Received: 30 April 2021 | Revised: 25 August 2022 | Accepted: 27 August 2022

DOI: 10.1002/jid.3745

RESEARCH ARTICLE

JOURNAL OF INTERNATIONAL DEVELOPMENT | WILEY

Africa's lockdown dilemma: High poverty and low trust

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Funding information
UNU-WIDER Inclusive Growth in Mozambique; UNU-WIDER's Inclusive Growth in Mozambique; Economic and Social Research Council, Grant/Award Number: ES/S009965/1

Abstract

As the COVID-19 pandemic unfolded, sub-Saharan African countries faced the dilemma of how to minimize viral transmission without adversely affecting the poor. This study proposes an index of lockdown readiness, taking into account housing conditions and income security, and analyses how this predicts the pandemic responses of governments. Drawing on Afrobarometer data, we document that less than two in 10 urban households were fully ready for a lockdown and that neither institutional nor community trust levels offset this challenge. We find that the prior degree of lockdown readiness was predictive of the stringency of restrictions adopted but not of social unrest.

KEYWORDS
conflict, COVID-19, lockdown, poverty, sub-Saharan Africa, trust

1 | INTRODUCTION

As the COVID-19 public health crisis morphed into a global pandemic in early 2020, it posed a critical policy dilemma for developing countries. While many high-income countries had decided to lock down large sections of the population, supported by extensive social security systems, the suitability of this approach in less-developed regions was far from clear. Public health best practice recommended that some type of 'shelter in place' measures would be necessary to prevent community transmission of the virus. Without them, the risk was that already-fragile health systems would be quickly overwhelmed and many would die. For instance, by January 2021, the health system in Manaus, the capital of Amazona state in Brazil, had already collapsed twice, resulting in deaths due to lack of health facilities (MSF, 2021).

Yet, the welfare implications of strict lockdown policies were worrisome. In low-income contexts, many individuals need to leave their homes daily just to access clean water, sanitation facilities and food. High levels of economic informality and urban un (der)employment (Ebrahim, 2020; Ray et al., 2020; Sen, 2020; Were, 2020) mean that many families live on a hand-to-mouth basis, with limited savings, and are unable to work from home (Dingel & Neiman, 2020; Raju & Ayeb-Karlsson, 2020). In addition, early simulation studies suggested a potential increase of between 60 million and 520 million people living in poverty due to the economic crisis associated with the pandemic (Lakner et al., 2019; Sumner et al., 2020; Valensisi, 2020). The fear that the public health cure (lockdown) might be worse than the disease (COVID-19) was raised in a variety of contributions early in the pandemic. For instance, in India, concerns related to the restrictive measures were raised indicating that the most harmful effects of the pandemic did not come from the disease per se but from the government response measures (see Ghosh, 2020). One such example is the severe impact of the lockdown measures put in place by the Indian Government on urban migrants, leading to a massive exodus towards their rural origins, with great personal harm and further contributing to the spreading of the virus (Srivastava, 2020). Furthermore, Gisselquist and Kundu (2020) found evidence that the stringent lockdown measures put in place in India exacerbated previously standing group inequalities. These results raise substantial questions about the readiness of developing countries to implement lockdown measures as a public health policy and the potential adverse social responses to such measures. The main aim of this paper is to understand these key questions in the context of sub-Saharan Africa during the COVID-19 pandemic.

The research set out in this paper also was initiated at the start of the pandemic. In light of the challenges posed by lockdown, we sought to quantify the extent to which pre-existing socio-economic conditions might shape the suitability of strict lockdown policies across sub-Saharan Africa. To do so, we used harmonized Afrobarometer data from 2019, covering 30 countries, and constructed a multidimensional index of lockdown readiness. As we detail in Section 3, our index reveals that at the start of the pandemic, just 6.8% of all households in sub-Saharan Africa, or 12.2% in urban areas, meet all the conditions for a full lockdown. We show that the readiness index—not surprisingly—correlates with other aggregate indicators of development, including GDP per capita and consumption poverty. But these correlations are far from perfect, implying significant variation in readiness at all levels of aggregate income.

Given the low readiness of African economies to enact lockdown policies effectively, we explore the extent to which trust might offset some of the costs of imposing a lockdown or at least help facilitate public health interventions. Indeed, the need to slow down the transmission of COVID-19 poses a classic collective action problem: If everyone stayed at home, everyone would benefit. But, if not monitored, some individuals may be able to free ride on others complying with the lockdown. External intervention is therefore necessary (Olson, 1971). Studies suggest that such collective action problems can be solved more effectively where populations trust political leaders, police and health workers (Algan et al., 2018; Buseh et al., 2015; Gambetta, 1988; Godlee, 2020), as well as their fellow citizens (Alesina & Giuliano, 2011). These two dimensions of trust (in institutions and in fellow citizens) have been shown to drive economic prosperity (Knack & Keefer, 1997; Algan & Cahuc, 2014) and democracy (Nannicini et al., 2013; Putnam, 1993). There is even evidence that institutional trust can foster interpersonal trust (Spadaro et al., 2020) and that high institutional trust can foster voluntary compliance with government measures (Batrancea et al., 2019; Kogler et al., 2013). The importance of trust has been highlighted in the present crisis by Bargain and Aminjonov (2020) and Brodeur et al. (2020) for Europe and the United States, respectively. And there is ample evidence of the key role of trustworthy local actors in rallying their communities behind political decisions during previous public health emergencies (Blair et al., 2017; Elston et al., 2017; Nuriddin et al., 2018; Santos & Novelli, 2017; Vinck et al., 2019). We show that there is no clear offsetting trust bonus—that is, lower readiness is generally not associated with higher levels of institutional or community trust, which may mitigate the need for very severe restrictions. This provides a stark warning that top–down lockdown measures in the poorest communities could be counterproductive.

In Section 4, we complement this ex ante or pre-COVID-19 analysis with an investigation of the ex post relationship between lockdown readiness and responses to the pandemic in sub-Saharan Africa. Concretely, we focus on whether differences in prior readiness were associated either with differences in COVID-19 public health restrictions or with societal responses, measured as the frequency of unrest or protests. Since lower readiness is not compensated

by trust, it is possible that strict lockdowns not accompanied by adequate welfare measures may result in heightened social tensions and civil unrest. We find that readiness was predictive of differences in the sensitivity of responses. However, this sensitivity emerged primarily in the later phases of the pandemic, when the pandemic was no longer seen as transient and countries sought to find a longer-run balance between economic harm and virus suppression. At the same time, our analysis finds no systematic relationship between readiness, response stringency and social unrest.

The contribution of this paper lies in its combination of both ex ante and ex post analyses, while most existing papers have taken either one or other approach. First, we propose an uncomplicated and easily replicable ex ante measure of lockdown readiness that can be applied to many other contexts with data that is often publicly available. Second, by combining various data sources, we perform an ex post analysis that confirms the relevance of the index for government responses. Furthermore, only few other studies about the COVID-19 pandemic so far looked at the sub-Saharan African countries despite the region's high vulnerability to severe socio-economic consequences of the pandemic.

2 | DATA AND VARIABLES

Before proceeding, we briefly summarize the data used herein. This study draws on various data sets to assess the lockdown readiness of sub-Saharan African countries, how readiness relates to other characteristics, as well as governments' and citizens' responses. To estimate the level of lockdown readiness across sub-Saharan Africa, we use the harmonized data from the most recent round of the Afrobarometer (Afrobarometer, 2019), which covers 37 696 people in 30 countries. These data were collected before the pandemic started in December 2019. The variables we use can be interpreted as initial, pre-pandemic, socio-economic characteristics of sub-Saharan countries.

Second, the same data allow to measure trust in institutions and within communities. Trust is usually defined in the social sciences as encompassing two dimensions. The first, called institutional or vertical trust, is related to how citizens believe in the legitimacy and efficiency of institutions (Rothstein & Stolle, 2008). To measure this dimension of trust, we combine answers to questions in the Afrobarometer about trust in the president, the parliament, the police and traditional leaders. Following the literature, we apply latent trait modelling (Vandemoortele, 2014) and normalize the derived variable to a zero mean and standard deviation of one.

The second dimension of trust, often referred to as interpersonal, generalized, or horizontal trust, has to do with beliefs about whether other people have our interests at heart (Alesina & La Ferrara, 2005; Gambetta, 1988). The Afrobarometer data do not include a direct measure of interpersonal trust, so we rely on a question about whether respondents trust their local market vendors: 'when a vendor sells you a kg of maize, sorghum or beans, how sure are you that you get the correct amount?'. This variable is not a perfect measure of trust in other citizens, but, given the prevalence of small markets in communities across sub-Saharan Africa, this question may indicate levels of trust of individuals in an aspect of community life they encounter in their day-to-day economic interactions. We use this variable as a proxy for 'community' trust and code the variable as 1 if the respondent said 'always'.

Some studies have shown that trust in community members is shaped by the strength of civic society and capacity for collective action (Aghajanian et al., 2020; Alesina & Giuliano, 2015; Guiso et al., 2007; Putnam, 1993), a variable that may also be correlated with lockdown readiness since a strong civic society may facilitate the implementation of public health measures, such as lockdowns, through community organizations working closely with community members to convey critical information and strength trust in public health authorities (Blair et al., 2017). To measure this, we include a variable on membership of community organizations and meeting attendance, which we label as associativism. This measure often proxies for the capacity of communities for collective action (Putnam, 1993). Organizations include religious groups, voluntary associations and community groups. We use this measure as a latent continuous and normalized variable. Table 1 (d) shows descriptive statistics for these variables. While the size of the values can only be interpreted in relative terms, we observe that institutional trust is positive in rural and negative in urban areas of our sample. Associativism shows the same pattern. Community trust is a binary variable and can thus be read as a percentage. It is also relatively lower in urban areas but only by around three percentage points.

TABLE 1 Pooled statistics from Afrobarometer 2019

	Mean	SD	Country min	Country max
(a) Descriptive statistics				
Age	30.7	11.8	27.6	33.4
Female (%)	50.7	50.0	49.5	52.6
Years of education	7.2	4.6	2.5	10.5
(b) Lockdown readiness 'inputs'				
Access to clean water (%)	41.4	49.3	11.8	86.1
Access to sanitation (%)	68.1	46.6	41.7	92.9
Access to electricity (%)	50.8	50.0	13.5	91.3
Access to phone (%)	88.3	32.1	54.6	98
Not cash constrained (%)	14.2	35.0	1	39.7
(c) Lockdown readiness				
Fully ready (%)	6.8	25.2	0.6	24.6
Partially ready (%)	30.0	45.8	6.5	72.1
Number of dimensions	2.6	1.4	1.4	3.8
(d) Trust				
Institutional trust	0.8	99.2	−74	57.3
Community trust (%)	24.1	42.8	12.9	33.8
Associativism	1.1	100.2	−62	44.3
(e) Potential social tensions				
Participated in protest (%)	10.4	30.5	2.4	27.4
Government narrows income gap (%)	22.4	41.7	5.9	38.9
Agree to curfew (%)	61.2	48.7	38.9	83.4
Observations	38 838			

Note: Weighted by country population. Fully ready is defined as the household having simultaneous access to safe drinking water, electricity, sanitation, a (mobile) phone and is not cash constrained. Partially ready refers to the first three components. The latent variable of institutional trust is constructed from answers to questions about trust in the president, the parliament, the police and traditional leaders. The latent variable of associativism is constructed from information about membership in religious groups, voluntary associations and community groups, as well as participation in community meetings. Community trust is defined as equal to 1 if the respondent answers 'always' to the question: 'when a vendor sells you a kg of maize, sorghum or beans, how sure are you that you get the correct amount?'. Participation in protest is equal to 1 if the respondent has once, several times or often attended a demonstration or protest march in the year prior to the survey, and 0 otherwise. Government redistributive effectiveness is equal to 1 if the respondent thinks that the government is handling narrowing gaps between rich and poor fairly well or very well, and 0 otherwise. The curfew variable is equal to 1 if the respondent agrees or strongly agrees that 'when faced with threats to public security, the government should be able to impose curfews and set up special roadblocks to prevent people from moving around'.

Source: Afrobarometer round 7. Authors' own calculations.

Fourth, we use the stringency index from the Oxford COVID-19 Government Response Tracker (OxCGRT) (Hale, Angrist, Goldszmidt, et al., 2021) gathered by Our World In Data (OWID). The stringency index offers a comparable measure of governments' reaction to the pandemic throughout its course. This index is a daily average of nine indicators: eight indicators related to containment and closures (e.g., school closing, workplace or restrictions on gathering size) and one of the policies put in place for the health system, which is the indicator of the existence of public information campaigns about COVID-19.

Fifth, we draw on the Armed Conflict Location and Event Data (ACLED) (Raleigh et al., 2010) to measure protest events as a reaction to readiness and government restrictions since the pandemic's onset.

Finally, we draw on the World Development Indicators (WDI) for data on GDP per capita, poverty headcount rates and inequality (measured with the Gini coefficient). Data on daily COVID-19 cases for each country come from OWID, which gathers it from the Center for Systems Science and Engineering (CSSE) at Johns Hopkins University (JHU).

3 | LOCKDOWN READINESS INDEX

This section introduces the lockdown readiness index and presents its properties in relation to other country characteristics.

3.1 | Lockdown readiness index construction

The first goal of this paper is to quantify on an ex ante basis the suitability of strict lockdowns based on pre-existing socio-economic conditions across sub-Saharan Africa. Drawing on existing data at the onset of the pandemic, this approach allowed us to warn against a blanket copy-and-paste response (Jones et al., 2020).

We define lockdown readiness as the ability of households to stay at home and avoid public spaces without irreversible damage to their health and welfare. For analytical tractability, we consider five minimum components of being ready for lockdown—namely that, within the household, the family has access to (1) safe drinking water, (2) basic sanitation, (3) a source of reliable energy, (4) means of information or communication (e.g., a mobile phone) and (5) a form of employment that provides sufficient income not to go without cash on a frequent basis.[1] If the first three criteria are not met, then almost all household members will need to make multiple daily trips outside the home to places where other people congregate (e.g., communal taps).[2]

But even if basic needs such as water and sanitation are in place, this does not ensure there is food on the table and families living hand-to-mouth would still struggle to stay locked down. Thus, we define a household as 'fully ready' if all five conditions are met and as 'partially ready' if at least the first three conditions are met—meaning household members have access to the most basic facilities to spend long periods of time within the home and avoid social contact elsewhere.

Panel (a) of Table 1 presents basic summary statistics, and Panel (b) shows the pooled means for the five variables that comprise the lockdown readiness index, differentiating between urban and rural areas. Table 1 shows that almost 70% of the sample have basic sanitation, half have electricity, but only 41% have access to safe drinking water. A much smaller proportion have access to all three basic public services simultaneously (Panel c). The share of households that are partially ready is just 30% overall and a little over half in urban areas.

Most households across the sample (88%) have a mobile phone or a telephone, but only 14% report having a stable source of income. This is a critical constraint, leading to, on average, only 6.8% of households in sub-Saharan Africa being fully prepared for lockdowns. This percentage drops to just 2.5% in rural areas, due to low basic service penetration and few stable sources of (cash) income. These results are of course not a direct measure of social compliance. They are rather based on measures of material preparedness for lockdowns and indicate the percentage of households in rural and urban settings in sub-Saharan Africa that have enough material assets to avoid social contact without risking extreme deprivation. Taken together, the results suggest that, realistically, strict lockdowns may only be *economically* possible to continue in (some) urbanized settings, which are also areas where the need for social distancing is greater due to higher population densities.

[1]The Afrobarometer surveys ask whether the respondent has gone without cash income. We consider those who reply 'Always' or 'Many times' as being in a casual/irregular job and thus not prepared for lockdown, even if they say that they currently work.

[2]The first four dimensions are included in the 'home environment for protection' (HEP) index proposed and assessed for 54 developing countries by Brown et al. (2020), a study released as we finalized ours.

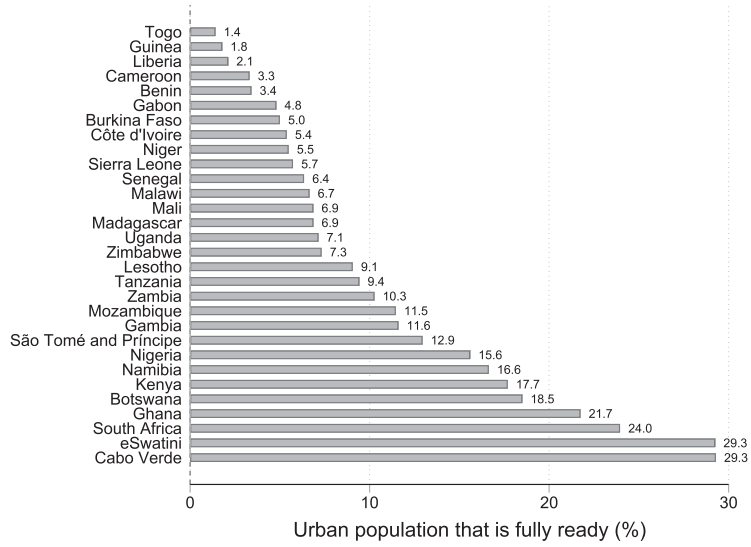

FIGURE 1 Proportion of fully ready urban population by country. *Note*: Weighted by country population. Full readiness is defined as the proportion of people that have simultaneous access to safe drinking water, electricity, sanitation, a (mobile) phone and are not cash constrained. Partially ready are those who simultaneously have at least the first three of these five dimensions. *Source*: Afrobarometer round 7. Authors' own calculations

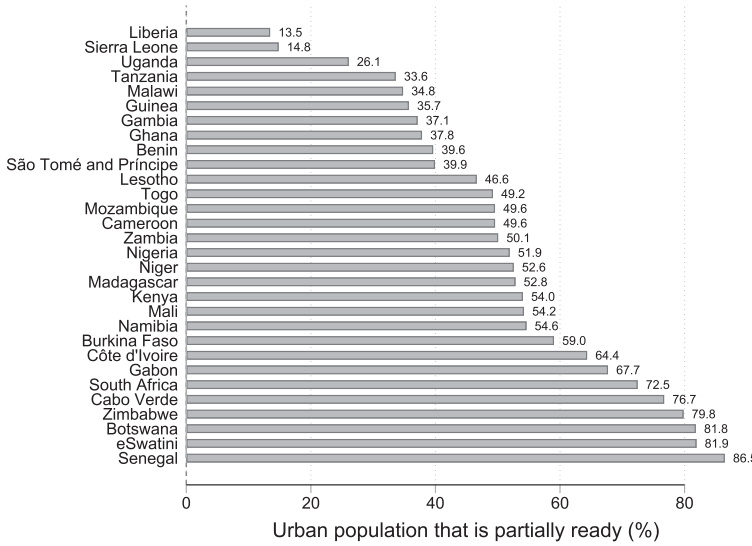

FIGURE 2 Proportion of partially ready urban population by country. *Note*: Weighted by country population. Full readiness is defined as the proportion of people that have simultaneous access to safe drinking water, electricity, sanitation, a (mobile) phone and are not cash constrained. Partially ready are those who simultaneously have at least the first three of these five dimensions. *Source*: Afrobarometer round 7. Authors' own calculations

At the country level, it is unsurprising that the richest countries show the highest levels of urban readiness (Figures 1 and 2). However, even in these cases, less than a third of the urban population is fully ready for lockdown. The ranking of countries is slightly different for partial readiness, capturing variation in access to basic services at home. The range of partial readiness is also much broader—from as low as 14% in Liberia to more than 80% in Senegal.

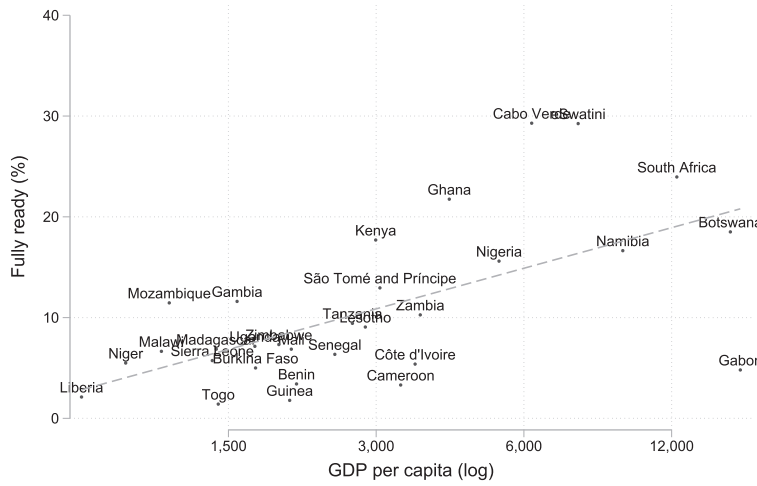

FIGURE 3 Percentage of the population fully ready for lockdown and GDP per capita. *Notes*: Weighted by country population. Full readiness is defined as the proportion of people that have simultaneous access to safe drinking water, electricity, sanitation, a (mobile) phone and are not cash constrained. Partially ready are those who simultaneously have at least the first three of these five dimensions. *Source*: Afrobarometer round 7 and World Development Indicators. Authors' own calculations

3.2 | Properties of the lockdown readiness index

We investigate how our lockdown readiness index relates to a country's socio-economic macro-indicators, as well as trust. A relevant question is whether our index simply replicates existing aggregate measures such as mean GDP per capita, the consumption poverty headcount or the Gini index (as a measure of inequality). Another is whether lower readiness might be offset by higher levels of trust, as discussed in the introduction.

Looking at the first group of variables, we observe that there is not a one-to-one relationship between readiness and aggregate development indicators, such as real GDP per capita. As shown in Figure 3, the cross-country relationship between aggregate income and full readiness is log-linear: Approximately, doubling real incomes is associated with just a five-percentage point increase in the share of the population that is fully ready. Furthermore, some nominally richer countries, such as Gabon, show weak lockdown readiness in relation to their income level. This is likely to be due to inequalities in households' access to public services and markets, which may not be necessarily correlated with national GDP levels.

Columns (1)–(3) in Table 2 present the correlation between GDP per capita, poverty headcount rates, inequality (measured with the Gini coefficient) and full and partial lockdown readiness. As Figures 3 and 4 indicate, there is a positive relationship between readiness and GDP per capita, larger for partial readiness. The relationship between readiness and poverty is thus negative but relatively small and weak. In contrast, readiness and inequality are positively correlated. Yet, neither of these correlations can explain much of the lockdown readiness variation (R-squared).

The lockdown readiness measure indicates the physical and material capacity of households to avoid social contact without risking severe deprivation. Adequate living conditions, a stable income and access to information alone may not ensure that lockdowns are sustainable. Compliance with lockdowns is also shaped by normative considerations related to how individuals assess their own risk of being affected by the virus and how others in society may comply with public health policies (Nuriddin et al., 2018; Santos & Novelli, 2017). A large literature in economics, sociology and political science, reviewed in Alesina and Giuliano (2015), has shown that such normative assessments are shaped by levels of trust in national and local institutions and among citizens. Trust might therefore play a crucial role both in enforcing lockdown measures and in providing a normative basis for less restrictive

TABLE 2 Lockdown readiness and country characteristics, simple correlations

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Fully ready							
GDP per capita	5.67** (1.86)						2.55 (2.22)
Poverty headcount		−0.18* (0.08)					−0.10 (0.08)
Gini index			0.49*** (0.11)				0.42* (0.18)
Institutional trust				1.08 (7.38)			1.92 (5.57)
Community trust					−8.68 (25.47)		18.58 (13.40)
Associativism						−10.71 (12.31)	8.49 (9.44)
Observations	30	30	30	30	30	30	30
R-squared	0.37	0.20	0.27	0.00	0.00	0.03	0.48
Partially ready							
GDP per capita	13.70*** (2.90)						19.44*** (4.50)
Poverty headcount		−0.33* (0.14)					0.36 (0.20)
Gini index			0.74 (0.37)				−0.35 (0.44)
Institutional trust				14.59 (23.06)			44.37 (23.41)
Community trust					28.49 (65.45)		−17.62 (79.69)
Associativism						−63.46* (25.54)	−52.95 (30.88)
Observations	30	30	30	30	30	30	30
R-squared	0.36	0.11	0.10	0.01	0.01	0.16	0.52

Note: Weighted by country population; robust standard errors in parentheses. Fully ready or partially are the dependent variables and indicate the proportion of households that are fully or partially ready for a lockdown in a country, respectively. Fully ready is defined as the household having simultaneous access to safe drinking water, electricity, sanitation, a (mobile) phone and is not cash constrained. Partially ready refers only to the first three components. Institutional trust, Community trust and Associativism are proportions of people with Institutional trust, Community trust and Associativism, respectively. Latent variables for Institutional trust and Associativism are constructed, and dummy variables that are equal to 1 if their value is above the mean of the latent variable are created. The value of 1 for the dummies indicates that one has Institutional trust or Associativism. The latent variable of institutional trust is constructed from answers to questions about trust in the president, the parliament, the police and traditional leaders. The latent variable of Associativism is constructed from information about membership in religious groups, voluntary associations and community groups, as well as participation in community meetings. Community trust is defined as equal to 1 if the respondent answers 'always' to the question: 'when a vendor sells you a kg of maize, sorghum or beans, how sure are you that you get the correct amount?'. The value of 1 for Community trust variable indicates that the person has community trust.

*$p < .10$.

**$p < .05$.

***$p < .01$.

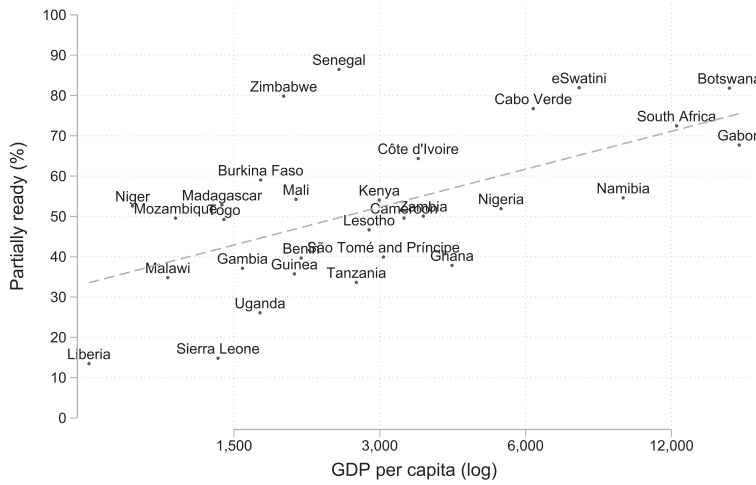

FIGURE 4 Percentage of the population partially ready for lockdown and GDP per capita. *Notes*: Weighted by country population. Full readiness is defined as the proportion of people that have simultaneous access to safe drinking water, electricity, sanitation, a (mobile) phone and are not cash constrained. Partially ready are those who simultaneously have at least the first three of these five dimensions. *Source*: Afrobarometer round 7 and World Development Indicators. Authors' own calculations

approaches to curtail the spread of the pandemic. If readiness is relatively low in many countries, higher trust could provide a buffer to help cope with the challenges of the pandemic.

Our results show that lower readiness is not offset by higher trust. Columns (4) and (5) of Table 2 show no systematic relationship between readiness and either institutional or community trust. Nonetheless, associativism is negatively correlated with readiness on a pairwise basis (column 6), meaning that in lower readiness countries, people are well prepared to organize themselves within their communities. But whether they would do so to comply with pandemic restrictions or to protest against remains unclear (and is investigated in the next section).

Taken together, these results lead to three important observations. First, while our lockdown readiness index coincides with standard economic indicators, it captures a unique combination of conditions. All country characteristics jointly explain only half of the variation in lockdown readiness of sub-Saharan African countries (column 7). Second, social trust in sub-Saharan Africa may not be enough to ensure lockdown compliance in settings where the economic capacity of households to stay at home is low. Strict compliance under these conditions may require government intervention, such as the imposition of curfews and mandatory closure of businesses as we have seen in many parts of the world over the last year.

Third, in light of the positive association between low levels of trust and weak lockdown readiness, it is possible that severe economic deprivation among those not prepared for the lockdowns may lead to non-compliance with lockdown and possibly a backlash against distrusted institutions (Justino, 2009, 2012; Verwimp et al., 2019). For instance, according to the Armed Conflict Location & Event Data Project (ACLED), political violence was reduced worldwide in 2020, with the exception of Africa, which recorded 4000 more violent events and 9000 more fatalities in 2020 than in 2019. Protests and demonstrations also increased considerably everywhere in the world after April 2020, including across sub-Saharan Africa (ACLED, 2021).

4 | READINESS AND RESPONSES

This paper began with the motivation that strict lockdown measures—adopted by many high-income countries at the start of the pandemic—may not be appropriate in all contexts. As the pandemic progressed, some of the

socio-economic risks associated with lockdown sadly have been confirmed. Lakemann et al. (2020) found severe economic consequences of the adoption of lockdowns in Africa. They also suggested differentiated impacts along, among other aspects, different levels of formality in each economy. Decerf et al. (2020) suggested another aspect driving differentiated impacts of the pandemic and lockdown: each economy's poverty levels.

In this section, we take advantage of the passage of time and review the relevance of our readiness index. Specifically, we consider the extent to which differences in readiness were associated with differences in responses to the pandemic across African countries. Our working hypothesis is that if public health responses did not take account for the degree of readiness, we should find no relationship between the extent of (ex ante) readiness and the stringency of (ex post) official pandemic restrictions, at least once we also take into account the number of COVID-19 cases. At the same time, we hypothesize that a combination of low readiness but highly stringent responses may have provoked a greater incidence of social unrest.

To examine the first hypothesis, we combine time-series data on the stringency of government COVID-19 restrictions and the number of new COVID-19 cases, measured as weekly averages taken from OWID, with the aggregate indicators presented previously. In turn, we run regression models over the period 2020 (Week 6) to 2021 (Week 31) using the following specification:

$$S_{iwt} = \lambda_t + \mu_i + \phi_w + X_i'\beta + \gamma C_{it} + (C_{it} \times X_i)'\delta + \epsilon_{iwt} \quad (1)$$

where t indexes time in weeks; i indexes countries; w indexes sequential COVID-19 waves (in each country), defined below and taking a value of zero if a given country is *not* experiencing a wave of infections; S is the realized stringency index (ranging from 0 to 100); X is a vector of time-invariant observed explanatory variables, which includes our readiness index; and Z is the time-varying number of new COVID-19 cases, lagged 2 weeks to allow for a delay between the observation of new cases and implementation of restrictions. Parameters γ, μ, ϕ respectively allow for country and time fixed effects, and ϵ is the residual error.

Inclusion of the index of COVID-19 waves reflects the insight that the most severe restrictions have typically been adopted on a semi-temporary basis during the most intense periods of new infections, being a key instrument to control for deaths during waves (see Hale, Angrist, Hale, et al., 2021). Thus, public health responses to relative changes in new infections may differ between so-called wave and non-wave episodes. In order to identify infection waves, we implement a simple algorithm. First, we calculate the rolling average of new cases based on a window of 6 weeks before and after each period. Second, we identify local maxima, defined as periods when the rolling average for country i at time t, denoted $\overline{C}_{it}$, meets the criteria: $\overline{C}_{it-2} < \overline{C}_{it-1} < \overline{C}_{it} > \overline{C}_{it+1} > \overline{C}_{it+2}$. Third, we drop irrelevant local maxima, defined as those in which the number of cases at an identified peak is less than double the number of cases 8 weeks previously. Finally, we define a wave as the period 7 weeks either side of any retained local maxima. On this basis, all but two countries (Bostwana and Tanzania) entered at least one COVID-19 wave over the period examined, and seven countries enter three waves.

Columns (1)–(4) of Table 3 report the core results from this analysis, building up sequentially to the full specification given in Equation (1). Column (1) regresses the stringency outcome on the observed covariates and period fixed effects only. Column (2) adds the interactions between (lagged) case numbers and vector X; column (3) adds wave number fixed effects; and column (4) adds country fixed effects, thereby eliminating all direct effects associated with the time-invariant controls. To assist interpretation, all time-invariant controls are standardized, taking a mean of zero and standard deviation of one—that is, values below (above) the region-wide mean are negative (positive), and new COVID-19 case numbers are stated in logarithms. However, to avoid dropping zero cases, we apply the inverse hyperbolic sine (IHS) transform, which takes the same interpretation as the standard logarithmic transform for all but very small values (Burbidge et al., 1988).

Three main results merit attention. First, across all specifications, we find a positive conditional relationship between the (log.) number of new COVID-19 cases and the level of stringency—for example, column (1) suggests that for every doubling of the number of cases, the level of stringency tends to increase by around 3 index points (6% of the mean). Second, ex ante readiness has been predictive of official restrictions. As might be expected, column (1)

TABLE 3 Responses and readiness—government stringency

	(1)	(2)	(3)	(4)	(5)	(6)
Cases	2.96*** (0.37)	3.84*** (0.42)	1.39** (0.56)	1.08* (0.55)	0.83 (0.92)	1.77*** (0.62)
GDP	−5.10*** (0.70)	9.06*** (2.39)				
Population	−4.06*** (0.43)	−5.21*** (1.71)				
Fully ready	4.19*** (0.47)	0.34 (2.09)				
Associativism	0.29 (0.50)	6.73*** (1.71)				
Comm. trust	−3.29*** (0.43)	−4.47** (1.81)				
Instit. trust	−5.43*** (0.42)	2.15 (1.71)				
Cases # GDP		−1.57*** (0.24)	−1.53*** (0.28)	−1.48*** (0.28)	−2.19*** (0.71)	−0.67* (0.38)
Cases # Population		0.07 (0.17)	−0.38** (0.17)	−0.39** (0.17)	−2.24*** (0.55)	0.06 (0.23)
Cases # Fully ready		0.42** (0.21)	1.06*** (0.27)	1.01*** (0.27)	2.83*** (0.66)	0.48 (0.33)
Cases # Associativism		−0.77*** (0.19)	−0.73*** (0.20)	−0.72*** (0.19)	−2.41*** (0.65)	−0.01 (0.24)
Cases # Comm. trust		0.09 (0.19)	−0.30 (0.20)	−0.25 (0.20)	0.15 (0.52)	−0.57** (0.27)
Cases # Instit. trust		−0.86*** (0.19)	−0.97*** (0.23)	−1.00*** (0.23)	−3.38*** (0.66)	−0.24 (0.32)
After						28.96*** (8.29)
Cases # After						−2.86*** (0.87)
Cases # GDP # After						−0.19 (0.14)
Cases # Population # After						−0.05 (0.10)
Cases # Fully ready # After						0.25*** (0.09)
Cases # Associativism # After						−0.34*** (0.10)
Cases # Comm. trust # After						0.11 (0.08)
Cases # Instit. trust # After						−0.36*** (0.09)
Constant	24.98*** (3.62)	17.27*** (4.03)	39.89*** (5.30)	42.91*** (5.27)	46.40*** (9.10)	36.80*** (5.55)
Observations	1,344	1,344	1,344	1,344	425	1,344
R-squared	0.57	0.59	0.79	0.80	0.83	0.81
Time FEs	Yes	Yes	Yes	Yes	Yes	Yes

(Continues)

TABLE 3 (Continued)

	(1)	(2)	(3)	(4)	(5)	(6)
Wave FEs	No	No	Yes	Yes	Yes	Yes
Country FEs	No	No	No	Yes	Yes	Yes

Note: Weighted by country population; robust standard errors in parentheses. The dependent variable in each regression is the government stringency index. Fully ready or partially indicate the proportion of households that are fully or partially ready for a lockdown by country, respectively. Fully ready is defined as the household having simultaneous access to safe drinking water, electricity, sanitation, a (mobile) phone and is not cash constrained. Partially ready refers only to the first three components. Instit. trust, Comm. trust and Associativism are proportions of people with Institutional trust, Community trust and Associativism, respectively, by country. Latent variables for Institutional trust and Associativism are constructed and then dummy variables that are equal to 1 if their value is above the mean of the latent variable are created. The value of 1 for the dummies indicates that one has Institutional trust or Associativism. The latent variable of institutional trust is constructed from answers to questions about trust in the president, the parliament, the police and traditional leaders. The latent variable of associativism is constructed from information about membership in religious groups, voluntary associations and community groups, as well as participation in community meetings. Community trust is defined as equal to 1 if the respondent answers 'always' to the question: 'when a vendor sells you a kg of maize, sorghum or beans, how sure are you that you get the correct amount?'. The value of 1 for Community trust variable indicates that the person has community trust. 'After' is a binary variable that is equal to 1 for all the periods after the first COVID-19 wave for each country. Cases is the growth rate (calculated by the IHS) in the number of COVID-19 weekly positive cases lagged by 2 weeks.

*$p < .10$.

**$p < .05$.

***$p < .01$.

TABLE 4 Responses and readiness—protests

	(1)	(2)	(3)	(4)	(5)	(6)
Stringency	−0.10 (0.19)	−0.14 (0.19)	−0.11 (0.19)	−0.48** (0.23)	−0.65 (0.56)	−0.06 (0.28)
Cases	9.61*** (2.22)	8.66*** (2.42)	8.44*** (2.44)	5.46* (3.02)	19.22** (9.62)	6.32* (3.38)
GDP	37.46*** (3.61)	35.04*** (10.31)	37.89*** (10.40)			
Population	38.32*** (2.91)	23.32** (9.51)	22.93** (9.53)			
Fully ready	−5.14 (3.36)	20.83* (11.48)	21.35* (11.40)			
Associativism	−5.42** (2.66)	−14.30** (6.89)	−15.97** (6.97)			
Comm. trust	−19.79*** (2.64)	−31.56*** (9.02)	−29.91*** (9.09)			
Instit. trust	−20.55*** (2.75)	−4.30 (8.36)	−2.76 (8.43)			
Stringency # GDP		0.05 (0.19)	0.00 (0.19)	−0.27 (0.22)	−0.84 (0.82)	−0.02 (0.26)
Stringency # Population		0.27* (0.15)	0.26* (0.15)	−0.01 (0.16)	1.08** (0.46)	−0.27 (0.20)
Stringency # Fully ready		−0.44** (0.19)	−0.44** (0.19)	−0.15 (0.21)	1.27* (0.72)	−0.34 (0.25)
Stringency # Associativism		0.16 (0.13)	0.20 (0.13)	0.02 (0.15)	−0.84 (0.58)	0.19 (0.17)
Stringency # Comm. trust		0.21 (0.16)	0.19 (0.16)	0.38** (0.17)	0.54 (0.53)	0.55*** (0.18)
Stringency # Instit. trust		−0.28* (0.15)	−0.32** (0.15)	−0.31** (0.15)	−0.37 (0.57)	−0.29* (0.17)
Stringency # After						−0.67* (0.36)
After						47.87** (20.94)
Stringency # GDP # After						0.21 (0.18)
Stringency # Population # After						−0.21* (0.11)
Stringency # Fully ready # After						−0.13 (0.16)
Stringency # Associativism # After						0.22* (0.12)
Stringency # Comm. trust # After						0.18 (0.11)
Stringency # Instit. trust # After						0.10 (0.15)
Constant	25.53 (21.38)	37.65 (24.13)	37.76 (24.72)	91.07*** (30.24)	−46.10 (104.01)	56.51 (34.48)
Observations	1,344	1,344	1,344	1,344	425	1,344
R-squared	0.49	0.50	0.50	0.65	0.71	0.65
Time FEs	Yes	Yes	Yes	Yes	Yes	Yes

TABLE 4 (Continued)

	(1)	(2)	(3)	(4)	(5)	(6)
Wave FEs	No	No	Yes	Yes	Yes	Yes
Country FEs	No	No	No	Yes	Yes	Yes

Note: Weighted by country population; robust standard errors in parentheses. The dependent variable in each regression is growth rate (calculated by the IHS) of weekly protest events per habitant by country. Stringency is the government stringency index. Fully ready or partially indicate the proportion of households that are fully or partially ready for a lockdown by country. Fully ready is defined as the household having simultaneous access to safe drinking water, electricity, sanitation, a (mobile) phone and is not cash constrained. Partially ready refers only to the first three components. Instit. trust, Comm. trust and Associativism are proportions of people with Institutional trust, Community trust and Associativism, respectively, by country. Latent variables for Institutional trust and Associativism are constructed and then dummy variables that are equal to 1 if their value is above the mean of the latent variable are created. The value of 1 for the dummies indicates that one has Institutional trust or Associativism. The latent variable of institutional trust is constructed from answers to questions about trust in the president, the parliament, the police and traditional leaders. The latent variable of Associativism is constructed from information about membership in religious groups, voluntary associations and community groups, as well as participation in community meetings. Community trust is defined as equal to 1 if the respondent answers 'always' to the question: 'when a vendor sells you a kg of maize, sorghum or beans, how sure are you that you get the correct amount?'. The value of 1 for Community trust variable indicates that the person has community trust. 'After' is a binary variable that is equal to 1 for all the periods after the first COVID-19 wave for each country. Cases is the growth rate (calculated by the IHS) in the number of COVID-19 weekly positive cases lagged by 2 weeks.

*$p < .10$.

**$p < .05$.

***$p < .01$.

shows that those countries that were more ready for lockdowns tended to implement stricter measures on average, after controlling for the number of cases and other factors. Column (2), however, nuances this insight and shows that it is the interaction between new cases and readiness that is most predictive of realized stringency. Specifically, column (2) indicates that countries with readiness one standard deviation above the regional average tended to be more sensitive to variation in the number of cases, adopting harsher measures (+0.42 points on the stringency index). When we add wave and country fixed effects to the model, the magnitude of this relationship strengthens, reaching 1.01 in column (4). Third, other fixed factors are systematically related to realized stringency. Although higher levels of GDP per capita are associated with greater stringency on average (column 1), its interaction with the number of cases is negative. This likely reflects that higher income countries were more able to sustain stricter public health measures (regardless of the number of cases), while lower income countries tended to be more reactive. We also note that countries with above-average levels of institutional trust and associativism tended to be less responsive to variation in case numbers.

Columns (5) and (6) delve further into the relationship between readiness and stringency. In column (5), we retain the specification from column (4) but restrict the sample to COVID-19 wave periods only. The results show an enhanced sensitivity to the number of cases in these periods but even more material variation depending on prior readiness—for example, the expected marginal response to a doubling of cases is 2.86 points greater for every one standard deviation increase in prior readiness.

In column (6), we distinguish between responses in the early phase of the pandemic, when many countries adopted relatively harsh measures to prevent widespread community transmission, versus later periods in which official restrictions measures largely aimed to flatten the curve of infections. To do so, we split the sample in each country between all observations before the end of the first wave and remaining periods (denoted 'After'). Interacting this dummy variable with the explanatory variables permits us to test whether responses in later periods differed systematically from those in the first. Our main finding is that it was principally in the later part of the pandemic that differences in each country's degree of readiness were associated with differences in the responsiveness of restrictions to new cases—that is, in the early phase, readiness was less relevant to responses but became more pertinent (predictive) as the pandemic progressed.

Turning to patterns of social unrest, Table 4 runs a complementary set of regressions following a similar specification to Equation (1). Here, the outcome is the IHS-transformed number of protests registered in each country in each period, as taken from ACLED. Based on the hypothesis that harsher official restrictions are likely to be associated with greater unrest, we include in the specification the stringency index and its interactions with time-invariant factors, including ex ante readiness. As before, columns (1) to (4) build up the specification sequentially, and columns (5) and (6) delve into variation across waves and earlier/later periods.

These results are less conclusive. Indeed, in the baseline model including country fixed effects, increases in stringency were associated with less social unrest, perhaps reflecting effective enforcement and adhesion to the measures. There is some evidence that more lockdown-ready countries were less likely to respond to increases in stringency with more protests (columns 2 and 3), this result does not survive inclusion of country fixed effects. Perhaps the most systematic result here is that higher levels of institutional trust were associated with lower responsiveness of protests to changes in stringency. That is, consistent with a number of other studies (see Lofredo, 2020; Schoch-Spana, 2017), trust in government has been a more critical factor than readiness per se.

5 | CONCLUSION

In light of the persistence of the COVID-19 pandemic and the slow roll-out of vaccination, especially in low-income countries, this paper set out to develop a simple index of lockdown suitability or readiness. We applied this index to harmonized survey data collected in 2019 to 30 sub-Saharan African countries. The index revealed that less than two in 10 urban households and less than one in 10 rural households across sub-Saharan Africa are fully ready for a prolonged lockdown. We investigated whether social trust could support compliance with lockdown or other

containment measures in contexts where households exhibit low economic capacity to avoid social contact. The results show no evidence for a trust offset effect, suggesting that strict lockdown policies may be difficult to enforce in sub-Saharan Africa where lockdown readiness and social trust are lowest.

Our ex post analysis showed that our index of lockdown readiness was predictive of the stringency of restrictions adopted by governments in response to new cases of COVID-19, which holds after controlling for other factors such as GDP per capita. However, lockdown readiness only seemed pertinent in the later phases of the pandemic, indicating that more generic restrictions were adopted early on. At the same time, we found no systematic relationship between the index and social protests during the pandemic. That said, we recognize that our study might have some limitations. First, we recognize that the present study presents only suggestive conditional correlations and we are not seeking to make strong causal claims about the responses of governments and citizens to the lockdown readiness of their country. Second, we are aware that, in the same way responses to the pandemic may be conditional to the level of development of each country, they may also be sensitive to the coverage of social protection in each country. Although levels of development and social expenditure may be correlated, due to limitations with data availability, we were unable to measure directly the impact of social protection coverage on pandemic responses. Finally, we recognize that our readiness index might not capture some specific differences between rural and urban areas. For instance, going without cash may not affect the ability to stay at home in rural or urban areas in the same way, especially for instance if people are able to grow their own food at home in rural areas. Future research is needed to better understand these differentiated mechanisms of transmission.

What might be the broader implications of these findings? First, given low lockdown readiness is determined by a lack of a regular income (or savings), then access to basic social protection measures—be it food or cash transfers—is likely to be necessary to ensure widespread compliance with (strict) public health restrictions, as shown in several high- and low-income countries alike (Gentilini et al., 2020). In contexts of high poverty without adequate safety nets, or the ability to scale up quickly, strict lockdowns are likely to compound the collective action problems associated with the containment of COVID-19 among those that face a trade-off between exposure to the virus and securing their livelihoods.

Second, in addition to safety nets, there is a need for effective communication and community engagement as shown in other pandemics in sub-Saharan Africa, such as the Ebola virus (Blair et al., 2017). While it is not possible to find 'off the shelf' solutions to build trust, the fact that low readiness is not offset by higher trust (ex ante) suggests that restrictive lockdown measures in contexts of both low economic capacity to avoid social contact and low trust in governments may provoke social tensions. But here, there may be a silver lining—if governments prove effective in handling the crisis, public trust in government may increase as a consequence (Flückiger et al., 2019).

In light of these results, the discussion cannot be whether or not lockdown measures were warranted. The body of evidence makes it clear that we were never dealing with a question of either-or but a question of the right policy mix (Decerf et al., 2020; Gourinchas, 2020; Lakemann et al., 2020). Lockdown does not need to be stringent; it can be targeted, along multi-group lines as suggested by Acemoglu et al. (2020), or other factors. As suggested by Gourinchas (2020), the continuation of income generating activities should be a priority. This increases the burden on each country's social protection infrastructures. In economies lacking one or with only a weak social safety net, lockdown can still be tailored to restrict leisure mobility while mitigating impacts on work and economic mobility. It will, nevertheless, be insufficient if (1) there is no strengthening of each country's social safety nets and (2) vaccination rollout remains insufficient.

In synthesis, our results show that a stringent lockdown is rarely a viable ongoing policy in countries with very low readiness. Although this study started early in the pandemic, the events that unfolded showed that, after a mimetic behaviour pushed all countries to adopt a stringent form of lockdown, most adapted to more lenient measures that took account of economic hardships. This occurred while COVID-19 cases increased above levels observed in the early phase of the pandemic in sub-Saharan African countries.

While it may be argued that the world is already at a more advanced stage in its knowledge of the COVID-19 pandemic, on therapeutics and even more so, in vaccine production and vaccination, there are strong reasons to

expect this not to be the last zoonotic pandemic that will emerge (Carlson, 2020; Naguib et al., 2020). Assessing whether lockdown readiness improves and monitoring whether, at any given point, a higher share of each country's households acquire it is a much-needed tool to advise on the appropriate policy mix to implement, if and when another epidemic (or pandemic) strikes.

ACKNOWLEDGEMENTS

We thank Finn Tarp, Kunal Sen and Tilman Brück for their valuable comments. This study was funded by UNU-WIDER's Inclusive Growth in Mozambique (IGM) programme and the UK Economic and Social Research Council (ESRC) under the Large Grant project 'Inequality and Governance in Unstable Democracies: The Mediating Role of Trust' (ES/S009965/1).

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are publicly available and sources are indicated in the study.

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How to cite this article: Egger, E.-M., Jones, S., Justino, P., Manhique, I., & Santos, R. (2023). Africa's lockdown dilemma: High poverty and low trust. *Journal of International Development*, 1–19. https://doi.org/10.1002/jid.3745