COVID–19 Intel Report

Prepared for the IFPMA, BIO and DCVMN Press Briefing
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16th December 2021
Significant progress made in 2021 on COVID-19 vaccines

An overview of major milestones achieved to date

- **31st Dec**: Pfizer/BioNTech granted WHO EUL
- **15th February**: AZ granted WHO EUL
- **12th March**: J&J granted WHO EUL
- **14th April**: 1 billion doses administered
- **20th March**: 1 billion doses produced
- **30th April**: Moderna granted WHO EUL
- **7th May**: Sinopharm granted WHO EUL
- **1st June**: SinoVac granted WHO EUL
- **30th September**: 30% of the world’s population have received a full initial vaccination course
- **3rd November**: Bharat’s candidate granted WHO EUL
- **August 2021**: Production first exceeds 1 bn doses per month
Despite a big increase in vaccination rates there are concerns on variants and rising cases

An analysis of the current dominant variant, infections, deaths and vaccinations globally over time
Vaccine production forecast to hit 11.2bn doses in 2021, with a capacity of 1.4bn in December alone

Vaccine production split by candidate

- Ad26COVS1 (J&J)
- AZD1222 (University of Oxford/AstraZeneca)
- BBIBP-CorV (Beijing/Sinopharm)
- BNT162b2 (Pfizer/BioNTech)
- CoronaVac (Sinovac)
- COVAXIN (Bharat/ICMR/NIV)
- mRNA-1273 (Moderna)
- NVX-CoV2373 (Novavax)
- Other

Number of collaborations

- Adjuvant
- Source of Materials
- Distribution and Storage
- Tech
- Fill/Finish
- Tech and Fill/Finish

Forecasted

- 11,154,014,965

449,137,108
793,509,302
1,319,090,336
2,029,478,998
2,897,046,796
3,890,170,715
4,879,176,678
5,958,441,475
7,103,620,786
8,355,897,372
9,701,276,930

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Date published: 15th Dec
China, EU, India and the US set to be the biggest vaccine producers in 2021

Vaccine production split by country

© 2021 Airfinity / Private & Confidential. *Other includes Belarus, Cuba, Egypt, Iran, Kazakhstan, Taiwan and Thailand. This analysis is based on where the vaccine drug substance is produced it does not take into account fill/finish occurring in other locations

Date published: 15th Dec
If a variant-updated vaccine is needed, production rate in 2022 would slow initially

An analysis of production forecasts if rate continues or if 50% of production is diverted to producing a variant vaccine

Production scale up if production continues at the current rate

Production scale up if 50% of production in 2022 is diverted to producing a variant updated vaccine*

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Significant increase seen in donations, either direct or through COVAX

Deliveries of vaccines through COVAX or through direct donations over time

Forecast surplus doses available for March 2022

-16%

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Significant impact on protection against infection from omicron, awaiting more data on hospitalisations and boosters

Comparison of vaccine effectiveness against different variants

Protection against symptomatic infection*

Pfizer/BNT: 87% ± 74% vs 34%
Modern: 91% ± 84%
AZ: 68% ± 61% vs 6%
J&J: 69% ± 59%

Protection against hospitalisation*

Pfizer/BNT: 93% ± 93% vs 70%
Modern: 94% ± 95%
AZ: 95% ± 90%
J&J: 81% ± 80%

Estimated protection against symptomatic infection restored from boosters

Overall: 94% vs 71%
Delta: 93% vs 76%
Omicron: 2x AZ + 1x Pfi/BNT vs 2x Pfi/BNT + 1x Pfi/BNT

Data on vaccine effectiveness against Omicron is extremely limited and based on a very small number of studies so should be interpreted with caution. This slide summarises what is currently published.

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Promising COVID-19 vaccine candidates in the pipeline

Overview of candidates and clinical trial phase

- Variant updated vaccines: 4
- Alternative route of administration: 2
- Able to store in fridge: 13
- Able to store at room temperature: 1

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Lots of innovation expected in 2022 for COVID-19 vaccines

A summary of vaccines in the pipeline

**Flu/RSV/COVID-19 combination vaccines**

- **Moderna**
  - One Flu/COVID combination vaccine (mRNA-1073) and one universal antiviral vaccine.

- **Novavax**
  - NanoFlu/NVX-CoV2373
  - Immunovative Therapies/Mirror Biologics Flu/RSV/COVID-19

**Planned/Announced**

- 1

**Discovery**

- 2

**Preclinical**

- 7

**Phase I/II**

- 2

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**Omicron variant updated vaccines**

- **Unapproved vaccines**
  - 12

- **Tweaked vaccines**
  - 6

**Brand-new Omicron vaccines**

- **Preclinical studies**
  - 3-4 months

- **Clinical trials**
  - 5 months

**September 2022**

The estimated time at which the first brand-new Omicron vaccines could receive approval

**Tweaked Omicron vaccines**

- **Variant analysis**
  - 2 weeks

- **Relatively small human trials**
  - 209-500 subjects
  - 2-3 months

- **Regulatory approval process**
  - 2 weeks

**Feb/Mar 2022 potential authorisation**

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Airfinity forecasts have been realistic to observed production

Comparison of Airfinity forecasts (made in early February) vs observed production up until July
### Appendix

Other vaccines mentioned in the production forecast

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<thead>
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<th>Other vaccines include</th>
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<td>COViran Barekat (Shifa Pharmed)</td>
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<td>CoviVac (Chumakov Federal Scientific Center)</td>
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<td>CoVLP (Medicago/GSK)</td>
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<td>EpiVacCorona (VECTOR)</td>
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<td>FINLAY-FR-2 (Finlay Vaccine Institute)</td>
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<td>GRAd-COV2 (Reithera/LeukoCare/Univercells)</td>
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<td>INO-4800 (Inovio Pharma)</td>
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<td>LUNAR-COV19 (Arcturus)</td>
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<td>MVC-COV1901 (Medigen/Dynavax)</td>
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<td>NVX-CoV2373 (Novavax)</td>
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<td>QazCovid-in (RI for Biological Safety Problems)</td>
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<td>Razi Cov Pars (Razi Vaccine and Serum Research Institute)</td>
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<td>S-268019 (Shionogi)</td>
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<td>SCB-2019 (Clover/Dynavax)</td>
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<td>UB-612 (Covaxx/Vaxxinity)</td>
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<td>Vaccine (Sanofi/GSK)</td>
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<td>VLA2001 (Valneva/Dynavax)</td>
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<td>ZF2001 (Anhui Zhifei)</td>
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<td>ZyCoV-D (Zydus Cadila)</td>
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<td>Ad5-nCoV (CanSino)</td>
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<td>CIGB-66 (Center for Genetic Engineering and Biotechnology (CIGB))</td>
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Appendix
Definitions for types of production

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<thead>
<tr>
<th>Definitions:</th>
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<tr>
<td><strong>Source of materials:</strong></td>
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<tr>
<td>Public announcements to supply raw materials for vaccine candidates</td>
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<td><strong>Distribution and storage:</strong></td>
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<tr>
<td>Public announcements to distribute and/or store vaccines after production (separate from procurement deal)</td>
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<td><strong>Adjuvant:</strong></td>
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<td>Public announcements to produce and supply adjuvant for vaccine formulations</td>
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<td><strong>Fill and finish:</strong></td>
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<td>Public announcements to fill and finish vaccines into vials and syringes</td>
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<td><strong>Tech:</strong></td>
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<tr>
<td>Public announcements to produce active vaccines or vaccine components</td>
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Appendix

Studies included in the Airfinity vaccine meta effectiveness tool

Omicron study:
https://khub.net/documents/135939561/430986542/Effectiveness+of+COVID-19+vaccines+against+Omicron+variant+of+concern.pdf/4423c9f4-91cb-0274-c8c5-70e8fad50074

<table>
<thead>
<tr>
<th></th>
<th>Pfizer-BNT</th>
<th>AstraZeneca</th>
<th>Moderna</th>
<th>J&amp;J</th>
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<tbody>
<tr>
<td><strong>Overall effectiveness</strong></td>
<td>47</td>
<td>17</td>
<td>20</td>
<td>15</td>
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<tr>
<td><strong>Effectiveness against Delta</strong></td>
<td>16</td>
<td>8</td>
<td>9</td>
<td>2</td>
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<tr>
<td><strong>Effectiveness against hospitalisations</strong></td>
<td>16</td>
<td>5</td>
<td>10</td>
<td>11</td>
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<tr>
<td><strong>Effectiveness against Delta hospitalisations</strong></td>
<td>11</td>
<td>5</td>
<td>4</td>
<td>2</td>
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Methodology for production forecast in the scenario that 50% of production is diverted to a variant-updated vaccine

Appendix

In this scenario it is assumed that vaccine production is reduced by 50% for 3 months to implement production of a new variant-specific vaccine, then there is an exponential increase in Omicron-specific vaccine production over the following 3 months, bringing production back to a rate of 1.4 billion doses produced per month. Following this period, vaccine production continues at a constant rate equal to the rate at the end of 2021 (current rate). Here the total production of vaccines is separated by the cumulative production of vaccines targeting wild-type Covid-19 and Omicron-specific vaccines.
More info.

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