

Yes
 No

Done

- The question about visualizations itself was asked to know whether they understand the visualizations or not.
- Surveys were conducted both as SurveyMonkey or general paper surveys, distributing questions on the paper to the lay public.

FEEDBACK 7

VAccines Adverse events

1. The presentation helped me to understand the vaccines safety?

- True
 False

2. The visuals used incorporate all the intended messages?

- Yes
 No

3. Does a stacked bar chart better than a simpler bar chart to incorporate multiple messages?

- Yes
 No

4. Is the visual dashboard effective for interactive presentations and getting feedback?

- effective
 Not effective

5. What was the main message of the presentation?

- Vaccine is safe
 Vaccine has adverse events

6. Do we need to add more visuals for the better presentation?

- Yes
 No

7. Which visuals are better to add to the presentation to make it more readable?

- Bar chart
 Line graph
 Map chart
 Bubble chart