Regional network for Equity in health in east and southern Africa (EQUINET)[1] and East Central and Southern Africa Health community (ECSA HC)[2]

Brief: COVID-19 in East and Southern Africa: developments in the pandemic, July 2020

This information sheet is the second presenting work summarising evidence as of July 17 2020 from official and scientific population data across countries in east and southern Africa (ESA) on the COVID-19 pandemic, the responses to it and the relationship with other indicators of population health, health systems and health determinants. The information is sourced from World Health Organisation (WHO), official, public health and technical/ scientific sources. The sources of information are cited or hyperlinked, with hyperlinks to documents giving further details on indicators or issues raised. Further information can be found on the WHO page on COVID-19.

The information sheet aims to address four questions:

a. What is happening with COVID-19 testing and detection
b. How and where is the epidemic progressing over time?
c. How has the health system responded?
d. What are the implications for wider vulnerability?

Key messages

In terms of the epidemic profile, increased testing has improved case detection, although still at low levels for an effective public health response. Reporting the share of tests that are positive will help to identify if transmission is rising and effective use of test resources. By July 17th most ESA countries had a rising pace of transmission and a sustained rise in total cases. As exceptions, Mauritius, Uganda and DRC show plateauing of cases. The pandemic thus continues to take different forms in different ESA countries. Average case fatality has risen. While it remains lower than other regions globally, South African data suggests that excess mortality has begun to rise later in the epidemic. Within country data is needed to explore this. July 2020 data indicate that over 30% of populations in ESA countries have food insufficiency. COVID-19 responses are projected to further increase food insecurity, particularly in east Africa due to climate and locust related losses and in countries where reliance on remittances is high.

In terms of the health system response, the evidence in July further indicates that countries with greater capacities at ports of entry and those that implemented a more stringent response at the time of the first index case had a lower prevalence of cases. Continued constraints in accessing diagnostics limit case detection, despite reasonable surveillance capacities. While local production of continuous positive airway pressure ventilation is feasible, the wide variability of access to ventilators in the region suggests a need to scale up such production and procurement of care supplies, given the rising prevalence of COVID-19.

In terms of wider vulnerability, the slower, sustained increase in cases in the ESA region raises concern on the effects of sustained implementation of measures such as school and workplace closures. ESA countries with more rapid and stringent measures (such as Mauritius and Uganda) have lower case prevalence and in Mauritius, a shorter highly stringent response appears to have been effective in pandemic control. There is some evidence from some ESA countries that there may be a 'health debt' in unmet management of other morbidity that would need to be further explored. An average vulnerability index combining socio-economic, health and health care data enables mapping of where attention may be most needed. While this is best implemented *within* countries, its variation across ESA countries points to the need to learn from positive situations and support responses where vulnerability is high, given that the populations in the region will only be secure when vulnerability is reduced for *all* countries in the region.

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1. The data and COVID-19 testing and detection

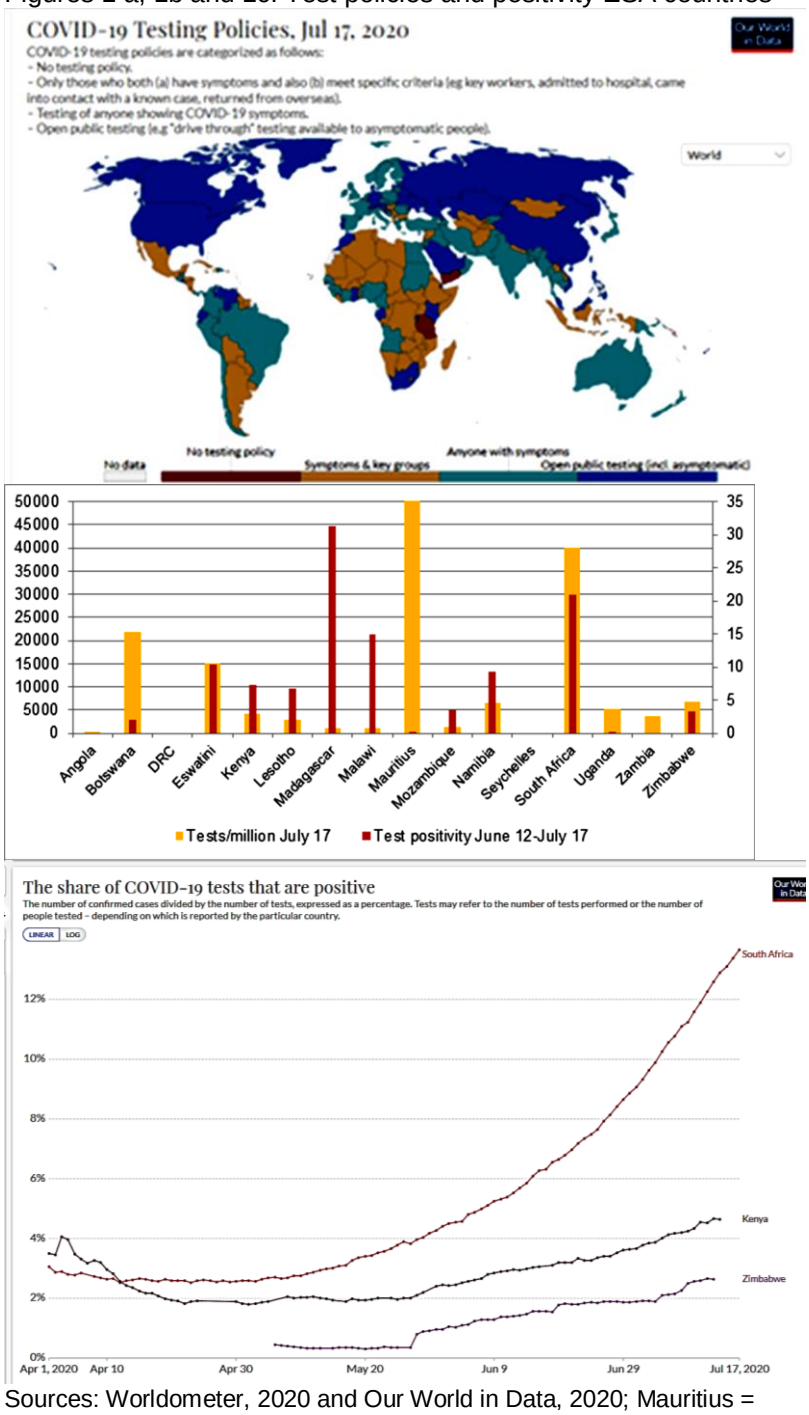
The cross country data reported in this information sheet comes from official data, reported on the WHO AFRO weekly situation reports; the online Worldometer database updated daily; the WHO global health observatory data; World Bank World Development indicators and other UN databases. Cross country databases were used to avoid having different definitions for different countries. Some health systems data were obtained directly from countries. The data sources are indicated in each section. As noted in the first brief analysing population data, the data has limitations where testing levels are low, affecting all evidence where case numbers are involved, including for mortality given the unavailability of excess all-cause mortality to compare 2020 data with the previous 5 year average. The available national data do not show the within country variations across groups, and recent population data is not yet available for some indicators. COVID-19 data for the Republic of Tanzania was not available in the sources used after May 8 2020 and has thus been excluded from many areas of analysis in this brief.

Testing is one cornerstone measure for public health prevention and planning. Test policies and the rate of antigen testing for COVID-19 vary across ESA countries (*Figures 1a, 1b*). Testing has increased, as have the reported cases and there is some pandemic modelling in the region. For example, the South African government has set up a National COVID-19 Modelling Consortium as a primary source of COVID-19-related projections, with a COVID-19 dashboard with pandemic updates for selected ESA countries.

Most ESA countries report on numbers of cases and numbers of tests implemented. However, there is need to distinguish between rising report of COVID-19 due to rising testing and a real rise in the rate of pandemic *incidence*. The positivity of tests can help to provide this, that is the share of tests that are positive out of total tests done.

For countries like Mauritius, South Africa and Botswana, high rates of testing (*Figure 1b*) suggests that reported cases may provide a reasonable reflection of COVID-19 rates in the population, ie much higher in South Africa, low in Botswana and very low in Mauritius. Rising positivity in South Africa (*Figure 1c*) suggests real increases in the incidence of COVID-19. For Kenya and Zimbabwe, where testing rates are much lower, rising cases may signal wider testing, while rising test positivity

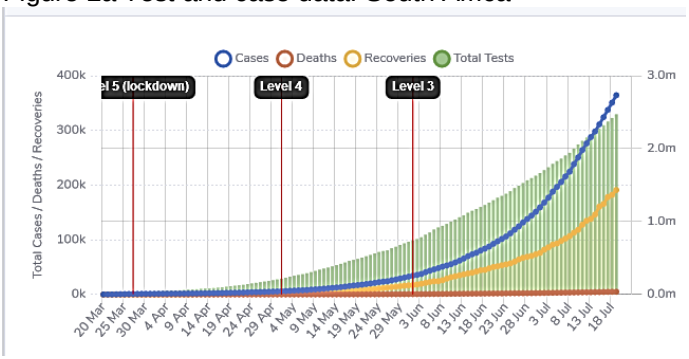
Figures 1 a, 1b and 1c: Test policies and positivity ESA countries



Sources: Worldometer, 2020 and Our World in Data, 2020; Mauritius = 152186 tests/million people July 17

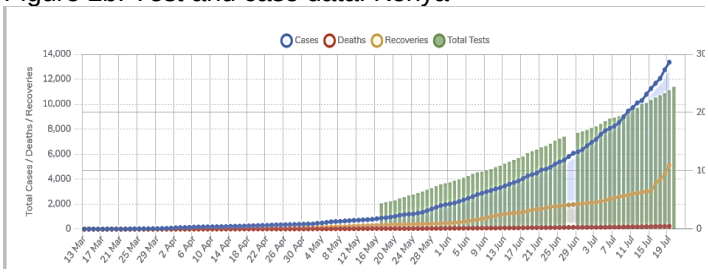
suggests that increases in case numbers are not simply due to rising testing levels but a real increase in transmission or more focused use of testing in areas where there is higher risk of infection. *Figures 2a,b, and c* provide further useful data.

Figure 2a Test and case data: South Africa



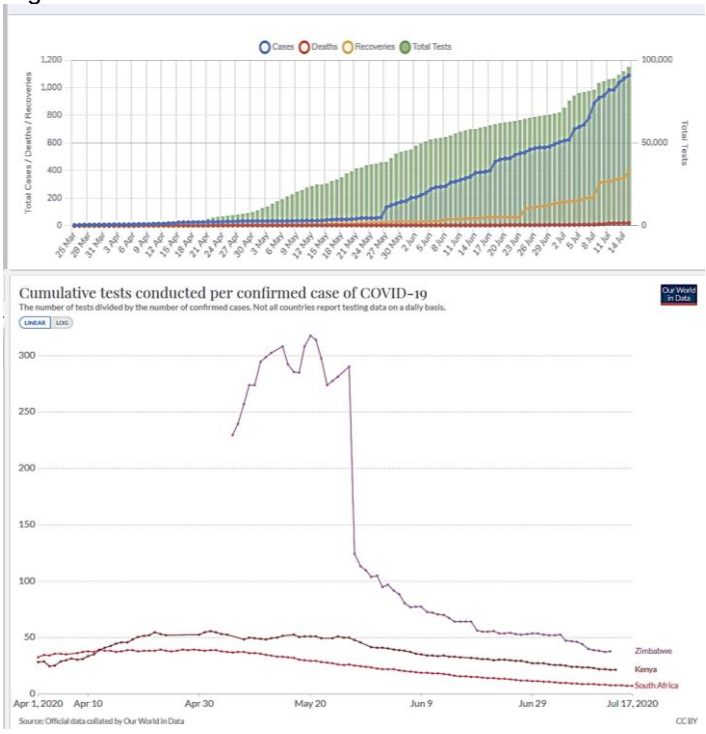
Global COVID-19 Dashboard, 2020

Figure 2b: Test and case data: Kenya



Global COVID-19 Dashboard, 2020

Figure 2c: Test and case data: Zimbabwe



Global COVID-19 Dashboard, 2020

For all three countries, rising test positivity (a rate of increase in cases that exceeds the rate of increase of testing) points to a real increase in the incidence of COVID-19. (When the epidemic is declining, the test positivity falls even if numbers of tests are rising and some cases are still being reported). In Figure 2c for Zimbabwe, the lower figure shows the number of tests per positive case (converse to positivity) and suggests both a focus in use of testing and a rise in cases in late May.

Given still low levels of testing in many countries, it is suggested that ESA countries report trends in test positivity, and where possible disaggregate this *within* countries.

Testing is vital for the public health response. The testing shortfalls signalled in *Figure 1b* across most ESA countries 5 months into the pandemic in the region suggest that the need and demand for essential diagnostics (tests and reagents) is not being met. While ESA countries are having to make most effective use of test resources to detect and manage outbreaks, given the rising level of local transmission within the general population reported in the next section, any shortfall in diagnostics is now a critical constraint for effective public health prevention through test, trace and isolate/quarantine strategies. As shown in *Figure 2a* for South Africa, after the lockdown was eased even from level 5 to level 3, the rapid reported rise in transmission highlights how widespread the implementation of test, trace and isolate needs to be to prevent such escalation.

2. How and where is the epidemic progressing over time?

To explore the epidemic progression in the region we explored data on the **incidence and mortality from COVID-19** and how this has progressed over time for the different ESA countries. *Table 1* overleaf reports this from official data sources indicated. The rates per million rather than absolute numbers take population differences into account.

The change in **days to doubling of the case numbers** between June and July shown in *Table 1* and *Figure 3* indicates changes in the pace of transmission of the epidemic: The shorter the days to doubling, the more rapid the speed of transmission. The days to doubling have fallen between June and July for 6 ESA countries and remained relatively constant in 3, suggesting **a rise in the pace of transmission** in the period. While the epidemic has plateaued in Mauritius, it has also slowed in Uganda and Democratic Republic of Congo (DRC).

Figure 3: Days to doubling, June and July

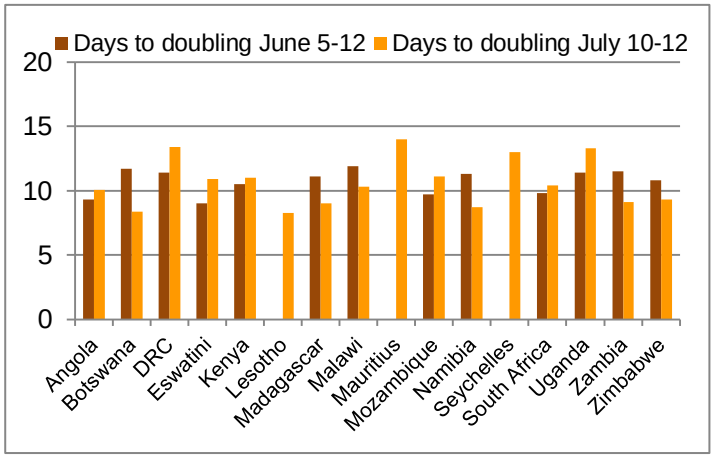


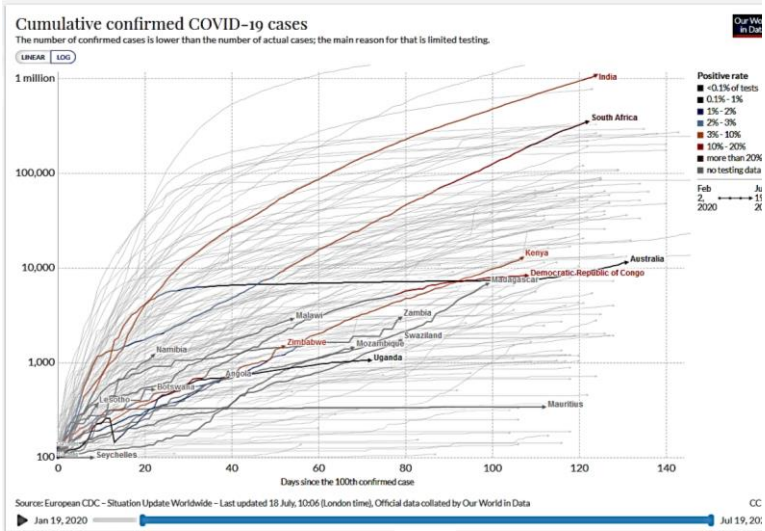
Table 1 Reported COVID-19 Cases in ESA countries 17 July 2020

Country	Total cases 17 July (i)	Estimated doubling time in days (ii)		Cases/ million people July 17 (i)	Total deaths 17 July (i)	Total deaths / mn 17 July (i)	Case fatality rate July 17 (i)	Tests / mn people 17 July (i)	Cases in health workers/ 1000 cases (iii)
		5-12 June	10-17 July						
Angola	638	9.3	10.1	19	29	9	4.50	304	0.0
Botswana	522	11.7	8.4	222	1	40	0.19	21830	42.0
DRC	8249	11.4	13.4	92	193	20	2.34		54.0
Eswatini	1619	9.0	10.9	1395	21	180	1.30	15128	43.0
Kenya	12062	10.5	11.0	224	222	40	1.84	4262	3.0
Lesotho	311	static	8.3	145	6	30	1.93	2815	0.0
Madagascar	1619	11.1	9.0	233	54	20	3.34	1146	26.0
Malawi	2805	11.9	10.3	146	55	30	1.96	1164	86.0
Mauritius	343	static	14.0	270	10	8	2.92	152186	90.0
Mozambique	1402	9.7	11.1	45	9	3	0.64	1360	0.0
Namibia	1078	11.3	8.7	424	2	8	0.19	6622	125.0
Seychelles	108	static	13.0	1098	0	0	0.00		0.0
South Africa	337594	9.8	10.4	5689	4804	810	1.42	39989	29.0
Uganda	1056	11.4	13.3	23	0	0	0.00	5213	0.0
Zambia	2810	11.5	9.1	153	109	60	3.88	3692	43.0
Zimbabwe	1420	10.8	9.3	95	24	20	1.69	6704	27.0

DRC = Democratic Republic of Congo mn = million. Tanzania has not provided data to these sources since May so is not included. Sources: (i) Worldometer 17/7/2020 (ii) Doubling time estimated from the total case numbers and days between periods shown. (iii) WHO AFRO 12 May

Figures 4a and 4b show the rapid rise in cases in most ESA countries in the last month. In addition to South Africa, Kenya, Madgascar, Zambia, Malawi, Zimbabwe and Namibia appear to be entering a phase of exponential spread. Aligning the different epidemics to a common start point (the date 30 cases/day were reached) - as shown in the logarithmic form in *Figure 4a* - indicates that **for most ESA countries, the rise in cases has continued**. South Africa's epidemic curve has been the highest, but all appear to be following a slope similar

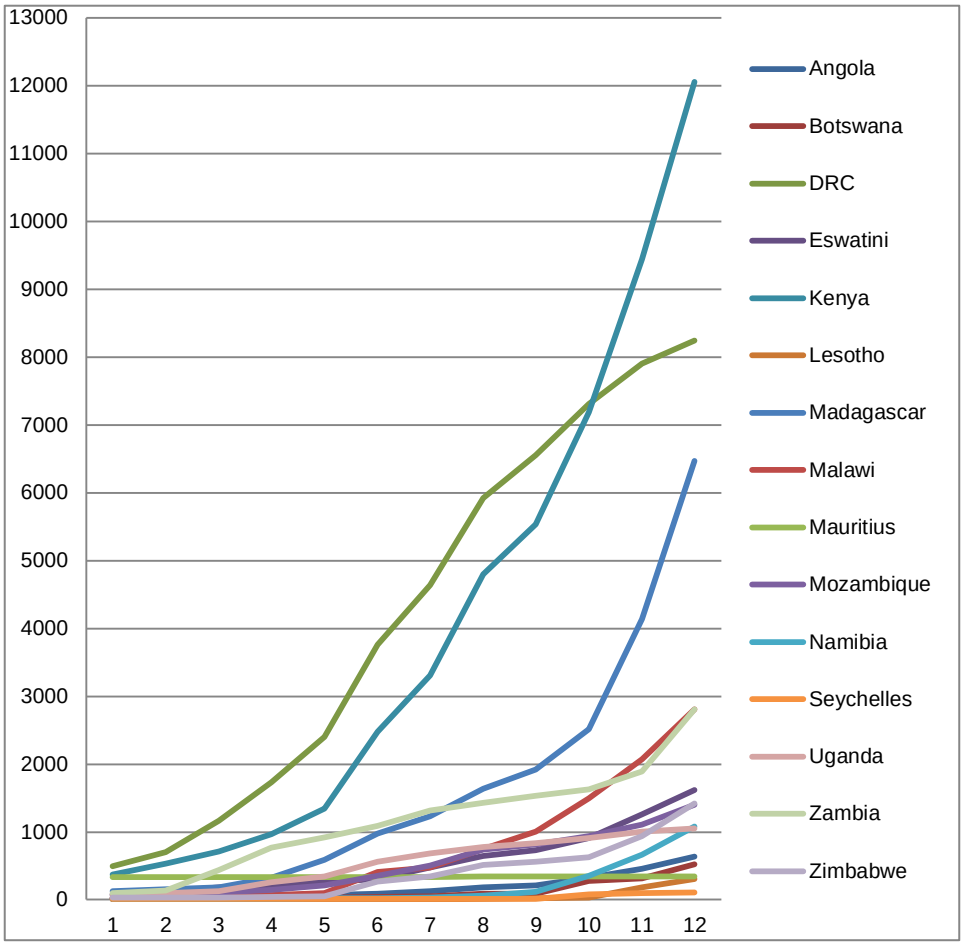
Figure 4a Cumulative confirmed COVID cases, ESA countries



Source: Our World in Data, 2020

to that of India than of the steeper rise in European countries. **This suggests a more sustained epidemic rise over time in ESA countries,** requiring a longer period of stronger social distancing and a sustained strain on social and economic activity.

Figure 4b Cumulative cases April 29-July17, ESA countries excluding South Africa

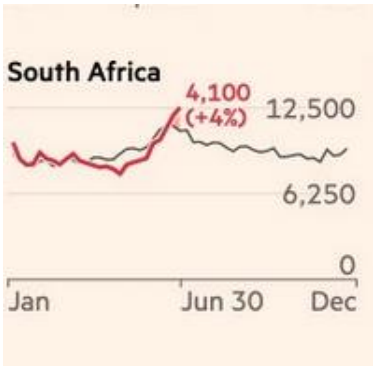


Source: Worldometer data; Time periods: 1=29 Apr; 2=6 May 3=12 May; 4=19 May; 5=26 May; 6=5 June; 7=12 June; 8=22 June; 9=26 June; 10=3 July; 11=10 July; 12=17 July
South Africa excluded as case rises significantly exceed Y axis July 17 at 337 594

The exceptions to this are Mauritius, where the epidemic has clearly plateaued in a similar curve to that of Australia, and Uganda and DRC, where the epidemic curves seem to be slowing. The response in these countries is further discussed in the next section, although the recent rise in cases in Australia shown in Figure 4b suggest that any plateauing or slowing cannot be taken for granted and demands attention to outbreak prevention and control.

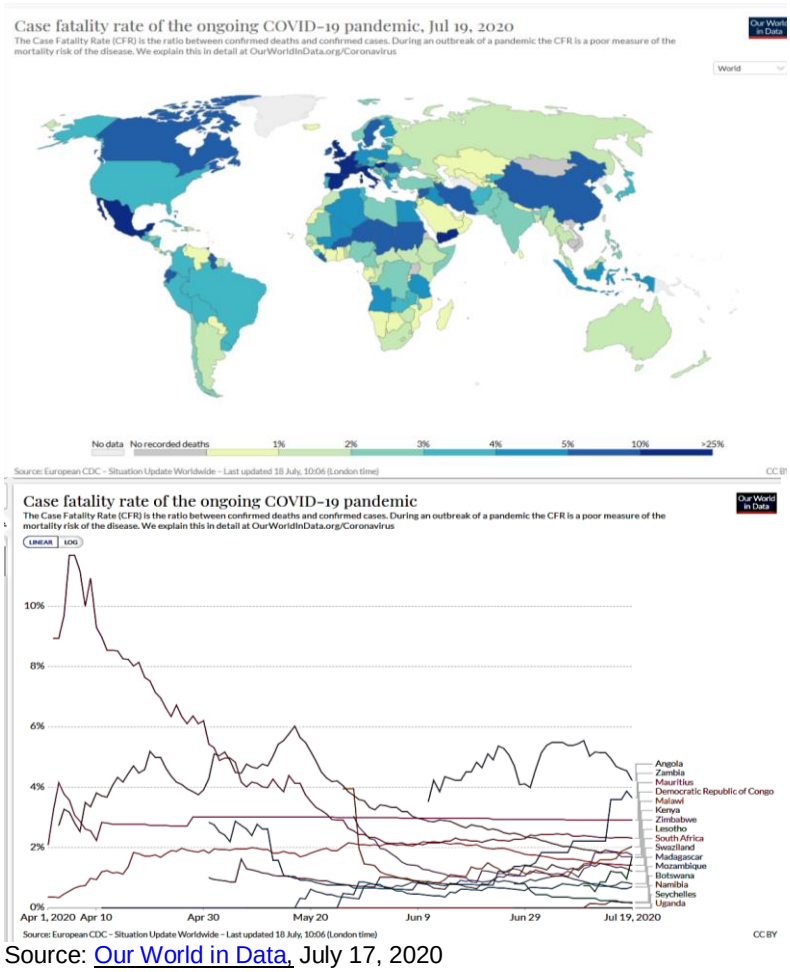
There is a gender differential in cases. Not all ESA countries disaggregate cases by gender, but some do. UN Women (2020) report the sex differentials in COVID-19 cases as 31% female to 69% male in Kenya, compared to 57% female to 42% male in South Africa, showing significantly different ratios, the reasons for which would need to be explored. The data in *Table 1* suggests that **case fatality rates** vary widely across ESA countries and as shown in *Figure 5b*, have varied within the same country over time. In part this relates to the variability in testing rates and accuracy of detection of deaths vs cases, especially when testing is largely done in hospital rather than community settings, where cases detected (the denominator) are severe and more likely to result in fatality (the numerator). The average case fatality rate in the ESA region, excluding Tanzania, was 1.76% by July 17, higher than the mid-June level reported in the last brief of 1.46%. The ESA case fatality rates are lower than in other global regions in the north, as shown in *Figure 5a.*

The only country for which the excess mortality from COVID-19 was available in any online source was South Africa, with the findings from analysis by Burn-Murdoch, (2020) shown below.



This analysis of the difference in all-cause mortality for the epidemic period compared to the average for the same period in the past 5 years indicates that **excess mortality began to rise later in the epidemic.** The question is whether this is a result of the level of cases rising, or if it is due to the spread to older communities, such as those in rural areas.

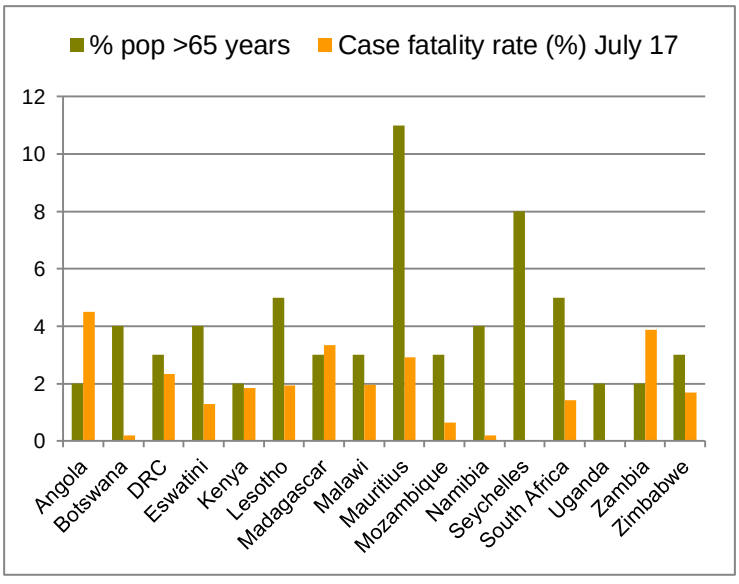
Figure 5 Case fatality rates July17, a. globally and in b. ESA countries over time



Source: Our World in Data, July 17, 2020

As the multi-country study by Dowd et al, 2020 showed, the age structure of populations may help to explain differences between countries in COVID-19 related mortality. In the June brief we did not find any relationship between COVID-19 related mortality and the share of people in older age groups in the population, and the same was the case in July, with no statistical correlation found. It may thus also relate to when in the epidemic these age groups are more at risk. If, as in many cases, the epidemic starts in urban areas where populations are generally younger and only spreads in later stages through within country movements to rural areas where more elderly people live, we may not see raised mortality at population level until later in the pandemic within countries. Overall mortality data is still very low.

Figure 6: Case fatality vs share of population > 65 years



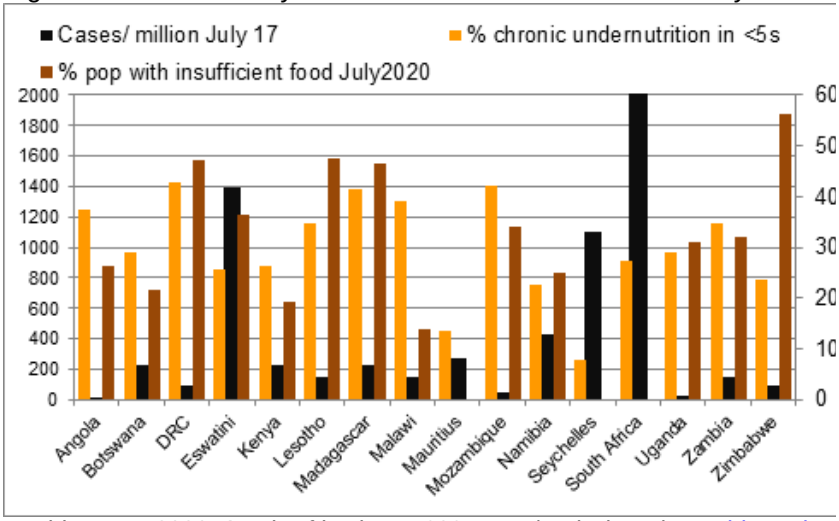
Sources: Worldometer data, World Bank development indicators

The data once again shows that **it is not valid to generalise about the epidemic in the region- it is taking different forms in different ESA countries.** This is not surprising **-** Rwema et al (2020) note the diversity in the transmission dynamics of other respiratory pathogens across the continent, including in influenza seasonality and strains, even between neighboring countries. The determinants and responses differ across and within ESA countries.

The June report observed the raised risk of infection in health workers in some ESA countries. Also, as found in the June report, we did not find any relationship between case fatality rates in July and the reported prevalence of diabetes or tuberculosis. These relationships may not be easily assessed at the still low rates of COVID-19-related mortality in the population. The first brief on population data reported on social determinants of risk and vulnerability in relation to COVID-19 cases.

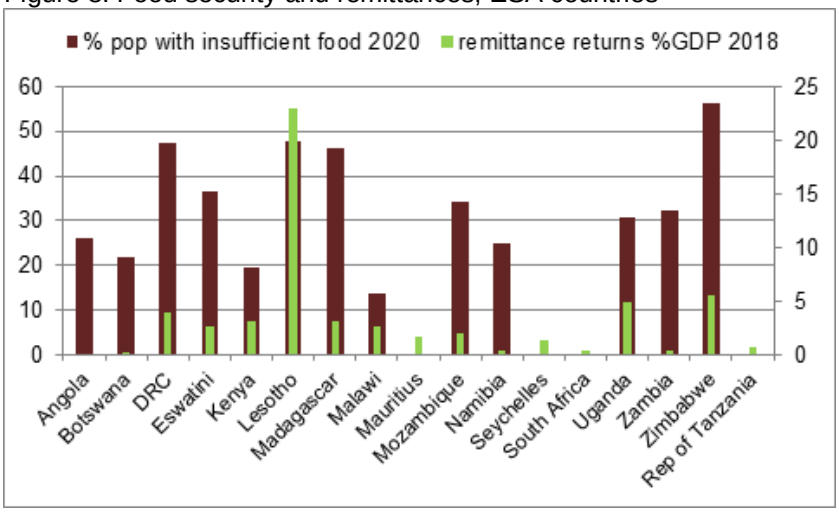
The United Nations in June 2020 estimated that from real-time household food security monitoring and model-based estimates that deteriorating employment conditions and other factors may have pushed as many as 15 million people in Sub-Saharan Africa into acute food insecurity since February 2020. Measures to control or mitigate COVID-19 outbreaks are already affecting global food supply chains and markets. World Food Programme data for July 2020 in *Figure 7* suggest that 8 ESA countries for which data are available already have over 30% of their populations with food insufficiency and that chronic child undernutrition is a major health challenge. The data in *Figure 7* suggest that food insecurity exists for countries with both high and low reported levels of COVID-19. The UN report that rather than COVID-19 cases themselves, COVID-19 related economic factors may push a further 25 million people into extreme poverty in the continent, with consequences for severe food insecurity. In East Africa the pandemic coincided with ongoing heavy rains and the worst locust swarms in a decade threatening crops. The World Bank projects a 23% decline in remittances to Sub-saharan Africa in 2020, in part due to falling employment in key remittance sending countries due to COVID-19. This will add a further challenge for households in meeting food needs in ESA countries with higher levels of remittance contributions and moderate to high levels of food insecurity (Lesotho, Uganda, Zimbabwe shown in *Figure 8)*.

Figure 7: Case data July 2017 ESA countries and food security



Worldometer, 2020; South Africa is at 5689 cases/mn(axis cut); World Food programme 2020

Figure 8: Food security and remittances, ESA countries



Worldometer, 2020; World Food programme 2020

3. How has the health system responded?

The public health response to the COVID-19 pandemic is not the responsibility of the health system alone. It also calls on public information, availability of safe water, soap, food, job security and social protection and the work of many other sectors, some of which were discussed in the previous information brief.

The first section discussed the level of testing as a core feature of the test, trace and isolate response. *Table 2* shows updates on selected indicators of different aspects of the public health response, including pandemic preparedness through capacities at land, sea and air ports and for surveillance, as required in terms of the International Health Regulations (IHR) (2005) care for cases. The first clinical trial in South Africa and on the continent for a COVID-19 vaccine was announced on 23 June, as a co-operation between Wits University, the University of Oxford and the Oxford Vaccine Group. A separate brief outlines wider issues of access to essential health products in the region. Further disaggregations not yet available are needed to show protection of health and other frontline workers from infection, together with qualitative evidence on different forms of community engagement. There are many stories beyond these numbers on how health systems are being affected. There is a wider 'health debt' of unmanaged health problems, including mental health challenges, that have grown under COVID-19, discussed later in this section.

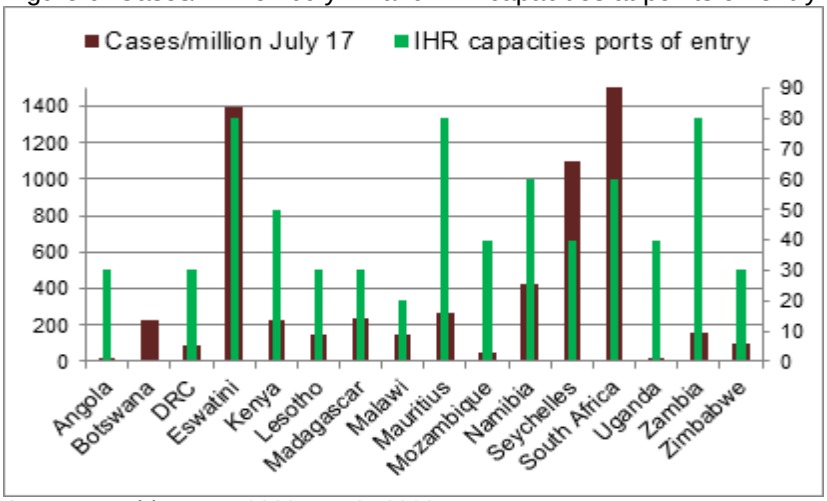
Table 2 Indicators of health system responses ESA countries 17 July 2020

Country	Tests / million people 17 July (i)	Covid-19 Government stringency index (ii)		# total hospital beds / 1000 (iii)	# ICU beds / 1 million pop (iv)	1000 people per ventilator (vii)	# nurses and midwives / 100 000 pop (v)	IHR capacities ports of entry (iii)	IHR capacities surveillance (iii)	TB case detection rate % (vi)
		Index date 1st case	As of July 17							
Angola	304	92	76	0.8	3.4		130	30	100	61
Botswana	21830	69	49	1.8	63.9		330	0	60	59
DRC		15	81	0.8	0.7		47	30	60	63
Eswatini	15128	14	81	2.1	0		383	80	80	80
Kenya	4262	31	81	1.4	9.7	198.4	150	50	80	63
Lesotho	2815	74	55	1.3	4.7		65	30	60	55
Madagascar	1146	94	69	0.2	0	4377.0	11	30	60	55
Malawi	1164	51	57	1.3	0	1067.2	25	20	80	48
Mauritius	152186	6	22	3.4	95.2		340	80	60	80
Mozambique	1360	22	75	0.7	0	867.5	44	40	80	57
Namibia	6622	9	52	2.7	44.6	244.8	280	60	80	61
Seychelles		23	33	3.6	326.5		330	40	80	87
South Africa	39989	17	81	2.8	55.7	18.0	350	60	20	76
Uganda	5213	58	87	0.5	1.5	776.8	63	40	80	65
Zambia	3692	20	51	2.0	5.5		89	80	60	58
Zimbabwe	6704	27	70	1.7	4.1	902.4	120	30	60	83

DRC = Democratic Republic of Congo Tanzania has not provided data to these sources since May so is not included.Sources: (i) Worldometer 12/6/2020 (ii) Oxford COVID-19 Government Response Tracker 2020 (iii) WHO Global Health Observatory 2020 (iv) Reuters 2020 (v) African health statistics 2020 (vi) World Bank 2020 (vii) One Africa COVID Tracker

The June brief showed the role of IHR **capacities for points of entry and for surveillance.** *Table 2* and *Figure 9* show more clearly the role of capacities at ports of entry using July 17 case prevalence. Seychelles and South Africa both with high levels of international traffic with lower levels of capacities at points of entry have higher case rates than Mauritius, which has high port capacities and international

Figure 9: Cases/ million July 17 and IHR capacities at points of entry

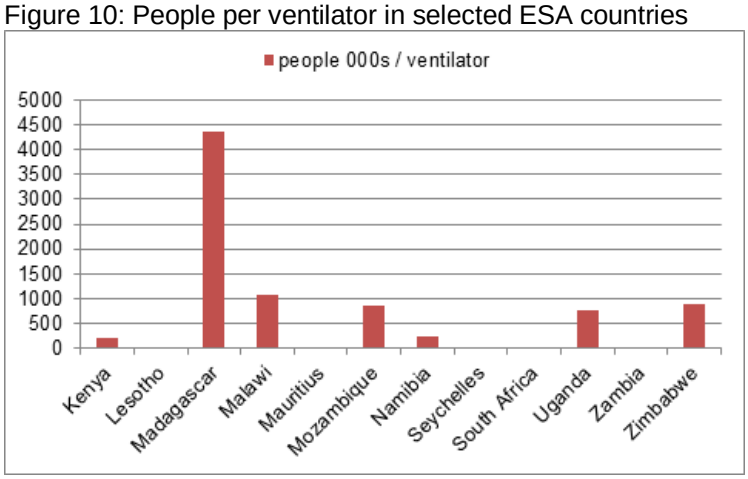


Source: Worldometer, 2020; WHO, 2020

traffic. While South Africa has now limited international traffic at the cost of income from this, Seychelles and Mauritius are only open to emergency flights. As noted in the earlier brief, while most ESA countries implemented early travel bans, an average IHR capacity for points of entry of 44% for ESA countries collectively indicates a need to strengthen port capacities for when these travel restrictions are lifted, particularly for those with long land borders. The previous brief observed from the gap between the high average TB case detection rate in the region (65% as shown in *Table 2*) and the much lower rate of COVID-19 testing for all except Botswana, Mauritius and South Africa point to the gap in effective test and trace systems in terms of access to the technology, noted earlier.

The June brief discussed the evidence on health sector capacities and levels of COVID-19 and case fatality in ESA countries. With rising incidence and several months since first cases demand on services is likely to rise. There is wide variability in the availability of ventilation equipment for those countries for which information is available (*Table 2 and Figure 10*). While South Africa has a better rate of 18 000 people/ventilator, two thirds of South Africa's 3216 ventilators are in the private sector and potentially inaccessible to the wider population. Yet continuous airway pressure (CPAP) equipment can be produced in the region. In April, for example, South Africa's National Ventilator Project indicated an aim to locally produce at least 10,000 ventilators by the end of June, although more recent evidence suggests that this goal has not been reached.

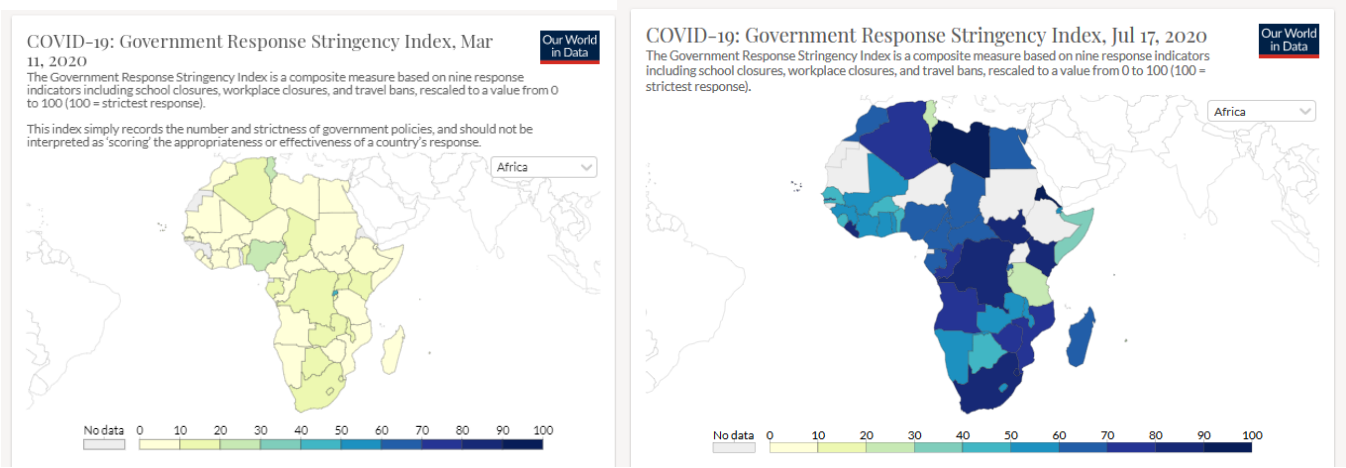
Figure 10: People per ventilator in selected ESA countries



Source: One Africa COVID Tracker, 2020; data not available for selected countries showing as zero

The early and strengthened response in most (not all) ESA countries is shown in *Figures 11a and 11b* for March to July 17, according to an index compiling 8 different elements of the response (see Oxford COVID-19 Government Response Tracker, 2020).

Figures 11a and 11b: Covid-19 Government response Stringency index March 11 and July 17



Source: Oxford COVID-19 Government Response Tracker 2020

In the June brief we noted that **the level of stringency of the response** on the date of the first index case appears to have been important for later case incidence- the lower the stringency, the higher the current cases, and vice versa. *Figure 12a* below suggests that this relationship still holds a month later for the case levels in July 2020.

Figure 12b suggests that this relationship with the stringency index is less clear in relation to current transmission (noting that longer days to doubling suggest lower rates of transmission). While testing levels lead to caution on evidence on transmission levels, one reason for this may also relate to the responses as formally intended and their application in practice.

Mauritius which has had a sustained plateauing of the epidemic had a combined hard and early lockdown over 3 months that led to a plateaued epidemic and lifting of the lockdown in mid-June. The measures applied are shown below:

Figure 12a: Covid-19 cases vs the Govt stringency index at 1st case

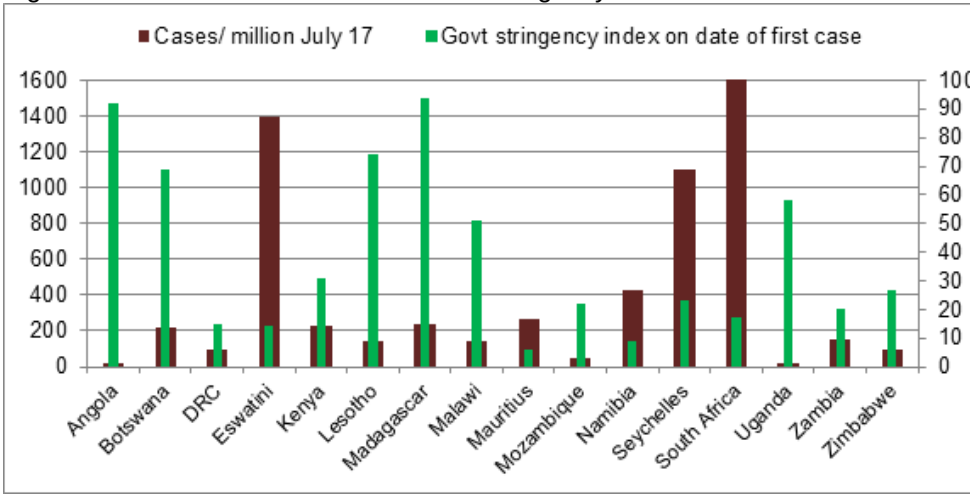
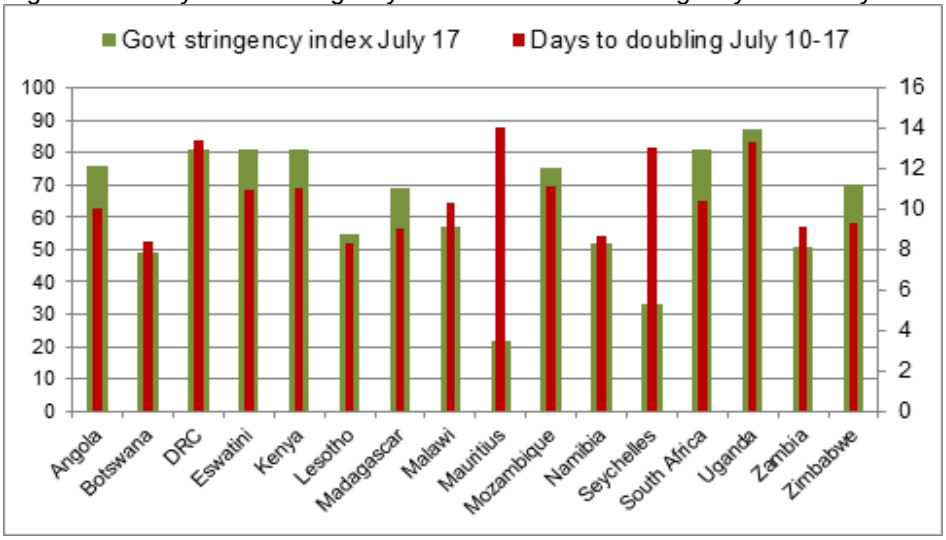


Figure 12b: Days to doubling July 10-17 vs the Govt stringency index July 17



Source: Worldometer 2020, Oxford COVID-19 Government Response Tracker 2020

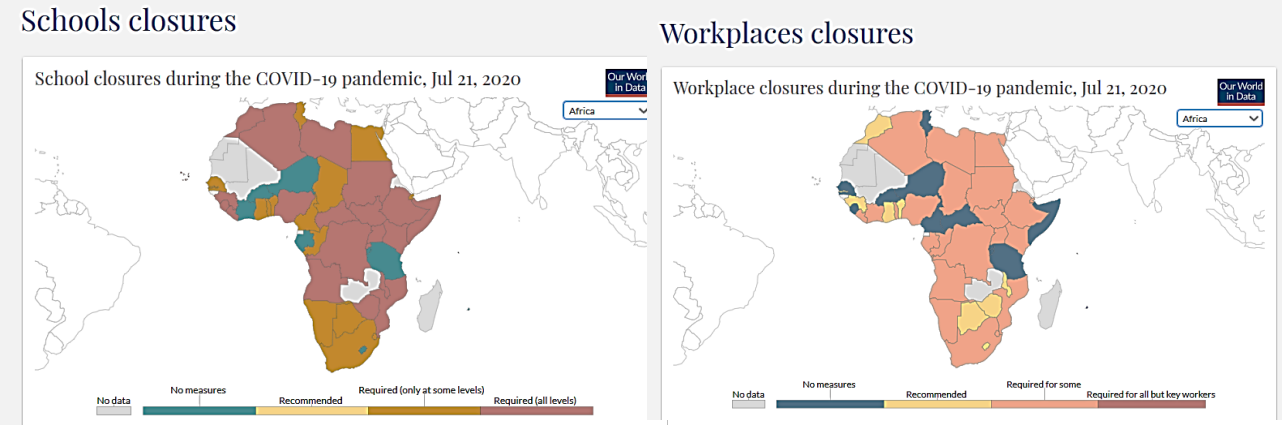
Table 3: Mauritius COVID-19 response: key steps	
22nd Jan 2020	Screening at the airport; Fever measurements and separation of at-risk passengers
28th Feb	Quarantine of visitors from countries with a high number of cases, despite no cases yet reported
From Feb	Persistent media campaign to raise awareness on how to prevent transmission of the disease
12th March	Independence Day celebrations in schools stopped. The Prime Minister addressed the nation regularly on national television and set up a communications cell in his office. The Ministry of Information and Communication Technology developed a mobile app called 'beSafeMoris'. It provides official up-to-date information, statistics and useful tips, and can be downloaded and used free of charge.
18 March 2020	First 3 cases, next day 4 cases—all imported. The Prime Minister announced the first case in Mauritius live on national television
19th March	Stringent measures imposed: Closure of schools; borders closed to international arrivals, apart from repatriating nationals; limited public transport and only essential workers allowed to report for duty. The Mauritian citizens were generally happy with government care and online classes for primary schools and those broadcast on national television highly appreciated. The government's daily press releases and intensive awareness campaign key to social support.
24 March	Case numbers > 42; A sanitary curfew is applied and supermarkets, bakeries, and shops are closed, despite some public dissatisfaction. Basic food items distributed to families on the Social Register of Mauritius; cash transfers of 50% of minimum wage; fees for market stalls waived during the curfew.
Up to 30th March	128 cases. Fever clinics instituted at public hospitals to separate potentially infected and symptomatic patients from other patients; contact tracing put in place
15th April	The curfew relaxed
29th April	332 cases reported; 306 patients recovered, 29 in quarantine. 15,893 tests conducted up to this date.
30 May-June 13	Lockdown lifted in stages and completely, 337 cases

Source: Jeeneea and Sukon, 2020 , UNDP, 2020

4. What are the implications for wider vulnerability?

The slower rate of rise of the epidemic in the ESA region than some other regions globally raises the question of the wider effects of sustained implementation of some of the prevention methods. For example the application of measures such as school and workplace closures varies across ESA countries, as shown in *Figure 13a and b*. Tanzania lifted school closures in June and does not have workplace closures in July, while Angola, DRC, Uganda, Kenya and Mozambique report more stringent measures for both areas. These latter countries also all have lower COVID-19 prevalence levels. It will be important to track whether this implies a shorter period of such measures, as in Mauritius, given their wider effect on children's schooling and workers incomes.

Figure 13 ESA country prevention measures a. School closures b. workplace closures



Source: Our world in data, 2020;

One area where there is emerging evidence is of the '**health debt'**, the potential fallout from services of other conditions when services are strained by COVID-19 or when people avoid services. The evidence on this is still limited. *Table 4* provides evidence on reported facility cases of different conditions comparing the same periods in 2019 with 2020. A negative figure suggests that 2020 cases reporting to facilities were lower than those in 2019.

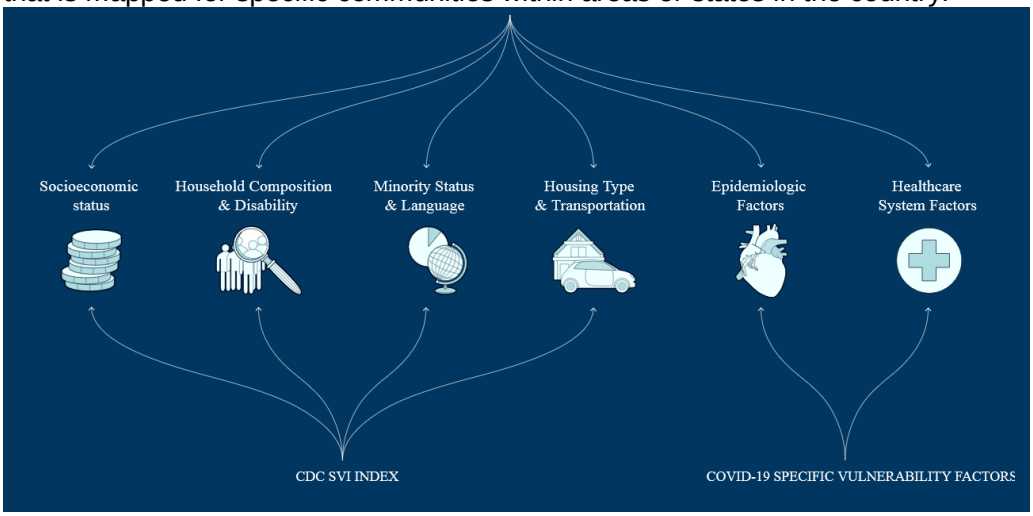
Table 4 Health information data selected ESA countries, May-May facility cases 2019, 2020

Country	OPD cases 2020 vs 2019	In patient cases 2020 vs 2019	TB cases at facilities 2020 vs 2019	Diabetes cases 2020 vs 2019	Road traffic accidents 2020 vs 2019	Asthma cases 2020 vs 2019
Eswatini	87218	-11270	-80	-3633	-506	-905
Kenya	Na	Na	-417	-20232	1190	-24705
Lesotho	-103352	-4346	-271	-1375	-19	-350
Zambia	435473	-1056	-1538	-1768	753	-4139

Source: Country health information systems

The table indicates that case numbers were lower in 2020 than 2019 for a number of areas of service use for the four countries. This trend was less evident for road traffic accidents and would need to be explored, including in relation to the different timings of travel restrictions, with some lifted by May. Inpatient declines were greater than outpatient. The reasons for this decline in 2020 and how far it related to avoiding service contact due to fear of exposure, as has been reported in other countries, would need to be explored. Abbas et al, 2020 report concern that routine childhood immunisation services may decline as people cannot gather in outreach services or visit services. They assessed that the deaths prevented by sustaining routine childhood immunisation in Africa outweigh the excess risk of COVID-19 deaths associated with vaccination clinic visits, especially for the vaccinated children and argue that routine childhood immunisation should be sustained as much as possible. Suppression measures and service demand may however lead to a level of unmet health need after lockdowns list. The size of this 'health debt' in the region is not clear and needs follow up assessment to plan for measures to address it.

The within and across country **vulnerability to COVID** has been mapped in some countries and regions. For example the COVID-19 Community Vulnerability Index (CCVI) in the USA combines the individual measures of vulnerability shown below to prepare a combined index that is mapped for specific communities within areas or states in the country.



Source: US CDC, 2020

Indicators of these features for ESA countries shown in *Table 5*, and the ranking of countries on each were used to provide an average vulnerability index for ESA countries, with 1=least vulnerable and 17= most vulnerable.

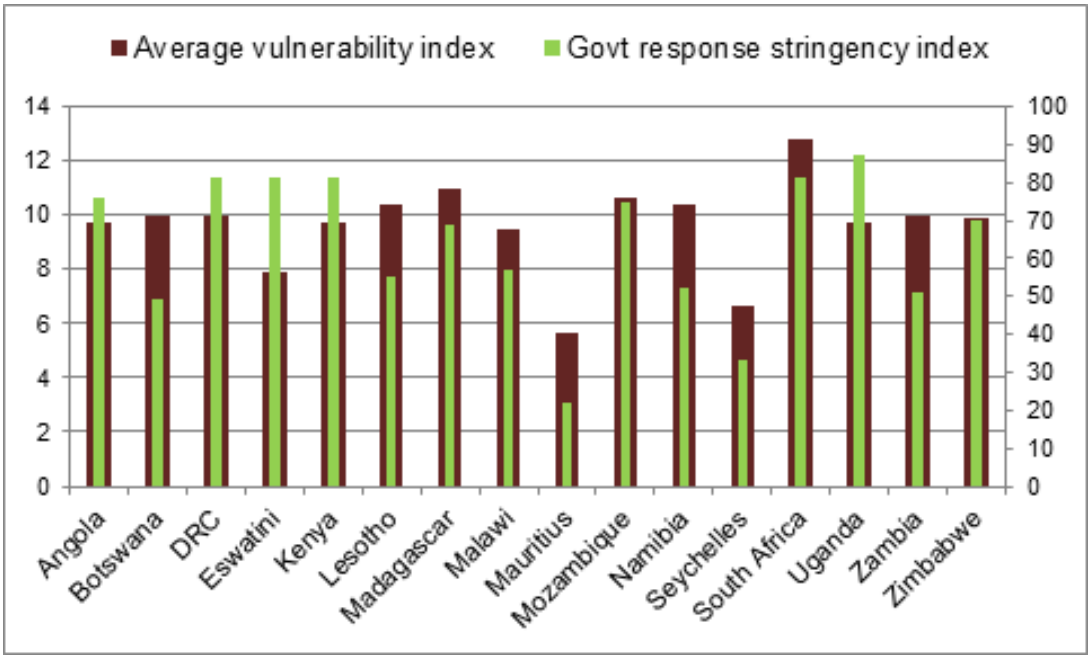
Table 5 Indicators of health system responses ESA countries 17 July 2020

	Socioeconomic status		Household composition	Minorities	Household features	Epidemiolo-gical factors		Health system factors			
Country	GINI coe-fficient (i)	GDP/ capita 2019 (i)	House-hold size (ii)	Number mi-grants 2019 (i)	% access to hand-washing with soap (iii)	Cases/ mn July 17 (iv)	Days to doubling July 10-17 (iv)	# total hosp-ital beds / 1000 (i)	IHR capaciti es surveill ance (v)	Ave vulnera bility index	Covid govt response stringency index 17 July (vi)
Angola	51.3	2974	2.3	106845	39	19	0.9	0.8	100	9.75	76
Botswana	53.3	7961	3.7	160644	60	222	8.4	1.8	60	10.00	49
DRC	42.1	545	5.3	545694	20	92	13.4	0.8	60	10.00	81
Eswatini	54.6	3837	4.6	31579	58	1395	10.9	2.1	80	7.88	81
Kenya	40.8	1817	3.9	1084357	30	224	11.0	1.4	80	9.75	81
Lesotho	44.9	1158	3.3	6572	44	145	8.3	1.3	60	10.38	55
Madagascar	42.6	522	4.7	32075	10	233	9.0	0.2	60	11.00	69
Malawi	44.7	412	4.5	215158	44	146	10.3	1.3	80	9.50	57
Mauritius	36.8	11204	3.5	28585	93	270	14.0	3.4	60	5.63	22
Mozambique	54.0	492	4.4	222928	24	45	11.1	0.7	80	10.63	75
Namibia	59.1	4958	4.4	93888	34	424	8.7	2.7	80	10.38	52
Seychelles	46.8	17402	3.8	12791	100	1098	13.0	3.6	80	6.63	33
South Africa	63.0	6001	3.2	3142511	73	5689	10.4	2.8	20	12.75	81
Uganda	42.8	777	4.7	749471	19	23	13.3	0.5	80	9.75	87
Zambia	57.1	1291	5.1	127915	31	153	9.1	2.0	60	10.00	51
Zimbabwe	44.3	1464	4.1	398866	39	95	9.3	1.7	60	9.88	70

mn = million; DRC = Democratic Republic of Congo Tanzania has not provided data to these sources since May so is not included .Sources: (vi) World Bank 2020 (ii) UN Pppulation 2020 (iii) WHO and UNICEF 2015; (iv) Worldometer 17/7/2020 (v) WHO 2019 (vi) Oxford COVID-19 Government Response Tracker 2020

The distribution of the average vulnerability index using the masures noted across ESA countries shown in *Table 5* indicates that combining various features of vulnerability from COVID-19, three countries are lowest levels *(*Mauritius, Syechelles and Eswatini) and two at highest levels (South Africa and Madgascar). *Figure 14* shows the relationship between the average vulnerability index and the government stringency index for July for ESA countries. For countries at low levels of both (Mauritius and Seychelles), the concern remains to ensure the prevention of outbreaks and to manage the longer term consequences of COVID-19, while for countries where vulnerability is higher and the stringency of response low (such as Zambia and Namibia) the concern remains to strengthen the pandemic response. The figure indicates, however, that many ESA countries have a high stringency of their (formal) response relative to their vulnerability at country level. What this does not tell is what areas and groups are more vulnerable *within* countries to ensure resources reach these areas/ groups.

Figure 14: Average Vulnerability index and Government stringency index, July 2020 ESA countries



Source: Author calculations and Oxford COVID-19 Government Response Tracker 2020. Excluding Tanzania

Vulnerability mapping is generally done within countries to support resource allocation and planning of responses, and it may be useful for countries to choose the relevant imidicators and implement this to focus resources where they are most needed, to prevent transmission and to manage vulnerability.

At regional level, mapping how vulnerability is distributed across the region is, however, still relevant, given that the populations of the region will only be secure when vulnerability is reduced for *all* countries in the region. For the majority of ESA countries, rising cases show that the focus is on suppressing transmission and vulnerability. For those where transmission has plateaued or shows signs of doing so, while we draw learning from their experience, the second waves and outbreaks in countries with more advanced epidemics point to the need to capacitate community, local and central systems to prevent and control outbreaks and vulnerabilities arising from the pandemic.