Public Health and Epidemiology in COVID-19

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From easing lockdowns to scaling up community-based coronavirus disease 2019 screening, testing, and contact tracing in Africa—shared approaches, innovations, and challenges to minimize morbidity and mortality *Nachega et al*.

This paper by Nachega et al. is a review (though it is not labelled as such) of the literature exploring the experience and approaches of African nations around community screening, testing and contact tracing. The paper includes examples from South Africa, the Democratic Republic of Congo (DRC), Tanzania, Rwanda and Mozambique representing how, at the time of publication, publications were not being churned out at the same pace in many Africa countries as the deluge seen in Europe, North American and China. They present the varying approaches to community screening from South Africa, where 6 million people have been screened with 42,000 tested using a workforce of approximately 28,000 community healthcare workers to the DRC where infrastructure and experience developed during the numerous Ebola outbreaks in the community have been applied to the COVID-19 response. Rwanda drew on its medical students to help with sample collection, transport and analysis. Each national example has something to teach, but the theme that runs across each is the utilisation and repurposing of available experience and resources.

This paper also highlights how community screening, contact tracing and testing are intimately linked, strength in one aspect does not make up for weaknesses in another. Testing in centralised laboratories may be necessary, but the delay in turnaround times caused by often significant transport times can have a real impact on the clinical utility of the test and its application in contact tracing. The different examples of approach reinforce the labour intensity inherent in contact tracing and returns us to the key point from screening about utilising and repurposing existing experience and resources with the authors concluding that ‘This crisis presents a unique opportunity to align COVID-19 services with those already in place for HIV, TB, malaria, and NCDs through mobilization of Africa’s interprofessional healthcare workforce to contain the pandemic.’

Novel coronavirus in Cape Town informal settlements: Feasibility of using informal dwelling outlines to identify high risk areas for COVID-19 transmission from a social distancing perspective *Gibson & Rush*

Given that social distancing remains one the key public strategies employed to reduce transmission of COVID-19, this paper sought to explore the challenges of ensuring such measures and identifying high risk areas within two informal settlements in Cape Town, South Africa. Using Geographic Information System (GIS) software, location vectors as well as existing aerial photography were used to determine distance between dwellings. Where proximity of dwellings were within 2 metres of each other, clusters were represented where individual self-isolation would likely be ineffective, and so groups of dwellings would need to self-isolate together for any transmission reduction to be feasible. In this way, the authors demonstrated areas of higher dwelling density and hence higher transmission risk (in the absence of population level data). There was acknowledgement that this was a novel approach to explore high risk areas, and that many informal settlements globally have not been mapped in a similar way, and so data to run analyses would not be immediately feasible. In addition, it was recognised that in such settlements, confinement in a dwelling is not always possible given the need to access communal facilities such as water, food and toilets. What the paper does provide is evidence to policy makers of the difficulties in implementing and maintaining a policy of social distancing within the context of informal settlements, and that other approaches, including those of preventing infection entering into settlements as well as focussing on dwelling sub-clusters and high traffic communal areas may be more appropriate and effective.

Structural barriers to adhering to health behaviours in the context of the COVID-19 crisis: Considerations for low- and middle-income countries *Coetzee & Kagee*

This is a theoretical paper about the structural barriers stopping preventing people from adhering to health behaviours during COVID-19 in low- and middle-income countries (though on reflection much of what Coetzee & Kagee say applies to the rest of the world). The authors argue that it is important to think about social isolation, employment, salience of risk, access to information, demographic factors, cultural factors, political factors and mental health considerations (together described as structural barriers) in a deeper way, taking local context into account to anticipate potential failing of any policy that might be adopted. The authors make a number of recommendations to try and improve the chance of success of any PH interventions. 1. governments in low- and middle-income countries need to take their populations into their confidence and ensure proper access to information. 2. such information needs to be tailored to children and young people. 3. improving access to the internet. 4. criminalising fake news. 5. scaling up access to e-banking. 6. recognise the role of government, non-government organisations and local charities in providing food and water relief. 7. engage traditional healers to try and positively influence lockdown regulations and safety behaviours. The authors also conceptualise the structural barriers in terms of ‘Theoretical Domains Framework’ to explore how said barriers impact adherence to lockdown rules, an approach that could be applied by others either researching or trying to implement behavioural change to influence the COVID-19 pandemic.

Cost-effectiveness of public health strategies for COVID-19 epidemic control 1 in South Africa *Reddy et al.*

This is a pre-print paper, but which provides a clear description of methodology and limitations of the approach adopted to estimate the cost-effectiveness of a range of public health interventions in reducing the mortality attributable to COVID-19. Utilising a dynamic microsimulation model, six public health strategies were incrementally analysed over a 360 day period, namely:

1) Healthcare Testing (HT)
2) Contact Tracing (CT), in addition to HT
3) Isolation Centre (IC) in addition to HT and CT
4) Mass Symptom Screening (MS) in addition to HT, CT and IC
5) Quarantine Centre (QC) in addition to HT, CT and IC
6) Combination of all the above, HT, CT, IC, MS and QC

Cost variables were inputted based on available data for KwaZulu-Natal province in the Republic of South Africa, including that of hospital and ICU beds.
The analysis suggested that the most cost effective strategies in limiting the epidemic size based on a range of infection reproduction rates was a combination of contact tracing, isolation of those with confirmed COVID-19 and mass symptom screening. Healthcare testing remained cost-effective in combination with the above strategies provided the Re remained below 2.6. While quarantine centres did provide clinical benefit, costs rose significantly with improving effectiveness. The authors acknowledged that modifying effect of HIV, as well as prevalence of comorbidities were not included as part of input parameters, assuming that age was the primary determinant of disease progression. There was no consideration of gender or ethnicity. Usefully, the model does not assume social distancing, given the impracticalities of such an approach in many LMIC settings. While the costings are specific to KwaZulu-Natal, the conclusions are likely to be relevant in a variety of similar contexts given the range of costing estimates analysed as part of the study. Such micro-simulation modelling studies, while recognising that they are limited by the inputted parameters, provide useful information for policy makers in support of specific public health intervention measures.

How villagers in central Sierra Leone understand infection risks under threat of Covid-19 *Kamara et al.*

This study aimed to assess how people living in rural areas who have levels of education understand epidemic infection risks. They selected two village communities in central Sierra Leone based on previous contrasting exposure to Ebola. One village had implemented strong community quarantine measures, the other had suffered a substantial number of cases. They assessed understanding of infection risk through an experimental game using models resembling Ebola and COVID-19.

The researchers managed to get 107 adult villages to play the game and found a preference for disease with the approximate characteristics of Ebola over COVID-19, their explanation being that once infection control measures were stringently applied Ebola has a low risk of spread. The game based method and findings are interesting enough, but in the context of wider public health considerations two points are especially valuable. Firstly this rapid study was made possible by researchers already being embedded in the communities in question (as part of an ethnographic study on pandemic preparedness). Secondly they argue that communities should be trusted to play a fuller part in infection control, an important point to remember if trying to implement any of the other approaches discussed.

Mass masking as a way to contain COVID-19 and exit lockdown in low- and middle-income countries *Siewe Fodjo et al.*

Referring to the guideline published by the WHO on June 5th 2020 recommending their use, this paper reviews the evidence for face covering use in low and middle income countries. They present data from 206,729 adults from 9 countries (Brazil, the Democratic Republic of Congo, Ecuador, Mozambique, Peru, Somalia, Thailand, Uganda and Vietnam) on demographics and face covering usage. This international consortium approach provides the large number of responses that is required to make the online survey methodology useful in this context. They found that countries that mandated, or highly encouraged mask wearing had adherence rates to mask wearing of >90%, showing that, even in countries with no pre-existing culture of mask use, high uptake of mass making was feasible. Data on the type of mask used was more limited, but what they have shown that reusable cloth masks were the most common type, account for 51.% of masks used.

Community-based screening and testing for Coronavirus in Cape Town, South Africa: Short report *David & Marsh*

This short report describes the opportunities presented by having a strong foundation of Community-Orientated Primary Care (COPC) which involves utilising a network of Community Health Workers (CHWs) to support the implementation of a Community Screening and Testing (CST) programme. This approach had a clear approach in responding to the epidemic at a community level as opposed to trying to address the challenges once already presented to a hospital. CHWs were assigned to specific geographical areas in Capetown, visited houses in pairs, screened patients for symptoms of COVID-19, referred suspected cases for testing, offered health promotion advice, including specific details on self-quarantine. However, a key weakness observed was the high false positive rate of the screening questions of fever, cough, sore throat and breathlessness, given the community prevalence rates of HIV and TB. The authors considered that although this meant more testing, the benefits of identifying even a small number of positive COVID-19 cases still could have significant impact in limiting disease transmission. It was felt that such a model of enhancing the role of COPC to support CST activities could be further strengthened by means of m-health technology, and would be valuable in combating disease spread. Such an approach would have relevance in other settings where community health workers are a well established resource for care provision.

Even so, one of the most serious threats experienced by staff and volunteers were related to security given the impacts of lock down on income and access to food. As such, CHWs should be accompanied by security, with additional humanitarian considerations made to meet the needs of affected communities. For such a model to be impactful, apart from adapting the screening tool to improve predictive value, there also needs to be an appropriate supply of trained workers, PPE and testing capacity with short turn around times for results.

'Self-collected upper respiratory tract swabs for COVID-19 test': A feasible way to increase overall testing rate and conserve resources in South Africa *Adeniji*

Performing nasal, nasopharyngeal and oropharyngeal swabs by trained health workers remains the mainstay of the approach to testing for COVID-19 in South Africa, thereby putting significant strain on scarce human resources, as well as PPE supplies. In this short literature review, the author argues that the precedent exists for the efficacy of self-collection of samples for other conditions such as influenza, S.pneumoniae, as well as other respiratory viruses, and so the approach should be adopted for the South African context in order to increase testing capacity. However, it is important to recognise that the papers referenced were for specific contexts and communities, and hence not generalisable to a wider population as required for mass testing. Furthermore, none of the papers were specific to LMIC settings, and as such, the recommendations, while pragmatic and relevant, may not be applicable. Usefully, the author reinforces the need for any initiative to be supported by community education, clear guidance and processes, as well as to be part of South African research study to compare the efficacy of self-collected samples with that of trained staff-collected samples.

Design for extreme scalability: A wordless, globally scalable COVID-19 prevention animation for rapid public health communication *Adam et al.*

Most, if not all, public health interventions involve an element of communication with the public. Multiple languages, particularly in the context of a global pandemic, can be a barrier to rapid communication of public health messages either across borders or within countries that have several languages. In this paper Adam et al. describe the development of a short animated video (available on YouTube https://www.youtube.com/watch?v=rAj38E7vrS8) which covers alot of ground in two and a half minutes. How COVID-19 is spread, use of masks, hand washing, stopping mass gathering, self isolation and social distancing all in wordless animation form. The animation is a useful resource but perhaps more so the process, described in the paper, of developing it. People in lower and middle income countries increasingly have access to phones capable of playing video hosted online, and by producing video that uses minimal data, access to high quality information can be improved.

Wastewater surveillance for Covid-19: An African perspective *Street et al.*

Monitoring of wastewater for disease is not a new concept, and has been previously employed in Nigeria as part of poliovirus surveillance. It is accepted that there is fecal viral shedding of SARS-CoV-2, and as such, an opportunity to support prevalence surveillance of communities by

testing wastewater. The ability to track prevalence using wastewater would be a potentially powerful public health strategy in combating COVID-19, allowing a less resource intensive approach to population surveillance and greater focus on affected communities. However, there are specific challenges for the African context, where there remains a significant burden of poor sanitation, as exemplified with an estimated 1 in 5 people having to practice open defecation, and sub-Saharan Africa having the highest proportion of shared toilets, particularly in densely-populated urban areas. Hence, apart from the lack of suitable wastewater management systems which could facilitate testing, there is a high risk of disease transmission due to shared facilities. As yet, fecal-oral transmission for SARS-CoV-2 has not been reported, but such a risk has not been explored completely within the context of shared spaces. This is an issue which needs to be investigated as a priority given the high risk to vulnerable communities. Non-sewered or dysfunctional systems are liable to be impacted by flooding and environmental runoff, and it remains unclear as to how this may impact the efficacy of wastewater testing. Furthermore it is also suggested that variations in temperature may also affect virus detectability, and adjustments would need to be made to avoid over- or under-estimating COVID-19 prevalence. A further significant sub-Saharan African challenge remains the capacity to handle, process and test wastewater samples, with only an estimated 24% of countries having an accredited laboratory. For the potential of wastewater surveillance to be harnessed, novel approaches to testing will be needed as an alternative to treatment plants. Strategies will additionally need to take into account local contexts of variability in sanitation.

Inequalities in access to water and soap matter for the COVID-19 response in sub-Saharan Africa *Jiwani & Antiporta*

This is one of several papers that were identified during our search which highlights the problem of being unable to wash hands in many settings in sub-Saharan Africa. The authors link this with COVID-19 but clearly it is relevant to any communicable disease. The paper is a short report in which the authors analyse data from demographic and health surveys from 16 countries in sub-Saharan Africa. Their sample revealed an average of 33.5% of households have a handwashing place at home with soap and water, with this ranging from 5% in Burundi to 64% in Angola. They found further inequalities between urban and rural settings and, predictably, between rich and poor households. They report some strategies that have been put in place, but more importantly this article reminds us access to facilities for handwashing is a taken-for-granted assumption that we can not afford to make.

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