COVAX and equitable access to COVID-19 vaccines
Katelyn J Yoo, Akriti Mehta, Joshua Mak, David Bishai, Collins Chansa & Bryan Patenaude

Objective To evaluate equity in the allocation and distribution of vaccines for coronavirus disease 2019 (COVID-19) to countries and territories participating in the COVID-19 Vaccines Global Access (COVAX) Facility.

Methods We used publicly available data on the numbers of COVAX vaccine doses allocated and distributed to 88 countries and territories qualifying for COVAX-sponsored vaccine doses and 60 countries self-financing their vaccine doses facilitated by COVAX. We conducted a benefit–incident analysis to examine the allocation and distribution of vaccines based on countries’ gross domestic product (GDP) per capita. We plotted cumulative country-level per capita allocation and distribution of COVID-19 vaccines from COVAX against the ranked per capita GDP of the countries and territories to generate a measure of the equity of COVAX benefits.

Findings By 23 January 2022 the COVAX Facility had allocated a total of 1,678,517,990 COVID-19 vaccine doses, of which 1,028,291,430 (61%) doses were distributed to 148 countries and territories. Taking account of COVAX subsidies, we found that countries and territories with low per capita GDP benefited more than higher-income countries in the numbers of vaccines. The benefits increased further when the analysis was adjusted by population age group (aged 65 years and older).

Conclusion The COVAX Facility is helping to balance global inequities in the allocation and distribution of COVID-19 vaccines. However, COVAX alone has not been enough to reverse the inequality of total COVID-19 vaccine distribution. Future studies could examine the equity of all COVID-19 vaccine allocation and distribution beyond the COVAX-facilitated vaccines.

Introduction
Equitable vaccine distribution can be a major factor towards global control of the coronavirus disease 2019 (COVID-19) pandemic.1 The COVID-19 Vaccines Global Access (COVAX) Facility was created to facilitate vaccine distribution, although it is unknown whether investments in the initiative have yielded equitable benefits across countries.2 There have been increasing concerns about vaccine nationalism where wealthy nations acquire a disproportionate share of global COVID-19 vaccines.3 As of 24 January 2022, only 9.7% (about 63 million) of people in low-income countries have received at least one dose of COVID-19 vaccine.4

Established in June 2020, the COVAX Facility is a vaccine acquisition mechanism for countries and territories unable to bargain directly with manufacturers.5 Financing for participants is dependent on need. The 92 countries and territories with a gross national income per capita of less than 4000 United States dollars (US$) qualify for the COVAX advance market commitment and are allocated COVAX-funded vaccines to cover up to 20% of their populations.6 Advance market commitment funding comes from bilateral and multilateral development partners, private industry and individual philanthropists.6,7 Countries and territories who participate in COVAX but do not qualify for advance market commitment have to self-finance their COVID-19 vaccine purchases. However, depending on their financial commitment, these countries are guaranteed COVAX-approved vaccine doses for 10–50% of their populations.8

COVAX-secured dose allocation follows the World Health Organization’s (WHO) allocation framework for fair and equitable access to COVID-19 health products.9 This framework recommends that all countries must receive doses to vaccinate high-risk and vulnerable people before roll-out of the vaccination programmes to the rest of the population. Although this framework seeks to achieve fairness in access to COVID-19 vaccines among countries, some scholars argue that the initial 20% coverage requirement fails to account for vulnerabilities existing in poorer countries and countries with large outbreaks of COVID-19.10–14 Nonetheless, adherence to the framework’s recommendation can allow equal distribution of COVAX benefits among countries relative to their population sizes.15

To assess the extent to which COVAX has fulfilled its commitment, we evaluated equity in the allocation and distribution of COVAX-facilitated COVID-19 vaccines to countries and territories by income group and by proportion of older people. The cross-country analysis will add to the evidence on whether collaborative efforts such as the COVAX Facility can contribute to the equitable international allocation and distribution of scarce global public goods (in this case, vaccines) during international health emergencies.

Methods

Data sources
We analysed secondary data on countries’ COVID-19 vaccine purchases, allocation and distribution, including data on the COVAX Facility and donations by bilateral and multilateral agencies, international nongovernmental organizations and private firms. We extracted the data from the United Nations Children’s Fund’s (UNICEF) COVID-19 vaccine dashboard as of 23 January 2022 at 20:00 Eastern Standard Time.16 We used the COVID-19 vaccine dashboard because it is the most comprehensive repository of up-to-date information on the distribution of the COVID-19 vaccines worldwide. Furthermore, UNICEF is leading efforts to procure and supply COVID-19 vaccines on behalf of the COVAX Facility.

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Submitted: 2 November 2021 – Revised version received: 19 February 2022 – Accepted: 8 March 2022 – Published online: 25 March 2022.
To understand the differences between actual and intended distribution of COVAX benefits, we obtained: (i) allocated dose counts from the COVAX deliveries category of the UNICEF dashboard and (ii) distributed dose counts from the doses shipped subset of the COVAX allocation values. Vaccine allocation describes the projected number of COVAX vaccine doses available to the country, based on potential supplies and the allocation framework. The doses distributed describes the quantities of COVID-19 vaccines delivered to countries by COVAX at a given point in time.

Among the 148 countries and territories included on the dashboard, 88 countries qualified for COVAX-sponsored vaccine doses under the advance market commitment mechanism and 60 countries were self-financing their vaccine doses facilitated by COVAX. We grouped the countries into four income groups based on the World Bank country classification:19 25 low-income countries (gross domestic product, GDP, per capita: less than US$ 1026), 55 lower-middle-income countries (GDP per capita: US$ 1026–3995), 43 upper-middle-income countries (GDP per capita: US$ 3996–12 375) and 25 high-income countries (GDP per capita: above US$ 12 375). Only three of the 92 countries and territories with advance market commitment were not included in the UNICEF dashboard: Burundi, Eritrea and Marshall Islands. Most upper-middle-income and high-income countries and territories had bilateral arrangements to obtain vaccines from other sources, which is not accounted for in this analysis. We used GDP per capita in US$ purchasing power parity (PPP) from the World Development Indicator database to rank countries and territories by income level. We used 2019 data which did not include the economic losses due to the COVID-19 pandemic. We obtained population data for 2020 from the United Nations Population Division. The focus of our study was equity across all COVAX participants. Other sources can shed light on vaccine allocations to crisis-affected populations.18 We only analysed cross-country and not intra-country allocation and distribution of COVID-19 vaccines.

Data analysis

In line with COVAX guidelines and WHO’s fair allocation framework, we assumed that COVAX will fully subsidize vaccines for 20% of the population in countries and territories qualifying for advance market commitment.2 COVAX estimates state that the average cost per dose for those participating in COVAX is US$7.00 per dose for participants under the advance market commitment mechanism and US$10.55 per dose for countries and territories using self-financing.20 These costs include the costs of safety boxes and syringes (devices), UNICEF’s Supply Division procurement fees, freight and transport fees, and all other costs until arrival of the vaccines to the respective countries and territories. The estimate excludes cost categories such as labour and capital costs, cold chain and wastage or buffer stocks.

We used standard benefit–incidence analysis methods for doses allocated and doses distributed to evaluate differences between actual and intended distribution of COVAX benefits. We performed the following steps: (i) ranking countries and territories from poorest to richest via per capita GDP adjusted for PPP; (ii) obtaining both COVAX vaccine doses allocated and distributed by country; (iii) estimating total per capita benefits received from COVAX; (iv) estimating self-financed per capita benefits that were facilitated by COVAX; (v) deducting self-financed per capita benefit from total per capita benefits to obtain COVAX-sponsored per capita benefits; and (vi) aggregating COVAX-sponsored per capita benefits.

We plotted COVAX-sponsored per capita benefits on Lorenz concentration curves to assess whether benefits were distributed equitably. A 45° line on the curves represents perfect equality and enabled us to quantify deviation from perfect equality.

We then calculated Wagstaff concentration index (C):20

\[
C = \frac{\text{cov}(h,r)}{\mu} = \frac{-2}{N} \sum_{i=1}^{N} h_i r_i - 1 - \frac{1}{N} \tag{1}
\]

where, \( \mu \) is the average benefit from COVAX, and \( \text{cov}(h,r) \) is the weighted covariance between per capita COVAX benefit \( h \) received by country \( i \) and the country's rank \( r \) in the GDP per capita distribution. The number of countries and territories, \( N \), are ranked from 1 to \( N \), that is, from poorest to richest. For computation, a more convenient formula for the concentration index defines it in terms of the covariance between the vaccine doses allocated or distributed and the fractional rank in the GDP per capita.21,14

When data are categorical rather than continuous, calculation of a standard concentration index may be insufficient. We therefore also calculated the Erreygers modified concentration index (MC), which accounts for the chosen transformation:21,22

\[
MC = \frac{1}{N} \sum_{i=1}^{N} \left( \frac{h_i}{\mu - h_{\text{min}}} \cdot (2r_i - 1) \right) \tag{2}
\]

where, \( h_{\text{min}} \) is the lower limit of \( h \).

We analysed per capita COVAX benefits measured as country-level per capita COVAX expenditures on vaccines net of domestic expenditures on the vaccines, plotted against the ranked per capita GDP adjusted for PPP. We calculated Wagstaff and Erreygers concentration indices for total benefits, COVAX-sponsored benefits and self-financed per capita COVAX benefits for all countries and territories. We made the calculations for the total population of each country or territory. We also examined the distribution of COVAX benefits based on the proportion of the population aged 65 years and older as a proxy for the relative size of the most vulnerable population in each country or territory.

For both indices, a concentration index of 0 to –1 reflects a pro-poor distribution, and an index of 0 to 1 reflects a pro-rich distribution.23 In a traditional benefit–incidence analysis approach, benefits are measured against individuals or entities ranked by an income metric. The analysis would therefore be based on individual-level data and the terms pro-rich or pro-poor would be used to refer to benefits accruing to different quintiles of the income distribution of countries. In our analysis we use the terms pro-rich to refer to COVAX benefits that were disproportionately...
| Country or territory, by log(y) COVAX doses allocated | Income group | Advanced market commitment status | Total population 2020 | GDP per capita PPP, current international $ | No. of COVAX doses allocated | No. of COVAX doses distributed | Per capita no. of doses allocated | Per capita no. of doses distributed | Log(y) COVAX doses allocated | Log(x) COVAX doses distributed |
|------------------------------------------------------|--------------|----------------------------------|------------------------|------------------------------------------|-----------------------------|--------------------------------|-----------------------------------|----------------------------------|-------------------------------|-------------------------------|
| Nauru High income                                     | Self-financing | 10834                            | 14099                  | 7200                                     | 7200                         | 0.66                           | 0.66                              | 3.86                             | 3.86                          |
| Micronesia (Federated States of)                     | Sponsored     | 115021                           | 3552                   | 7200                                     | NA                           | 0.06                           | NA                                | 3.86                             | NA                            |
| Tuvalu High income                                    | Self-financing | 11792                            | 4456                   | 16800                                    | 9600                         | 0.15                           | 0.15                              | 3.98                             | 3.98                          |
| Saint Kitts and Nevis Lower-middle income            | Sponsored     | 53192                            | 27345                  | 21600                                    | 21600                        | 0.41                           | 0.41                              | 4.33                             | 4.33                          |
| Andorra High income                                   | Self-financing | 77265                            | 49900                  | 28740                                    | 28740                        | 0.37                           | 0.37                              | 4.46                             | 4.46                          |
| Kuwait High income                                    | Self-financing | 4270563                          | 51962                  | 35100                                    | 35100                        | 0.01                           | 0.01                              | 4.55                             | 4.55                          |
| Tonga Upper-middle income                             | Sponsored     | 97928                            | 22460                  | 60000                                    | 60000                        | 0.61                           | 0.61                              | 4.78                             | 4.78                          |
| Montenegro Upper-middle income                        | Self-financing | 621718                           | 23344                  | 84000                                    | 48000                        | 0.14                           | 0.08                              | 4.92                             | 4.68                          |
| New Zealand High income                               | Self-financing | 5084300                          | 45073                  | 100620                                   | 100620                       | 0.02                           | 0.02                              | 5.00                             | 5.00                          |
| Brunei Darussalam High income                         | Self-financing | 437483                           | 64724                  | 100800                                   | 100800                       | 0.23                           | 0.23                              | 5.00                             | 5.00                          |
| Dominica Upper-middle income                          | Sponsored     | 71991                            | 12409                  | 101920                                   | 91980                        | 1.42                           | 1.28                              | 5.01                             | 4.96                          |
| Bahrain High income                                   | Self-financing | 1701583                          | 46966                  | 107820                                   | 107820                       | 0.06                           | 0.06                              | 5.00                             | 5.00                          |
| Barbados High income                                  | Self-financing | 287371                           | 16300                  | 114840                                   | 114840                       | 0.40                           | 0.40                              | 5.06                             | 5.06                          |
| Saint Vincent and the Grenadines                      | Sponsored     | 110947                           | 13013                  | 115800                                   | 115800                       | 1.04                           | 1.04                              | 5.06                             | 5.06                          |
| Kiribati Lower-middle income                          | Sponsored     | 119446                           | 2366                   | 118400                                   | 104000                       | 0.99                           | 0.87                              | 5.02                             | 5.02                          |
| Qatar High income                                     | Self-financing | 2881060                          | 93852                  | 122400                                   | 122400                       | 0.04                           | 0.04                              | 5.09                             | 5.09                          |
| Grenada Upper-middle income                           | Sponsored     | 112519                           | 17771                  | 124710                                   | 114630                       | 1.11                           | 1.02                              | 5.06                             | 5.06                          |
| Uruguay High income                                   | Self-financing | 3473727                          | 24007                  | 148800                                   | 148800                       | 0.04                           | 0.04                              | 5.17                             | 5.17                          |
| Seychelles High income                                | Self-financing | 98462                            | 28685                  | 154440                                   | 74880                        | 1.57                           | 0.76                              | 5.19                             | 4.87                          |
| Bahamas High income                                   | Self-financing | 391284                           | 38669                  | 158130                                   | 158130                       | 0.40                           | 0.40                              | 5.20                             | 5.20                          |
| Belize Lower-middle income                            | Self-financing | 397621                           | 7559                   | 159300                                   | 159300                       | 0.40                           | 0.40                              | 5.20                             | 5.20                          |
| Suriname Lower-middle income                          | Self-financing | 586634                           | 19842                  | 165600                                   | 144000                       | 0.28                           | 0.25                              | 5.22                             | 5.16                          |
| Vanuatu Lower-middle income                           | Self-financing | 307150                           | 3250                   | 178800                                   | 95950                        | 0.58                           | 0.31                              | 5.25                             | 4.98                          |
| Trinidad and Tobago High income                       | Self-financing | 1399491                          | 26920                  | 184800                                   | 184800                       | 0.13                           | 0.13                              | 5.27                             | 5.27                          |
| United Arab Emirates High income                      | Self-financing | 9890400                          | 69958                  | 198900                                   | NA                           | 0.02                           | NA                                | 5.30                             | NA                            |
| Saint Lucia Upper-middle income                       | Sponsored     | 183629                           | 16102                  | 202470                                   | 197430                       | 1.10                           | 1.08                              | 5.31                             | 5.30                          |
| Georgia Upper-middle income                           | Self-financing | 3714000                          | 15623                  | 224820                                   | 160020                       | 0.06                           | 0.04                              | 5.35                             | 5.20                          |
| Sao Tome and Principe Lower-middle income             | Sponsored     | 219161                           | 4175                   | 237120                                   | 129120                       | 1.08                           | 0.59                              | 5.37                             | 5.11                          |

(continues...)
Country or territory, by log(y) COVAX doses allocated

| Income group | Advanced market commitment status | Total population 2020 | GDP per capita PPP, current international \(\$\) | No. of COVAX doses allocated | No. of COVAX doses distributed | Per capita no. of doses allocated | Per capita no. of doses distributed | Log(y) COVAX doses allocated | Log(x) COVAX doses distributed |
|--------------|-----------------------------------|-----------------------|-----------------------------------------------|-----------------------------|-----------------------------|-------------------------------|-------------------------------|-----------------------------|--------------------------------|
| Samoa        | Lower-middle income, Sponsored    | 198 410               | 6 778                                         | 245 000                     | 215 200                     | 1.23                          | 1.08                          | 5.39                        | 5.33                          |
| Comoros      | Lower-middle income, Sponsored    | 899 595               | 3 189                                         | 250 380                     | 12 000                      | 0.29                          | 0.01                          | 5.40                        | 4.08                          |
| Guyana       | Upper-middle income, Sponsored    | 786 559               | 13 635                                        | 339 540                     | 291 540                     | 0.43                          | 0.37                          | 5.53                        | 5.46                          |
| Cabo Verde   | Lower-middle income, Sponsored    | 555 988               | 7 475                                         | 361 840                     | 361 220                     | 0.65                          | 0.65                          | 5.66                        | 5.66                          |
| Djibouti     | Lower-middle income, Self-financing | 988 002              | 5 769                                         | 386 250                     | 254 850                     | 0.39                          | 0.26                          | 5.59                        | 5.41                          |
| Albania      | Upper-middle income, Self-financing | 2 837 743            | 14 231                                        | 418 200                     | 331 800                     | 0.15                          | 0.12                          | 5.62                        | 5.62                          |
| Solomon Islands | Lower-middle income, Sponsored   | 686 878               | 2 774                                         | 432 620                     | 209 420                     | 0.63                          | 0.30                          | 5.64                        | 5.32                          |
| Eswatini     | Lower-middle income, Sponsored    | 1 160 164             | 8 986                                         | 441 420                     | 441 420                     | 0.38                          | 0.38                          | 5.64                        | 5.64                          |
| Democratic Republic | Upper-middle income, Self-financing | 10 847 904          | 19 192                                        | 463 200                     | 463 200                     | 0.04                          | 0.04                          | 5.67                        | 5.67                          |
| Gambia       | Low income, Sponsored             | 2 416 664             | 2 317                                         | 477 750                     | 477 750                     | 0.05                          | 0.05                          | 5.68                        | 5.68                          |
| Jordan       | Upper-middle income, Self-financing | 10 203 140         | 10 497                                        | 500 800                     | 500 800                     | 0.56                          | 0.56                          | 5.70                        | 5.70                          |
| Bhutan       | Lower-middle income, Sponsored    | 771 612               | 12 333                                        | 505 850                     | 505 850                     | 0.66                          | 0.66                          | 5.70                        | 5.70                          |
| Fiji         | Upper-middle income, Sponsored    | 896 444               | 14 263                                        | 500 800                     | 500 800                     | 0.56                          | 0.56                          | 5.70                        | 5.70                          |
| Australia    | High income, Self-financing       | 25 687 041            | 52 203                                        | 513 630                     | 513 630                     | 0.02                          | 0.02                          | 5.71                        | 5.71                          |
| United Kingdom | High income, Self-financing      | 67 215 293            | 48 514                                        | 539 370                     | 539 370                     | 0.01                          | 0.01                          | 5.73                        | 5.73                          |
| North Macedonia | Upper-middle income, Self-financing | 2 083 380           | 17 583                                        | 201 420                     | 201 420                     | 0.27                          | 0.10                          | 5.74                        | 5.30                          |
| Oman         | High income, Self-financing       | 5 106 622             | 28 449                                        | 577 680                     | 520 260                     | 0.11                          | 0.10                          | 5.76                        | 5.72                          |
| Maldives     | Upper-middle income, Self-financing | 540 542             | 20 357                                        | 581 770                     | 371 170                     | 1.08                          | 0.69                          | 5.76                        | 5.57                          |
| Timor-Leste  | Lower-middle income, Sponsored    | 1 318 442             | 3 703                                         | 587 640                     | 393 420                     | 0.45                          | 0.30                          | 5.77                        | 5.59                          |
| Armenia      | Upper-middle income, Self-financing | 2 963 234           | 14 231                                        | 640 800                     | 360 000                     | 0.22                          | 0.12                          | 5.81                        | 5.56                          |
| Mauritius    | Upper-middle income, Self-financing | 1 265 740           | 23 837                                        | 666 870                     | 488 070                     | 0.53                          | 0.39                          | 5.82                        | 5.69                          |
| Gabon        | Upper-middle income, Self-financing | 2 225 728           | 15 582                                        | 688 830                     | 472 200                     | 0.31                          | 0.21                          | 5.84                        | 5.67                          |
| Guinea-Bissau | Low income, Sponsored             | 1 967 998            | 2 021                                         | 763 200                     | 360 000                     | 0.39                          | 0.18                          | 5.88                        | 5.56                          |
| Serbia       | Upper-middle income, Self-financing | 6 908 224          | 18 930                                        | 797 280                     | 730 080                     | 0.12                          | 0.11                          | 5.90                        | 5.86                          |
| Bosnia and Herzegovina | Upper-middle income, Self-financing | 3 280 815          | 15 847                                        | 835 740                     | 332 640                     | 0.25                          | 0.10                          | 5.92                        | 5.52                          |
| Lesotho      | Lower-middle income, Sponsored    | 2 142 252             | 20 357                                        | 917 490                     | 653 670                     | 0.43                          | 0.31                          | 5.96                        | 5.82                          |
| Singapore    | High income, Self-financing       | 5 685 807            | 105 273                                       | 938 400                     | 938 400                     | 0.17                          | 0.17                          | 5.97                        | 5.97                          |
| Canada       | High income, Self-financing       | 38 005 238            | 50 661                                        | 972 000                     | 972 000                     | 0.03                          | 0.03                          | 5.99                        | 5.99                          |
| Taiwan, China | High income, Self-financing       | 23 871 085           | 24 502                                        | 1 020 000                    | 1 020 000                    | 0.04                          | 0.04                          | 6.01                        | 6.01                          |
| Republic of Moldova | Upper-middle income, Sponsored   | 2 617 820            | 13 573                                        | 1 032 810                    | 830 790                     | 0.39                          | 0.32                          | 6.01                        | 5.92                          |
| Namibia      | Upper-middle income, Self-financing | 2 540 916           | 10 262                                        | 1 055 980                    | 332 640                     | 0.42                          | 0.13                          | 6.02                        | 5.52                          |
| Papua New Guinea | Lower-middle income, Sponsored   | 8 947 027            | 4 534                                         | 1 095 200                    | 883 200                     | 0.12                          | 0.10                          | 6.04                        | 5.95                          |
| Haiti        | Lower-middle income, Sponsored    | 11 402 533           | 3 028                                         | 1 124 700                    | 805 480                     | 0.10                          | 0.07                          | 6.05                        | 5.91                          |

(continued . . .)
| Country or territory, by income group<sup>a</sup> | Total population<sup>b</sup> | GDP per capita<sup>b</sup> PPP, current international $ | No. of COVAX doses distributed<sup>c</sup> | Per capita commitment by log(x) NO. of doses allocated | Log(k) COVAX doses distributed | Log(y) NO. of doses allocated |
|---------------------------------------------|-----------------------------|-------------------------------------------------|------------------------------------------|------------------------------------------|-------------------------------|-------------------------------|
| Botswana | 1,872,065 | 14,529 | 61,920 | 135,260 | 1,083,440 | 0.49 |
| South Sudan | 1,195,729 | 127,583 | 61,260 | 125,270 | 1,080,370 | 0.49 |
| Mongolia | 1,377,260 | 57,912 | 61,160 | 1,327,260 | 1,327,260 | 0.49 |
| Korea<sup>1</sup> | 53,728 | 39,796 | 61,040 | 39,796 | 39,796 | 0.49 |
| Kenya | 53,192 | 39,120 | 60,910 | 39,120 | 39,120 | 0.49 |
| Cameroon | 53,480 | 38,720 | 60,790 | 38,720 | 38,720 | 0.49 |
| Sri Lanka | 53,848 | 36,480 | 60,570 | 36,480 | 36,480 | 0.49 |
| Maldives | 53,968 | 36,120 | 60,440 | 36,120 | 36,120 | 0.49 |
| Botswana | 1,359,560 | 102,880 | 60,320 | 1,359,560 | 1,359,560 | 0.49 |
| South Sudan | 1,193,480 | 121,920 | 60,160 | 1,193,480 | 1,193,480 | 0.49 |
| Mongolia | 1,372,260 | 57,912 | 60,040 | 1,372,260 | 1,372,260 | 0.49 |
| Kenya | 53,728 | 39,796 | 59,890 | 39,796 | 39,796 | 0.49 |
| Cameroon | 53,480 | 38,720 | 59,760 | 38,720 | 38,720 | 0.49 |
| Sri Lanka | 53,848 | 36,480 | 59,630 | 36,480 | 36,480 | 0.49 |
| Maldives | 53,968 | 36,120 | 59,500 | 36,120 | 36,120 | 0.49 |

<sup>a</sup> Country or territory, by income group

<sup>b</sup> Total population, GDP per capita, PPP, current international $:

- **Upper-middle income**
- **Low income**
- **Lower-middle income**

<sup>c</sup> No. of COVAX doses distributed, Per capita commitment by log(x) NO. of doses allocated, Log(k) COVAX doses distributed, Log(y) NO. of doses allocated:

- **Self-financing**
- **Sponsored**

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Research:

Equitable access to COVID-19 vaccines

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Bull World Health Organ 2022;100:315–328 doi: http://dx.doi.org/10.2471/BLT.21.287516

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| Country/Special Territory | Income groupa | Population 2020 | GDP per capita, current international $ | Total COVAX doses allocated | No. of COVAX doses distributed | Per capita no. of doses allocated | Per capita no. of doses distributed | Log(y) COVAX doses allocated | Log(x) COVAX doses distributed |
|---------------------------|---------------|-----------------|----------------------------------------|-----------------------------|-------------------------------|---------------------------------|---------------------------------|-------------------------------|-------------------------------|
| Brazil                    | Upper-middle income | 212,559,409     | 15,388                                  | 13,881,600                  | 13,881,600                    | 0.07                            | 0.07                            | 7.14                           | 7.14                           |
| Myanmar                   | Upper-middle income | 54,409,794      | 12,25,600                               | 11,898,700                  | 11,898,700                    | 0.23                            | 0.23                            | 7.14                           | 7.14                           |
| South Africa              | Low income      | 59,360,890      | 13,881                                  | 13,881,600                  | 13,881,600                    | 0.07                            | 0.07                            | 7.14                           | 7.14                           |
| Bangladesh                | Lower-middle income | 161,670,490    | 8,809                                  | 8,809,700                   | 8,809,700                     | 0.14                            | 0.14                            | 6.88                           | 6.88                           |
| Cambodia                  | Lower-middle income | 60,340,794     | 4,860                                  | 4,860,700                   | 4,860,700                     | 0.13                            | 0.13                            | 6.87                           | 6.87                           |
| Egypt                     | Low income      | 101,900,490     | 7,275                                  | 7,275,800                   | 7,275,800                     | 0.06                            | 0.06                            | 6.87                           | 6.87                           |
| Ethiopia                  | Lower-middle income | 113,000,490    | 5,708                                  | 5,708,000                   | 5,708,000                     | 0.03                            | 0.03                            | 6.86                           | 6.86                           |
| Ghana                     | Lower-middle income | 30,000,490     | 3,770                                  | 3,770,000                   | 3,770,000                     | 0.11                            | 0.11                            | 6.85                           | 6.85                           |
| Indonesia                 | Lower-middle income | 267,900,490    | 3,190                                  | 3,190,000                   | 3,190,000                     | 0.11                            | 0.11                            | 6.85                           | 6.85                           |
| Iraq                      | Upper-middle income | 40,222,503     | 11,898                                  | 11,898,700                  | 11,898,700                    | 0.21                            | 0.21                            | 7.08                           | 7.08                           |
| Jordan                    | Lower-middle income | 10,000,490     | 4,194                                  | 4,194,000                   | 4,194,000                     | 0.19                            | 0.19                            | 6.89                           | 6.89                           |
| Kazakhstan                | Low income      | 17,670,490      | 5,712                                  | 5,712,000                   | 5,712,000                     | 0.12                            | 0.12                            | 6.86                           | 6.86                           |
| Lebanon                   | Lower-middle income | 9,610,490      | 4,046                                  | 4,046,000                   | 4,046,000                     | 0.11                            | 0.11                            | 6.86                           | 6.86                           |
| Lesotho                   | Lower-middle income | 2,900,490      | 1,276                                  | 1,276,000                   | 1,276,000                     | 0.05                            | 0.05                            | 6.70                           | 6.70                           |
| Malaysia                  | Upper-middle income | 31,900,490     | 12,376                                  | 12,376,000                  | 12,376,000                    | 0.39                            | 0.39                            | 6.91                           | 6.91                           |
| Mongolia                  | Lower-middle income | 29,900,490     | 6,123                                  | 6,123,000                   | 6,123,000                     | 0.21                            | 0.21                            | 6.88                           | 6.88                           |
| Namibia                   | Lower-middle income | 2,190,490      | 1,070                                  | 1,070,000                   | 1,070,000                     | 0.05                            | 0.05                            | 6.71                           | 6.71                           |
| Nepal                     | Lower-middle income | 30,900,490     | 5,708                                  | 5,708,000                   | 5,708,000                     | 0.13                            | 0.13                            | 6.86                           | 6.86                           |
| Nigeria                   | Low income      | 210,000,490     | 8,809                                  | 8,809,700                   | 8,809,700                     | 0.14                            | 0.14                            | 6.88                           | 6.88                           |
| Pakistan                  | Lower-middle income | 206,900,490    | 4,860                                  | 4,860,700                   | 4,860,700                     | 0.13                            | 0.13                            | 6.87                           | 6.87                           |
| Peru                      | Upper-middle income | 32,971,846     | 13,881                                  | 13,881,600                  | 13,881,600                    | 0.06                            | 0.06                            | 7.14                           | 7.14                           |
| Philippines               | Lower-middle income | 109,000,490    | 5,708                                  | 5,708,000                   | 5,708,000                     | 0.11                            | 0.11                            | 6.85                           | 6.85                           |
| Poland                    | Upper-middle income | 38,928,341     | 12,376                                  | 12,376,000                  | 12,376,000                    | 0.33                            | 0.33                            | 6.91                           | 6.91                           |
| Portugal                  | Upper-middle income | 10,000,490     | 4,046                                  | 4,046,000                   | 4,046,000                     | 0.11                            | 0.11                            | 6.86                           | 6.86                           |
| Qatar                     | Lower-middle income | 1,276,490      | 5,708                                  | 5,708,000                   | 5,708,000                     | 0.13                            | 0.13                            | 6.87                           | 6.87                           |
| Republic of Georgia       | Lower-middle income | 60,340,794     | 4,860                                  | 4,860,700                   | 4,860,700                     | 0.13                            | 0.13                            | 6.87                           | 6.87                           |
| South Korea               | Lower-middle income | 52,760,490     | 9,610                                  | 9,610,000                   | 9,610,000                     | 0.18                            | 0.18                            | 6.93                           | 6.93                           |
| Sri Lanka                 | Low income      | 21,376,490      | 10,708                                 | 10,708,000                  | 10,708,000                    | 0.05                            | 0.05                            | 6.71                           | 6.71                           |
| Sudan                     | Low income      | 28,000,490      | 10,708                                 | 10,708,000                  | 10,708,000                    | 0.05                            | 0.05                            | 6.71                           | 6.71                           |
| Turkey                    | Lower-middle income | 85,960,490     | 4,860                                  | 4,860,700                   | 4,860,700                     | 0.13                            | 0.13                            | 6.87                           | 6.87                           |
| Ukraine                   | Lower-middle income | 14,376,490     | 10,708                                 | 10,708,000                  | 10,708,000                    | 0.05                            | 0.05                            | 6.71                           | 6.71                           |

(continued...)
Research

Equitable access to COVID-19 vaccines

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| Country or territory, by log(y) COVAX doses allocated | Income group | Advanced market commitment status | Total population 2020 | GDP per capita PPP, current international $ | No. of COVAX doses allocated | Per capita no. of doses allocated | Per capita no. of doses distributed | Log(y) COVAX doses allocated | Log(x) COVAX doses distributed |
|------------------------------------------------------|--------------|---------------------------------|-----------------------|---------------------------------|-----------------------------|----------------------------------|---------------------------------|-----------------------------|-------------------------------|
| Iran (Islamic Republic of)                            | Lower-middle income | Self-financing                    | 83 992 953            | 12913                           | 14423650                    | 0.17                             | 0.16                            | 7.16                         | 7.12                          |
| Morocco                                              | Lower-middle income | Sponsored                        | 36 910 558            | 7856                            | 14722825                    | 0.40                             | 0.11                            | 7.17                         | 6.62                          |
| Rwanda                                                | Low income      | Sponsored                        | 12 952 209            | 2322                            | 15340910                    | 1.18                             | 1.10                            | 7.19                         | 7.15                          |
| Syrian Arab Republic                                 | Low income      | Sponsored                        | 17 300 657            | 4685                            | 15587640                    | 0.89                             | 0.28                            | 7.19                         | 6.69                          |
| Côte D’Ivoire                                        | Lower-middle income | Sponsored                        | 26 378 275            | 5433                            | 16581140                    | 0.63                             | 0.48                            | 7.22                         | 7.10                          |
| Ghana                                                 | Lower-middle income | Sponsored                        | 31 072 945            | 5625                            | 18478400                    | 0.59                             | 0.53                            | 7.27                         | 7.22                          |
| Venezuela (Bolivarian Republic of)                   | Upper-middle income | Self-financing                    | 28 435 943            | 17528                           | 18584400                    | 0.65                             | 0.42                            | 7.27                         | 7.08                          |
| Uzbekistan                                            | Lower-middle income | Sponsored                        | 34 232 050            | 7311                            | 21041690                    | 0.61                             | 0.29                            | 7.32                         | 6.99                          |
| Algeria                                               | Lower-middle income | Sponsored                        | 43 851 043            | 11997                           | 21834400                    | 0.50                             | 0.36                            | 7.34                         | 7.20                          |
| Mozambique                                            | Low income      | Sponsored                        | 31 255 455            | 1336                            | 24603390                    | 0.79                             | 0.61                            | 7.39                         | 7.28                          |
| Kenya                                                 | Lower-middle income | Sponsored                        | 53 771 300            | 4513                            | 26746470                    | 0.50                             | 0.36                            | 7.43                         | 7.29                          |
| Colombia                                              | Upper-middle income | Self-financing                    | 50 882 884            | 15621                           | 26916150                    | 0.53                             | 0.23                            | 7.43                         | 7.07                          |
| Nepal                                                 | Lower-middle income | Sponsored                        | 29 136 808            | 4120                            | 30406390                    | 1.04                             | 0.79                            | 7.48                         | 7.36                          |
| Angola                                                | Lower-middle income | Sponsored                        | 32 866 268            | 6952                            | 32323830                    | 0.98                             | 0.66                            | 7.51                         | 7.33                          |
| Uganda                                                | Low income      | Sponsored                        | 45 741 000            | 2280                            | 36895510                    | 0.81                             | 0.68                            | 7.57                         | 7.49                          |
| Ethiopia                                              | Low income      | Sponsored                        | 114 963 583           | 2315                            | 40813010                    | 0.36                             | 0.20                            | 7.61                         | 7.35                          |
| Viet Nam                                              | Lower-middle income | Sponsored                        | 97 338 583            | 8381                            | 68341900                    | 0.70                             | 0.51                            | 7.83                         | 7.70                          |
| Philippines                                           | Lower-middle income | Sponsored                        | 109 581 085           | 9292                            | 69869275                    | 0.64                             | 0.60                            | 7.84                         | 7.82                          |
| Egypt                                                 | Lower-middle income | Sponsored                        | 102 334 403           | 12261                           | 78265520                    | 0.76                             | 0.55                            | 7.89                         | 7.75                          |
| Nigeria                                               | Lower-middle income | Sponsored                        | 206 139 587           | 5353                            | 99119100                    | 0.48                             | 0.29                            | 8.00                         | 7.78                          |
| India                                                 | Lower-middle income | Sponsored                        | 138 000 438           | 6998                            | 14000000                    | 0.10                             | 0.01                            | 8.15                         | 7.00                          |
| Pakistan                                              | Lower-middle income | Sponsored                        | 220 892 331           | 4889                            | 146158660                   | 0.66                             | 0.35                            | 8.16                         | 7.89                          |
| Indonesia                                             | Lower-middle income | Sponsored                        | 273 523 621           | 12312                           | 178461900                   | 0.65                             | 0.32                            | 8.25                         | 7.94                          |
| Bangladesh                                            | Lower-middle income | Sponsored                        | 164 689 833           | 4955                            | 192439610                    | 1.17                             | 0.81                            | 8.28                         | 8.12                          |

COVAX: COVID-19 Vaccines Global Access Facility; COVID-19: coronavirus disease 2019; GDP: gross domestic product; NA: data not available; PPP: purchasing power parity.

a Income groups are World Bank classifications.

b All references to Kosovo should be understood to be in the context of the United Nations Security Council resolution 1244 (1999).

Note: Countries are ordered from the lowest to highest log(y) COVAX doses allocated (Fig. 1).
accredited by wealthier countries and territories, as ranked by GDP per capita and adjusted for the size of the eligible population (and vice versa for the term pro-poor).

We used Excel (Microsoft Corp., Redmond, United States of America) and Stata version 16 (Stata Corp., College Station, USA) for the analysis.

**Results**

**Vaccines allocated and distributed**

At the time of analysis COVAX had allocated a total of 1,678,517,990 COVID-19 vaccine doses among 148 countries and territories, of which 1,028,291,430 (61%) doses had been distributed (Table 1). Fig. 1 demonstrates the disparity between the log of vaccine doses allocated and distributed to these countries and territories, while Fig. 2 and Fig. 3 stratify the doses by country income level as a share of the population. The lowest income group had relatively low total vaccine doses allocated and distributed in both absolute and relative terms to the population. The lowest income group had one of the greatest gaps between the shares of total vaccine doses allocated and distributed to their populations (Fig. 3). Additional findings from the exploratory data analysis are presented in the authors’ online data repository.24

**Benefit–incident analysis**

**Whole populations**

The concentration curve for total per capita COVAX benefits shows a pro-poor distribution, which lies mostly along the line of equality (Fig. 4). However, for the poorest 45% of countries and territories, a slight pro-rich trend is demonstrated. The concentration curve for the self-financed countries shows a disproportionate COVAX benefit to countries with higher per capita GDP but becoming slightly pro-poor for the wealthiest 15% of countries and territories. On the other hand, the concentration curve for the COVAX-sponsored per capita benefits consistently demonstrates pro-poor trends with about 50% of the poorest nations receiving about 80% of the benefits.

The average total per capita COVAX benefit was US$ 3.37 while the average COVAX-sponsored and self-financed per capita benefits were US$ 1.40 and US$ 1.98, respectively. The Wagstaff concentration indices for total per capita benefits and COVAX-sponsored per capita benefits were −0.034 and −0.657, respectively, indicating that the poorest 50% nations were allocated about 3% and 49% more total and COVAX-sponsored doses, respectively, compared...
with the wealthiest 50% nations, after adjusting for need (Table 2). In contrast, the index for self-financed per capita benefits (0.214) shows a disproportionate COVAX benefit to the least poor countries, indicating that about 16% of allocated doses would have to be transferred from the richest 50% countries to the poorest 50% countries to achieve need-based equity. The trend for Erreygers concentration indices was similar at −0.022 for total, −0.657 for COVAX-sponsored and 0.089 for self-financed COVAX-facilitated per capita benefits from doses allocated.

The concentration curves for per capita benefits from COVAX doses distributed mirror the trends seen in the curves for doses allocated (Fig. 4). The concentration curve for total per capita benefits lies along the line of equality and crosses it at the 49% mark, showing a disproportionate COVAX benefit to the poorest nations. A list of countries lying above and below the line of equality is shown in the author’s data repository. Self-financed per capita benefits were in favour of richer nations, although the curve crosses the line of equality at the 90% mark to become pro-poor. In contrast, the COVAX-sponsored per capita curve showed that benefits were consistently pro-poor, with about 50% of the poorest nations receiving about 75% of the benefits.

The average per capita benefits were US$ 2.46 for total, US$ 1.16 for COVAX-sponsored and US$ 1.29 for self-financed benefits. The Wagstaff concentration indices for total and COVAX-sponsored per capita benefits were pro-poor at −0.014 and −0.518, respectively (Table 2). Meanwhile, the index for self-financed per capita COVAX benefits at 0.298 favoured wealthier nations, indicating the need for a transfer of 22% of doses from the wealthiest 50% of the countries to the poorest 50% of the countries to achieve need-based equity. For reference, an index of −0.518 implies that the poorest 50% countries were receiving 39% more COVAX-sponsored doses than the richest 50% countries after adjusting for need, indicating that the financial benefits of COVAX are accruing to settings with lower ability to self-finance. Erreygers concentration indices for total (−0.012), COVAX-sponsored (−0.507) and self-financed COVAX-facilitated (0.164) per capita benefits showed similar findings to the Wagstaff concentration indices.

Benefits from allocated doses were more pro-poor compared with distributed doses. Additionally, the analysis demonstrates that self-financed expenditure both for doses allocated and doses distributed disproportionally benefited the richest nations in the absence of COVAX’s subsidies. When we took account of COVAX subsidies, we found that total and COVAX-sponsored per capita benefits were pro-poor for both allocated and distributed doses.

**Vulnerable populations**

The concentration curves and indices for COVAX-sponsored benefits adjusted for the size of the population aged 65 years and older are presented in Fig. 4 and Table 2. Similar to the whole population analysis, the concentration curves and indices for total and COVAX-sponsored per capita benefits were pro-poor, while the curves and indices for the self-financed COVAX-facilitated per capita benefits were in favour of wealthier nations, for both doses allocated and doses distributed. While the curves for whole population COVAX-sponsored benefits mirrored those after adjusting for the relative size of the older populations, the curves for total benefits adjusted for older populations were more pro-poor than the whole population benefits for both doses allocated and doses distributed. Compared with the whole population curves, the curve for self-financed benefits adjusted for older population size lay much closer to the line of equality for doses allocated, while the doses distributed still disproportionately benefitted the wealthier nations, although less so.

Overall, after accounting for the size of the population aged 65 years and older, there was an even greater pro-poor distribution of benefits compared with the overall population for both doses allocated and distributed. Additionally, the concentration indices for overall and adjusted for older populations showed that COVAX benefits were more pro-poor for allocated doses as compared with distributed doses.

**Discussion**

We found that for both allocated and distributed COVID-19 vaccine doses, the total per capita benefits from the COVAX initiative disproportionately benefited countries and territories with lower per capita GDP. This difference applied when analysing the overall population and after accounting for the relative size of vulnerable older populations within each country. The total per capita benefits after adjusting for the size of older populations within each country demonstrated even higher benefits towards countries and territories with lower GDP per capita. These results...
were similar for COVAX-sponsored per capita benefits for both allocated and distributed COVID-19 vaccine doses. The results also revealed that the benefits to poorer countries were greater for doses allocated than for doses distributed. This disparity can be explained by differences in the vaccine distribution systems across countries and territories.

The differences include availability of cold-chain equipment, warehousing or storage capacities and human resources. Due to variations in supply-chain readiness, COVAX-eligible countries and territories may not receive their allocation from the COVAX Facility until minimum conditions are met. As such, WHO and UNICEF have developed a guidance note on COVID-19 vaccine supply and logistics management to help countries to prepare.25

We found variations in the benefits accrued across country income levels. Although total and COVAX-sponsored per capita benefits favoured poorer countries and territories, the benefits varied across country income levels,

![Fig. 4. Concentration curves for per capita benefits accruing to 148 countries and territories participating in the COVAX Facility, 23 January 2022](image)

COVAX: COVID-19 Vaccines Global Access Facility; COVID-19: coronavirus disease 2019.

Note: The black line depicts the line of perfect equality, whereby the poorest 10% countries (based on gross domestic product per capita adjusted for purchasing power parity) would receive 10% of the per capita COVAX benefits, poorest 20% countries would receive 20% of the benefits, and so on.
especially after adjusting for need using the size of the vulnerable older populations. In general, both total and COVAX-facilitated per capita benefits among self-financing countries disproportionately favoured countries with higher GDP per capita. This difference may be because nations with more resources can procure extra doses of COVID-19 vaccines in addition to the vaccines from the COVAX subsidy. These results also explain why the self-financed COVAX-facilitated per capita benefits accrued to nations with higher GDP per capita. However, the total benefits per capita favoured poorer countries when we took account of COVAX subsidies in the analysis.

Despite substantial investments in vaccine delivery systems during the Global Vaccine Action Plan’s decade of vaccines (2010–2019), vaccine distribution systems of the poorest countries lag behind those of middle- and high-income countries. The performance gap may be partially due to previous vaccine investments focusing on reaching children, whereas addressing COVID-19 requires health systems to expand to reach the adult population. The ability to adapt to emerging challenges is a long-standing health-system goal that may have eluded past investments in vaccination systems in the poorest countries. Those countries who are facing discrepancies between the doses allocated and distributed may also face issues with allocating and distributing vaccines to the most vulnerable. Future progress on equity in the face of the current COVID-19 crisis will therefore require attention on the core capabilities of the health systems of the lowest income countries.

COVAX alone will not be sufficient to tackle future global inequity of vaccine access unless considerable reforms to the global system of vaccine governance are made. Although COVAX was able to allocate its COVID-19 vaccine doses among countries in an equitable manner, these efforts have not been enough to reverse the inequitable allocation and timely delivery of total COVID-19 vaccine. Inequities also still persist due to countries’ hoarding vaccine supplies for their own populations. The disparity in the total share of people vaccinated against COVID-19 between low-income and high-income countries remains large: more than 80% of the population in high-income nations compared with less than 10% of the population in low-income countries as of early 2022. This inequity in vaccine access exacerbates already overburdened health systems and economies and costs millions of lives globally, especially within lower-income countries. Without collective action from the international community and governments, paired with improvements in global vaccine equity mechanisms, the challenges will persist.

There were some limitations to the study. First, we used PPP-adjusted GDP per capita to rank countries along a continuum. This country-level average does not reflect cross-country and in-country variations in living standards that may exist. Second, the analysis

Table 2. Concentration indices showing per capita benefits accruing to 148 countries and territories participating in the COVAX Facility, 23 January 2022

| Variable | Whole population | Population aged 65 years and older |
|----------|------------------|-----------------------------------|
| Vaccine doses allocated | | |
| Total benefits | | |
| Benefits to COVAX-sponsored countries | | |
| Benefits to self-financed COVAX-facilitated countries | 0.214 | 16 | 0.089 | 7 | 0.057 | 4 | 0.031 | 2 | 0.258 | 19 | −0.176 | 13 |
| Benefits to COVAX-sponsored countries | 0.518 | 39 | 0.507 | 38 | 0.514 | 39 | −0.338 | 25 |
| Benefits to self-financed COVAX-facilitated countries | 0.298 | 22 | 0.164 | 12 | 0.120 | 9 | 0.054 | 4 |
| Vaccine doses distributed | | |

COVAX: COVID-19 Vaccines Global Access Facility; COVID-19: coronavirus disease 2019.

a Relative dose benefits calculated from Wagstaff concentration index.
b Relative dose benefits calculated from Erreygers concentration index.

Note: We analysed data for a total of 148 countries and territories: 88 countries qualifying for COVAX-sponsored vaccine doses under the advance market commitment mechanism and 60 countries self-financing their vaccine doses facilitated by COVAX. We calculated both Wagstaff and Erreygers concentration indices as the Erreygers index accounts for when data are categorical rather than continuous. An index of 0 to −1 means that the benefits from COVID-19 vaccines supplied by the COVAX Facility are higher for countries and territories with low incomes based on GDP per capita adjusted for PPP (pro-poor). When the concentration index is positive, it signifies a relatively pro-rich distribution of benefits, while when the concentration index is negative, it implies a relatively pro-poor distribution. Relative dose benefit is computed from the formula (CP 75) to interpret the concentration index. This is the amount that would need to be linearly transferred from the top (bottom) 50% to the bottom (top) 50% of countries based on GDP per capita PPP to obtain perfect equality in benefits. For a concentration index which is positive, the relative dose benefit is the percentage of excess doses allocated or distributed to the richest 50% countries relative to the poorest 50% countries. For a concentration index that is negative, the relative dose benefit is the percentage of excess doses allocated or distributed to the poorest 50% countries relative to the richest 50% countries.
focused on the benefits received by countries and territories from COVAX in terms of the numbers of vaccine doses allocated and distributed. We were unable to determine how COVAX vaccine doses were allocated and distributed within the countries after the delivery by COVAX. Key issues such as human resources for health availability, geospatial access issues, internal stocking and cold-chain maintenance issues, and vaccine hesitancy may affect the ability of the countries and territories to eventually vaccinate their populations. As such, there may be significant variation in full vaccination coverage within and among the countries and territories. Another limitation is that we only examined doses from COVAX, omitting doses from other bilateral deals or non-COVAX sources. COVAX vaccine doses represent approximately 20% of all doses in circulation. Furthermore, our study was unable to assess the full effectiveness of COVAX, as we focused only on the allocation mechanism and not the procurement component. Lastly, the benefit-incident analysis assumes that expenditure on COVAX is an appropriate proxy for benefit. In reality, benefits are context-specific and require country-level epidemiological parameters to standardize the relative benefits of the additional doses across settings.

In conclusion, global risk-sharing for pooled procurement can foster the equitable distribution of COVID-19 vaccines and help to balance global inequities in the allocation and delivery of COVID-19 vaccines. Without COVAX subsidies and the COVAX Facility as a whole, poorer countries and territories may struggle to access COVID-19 vaccines. Therefore, expanding COVAX subsidies beyond 20% of the population for the poorer countries may be important to further enhance equity in the allocation and delivery of COVID-19 vaccines. Future studies should examine the equity of vaccine distribution within countries and include vaccines beyond the COVAX-facilitated vaccines.

Competing interests: None declared.
**Résultats**

Au 23 janvier 2022, le mécanisme COVAX avait attribué 1 678 517 990 doses de vaccin contre la COVID-19, dont 1 028 291 430 (61%) ont été distribuées à 148 pays et territoires. En tenant compte des subsides COVAX, nous avons découvert que, en termes de nombre de vaccins, les pays et territoires possédant un faible PIB par habitant en ont davantage bénéficié que les pays à revenu plus élevé. Ce bénéfice s’est accru lorsque nous avons paramétré l’analyse selon la catégorie d’âge de la population (65 ans et plus).

**Conclusion**

Le mécanisme COVAX aide à atténuer les inégalités de répartition et de distribution des vaccins contre la COVID-19. Néanmoins, lui seul ne suffit pas à inverser la tendance à la disparité en matière de distribution de tels vaccins. Les futures études pourraient s’intéresser à l’équilibre de répartition et de distribution de tous les vaccins contre la COVID-19, et pas uniquement ceux fournis dans le cadre du mécanisme COVAX.

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**Resumen**

**Objetivo**

Evaluar la equidad en la asignación y distribución de las vacunas para la enfermedad por coronavirus de 2019 (COVID-19) a los países y territorios que participan en el Mecanismo de acceso mundial a las vacunas contra la COVID-19 (Mecanismo COVAX).

**Métodos**

Se utilizaron los datos disponibles públicamente sobre el número de dosis de vacunas del Mecanismo COVAX asignadas y distribuidas a 88 países y territorios que cumplían los requisitos para recibir las dosis de vacunas patrocinadas a través del Mecanismo COVAX y a 60 países que autofinanciaban sus dosis de vacunas con el apoyo del Mecanismo COVAX. Se realizó un análisis de beneficios e incidenceas para revisar la asignación y distribución de las vacunas según el producto interno bruto (PIB) per cápita de los países. Se trazó la asignación y distribución acumulativa per cápita a nivel de país de las vacunas para la COVID-19 del Mecanismo COVAX frente al PIB per cápita clasificado de los países y territorios para generar una medida sobre la equidad de los beneficios del Mecanismo COVAX.

**Resultados**

A 23 de enero de 2022, el Mecanismo COVAX había asignado un total de 1 678 517 990 dosis de vacuna contra la COVID-19, de las que 1 028 291 430 (61%) se distribuyeron a 148 países y territorios. Teniendo en cuenta las subvenciones del Mecanismo COVAX, se comprobó que los países con mayores ingresos en lo que respecta al número de vacunas. Los beneficios aumentaron aún más cuando el análisis se ajustó por grupos de edad de la población (mayores de 65 años).

**Conclusión**

El Mecanismo COVAX está ayudando a equilibrar las desigualdades a nivel mundial en la asignación y distribución de las vacunas contra la COVID-19. Sin embargo, el Mecanismo COVAX por sí solo no ha sido suficiente para revertir la desigualdad en la distribución total de las vacunas contra la COVID-19. Los estudios futuros podrían analizar la equidad de toda la asignación y distribución de las vacunas contra la COVID-19 además de las vacunas que se obtienen a través del Mecanismo COVAX.
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