EQUINET Information sheet 3 on COVID-19

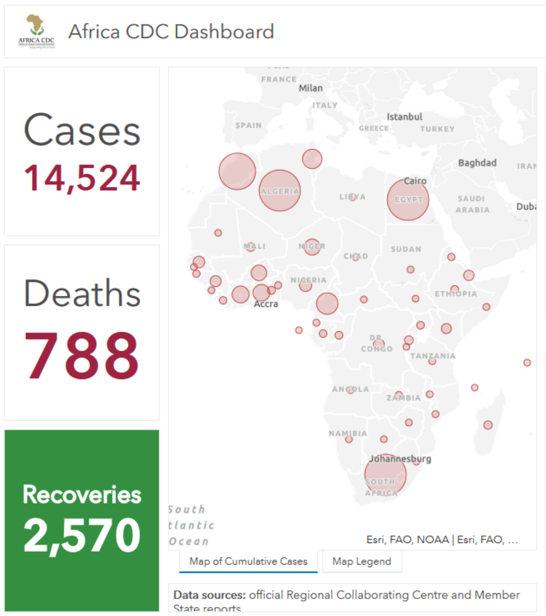
Produced by Training and Research Support Centre for the Regional Network for Equity in Health in east and southern Africa (EQUINET)[1]
April 15, 2020

This is the third information sheet from EQUINET summarising and providing links to official, scientific and other resources as of April 14 2020, to inform, support understanding for individual to regional level responses to COVID-19. *This brief complements and does not substitute information from your public health authorities.* Please read the first information brief for basic information on the epidemic and the second information brief on the health system, policy and community responses; the macro-economic impacts and various dimensions of (in)equity. To receive future editions if you are not already on the EQUINET newsletter mailing list, please subscribe at https://www.equinetafrica.org/content/subscribe.

You can read the full brief or go to the section that is most relevant to you. This brief covers:

The focus is on east and southern Africa (ESA), with information from other regions that may be useful for the ESA region or that may raise issues for the region. The information is sourced from World Health Organisation (WHO), official, public health and technical/ scientific sources, and from media and grey literature emailed to EQUINET. The source of information is cited or hperlinked so readers can read from sources directly or for deeper information on the issues raised. The WHO page on COVID-19 is at https://www.who.int/emergencies/diseases/novel-coronavirus-2019. *We welcome feedback and contribution, including on any errors to be addressed – please send to admin@equinetafrica.org*.

1. Developments in the COVID-19 epidemic



In relation to the spread of the epidemic, as of 12 April 2020, of the 1 862 028 cases of COVID-19 globally, the Africa CDC reported that 14 524 were reported from Africa (0.78%), with a case fatality rate (CFR) of 5.4% in the African cases. Both statistics are higher than those reported in information sheet 2. The figure adjacent from the AU CDC website shows the distribution of the cases in Africa.

As a reminder, you can find daily updates on cases, deaths and other information on COVID-19 (hyperlinks provided)

a. From WHO at https://www.who.int/emergencies/diseases/novel-coronavirus-2019/situation-reports/
b. From the 'Our World in Data' site
c. From the Johns Hopkins visual dash board.
d. From the daily updates on the Worldometer site

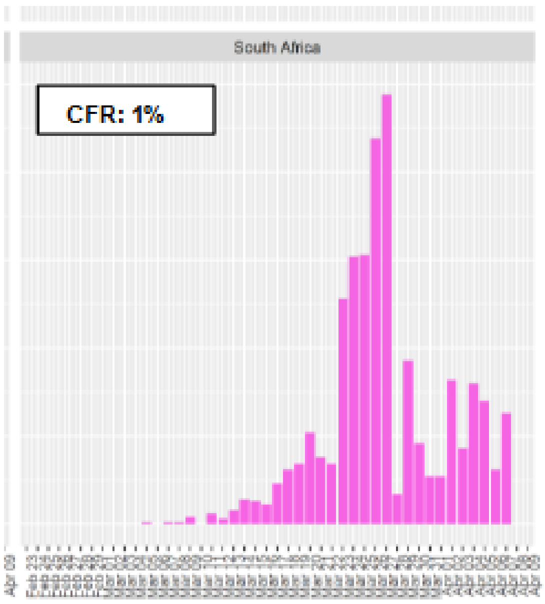
[1] EQUINET is a network of professionals, civil society members, policy makers, state officials and others within east and southern Africa (ESA) implementing research, analysis, information sharing, dialogue and learning from action to promote health equity. Synthesised by TARSC (R Loewenson), with grateful acknowledgement of contributions from within and beyond the region, including information on modelling from U Aberdeen (L D'Ambruoso) and on technologies from SEATINI (R Tayob and R Machemedze) and University of the Western Cape School of Government (P Bond). Produced under the principles of 'fair use', attributing sources by providing direct links to authors and websites, whose views do not necessarily represent those of EQUINET or the members of its steering committee.

Table 1 shows for ESA countries the cases reported for the period ending 12 April from Worldometer, using international and national official data sources. Apart from Lesotho, all ESA countries now report cases. The estimated doubling times of *reported* cases (longer doubling represents slower progression) suggest that most countries were still at relatively early stages in the epidemic in beginning April (noting that cases reported reflect a delay of the incubation period). The figures are, however, rough estimates, with a wide range in how far testing is being done in different ESA countries, shown in *Table 1.* Mauritius and Botswana, with small populations and South Africa (with a large population) have the highest intensity of testing per million people, albeit at 1325-5565/mn, still below the levels of countries that have effectively built strategies around testing, case tracing and quarantining, eg 15 730/mn in Germany; 10 038/mn in South Korea.

Table 1 Reported COVID-19 Cases in ESA countries 28 March and 12 April 2020

Country	Total cases 28 March (i)	Total cases 12 April (i)	Estimated doubling time in days (ii)	Total new cases 28 March (i)	Total new cases 12 April (i)	Tests per million 12 April (i)	Total cases/ million 12 April (i)	Total deaths 28 March (i)	Total deaths 12 April (i)
Angola	5	19	7.4	1	0	-	0.06	0	2
Botswana	0	13	-	0	0	1325	0.4	0	1
DRC	65	234	7.8	14	11	-	0.2	6	20
Eswatini	9	14	10.9	0	2	-	-	0	0
Kenya	38	197	5.4	7	6	-	0.1	1	8
Lesotho	0	0	-	0	0	139	0	0	0
Madagascar	26	106	7.0	0	4	-	-	0	0
Malawi	0	13	-	0	1	15	0.1	0	2
Mauritius	102	324	10.4	8	5	5565	7.0	2	9
Mozambique	8	21	10.7	1	1	22	-	0	0
Namibia	8	16	14.0	0	0	142	-	0	0
Seychelles	8	11	20.4	1	0	-	-	0	0
South Africa	1187	2173	15.3	17	145	1350	0.4	1	25
Tanzania	14	32	12.3	1	0	-	0.05	0	3
Uganda	30	54	15.6	7	1	110	-	0	0
Zambia	28	43	18.2	6	3	67	0.1	0	2
Zimbabwe	7	14	14.0	2	0	38	0.2	1	3

All reporting imported cases only except South Africa and DRC in 24/3. DRC = Democratic Republic of Congo
Source: (i) Worldometer 28/3/2020 (ii) Doubling time estimated from the total case numbers and days between 28 March and 12 April. Not estimated for countries that started with a zero baseline on 28 March



The WHO AFRO Report 6 on 8 April 2020 provides a map of trends in cases in selected countries February 7 to April 12. South Africa is the only ESA country for which the trend is shown, with the figure shown adjacent. It appears to show an encouraging trend. An incubation period of 5-14 days makes it difficult to attribute the sharp fall in late March to the 'lockdown' initiated on March 27, although it may play a role in the later decline. Without sero-prevalence surveys and with low reported deaths it is difficult to judge the real trends, particularly given changing levels testing and case detection. WHO AFRO report that of ESA countries, Madagascar has started implementing COVID-19 early and contact investigation protocols and South Africa is assessing the clinical characterization and virus shedding of HIV infected and uninfected people. WHO AFRO indicated a need to improve contact tracing and testing in all countries to rapidly identify and isolate secondary cases, to break transmission chains. This will also help to provide better evidence on epidemic progression.

2. What population evidence do we need? What role for models?

As a new epidemic with wide but uncertain progression and impact, many countries have used modelling to project the course of COVID-19, to test assumptions and to raise best and worst case scenarios under different sets of circumstances, to inform intervention strategies. Some A COVID-19 prediction models have been published to support decisions on prevention and care.

Modelling was used in Singapore by Koo et al (2020) to estimate the likelihood of human-to-human transmission of SARS-CoV-2 (the virus causing COVID-19) to investigate options for early intervention. Modelling has been used in the USA and Europe to predicted the surge potential (rapid rise) in COVID-19 cases, when peak mortality may occur, the health service demands (total and intensive care unit (ICU) beds over time); what forms and timing of mass and individual distancing would reduce cases and affect immunity and the relative role of lockdowns vs community–wide screening/ case tracing, testing and isolation of cases in preventing a rebound of cases after lockdowns are lifted.

There is some report of models used elsewhere being applied in Africa. In West Africa, Alvarez et al, (2020) compared case data from West Africa with that from Europe to suggest that once community transmission was established, the epidemic would progress in the same way as in European countries with the most expansive epidemics, such as Italy and Spain, where SARS-CoV-2 spread quickly after the fifth case was detected. The Imperial College COVID-19 Response Team[2] has now projected the mortality impact in 202 countries globally under similar mitigation (shielding elderly people and social isolation slowing transmission) options tested for in the UK. They used mortality and healthcare demand data from China and high-income countries, albeit noting differences in underlying health conditions and healthcare system capacity in low income settings and that they were not considering wider and potentially high social and economic costs of suppression in these settings. From the modelling they suggest that healthcare demand can only be kept within manageable levels if testing and isolation of cases and wide social distancing measures are started early, when mortality is at 0.2 deaths / 100 000 population per week, and that these measures be maintained in some manner until vaccines or effective treatments become available to avoid later epidemics.

These models acknowledge uncertainty and describe possibilities, not fact. Yet they are often presented in media as though they are 'fact' and criticised when their predictions have to be revised. Yet this misses the point: A model is only one source of evidence, allows us to monitor and test assumptions about the epidemic and intervention strategies, as a pointer to where action may need to be focused to prevent worst and promote best outcomes. Many ESA countries are in early stages of the epidemic, so the uncertainty is high, but so too is the advantage of early intervention. *It is thus important to critically assess the design and assumptions of any models that are informing population interventions and to use them as one source of evidence for planning measures, and not the only one.*

To break it down: as summarised by Koerth et al (2020),[3] the basic equation (simplified) in many current population models is that the number of deaths is an outcome of the susceptible population multiplied by the infection rate multiplied by the case fatality rate (CFR). Each of these key variables is subject to knowledge gaps and contextual differences.

a. The **number susceptible** depends on unknowns, like how long immunity will last, as well as differences in the population (eg age, gender), their health and immune status and the co-morbidity with other conditions that compromise immunity. Dahab et al (2020) suggest that despite having younger populations, susceptibility in low-income settings may be higher due to larger household sizes, intense social mixing, overcrowding, inadequate water and sanitation, cultural practices such as mass prayer gatherings, and, as raised by Kaseje (2020), more common co-morbidities such as hypertension and diabetes, undernutrition and tuberculosis. The Indian COV-IND-19 Study Group thus factored in the estimated number of people with high blood pressure, heart disease, lung disease,

[2] Walker et al., (2020) The Global Impact of COVID-19 and Strategies for Mitigation and Suppression, Mimeo, Imperial College COVID-19 Response Team, UK

[3] Koerth M, Bronner L, Mithani J (2020) Why its so freaking hard to make a good COVID-19 model, online at https://fivethirtyeight.com/features/why-its-so-freaking-hard-to-make-a-good-covid-19-model/

cancer and diabetes and immunocompromised persons in their epidemic projections. There has been some suggestion that widespread BCG vaccination for tuberculosis may have a protective effect, but this is not proven and still subject to controlled trials.

b. Mapping the **Infection rate** depends on estimates of transmission rates (Ro), how virulent the virus is, how long it survives on surfaces in different regions and climatic conditions; the duration of infectiousness, the incubation period before symptoms are evident and the ratio of symptomatic to asymptomatic people. The data on confirmed cases depends on the strategy and extent of testing. As noted earlier this varies across countries. There is some discussion that higher outdoor temperatures may limit survival of the virus and reduce susceptibility but this is an 'unknown'. The COV-IND-19 Study Group, an interdisciplinary group of modelling the evidence for India did not find statistically significant evidence of higher temperature reducing the number of new cases.

c. The **Fatality rate** is the number of deaths over the number infected, so it reflects whatever assumptions and variability apply to the infection rate as denominator. For example initial estimates of the case fatality rate (CFR) of about 2% falls to about 1.2% when infection rates include asymptomatic cases, but may rise if there are high levels of co-morbidity with other diseases that affect survival outcomes, or when there are more limited health service and intensive care unit (ICU) capacities to manage severe cases, as may be the case in ESA countries. A recent analysis of countries with the highest numbers of intensive care beds per capita does not include any country from Africa. Uganda, for example, has 0.1 ICU beds/100 000 population, compared to the USA's 34.7 ICU beds/100 000. Whether deaths are attributed to COVID-19 depends on protocols for recording it as a cause of death when present with other causes. The CFR generally excludes deaths from TB or other conditions linked to COVID-19-related displacements.

Appendix 1 shows current models of the epidemic compiled at the Duke University SMDM COVID-19 Modelling portal, together with their assumptions for some of the inputs noted above. From this source it appears that the assumptions were not always clearly stated. There was also variability in the indicators used. This is not surprising given the uncertainties inherent in a new epidemic and the need to choose best evidence that is most relevant to where the model is being applied. While this discussion focuses primarily on population models, the need for scrutiny also appears to apply to models for diagnosis and prognosis of COVID-19 cases: Wynants et al (2020) carried out a systematic review of 15 studies describing 19 models predicting risk of hospital admission due to COVID-19 in the general population; COVID-19 infection in symptomatic individuals and prognosis of patients diagnosed with COVID-19 infection. They appraised all as having a high risk of bias, mostly arising from selection and inclusion/ exclusion problems and poor statistical analysis, with a high risk of model overfitting.

For ESA countries, it is thus important when presented with a model to interrogate it- to critically review its design and assumptions, especially when taking a model from one setting to another. Have the assumptions and choices of input levels been detailed? Are they relevant to the local context? What do international and local peer reviewers say about the model? If the model projects the impact of different interventions, what motivated the choice of strategies assessed and what impacts, costs and benefits were included? The assumptions, the models and their implications need to be regularly and actively reviewed against reality, as they are likely to change as we learn more about the epidemic. A model intends to inform and not replace agency.

Wider evidence for decision making: While models are a key source of evidence and have the visual appeal of simplifying complex information, as McCoy (2020) observes, decision-making must also be informed by people with relevant expertise and experience; by mechanisms to quickly obtain evidence from the facts on the ground; by what is ethical and by making clear the trade-offs, including between immediate and longer term challenges and outcomes. Power is exercised in decisions around these areas, including in terms of what interests are served in resolving trade-offs, and they need to be scrutinised and can't be hidden behind a model.

Debates on the epidemic progression, on interventions and their impacts suggest a range of areas of evidence for decision making, action and review, such as:

a. ***How far are we taking the population features into account?*** Levels and distribution of access to adequate safe water, of crowding of housing and transport, of income poverty; of social and cultural behaviours whether as potentials for gatherings in super-spreading or as assets for solidarity and social support; the assets and resource deficits different social groups have for physical distancing, including internet and mobile data, social protection; job security, income and community networks; and other determinants of the level and distribution of susceptibility and vulnerability in the population.

COVID-19 Street art; Z Bensemra , 2020

b. ***How effectively are we identifying cases and preventing transmission?*** The capabilities for case and community testing; the coverage of testing against public health targets[4], the strength of the link between testing and case tracing and quarantine and the time from onset of symptoms to testing, the test turn-around time and share of tests administered with results pending; the total positive persons, and the positive results as a proportion of tests done. This also includes the coverage and impact of case tracing, the level of imported or local transmission; and the risk factors and co-morbidities of cases.

c. ***How effectively are we managing illness?*** The levels of severe illness and the share of cases that are severe, active, resolved and fatal; the prevalence of co-morbidities; the health system capabilities and distribution (personnel, equipment, commodities; training) at different levels; the PPE coverage and testing of health workers and frontline personnel and illness and mortality in health workers; In the WHO Euro region, for example, a COVID-19 Health System response monitor provides country and comparative evidence on different parameters of the prevention and care response. In some settings there are decision making tools for health workers to allocate critical care when resources are scarce, rather than leaving this as an ethical burden on individual health workers.

d. ***What are the impacts of our interventions?*** This includes evidence related to the effectiveness, sustainability, distribution and intensity of different measures used, generally and for different areas and social groups, including the distribution of their social, economic and wider health benefits and harms. In part the evidence collected seeks also to provide markers from the onset for the exit strategy for any mass physical distancing measures, including what evidence is needed to frame effective health protection and revive economic activity and to address any harms.

Shared public domain evidence for decision making in the region. Do we have shared data gathering and evidence on these areas for the region? A global COVID-19 Government Response Tracker reports public information on 11 indicators of government response, to enable cross country exchanges and review, including school, workplace and public transport closures; public event cancellation; public information campaigns; restrictions on internal movement and international travel; fiscal and monetary measures; and investment in healthcare and vaccines. It does not yet include African countries. *ESA countries, already overwhelmed by demands, need core measures to support decision-making and regular strategic review and communication of the epidemic progression, its management and the impact of interventions. If regionally agreed this would also support exchange across countries.*

In its 3 April Communique, African Union Heads of State *underscored the need for a comprehensive and coordinated continental approach, and to speak with one voice on Africa's Priorities*. The AU, Africa CDC Africa Joint Continental Strategy for COVID-19 outbreak notes as an objective to collect, analyze, and disseminate accurate, timely data about the epidemiology of COVID-19 in Member States and to 'support prompt communication to debunk false stories'. Shared, comprehensive, public-domain and peer–reviewed evidence will be critical for both of these objectives and for ensuring that models, analyses and the learning from intervention in this new epidemic are relevant to the regional context.

[4] It is reported that to be successful the scale of testing needs to be at least equivalent to that of South Korea (for example equivalent to 17 322 tests per day in South Africa)

3. Initiatives on health technologies

It is widely known that the Chinese word for crisis consists of two characters – "wei ji". Wei stands for danger and ji stands for opportunity. Every crisis is pregnant with danger and risks but also with opportunities – for some to make money, for others to learn valuable lessons, and for society to reorient or restructure its priorities, institutions and even the system. Lim Mah Hui and Michael Heng in Pandemic Crisis: Dangers and Opportunities, April 2020

The discussion on health technology presents many facets of this mix of danger and opportunity in the current pandemic 'crisis'. Risk is present in many areas of deficit: in access to safe water supplies and affordable data for communities; in supplies of antigen test kits and decentralised laboratories, in supplies of personal protective equipment (PPEs), masks, gowns and gloves for health, frontline and care worker; and in availability of oxygen, constant positive airway pressure (CPAP), ventilator and other ICU equipment to manage severe cases. Risk is also present in an assumption that adequate essential health commodities can be imported at low cost that is evidently not valid. While the AU reported in early April distributing over a million diagnostic tests, six million masks and 600 000 PPE items to all AU member states in less than a week, and while business councils in African countries have mobilised funds to procure health technologies, these numbers still fall short of what is needed.

High demand and supply barriers: A WHO COVID-19 'readiness' assessment with 34 African countries found only 29% to have adequate 'readiness' with just over half the countries having available and accessible PPE for healthcare workers, including for products that could be locally produced. The assessment found for ESA countries public sector services in Angola, Lesotho, Malawi, Mozambique, Seychelles and Zimbabwe to lack ICU capacities to treat Covid-19. With high income countries themselves demanding such technologies, with the USA actively outbidding and capturing market supplies, with a reduction in airline traffic and barriers to cross border transport to transport supplies (shown in the table adjacent compiled by the Trade Law Centre report) ESA countries face a challenge to secure the commodities for effective prevention and care approaches. The SADC Bursiness Council on 1 April 2020 called for greater clarity on the classification of essential goods and duty free facilities for importation of COVID-19 related equipment to enable their smooth flow. Adequate foreign exchange is also needed to secure these imports. Other barriers are being tackled: Zambia and Zimbabwe, reliant on imports of these products, have implemented temporary suspension of customs tariffs on COVID-related essential medical products and equipment.

Country	*Measures*
Angola	Fuel exports banned
Egypt	Banned export of all pulses on 30 March
Ethiopia	Land border only allowed for essential goods
Ghana	Only vessels carrying fuel, food stuffs, medicines are permitted at the Tema port
Guinea	Land border is closed
Guinea-Bissau	Closure of land borders and air and sea ports except for medical and food imports
Kenya	Trucks with number plates from DRC and Rwanda are not allowed to enter. Trucks to South Sudan are allowed – returning trucks crew must self-isolate, leading to truck shortages
Malawi	Land border with Zambia is closed
Namibia	Air cargo not allowed
Nigeria	Air and road cargo only for humanitarian or essential items. River state borders are closed.
South Africa	Cross-border land freight restricted to food and essential items, delays to be expected.
Zambia	Truck drivers with cross-border consignments undergo extensive screening at border entries

Yet there is a risk in being a region where supply depends principally on imports. South Africa, the biggest producer of soaps, surface-active agents, respiratory masks, protective spectacles, garments, suits and gloves in Africa has recently introduced export restrictions of COVID-19 related products, including alcohol-based hand sanitizers, face-masks and hydroxychloroquine. Scarcity breeds speculation and Botswana has invited reports of predatory price increases for these products. While recognising the need for countries to secure supplies for their populations without undermining trade agreements, there is equally a need for regional dialogue and measures to ensure co-operation on regional needs, and between relevant national authorities, appreciating that the region is not collectively secure until all its countries and communities are.

Countries that turned away from import substitution industrial policies are now looking to how they can locally produce these critical products. The SADC Business Council called for rapid national assessments to identify companies that could supply COVID-19 related products, covering what they currently produce; their capacity and support needed to scale up.

ESA are tapping opportunities to shift local production lines to supply a range of key health commodities and exploring links to existing production lines and products. This needs to include local engineering solutions to improve access to safe water and to protect workers beyond the health sector involved in a range of client interactions, including drivers, tills operators etc. This is work in progress, and particularly for access to safe water, the deficits outstrip need.

Testing kits are key. ESA countries need a rapid diagnostic test with high volume turnover and short processing time to effectively implement large scale testing approaches, and to avoid the sometimes 5-7 day delays to get test results, often in remote capitals. Countries with high investment in R&D and technology innovation are making progress in this area, including to manage quality control and legal liability issues, including through expedited approvals and temporary mutual recognition. Rapid portable RT-PCR machines are under development globally. A South Korean biotech lab company (Seegene) designed and is producing 350 000 test kits a day of a COVID-19 field test kit and plans to expand to a 24 hours production and over a million kits daily. Laboratories in Singapore and in Germany have developed new rapid testing kits able to detect COVID-19 within under 2 hours. In Brazil, public universities are producing test kits and lower cost respirators with an open source license. Production of antibody testing of past infection is being scaled up in a number of countries and is in use in South Korea, Japan, Italy, China and some countries in the Middle East.

As noted earlier, apart from South Africa, Mauritius and Kenya, testing per capita remains low in the region. Even in countries with higher rates of testing, the levels still fall short of public health targets. In South Africa, the Medical Research Council suggested that the country should be testing about 25,000 people a day and the National Health Laboratory Service aims by end of April to be able to process approximately 36,000 tests in 24 hours. According to WHO AFRO the availability of testing kits is a major constraint, notwithstanding donations by philanthropies. This has triggered some innovation:

a. A specialized facility in Dakar, Senegal, a joint investment of the Institut Pasteur de Dakar and the UK government and private sector is developing "point of need" test kits that can diagnose Covid-19 in 10 minutes, with prototype test kits validated by specialists from UK, China, Malaysia and Brazil.
b. The South African government is reported to be working with three local institutions, Biovac, the Centre of Excellence for Biomedical TB Research and Afrigen Bio – to repurpose and accredit facilities and laboratories to start locally producing the reagents needed for Covid-19 tests.
a. Kenya is making testing more accessible by piloting drive-through testing

Local production of masks and PPE for health workers has expanded. Face masks for public use has become a focus of local production by large and small enterprises and by communities themselves, not only in Africa but in other countries globally. For example, even the New York Times provided guidance on 31 March on how to make a fabric face mask from common household materials and other organisations have provided similar downloadable guidance. In Kenya, the government announced that the textile industry would be able to supply fabric manufacturers with the material to produce 60 million face masks, as well as PPE. In Zimbabwe, the local University has produced face masks. In Tunisia textile entrepreneurs assisted by UNIDO's Mashrou3i project have produced a thousand face masks for municipalities, administrations and citizens and Tunisian entrepreneurs have also developed a disinfectant gel at a minimal price and an automatic gel dispenser with an infrared sensor.

Wearing a mask can help limit the spread of respiratory droplets from asymptomatic infected people. Yet the scale up of production of cloth masks goes with cautions, including from the College of Public Health Medicine in South Africa: that the public should not use medical-grade masks, which are in short supply and must be reserved for health care workers; that the evidence for their effectiveness of cloth face masks is unclear, including whether their benefits outweigh their harms and if prolonged wearing increases risk of acquisition of infection; and that they be used only with clear messages on how to safely put them on and remove them (not touching the outer surface), not touching your face / mask while wearing them, on how to clean, disinfect and dispose of them and with emphasis on other measures, such as handwashing with soap.

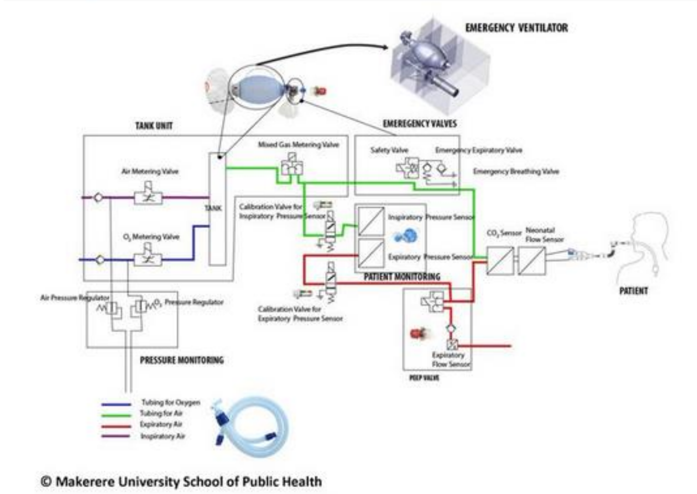
PPE masks for health workers are even more critical. Demand outstrips supply, with competition over available supplies, including between high-income countries in a market free-for-all. In Africa, some countries have thus turned to local production of PPE, switching production lines from other producers such as in the automotive industry and using 3D printing technology.

- The SADC business council reports that a partner, GIZ SIPS, is seeking to support companies in the SADC region to increase local production of medical masks; hospital masks (FFP2); face shields, sanitizers, gloves, gowns, oxygen flasks and ventilators.
- In South Africa, the national treasury has put out a call for local suppliers to provide key PPE for health workers, ventilators and other CIVD-related supplies. Ford in South Africa has shifted from cars to face masks for healthcare workers with a promise to make 57,000 face shields for front-line medical personnel and essential services workers.
- In Tunisia, co-ordinated by the Ministry of Industry's Director General of Innovation and Technological Development, a multidisciplinary team of volunteers from the public and private sectors and civil society have produced 5,000 medical face shields for PPE for public sector health services. The group has also produced 3D printed medical visors and intensive care equipment is currently being manufactured by students from the Faculty of Medicine and the Engineering Schools of Sousse and Gabes.
- The SADC Business Council report the mining sector providing masks used in mining for health worker use.

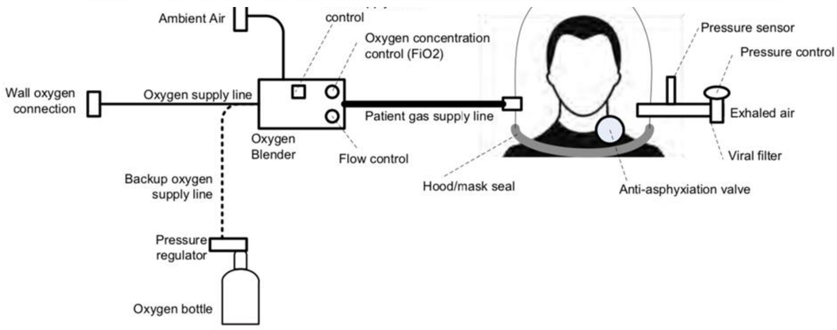
PPE production in Tunisia, UNIDO, 2020

Enterprises at different scales and universities are producing CPAP and ventilator equipment: Severe hospital cases require care ranging from Level 1 with basic oxygen therapy to Level 3 to support two or more organs or mechanical ventilation to aid breathing. CPAP equipment is less complex than mechanical ventilators used with intubation. It eases respiratory distress and reduces the amount of oxygen needed and the need for intubation and mechanical ventilation. Mechanical ventilation equipment has been more complex to produce and there is report of companies supporting imports for countries, as was the case in Zimbabwe. CPAP can, however, be assembled from locally available equipment and thus produced locally and there have been initiatives in Uganda and South Africa to do so.

Uganda's Makerere University College of Health Sciences announced the release on April,10th of prototypes of a low-cost CPAP ventilator designed at the University to support coronavirus patients, providing the image shown adjacent. .



South Africa's National Ventilator Project is now evaluating submissions from producers who can help to manufacture 10000 CPAP ventilators before end June, and up to 50 000 more for export, using only components locally made or readily available in SA. As shown adjacent, "the proposed design is of a hood, with a seal around the neck or shoulders and straps that run under each arm. The hood's supply system can be hooked up either to a free-standing oxygen bottle or the piped oxygen supply of a hospital. Exhaled air will be filtered for viruses, to prevent the further spread of the novel coronavirus in medical facilities. Ideally the system will not require electricity".



It may be asked why other ESA countries could not locally produce this vital technology. Anecdotal report from those working health systems suggests that some technologies, such as CPAP, used to be produced locally. While tariff reductions and reduced protections for domestic industry have well suited a global strategy of 'lowest-cost-production', this has often led to a fall in 'uncompetitive' domestic production in the region, leaving ESA countries vulnerable in a pandemic with a global competition for products, dependent on charity, and excluded from the economic and employment benefits of the demand for health technologies.

Information technology (IT) innovations play multiple roles: IT has played a role in various countries globally to crowdsource information on infections, support quarantine measures, provide telemedicine in quarantined areas, provide remote fever screening in public places and to support patient diagnosis .

Africa's IT and tech systems have also responded to COVID in various ways. In many countries (Kenya, Ghana, Nigeria, Zimbabwe) there has been a shift to digital cash for payments, given cash being seen as a possible source of transmission. In Kenya and Ghana fees have been waived for three months on mobile-money person-to-person transactions under US$10-18 respectively. IT innovation has also supported tech and artificial intelligence (AI) innovations to model the epidemic, to solve engineering problems and provide 'last-mile' delivery networks for key health commodities.

- A Pan-African e-commerce company Jumia with online goods and services in 11 African countries has drawn on its supply networks outside Africa to supply PPE and offered African governments use of its last-mile delivery network to distribute supplies to health services.
- Lifebank, a Nigerian health technology firm created a digital inventory to track the availability of ventilators and respirators in hospitals.
- An African innovation incubator, CcHub, based in Nairobi and Lagos, has provided $5,000 to $100,000 funding blocks and engineering support to tech projects aimed at curbing COVID-19 and its social and economic impact. Cape Town based crowdsolving startup Zindi uses artificial intelligence (AI) and machine learning to tackle complex problems. It has opened a challenge to the 12000 engineers and scientists on its platform to create predictive models for COVID-19 and is sponsoring a 'hackathon' on solutions to COVID-related technology.


Image Credits: Sam Masikini via Zindi

- WHO AFRO also hosted its first virtual 'hackathon' involving 100 leading innovators from across Africa working online in subgroups to pioneer creative local solutions for: surveillance; risk communication and community engagement; points of entry; laboratory; infection prevention and control; case management and continuity of essential health services; and for operational and logistics support. Proposals included self-diagnosis using smartphones, fever screening, mapping tools; real time mapping of testing and community risk levels for CHWs and others; and low-cost methods for producing PPE. The three highest ranking groups are now receiving seed funding and WHO support to help develop and implement their solutions.

An opportunity for import substitution: *The examples show the potential, albeit with still patchy report of production lines across all ESA countries. Is a scale up of local production of health technologies possible in all ESA countries?* The story of Vietnam, a lower-middle income country, suggests that the answer could be yes. In the three months since the beginning of the outbreak, local hospitals, research institutes, and universities in Vietnam have created reliable platforms to track cases and produced vital commodities such as hand sanitizers and low-cost test kits. The potential is there, if barriers are addressed and supportive measures and incentives provided, such is in the hackathons, grants, public calls and design sharing indicated earlier. UNIDO in a joint initiative with WHO AFRO is also contributing technical expertise for the production of PPE and to retool factories to switch from traditional production lines and diversify into products needed for the response to COVID-19. It is also supporting complementary areas, such as supply chain management, quality assurance and eco-friendly waste disposal.

WHO, SADC, EAC and COMESA could play a key role in information sharing on design blueprints and related inputs for production, support co-ordination of product needs and supply, share capacities and learning and in the longer term promote regional R&D investments of these *and other health technologies and co-ordination of production to avoid destructive competition and promote the income potential of large and small scale health technology production. Beyond the welcome and appreciated provision of immediate supplies, is this not an opportunity for ESA countries to also negotiate for technology transfer and innovation?* The China-Africa project suggests that China could focus more on production capacities and speed up the process of transferring its manufacturing capacity to Africa, while also greening that investment.

Beyond these initiatives to secure immediate needs, barriers to **access to medicines and vaccines** raise public health and equity concerns that need to be tackled now.

WHO has published a list of therapeutics which could be used for treating COVID-19, some of which are undergoing clinical trials. For products with recent patents, such as Remdesivir and Favipiravir, ESA countries may need to use their declaration of COVID-19 as a public health emergency to use compulsory or government use licenses to facilitate production and procurement of generic versions of these medicines, as has been done or prepared for in law by Israel, Chile, Germany, Canada and Ecuador. As further measures to support access, WHO announced in April that the Medicines Patent Pool and UNITAID have included medicines and diagnostics for COVID-19 in their licensing pool . WHO is working with Costa Rica to create a pool of rights to tests, medicines and vaccines, with free access or licensing on reasonable, affordable terms for all countries. With a co-existence of open access and commercial R&D, It remains uncertain which initiatives will yield results first and thus what access terms will finally result.

Vaccines are already raising issues for the region. The first is the ethical conduct of vaccine trials against COVID-19 in Africa, following a controversy of a proposal from a French researcher that new vaccines be tested in Africa, condemned by many, including the WHO DG, as racist. The second relates to over-coming any patent, data exclusivity and trade secret barriers to procure and produce COVID-19 vaccines. Vaccine development is at various stages, with some entering human trials in the USA and about 35 others at the "pre-clinical testing" stage. It usually takes 5-10 years to develop safe, effective vaccines, but the current development processes are being fast-tracked, building on work done on SARs1 and MERS. It is estimated, albeit with some debate, that a vaccine would not be ready until mid 2021. As vaccine production is scaled up the debate will turn to equity in access for highest risk groups and locations, and, as has already been raised in ESA countries, on making the vaccine free as a public good. These issues are acknowledged by WHO. ESA countries have high interest in ensuring that measures are in place. ESA countries should ensure that they are "eligible importing members" under the World Trade Organisation's TRIPS agreement to procure medicines produced under compulsory licence in other countries and to prioritise working on local vaccine production capabilities.

In the same way as COVID-19 has led high income countries to discard fiscal and economic rules that were perceived to be immutable (outlined in Information sheet 2), it is also raising questions about changes that need to be made to production and intellectual property (IP) systems to manage COVID-19. This has resonance with what is already being debated around growth, green technology and climate change. As Hui and Heng (2020) observe this COVID-19 pandemic may not be the last. It has laid "bare the myth of the invincibility of the market" as states step in to support economic activity and public need, one dimension of which must be how innovation and production link to social wellbeing. Perhaps for the ESA region it will make us reflect on whether replacing import substitution policies and pursuing extract and export strategies were such a good idea after all?

4: An update:African engagement on releasing resources from debt

There is no coronavirus for developed countries and a coronavirus for developing and debt-stressed countries. We are all in this together. The pandemic is no time for fiscal distancing. *Akinwumi Adesina, Ph.D., President, African Development Bank*

A poorly resourced response inevitably shifts burdens to the most vulnerable and precarious people, households and countries, even while it creates a potential for rising wealth for some, including hedge funds. Significant international resources have been mobilised for COVID-19: The Global Fund for HIV, TB and malaria has redirected some of its funds to coronavirus; the UN's global emergency response fund, the CERF has contributed $15 million, a public online drive is fundraising the $675 million WHO Strategic Preparedness and Response Plan, World Bank has pledged $3.3 billion in grants for LICs as part of a $14 billion package of private loans and investments, IMF has committed to US$10bn in lending to LICs through a Catastrophe and Containment Relief Trust fund, only $295 million of which is available as grants and various pledges from governments and multilateral institutions have been made for to fund response in low- and middle-income countries. The AU has mobilised from member states US$12.5mn in an AU Covid-19 Response Fund with an additional US$4.5million to the Africa CDC, and has identified Special African Envoys to mobilise international support for Africa's efforts to address the economic challenges resulting from COVID-19. The NDB, (the BRICS bank) has provided for US$1bn as special drawing rights for each of its five members, although only South Africa is eligible for this in the ESA region. The African Development Bank has created a US$10 billion COVID-19 Response Facility to assist epidemic management in countries in the region and has floated a $3bn Fight COVID-19 Social Bond, the world's largest US dollar-denominated social bond ever on the international capital market.

While significant, even these funds are likely to be insufficient and their disbursement may not keep pace with the demands of the epidemic, estimated at US$100bn for the emergency economic stimulus alone.

Progress on the call for debt relief: Information brief 2 reported the call by African Ministers of Finance to release an estimated US$44bn by suspending interest payments on debt and sovereign bonds, to create fiscal space for Covid-19 responses. This call reverberated, including in the UN Secretary-General's call that debts of low-income countries (LICs) be suspended.

It is thus positive news that in 14 April the IMF Executive board approved immediate debt service relief for 25 of the IMF's member countries under its Catastrophe Containment and Relief Trust to cover their IMF debt obligations for the next six months. This comes in the form of US$500mn in grant-based debt service relief, supported by contributions from the U.K, Japan, China, the Netherlands and others. Of the 25 countries, 18 are in Africa and in the ESA region they are DRC, Madagascar, Malawi and Mozambique.

This debt service relief is an important step, and one that will engage the public to ensure that the funds are applied to health, social protection and economic interventions that have greatest and most equitable benefit. Yet it is a first step and still insufficient.

But more to do: Firstly, the economic demand and damage from COVID-19 will extend well beyond these 18 African countries and the 6 months of relief, as acknowledged by the IMF. There are 31 LICs covering nearly one in 10 people globally, of which 25 are from Sub Saharan Africa. The Ethiopian Diaspora High-Level Advisory Council COVID-19 questioned why only US$10bn or 1% of the US$1 trillion in the IMF's planned lending was earmarked for LICs.

Secondly, African countries have not only raised the need for debt relief, but concerns about the way the system itself exacerbates inequality in access to financial resources, notwithstanding philanthropy. South Africa, for example, has been hit by Fitch Ratings placing the country's debt two notches into junk, at the very time it is seeking to raise new capital and while it remains outside the focus of relief for low income countries. Many emergent, middle and low income economies have experienced significant capital outflows since January, with Chandrasekhar and Ghosh (2020) reporting outflows from emergent markets alone of US$95bn since late January 2020, as investors seek returns elsewhere. Remittance inflows to African countries, a significant source of household and national income for many, are also reported to have fallen. African countries have thus called for a new significant allocation of between $500 bn to $1 trillion of Special Drawing Rights, the IMF's reserve asset that carries no policy conditions. Yet here too there is a disadvantage as Sub-Saharan African countries currently collectively only receive about 5% of this allocation because the rights are allocated according to country's IMF quotas (voting rights). UNCTAD has thus called for high income countries to contribute the unneeded portion of their share of special drawing rights to a fund to support low income countries.

Thirdly, there is the approximately one third of Africa's total long term debt of $493bn owed to private creditors, mainly as bonds. Some African countries have already begun to signal that they will not be able to repay the debts on these bonds due to COVID-19 related impacts, as is now also reported for high income countries. Speculators may buy these unpaid private bond debts cheaply, but may also later demand full repayment from debtor African governments, even though the economic damage may be long-standing. This will be particularly severe where the debt is in US$ rather than in local currencies. A similar strategy used in the past against countries, including 12 African countries, yielded high profits for such speculators, unless there are laws preventing this and a more multilateral / multi-actor mechanism to manage private debt.

Fourthly, there is concern on the mechanisms and conditions for disbursement and where the funds flow to. Kentikelenis et al (2020) highlights the World Bank's US$14bn package of fast-track assistance being channelled through the International Finance Corporation (IFC) and its loans to private companies, despite the IFC's lack of experience with public health systems and evidence of poor performance of private-public partnerships in health. There is concern on conditionalities attached for liberalisation reforms that contradict the levels of state support needed for COVID-19 responses and on the use of loans rather than grants, given that the additional debt repayments that result will further drain resources from public health. Bond (2020) reminds how measures that sought to link loans to importation of expensive anti-retrovirals rather than parallel generics at 5% of the cost during the HIV epidemic were successfully resisted, with a demand to provide grants not loans for funding for HIV, given its wide and longer term impacts. Similar concerns would seem to apply to the current situation with COVID-19.

The public health community has long been asking for health-in-all sectors. COVID-19 is providing a stimulus for this, as evidenced from the developments in production and finance systems described in this brief. The pandemic provides a window to see how current global financing and production systems inadequately serve collective immunity to shocks. It has generated innovation and the reconfiguring of resources and systems. Public health strategies are designed to support collective security and can only be successful if society trusts in this. It is thus a matter of common sense and public health principle to question to seek change in financing and production systems that are premised on ensuring enclaves of self- protection.

5: Resources

This last section provides links to resources that have been shared since the last information sheet, in areas not covered in this brief. We will maintain this so please email us resources that would be useful for others, not limited to the areas below.

Community, social and labour resources:

- Daraja Press has published an ongoing series of interviews on organizing in a time of COVID-19
- The C19 People's Coalition is an alliance of 210 social movements, trade unions, community and non-government organisations united by a shared Programme of Action to ensure that the South African response to COVID-19 is effective, just and equitable.
- The Botswana Labour Migrants Association (BOLAMA) has provided regular press briefings on the needs of and implications of COVID-related measures on ex-mineworkers. Including on their ability to access health care services generally and for tuberculosis.
- "Their Voices Matter" Community Responses to Covid-19 Measures is documenting through the Zimbabwe Human Rights Association the community experiences of the mass physical distancing and other measures in the responses to COVID-19.

On guidance and research related to COVID

- Information on regional community strategies and guidance can be found for the East African Community site on COVID-19; and SADC,including SADC guidelines on the movement of critical goods and services in the region during COVID-19
- PAHO has launched a searchable database on COVID-19 guidance and research **with** the latest guidance and research on COVID-19 from the Americas and worldwide.
- The WHO provide technical guidance in a range of areas related to the COVID response.
- The African Union CDC provides a range of resources on the response to COVID-19, including guidance on testing, surveillance and contact tracing.
- COHRED Links to Appropriate Technologies for COVID-19 Response in a new web page for researchers /institutions to share and find COVID19 research, solutions and collaborations.

Appendix 1: Current quantitative models in the [Duke university SMDM COVID-19 Modelling portal]()

MODEL	PURPOSE AND COUNTRY COVERED	Estimated peak doubling time in days	Ro Esti-mate	% Asymp-tomatic spread	% reduction through social distancing	% infections hospital-lised (*)	Estimated CFR	Interventions and comparitors
Columbia University	Simulate the spread and growth of COVID-19 incidence in the USA at county resolution and evaluate the effects of social distancing and travel restrictions on the outbreak	na	A func-tion of 4 para-meters, all esti-mated from the data	Estimated initially through March 13th that about 8% of infections were documented (no distinction of symptom status)	Estimated through time in later versions of model	From sources from China	As for hospitali-zations	-
SEIR +Testing + Quarantine	SEIR model with testing of asymptomatic cases and quarantine that is conditional on the information sets faced by policy makers. Testing resolves incomplete information issues. To be expanded to include permanently asymptomatic cases and serological testing to resolve recovered cases. Model shows how testing + targeted quarantine can reduce: deaths, quarantine, peak symptomatic infection, relative to a blanket quarantine	-	2.5	-	-	-	1	"Asymptomatic -testing
COV-IND-19 Model	Describe the COVID-19 outbreak in India to date as well as prediction models under various hypothetical scenarios	-	2.0	-	Ro during no intervention period=1, period with travel ban in effect only=0.8, period with travel ban + social quarantine=0.6, period with nationwide lockdown=0.2	-	-	Intermittent social distancing
SURF Bed Demand	Hospital level bed demand projection under COVID patients influx	6	-	-	-	-	-	Isolating
SURF COVID-19	Estimate regional demand for COVID-19 hospital beds	An input and not estimated	na	na	na	Varies by county	Varies by county	Lifting social distancing/stay -at-home orders
IITBHU CovidTrack	Study Covid-19 spread through machine learning and statistical inferences initially for the whole of India and subsequently by state and district level	Base case assumption of the same social contact patterns after the lockdown, as before it. Except parameters learned from data	A function of beta, learned from the data.	Given by the parameter alpha, a function of the nature of disease, studied from countries like Italy and Spain	Found by comparing data of different countries	Not a focus. Assume all cases either hospital-lized or quaran-tined until recovery. Those infected and not	From the analysis of different countries, an assumption of a 14 day lag between infection and fatality used to estimate	Social distancing

MODEL	PURPOSE AND COUNTRY COVERED	Estimated peak doubling time in days	Ro Esti-mate	% Asymp-tomatic spread	% reduction through social distancing	% infections hospital-lised (*)	Estimated CFR	Interventions and comparitors
		for the model instead of assuming them				hospital-ized assumed asymp-tomatic once, taken care by alpha	the average deaths	
Rand Critical Care Surge Response Tool	Help hospitals determine critical care surge capacity	-	-	-	-	-	-	Status quo
BDD Covid19-ILI	Differential Diagnosis of COVID-19 and Influenza-Like Illnesses with Bayesian Networks	-	-	-	-	-	-	Stay-at-home order"
TriTri	Evolution of the epidemic, assessment of policies for lifting measures.	Function of other basic parameters and varies by setting	A random effect differing by global region	100% of early infected assumed asymptomatic; probability of asymptomatic transmission among infected a prior, mode =25%	Priors from European data analyses - separate for each of 5 behavioral measures	Distribution with mode at 5%	Distribution with mode 1%	Lifting social distancing/stay -at-home orders
Cornell C5V	Project anticipated healthcare utlization for COVID-19	Variable	Variable	Variable	n.a	Variable	Variable	Social distancing
Eliminating COVID-19	To shed insight into how rapid action and travel restictions can eliminate COVID-19 from a set of communities. Uses the community-to-community reproductive number as a key concept.	3 days	2.0 - 2.5	-	Estimates how various degrees of reduction in social distancing affect the elimination of COVID-19	-	-	Status quo
IHME Model: Institute for Health Measure-ment and Evaluation	To determine the extent and timing of deaths and excess demand for hospital services due to COVID-19 in the USA	-	-	-	-	age-stratified	age-stratified	Stay-at-home order
University of Michigan	Effects of NPI in China	-	With Interven-tions	-	-	-	-	Travel restrictions"
WHO CIDEC	Estimate clinical severity	5.2 [4.6-6.1] days	In Hubei 2.96 [1.82-4.49]	-	-	-	-	-
CHIME: COVID-19 Hospital Impact Model for Epidemics	Interactive tool for hospital capacity planning	7-10 days, 2-4 days	Outside Hubei 2.58 [1.58-4.26]"	-	User-input	User input, base 2.5%	-	-
Global Epidemic and Mobility Model	Effect of travel restrictions on spread of COVID-19	4.2 days [3.8-4.7]	1.94 [1.83-2.06]	-	-	-	-	Other n.a
Imperial College	Estimate impact of NPI on number of cases and deaths in UK and US,	-	-	50% reduction in infectivity for asymptomatic	75% household to household	Age-stratified, 0.1%-	-	Other n.a

MODEL	PURPOSE AND COUNTRY COVERED	Estimated peak doubling time in days	Ro Esti-mate	% Asymp-tomatic spread	% reduction through social distancing	% infections hospital-lised (*)	Estimated CFR	Interventions and comparitors
	ICU bed requirements			individuals	reduction, 25% workplace, inter household increased by 25%	27.3%		
Center for Mathematical Modeling of Infectious Diseases Covid-19	Test effects on contact tracing and isolation	n.a	2.57 [2.37-2.78]	-	0 spread after isolation (100%)	-	-	-
Ranges (**)		3-10	1.58-4.49	25-100%	20-100%	0.1-27.3%	1%	
% Not stated/ na (N=19)		47.3%	31.6%	68.4%	52.6%	52.6%	57.9%	

(*) most assessing this also assessed % total infections needing ICU and some also assessed the % needing ventilators (**) in some cases a variable output of input data or variation due to age or area disaggregation
n.a= not available.
Source: Duke university SMDM COVID-19 Modelling portal, April 11 2020