



## PUBLIC EDUCATION PAPER ON COVID – 19 VACCINES

### What are vaccines?

In the past, vaccines have been known to be substances that teach the body to recognise and defend itself against infections from harmful pathogens, such as bacteria, viruses and parasites. This is because they contained a harmless element of the infectious agent that directly stimulates the immune system to mount a response, beginning with the production of antibodies. Vaccines seek to provide active acquired immunity to particular infectious diseases. They stimulate the body's immune system to prepare itself in the event that infection occurs. Cells that are responsive to the vaccine proliferate in order to manufacture antibodies specific to the provoking agent and also to form 'memory cells'. Upon encountering the infectious agent a second time, these memory cells are quickly able to deal with the threat by producing sufficient quantities of antibody. Pathogens inside the body are eventually destroyed, thereby thwarting further infection. Several infectious diseases including smallpox, measles, mumps, rubella, diphtheria, tetanus, whooping cough, tuberculosis and polio are no longer a threat in Europe due to the successful application of vaccines. This is not different in the case of Ghana and Africa. Low-cost vaccines against preventable diseases have contributed to the reduction in childhood mortality.<sup>1</sup>

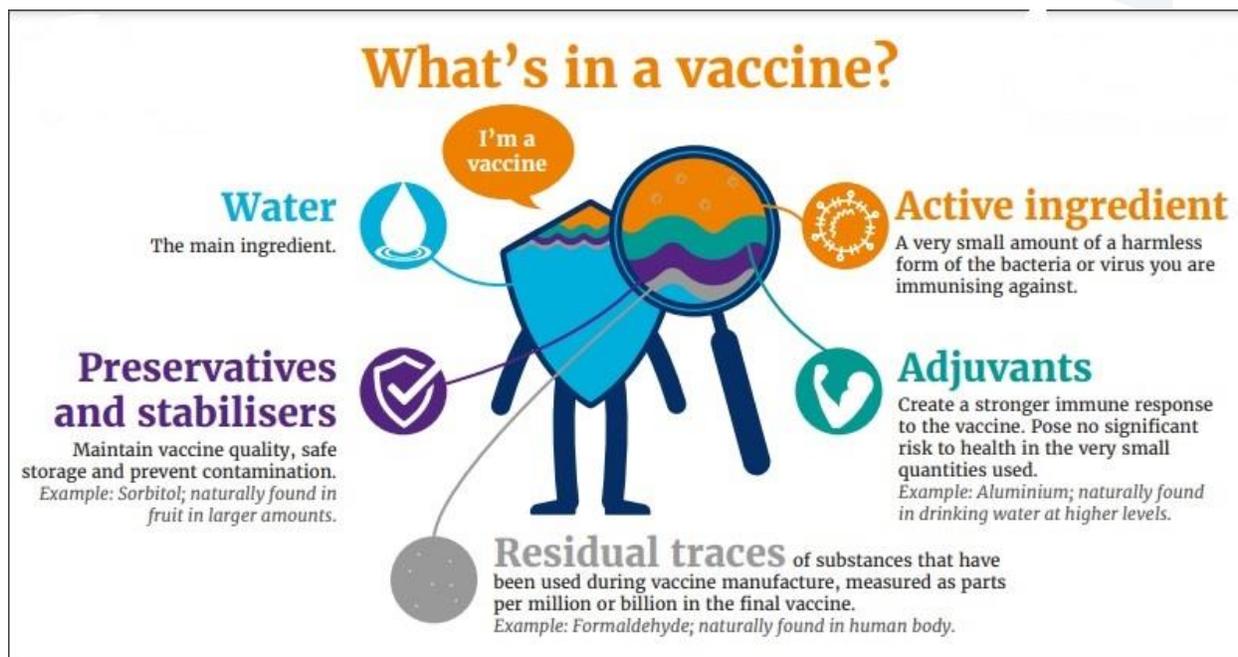


Figure 1: Vaccines, British Society for Immunology<sup>2</sup>

<sup>1</sup> Ayaga A. Bawah et al., "The Impact of Immunization on the Association between Poverty and Child Survival: Evidence from Kassena-Nankana District of Northern Ghana," *Scandinavian Journal of Public Health* 38, no. 1 (February 2010): 95–103, <https://doi.org/10.1177/1403494809352532>.

<sup>2</sup> "BSI Resource\_vaccine Ingredients Infograph.Pdf," accessed February 8, 2021, [https://www.immunology.org/sites/default/files/BSI%20resource\\_vaccine%20ingredients%20infograph.pdf](https://www.immunology.org/sites/default/files/BSI%20resource_vaccine%20ingredients%20infograph.pdf).

## How do traditional vaccines work?

As previously indicated, traditional vaccines contain a harmless form of the virus or bacteria that causes the disease you are being immunized against. Your immune system will still recognise the harmless form of the virus or bacteria in the vaccine without making you sick and will produce a specific immune response to fight it off. The immune system then maintains a memory of the virus or bacteria, so if a vaccinated person encounters the virus or bacteria later, their immune system is already prepared to fight it off quickly and prevent an infection from developing.

## Why is there so much hue and cry about the new COVID 19 vaccine?

A lot of concerns have arisen around the new vaccines especially those ones manufactured by Pfizer and Moderna for the COVID 19 pandemic. These are a few points to address some of the issues:

1. Historically, racial minorities like Blacks have been used as test subjects unknowingly in the roll-out/trials of new vaccines. This makes the issue of mass vaccination problematic among such groups in times of recent pandemics as people believe the vaccines may actually be a plan to harm, annihilate or depopulate such person groups.<sup>3</sup>
2. Traditional vaccines usually take many years to be introduced as safe and efficacious. This time, new technologies have been employed in developing vaccines under a year from onset of the pandemic. People question the veracity of the efficacy of these vaccines because of their rapid development. It is important to note that, since MERS (2012) and Ebola (2014), scientists all over the world have been actively working hard to create new vaccines using these technologies which were conceived about 30years ago.<sup>4</sup>
3. The mechanism of action of these vaccines (mRNA) are not known to change human DNA yet because the viral strand in the vaccine has not been implicated in entering the cell nucleus.<sup>5</sup>
4. Concerns about reducing fertility and depopulating nations that have arisen around these vaccines are not verifiable. However, we know that scientists have been working hard to develop birth control vaccines using mRNA technology for nearly 3 decades.<sup>6</sup>
5. There are many unknowns about these vaccines because new technologies have been employed. Concerns about long term side effects such as the emergence of auto-immune diseases are legitimate. Studies and surveillance are ongoing even as populations are vaccinated, in order to intervene where possible. The global deployment of these vaccines is actually part of the Phase IV clinical trial of nanomedicine.<sup>7</sup>

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<sup>3</sup> Austin Frakt, "Bad Medicine: The Harm That Comes From Racism," *The New York Times*, January 13, 2020, sec. The Upshot, <https://www.nytimes.com/2020/01/13/upshot/bad-medicine-the-harm-that-comes-from-racism.html>.

<sup>4</sup> Anthony Komaroff MD, "Why Are MRNA Vaccines so Exciting?," Harvard Health Blog, December 10, 2020, <https://www.health.harvard.edu/blog/why-are-mrna-vaccines-so-exciting-2020121021599>.

<sup>5</sup> CDC, "COVID-19 and Your Health," Centers for Disease Control and Prevention, February 11, 2020, <https://www.cdc.gov/coronavirus/2019-ncov/vaccines/different-vaccines/mrna.html>.

<sup>6</sup> G. P. Talwar et al., "Vaccines for Control of Fertility," *Indian Journal of Experimental Biology* 30, no. 11 (November 1992): 947–50.

<sup>7</sup> Lara Milane and Mansoor Amiji, "Clinical Approval of Nanotechnology-Based SARS-CoV-2 MRNA Vaccines: Impact on Translational Nanomedicine," *Drug Delivery and Translational Research*, January 29, 2021, <https://doi.org/10.1007/s13346-021-00911-y>.

## **How do these new vaccines work?**

These new vaccines are different from the traditional ones because new technologies have been employed in developing them. This is the nanotechnology. It is simply the study and manipulation of individual atoms and molecules to utilize the unique physical, chemical, mechanical and optical properties of materials that naturally occur at that scale. A notable example of nanotechnology application is the Doxil, which is a clinically approved drug for cancer treatment in the USA.

The mRNA vaccines introduce strands of the viral spike protein [a part of the coronavirus (SARS-CoV-2)] into the human body. These strands are actually messengers that make the human cells produce the viral spike protein once introduced into the body. These strands will be delivered to the cell by hydrogel nanotechnology. This technology is a preparation that keeps the mRNA stable. The human body is then tricked into producing antibodies against this viral protein. An immune memory builds up in the body after receiving two doses of the vaccine. The antibodies circulate in the blood for a period, during which they will mount a response against a real COVID 19 infection if one should catch the real virus. The antibodies are able to quickly recognize the viral spike protein (during a real infection) and crush it because of the immune memory already created. This is why persons who get vaccinated may not end up severely ill or even dying after contracting a COVID infection. One begins to build immunity after 10-14 days of first dose.

The AstraZeneca/ Oxford vaccine is a viral vector vaccine. This means that instead of the real COVID 19 virus (could be dead or alive) as in traditional vaccines, an unrelated and harmless virus which has been modified to act as a delivery system carries the coronavirus genetic material to the human cell to be used, once the vaccine is introduced. The genetic material is a segment of the coronavirus RNA that signals for the production of the viral spike protein in the human body. The use of the delivery virus makes it a viral vector vaccine. The viral vector is a weakened chimpanzee adenovirus which normally causes the common cold in chimpanzees. It has been weakened and changed in order not to harm human beings. The genetic material is delivered to the cell, which then produces the viral spike protein of the coronavirus. The body is then tricked to produce antibodies against this viral protein. Once again, an immune memory is built to fight any COVID infections in future within a period which is currently unknown. Ongoing studies will reveal that later. This vaccine also employs nanotechnology-based strategy.

## **Which of the new vaccines have been actively rolled out globally?**

Pfizer/BioNTech vaccine

- mRNA vaccine
- Storage: -70 deg Celsius
- Two-dose regimen,
- 95% effective after 2nd dose to prevent COVID-19 (doses administered 3 weeks apart)
- Limited data on pregnant women/lactating mothers/children below 16yrs
- No one had severe COVID-19 symptoms after the 2nd dose

## Moderna vaccine

- mRNA vaccine
- Storage: -20 deg Celsius
- Two-dose regimen
- 94% effective after 2nd dose to prevent COVID-19 (doses administered 1month apart)
- Limited data on pregnant women/lactating mothers/children below 18yrs
- No one had severe COVID-19 symptoms after the 2nd dose.

## AstraZeneca/Oxford vaccine (viral vector vaccine)

- Viral vector vaccine
- Storage: domestic fridge
- Two-dose regimen, given 4-12 weeks apart
- 62-67% effective after 2nd dose to prevent COVID-19 (better effectiveness with longer intervals between 1st and 2nd dose)
- Effect observed 22-90 days after vaccination
- Limited data on pregnant women/lactating mothers/children below 18yrs
- No one had severe COVID-19 symptoms after the 2nd dose.

VACCINE	TRIAL SIZE	REDUCTION IN COVID INFECTION	REDUCTION IN DEATH	DOSES/ STORAGE
<b>Moderna</b> (mRNA)	30.420	95%	100%	2 doses, 4 weeks apart (-20C)
<b>Pfizer</b> (mRNA)	43.000	95%	100%	2 does, 3 weeks apart (- 70C)
<b>Johnson and Johnson</b> (Adenovirus Vector -DNA)	43.783	85%	100%	1 dose (shelf life at 2-8 C)
<b>Oxford</b> (Genetically modified virus adenovirus)	23.848	70% (90% in low dose/ high dose)	100%	2 doses (regular fridge temperature)
<b>Sputnik</b> (2 modified adenovirus)	21.977	91.6%	100%	2 doses, 21 days (18C)
<b>Novavax</b> (protein)	Pending	Pending	Pending	Pending

Please note the number of patients in the studies that died are small so the confidence intervals are large. Post vaccination surveillance will provide better information about the exact reduction in mortality in large groups and across virus variants

Figure 2 : Vaccine Update<sup>8</sup>

<sup>8</sup> “Vaccine Update | February 2, 2021,” EM:RAP, accessed March 6, 2021, <https://www.emrap.org/episode/vaccineupdate/vaccineupdate>.

Other vaccines include;

- [BBIBP-CorV](#) from [Sinopharm](#),
- [BBV152](#) from [Bharat Biotech](#),
- [CoronaVac](#) from [Sinovac](#),
- Wuhan from Sinopharm,
- [Ad5-nCoV](#) from [CanSino Biologics](#) and
- [EpiVacCorona](#) from the [Vector Institute](#)

Ghana has received the AstraZeneca/Oxford vaccine licensed and manufactured by the Serum Institute of India (SII). The vaccine, branded COVISHIELD, was granted Emergency Use Listing (EUL) by the World Health Organization on February 15.

### **What are the side effects of each?**

Mostly, the common side effects are similar for most of the vaccines.

- Mild-to-moderate pain at the injection site
- Fatigue and headache which resolved within a few days.
- Muscle pain
- Chills
- Joint pain
- Fever
- Injection site swelling
- Axillary swelling

### **Who should stay clear of the vaccine?**

Each COVID-19 vaccine is recommended for use in defined groups of people depending on who was included in the clinical trials and found to safely tolerate it. It is rare that someone is unable to be vaccinated. People with an allergy to any ingredients of the vaccine should not receive it. It is important for our Public Health Institutions like the FDA to provide information on vaccine types, ingredients, and the population targeted in clinical trials to bolster the confidence of citizens in patronizing the vaccine and for those with known allergic reactions to avoid any such side effects.

Due to limited data on these groups of people, use of vaccines should be based on risk to benefit ratios.

1. Children below 16-18 years
2. Pregnant women
3. Lactating mothers
4. Persons with comorbid conditions must first consult their doctors

Areas of insufficient evidence includes:

1. Persons with prior COVID-19 infection
2. Individuals who are immunocompromised
3. Efficacy in preventing infection
4. Efficacy against long-term effects of COVID-19

### **Will vaccines completely eradicate the virus?**

- No, the vaccines will not completely eradicate the virus - at least not in the short to medium term. However, it is important to note that stopping a pandemic requires using all the available tools. Vaccines work with your immune system so your body will be ready to fight the virus if you are exposed. Other steps, like masks, social distancing, hand hygiene, and avoiding crowds, help to reduce your chance of being exposed to the virus or spreading it to others. Together, COVID-19 vaccination and the protocols above will offer the best protection from COVID-19 by slowing the spread gradually. This is why we must continue to observe the protocols even after receiving the vaccine.
- The vaccine will not reduce spread or transmission.
- It will not protect a person from being infected when exposed. It is hypothesized that the vaccine will only make one less sick and so will likely not require hospitalization or die from COVID 19.
- Getting vaccinated is one of the many steps you can take to protect yourself and others from severe COVID-19 disease. Protection from severe COVID-19 disease is critically important because for some people, it can cause death.
- Another key reason for vaccinating is that safe mass vaccinations seek to achieve herd immunity. Herd immunity is the situation where enough people in the community are protected from getting a disease because they have already had the disease or they have been vaccinated. Herd immunity

makes it difficult for the disease to spread from person to person, and it even protects those who cannot be vaccinated, like newborns. The percentage of people to be vaccinated to achieve herd immunity to COVID-19 is not known at the moment.

- It is very important to state that documents like the UK COVID-19 vaccination consent form of the UK Medical Freedom Alliance make it clear that the mRNA vaccine is essentially experimental with the possibility of unanticipated, unpredictable long term/ late onset health effects.<sup>9</sup>

### **Will the vaccine be compulsory for all residents of Ghana?**

Presently, the vaccines have not been made mandatory. However, it is worthy of note that, Part 2, sections 20-23 of Ghana's Public Health Act 2012 (Act 851) allude to adult, public and compulsory vaccination. The Minister of Health has the authority (by executive instrument) to order the vaccination of specific groups of people and non-compliance may attract penalties. A person is only permitted to refuse where it will be injurious to their health or upon presentation of sufficient evidence that he/she has a natural immunity to the disease being vaccinated against.

The Patient's Charter which is also found in the 6<sup>th</sup> Schedule of Act 851 promotes respect for patient's right of choice, right to informed consent, etc. However, in the event of a public health outbreak such as COVID19, the public's health trumps individual rights. Consequently, it is important for each person to be well informed about all matters pertaining to one's health, seek clarification where necessary and read consent forms carefully.

### **What role, if any, are local researchers and pharmaceutical industries playing?**

The public discourse from Government has not been deeply engaging about how it intends to support and engage with local researchers like Noguchi and the pharmaceutical industries to identify and promote local remedies in the form of drugs and the development of local vaccines. We recognize the committee that has been set up and chaired by Prof. Frimpong Boateng (Former Minister of Science, Technology and Innovation) to handle these issues but we dare say that, that is not enough. COVID19 provides an excellent opportunity for the existing capacities we have in science, research, technology and industry to be harnessed for the common good. There has to be an intentional effort and policy in this regard.

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<sup>9</sup> UK Medical Freedom Alliance, COVID-19 Vaccination Consent Form, [https://uploads-ssl.webflow.com/5fa5866942937a4d73918723/5ff46fd3fa0a18f0c8e0cbc2\\_UKMFA\\_CV19\\_vaccine\\_consent\\_form\\_v3.pdf](https://uploads-ssl.webflow.com/5fa5866942937a4d73918723/5ff46fd3fa0a18f0c8e0cbc2_UKMFA_CV19_vaccine_consent_form_v3.pdf) >

## **Recent happenings in Ghana**

Ghana received 600,000 doses of the AstraZeneca/Oxford vaccine (also called Covishield) on Wednesday, 24th February 2021 through the COVAX vaccine-sharing initiative. Ghana was the 1st of 46 countries to receive vaccines through this initiative.<sup>10</sup> All the 600,000 doses will be vaccinated as first shots in 43 districts identified as epicenters. The second dose will be given after 8-12 weeks from the first dose. Plans are underway to receive the next consignment of the vaccines in the next 2 weeks to continue the vaccination of the remaining population.

Requirements for vaccination will include a national identification card (NIA card, NHIS card and your house address (digital address if known).

Vaccine deployment will be staggered in 3 phases.

### **Group 1: Persons at most risk**

- a. Health care worker
- b. Frontline Security Personnel
- c. Persons with known underlying medical conditions
- d. 60+ year old persons
- e. Frontline members of the Executive; Legislature; Judiciary
- f. Teachers more than 50 years
- g. Other essential service providers
- h. Others

### **Group 2: Other Essential Service Providers including the remaining security agencies**

Water supply services; Electricity supply services; Teachers and students; Supply and distribution of fuels; farmers and food value chain; telecommunications services; Air traffic and civil aviation control services; Meteorological services; Air transport services waste management services; Media; Public and private commercial transport services.

**Security and Intelligence Agency:** The Police Service, Armed Forces; Prisons Service; Immigration service; National Fire Service; CEPS Division of the rest of Ghana Revenue Authority

Rest of the Arms of Government: Executive; Judiciary and Legislature.

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<sup>10</sup> "Covax Vaccine-Sharing Scheme Delivers First Doses to Ghana - BBC News," accessed March 6, 2021, <https://www.bbc.co.uk/news/world-africa-56180161>.

### **Group 3: Rest of General Public**

All persons 18 years and over excluding pregnant women

**Group 4: All others (when an approved vaccine for this category is found):** Pregnant women and persons under 18 years.

The President and his wife as well as the Vice President and his wife were vaccinated on 1st March, 2021 without any reported adverse effects. The former President and his wife took their vaccines on 2nd March, 2021. The Asantehene of the Ashanti Kingdom and his wife also took their shots on 2nd March, 2021.

### **What does the research say about AstraZeneca vaccine (COVISHIELD) efficacy & safety?**

Researchers reported three efficacy levels for the vaccine - an overall effectiveness of 70%, a lower one of 62% and a high of 90%. This is because different doses of the vaccine were used in one part of the trial. Some volunteers were given shots that were half the strength than originally planned.<sup>11</sup>

The AstraZeneca vaccine has been found to be less effective against a rapidly spreading coronavirus variant first discovered in South Africa, but it still offers strong protection against a variant identified in the United Kingdom (both variants appear to make the virus more contagious). It is believed that the vaccines are still able to make infections less serious by reducing the rates of serious disease, hospitalization and death.

Public health experts advise that if people are vaccinated en masse, the virus will replicate less and have fewer opportunities to mutate, meaning new variants will eventually stop emerging.<sup>12</sup> So far no adverse reactions or side-effects have been reported by 5,286 Sri Lankans who received Covishield, the Oxford-AstraZeneca vaccine provided by India about a month ago. Covishield has also been deployed in Nepal where no major adverse reaction has been reported after the first dose. The need for long-term monitoring of adverse drug reactions by the Food and Drugs authority within the country cannot be overemphasized.<sup>13</sup>

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<sup>11</sup> "Oxford Covid Vaccine 'safe and Effective' Study Shows - BBC News," accessed March 6, 2021, <https://www.bbc.co.uk/news/health-55228422>.

<sup>12</sup> Joe Walsh, "Fauci: Covid Vaccines Are Less Effective Against New Strains — But Still Worth Taking," Forbes, accessed March 6, 2021, <https://www.forbes.com/sites/joewalsh/2021/02/01/fauci-covid-vaccines-are-less-effective-against-new-strains---but-still-worth-taking/>.

<sup>13</sup> "No Adverse Reactions Reported in Sri Lanka Following Vaccination with Covishield," accessed March 6, 2021, <https://theprint.in/health/no-adverse-reactions-reported-in-sri-lanka-following-vaccination-with-covishield/595438/>.

In the past few days, COVAX has delivered vaccines to Ivory Coast, Angola, Cambodia, Columbia, The Democratic Republic of the Congo, Gambia, India, Kenya, Lesotho, Malawi, Mali, Moldova, Nigeria, the Philippines, the Republic of Korea, Rwanda, Senegal, Sudan and Uganda.

Other countries which have so far received the Covishield include Bangladesh, Myanmar, Bhutan, the Maldives, Mauritius, Seychelles, Bahrain, Oman, Afghanistan, Barbados and Dominica.

Adverse reactions such as fever, swelling at site of injection or breast, etc can be reported to the nearest health facility for treatment and also reported through the Med Safety App which is freely available in Google Play and App Store.

### **What does God require of us?**

Obedience to His Word and the application of wisdom. He has not given us the spirit of fear and of timidity but of power, love and a sound mind. (2 Tim. 1:7)

God wants His people called by His name to humble themselves, pray, seek His face and turn from their wicked ways during seasons of plagues. His promise is to heal their land when such prayers reach Him. (2 Chronicles 7:13-15)

Broadly, these times require us to follow the 5Ps of Prayer, Protocol, Prayer, Protocol and Prayer. (Source: Archbishop Palmer Buckle)

This requires us:

1. To be considerate of others. (Philippians 2:3)
2. To be responsible and stay safe, abiding to the protocols. (3 John 2)
3. To be prayerful about these issues if one still feels anxious about them. (Phil. 4:6)
4. To always wash our hearts as well, and not only our hands. (James 4:8)
5. To continually seek His face as we restrict our movements. (Isaiah 26:20)
6. To share verifiable information via social media rather than that which merely creates fear and panic. (2 Tim. 1:7)
7. To consider how we can spread the good news about the love and compassion of God to all, especially those afflicted and those bereaved. May discipleship be central to our lifestyle as commanded by our Lord and Saviour (Matt. 28:18-20)
8. Above all, be strongly led by the convictions of the Holy Spirit of God. (Rom. 8:14). His way is life and peace. (Rom. 8:6)