

# COVID-19 vaccines for children and adolescents in Africa: aligning our priorities to situational realities

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## ABSTRACT

The evolving COVID-19 pandemic is an unprecedented global public health crisis that continues to have a major impact on the African continent. Most countries within Africa are facing significant challenges vaccinating their populations for COVID-19. Inadequate COVID-19 vaccine supply, weaknesses in health system infrastructure, COVID-19 misinformation and disinformation, and ineffective health risk communication are contributing to low adult vaccination rates on the continent. Without sufficient COVID-19 vaccine coverage on the African continent, the prolonged social, economic and health impacts of this public health crisis are likely to exacerbate pre-existing social-structural issues in this part of the world. In this paper, we highlight trends in SARS-CoV-2 infections among children and adolescents (CA), compare COVID-19 vaccination patterns in Africa to those in high-income countries, and discuss some of the benefits, challenges and unknowns associated with vaccinating CA for COVID-19. In light of ongoing COVID-19 vaccine supply challenges and the slow progress that the African continent is making towards vaccinating the adult population, we suggest that the immediate priority for Africa is to accelerate COVID-19 vaccinations among adults (particularly high-risk populations) and vulnerable CA (ie, those who are immunocompromised and/or living with certain medical conditions). Accelerating the roll-out of COVID-19 vaccines and rapidly achieving high levels of vaccination coverage in the adult population will free up capacity to vaccinate CA sooner rather than later. While we hope that COVID-19 vaccines will soon become available to CA throughout Africa, countries must continue to prioritise non-pharmaceutical interventions.

## INTRODUCTION

As countries continue to roll out COVID-19 vaccines, decisions about vaccination strategies need to balance limited vaccine availability with prioritising people at greater risk of severe illness from the disease.<sup>1</sup> When COVID-19 vaccines first became available, countries around the world decided to implement vaccination strategies focused primarily on the adult population because children were less likely to experience severe illness from COVID-19.<sup>2</sup>

## Summary box

- African countries need to free up capacity to prioritise COVID-19 vaccines for children and adolescents (CA) by accelerating vaccinations in the adult population through early 2022.
- Countries throughout Africa should consider offering COVID-19 vaccines to CA who are at increased risk of severe illness from the disease, with subsequent roll-out efforts focusing initially on older and school-going CA.
- Effective collaboration between global partners (eg, humanitarian agencies, high-income countries) and African countries is needed to ensure equitable access to COVID-19 vaccines and assist with improving vaccination roll-out infrastructure for the administration of COVID-19 vaccines in Africa.
- More data are required to develop a better understanding of the safe and effective use of COVID-19 vaccines in children younger than 12 years of age, particularly among those who are living with chronic and life-threatening medical conditions that are particularly prevalent in Africa.

However, mutations in the SARS-CoV-2 genome have led to variants that pose a heightened risk of infection to a wider range of individuals, including subpopulations (eg, children) that were not part of initial vaccination roll-out strategies. Recent evidence indicates that children and young adults can carry a high SARS-CoV-2 viral load in their upper airways, particularly early in the course of infection, suggesting that paediatric populations may be a key source of community transmission and have the potential to serve as a reservoir for the evolution of new variants.<sup>3</sup> Informed by the evolving conditions of the COVID-19 pandemic, several countries—particularly high-income countries (HICs) that were able to roll-out COVID-19 vaccines earlier and more consistently than many other countries—have recently begun offering COVID-19 vaccines to children and adolescents (CA) who were previously ineligible.<sup>4</sup>



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In Africa, where COVID-19 vaccine supply challenges and health system infrastructure issues have impacted the dissemination of vaccines,<sup>5</sup> most countries have not modified their initial vaccination strategies to include a broader age range of CA. Although it may be unrealistic for many African countries to increase their emphasis on vaccinating CA for COVID-19 at present, there are unique conditions within the African continent that suggest it will be important to appropriately plan for expanding COVID-19 vaccine roll-out strategies to be more inclusive of CA. For example, Africa is currently experiencing a decade's long youth bulge,<sup>6</sup> some parts of Africa (eg, sub-Saharan Africa) are struggling to manage the impact of COVID-19 alongside colliding epidemics (ie, HIV and TB) that have strained health systems,<sup>7</sup> and many African countries are dealing with pervasive social-structural disadvantages (eg, lack of access to education, high unemployment, economic inequality) that have been magnified by the COVID-19 pandemic.<sup>8</sup>

If the African continent can rapidly increase COVID-19 vaccine coverage among adults (especially those considered high-risk) and then swiftly shift their vaccination priorities to include a wider age range of CA, it may be possible for countries in Africa to approach herd immunity and recover more rapidly from the COVID-19 pandemic. Herd immunity can be theoretically reached when enough people have been vaccinated against a disease and have developed protective antibodies against future infection. Although the precise threshold for herd immunity is difficult to determine, it is thought that herd immunity can be achieved when 70%–90% of the population is immune through natural infection or vaccination.<sup>9</sup> However, reaching herd immunity is increasingly unlikely because of factors such as vaccine hesitancy, the delayed arrival of vaccinations for CA in some countries, the emergence of new variants (eg, the Omicron variant that was first reported from South Africa), and the possibility of both SARS-CoV-2 reinfection and breakthrough SARS-CoV-2 infection.<sup>10</sup> Even if there is a low likelihood of achieving COVID-19 herd immunity, vaccinating as many people as possible will reduce COVID-19-related hospitalisations and deaths.

In this paper, we summarise trends in SARS-CoV-2 infections among CA, compare COVID-19 vaccination patterns in Africa to more developed parts of the world, and discuss some of the benefits, challenges and unknowns associated with vaccinating CA for COVID-19. In light of situational realities related to COVID-19 vaccine availability and the current progress that the African continent has made towards vaccinating the adult population against COVID-19, we conclude by offering recommendations for a vaccination roll-out strategy in Africa.

### ARE SARS-COV-2 INFECTIONS INCREASING AMONG CHILDREN?

Most COVID-19 cases reported since the SARS-CoV-2 outbreak have occurred among adults between 20 and

49 years of age.<sup>11</sup> However, older adults and others considered particularly high-risk (eg, people with certain medical conditions)<sup>12</sup> have been more vulnerable to severe disease and mortality. Nonetheless, US data indicates that COVID-19 cases and hospitalisation rates among CA have risen because of the highly transmissible Delta variant.<sup>13 14</sup> A similar trend has been observed in African countries, such as South Africa, where the National Institute of Communicable Diseases raised the alarm over the number of CA who tested positive for SARS-CoV-2 infection during the country's third wave of infections.<sup>15</sup> Additionally, some evidence from the ongoing fourth wave of COVID-19 infections in South Africa suggests that the rate of hospital admissions in children under 5 years of age has increased due to variants of concern that have emerged more recently (eg, Omicron variant).<sup>16</sup>

Although COVID-19 cases and hospitalisations have been increasing among CA, the Delta variant does not appear to be associated with an increased risk of severe illness in this population. For example, US estimates of COVID-19-related hospitalisations among CA (0–17 years of age) have shown that length of hospitalisation and the percentage of intensive care admissions during the Delta-predominant period have been similar to the pre-Delta period.<sup>13</sup> An important driver of COVID-19-associated hospitalisations among CA is vaccination coverage in adults. For example, one study found that COVID-19-related emergency department visits and hospital admissions of CA was highest in USA states that had the lowest adult vaccination rates.<sup>14</sup> This finding is consistent with data that suggests children are more likely to acquire SARS-CoV-2 from adults than to be transmitters of infection.<sup>17</sup> Taken together, existing evidence suggests that outbreaks of SARS-CoV-2 variants (particularly those that are more transmissible) in unvaccinated adult populations might lead to increased infections in CA.<sup>18</sup> To limit infections among this population and reduce wider community transmission of SARS-CoV-2, it is important for countries in Africa to rapidly increase COVID-19 vaccine coverage among adults and consider vaccinating older adolescents. CA who are at increased risk for severe illness from COVID-19 and CA living with vulnerable adults should be prioritised. Beyond the benefits of these actions for physical health and reducing transmissibility, they could support the well-being of CA more broadly by minimising further disruptions in important areas of life (eg, education) that have been significantly impacted by the COVID-19 pandemic.

### HOW DO COVID-19 VACCINATION TRENDS AND VACCINE APPROVALS FOR CHILDREN IN AFRICA COMPARE WITH OTHER COUNTRIES?

When COVID-19 vaccines were initially approved for use, countries almost exclusively prioritised vaccinating the adult population.<sup>19</sup> More than a year into the COVID-19 pandemic, a number of countries have modified their vaccination programmes to include a wider range of

non-adults. There are at least two reasons driving adjustments to vaccination strategies in many countries. First, accumulating evidence from vaccine trials supports the safe and effective use of COVID-19 vaccines in CA aged 2–17 years.<sup>20 21</sup> As such, some regulatory agencies have begun to approve COVID-19 vaccines for dissemination in younger CA. For example, Pfizer-BioNTech COVID-19 vaccine was initially available under emergency use authorisation for individuals aged 16 years and older. The US Food and Drug Administration recently approved this vaccine for the prevention of COVID-19 in children aged 12 years and older, which has since been expanded to include children from 5 to 11 years of age.<sup>22</sup> Second, the extent of COVID-19 vaccine coverage in the adult population of some countries reached a threshold that authorities considered sufficient for expanding coverage to younger CA. For example, Spain has completed vaccinating the groups it prioritised first, especially people aged 80 years and above (100% fully vaccinated), and the country is currently vaccinating CA.<sup>23</sup>

So far, most of the countries that have expanded COVID-19 vaccine coverage to include a broader age range of CA are HICs. Many HICs that have modified their vaccination strategies in this way have already achieved a high rate of COVID-19 vaccine coverage among CA (eg, Italy has fully vaccinated 80% of people over the age of 12 years).<sup>24</sup> In contrast, relatively few countries in Africa have modified their initial COVID-19 vaccine strategies to include a wider age range of CA. To illustrate, in [table 1](#) we compare trends in COVID-19 vaccine approvals and rates of coverage in 10 HICs and 10 African countries that have had the highest burden of COVID-19. Whereas most of the HICs in [table 1](#) are offering COVID-19 vaccines to CA between 12 and 17 years of age and some have achieved up to 47% full coverage among CA,<sup>25</sup> few African countries that have experienced a high burden of COVID-19 have approved or are administering vaccines to CA (eg, South Africa recently approved two doses of the Pfizer-BioNTech COVID-19 vaccine for those aged 12–17 years).<sup>26</sup>

It is evident that HICs have faced high burdens of COVID-19 infections compared with African countries, but this does not mean that African countries have felt the impact of COVID-19 less severely. If one focuses on the existing capacity of health systems, we notice that many African countries have universal health service coverage (UHC) indices that are lower than HICs (eg, Lesotho=48 vs UK=87). This means that the patient load caused by COVID-19 in countries with a low UHC index places further strain on the health system and will likely lead to increased COVID-related mortality due to an insufficiency of healthcare resources, over and above that due to the pathogenicity of circulating SARS-CoV-2. For example, the case fatality rate in Lesotho is double that of the UK (3.0% vs 1.4%), even though the number of COVID-19 cases in Lesotho has been far less (see [table 1](#)). Hence, there is a need to step-up vaccination coverage in Africa, especially in countries with weaker health systems.

Considering the inequities in access to vaccines between HICs and African countries, it may be some time before it is reasonable for all countries in Africa to prioritise COVID-19 vaccines for CA. As countries on the African continent find ways of increasing COVID-19 vaccine coverage in the adult population, it will be prudent to prioritise the delivery of health interventions that are already known to save children's lives, such as vaccines against measles and other vaccine-preventable diseases,<sup>27</sup> especially since immunisation programmes have been severely disrupted due to COVID-19 lockdowns.<sup>8</sup>

#### WHAT ARE THE BENEFITS OF VACCINATING CA FOR COVID-19?

Vaccinating children can have several public health benefits that include reducing the severity of illness due to COVID-19 and decreasing the transmissibility of virulent strains of SARS-CoV-2.<sup>28</sup> Although most infected CA experience mild symptoms, a small proportion do become critically ill and mortality can occur.<sup>29</sup> Some evidence suggests that illness severity due to COVID-19 and risk of mortality tends to be greater in less developed contexts (including Africa), possibly due to delays in seeking treatment and weaknesses of the health systems in such contexts.<sup>30</sup> Of note, a recent multicountry study across East, West, Central and Southern Africa reported 8.3% mortality among nearly 500 CA hospitalised with COVID-19.<sup>31</sup> Therefore, it will be important to consider vaccinating CA throughout Africa, with plans needed to ensure that health systems are able to efficiently provide COVID-19 vaccines to CA when the circumstances allow for their prioritisation.

In addition to the more direct benefits that COVID-19 vaccines can offer to the physical health of CA, high coverage of COVID-19 vaccines among CA could support well-being more broadly by mitigating educational disruptions associated with school closures, helping to maintain the continuity of feeding schemes, and limiting disruptions to extracurricular activities.<sup>32</sup> Providing COVID-19 vaccines to CA may help to minimise the cascading social and economic impacts that COVID-19 infections among CA could have on parents, families and communities. For example, evidence suggests that a spike in COVID-19 infections among CA in schools may result in school closures that require caregivers to take time off work to supervise their children while at home, which could lead to income loss, intensify caregiver stress and/or increase family conflict.<sup>33</sup> The potential consequences that arise from COVID-19 hotspots could be especially devastating to people living in vulnerable contexts characterised by (among other factors) high levels of poverty and unemployment.<sup>8</sup>

#### ARE THERE CHALLENGES AND UNKNOWNNS ASSOCIATED WITH COVID-19 VACCINES FOR CA?

There are challenges to vaccinating CA for COVID-19 that exist across contexts. Improving the distribution of vaccines to resource-limited countries (including those in

**Table 1** UHC index, COVID-19 disease burden, COVID-19 vaccine approval and COVID-19 vaccine coverage in high-income countries outside Africa with high COVID-19 case burden and African countries with high COVID-19 case burden

Country	UHC service coverage index <sup>1</sup>	COVID-19 cases (per 100 000 population) <sup>2*</sup>	Case fatality rate <sup>3*</sup>	COVID-19 vaccine eligibility for HCW, adults, and children	Date of initial roll-out for any COVID-19 vaccine (emergency use or full)	Percentage of adult population (18+ years) fully vaccinated <sup>47*</sup>	Percentage of eligible child population (<18 years) fully vaccinated*
High-income countries							
Slovakia	77	23 475	1.2%	▶ HCW and adults aged 65+ years <sup>4</sup> ▶ Children aged 5–11 years <sup>5</sup>	▶ 26 December 2020 <sup>4</sup> ▶ 08 September 2021 <sup>5</sup>	43.3%	Not available†
Slovenia	79	21 034	1.2%	▶ HCW and adults aged 80+ years <sup>4</sup> ▶ Children aged 12+ years <sup>6</sup>	▶ 27 December 2020 <sup>4</sup> ▶ 31 May 2021 <sup>6</sup>	55.7%	Not available†
San Marino	Not available	19 090	1.5%	▶ HCW and adults aged 65+ years <sup>7</sup> ▶ Children aged 12–15 years <sup>9</sup>	▶ 25 February 2021 <sup>8</sup> ▶ 01 June 2021 <sup>9</sup>	70.0%	Not available†
Belgium	84	16 804	1.4%	▶ HCW and adults aged 65+ years <sup>4</sup> ▶ Children aged 12–15 years <sup>10</sup>	▶ 28 December 2020 <sup>4</sup> ▶ 07 July 2021 <sup>10</sup>	75.6%	Not available†
United Kingdom	87	16 117	1.4%	▶ HCW and adults aged 80+ years <sup>11</sup> ▶ Children aged 16+ years <sup>13</sup> ▶ Children aged 12–15 years <sup>14</sup>	▶ 02 December 2020 <sup>12</sup> ▶ 23 August 2021 <sup>13</sup> ▶ 13 September 2021 <sup>14</sup>	69.5%	Not available†
Croatia	71	16 026	1.8%	▶ HCW and adults aged 65+ years <sup>4</sup> ▶ Children aged 12+ years <sup>15</sup>	▶ 27 December 2020 <sup>4</sup> ▶ 06 September 2021 <sup>15</sup>	50.1%	Not available†
United States	84	15 224	1.6%	▶ HCW and adults aged 65+ years <sup>16</sup> ▶ Children aged 16+ years <sup>16</sup> ▶ Children aged 12–15 years <sup>16</sup> ▶ Children aged 5+ years <sup>17</sup>	▶ 14 December 2020 <sup>16</sup> ▶ 23 August 2021 <sup>16</sup> ▶ 10 May 2021 <sup>16</sup> ▶ 02 November 2021 <sup>17</sup>	60.7%	47.0% <sup>48</sup>
Hungary	74	12 108	3.1%	▶ HCW and adults aged 60+ years <sup>4</sup> ▶ Children aged 16–18 years <sup>18</sup> ▶ Children aged 12–16 years <sup>19</sup>	▶ 26 December 2020 <sup>4</sup> ▶ 13 May 2021 <sup>18</sup> ▶ 10 June 2021 <sup>19</sup>	60.3%	Not available†
Poland	75	10 031	2.3%	▶ HCW and adults aged 65+ years <sup>4</sup> ▶ Children aged 16–17 years <sup>20</sup> ▶ Children aged 12+ years <sup>21</sup> ▶ Children aged 5+ years <sup>22</sup>	▶ 26 December 2020 <sup>4</sup> ▶ 17 May 2021 <sup>20</sup> ▶ 07 June 2021 <sup>21</sup> ▶ 16 December 2021 <sup>22</sup>	54.4%	Not available†
Italy	82	8634	2.6%	▶ HCW and adults aged 80+ years <sup>4</sup> ▶ Children aged 16+ years <sup>23</sup> ▶ Children aged 12+ years <sup>24</sup> ▶ Children aged 5–11 years <sup>25</sup>	▶ 31 December 2020 <sup>4</sup> ▶ 03 June 2021 <sup>23</sup> ▶ 16 August 2021 <sup>24</sup> ▶ 01 December 2021 <sup>25</sup>	74.4%	45.0% <sup>21</sup>
Africa							
Seychelles	71	24 385	0.5%	▶ HCW and adults aged 65+ years <sup>26</sup> ▶ Children aged 12+ years <sup>27</sup>	▶ 10 January 2021 <sup>26</sup> ▶ 10 September 2021 <sup>27</sup>	79.2%	Not available†
Botswana	61	8512	1.2%	▶ HCW and adults aged 75+ years <sup>28 29</sup>	▶ 26 March 2021 <sup>30</sup>	22.5%	Not available†

Continued

Table 1 Continued

Country	UHC service coverage index <sup>1</sup>	COVID-19 cases (per 100 000 population) <sup>2*</sup>	Case fatality rate <sup>3*</sup>	COVID-19 vaccine eligibility for HCW, adults, and children	Date of initial roll-out for any COVID-19 vaccine (emergency use or full)	Percentage of adult population (18+ years) fully vaccinated <sup>47*</sup>	Percentage of eligible child population (<18 years) fully vaccinated*
Tunisia	70	6152	3.5%	▶ HCW and adults aged 65+ years <sup>31</sup> ▶ Children aged 15+ years <sup>32</sup>	▶ 13 March 2021 <sup>31</sup> ▶ 07 October 2021 <sup>32</sup>	45.0%	Not available†
Libya	64	5569	1.5%	▶ HCW and adults aged 50+ years <sup>33</sup>	▶ 17 April 2021 <sup>33</sup>	10.6%	Not available‡
South Africa	69	5344	2.9%	▶ HCW and adults aged 60+ years <sup>34</sup> ▶ Children aged 12–17 years <sup>36</sup>	▶ 17 February 2021 <sup>35</sup> ▶ 20 October 2021 <sup>36</sup>	25.8%	Not available†
Eswatini	63	4544	2.4%	▶ HCW and adults aged 60+ years <sup>37</sup>	▶ 24 March 2021 <sup>37</sup>	22.5%	Not available‡
Lesotho	48	1056	3.0%	▶ HCW and adults aged 60+ years <sup>38</sup>	▶ 10 March 2021 <sup>38</sup>	28.9%	Not available‡
Zimbabwe	54	1127	3.0%	▶ HCW and adults aged 60+ years <sup>39</sup> ▶ Children aged 14+ years <sup>40</sup>	▶ 18 February, 2021 <sup>39</sup> ▶ 26 August 2021 <sup>40</sup>	19.9%	Not available†
Egypt	68	367	5.7%	▶ HCW and adults aged 40+ years <sup>41 42</sup> ▶ Children aged 15+ years <sup>43</sup> ▶ Children aged 12+ years <sup>44</sup>	▶ 24 January 2021 <sup>41</sup> ▶ 02 November 2021 <sup>43</sup> ▶ 28 November 2021 <sup>44</sup>	16.4%	Not available‡
Nigeria	42	108	1.4%	▶ HCW and adults aged 60+ years <sup>45</sup>	▶ 15 March 2021 <sup>46</sup>	1.9%	Not available‡

\*Information extracted from sources on 12 December 2021.

†COVID-19 vaccines are being offered to individuals <18 years of age, but no official data are available (as of 12 December 2021).

‡COVID-19 vaccines are not being offered to individuals <18 years of age (as of 12 December 2021). The references to sources that correspond with the Arabic numeral superscripts can be found in online supplemental file 1.

HCW, healthcare worker; UHC, universal health coverage.

Africa) requires greater international cooperation among all countries to make vaccines available, affordable, and accessible to all. WHO, in collaboration with other global partners (eg, HICs, United Nations), must strive to ensure equitable access to COVID-19 vaccines and assist with improving vaccination roll-out infrastructure for the administration of vaccines across the world.

Given that children are especially vulnerable to preventable diseases (eg, measles, polio, neonatal tetanus, hepatitis B), it is important that child immunisation campaigns in African countries continue their activities.<sup>34</sup> In this part of the world, countries are encouraged to direct efforts towards strengthening immunisation platforms, which will also contribute to infrastructure that is needed to distribute and administer COVID-19 vaccines to CA. Furthermore, countries should be supported to follow the WHO's recommendation that children between 12 and 15 years of age who are considered high-risk for severe illness (eg, those who are immunocompromised and/or living with certain medical conditions) should be a priority group for the COVID-19 vaccine.<sup>35</sup>

Although vaccines are slowly becoming widely available to the adult population in most African countries, vaccine hesitancy in the adult population remains a barrier to more widespread uptake. In a recent study that was comprised almost entirely of residents from 34 African countries, 37% of participants were hesitant to receive

the COVID-19 vaccine. Vaccine hesitancy was more likely among participants with a low-risk perception of infection and those who believed that their risk of severe illness from SARS-CoV-2 infection was low.<sup>36</sup> Vaccine hesitancy among the adult population may prevent CA who need parental/guardian consent to receive the vaccine from being vaccinated. Research by the Kaiser Family Foundation<sup>37</sup> revealed that a higher proportion of parents of unvaccinated children feared potentially irreversible and unknown long-term effects of COVID-19 vaccines. In many HIC contexts where COVID-19 vaccines are available to CA, some parents who themselves are vaccinated for COVID-19 have decided to postpone vaccinating their children, and parental support for school vaccine mandates has been low.<sup>38</sup> These attitudes occur in the face of clinical trials that have provided evidence supporting the safe and effective use of COVID-19 vaccines in CA over the age of 12.<sup>20 39</sup> However, in HICs where COVID-19 vaccines are more widely available, there is evidence to suggest that vaccine coverage among both CA and adults is rising in spite of vaccine hesitancy.<sup>40</sup>

There is a need to educate caregivers on new SARS-CoV-2 variants that are potentially more transmissible,<sup>41</sup> as well as country consent policies for vaccinating CA. In some countries, COVID-19 vaccines are being offered to CA without parental/guardian consent. For example, children aged 12–17 years old in South Africa are now

permitted to receive two doses of the approved Pfizer-BioNTech vaccine without needing parental/guardian consent.<sup>26</sup> The decision to authorise this COVID-19 vaccine for children aged 12 years and older is premised on the understanding that older minors are capable of understanding the risks and benefits of the vaccination.<sup>42</sup> Some of these countries have already set precedents by lowering the age of consent to accessing other health services (eg, HIV testing), which have improved access to care among adolescents.<sup>43</sup> However, mechanisms must be established to provide CA (as well as their caregivers) with accurate information about both the advantages and potential disadvantages of receiving the COVID-19 vaccine. Governments, civil organisations, and community leaders must collaborate to address concerns raised by disinformation campaigns and find effective ways of delivering reliable information about the efficacy of COVID-19 vaccines that have been approved for use among CA.

Current evidence generally supports the safety and effectiveness of COVID-19 vaccines for children. For example, recent data from a phase II/III trial indicates that a child-size dose of the Pfizer-BioNTech COVID-19 vaccine generates a robust antibody response in children aged 5–11 years old, and side effects are generally comparable to those in young adults.<sup>44</sup> However, more contextual research is required to understand the implications of COVID-19 vaccines on the development of CA, as most evidence about the impacts of COVID-19 in this population comes from studies in high-resource settings.<sup>45</sup> Research is also needed to determine the potential immediate and long-term side effects of COVID-19 vaccines for CA living with chronic and life-threatening medical conditions that are particularly prevalent in Africa. For example, little is known about the effects of COVID-19 vaccines among CA living with HIV and/or TB, which are two serious chronic infections highly prevalent among CA in sub-Saharan Africa. Hence, paediatric COVID-19 vaccine clinical trials among CA in African countries will play an important role in establishing the safety, reactogenicity and immunogenicity of COVID-19 vaccines in CA living with HIV and/or TB.

## CONCLUSION

In Africa, the negative implications of social-structural vulnerabilities (eg, poverty, inequities in access to health-care) that predated the COVID-19 pandemic have been amplified by its impact. Vaccinating CA for COVID-19 could play an important role in mitigating the strain on overburdened health systems and promoting postpandemic recovery. Expanding COVID-19 vaccine strategies to include a wider age range of CA, especially older adolescents, may help to lower the rate of SARS-CoV-2 transmission in schools, which could support the well-being of CA more broadly (eg, fewer disruptions in formal learning, greater continuity of daily routines). However, vaccination strategies also need to consider the prevailing

global inequities in access to vaccines. In many African countries, capacity to engage in large-scale roll-outs of COVID-19 vaccinations is limited by supply challenges and weak health system infrastructure, suggesting that the African continent should continue to prioritise vaccinations for adults and consider offering COVID-19 vaccines to CA who are at increased risk of severe illness from the disease. A concerted effort to accelerate COVID-19 vaccination coverage among adults to approach at least 70% by early 2022<sup>46</sup> would allow African countries to free up capacity to prioritise COVID-19 vaccines for CA during 2022, with roll-out efforts needing to focus on older and school going CA. Actionable strategies should be developed and implemented to ensure that caregivers have the information they need to make informed decisions about providing consent for their minor children to be vaccinated for COVID-19.

More data are needed to develop a better understanding of the safe and effective use of COVID-19 vaccines in children who are younger than 12 years of age. We need to continue gathering evidence on the use of different COVID-19 vaccines in CA, which would allow for general recommendations on vaccinating children to be made. It will also be important to engage in ongoing evaluation of the safety and efficacy of COVID-19 vaccines for CA, as well as research to identify risk factors for severe COVID-19 and the potential impact of future variants on CA. More generally, antibody studies are needed to detect immunity levels in the population and inform public health responses. Although countries throughout Africa should be supported to rapidly expand COVID-19 vaccines to CA in the near future, maintaining control over COVID-19 and its impacts will require African countries to continue prioritising non-pharmaceutical interventions among both vaccinated and unvaccinated people.

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