COVID-19 Vaccine Production
Summit

March 8th - Prepared for Vaccine Supply & Production Summit
Challenging start to the biggest vaccination drive in human history

Vaccine productions in 2020 vs. what was originally projected

Number of COVID vaccine doses produced vs projected in 2020

-96%

Millions of doses

31

837

Actually produced

Originally projected
Production is beginning to scale up rapidly

Timelines of each vaccine candidates’ cumulative production

- Pfizer: 119 mil
- Sinovac: 91 mil
- AstraZeneca: 83 mil
- Moderna: 61 mil
- Sinopharm: 38 mil
- Sputnik-V: 10 mil
- Bharat: 5.5 mil
- J&J: 4 mil
- CanSino: 2 mil

Current production: 413 million doses

Lines are smoothed and may not completely representative of actual output at any given time

Production to date as of 05/03/2021
**mRNA vaccines are currently the most produced vaccines**

Total current vaccine production by vaccine type

- **Viral Vector**
  - Ad26COVS1 (J&J) [22%]
  - Ad5-nCoV (CanSino) [35%]
  - AZD1222 (AstraZeneca)
  - BBIBP-CorV (Beijing/Sinopharm)
  - BNT162b2 (Pfizer/BioNTech)
  - CoronaVac (Sinovac)
  - COVAXIN (Bharat/ICMR/NIV)
  - mRNA-1273 (Moderna)
  - Sputnik V (Gamaleya Research Institute)

- **mRNA**
  - CoronaVac (Sinovac) [43%]
  - BNT162b2 (Pfizer/BioNTech)
  - BBIBP-CorV (Beijing/Sinopharm)
  - COVAXIN (Bharat/ICMR/NIV)
  - mRNA-1273 (Moderna)
  - Sputnik V (Gamaleya Research Institute)

- **Whole Virus**
  - CoronaVac (Sinovac) [35%]
  - BNT162b2 (Pfizer/BioNTech)
  - BBIBP-CorV (Beijing/Sinopharm)
  - COVAXIN (Bharat/ICMR/NIV)
  - mRNA-1273 (Moderna)
  - Sputnik V (Gamaleya Research Institute)

Production to date as of 05/03/2021
China has quickly emerged as the largest producer but others are scaling faster

Current total production by country

<table>
<thead>
<tr>
<th>Country</th>
<th>Production to date (as of 03/03/2021)</th>
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</thead>
<tbody>
<tr>
<td>China</td>
<td>141,624,000</td>
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<tr>
<td>United States</td>
<td>103,000,000</td>
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<tr>
<td>Germany/Belgium</td>
<td>70,534,055</td>
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<tr>
<td>India</td>
<td>42,390,000</td>
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<tr>
<td>United Kingdom</td>
<td>12,200,000</td>
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<tr>
<td>Netherlands/Belgium</td>
<td>10,496,982</td>
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<tr>
<td>Russia</td>
<td>10,492,500</td>
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<tr>
<td>Switzerland</td>
<td>5,462,338</td>
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<tr>
<td>South Korea</td>
<td>1,617,000</td>
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<tr>
<td>Brazil</td>
<td>200,000</td>
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<tr>
<td>South Africa</td>
<td>160,000</td>
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</tbody>
</table>
Forecasted production for 2021 is twice total non-COVID vaccines

Estimated vaccine production vs global demand (75% population)

**COVID Vaccine Production**

- **Vaccine demand** is calculated as 75% of the population being vaccinated – assuming vaccine efficacy is ~90%, then this results in 67% (2/3) of the population being immunised. Furthermore, it is assumed that 2 doses are required to fully vaccinate each person.

- Production to date: 413,176,875
- Forecasted production for 2021: 9,488,967,235
- Demand: 11,540,670,000

**Pre-COVID Vaccine Production**

- Annual vaccine production pre-COVID*: 5,000,000,000
  - Seasonal Flu: [Diagram shows a portion of the annual production]
  - Other: [Diagram shows a portion of the annual production]

*Production to date as of 05/03/2021
2021 production based on Airfinity forecasts accounting for scale up time and expected start date of production at each facility
*Excluding OPV and travel & military markets – from 2018
Large scale up for the year, facilitated by vaccine partnerships

Forecasted vaccine production for 2021 with notable partnership deals

Production forecasts based on current output and scale up time
77 candidates in clinical trials – added pressure on production to be expected

Number of vaccine candidates in clinical trials

The repurposed BCG, VPM1002, RUTI, Polio and MMR vaccines have been excluded from this view.
### Variants of Concern could have a significant impact on current COVID vaccines

Summary of findings from studies investigating impact of variants on vaccine sera and efficacy

<table>
<thead>
<tr>
<th>Vaccine</th>
<th>B.1.1.7 (UK)</th>
<th>B.1.351 (SA)</th>
<th>P.1 (BRA)</th>
<th>P.2 (BRA)</th>
<th>VOC202102/02 (UK-Bristol)</th>
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<tbody>
<tr>
<td>BNT162b2 (Pfizer/BioNTech)</td>
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<td>mRNA-1273 (Moderna)</td>
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<td>NVX-CoV2373 (Novavax)</td>
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<td>Ad26.COV2.S (J&amp;J)</td>
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<td>AZD122 (AstraZeneca)</td>
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<tr>
<td>CoronaVac (SinoVac)</td>
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</table>

*All vaccine efficacy is based on primary endpoint unless specified

*Utilised RBD mutations only

Red or white underlined text indicates new findings this week

Impact is shown on either/both vaccine sera and/or efficacy
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