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→ Predictions of vaccine uptake

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→ Supply agreed to Africa
→ Donations and deliveries to date

Testing capacity
→ Across the continent, split by country

Treatment capacity
→ Treatment supply and production
Production of COVID-19 vaccines
BioNTech to transfer mRNA technology to 6 African countries

Map of vaccine production locations in Africa, manufacturers and products

- **Algeria**
  - Institut Pasteur Algeria
  - Rabies (Tech)
  - Saidal COVID-19 (Sinovac, Gamaleya)

- **Morocco**
  - Sothema
  - COVID-19 (Sinopharm)

- **Senegal**
  - Institut Pasteur Dakar
  - Yellow fever (Tech and fill/finish)
  - BioNTech mRNA vaccines (Tech)

- **Tunisia**
  - Institut Pasteur Tunis
  - BCG (Tech and fill/finish)
  - BioNTech mRNA vaccines (Tech)

- **Egypt**
  - EGYVAC (Vacsera)
  - Tuberculosis, Tetanus, DTP, Typhoid, Cholera, COVID-19 (Sinovac)
  - Minapharm COVID-19 (Gamaleya)
  - BioNTech mRNA vaccines (Tech)

- **Kenya**
  - BioNTech
  - Moderna mRNA vaccines (Tech)

- **Rwanda**
  - BioNTech
  - mRNA vaccines (Tech)

- **South Africa**
  - Biovac
  - Tuberculosis (Tech and fill/finish), Measles, Pneumococcal, Hepatitis B, Tetanus, COVID-19 (Pfizer/BioNTech)
  - Aspen Pharmacare – may halt production COVID-19 (J&J)
  - BioNTech mRNA vaccines (Tech)
  - Afrigen Biologics and Vaccines COVID-19 vaccines (Will have to go through clinical trials)

- **Ghana**
  - COVID-19 vaccines

- **Nigeria**
  - BioNTech
  - mRNA vaccines (Tech)
  - Merck

- **Production has not started yet**
- **Producing**
- **Planned for the future**

Limitations:
→ Reliant on public information

Data and Visualisations: Airfinity

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Last updated: 25th April 2022
→ Innovations in COVID-19 vaccines
Second generation vaccines focus on variant-resistance, alternative administration or targeting multiple diseases

Overview of innovations in COVID-19 vaccine development

A greater proportion of new candidates have been pan-SARS-CoV-2 in 2022:
New candidates to be pan-SARS-CoV-2, alternatively administered or combined as a percentage of all new candidates

- NRx, SK Bioscience and Arcturus have pan-SARS-CoV-2 booster candidates in phase III trials.
- These candidates generally contain mutations present on the spike proteins of multiple variants.

Alternative administration
(Oral/Intranasal/Needle-free injection)

- The top five intranasal candidates are being developed by CanSino, Bharat, Wantai, Avimex and AstraZeneca.

Combined
(Flu/COVID or Flu/RSV/COVID)

- Novavax have a combined Flu/COVID candidate in phase III. Positive phase III data has been released for both the COVID and Flu components of this candidate.
- Moderna have announced a preclinical candidate targeting Flu, COVID and RSV.

Last updated: 25th April 2022
Variant specific vaccines are losing popularity

Overview of new variant-specific candidates and Omicron-specific timelines

After Omicron was detected, a large proportion of newly announced candidates targeted specific variants, mainly Omicron. In recent months, however, the proportion of new candidates to target variants has reduced. This follows preclinical data from Moderna, showing Omicron-specific boosters to be no more effective than standard boosters, in non-human primates. Nevertheless, Pfizer and Moderna have preceded with trials of their tweaked vaccines. Data from these trials is expected this month.

New variant-vaccine announcements and Omicron-specific vaccine timelines:
(Variant-specific (including Omicron-specific) candidates as a percentage of all new candidates each month)

- New variant targeting
- New omicron-specific
Rollout capacity and uptake in African countries
Range in vaccine uptake across Africa

Map of vaccine uptake in Africa (fully vaccinated*)

Top 5 highest vaccination rates

- Seychelles: 83%
- Mauritius: 76%
- Rwanda: 65%
- Morocco: 65%
- Botswana: 57%

Top 5 lowest vaccination rates

- Burundi: 0.09%
- Eritrea: 0.00%
- Mayotte: 0.00%
- Reunion: 0.00%
- Western Sahara: 0.00%

Limitations:
- Reliant on public information

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Last updated: 25th April 2022
Range in vaccine uptake across Africa

Map of vaccine uptake in Africa – for those boosted

Top 10 highest boosted (total population)

- Mauritius: 47%
- Seychelles: 36%
- Rwanda: 23%
- Morocco: 16%
- Cape Verde: 12%
- Botswana: 10%
- Tunisia: 10%
- Eswatini: 6%
- Zimbabwe: 4%
- South Africa: 4%

Limitations:
→ Reliant on public information

% of total population who have had a booster administered

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Last updated: 25th April 2022
If all boosters have gone to over 50s, some countries have been able to achieve good coverage

Map of vaccine uptake in Africa – for those boosted

The charts below summarise what booster uptake would be if all boosters administered in the country have been administered to those over the age of 50, which may not be the case.

**Top 10 highest boosted (if all boosters have gone to over 50s)**

- Rwanda: 1.00
- Mauritius: 1.00
- Seychelles: 1.00
- Morocco: 0.80
- Botswana: 0.65
- Cape Verde: 0.63
- Eswatini: 0.52
- Zimbabwe: 0.43
- Tunisia: 0.39
- Sao Tome + P.: 0.37

**Limitations:**
- Reliant on public information
- Assumes all boosters have gone to those over the age of 50 which may not be the case

Proportion of over 50s boosted if all boosters have gone to over 50s

Last updated: 25th April 2022
Relationship between past vaccination coverage and COVID-19 vaccination coverage in booster countries

Applying this association to African countries to predict their COVID-19 vaccination uptake if they had full vaccine supplies

Limitations:
→ Reliant on public information
Predicting COVID-19 Vaccine Uptake in Africa

Countries predicted to have a higher vaccine uptake should be given a higher volume of C-19 vaccines to prevent wastage.

A relatively higher volume of C-19 vaccines should be distributed to countries where uptake is predicted to be higher, such as Morocco, Rwanda, Cabo Verde, Egypt and Ghana, according to estimates.

A lower volume of C-19 vaccines should be sent to countries that are predicted to have a lower predicted uptake, such as Somalia, Central African Republic, Guinea and Nigeria, to prevent vaccine wastage.

Limitations:
→ Reliant on public information

*Based on pol3, DTP3, HepB3, MCV2, Hib3 vaccine coverage
Supply agreed

45,746,900 doses of J&J have been delivered through AVAT
Range seen in doses secured per capita in Africa

Supply agreed to date

Limitations:
- Reliant on public information
- Doses procured by the African Union are excluded as allocation per country has not been confirmed

Data and Visualisations: Airfinity

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Last updated: 25th April 2022
Range seen in doses secured per capita in Africa

Supply agreed to date

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Data and Visualisations: Airfinity

<table>
<thead>
<tr>
<th>Country</th>
<th>Doses per Capita</th>
</tr>
</thead>
<tbody>
<tr>
<td>Republic of the Congo</td>
<td>0.60</td>
</tr>
<tr>
<td>Rwanda</td>
<td>2.24</td>
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<tr>
<td>Sao Tome and Principe</td>
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<td>Senegal</td>
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<td>Seychelles</td>
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<td>Sierra Leone</td>
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Last updated: 25th April 2022
Range seen in doses secured per capita in Africa

Supply agreed to date

Limitations:
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<table>
<thead>
<tr>
<th>Country</th>
<th>Bilateral</th>
<th>Vaccine donation</th>
<th>COVAX - donation</th>
<th>COVAX - direct</th>
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<tbody>
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<td>Zimbabwe</td>
<td>0.34</td>
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<td>0.89</td>
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</table>

Vaccine donation

Bilateral

COVAX - donation

COVAX - direct

Last updated: 25th April 2022
Donations and deliveries overview
### Range seen in doses delivered per capita in Africa

#### Deliveries to date per capita

<table>
<thead>
<tr>
<th>Country</th>
<th>Bilateral supply</th>
<th>Vaccine donation</th>
<th>COVAX - donation</th>
<th>COVAX - direct</th>
<th>Last updated: 25th April 2022</th>
</tr>
</thead>
<tbody>
<tr>
<td>Algeria</td>
<td>0.72</td>
<td>0.34</td>
<td>0.13</td>
<td>0.15</td>
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<td>Angola</td>
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<td>Benin</td>
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<td>0.07</td>
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<td>Botswana</td>
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<td>0.04</td>
<td>0.04</td>
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<tr>
<td>Burundi</td>
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<td>0.05</td>
<td>0.05</td>
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<td>Cameroon</td>
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<tr>
<td>Comoros</td>
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<tr>
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<td>0.09</td>
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</table>

#### Limitations:
- Reliant on public information
Range seen in doses delivered per capita in Africa

Deliveries to date per capita

Limitations:
- Reliant on public information

Data and Visualisations: Airfinity

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Last updated: 25th April 2022
Range seen in doses delivered per capita in Africa

Deliveries to date per capita

Limitations:
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Bilateral supply
Vaccine donation
COVAX - donation
COVAX - direct

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<td>0.21</td>
<td>0.47</td>
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<tr>
<td>Sao Tome and Principe</td>
<td>1.03</td>
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<td>0.09</td>
<td>0.24</td>
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<td>0.19</td>
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<tr>
<td>The Gambia</td>
<td>0.12</td>
<td>0.12</td>
<td>0.33</td>
<td>0.12</td>
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Last updated: 25th April 2022
Range seen in doses delivered per capita in Africa

Deliveries to date per capita

Limitations:
→ Reliant on public information

Data and Visualisations: Airfinity

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Last updated: 25th April 2022
J&J makes up the vaccine delivered most to Africa

Doses delivered split by vaccine

Limitations:
- Reliant on public information

<table>
<thead>
<tr>
<th>Vaccine</th>
<th>Total deliveries to date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ad26COVS1 (J&amp;J)</td>
<td>188,010,177</td>
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<tr>
<td>BNT162b2 (Pfizer/BNT)</td>
<td>159,570,802</td>
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<tr>
<td>AZD1222 (AstraZeneca)</td>
<td>145,093,600</td>
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<tr>
<td>BBIBP-CorV (Sinopharm)</td>
<td>124,075,698</td>
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<tr>
<td>CoronaVac (Sinovac)</td>
<td>55,196,894</td>
</tr>
<tr>
<td>mRNA-1273 (Moderna)</td>
<td>42,957,400</td>
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<tr>
<td>Sputnik V (Gamaleya)</td>
<td>3,771,000</td>
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<tr>
<td>Sputnik-Light (Gamaleya)</td>
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<tr>
<td>COVAXIN (Bharat)</td>
<td>375,000</td>
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<tr>
<td>TURKOVAC (Erciyes Uni)</td>
<td>100,000</td>
</tr>
</tbody>
</table>

Last updated: 25th April 2022
US are the biggest donor to Africa to date

Total donations to Africa to date

- **United States**: 173,075,640
- **EU**: 161,294,140
- **China**: 27,519,898
- **United Kingdom**: 14,856,940
- **Canada**: 9,411,080
- **Japan**: 2,308,480
- **Turkey**: 1,900,400
- **Saudi Arabia**: 1,608,000
- **Argentina**: 1,450,000

Limitations:
- Reliant on public information

Data and Visualisations: Airfinity

Total donations to Africa to date last updated: 25th April 2022
60% of doses delivered to Africa have been administered to date, 21% have received at least one dose

An overview of doses delivered vs. doses administered to the continent

Limitations:
- Reliant on public information

Data: Airfinity and OWID
Visualisations: Airfinity

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Highest number of deliveries was in Dec 2021

Deliveries per month to Africa

Limitations:
→ Reliant on public information

Total deliveries to Africa that month

India issue an export ban
US begin exports
Export ban lifted from India

Jan-21: 1,795,600
Feb-21: 3,164,000
Mar-21: 27,618,810
Apr-21: 6,297,500
May-21: 17,940,510
Jun-21: 13,895,190
Jul-21: 35,525,380
Aug-21: 47,773,810
Sept-21: 56,249,384
Oct-21: 82,608,314
Nov-21: 91,103,582
Dec-21: 160,459,030
Jan-22: 100,783,287
Feb-22: 36,593,344
Mar-22: 39,675,360
Apr-22: 18,596,990

Total deliveries to Africa that month

Last updated: 25th April 2022
Majority of doses administered in Africa are first doses

Doses administered over time in Africa

Limitations:
→ Reliant on public information

Data: Airfinity and OWID
Visualisations: Airfinity

Last updated: 25th April 2022
Testing capacity
Testing rates per capita are lower in Africa than any other continent

Comparison of COVID-19 testing data by continent

The number of tests performed has been steadily increasing in Africa since the start of the pandemic, however, testing rates on the continent are the lowest globally. This is partly due to data reporting across the continent; out of 55 African countries only 16 have reported testing data for over half the duration of the pandemic. Low testing rates mean that infection levels are difficult to monitor, and fewer people will be eligible to antiviral treatments (where available) that require on a COVID-positive diagnosis prior to administration.

Limitations:
→ Different countries publish their testing data according different definitions.
→ Testing data is not available for every country.

Total tests and total test per capita in Africa, Jan 2020-present

Total tests performed per 1000 by continent

*As of 31/03/22

Data: OWID
Visualisations: Airfinity
Testing rates are highly variable across Africa

Analysis of test per capita data of individual African countries

There is a large range of testing rates across Africa. Algeria has reported the fewest tests throughout the pandemic, recording a total of 5.2 tests/1000 over the course of the pandemic. Botswana has reported the most tests per capita (925.8 tests/1000). However, it is the only country in Africa that has performed more tests per capita that the global average of 800 tests/1000.

Limitations:
- Different countries publish their testing data according different definitions.
- Testing data is not available for every country.

Data: OWID
Visualisations: Airfinity
For countries providing testing data, positivity rates are low

Analysis of positivity rates of tests in Africa

For countries that provide testing data and positivity rates, the majority are testing sufficiently according to WHO’s criteria of sufficient testing to prevent an outbreak.

Limitations:

→ Different countries publish their testing data according different definitions.
→ Testing data is not available for every country.

Data: [OWID](https://ourworldindata.org)

Visualisations: Airfinity

Last updated: 25th April 2022
→ Treatment capacity
675 million people in Africa are at high-risk of progression to severe COVID-19

Overview of the total number of those at high-risk of progression to severe COVID-19 in Africa

Limitations:
- Does not include average case rates for Africa; not all of the high-risk population will be infected.
- Does not take into account re-infection.

Number of Those At High-Risk of Progression to Severe COVID-19 in Africa

- One Condition
- Two or More Conditions
- No Conditions But Age Risk Factor

<table>
<thead>
<tr>
<th>Age Group</th>
<th>No Conditions But Age Risk Factor</th>
<th>One Condition</th>
<th>Two or More Conditions</th>
<th>Total</th>
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<tbody>
<tr>
<td>&lt;15</td>
<td>21,200,000</td>
<td>114,900,000</td>
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<td>15-49</td>
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<tr>
<td>&gt;69</td>
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<td></td>
<td>675,100,000</td>
</tr>
</tbody>
</table>

Total: 675,100,000

Last updated: 25th April 2022
COVID-19 treatment manufacturing in Africa

Six known manufacturers of approved COVID-19 treatments in Africa

**Supply Agreements Concerning Africa**

- **Eva Pharma** (Egypt) produces Remdesivir for COVID-19 under a voluntary licensing agreement with Gilead. Remdesivir is used domestically by Egypt and exported to India (300,000 doses in 2021).
- **UNICEF** has supply agreement with Merck for 3 mln courses of Molnupiravir
- **African CDC** in talks with Pfizer for supply of oral antiviral, Paxlovid

**Limitations:**

Not all treatment manufacturers (particularly of generics) are known.

Data: [Airfinity]
Visualisations: [Airfinity]
Antivirals accessible to African nations through Medicines Patent Pool

Paxlovid, Molnupiravir MPP agreements cover all of Africa

- Under agreements signed by Pfizer/Merck, and the MPP, generic manufacturers can produce and export Paxlovid/Molnupiravir to 105+ countries (including all African nations).

- 27 manufacturers have been granted sublicenses to produce and distribute Molnupiravir, 3 of which are in Africa (Kenya, Egypt, South Africa). Generic forms of this treatment are expected to go to market Q1 2022.

- Paxlovid generic manufacturers unknown currently.
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→ Caroline Casey
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