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"My business challenges are far worse right now, I will go for Covid-19 vaccine later":
Post-pandemic lessons from the Covid-19 vaccine rollout in informal settlements in Harare, Kampala, Lilongwe and Nairobi

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Abstract

This paper focuses on the immediate post-pandemic period (2021–23) to discuss how the Covid vaccination rollout offers insights into the pandemic's longer-term socioeconomic, health and political consequences for marginalised residents of African cities. Our findings provide a snapshot of the local impact of global vaccine inequalities as these continued to play out in Harare, Lilongwe, Kampala and Nairobi. Structural barriers to vaccine deployment and access continued to be exacerbated by pre-pandemic inequities in infrastructure, basic services and local governance. Among low-income urban communities in the four cities, interest in getting vaccinated and vaccine accessibility have both declined despite improvements in global allocation and national availability. Drivers of hesitancy changed over time, as perceptions of risk shifted from the high potential harm of vaccination to the low severity of the Covid health threat, further influenced by limited availability of information from trusted sources. And Covid vaccination campaigns have largely been eclipsed by overlapping new crises, the effects of which have further compromised many people's already slow recovery.

1. Introduction

Covid-19 vaccination has enabled communities to protect their health, avoid further exclusion and participate in a society gradually returning to normal life. However, throughout the pandemic, across the global North and South and at multiple levels, socioeconomic inequalities have fundamentally shaped both disease burdens and non-health impacts, not least in influencing access to and uptake of Covid vaccines. For low-income workers and residents of cities and towns in the global South, Covid's health effects have not been insignificant. However, the impact of states' non-pharmaceutical intervention (NPI) responses – such as lockdowns, curfews, mobility restrictions or school closures – have often been far more serious, because these were so often implemented without full consideration of the poverty consequences and with inadequate social protection measures in place (Lenhardt, 2021). By 2023, many informal workers and residents of informal settlements were struggling with a slow economic recovery. The longer-term impacts of the pandemic on urban informality remain poorly understood, particularly in combination with the rising cost of living or with other concerns like climate change and inequitable local governance (Sverdlik et al., 2024).

As Covid-19's acute phase has subsided, this paper focuses on the immediate post-pandemic period to discuss how the Covid vaccination rollout offers insights into the pandemic's longer-term socioeconomic, health and political consequences for marginalised residents of African cities. We draw on action-research by affiliates of Slum Dwellers International (SDI) in ten informal settlements across the cities of Harare (Zimbabwe), Kampala (Uganda), Lilongwe (Malawi) and Nairobi (Kenya).[1] Data collection was conducted during a period when recorded Covid-19 cases had fallen, restrictions were mostly removed, economies had largely reopened and several new overlapping crises had risen to the foreground – all of which coincided with persistently low Covid vaccination rates.[2]

Our research findings provide a snapshot of the local consequences of global vaccine inequalities as these continued to play out during the post-pandemic era. And they illustrate how structural barriers to vaccine deployment and access continued to be exacerbated by pre-pandemic inequities in infrastructure, basic services and local governance. Vaccine uptake was further influenced by factors like cultural beliefs and the availability of, or access to, clear information from trusted sources.

We also found that, post-pandemic, interest in getting vaccinated has further declined among low-income urban communities, despite improvements in global vaccine allocation and national availability – although not necessarily in local accessibility (see below). Drivers of low uptake (hesitancy) have also changed over time, as perceptions of risk have shifted from focusing upon the high potential harm of vaccination to the low

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[1] SDI is a movement of grassroots federations active in over 18 nations across the global South, which promotes inclusive urbanisation via community-led interventions and partnerships.
[2] As the paper was being written in November 2023, 32% of Africa's population is fully vaccinated, defined here as having had a complete first course (OWID, nd).

severity of the Covid health threat. In addition, what remains of Covid vaccination campaigns has been eclipsed by other concerns, and the effects of overlapping new crises (like the rising cost of living and other disease outbreaks) are compromising many low-income residents' and informal workers' already slow recovery and further exhausting their depleted savings and assets (Sverdlik et al., 2024). For many people, going for a Covid vaccination was and still is the least of their worries.

The paper is structured as follows: Section 2 below outlines the methodology and study settings. Section 3 briefly contextualises the research by providing an overview of the relevant dimensions of global vaccine inequality and national Covid vaccination programmes. In Section 4, we use illustrative findings about Covid vaccine accessibility and uptake in the four cities to discuss some of the pandemic and post-pandemic trends observed in each setting. Here, we also discuss grassroots contributions to vaccination campaigns in the cities. Section 5 concludes with reflections on what has been learnt for tackling future urban health crises and for recovering from this one.

2. Methods

This paper forms one component in a larger 2022–23 action-research project exploring the Covid pandemic's longer-term socioeconomic, health and political consequences for informal workers and low-income residents in African cities. Data collection focused on changes and continuities in the post-pandemic period, after official Covid-19 restrictions had been lifted. Sverdlik et al. (2024) summarise the overall research findings, covering inequitable impacts, official responses and grassroots strategies over time and particularly since official restrictions were lifted. The study also builds on prior research in 2021 that explored bottom-up pandemic responses, urban coalitions and Covid vaccine access in informal areas of African cities (respectively, Kimari et al., 2022; Sverdlik et al., 2022; Lines et al., 2022; Lines et al., 2023). In each phase, the research was undertaken by SDI affiliates with coordination support from SDI's global secretariat and The University of Manchester. Both phases were part of the Covid Collective research partnership led by the Institute of Development Studies and funded by the UK's Foreign, Commonwealth and Development Office (FCDO).

The ten informal settlement study settings described in this paper were selected by the SDI-affiliated research partners,[3] in consultation with SDI Federation leaders in each city who helped link research teams to the participants.[4] Research activities took place

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[3] Dialogue on Shelter Trust in Harare, ACTogether and Urban Action Lab in Kampala, CCODE in Lilongwe and SDI-Kenya in Nairobi.

[4] The settings were as follows: in Harare the 2022–03 research took place in the informal settlements of Epworth, Hatcliffe Extension and Stoneridge; the 2021 research we build this paper on took place in these three settlements plus Hopley and Mbare. In Kampala the 2022 research took place in the informal settlements of Naguru II, Mulago II and Nakulabye, while in 2021 research took place with participants across multiple settlements in all five city divisions. In Lilongwe the 2022 research took place in the informal settlements of Area 36, Area 50 and Kaliyeka. In Nairobi the 2021 and 2022 research took a deep dive, focusing on different neighbourhoods within the informal settlement of Mathare. The Federation leaders were the Zimbabwe Homeless People's Federation in Harare, National Slum Dwellers Federation of

in late 2022 and early 2023, and fieldwork was carried out through a mixture of quantitative and qualitative data collection to support a qualitative methodology, as well as through a review of secondary literature. We conducted key informant interviews (KIIs) with civil society organisations and local and national government stakeholders; a survey (semi-structured questionnaire) in three of the four cities (Harare, Kampala and Lilongwe); and focus group discussions (FGDs), which varied by city and typically included a mix of community health workers, local leaders, vulnerable groups (migrants and refugees, elderly people, people living with disabilities, people with chronic illnesses), small business owners, youth groups, savings groups and women's groups. The views of community health workers, as well as of residents varying in age, migration status and other axes of difference, helped to provide a nuanced understanding of cities' vaccine uptake strategies and the barriers to access facing their residents.

The survey of key informants living locally (N= 130 in Kampala; 90 in Harare; 59 in Lilongwe) aimed to capture people's perceptions of key events in the period mid-2022 to January 2023. It focused on Covid vaccination, and we gathered quantitative and qualitative data on vaccine access and uptake over time in each settlement, building on a similar tool used in the 2021 research (Lines et al., 2023). Survey participants were also asked more generally about health and socioeconomic experiences of the post-pandemic period in their settlements; these findings are discussed in Sverdlik et al. (2024). The survey tool was not designed to be statistically representative and instead explored patterns among a limited number of community leaders and residents, who were selected as participants because they could reasonably be expected to have a good sense of trends in their areas. By drawing upon community leaders and other knowledgeable informants from ten settlements in the four cities, we were able to capture some of the variations and evolving patterns in vaccine uptake across Eastern and Southern African cities. We also examined change over time since the previous study in late 2021: in Kampala and Harare, the same settlements were the focus of the 2021 and 2022–23 surveys, and many interviewees participated in both rounds of research.

Data were collected individually and face-to-face in the study settlements using printed questionnaires or tablets; information was then uploaded to Qualtrics software for tabulation and analysis. The survey findings were also summarised in handouts and posters featuring data visualisations and quotes, for dissemination to Federation members and other community groups in the four cities.

Uganda in Kampala, Malawi Federation of the Rural and Urban Poor in Lilongwe and Muungano wa Wanavijiji in Nairobi.

3.   Context

3.1.   Global and national Covid vaccine inequalities

In the crucial early months of Covid vaccine distribution, major inequalities in access and allocation for low- and middle-income countries (LMICs) reflected longstanding structural imbalances in power and wealth; geopolitical calculations; and technological inequities linked to vaccine production and deployment. Ambitions for a staged rollout through the World Health Organization's (WHO) global allocation mechanism, COVAX,[5] learning from previous crises such as the 2009 H1N1 influenza pandemic and in accordance with principles of global equality, were quickly undermined (Wouters et al., 2021). As a result, by September 2021, when over 50% of the populations of Europe and the US had been fully vaccinated, only 3.4% of Africans were – with many priority groups such as health workers still unvaccinated (Horner, 2022). As has been well documented elsewhere, this global vaccine nationalism has been hugely counterproductive, epidemiologically, ethically and economically.[6] The possibility of virus mutation is higher when there remain countries with low vaccination rates (Ramirez-Zamudio and Sanchez Davila, 2023), threatening existing vaccines' efficacy. For example, Omicron was first discovered in South Africa in late 2021, where an initial large-scale outbreak was exacerbated by the country's low vaccination rates and contributed to the variant's rapid global spread (Ao, D et al., 2022).

In the face of evolving variants, vaccine inequality leads to new waves and to earlier and larger outbreaks, which risks undermining infection control and economic recovery worldwide (Ye et al., 2022; Çakmaklı et al., 2021). Nevertheless, for the global South the impact has been far greater. In terms of health burden, an estimated 50% of Covid deaths in LMICs could have been averted with the availability of higher and earlier

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[5] Covid-19 Vaccine Global Access Facility (COVAX) is the global mechanism for equitably sharing Covid-19 vaccine doses. Administered by the Coalition for Epidemic Preparedness Innovations (CEPI), the Global Alliance for Vaccines and Immunisation (Gavi) and the WHO, it relied heavily on largely inadequate donations of both funds and doses by rich countries. At the core of COVAX's approach was that vaccination should proceed in stages, starting with priority groups before proceeding to wider sections of the population. COVAX's initial ambition was that no country should vaccinate more than 20% of its population before all countries had vaccinated 20% of theirs, but in reality its achievement has been to help countries procure doses at lower prices and thus start vaccine rollouts earlier than they otherwise would have done without external assistance (Wouters et al., 2021). Widespread vaccine nationalism undermined COVAX's global solidarity efforts from the start. India's mid-2021 decision to halt vaccine exports for several months was a further setback, curtailing COVAX's access to the (cheaper) Indian manufacturers on which it was overly reliant.

[6] "Vaccine nationalism" is an economic strategy whereby governments take unilateral actions to acquire vaccinations from manufacturers and increase supply in their own country, in order to provide their own populations with access to vaccines ahead of other countries and regardless of the limited vaccine distribution for the rest of the world (Riaz et al., 2021; Gruszczynski and Wu., 2021). During the Covid-19 pandemic, vaccine nationalism was largely a phenomenon characteristic of high-income countries in the global North (Gruszczynski and Wu, 2021). Vaccine nationalism leads to weak cooperation between nations, which was a major barrier to achieving worldwide vaccination at the scale needed to end the Covid-19 pandemic safely (Ghebreyesus, 2021).

doses on par with richer countries (Gozzi et al., 2023). In macroeconomic terms, two major dimensions of global vaccine inequality include the relative affordability of national Covid vaccination campaigns (in terms of purchase of pharmaceutical products and their deployment) and the long-term economic losses from delaying vaccination. High-income countries needed to increase average health care spending by only 0.8% of GDP to cover the cost of achieving herd immunity by vaccinating 70% of the population; for low-income countries, this figure is 57% of GDP (UNDP, nd).[7] And sub-Saharan African countries are forecast to lose an average 3% of GDP from 2022 to 2025 as a result of delays in Covid vaccination, while other world regions' losses are forecast at between just 0% and 1.4% of GDP (EIU, 2021).

Within countries, logistical and administrative deployment challenges and Covid vaccine distribution inequalities have reinforced many existing health and socioeconomic inequities, including rural and urban divides, gendered inequalities and other vulnerabilities (cf Bayati et al., 2022; Dasgupta, 2021; Sekalala et al., 2021). Wouters et al. (2021) set out various deployment challenges of particular concern to low-income countries. These include weak data infrastructure to identify and invite eligible individuals by priority group (for example, few adult immunisation registries) and to implement monitoring and evaluation systems to track vaccine rollout. Inadequate storage, delivery and waste management systems to administer vaccines at scale are also a challenge, particularly important for products requiring cold supply chains or with short shelf lives. And a lack of clear, transparent vaccination information from government officials about timelines, group prioritisation and choice of vaccine products makes deployment especially difficult in the face of supply uncertainty (both type and quantity of vaccines).

Obviously, overall lack of supply in many African nations further exacerbates the above inequalities. And – critically, for urban informal workers and residents – the absence of vaccines means that more NPIs are required, for longer, to achieve effective control of virus transmission (Gozzi et al., 2023). Throughout the second half of 2022, Uganda's, Malawi's and Zimbabwe's NPIs were all significantly more stringent than those of countries with far higher vaccination rates such as Canada, Denmark or the UK (Oxford Covid-19 Government Response Tracker via OWID, nd).[8]

National Covid vaccine contexts in Zimbabwe, Uganda, Kenya and Malawi

Supply and vaccination rates. Zimbabwe's vaccine rollout started in February 2021, around a month earlier than rollouts in Kenya, Malawi and Uganda, and it is the only study country to have reached the WHO target of fully vaccinating 10% of the population by October 2021. Zimbabwe's rollout reflects its geopolitical ties to China, and it has almost exclusively used Chinese-made vaccines, including in booster programmes since December 2021. Some early supply issues still arose, with the

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[7] Only two LICs, Rwanda and Liberia, have fully vaccinated 70% of their population, achieving this in December 2022.

[8] See ourworldindata.org/covid-stringency-index.

Zimbabwean media and our Harare research participants both reporting long queues when vaccination centres were unable to meet demand. In contrast, Uganda's, Kenya's and Malawi's vaccine rollouts started slowly thanks to lack of supply, as all were heavily reliant on COVAX, although Uganda and Kenya also show some limited evidence of China's vaccine diplomacy. With no internal manufacturing capabilities, this dependency on unreliable international donations caused various kinds of challenges. Uganda received at least five different types of vaccines over the course of its rollout, which generated some public confusion, including in the settlements where we collected data (Lines et al., 2023). Malawi, already constrained by health service deficiencies (Ao, Q et al., 2022), faced supply challenges at some of the most critical moments in the pandemic, resulting in a lack of vaccine stocks at the peak of its third wave of infection. In Kenya, limited supply contributed to a slow rollout which – when combined with poor public information – raised suspicions that wealthier, better connected people were able to access Covid vaccines more easily, exacerbating mistrust and vaccine hesitancy (Bukenya et al., 2022).

Zimbabwe's early progress in vaccination later slowed, and uptake in all countries began to flatten out variously between May 2022 (Zimbabwe) and October 2022 (Malawi). Table 1 shows the known vaccination rates as of 31 July 2023 (WHO, nd). Figure 1 compares infection rates and vaccination up to the latest available data; some countries have stopped regularly publishing such statistics.

Table 1: Reported vaccination rates, end July 2023

Country or region	Population complete initial protocol ('fully vaccinated')	
Zimbabwe		34%
Uganda		30%
Malawi		22%
Kenya		21%
Africa		33%
World		64%

Sources: WHO (nd); OWID (nd).

Figure 1: National Covid vaccination and infection context, March 2020-June 2023
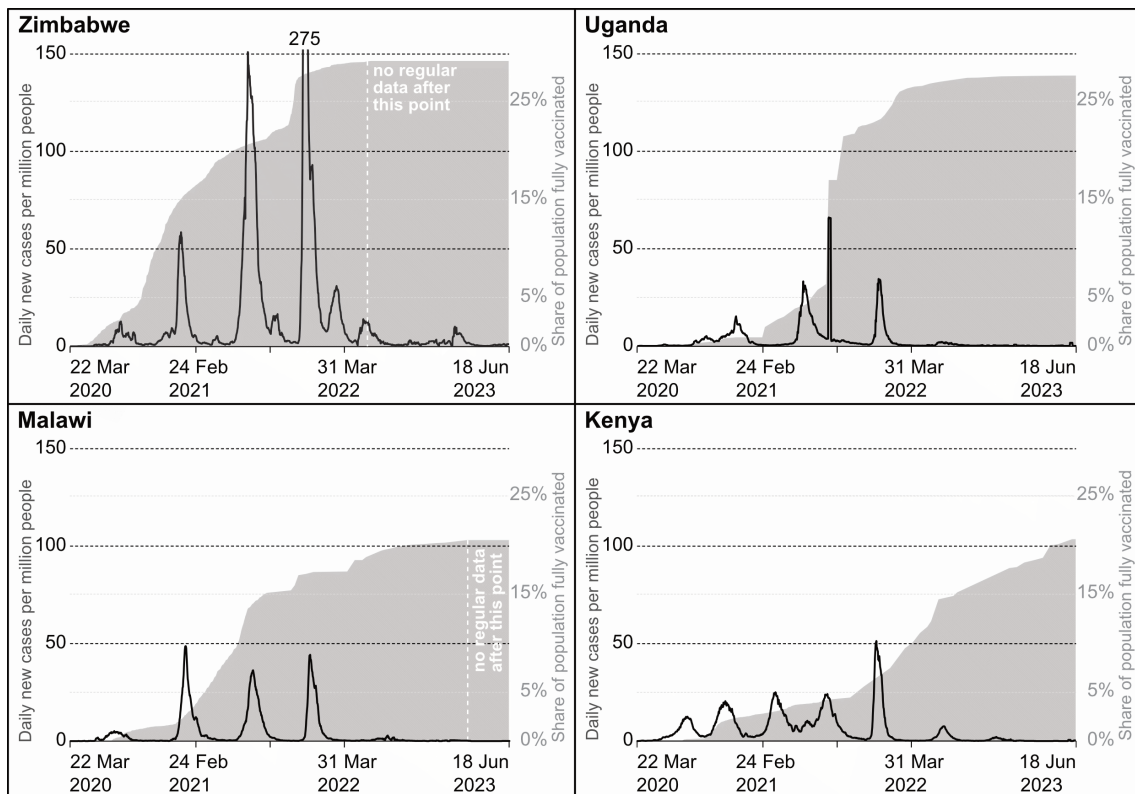
Notes: Black line is daily new confirmed Covid-19 cases per million people seven-day rolling average (as a result of limited testing, the number of confirmed cases is lower than the true number of infections). Grey area is share of population that is fully vaccinated, that is, having received a complete initial protocol. (Alternative definitions of full vaccination, such as having been infected with SARS-CoV-2 or having had one dose of a two-dose protocol, are ignored). All charts are to the same scale.
Source: OWID (nd).

Rural/urban differences. This paper focuses on vaccine access and uptake in city contexts, and the picture may be very different in rural areas or even smaller urban configurations. Unfortunately, in three of the four study areas, we found little data to support subnational analysis of urban variations in vaccine uptake (as compared to national averages). In Kenya, a March 2022 report from the Ministry of Health gave Nairobi City County the second highest Covid vaccination rate in the country:[9] 46.7% of the population fully vaccinated, compared to a national rate of 15% (Bukenya et al., 2022). In Zimbabwe, vaccination campaigns were initially concentrated in big cities, starting with Harare, although a later study suggested equitable distribution of vaccines across Zimbabwe's ten provinces (Murewanhema et al., 2021; Murewanhema et al., 2022). In terms of access, a survey across six African countries (including Kenya, Malawi and Uganda) concluded that urban inhabitants were more likely to say that work commitments stood in the way of them getting vaccinated, whereas in rural areas, structural issues such as availability and distance to the nearest centre were more

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[9] After the smaller and more rural Nyeri County.

frequently reported (Wollburg et al., 2023). In such cases, people living in rural areas may have been willing to be vaccinated, but the vaccines were not accessible to them. In terms of Covid vaccination hesitancy, some studies have found urban Ugandans and Malawians to be less hesitant than their rural counterparts (Kabagenyi et al., 2022; Ao, Q et al., 2022); by contrast, other research has found urban populations in Burkina Faso, Kenya, Nigeria and Uganda to be more hesitant (Wollburg et al., 2023).

NPIs, including lockdowns and curfews. While lockdowns and other restrictions have been most heavy-handed in Harare, NPIs have negatively affected informal workers and residents in other cities as well. In Harare, most curfew restrictions had ended by late 2021, although in late 2022 a quarter of survey participants said there had been recent mobility controls in their informal settlements. During the pandemic, Harare city authorities oversaw the "cleaning up" – in other words forceful demolitions and evictions – of many informal business markets and structures, under the guise of disease control (Mwonzora, 2022). Similar tactics were found in Kampala, for example targeting motorcycle *boda-boda* riders and vendors, and in Nairobi, which saw forced evictions in informal settlements.

In Malawi, Covid-19 NPIs were relatively limited, although there were restrictions on public gatherings (difficult to observe or enforce in informal settings), capacity limits on public transport (leading to fare rises of up to 150% in our Lilongwe study areas), and some early curbs on informal sector activities in public places. One reason why Lilongwe's experience has been distinctive is that, early in the pandemic, the government's planned control measures were challenged by human rights groups and blocked by national courts, on the grounds of lack of social support available to counter the impact on low-income and vulnerable groups. However, the NPIs related to Malawi's more recent cholera outbreak appear to have been more thoroughly enforced than Covid restrictions, and in 2022 we found a range of "clean-up" measures to be in place in Lilongwe, for example limiting street vending and banning the sale of water and ready-to-eat or cooked foods along streets and in public places. These measures are likely to affect informal sector activities and businesses in informal settlements in similar ways to the Covid measures seen elsewhere.

In Uganda, countrywide curfews were in place from mid-2021, with heavy security deployed during peak periods of the crisis to enforce mobility restrictions. Studies have suggested that this has led to reduced insecurity in major centres (Bukenya et al., 2022); however, our research in both 2021 and 2022 found that curfews were associated with heightened levels of criminality in informal areas of Kampala, where the pandemic's socioeconomic impacts have been most acute (Lines et al., 2023). Uganda's policy of universal adult vaccine eligibility was the latest among the four study countries, towards the end of 2021 and as supply constraints eased.[10] Before this announcement, only high-risk and vulnerable groups such as frontline health workers and service providers had been prioritised. There followed a massive ramping

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[10] Malawi expanded eligibility to all adults in April 2021, prompted by the receipt of a shipment of near-expired doses; Kenya announced this in June 2021.

up in vaccination awareness campaigns by government, private sector and civil society actors (including cultural, religious and media institutions). This was given further impetus by the Ugandan president's announcement that, if vaccination targets were met, schools and the economy would begin to reopen in January 2022.

Nairobi's lockdown measures were implemented between March 2020 and May 2021, and curfews continued until October 2021, accompanied by reports of continuing police brutality in Nairobi and other urban centres (Mutahi and Wanjiru, 2020). Remaining mandatory restrictions were lifted in March 2022.

Vaccine mandates. Implementation and enforcement of vaccine mandates has varied across the four study contexts, with differences in both government-set directives and in the private sector.[11] Although in Zimbabwe vaccinations were officially voluntary, research participants said they were not always experienced as such, and mandates requiring vaccine certificates were enforced for many aspects of life in 2021. For instance, certificates were necessary for government employees, those visiting government offices, travel on public buses, market trading (including informal market vendors), and gym and church attendance. These requirements were also extended in late 2022 to include school children sitting exams. In contrast, in Malawi official vaccine mandates were few, although research participants reported some private employers requiring certificates. In Uganda, a limited set of mandates requiring vaccination cards was put in place, including for public servants, long-distance travel and public access to some government facilities; fake certificates were reportedly widely available, however. In early 2022, two stronger mandates proposed by the Ugandan government were quickly rejected. These would have required vaccine certificates on public transport and even the fining of people who refused Covid vaccination. In Kenya, most of the government's proposed internal vaccine mandates were blocked by the courts in December 2021. The directives would have targeted those accessing government services, hospitals, national parks, public transport, bars and restaurants, but business and human rights groups argued that, given the country's low vaccination rates, this would deprive millions of their rights, for example to access life-saving health services.[12]

4.   Research findings: Post-pandemic vaccine trends

The following section will discuss five broad trends observed in our findings, with a focus on changes and continuities relating to the Covid vaccine rollout experiences of low-income informal workers and residents in the study cities.

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[11] Here we focus on internal mandates, those affecting everyday life, rather than on those relating to international travel.
[12] See www.aljazeera.com/news/2021/12/14/kenyan-court-suspends-mandatory-vaccination-order.

4.1. With the post-pandemic reversal of emergency health care measures, Covid vaccines (and other health services) are becoming less accessible to low-income communities

In all cities, we found structural barriers to accessing Covid vaccines that are linked to the broader social inequities facing low-income informal workers and residents. A key obstacle found in 2021 and 2022 was the (lack of) proximity of vaccination services to informal settlements. For example, there were usually very few nearby health centres, the roads were bad and transport links poor (limiting health worker visits and vehicular assistance); alternatively, residents had to travel long distances to vaccinating hospitals. In Kampala, a majority of the urban poor purportedly have to travel between 1.5 and 3km to access vaccination centres, but in reality we found that deficient supplies and distributional challenges meant that many had to travel much further to get vaccines:

> When people used to go to medical centres, the vaccines were not there and if they were available, they were not enough for all those who had gone to get vaccinated… People even moved longer distances and they didn't even find the vaccines there… Vaccination should be brought closer to our local areas like the way the child immunisation campaigns are done, so that whoever wants to be vaccinated goes and gets the Covid shot.[13]

Our 2022 research found that, with the end of pandemic restrictions, there has been a major rollback in the emergency medical provisions implemented in underserved areas, such as temporary health centres and mobile clinics.[14] At the height of the rollouts, these measures had been instrumental in bringing vaccines closer to low-income areas still under curfew. This was especially important in improving access for women, who tend to combine care duties with livelihoods closer to home; groups with mobility challenges (such as the elderly, people with disabilities); and anyone who lacked the strength, time or money to travel by taxi or public transport or walk long distances to vaccination centres. According to respondents in Kampala and Lilongwe, in the post-pandemic period this has resulted in troublesome barriers that prevent access to vaccination:

> We had a medical centre [nearby] and people used to access every service there, including vaccination. But now they have relocated away from [us].[15]

> Nowadays health workers [rarely] come to vaccinate with mobile clinics. [People] have to go to [a hospital] 4.1km away. The distance requires you to use a taxi, except for a few strong people who can walk. So old people and those who don't have money find it hard to access.[16]

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[13] Federation leader, Kawempe, Kampala.
[14] These findings echo others in the larger research project, showing that early Covid-related interventions and improvements in water, sanitation and hygiene (WASH) were also rarely maintained over time (Sverdlik et al., 2024).
[15] Male community member, Nakulabye, Kampala.
[16] Female community member, Area 36, Lilongwe.

We also found that, post-pandemic, travel by public transport was still more difficult or less affordable in many of the study areas, even after most NPIs were relaxed – making the few remaining, more distant vaccination centres even harder to access. In Harare, city council "clean-ups" during lockdown included banning all public transport that was not government owned; many private services to low-income areas have still not resumed. In Lilongwe, capacity restrictions on public buses led to fare rises of up to 150%, which have not returned to pre-Covid rates. Such measures disproportionately affect informal workers and low-income residents, forcing many to resort to walking when they would previously have taken the bus. Our Lilongwe research participants said that they must now leave home earlier in the morning and in the dark to get to their work, exposing women in particular to security hazards like physical assault and robbery.

More positively, some Harare research participants reported Covid vaccines had come closer, albeit with continued challenges in uptake. In 2021, residents of Stoneridge informal settlement had no nearby health centre and faced challenges accessing Covid vaccines. While in 2022 a temporary vaccination centre was now in place, residents were aware that it still did not represent a permanent improvement in their health care provision. Across Harare, the long queues at vaccinating centres reported in 2021 had generally reduced, easing time pressures that are off-putting to the hesitant or may otherwise force those working long hours to choose between earning and going for vaccination. Some residents ascribed this improvement to various changes in rollout, such as better vaccine supply, the fact that so many people were already vaccinated, or to continued and newly introduced mandates. Others, however, thought it was mainly the result of low uptake as cases fell and scepticism remained about vaccine types available: "Almost everyone has decided not to get any further vaccinations because of rumours that the [old, Chinese] vaccine in stock is not effective against the current variant."[17]

Other barriers to Covid vaccine access reflect the heightened pressures (earnings, time) facing low-income urban workers and residents in the post-pandemic context of overlapping crises like the increased cost of living and food insecurity. In Harare, participants reported that vaccination centres' opening times still often do not meet the needs of people who work long or late hours, such as informal vendors or security and domestic workers, and that urban agriculture cycles were another pressure restricting people's time, especially in a context of heightened food insecurity: "It's now the rainy season, so people are focused on farming their small plots. Going to get vaccinated would be an interruption they can't afford."[18]

We also uncovered other challenges disproportionately affecting vulnerable groups in the four cities. In Kampala, Harare and Nairobi, people without national ID cards are excluded from accessing vaccinations, such as the many Ugandan migrants living in Nairobi's informal settlement of Mathare, but also more generally migrants without ID

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[17] Male community member, Epworth, Harare.
[18] Female community leader, Hatcliffe Extension, Harare.

cards in the respective cities. Meanwhile, in Lilongwe, in discussions of vaccine hesitancy, research participants reported that some food-insecure households were avoiding getting vaccinated for fear of the drugs' potentially strong side-effects on an already weakened body. "The poor [want to get a Covid vaccine but can't] due to lack of food – they are afraid that they may not withstand the strength of the vaccine."[19]

This underscores the complex mix of challenges facing residents in informal settlements, with Covid often receding and other vital threats coming to the fore, as discussed below.

4.2. Covid vaccination campaigns have now been eclipsed by more recent health crises, making reliable information harder to come by; but they have also underscored the value of local outreach campaigns

During the pandemic, there had been various Covid vaccination campaigns in the study areas, with information disseminated through a range of different agencies and media, from UN bodies to community health workers and from national television adverts to skits by local theatre groups. Our findings highlight two broad categories of information needs: practical details about when, where and how to get Covid vaccination; and a more diverse set of information encouraging uptake. The latter has helped to reduce hesitancy by explaining why Covid vaccination is important and how vaccines work or by addressing misinformation and concerns.

In 2022, the information inadequacies which participants identified in the 2021 research had only rarely improved, and in some places had become worse. This is despite supply problems easing in the COVAX-dependent study countries (Kenya, Malawi, Uganda), which should have facilitated stable rollout campaigns. In Harare and Kampala, around half the survey respondents (48-61%) said that Covid vaccine information was both available and adequate for their communities' needs,[20] while, in Lilongwe, fewer than a third of survey respondents thought that their communities had adequate information about Covid vaccination in the post-pandemic period. In contexts of low and unreliable vaccine supply and/or distribution challenges, practical information that is both accessible and locally relevant can build trust in authorities and save people time. Waiting in long queues, or travelling distances only to find vaccines unavailable at centres, were widespread sources of frustration in the 2021 survey, especially among self-employed workers.

Heterogeneous informal settlement communities also represent a range of information needs that should be taken into account, including in terms of digital divides. For example, studies in low-income urban areas in Bangladesh found Covid vaccine uptake lower among very marginalised groups who lacked access to the technology needed for reliable information about availability, venues, safety and side-effects, or to

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[19] Female community member, Area 50, Lilongwe.
[20] "Survey respondents" here refers to research participants living in the Harare, Kampala and Lilongwe study settings who took the semi-structured questionnaire. This was not conducted in Nairobi.

book appointments (Akter and Badiuzzaman, 2021). Similar themes appeared in our Harare data. This is despite the shift towards new digital tools and technologies for use in social support, grassroots savings activities and livelihood strategies, which we found in all four cities (Sverdlik et al., 2024).

As a resident noted in Harare, limited access to radio and television has frequently hampered low-income community members' access to vital information: "People do not have enough information. Due to lack of basic services like electricity, [many] people do not have a radio or television from where most true information is disseminated."[21]

In Lilongwe, government campaigns and public focus had shifted to the cholera outbreak, which was declared in Malawi in March 2022 and increasingly eclipsed Covid vaccination information. Between then and July 2023, Malawi recorded 1,766 cholera deaths (WHO, 2023), while between April 2020 and July 2023 it confirmed a total of 2,686 Covid deaths, but with an estimated 32,000 excess deaths (OWID, nd). Our Lilongwe research participants reported that Covid information is now rarely discussed on mass media channels like radio and television, or when chiefs and local leaders communicate with residents: "Nowadays there are not many platforms reminding people about Covid vaccines. People who want to may not know where to get it";[22] "Vaccines are very far [not accessible nearby], as compared to back then, hence some people give up. After all, the coronavirus is not a problem nowadays. People are busy with the cholera vaccine."[23]

In none of the study areas were there reliable granular statistics available about local rates of infection, death or vaccination, which could have supported local leaders and health workers seeking to improve uptake to target information campaigns and other kinds of interventions more effectively. During the pandemic, only national or provincial vaccination rates were shared with the public, and in 2022 these findings were in some countries no longer being published (as noted above). Lilongwe research participants felt that Malawi's Covid vaccination data were "packed in general formats" and mostly gender blind. When asked, most participants across the three survey cities could not estimate recent vaccination rates in their areas; of those who could offer estimates, such responses varied widely.

In terms of other types of information about Covid vaccines and vaccination campaigns – for example timelines, location of centres and myth busting – many of our respondents' main information sources were at the local level, across all four study cities and in both pandemic and post-pandemic periods. In Kampala, the success of local-level information sources, particularly village health teams (discussed below), was seen to be key to the vaccination uptake improvements at the end of 2021. In Lilongwe, the Ministry of Health's strategies relied on the participation of community leaders using public address systems to disseminate Covid vaccination information in informal settlements. However, research participants considered that many settlement leaders

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[21] Male community member, Stoneridge, Harare.
[22] Female youth leader, Area 36, Lilongwe.
[23] Male traditional and federation leader, Area 50, Lilongwe.

were unreliable and overly influenced by politics during the pandemic, including in the context of supporting the vaccine rollout. In Nairobi, the city's network of community health volunteers was at the frontline of vaccination rollout information dissemination in informal settlements, and in Mathare the chief and village elders also conducted door-to-door campaigns to improve awareness of government services available to people during the pandemic, including vaccination and the supply of vaccines.

Channelling information through local-level agents is often effective and pragmatic, but ensuring adequate access to sources of information that will be heard will depend upon who communities consider to be trustworthy. For marginalised urban residents and informal workers who exist "amidst social, economic, political, and geographic exclusion" (Banks et al., 2019: 223), government agencies, including local administrators, may not be seen as credible information sources. Research into Covid vaccination uptake in Nairobi's informal settlements has shown that environments marked by widespread distrust of the state and mainstream media support the flourishing of rumours, conspiracy theories and unofficial information conveyed by word of mouth (Ireri et al., 2023). Similarly, Covid vaccine misinformation studies in Canada and Israel have concluded that people who feel socially excluded "are less likely to follow recommendations and are more likely to respond to alternative and refractory voices that make them feel heard" (Beaulieu-Pelletier, 2021; see also Leonard and Philippe, 2021; Eshel et al., 2022). According to residents in Lilongwe, the preferred strategy to combat such rumours would be for a range of agencies to conduct outreach campaigns that engaged with smaller groups, allowing space for individuals' specific concerns to be aired and answered:

> There is a need for government, [community based organisations] and health workers to do house-to-house vaccination [campaigns], because here people easily discourage each other, giving each other false information. But if households are targeted, people will be able to air out their fears, ask questions and be answered.[24]

Working with communities and trusted local voices is therefore crucial for governments, both in providing practical information and in targeting concerns and misinformation. During crises like Covid, it is important for local decisionmakers to acknowledge that "communities are dynamic and complex", while also supporting community-led actions for recovery "underpinned by mechanisms which foster trust and enable the participation of those involved in local governance and leadership" (Schmidt-Sane et al., 2021: 3-4). Compared to central government actors or other official stakeholders, communities are usually better positioned "to communicate clearly on how vaccines can help people resume daily activities, build trust towards vaccines and elicit the collaboration of influential leaders" (Jaga and Ollier-Malaterre, 2022: 775, discussing the Covid vaccine rollouts in Zimbabwe and South Africa).

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[24] Male traditional and religious leader, Area 36, Lilongwe.

4.3. Vaccine hesitancy persists, but the drivers of low uptake have changed as perceptions shift from the high potential harm of vaccination to low severity of the health threat

Misinformation, mistrust and hesitancy have undermined Covid vaccination campaigns across the global South (Samarasekera, 2021), including in our study countries. Even before Covid, the WHO had marked general vaccine hesitancy, driven by multiple complex factors, as a major threat to global health (WHO, 2019). The focus now is on how Covid-era lessons from tackling vaccine scepticism and misinformation can improve uptake of childhood immunisation programmes, and of cholera and malaria vaccines (Titanji et al., 2023). Mutombo et al. (2022) argue that Covid vaccine hesitancy among African citizens, including marginalised urban residents, should not be seen in isolation from either global vaccine inequalities or deeper structural inequities that communities face closer to home. A growing body of literature is drawing attention to the particular reasons behind Covid vaccine hesitancy in African contexts. These include not only culturally specific belief systems but also historical legacies of colonial-era medical abuses and an underlying lack of trust that is rooted in witnessing the effects of Covid vaccine nationalism and the international community's poor response to the Covid vaccine supply challenges faced by the global South (Leach et al., 2022; Mutombo et al., 2022).

Across all study cities, we observed two interlinked post-pandemic trends: on the one hand, as restrictions have eased and health officials report low cases numbers, Covid vaccination has sunk lower in the priorities of people still maintaining a "wait and see" attitude. Additionally, the limited testing facilities available to informal settlement residents have contributed to post-pandemic reluctance to go for vaccination, by further supporting perceptions of Covid's low health risks. On the other hand, after three years of the pandemic, Covid vaccination has become normalised in many contexts (Makadzange et al., 2023), as availability has improved and eligibility has extended, first to all adults and then also to children. Many people now know someone who is vaccinated. Observed reality (that rumoured safety concerns do not manifest) can sometimes outweigh gaps in vaccine understanding and information, dampening the power of circulating misinformation.

Our survey participants reported that many people in their communities now no longer subscribe to the myths and conspiracy theories, and even previously reluctant people are now willing to go for vaccination. Our 2021 research found similar insights from residents of Mumbai's informal settlements, where the Covid vaccination rollout was then far in advance of the African study cities. In Mumbai, survey respondents reported that widespread initial hesitancy in their communities began to dissipate once a critical mass of people had been vaccinated, providing first-hand evidence of the lack of severity of side-effects and the (un)reality of misinformation (Lines et al., 2023). In Lilongwe, a community leader explained how a young resident got himself vaccinated after his fellow residents had done so, signalling the key role of local peers and

demonstration effects in fostering vaccination uptake: "My friend at first ignored the vaccines, but after realising that our crew all got vaccines, he joined us."[25]

Table 2 lists the main groups considered by respondents to be most hesitant among informal settlement residents. For all cities, youth were perceived to be one of the groups most hesitant in getting vaccinated. However, the research on age-related determinants of vaccine hesitancy is less clear cut. In South Africa, studies have found higher Covid vaccine hesitancy in young people, linking this with perceived lower severity of infection-related morbidity and mortality among younger age groups (Kollamparambil et al., 2021). But young hesitant South Africans are also more likely to change their minds over time than other age groups, as safety concerns subside (Burger et al., 2022), an interesting finding in the context of our study. Research looking at mixed-income populations in Lilongwe has even found that young people were more likely to be vaccinated or be positive about Covid vaccination (Ao, Q et al., 2022). Other studies, for example Orangi al., (2021), on Kenyan predictors of Covid vaccine hesitancy, have returned inconclusive findings.

Across several studies in different African contexts, being male is one of the most commonly reported factors associated with increased Covid vaccine acceptance (Ackah et al., 2022). In contrast, our survey respondents in both the 2021 and 2022 surveys tended to observe little difference in vaccine uptake by sex, or that slightly more women were getting vaccinated in their settlements.[26] A possible explanation is that women are more visible at local vaccinating centres, especially those only open in the daytime (see trend 1 above). Survey respondents in all cities said that more men in their settlements were formally employed,[27] working away from home in the day and perhaps also better able to seek vaccination centres further from home. In many contexts this also makes men more subject to employment-related vaccination directives, as noted below for a male worker in Harare. "Women are always at home when the vaccination campaigns are going on";[28] "My son was very [hesitant], paying heed to circulating conspiracy theories. [But] when he was faced with the ultimatum of either get vaccinated or lose his job, he had no choice."[29]

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[25] Male religious leader and youth, Kaliyeka, Lilongwe.
[26] Average all survey cities (Harare, Kampala, Lilongwe). No difference: 44% in 2021, 39% in 2022. More men: 17% in 2021, 18% in 2022. More women: 32% in 2021, 33% in 2022.
[27] Informal employment is a greater source of employment for women than for men in Africa (ILO, 2023).
[28] Female community leader, Nakulabye, Kampala.
[29] Female community member, Hatcliffe Extension, Harare.

Table 2: Research participants' perceptions of the top two groups in their settlement who are most keen and most hesitant to get Covid vaccines in the post-pandemic period (2022)

City	Most keen	Most hesitant
Harare	Elderly people Health workers	Youth People with anti-vaccine religious beliefs
Kampala	Elderly people Youth	Youth Men
Lilongwe	Elderly people People with underlying conditions/chronic illnesses	Youth People with anti-vaccine religious beliefs
Nairobi	Elderly people People with underlying conditions	Youth Some religious leaders

Some of the other main characteristics of post-pandemic Covid vaccine hesitancy found in each study city are also outlined below. Figure 2 also presents common reasons for Covid vaccine hesitancy in Harare, Kampala and Lilongwe, combining qualitative data from our 2021 and 2022 surveys.

Vaccine misinformation appears particularly widespread in Malawi (cf Ao, Q et al., 2022) and seems to have influenced our results for Lilongwe. We found both Covid and, more recently, cholera vaccination efforts in the city to have struggled with the widespread prevalence of fake news and anti-vaccine stances, including religious beliefs that have sometimes undermined health workers' efforts (Figure 2.[30] Vaccine hesitancy arising from misinformation, disinformation and a lack of general knowledge about Covid vaccines were all observed in both the first and second phases of this research. In 2022, we even found examples of residents losing employment because they continued to refuse Covid vaccination. But in other cases, jobseekers are actively choosing vaccination as a strategy to improve their employment prospects, in a competitive environment with many newly unemployed because of the Covid-related economic slowdown.

In Kenya, vaccine hesitancy has been closely linked to public distrust in government, alongside generally low public adherence to Covid guidelines (Ireri et al., 2023), which resonates with our results in Nairobi. In 2022, before the general election in August, widespread flouting of the country's Covid guidelines by campaigning politicians reinforced this distrust and further politicised popular feelings about corrupt pandemic management. The lesson for Ireri et al. (2023) is that public health responses to crises

[30] KII, Ministry of Health.

typically rely on the idea that the public trusts the authorities; but in Nairobi, low trust levels have usually led to low compliance with the vaccine rollout (Ireri et al., 2023). According to our FGDs with community health workers, Mathare residents had scant interest in vaccination, despite government efforts to promote uptake of the jab:

> I have never seen anyone with [Covid-19] being taken from this place to the hospital, that is what made most people not to receive the vaccine…The government is looking for people to vaccinate for free and they still do not want it. They are still asking where the Covid-19 is.[31]

In Kampala, research findings focused on still hesitant groups and in particular youth, who respondents said are particularly receptive to fake news via social media, and are particularly unreceptive to Covid's health threats (see Table 2). The 2022 study found that young people's vaccine uptake was improving (relative to the 2021 findings) where vaccination was necessary to participate in social and economic life, for example to comply with remaining work- and travel-related directives. Research participants identified some private enterprises and public offices still requiring workers, job seekers or visitors to present proof of vaccination before accessing their spaces. More generally, in late 2021 the effects of vaccine normalisation and mass sensitisation campaigns (including in informal settlements) to address safety concerns were key factors in improving uptake from early 2022.

> Some people did not want to get the vaccine but when they saw that Covid was killing people, they changed their minds and got the vaccine…There are [also] some offices you can't access without vaccination cards, which compelled people to go for vaccination.[32]

In Harare, in contrast to the other cities, research participants reported that most people in their communities have been vaccinated, responding to the many mandates in place affecting participation in social and public life, study, travel or work. According to our Harare respondents in 2022, most reasons for continuing vaccine refusal related to residents' religious beliefs, although even here the influence of state mandates was visible:

> Some religious groups are now more accepting of vaccines as this will allow them to freely conduct their church activities [thanks to] less restrictions on gatherings. Most people now no longer believe in conspiracy theories and have realised the vaccinations are for their own health benefit.[33]

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[31] Community health worker, Mathare, Nairobi.
[32] Youth leader, Nakulabye, Kampala.
[33] Female federation leader, Hatcliffe Extension, Harare.

Figure 2: Reasons for hesitancy
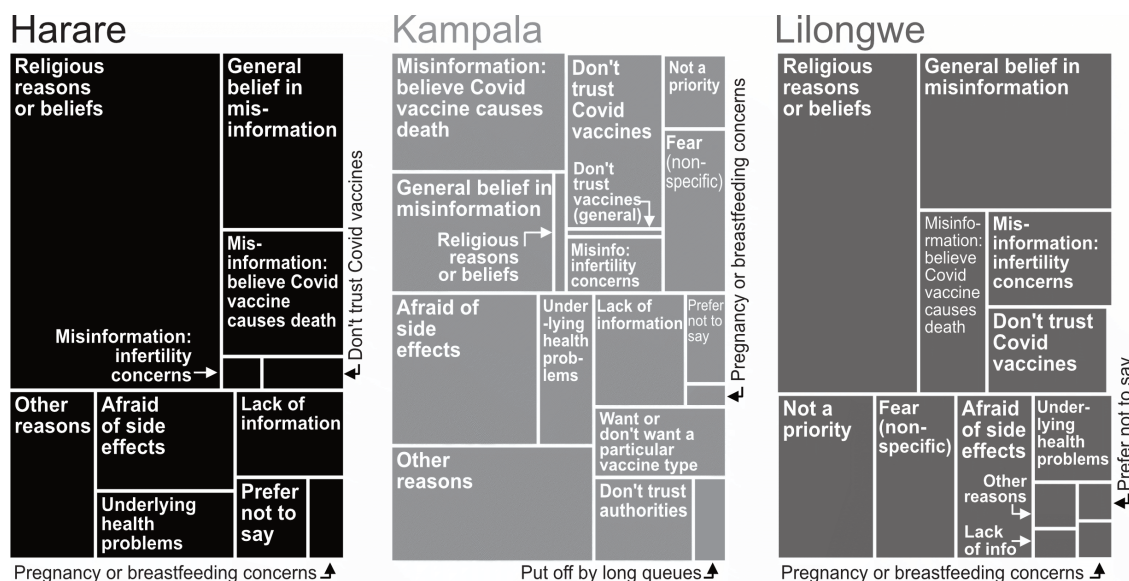
Notes: These were given in response to the survey question "Do you personally know anyone who, in the last 3-4 months, has been offered and refused a Covid-19 vaccine? What is their story?" Responses were coded and aggregated at city-level. The figure combines 2021 and 2022 survey data.

4.4. In all cities, the Covid vaccination rollout has underscored the integral role of community actors (especially health workers and youth) in tackling health emergencies in informal settlements

Our findings in all four cities are that community health workers (CHWs),[34] who are mostly women, play an essential yet often overlooked role in health systems and crisis response in informal settlements (Sverdlik et al., 2024), including with regard to the Covid vaccine rollout.

In all cities, CHWs played an important role at the height of vaccination rollout campaigns, raising awareness and combating myths about vaccines, providing information on where and when to go, and serving as outreach for healthcare centres, mobile clinics and temporary venues. In many cases this has involved door-to-door information dissemination, using tools like megaphones, roadshows, pamphlets and posters. In our interviews, CHWs said they also served as role models by getting

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[34] CHWs are known variously as village health workers in Harare, community health volunteers (CHVs) in Nairobi, health surveillance assistants in Lilongwe, and village health teams in Kampala. Many CHW programmes were established after a 1978 WHO conference on primary health care (Van Ginneken et al., 2010; and references therein). After a decline in state interest from the 1990s, Zulu and Perry (2021: 1-2) have argued recently that "there is growing interest globally in large-scale community health worker (CHW) programmes" with evidence of their effectiveness to improve the health of populations from, for instance, Bangladesh, Brazil, Iran, Ethiopia and Nepal (see Zulu and Perry, 2021). The challenges for expanding CHW programmes are summarised as "inadequate financing, lack of supplies, low compensation of CHWs, and inadequate supervision" (Zulu and Perry, 2021: 3).

vaccinated themselves, normalising the process and providing first-hand evidence to counter misinformation.

> Our role as CHVs [community health volunteers] was mobilisation. You might find there is an outreach where vaccine is being issued, and it is our duty to mobilise the community to go get the vaccine. Second duty is to create awareness on the vaccine. Third is to educate the community about the myths because, when the vaccines came, there were several myths surrounding it and it is our duty to discard such myths so that the members of the community feel safe and can go and receive the vaccine.[35]

The Covid response has exposed many of the obstacles that CHWs already faced in complex and challenging urban environments, such as training gaps, lack of remuneration and poor recognition of their vital role; latterly there have been some efforts to address these challenges. In Nairobi, the advocacy of many agencies, supported by data collected by the Kenyan SDI affiliate, led to the passing in June 2021 of county legislation entitling the city's 50,000 previously unpaid CHWs to a monthly stipend (Weldeghebrael, 2024). In Kampala, Covid and the more recent Ebola crisis have led to more structured and inclusive partnerships between CHWs, community leaders and the Ministry of Health to respond to shocks with locally rooted outreach and sensitisation strategies in informal settlements (Sverdlik et al., 2024; see also quote below). And we found evidence of communities advocating successfully with local health authorities for the installation of closer vaccination centres. In Lilongwe, interactions during the pandemic have strengthened partnerships between the SDI Federation and CHWs.

> [In Kampala], we have worked with [Village Health Teams] to lobby for extension of Covid vaccination in our settlements…The Ministry of Health trained our staff to participate in vaccination campaigns and awareness of diseases in communities… A number of vaccination camps have been carried out in different communities of Kampala, with the most recent being the vaccination of children against polio.[36]

Our research has also highlighted the valuable role played by young people in organised informal settlements during times of crisis, who are often able to mobilise quickly and effectively, and are knowledgeable about the needs of their community and able to respond to them quickly. Youth groups were often active in disseminating correct information and negating fake news related to vaccines, for example putting up posters throughout communities and working with CHWs.

4.5. Vaccine mandates have sometimes contributed to post-pandemic changes in relationships between informal communities and local authorities (both positive and negative)

Vaccine mandates have been effective in some instances, as evidenced by the difference in early vaccination rates between Harare and Lilongwe. But with a relaxing

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[35] Community health worker, Mathare, Nairobi.
[36] FGDs in Kampala with Village Health Teams in Nakulabye, Mulago II and Naguru II settlements.

of mandates and other restrictions, despite continuing low levels of immunisation, few people are now motivated to get vaccinated.

In Harare, where vaccine mandates and other NPI measures were relatively stringent and more effectively enforced (compared with the other three cities), over four in ten respondents said that the pandemic had had a negative overall effect on their relationship with local authorities. In particular, 41% of Harare survey respondents said that vaccine mandates had contributed to making their communities' relationship with local authorities worse than it had been before the pandemic (Figure 3). In contrast, a small number of respondents in the three cities considered the increased contact between authorities and communities at the height of the pandemic to have led to improved relationships and in some instances built new relationships, particularly with health authorities. For instance, we found some positive trends in community–state relations in Kampala's informal settlements, thanks to enhanced contacts with local authorities during Covid: "The pandemic has strengthened the relationship [between community and the authorities] because of the continuous visits during Covid."[37]

However, other respondents were sceptical of any long-term effect, or reported only limited changes. In Lilongwe, which had seen few mandates imposed on the population, 71% of survey respondents said there had been no change in their community's relationship with local authorities as a result of the pandemic. And in Kampala, 52% of respondents said that there was no change in their community's relations with local authorities: "In the first few months, local authorities improved their working relationship with community governance structures, but now there are few engagements taking place."[38]

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[37] Male community member, Nakulabye, Kampala.
[38] Youth leader, F, Area 36, Lilongwe.

Figure 3: Responses to the question "have vaccine mandates affected your community's relationship with local authorities?"

Percentage respondents, by city
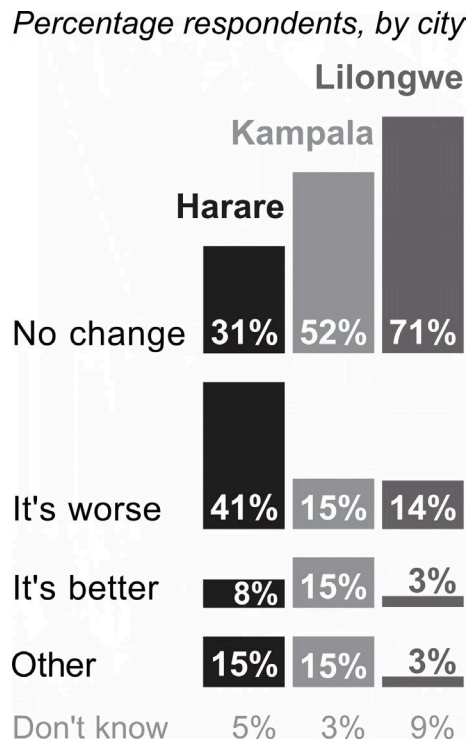
Notes: Aggregated at the city level. 2022 survey data.

5. Conclusion

From the start, global vaccine inequalities have compromised the success of local rollouts in the global South, and this has been compounded by the greater deployment challenges faced by many low- and middle-income countries in implementing vaccine campaigns. For the marginalised urban residents on which this study has focused, structural inequities in access to health care services have been a further obstacle, making it harder for those with fewer resources to get vaccinated. Alongside the lack of nearby health centres, barriers can relate to inadequate infrastructure, transport and mobility, technology access, WASH and electricity provision, and availability of childcare, among others.

Scholars have argued that an overemphasis in research and public discussion on vaccine hesitancy has made systemic barriers to getting vaccinated invisible to the public; instead, individuals are being blamed for not getting vaccinated, even when access to vaccines is not equitable (Manca et al., 2022). Systemic exclusion may also lead to politicisation and distrust of government information campaigns, further influencing uptake. Another impediment has been the daily time pressures of urban life, currently being exacerbated by escalating food insecurity, increases in the cost of living and the socioeconomic aftermath of the pandemic, particularly for informal or casual workers. Even for those who want to be vaccinated, vulnerable groups like migrants and people living with disabilities face heightened barriers to access (as discussed

above). Vaccine hesitancy is still a major concern and is found across low- and high-income countries and in many different groups across populations. However, in our study cities the underlying contextual and historical influences on vaccine hesitancy need to be better understood, including as they connect to structural inequities and the pandemic's disproportionate socioeconomic impacts upon low-income communities.

Our research has uncovered an unfortunate coincidence: growing normalisation and acceptance of Covid vaccines (thanks to a range of factors) yet reduced accessibility as emergency healthcare measures are rolled back. Religious beliefs often held particular sway in Lilongwe, and we also examined how gender, age and occupation may (or may not) influence levels of vaccine uptake. We suggest that vaccine hesitancy might be addressed by a constellation of local actors like CHWs, youth leaders and religious organisations, complemented by media campaigns and other outreach measures (including collaborations with government officials). Local peers who take vaccines can also facilitate uptake, alongside the influence of official vaccine mandates and work-related requirements. Perhaps just as significant in improving uptake have been Covid-related measures to improve the physical proximity of vaccine centres and reduce waiting times. These were highly appreciated, making the withdrawal of such newly accessible services especially unfortunate.

In disseminating information and tackling vaccine hesitancy in an urban health crisis, governments need to make more effort to communicate through trusted local and influential figures and to co-produce locally appropriate interventions in informal settlements. The fundamental reasons why even local government leaders are not trusted also need to be addressed – we found many perceptions of pandemic mismanagement and corruption.

More fundamentally, there is a great need for co-creating innovative and locally tailored solutions, especially in informal settlements where existing services and infrastructure are often lacking. In meeting this need, communities have much knowledge and experience to offer, for example identifying groups excluded from the vaccine rollout and developing strategies to tackle long waiting times. As noted above, we found promising examples of community groups advocating for and identifying the best locations for mobile vaccination clinics, effective CHW training and outreach, multiple uses of creative media for vaccine awareness, and engagement by youth groups and influential faith leaders. Such locally rooted strategies can help to strengthen social capital and address the political drivers of vulnerabilities in informal settlements, with potential to foster resilience in the face of both chronic and acute crises.

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