

## **Special theme: from Labs to Jabs: ensuring access and equity in Covid-19 vaccination**

### **STRENGTHENING THE HEALTH SYSTEM TO ADDRESS INEQUALITIES IN COVID-19 VACCINE ACCESS IN THE ASIA-PACIFIC REGION**

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The economic and health recovery of countries in the Asia-Pacific region from the pandemic is hinged on the rapid and equitable deployment of safe and effective COVID-19 vaccines. However, in the initial years of the COVID-19 vaccine roll-out, highly unequal distribution of vaccines occurred across and within countries. Even though tight global supply was indeed an issue, health system challenges, particularly in terms of financing, service delivery, human resources, regulatory capacity and governance, played an important role in the inequitable deployment of vaccines. Recommendations given in this paper revolve around the importance of strengthening the health system to enable the equitable allocation and distribution of COVID-19 vaccines.

*Keywords:* health system, inequality, COVID-19 vaccine

*JEL classification:* I18

## **I. INTRODUCTION**

The Asia-Pacific region has been severely affected by the COVID-19 pandemic. The economic and health recovery of countries in the region from the pandemic is hinged on the rapid and equitable deployment of safe and effective COVID-19 vaccines. As of August 2022, approximately 70 per cent of the population in the region has been fully vaccinated, but with a large variation across and within countries. The vaccine coverage among high-income countries in the region was 82 per cent compared to 24 per cent among low-income countries (Our World in Data, 2022). As of August, 2022, some countries had already started administering booster shots, while poorer countries had yet to achieve their coverage targets for the primary series. For example, the Republic of Korea and Singapore had already boosted 80 per cent of their population (Our World in Data, 2022).

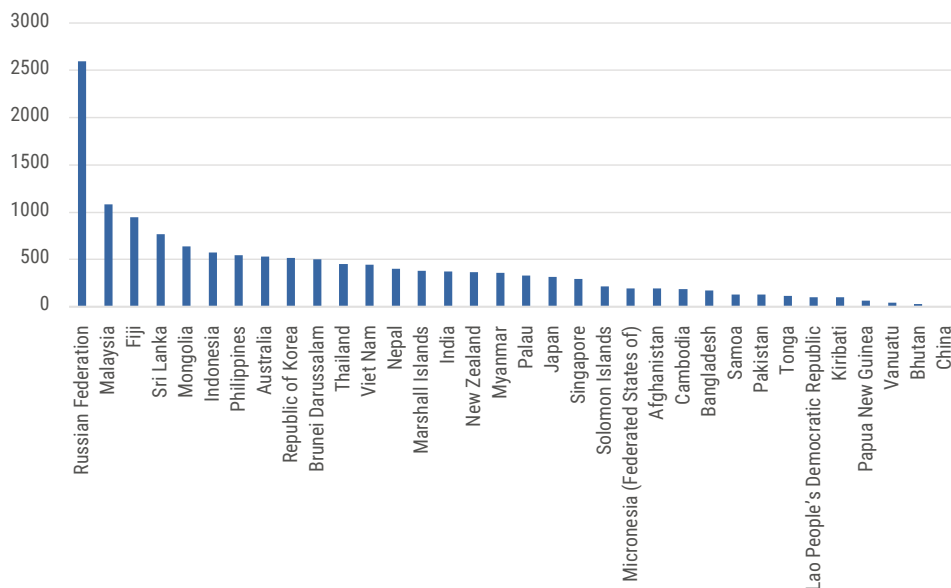
The equitable distribution of COVID-19 vaccines means that all countries should have access to them regardless of their level of economic development (WHO, 2020c). Vaccine inequity is a serious threat to public health as well as to the global economy. Allowing certain countries to remain unprotected increases the risk of continuous viral transmission and mutation, leading to a patchy economic recovery (Asundi, O'Leary and Bhadelia 2021). The difficult position of most developing countries in accessing life-saving vaccines and drugs had been a problem in previous public health emergencies and epidemics, such as the 2004 and 2009 influenza (Fidler, 2010). Regarding the COVID-19 pandemic, there has been a concerted effort to address the problem through the creation of the COVID-19 Vaccine Global Access (COVAX) facility (WHO, 2020b, Emanuel and others, 2021). Despite this effort, vaccine inequity remains a challenge in many countries in the region (Stein 2021). Emerging data show troubling signs of inequity within countries. In general, poor subnational states and disadvantaged populations have lower vaccination coverage (Thankur and others, 2020; Marmot and others, 2020).

The unequal distribution of COVID-19 vaccines across and within countries in the region during the initial year of vaccine roll-out could be attributed to supply outstripping demand fuelled "vaccine nationalism" (Katz and others, 2021). However, as COVID-19 vaccines become part of countries' disease prevention programmes and global supply stabilizes, the readiness of health systems of countries becomes even more critical (Haldane and others, 2021). This paper has three objectives: (1) examine vaccine inequities across and within countries in the Asia Pacific region; (2) identify health systems barriers that might impede equitable access; and (3) provide specific recommendations for countries in the region in ensuring vaccine access

## II. THE STATE OF THE COVID-19 PANDEMIC IN THE ASIA-PACIFIC REGION

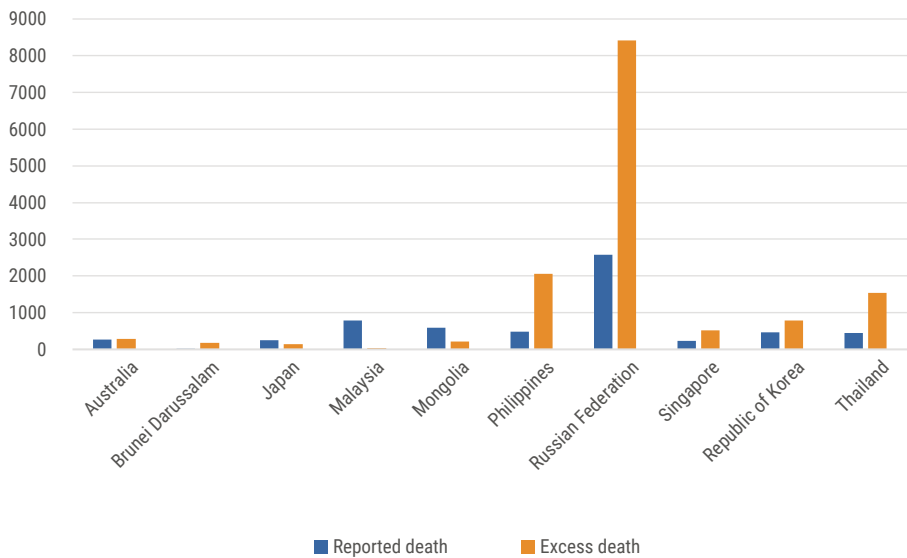
The Asia-Pacific region has been severely affected by the COVID-19 pandemic. As of August 2022, confirmed cases of COVID-19 in the region had reached 159 million and 1.5 million deaths had occurred with large differences across countries. Figure 1 shows the large variation in reported COVID-19 deaths relative to population in the region (Our World in Data, 2022). However, many COVID-19 cases have gone undetected and are excluded in governments' official death tallies. Figure 2 shows that the excess deaths are significantly higher than the reported deaths in some countries in the region. Excess mortality is a comprehensive measure of the impact of the pandemic on mortality. It includes the confirmed COVID-19 death count and COVID-19 deaths that were not diagnosed correctly as well as deaths indirectly attributed to the pandemic, such as a person with cancer who died because their screening was cancelled owing to the pandemic's impact on health-care system (Our World in Data, 2022).

**Figure 1. Confirmed COVID-19 deaths (per million population), Asia-Pacific Region, as of August 2022**



Source: Basic data from Our World in Data (2022).

**Figure 2. Confirmed COVID-19 deaths vs. excess deaths (per million population), selected countries in the Asia-Pacific region, as of August 2022**



Source: Basic data from Our World in Data (2022).

The disease burden attributed to COVID-19 varies highly across populations. The COVID-19 pandemic has disproportionately affected the elderly population and among those with chronic underlying conditions. The mean age of COVID-19 death is approximately 70 years old, and those populations with chronic conditions are 1.5 times more likely to die because of the virus (Simonsen and Viboud 2021; Popkin and others, 2020). However, emerging studies have shown that the linear relationship between the share of population aged 65 years and above and COVID-19 mortality was only significant for countries with low levels of hospital beds, which is an indicator for health-care system capacity (Farzanegan, 2020). The variation in disease burden across the population is exacerbated by structural inequities. Vulnerable populations, such as minority ethnic groups, people living in areas of higher socioeconomic deprivation and other marginalized groups have a greater risk of contracting the COVID-19 disease. They have higher rates of almost all of the known underlying clinical risk factors that increase the severity and mortality of COVID-19 (Bambra and others, 2020). The inequities caused by the pandemic could be observed across the world, including in the Asia-Pacific region. For example, foreign workers in Singapore, Malaysia and Thailand were at a higher risk of infection. Manual foreign workers in

Singapore who live in crowded dormitories fuelled the first wave of infection in the country (Binns and Low, 2021). This is an example of how crowded condition results in the rapid spread of the infection. Similar patterns were observed in urban slums or informal settlements in Bangladesh, India and the Philippines (George and others, 2021, Sahasranaman and Jensen, 2021).

### **III. EQUITABLE COVID-19 VACCINATION IN THE ASIA-PACIFIC REGION**

#### **3.1 Variation in COVID-19 vaccination programme**

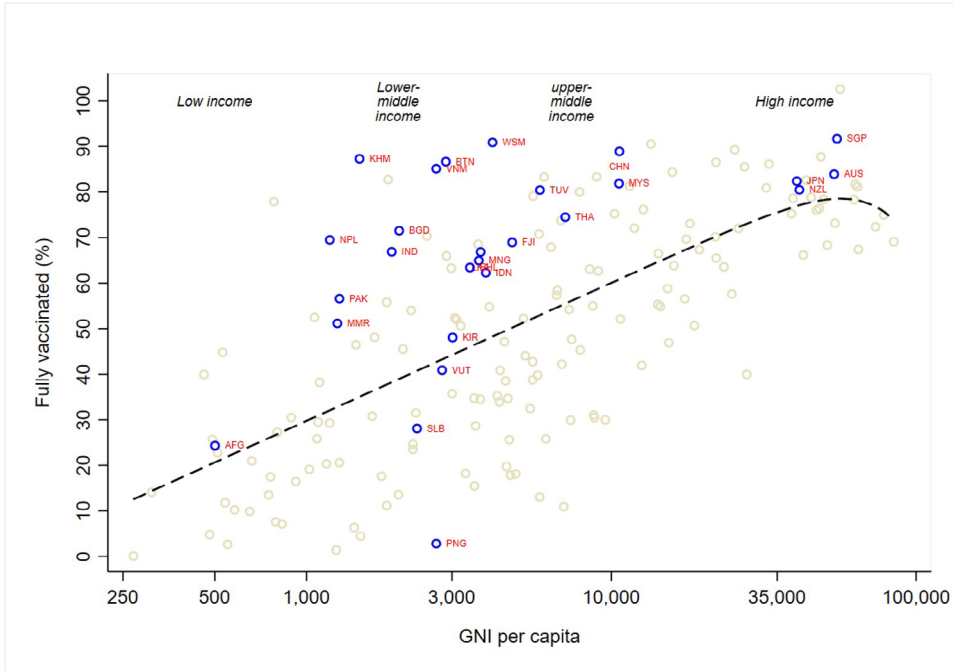
Rapid and equitable distribution of the diagnostics, therapeutics, and COVID-19 vaccines within and across countries are the most effective interventions to address the health and economic impact of the pandemic. The development of safe and effective COVID-19 vaccines has dramatically changed the course of addressing the pandemic. Most countries in the Asia-Pacific region started their COVID-19 vaccination campaigns around the first quarter of 2021, a delay of about one to two months compared to Western countries. Many countries in the region aimed to vaccinate at least 70 per cent of their population to achieve a high-level of population protection. The World Health Organization (WHO) aimed to target at least 40 per cent of the global population by 2021 and 70 per cent by 2022 (WHO, 2021b), but given the tight global supply, especially during the first few months of the campaign, countries had to prioritize selected population groups, such as health workers and the elderly population, which are considered the most at risk of morbidity and death. Countries that have received COVID-19 vaccine donations from the WHO COVAX facility are also mandated to follow the prioritization framework. The commencement of universal roll-out (the rest of the population) of the vaccine varies across countries in the region. Singapore, for example, started universal vaccination in April and May of 2021, while lower middle-income countries, Bangladesh, Indonesia and the Philippines, started around August to September of 2021 (Hale and others, 2021). The development of vaccines has raised optimism towards a more rapid health and economic recovery (IMF, 2021a).

#### **3.2 Inter and intracountry variation in vaccine coverage**

Approximately 70 per cent of the population has been fully vaccinated in the Asia-Pacific region, as of August 2022. However, the vaccine coverage in the region is highly unequal. For example, the coverage in Singapore has reached 90 per cent in contrast to less than 30 per cent in Afghanistan. Figure 3 shows the positive relationship between vaccine coverage (fully vaccinated) and income per capita (blue dots). Most of the countries that have already reached a coverage of

70 per cent are high-income countries (such as Australia, Japan, New Zealand and Singapore). However, several lower middle-income countries have attained 'high vaccine coverage, such as Cambodia, and Bhutan (Our World in Data, 2022). A similar pattern can be observed for booster coverage. It is worth noting that the coverage could be affected by the share of priority population; countries with a larger share of the elderly population (such as Japan) tend to have higher coverage relative to countries with younger population groups.

**Figure 3. Vaccine coverage vs. gross national income per capita, selected countries in Asia-Pacific region**



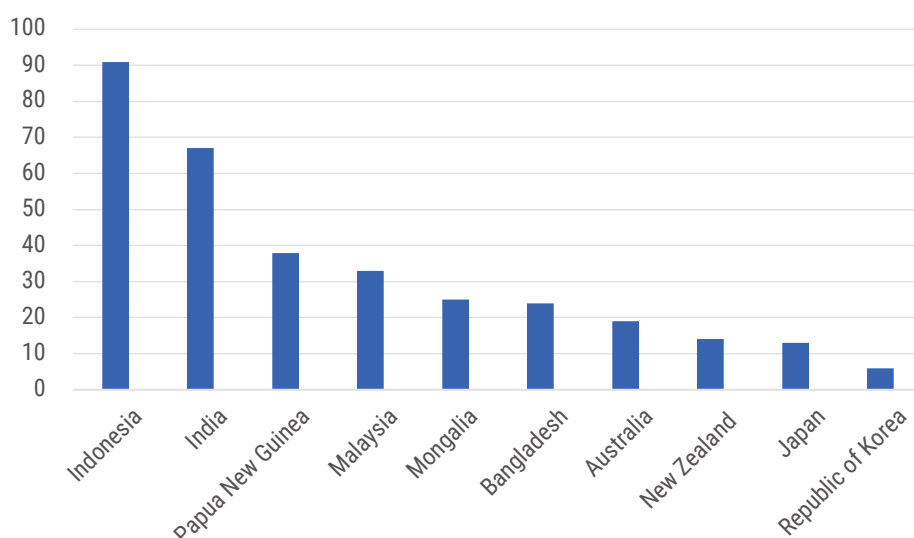
**Source:** Author's analysis; basic data from Oxford University and World Development Indicators

**Note:** As of August 2022; GNI, gross national income. Blue dots are coverage of full series and green dots are booster coverage

Emerging data show the large disparity in vaccine coverage within countries. Although a comprehensive global database that would make it possible to determine the magnitude of inequality within countries is lacking, available subnational coverage suggests wide disparity, especially in developing countries. Figure 4 shows selected countries in the Asia-Pacific region with available subnational data (such as region,

state, province and prefecture). Within-country inequality tends to be higher in lower middle-income countries compared to high-income countries. In some provinces and states in India, Indonesia and the Philippines, coverage has already reached 70 to 100 per cent, while other subnational units have yet to reach the 20 per cent mark. In contrast, the disparity in high-income countries, such as Australia, Japan and New Zealand, have a small difference between the highest and the lowest subnational coverage (IMF, 2021b).

**Figure 4. Absolute difference between the highest and lowest coverage of subnational units (as of March 2022)**



*Source:* Author's analysis; basic data from IMF.

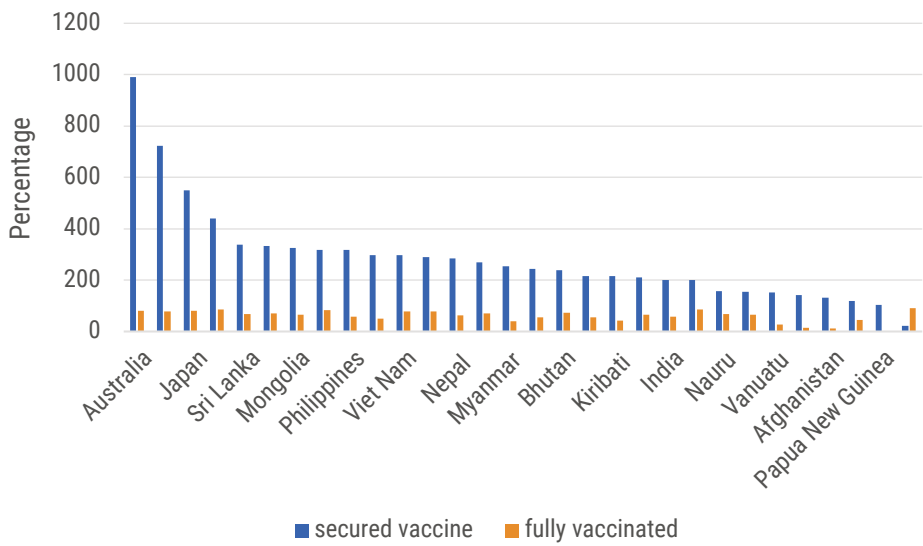
*Note:* Absolute difference=highest coverage-lowest coverage.

### 3.3 Variation in vaccine supply

The supply of COVID-19 vaccines varies across countries in the Asia-Pacific region. Figure 5 shows the secured number by countries in the region relative to their populations based on publicly available data. High-income countries in the region, such as Australia, Japan and New Zealand, have already secured vaccine supplies that were five to ten times the population size, while some lower middle-income countries have yet to vaccinate a large part of their populations and had

secured far fewer vaccines than their populations. In terms of sourcing, many island countries have purely relied on COVAX and bilateral donations to expand coverage. Interestingly, South-East Asian countries have secured vaccines from COVAX and bilateral deals.

**Figure 5. Secured vaccine as a share of population vs. vaccine coverage rate, as of March 2022**

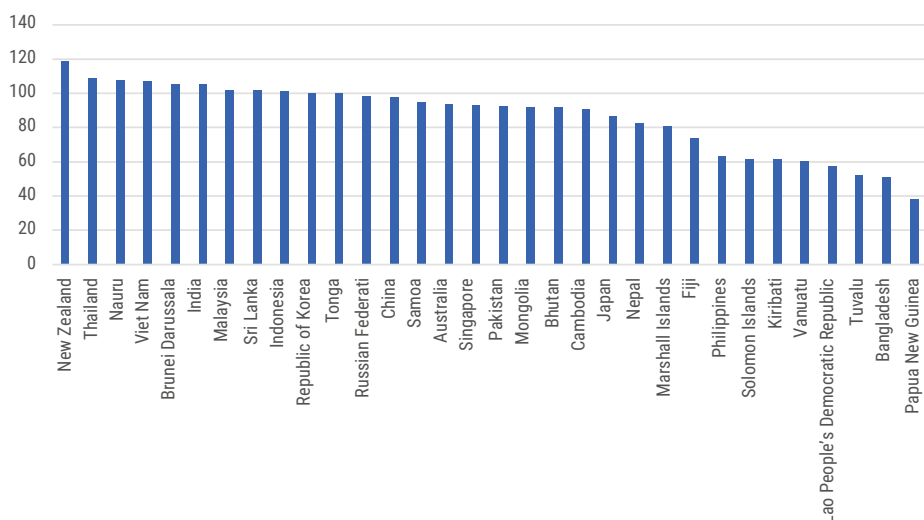


Source: Authors' analysis of data from IMF (2022)

Supply does not automatically lead to vaccination. Even if enough vaccine doses are eventually made available through various channels, success is hampered by challenges in the health systems, especially in developing countries. Figure 6 shows that the share of administered vaccines out of the delivered vaccines varies across countries in the region (IMF, 2022). This suggests the low absorptive capacity of some countries. The high number of unadministered vaccines could reflect the challenges in their health system to allocate and administer the vaccine with speed and agility, particularly because of limited health infrastructure and human resources for health capacity.



**Figure 6. Administered of total delivered vaccine, as of March 2022**



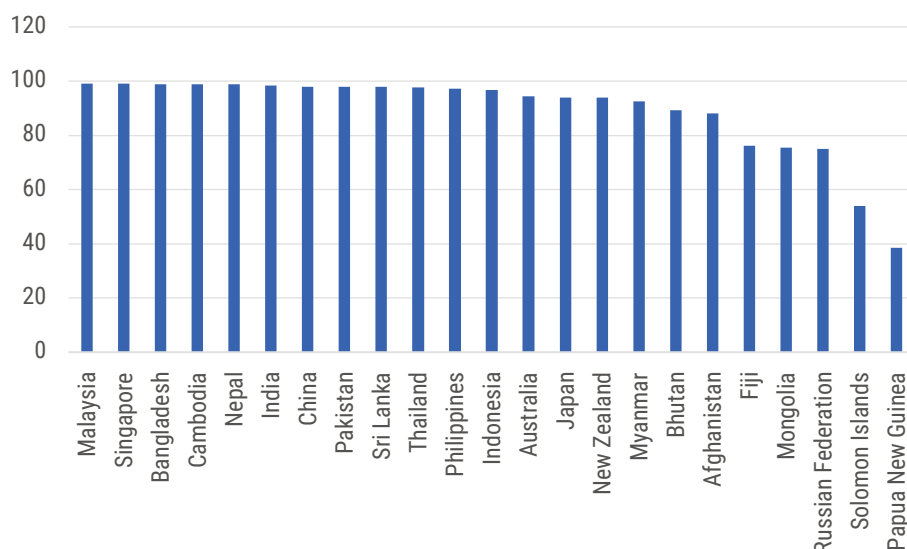
Source: Authors' analysis of data from IMF(2022).

### 3.4 Demand factors

Demand-side challenges could contribute to the low uptake of vaccines. Vaccine equity should reflect policies and strategies in ensuring equal access across countries and in addressing structural inequities that prohibit disadvantaged population groups (such as the poor, older persons, persons with disabilities, indigenous people, migrants, women and prisoners) to access vaccines (Agarwal and others, 2021). Disadvantaged groups are less likely to access essential health services. At present, there is no comprehensive data that examines the association between structural inequities in vaccine coverage. However, the best available global data and case studies provide evidence of looming inequities. For instance, as of December 2021, in Thailand, the coverage of Bangkok had reached 100 per cent. However, in the provinces of Thailand near international borders, which are epicentres of cross-border migration (such as at the borders with Cambodia, the Lao People's Democratic Republic, Malaysia and Myanmar) the coverage was 30 to 40 per cent (WHO, 2021c). In the Philippines, the socioeconomic gradient in vaccine coverage is extremely wide. In Indonesia, the coverage in Papua and Maluku, islands comprising mostly indigenous

people, was only 20 and 40 per cent, respectively (as of December 2021) in contrast to the reported 140 per cent in the mega-city, Jakarta (IMF, 2021b). Similarly, in the Philippines, coverage in the mega-cities reached 90 per cent, but in the poverty-stricken and war-torn Bangsamoro Autonomous Regional for Muslim Mindanao (BARMM), the coverage was only 10 per cent (as of December 2021) (Philippine Department of Health, 2021). In addition, geographical barriers pose a challenge in vaccine access. For example, in high altitudinal landscapes within the Himalayan regions, such as in Nepal, Bhutan, Pakistan, and Afghanistan, or remote areas experiencing war, instability, and conflict (Acharya, Ghimire and Subramanya, 2021). Countries have adopted allocation frameworks to promote vaccine equity. Given the limited COVID-19 vaccine supplies and resources to vaccinate the population, almost all countries have adopted vaccine allocation frameworks upholding utilitarian principles by prioritizing the population that maximizes the best health outcomes, in this case, the elderly and people with co-morbidities. However, other countries (such as Indonesia) took a divergent path, by first prioritizing economic workers instead of the elderly population (Witando and Diela, 2021). In addition, several countries have included egalitarian approaches in their allocation framework. In the Philippines and India, for example, priority was given to slum dwellers and people below the poverty line (Basu and Mishra, 2020; Philippine Department of Health, 2021). However, adherence to and implementation of these utilitarian and egalitarian frameworks should be examined as leakages and elite capture are reported to be rampant. Demand-side challenges, such as vaccine hesitancy, are also factors behind low vaccine coverage in some countries in the region. Figure 8 shows the share of the population willing to be vaccinated if the supply is available. Willingness is high in most countries in the Asia-Pacific region, however, some of them, such as Afghanistan, Fiji, Mongolia, the Russian Federation, Solomon Island, and Papua New Guinea, have remarkably low levels of willingness. The low willingness in some countries is largely driven by conspiracies, misinformation and a growing anti-vaccination sentiment. In the age of social media and online information, fake news and misreporting on the safety of vaccines has spread rapidly, creating an “infodemic”, which exacerbates vaccine hesitancy (Forman and others, 2021; Carrieri, Madio and Principe 2019). In the Asia-Pacific region, approximately 30 per cent of online content is considered unreliable (Collective Service, 2022). While digitalization could facilitate demand for vaccine as many countries have depended on digital platforms for their vaccination drives (such as electronic booking systems and demand generation), the large digital divide could exacerbate the problem of lack of access within and across countries in the region. In some settings, the rural population and the digitally illiterate have been left out of this new vaccination process, which instead has only benefited the privileged, educated, and urban populations (Poole, Ramasawmy and Banerjee, 2021).

**Figure 7. Share of the population willingness to be vaccinated, as of March 2022**



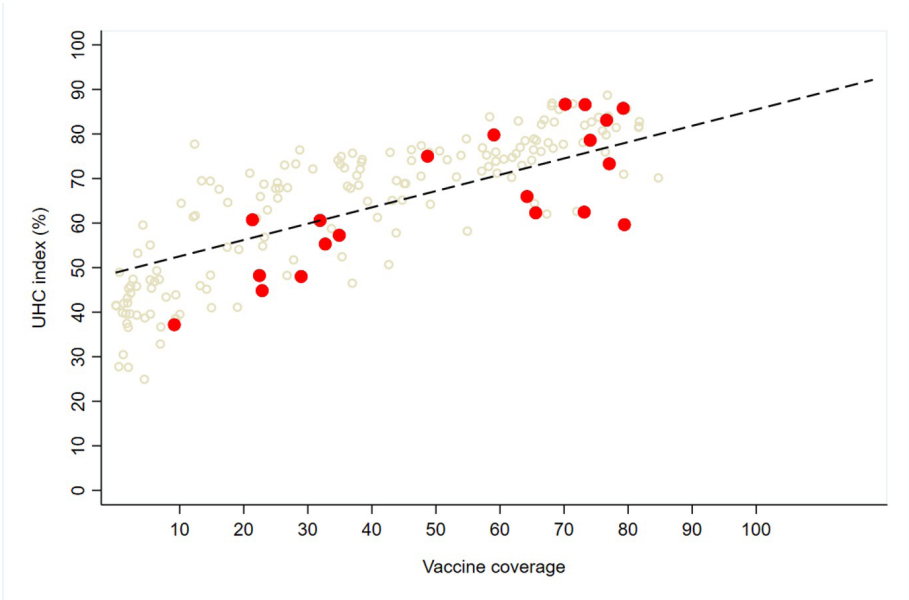
Source: Collective Service (2022).

## IV. DRIVERS OF INEQUITIES IN VACCINE ACCESS

As COVID-19 becomes part of most countries' prevention and control programmes, equitable access to these programmes will be highly dependent on the capacity and readiness of their health systems (Usher, 2021). In this section, three supply-side barriers that could impede the equitable access to vaccine are classified as being (1) financial; (2) geographic; or (3) regulatory. Financial access means that there are no or few costs – both direct and indirect in receiving the vaccine. These access factors are adapted from a framework developed by the Harvard University Health and Places and Initiative, which identifies different types of health-care access (Health and Places Initiative, 2014). Geographic access means the absence of barriers due to distance, transportation and other physical barriers. Regulatory access means the absence of unnecessary policies or processes that impede timely access to vaccines. These supply-side barriers in the health system are not something new. They remain the drivers of inequitable access to essential health-care services and goods more generally. Figure 8 shows the strong linear relationship between the Universal Health Care (UHC) Service Coverage Index and COVID-19 vaccine coverage

(as of December 2021). The index (a unitless scale of 0 to 100) measures the capacity of health systems to provide a wide-range of essential health-care services to the population (WHO, 2022a).

**Figure 8. COVID-19 vaccine coverage and UHC index, as of March 2022**



Source: Author's analysis; basic data from WHO and Oxford University

4.1 Financial access

Financial barriers reflect the challenges in countries’ health financing systems. Financial access is one of the determinants of health-care utilization. To understand financial access, it is necessary to examine it from a health financing perspective. One of the core functions of any health financing system is to mobilize resources either from public (such as government revenue and social insurance) and private (such as private insurance and out-of-pocket/user fees) sources. However, the level and source of financing matter. Essential vaccination programmes (such as a routine child immunization programme) should be publicly financed and out-of-pocket payments should be discouraged because it is counterproductive to the goals of vaccination programmes.

Out-of-pocket fees continue to be the major source of health financing in the region. In 2018, out-of-pocket fees accounted for approximately 57 per cent of total health spending among lower middle-income countries in the Asia-Pacific region compared to 22 per cent among high-income countries (WHO, 2021b). Public spending on health remains relatively low with a marked difference across countries in the region. Because of the enormous socioeconomic impact and political pressures of COVID-19, governments have mobilized public resources (either from general revenue or external sources) to finance the pandemic response, including their vaccination programmes. However, important policy questions remain:

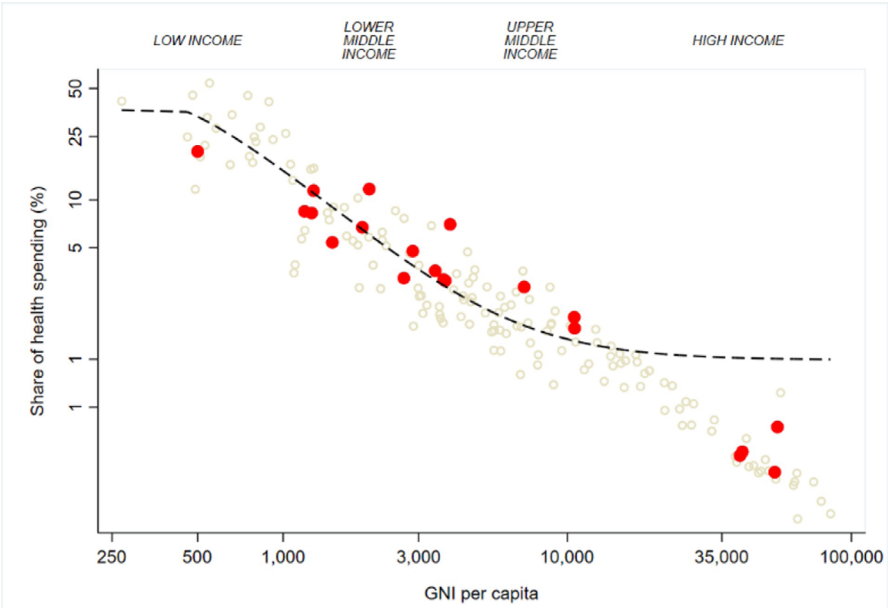
Will governments sustainably allocate higher public spending to finance COVID-19 vaccines similar to any other regular prevention and control programme?

Will government rely on out-of-pocket fees to finance some parts of the vaccination programme?

Will governments allow a private market in parallel with the public system to administer COVID-19 financed through out-of-pocket fees, especially when current vaccines can now be sold in the market, which is the delivery structure for vaccines in such countries as India and the Philippines (Ulep and Uy, 2020)?

Given that financial pressures are coming at a time when many economies are in crisis due to the pandemic, and rising fuel and food prices, countries are left no choice but to mobilize incremental resources for health services. Out-of-pocket fees could provide adequate, timely and reliable resources for vaccines and thus can contribute to countries' overall financial balance. However, the potential benefits of out-of-pocket fees for sustainability of the COVID-19 vaccination programme would not offset the negative effects on equity. Raising public resources for COVID-19 vaccines faces a mounting challenge given the enormous financing needs of these programmes. In lower middle-income countries, the cost of vaccinating 40 per cent of the population approximately accounts for 10 to 20 per cent total health spending, which is substantial (UNDP, 2022). Figure 10 shows the resources needed to fund COVID-19 vaccination programmes for 40 per cent of the population compared to routine immunization programmes,

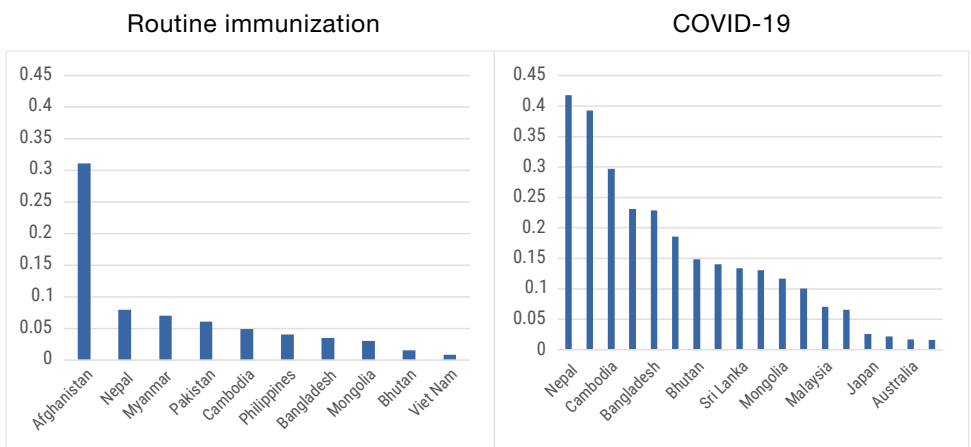
Figure 9. COVID-19 vaccination programme as a share of health spending, as of March 2022



Source: Author's analysis of UNDP and World Bank data

Note: GNI, gross national income

Figure 10. Routine and COVID-19 vaccination programme as a share of gross domestic product



Fiscal decentralization could exacerbate vaccine inequity within countries. Public financing in general should promote equitable access to the programme. However, the growing trend towards political and fiscal decentralization (such as in India, Indonesia, the Philippines and Viet Nam) should prompt governments to examine the financing capacity and decision-making process of subnational units; otherwise there can be a tremendous impact on vaccine equity. Heavy reliance on subnational financing for vaccination programmes could have a detrimental equity implication. In general, subnational units with the lowest capacity to finance vaccination programmes and where health services are relatively costlier to implement because of geographical and supply-side constraints require the most assistance in financing access to vaccines. Yoong (2007) examined the impact of decentralization in Madhya Pradesh, one of the largest and poorest states in India. The state-wide implementation of the reform led to a fall in immunization coverage, particularly in rural areas. Maharani and Tampubolon (2014) suggested that fiscal decentralization in Indonesia had no impact on child immunization. They concluded that decentralization in the country failed in its aim to improve outcomes for child immunization due to limited local capacity in planning, budget development and budget execution. A similar pattern was observed in the Philippines. While routine vaccines are procured directly by the central Government through the Department of Health, local government units finance operational costs (such as syringes and health promotions). However, given the limited capacity of some local government units to even finance and deliver the programme, decentralization resulted in disparities in vaccine coverage (Ulep and Uy, 2020). In some settings, the less progressive nature of taxes levied at the subnational level than at the national-level, have also led to inequitable public financing. The wealthy members of the population mostly benefited from the public vaccination programmes.

Reports show marked inequities in COVID-19 vaccine coverage under decentralized regimes. For example, the provinces of Viet Nam have been taking on a greater role in immunization financing and are responsible for financing the operational costs of the COVID-19 vaccine roll-out. While subnational autonomy has enabled more flexibility and efficiency in vaccine operations, some provinces have encountered problems due to inadequate funds. In contrast, recentralization of vaccine procurement and financing in Pakistan helped improve efficiency (Learning Network for Countries in Transition, 2021). In the Philippines, during the early stages of the COVID-19 vaccination campaign when global supply was limited, affluent local government units in the country (mostly in mega-cities) purchased their own COVID-19 vaccines, leaving relatively poor local government units reliant on nationally procured vaccines. This scenario not only created inequality in vaccine coverage, but also political tensions within the government (Cabico, 2021). Decentralization has been the subject of debates on the role of subnational units during the height of the pandemic, not just

during the roll-out of vaccination programmes (OECD, 2020). Previous studies have challenged the effectiveness of decentralization in addressing the pandemic. Cheng and others (2021) find that the Covid-19 tends to spread at a higher speed, leading to a higher disease burden in more decentralized countries.

## 4.2 Geographic access

Geographical access refers to supply, diversity and distribution and physical accessibility of health-care services (Health and Places Initiative, 2014). To identify geographical barriers to vaccine access, it is imperative to start by reviewing the readiness of countries' primary care systems. The locus of sustainable implementation of COVID-19 vaccination similar to any preventive intervention is primary care. Hence, any challenge in vaccine inequity could reflect weaknesses in primary care. Under geographical access, three supply-side elements are relevant: (a) health workers; (b) health facilities; and (c) supply chain and logistics.

All countries need a sizeable number of health workers to meet the demand under a COVID-19 vaccine roll-out. There should be widespread availability of health workers to reach the target vaccine coverage in all parts of a country, including in far-flung areas. Almost all countries, including those with resilient health systems, have had to deal with a scarcity of vaccinators. However, in the lower middle-income countries, the shortage and maldistribution of health workers has been an acute and chronic problem. There is a large variation in the availability of health workers across the region, and within country disparity is ubiquitous. For example, in the Philippines, poor provinces suffering from a shortage of health workers. as most health workers are in the cities The shortage of health workers has implications for the quick deployment of vaccines, particularly in far-flung areas. Maguindanao, one of the poorest provinces in the Southern part of the Philippines, has less than one doctor per 15,000 people compared to approximately 60 per 15,000 people for one of the richest cities in the country. A similar pattern can also be observed for other type of health workers (Abrigo and Ortiz, 2019).

The lack of trained human resources to assist in implementing the COVID-19 vaccination programme is a common problem. Training more health workers would ensure that vaccines were administered to all, including those living in poor and hard-to-reach communities. It would also ensure that vaccines were delivered safely. The lack of trained health workers not only compromises vaccine throughput, but it also negatively affects the quality, safety and efficiency of the programme. Countries routinely administer vaccines to children as part of their immunization, but COVID-19 vaccinees, are mostly for adults, which requires a different approach. Based on the WHO Joint Reporting Form, the percentage of countries reporting at least one adult vaccination programme ranged from approximately 10 per cent in South-East Asia



to 90 per cent in Europe. Particularly for influenza, the vaccination programme in Thailand, for instance, was the only adult immunization programme reported. The success of delivering COVID-19 vaccines is threatened by the lack of sufficient adult immunization (Williams and others, 2021). The lack of training compromised the efficiency of vaccines. For example, the Government of India blamed the high level of wastage on health workers not being properly trained to take out vaccine shots from the multi-dose vials. It also cited improper planning at local vaccination centres as another one (Sheriff M, 2021). In Afghanistan, only 10 per cent of the vaccinators fulfilled the required educational criteria and only 14 per cent of health facilities have “micro-plans”, a comprehensive guide for health workers to cover all aspects of the vaccination programme (Wardak and others, 2021).

The scarcity of health workers could disrupt the delivery of other primary health-care services. In assessing vaccine access from a health human resource perspective, the vaccination programme must be examined with other services and programmes that health workers should provide in primary care facilities. Even before the pandemic, many health workers were overworked. The pandemic further exacerbated this problem of staffing shortages. In addition to the COVID-19 vaccination programme, health workers still need to deliver essential non-COVID-19 treatments (such as routine child vaccination), manage potential COVID-19 cases and perform surveillance of other diseases. In 2020, national immunization programmes against diseases, such as diphtheria, measles and polio, were substantially disrupted in at least 68 countries around the world, affecting up to 80 million children (WHO, 2020a). Given the tight workload and the risk of getting infected, many countries in the region have reported high turnover rates of front-line health workers because of high-levels of physical and mental stress (Santos and Labrague, 2021; Yousaf, Nasani and Haffar; 2021, Sethi and others, 2020). The high turnover rates, particularly among community health workers, compromise both the quality and quantity of vaccination programmes, especially in far-flung communities where health workers are already scarce to begin with. However, some countries in the region have developed programmes to address the problem. In China and Pakistan, for example, governments have continued to provide moral as well as financial support to health workers and organizations as an acknowledgement of their services (Noreen and others, 2020).

Low remuneration and lack of incentives result in a high turnover rate of health workers. Monetary remuneration and non-monetary incentives are important for maintaining motivation and minimizing attrition. Studies have identified low remuneration as one of reasons for high turnover rates. In addition, there is no standardized approach to remuneration in countries in South-East Asia. Without a more harmonized approach for health worker remuneration and incentives, their motivation and performance are likely to be inconsistent and unsustainable, resulting in adverse effects on health outcomes (Bezbaruah and others, 2021).

Inability to expand the pool of potential vaccinators may also arise from regulatory barriers. Existing medical regulations and policies prohibit certain health workers from prescribing medicines or administering vaccines. Task shifting and rationalization of health workers has been one of the solutions to address scarcity and maldistribution of health workers in lower middle-income countries. With COVID-19, even high-income countries have revised their policies allowing certain health cadres to administer vaccines. For example, the Government of the United States of America, has already authorized pharmacists to procure and administer COVID-19 vaccines. Several states are looking into expanding their scope of practice or licensure for COVID-19 vaccine administration by non-traditional providers, such as advanced emergency medical technicians, paramedics, and medical and nursing students.

### **4.3 Supply chain and logistics**

The COVID-19 crisis has revealed the fragility of the supply chain systems. Vaccines were developed with unprecedented speed; however, a critical concern is whether it will be possible for countries' pharmaceutical supply chains to scale up and deploy vaccines with speed and agility. Supply chains move medical products from manufacturers to the point of use (such as primary care facilities) through many distribution layers, using different modes of transport and storage. Hence, well-functioning and efficient supply chain are critical for successful vaccination programmes. Underperforming pharmaceutical supply chains has been a major challenge even before the pandemic, especially in lower middle-income countries. The supply chain in most developing countries is complex and fragmented, with multiple configurations, and variable levels of maturity and performance and degrees of private-sector participation. COVID-19 vaccines have the added complexity of requiring cold chain facilities and more agility and efficiency to ensure product quality and availability. Some COVID-19 vaccines are temperature sensitive. Inability to maintain the recommended temperature may reduce the efficacy of the vaccine, especially in tropical regions. Approximately 20 per cent of vaccination facilities in lower-income countries do not have cold chain capacity, and in a 2017 review by GAVI, it was found that between 37 and 50 per cent of vaccines in lower middle-income countries had been stored under incorrect temperature, which undermine the efficacy of the vaccines (GAVI, 2018). The supply chain is also more difficult to maintain in countries with geographic challenges and in areas prone to natural disasters. Governments are forced to operate supply chains through suboptimal communication and to operate in environments where information is limited (Quiros and Alam, 2021).

### **4.4 Regulatory access**

Regulatory access means the absence of unnecessary policies or processes that impede timely access to vaccines. During emergency situations, one of the major

regulatory constraints especially in developing countries, is the ability of countries to assess information and expediently issue an emergency authorization for a vaccine be used during pandemics. The latter may be dependent on local regulatory capacity and willingness to “benchmark” alongside stringent regulatory authorities, recognizing that WHO takes a longer time to issue its authorization of a vaccine. The urgency at which manufacturers file their applications for emergency authorization differs across countries.

In the medium to long term, developing countries should have the capacity to locally produce vaccines. However, intellectual property rights are regularly cited as a constraint to scaling up access to vaccines in developing countries. Sharing of technical knowledge, expertise and know-how is also increasingly seen as challenge. More importantly, for developing countries to manufacture a product at par with global standards, the existence of regulatory capacity and presence of regulatory authorities are critical. Unfortunately, WHO estimates that only one out of three countries have the capacity to effectively regulate medical products in their countries. Expanding vaccine manufacturing without guaranteeing adequate regulatory capacity can have great repercussions on the quality and safety of the product and can undermine credibility, thus affecting public trust (Guzman and Yadav, 2021). According to the latest WHO data (2016), the following are vaccine-producing countries in the region with “functional” national regulatory agencies: China; India; Indonesia; Japan; and the Republic of Korea (WHO, 2022b).

## **V. RECOMMENDATIONS**

Even if enough vaccines are available for all countries, rolling out COVID-19 vaccines will always be a challenge because of perennial health system constraints. Hence, these recommendations revolve around the strengthening of health systems.

The first is to accelerate universal health coverage. The lack of equitable access to COVID-19 vaccines is a manifestation of perennial problems in health systems. Even the Access to COVID-19 Tools (ACT) Accelerator, which is a new and ground-breaking global collaboration led by the WHO to fast track development, production, and equitable access to COVID-19 vaccines has recognized the importance of strengthening health systems as one of the critical pillars, albeit this has received less focus and funding. Dealing with the problem holistically at the health systems level would not only address challenges in the vaccination programme, but also in other public health programmes. Accordingly, governments should focus on the following reform areas:

- (a) Expansion of primary care. Preventive and primordial programmes, including vaccination programmes are typically provided at the primary care level. Hence, improving the quality and availability of primary care providers should be an utmost priority as part of UHC programmes of governments (WHO, 2019). This includes expansion of capital investments and health benefit packages for primary care services;
- (b) Increase public financing. The move to UHC service coverage means increasing pooled public financing, that is, government budget, social insurance and external grant/aid. Governments should aim to reduce the role of private financing mechanisms, particularly user-fees, to fund critical and cost-effective public health programmes, such as vaccines for high-burden diseases. However, given the limited fiscal space for health, countries should mobilize domestic resources through innovative means to fund public health programmes (such as health earmarking);
- (c) Prioritize vulnerable members of the population. These population groups, such as women, indigenous peoples, poor households and migrants, are less likely to seek health care, including vaccinations, because of geographical, structural and institutional barriers. Hence, governments should develop innovative financial and delivery mechanisms to increase access among vulnerable groups.

Second, institute genuine reforms in countries' health information systems. The COVID-19 pandemic provides an opportunity to reflect on the kinds of innovations that should become part of an enhanced health information system. Governments should adopt a health information system to improve business operations of health facilities and supply and logistics.

Traditionally, the practice of medicine is performed through in-person interaction. However, the COVID-19 pandemic has encouraged providers to deliver health-care services using digital platforms. Thus, governments need to institute reforms to ensure quality of care (such as including telemedicine in medical curricula, training of providers) and financial sustainability (such as telemedicine as part of government's health benefit packages) to augment telehealth capacity.

Digital technology could be used to improve business operations. In developing countries, medical records in health facilities are manual and non-interoperable. Government should institute broad-based adoption of the electronic medical record (EMR) to facilitate efficiency and accuracy of health data. In addition, digital technology is critical to improve the supply chain performance. Without timely and high-quality information, decision-makers would not know demand, how much inventory is in

stock, and when more products should be transported. Information provides supply chain visibility, enabling managers to make informed decisions.

In conclusion, this paper shows the large disparities in vaccine access in the region, which reflects the high variation of health system maturity. Hence, the pandemic should facilitate genuine regional cooperation to strengthen countries' health systems and public health responses, which could simply start with regional knowledge-sharing of good practices.

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