A Framework for Decisions in a Post-COVID World

AN AID TO POLICY-MAKERS IN SOUTH AFRICA

A REPORT OF THE INSTITUTE FOR THE FUTURE OF KNOWLEDGE AT THE UNIVERSITY OF JOHANNESBURG

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Executive Summary

The document identifies six fundamental policy priorities which, together, constitute **a framework for making all-things-considered policy decisions**. These decisions must respond to immediate needs for action, but must also be taken **with a view to the future** (the post-COVID world). The policy decisions that frame them are not created by this pandemic: they existed before it, will persist beyond it, and constitute the reason that we care about COVID-19 and its consequences.

Available evidence suggests that **South Africa's lockdown lacks a strong evidence base**, especially when compared to moderate scenarios rather than complete inaction. A one-page analysis (two-pages in the case of health) is provided for each of the following priorities.

1. Health
2. Food security and nutrition
3. Education
4. Economy and unemployment
5. Vulnerable groups
6. Governance and enforcement

A decision tool is offered for scoring these components to represent the impact of lockdown or other measure on that policy priority, and weighting them to represent the relative accordance afforded to e.g. health, the economy, and so on. This approach is customizable: items may be altered, added and subtracted from the list of policy priorities.

While **the report writers offer their own recommendations** based on the rationale encapsulated in their one-page summaries, in the end **these are of secondary importance**. This document is meant to **support rather than prescribe to policy-makers**, by enabling a **decision process that makes implicit assumptions and value-judgements clear**.

> **Our primary recommendation is that this framework be adopted, adapted and used by policy-makers for both making decisions and communicating the rationale for decisions, especially (i) decisions to allow and prohibit particular behaviours at different lockdown levels and (ii) decisions to move from one level to another.**

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Foreword

Decisions to "lock down", or impose stringent suppression measures against the spread of COVID-19, have been taken in many countries during recent months. These have commonly been accompanied by **detailed mathematical models predicting the number of deaths caused by COVID-19** under various scenarios, from doing nothing to the stringent restrictions on economic, social and leisure activities, known collectively as "lockdown" or "suppression strategy". The political decisions to lock down have **not been accompanied by similarly detailed models of the consequences of locking down**. The evaluation of such consequences has thus been either implicit or absent.

This is a particular problem in low income settings, because the most influential models originate in Europe. Several key **implicit assumptions providing the rationale for lockdown do not carry from Europe to Africa**. It is uncontested that the **costs** of ceasing economic activity are far greater for the very poor, for whom starvation, diversion of health resources and disease outbreak are real threats.

Evidence suggests that the prospective **benefits** of reducing the risk of contracting COVID-19 are less in Africa than Europe, on the other hand. This includes South Africa, where, according to the World Bank, life expectancy is 60 for men and 67 for women, compared to 78 and 83 respectively in the European Union.[1] The average European should expect to live to be at high risk of dying of COVID-19. The average South African should not. Lower life expectancy means that many people face other serious threats to life to contend with, lowering the *relative* threat of posed by COVID-19. South Africans have other things to worry about besides COVID-19.

Over and above the costs and benefits, **lockdown is a fiction** in both townships and rural areas, where several people commonly share small dwellings, and need to leave their dwellings to reach communal sanitation, collect social grants, tend to livestock, and so forth.

This document presents simple, high-level, qualitative assessments of lockdown from the perspective of seven policy priorities. It then presents an extremely simple way to combine these assessments to arrive at an all-things-considered overall judgement about the merits of a given lockdown level, or other bundle of measures.

The policy priorities we identify are interlinked: unemployment affects food security which affects health, and so forth. This is not a defect of our approach, but a reflection of reality.

We make a number of recommendations which, together, amount to a *Mitigation Scenario.* While we endorse the recommendations making up this scenario, our overarching message is that decisions must be made with a view to *all* policy priorities, and not just on the basis of number of deaths caused by COVID-19, and that they must be approached in a structured way. **It is more important to us that our framework be adopted than our recommendations.**

Conceptual framework

Considerable uncertainty exists concerning COVID-19. This leads to wide variations in projected consequences of any given course of action. On one model, letting children back to schools might appear benign, while on another, it might usher in the apocalypse. Reputable scientists may hold quite different views. So it is not enough to "trust the science", and nor is this a case of "science vs. the people".

Nonetheless, immediate decisions are required by the pace at which the virus moves and by the hardship that current lockdown measures cause.

Our approach is to arrive at an *all-things-considered decision about proposed measures, by evaluating them from a number of viewpoints.* The approach has precedent in epidemiology: Sir Austin Bradford Hill, a seminal figure in the discipline, identified nine viewpoints from which to assess whether a correlation amounted to causation, in order to bring together the very different kinds of evidence about the effects of smoking.[2] Unfortunately, COVID-19 forces the policy maker to choose between competing scientific views. It is therefore appropriate to use a scientific tool for doing so.

More sophisticated inference and synthesis techniques have been developed since Bradford Hill, and we recommend the deployment of evidence evaluation frameworks below. However, for the final policy decision, the variety of factors – including scientific evidence, social context, moral values – is so complex that the approach must be simple, robust, and extremely flexible.

The evaluations in this report are primarily qualitative.

First, **we focus on the big picture.** Our emphasis is on weighing all considerations, rather than modelling some in great detail and forgetting about others. Some important factors resist modelling at all, either in principle or because of lack of data (e.g. Education), and a quantitative analysis will leave this out.

Second, **quantitative analysis is only as good as its qualitative basis**. All models depend on assumptions. Models have the virtue of making these explicit, but the virtue must be enacted by evaluating the assumptions.

Our framework is fully compatible with quantitative inputs to justify scores (or even weights). We expect that quantitative work will follow, improving the justification of score-assignment. But we want to lay down qualitative priorities before hitting them with quantitative analysis, rather than picking up the quantitative hammer and then looking around for a qualitative nail.

Evidence

This section reviews relevant evidence bearing on the current lockdown. Various restrictions were introduced following 15 March including social distancing, alcohol sale restrictions, and travel restrictions. Two weeks later, on 27 March, there was a marked decrease in the rate at which infections were increasing (see Appendix 1). Also on 27 March, South Africa went into "full lockdown". Since then the rate at which infections are growing has remained on the same curve. It follows that:

- The sharp change in the trajectory of infection rate on 27 March was **definitely not a result of locking down**
- The trajectory is **consistent with effectiveness of measures introduced on 15 March**, although a strong causal inference is not warranted
- The evidence is **ambivalent as to the contribution of lockdown** to the sustained trajectory after 27 March (lockdown may have helped sustain the infection rate after 27 March but it may not have)
- **The decision to move to Level 4 was not based on any change in the trajectory of infection rate after lockdown**, since there was none at the time the decision was taken (and, so far, there has been none since)

With regard to specific components of lockdown, the evidence base for the effectiveness of these is generally weak. Washing hands is well-established as an effective measure for inhibiting spread of disease[3] but is not a lockdown measure. Evidence on mask-wearing is not conclusive.[4] Evidence on school closures shows little or no benefit to closing schools (see *Education*). Evidence on cigarette smoking does not support strong conclusions about an effect (positive or negative) of smoking.[5] Evidence on alcohol sales reducing the rate of infection is lacking, although other reasoning has some force here (e.g. reducing stress on emergency rooms).

With regard to measures taken elsewhere in Africa, the WHO has recently indicated that countries implementing **less stringent measures have seen slightly better outcomes** than those implementing strict lockdown.[6]

Many of the arguments both for and against lockdown amount to very weak evidence according to standard evidence hierarchies, which place expert judgement and "mechanistic reasoning" at the very bottom.[7] While one may need to rely on suboptimal evidence at times, one should not (usually) do so when more credible evidence is available.

In sum, **the evidence base for sustaining lockdown at either level 5 or level 4 is weak**.

Recommendations

1. Bring relevant evidence to the fore when evaluating courses of action
2. Employ evidence evaluation frameworks and experts to evaluate evidence on the basis of its relevance and type
3. Do not give undue weight to any expert, to any group of experts, or to advocacy groups, including health advocacy groups, all of whom may have gaps of knowledge elsewhere and/or fail to see the whole picture

1: Health

Implementation of lockdown and previous restrictions has been justified with reference to the health impact of unchecked COVID-19. The government has not explicitly estimated this impact but the main sources of concern appear to be (a) the model produced by Imperial College London, predicting an excess of about 220,000 deaths if the disease is unchecked,[8] and (b) the spectacle of overwhelmed health systems in Wuhan, Italy, Spain, and other places

Non-COVID health impact

Implementation of lockdown made no detailed reference to health consequences of lockdown beyond deaths caused from COVID-19, summarised in this table.[9]

Factor	Impact
Malnutrition and general reduction in life expectancy reliably association with economic depression (inc. unemployment)	Economic downturn is well-established to lead to reduction in socioeconomic status and to absolute poverty, both causative for reduced life expectancy.[10] Malnutrition causes 45% of all under-5 deaths globally.[11]
Diversion of resources from other healthcare needs	Almost all healthcare capacity is currently focused on COVID-19, with negative impact on HIV[12] provision, maternal deaths,[13] and other healthcare provision.[14]
Outbreaks of infectious disease consequent on poverty and diversion of health resources	Poverty increases risk of infectious disease outbreak consequent on malnutrition and deterioration in living conditions (overcrowding, sanitation). Outbreaks have been observed in neighbouring countries.[15]
Effect of lifting lockdown on COVID-19 mortality	The same cumulative total of infections will be reached when suppression/mitigation measures are relaxed, unless (i) model assumptions are incorrect and/or (ii) a vaccine or other measure is available then.[16]
Years of life lost (as opposed to a tally of deaths)	COVID-19 mortality is exponential with age and rises sharply around 60-65.[17] Life expectancy at birth in SA is 59/65 M/F.[18] Thus lockdown will appear less attractive in life-years lost than in deaths averted (additional to other factors).
Mental health	Prolonged confinement is psychologically stressful, in addition to the fear engendered by pandemic.[19]

Non-health consequences

There is rhetorical mileage in arguing that health cannot be traded against the economy, or that lives must be saved from COVID-19 at all costs. This is equivalent, in our framework, to weighting *Health* at or near 100% relative to other policy priorities. Yet emergencies do not determine our underlying policy priorities: they matter *because* of our priorities. The prioritization of health over all else is thus either an epiphany, a case of the tail wagging the dog.

Models: reliability and scrutiny

The projections derived from the Imperial model are is open to question.

- The model's assumptions have been scrutinized and questioned[20]
- The model's applicability to local context is questionable because the suppression as modeled is not feasible in much of South Africa[21]
- The relevant comparator for suppression (lockdown) is not inaction but mitigation

The twin effects of these questions are (i) to suggest that a less extreme measure than full lockdown ought to have been given greater consideration initially, or, alternatively, earlier consideration, and (ii) that the extension of lockdown at 3 weeks was either wrong or not adequately explained in public.

The future

The effectiveness of suppression strategies as modeled by Imperial is explicitly premised on the availability of a vaccine at end of lockdown. This is not a reasonable premise for South Africa.

- A vaccine is likely to take 18 months or more to develop, and lockdown cannot be sustained this long without risking destruction of the nation
- A vaccine is not guaranteed to be highly effective
- Availability may be limited by production capacity and/or cost
- Implementation of universal vaccination may prove challenging

Recommendations

4. Consider and take urgent steps to mitigate health consequences of anti-COVID measures, alongside deaths caused by COVID-19
5. Consider and take urgent steps to mitigate non-health impacts
6. Scrutinize models in light of:
    a. Questions and criticisms raised
    b. Whether the strategies they model can be realised in this context
    c. Comparison of extreme measures with partial measures, not with doing nothing, in estimating and communicating excess deaths
7. Do not assume near- or medium-term availability of a vaccine or other effective preventive or curative measure

2: Food security and nutrition

Food insecurity is a major cause of malnutrition in the developing world. It is defined as "[a] situation that exists when people lack secure access to sufficient amounts of safe and nutritious food for normal growth and development and an active and healthy life."[22]

According to Stats SA, South Africa is food-secure at a national level (although perhaps this may change) but insecure at household level. 20% of households experience food insecurity and 30% of those with 3 or more children under 5. Malnutrition is especially severe among children. More than two thirds of South African children live in poverty, with one-third in extreme poverty, which is defined in terms of food insecurity.[23] As more people move into between poverty categories, the number of hungry people will grow. Multiple children are dependent on breadwinners, and food security falls with household size. Therefore child poverty is likely to grow at least as fast and probably faster than overall food insecurity.

Food insecurity is so grave in South Africa that the United Nations (UN) listed it as one of 10 countries which will face famines of "biblical proportions" due to the coronavirus. In a bid to mitigate this challenge, the South African government has implemented measures to ensure that vulnerable populations have access to food during the lockdown, including increasing social grant allowances, as well as distributing food parcels. An analysis of the food parcels against the World Health Organisation (WHO) values of selected nutrients reveal that the food parcels: (i) lack dietary diversity; (ii) have significantly higher carbohydrate, protein and fat content compared with nutritional guidelines; (iii) provide a sufficient amount of zinc and iron but lack adequate Vitamin A; and (iv) have a 98% deficit in daily recommended allowance for Vitamin C.[24]

The effects of COVID-19 itself on food security are mediated by incapacitation and killing breadwinners. Projections as to number of deaths are therefore central to estimating food security effects of COVID-19 itself. These projections are contestable, as indicated in *Health: Models*. Projections in relation to effects of lockdown are relatively certain [actuaries]. In lower income countries and among poorer populations, lockdown has a higher impact on food insecurity both absolutely and relative to COVID-19. In our view, based on the estimates we find most credible, the food security effects of lockdown are likely to be larger than those of COVID-19 *appropriately mitigated*.

Recommendations

In addition to the recommendations made in *Unemployment* and *Economy*:

8. Urgently implement strong anti-corruption and accountability steps in delivery of food parcels
9. Improve nutritional quality of food parcels
10. Improve implementation, including around targeting and coverage

3: Education

School closures are among the most severe lockdown measures in their effects on children (especially girls) and the ability of their parents to work (including health workers). Yet the closure of schools lacks an evidence base. A systematic review in *The Lancet* states:

> *…there are no data on the relative contribution of school closures to transmission control. Data from the SARS outbreak in mainland China, Hong Kong, and Singapore suggest that school closures did not contribute to the control of the epidemic… Recent modelling studies of COVID-19 predict that school closures alone would prevent only 2–4% of deaths, much less than other social distancing interventions.* **Policy makers need to be aware of the equivocal evidence when considering school closures for COVID-19,** *and that combinations of social distancing measures should be considered. Other less disruptive social distancing interventions in schools require further consideration if restrictive social distancing policies are implemented for long periods.*[25] *[Emphasis inserted]*

The review strongly advises policy makers to consider alternative measures.

In South Africa, some schools are offering online learning, but many schools are ill-equipped to offer to do. The Department of Education also offers online resources to support home learning, but many students are unable to access online learning and/or lack a congenial learning environment. Universities are also seeking to offer online learning but similar issues arise.

Taking into account the negative effects both on children's education (especially girls', who may not return to school) and on economic activity as parents (including health workers) cannot work, there is a very strong case for returning children to school as a matter of priority. **The evidence does not support fears that school-children may drive the spread COVID-19.**

Recommendations

11. Immediate return to full school education (for non-vulnerable children), subject to
    a. Immediate hand-washing/hygiene training for teachers and pupils
    b. Physical distancing recommendations *where feasible*
12. Urgent supply of emergency sanitation measures (hand sanitiser, soap) to schools
13. Immediately commence sanitation of schools without proper sanitation

4: Economy and unemployment

On 21 April 2020, President Cyril Ramaphosa said that his administration was determined to return South African economy to the period before the emergence of COVID-19. [26] However, the economy was already in bad shape pre-COVID-19. The South African Reserve Bank predicts that South African GDP will contract by 6.1% in 2020, and will grow by 2.2% and 2.7% in 2021 and 2022, respectively. While Consumer Price Inflation (CPI) is expected to average 3.6%, forecast for core inflation is 3.8% in 2020.[27] In a report prepared in April 2020, the programme *Southern Africa – Towards Inclusive Growth* is also pessimistic. It distinguishes three scenarios: (i) *Quick* (the pandemic is contained quickly, and the economy bounces back); (ii) *Slow* (the pandemic takes longer to contain, and the economy is slower to recover); and (iii) *Long* (the pandemic endures even longer, and the recovery thereafter is spread over a longer period than in the slow scenario). In their analysis, the post-COVID-19 growth rate would be -3% in the Quick scenario, -10% in the Slow scenario and -14% in the *Long* scenario in 2020.[28]

Unemployment is a particular concern since it directly impacts poverty and concomitant health burdens (including *Health* and *Food insecurity and nutrition*). While the official unemployment rate was 29.1% in final quarter of 2019, effective under- and unemployment was at 40% with the youth accounting for more than 50%[29]. Financial institutions such as the International Monetary Fund (IMF), BRICS Bank and African Development Bank (ADF) seem to be ready to offer their financial support on "good terms" to combat the pandemic, COVID-19 will still have significant impact on unemployment as around 1.6 million South Africans working in the formal sector of the economy have already be predicted to lose their jobs by June 2020.[30] There is no gainsaying that it will be worse in the informal sector which has ceased to be operational since the beginning of the lockdown. This is compounded by the fact that the IMF and the South African Reserve Bank (SARB) have projected that South Africa's economy will decline by 5.8%[31] and 6.1% in 2020, respectively.

The South African government response is seen in the R100 billion allocated to protect and create jobs. It is, however, not clear if this move will have a significant impact and the likelihood that it will be sustained is dim, given the looming "great recession". High rate of unemployment will thus continue to be a major challenge during and post-COVID-19 periods in South Africa.

Recommendations

14. Resume economic activity in all sectors, subject to
    a. Sanitation conditions on workplaces
    b. Physical distancing recommendations for workplaces *where feasible*
    c. Partial restrictions on transport crowding
    d. Social distancing and sanitation requirements in entertainment and catering (e.g. distance between tables)
    e. Recommendation to work from home where possible.

5: Vulnerable groups

South Africa is one of the most unequal countries in the world.[32] Some socio-cultural groups are especially marginalised and socially excluded, as they lack access to rights, resources, and opportunities. While there are many such groups, there is strong evidence that women globally as well as locally are suffering a "shadow pandemic" of domestic violence.[33] Lockdown measures have escalated tensions in households resulting in high levels of domestic violence in the country, [34] and restrictions on leaving the home also make escape more difficult. Women in rural areas and townships are the most vulnerable to increased violence.[35]

Children are at risk of domestic violence and abuse too, especially when confined with potential abusers. Children obviously suffer in both the short and long term from being deprived of education. Infants and children are especially at risk of malnutrition and many infectious diseases (other than COVID-19).

Migrants and refugees, especially those without legal status, are less able to access government support and may lack community support networks. At the same time they are not able to travel to their countries of origin legally. Homeless persons may likewise struggle to access official or unofficial support networks.

Recommendations

15. Cross-cutting other policies, specific consideration be given to these groups, especially women, for whom there is clear evidence of suffering.

6: Governance and enforcement

Behaviour of security forces

Social, national and international media have carried credible reports of a number of violations of non-derogable constitutional rights by South African Police Service and South African National Defence Force, including corporal punishment (such as forcing people to roll or crawl) and beatings, leading in some cases to death.

A minority have been officially confirmed and resulted in criminal action against suspected perpetrators.[36] Accountability is thus lacking. Citizens are not adequately protected against wrongful and even lethal behaviour by law enforcement officials.

Inadequate protection and consideration of women and other vulnerable groups in formulating and implementing lockdown regulations may also amount to a violation of the non-derogable right to equality.

The Constitution represents the basis of the pact between state and citizen. When the state violates the Constitution, it breaks that pact. Disobedience of any law does not justify any violation of the Constitution.

Legitimate disobedience

Disobedience is unavoidable in some instances, where people are unable to remain confined to overcrowded accommodation, including cases where conditions are so intolerable as to render confinement itself a violation of a non-derogable right.

Contents of regulations

Where regulations are based on anything other than their intended effect on COVID-19, they are unlawful. There is a risk that, having been implemented, regulations will "stick" until a reason is proposed to lift them. This is notably the case for cigarette and alcohol sales, where an evidence base for a ban is lacking, but the burden of proof may be subtly shifted onto the case for lifting restrictions, when it properly falls on the case for their continuation. The correct route for legal restriction of smoking and drinking, or for implementation of any measure for reasons other than combating COVID-19, is through legislation, which further permits full and proper scrutiny of evidence.

Recommendations

16. Urgently implement strong anti-corruption and accountability measures to address illegal and criminal behaviour of enforcement services
17. Content of regulations be justified exclusively with reference to COVID-19 in terms of the [act]
18. Content of regulations be
    a. Feasible for enforcement
    b. Not such as to create a situation that violates non-derogable rights (e.g. through confinement in inhumane conditions)

Recommendations

Primary recommendation

We recommend that this framework be used for making, assessing, explaining and communicating decisions, based on the careful evaluation, including qualitative analysis as well as quantitative, of the performance of contemplated measures from the perspective of clearly-identified policy priorities. All other recommendations are secondary.

Specific recommendations

Here is a list of all the specific recommendations above.

1. Bring relevant evidence to the fore when evaluating courses of action
2. Employ evidence evaluation frameworks and experts to evaluate evidence on the basis of its relevance and type
3. Do not give undue weight to any expert, to any group of experts, or to advocacy groups, including health advocacy groups, all of whom may have gaps of knowledge elsewhere and/or fail to see the whole picture
4. Consider and take urgent steps to mitigate health consequences of anti-COVID measures, alongside deaths caused by COVID-19
5. Consider and take urgent steps to mitigate non-health impacts
6. Scrutinize models in light of:
    d. Questions and criticisms raised
    e. Whether the strategies they model can be realised in this context
    f. Comparison of extreme measures with partial measures, not with doing nothing, in estimating and communicating excess deaths
7. Do not assume near- or medium-term availability of a vaccine or other effective preventive or curative measure
8. Urgently implement strong anti-corruption and accountability steps in delivery of food parcels
9. Improve nutritional quality of food parcels
10. Improve implementation, including around targeting and coverage
11. Immediate return to full school education (for non-vulnerable children), subject to
    a. Immediate hand-washing/hygiene training for teachers and pupils
    b. Physical distancing recommendations *where feasible*
12. Urgent supply of emergency sanitation measures (hand sanitiser, soap) to schools
13. Immediately commence sanitation of schools without proper sanitation
14. Resume economic activity in all sectors, subject to
    a. Sanitation conditions on workplaces
    b. Physical distancing recommendations for workplaces *where feasible*
    c. Partial restrictions on transport crowding
    d. Social distancing and sanitation requirements in entertainment and catering (e.g. distance between tables)
    e. Recommendation to work from home where possible.
15. Cross-cutting other policies, specific consideration be given to these groups, especially women, for whom there is clear evidence of suffering.
16. Urgently implement strong anti-corruption and accountability measures to address illegal and criminal behaviour of enforcement services

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18. Content of regulations be
    a. Feasible for enforcement
    b. Not such as to create a situation that violates non-derogable rights (e.g. through confinement in inhumane conditions)

Mitigation Scenario

The implementation of these recommendations results in our *Mitigation Scenario*. This is not a fully specified set of measures but a broad brush picture, whose further details would need to be specified for implementation.

Framework

For each "Lockdown Level" or other bundle of measures (or individual measure), we can make an assessment from the perspective of each of the policy priorities identified. The assessment includes both a *weight* and a *score*.

Score indicates how well the level of lockdown or bundle of measures performs against this priority. Scores are out of 10. One may think of 10 being "normal function", which is not necessarily perfect function, but rather function that is at a level roughly equivalent to what we would have expected it to be, had COVID-19 never been.

Weight indicates how important a priority is relative to others. Weights are percentages and must sum to 100%.

We can tally the weighted scores to reach an overall score, which may be compared to the scores achieved by other levels or bundles of measures.

Time is not included here, but could be done so, by simply specifying the time period over which one is assessing the impacts.

This exercise is intended as an aid to decision-making and not a straitjacket. Policy makers may reach surprising conclusions and then revisit their weights and scores. However, this exercise is valuable, because it enforces reflection on the bases of judgements, and ensures a degree of overall coherence of reasoning.

Using the framework

An editable, implementation-ready spreadsheet is provided to support this exercise calculations. It is a simple matter to enter add, subtract or alter elements of the framework, and to weight and score them differently. It is also simple to feed the outputs of quantitative assessments into scores or weights.

Application to the Mitigation Scenario

Leaving weights the same, we estimated scores for the Mitigation Scenario resulting from the implementation of our specific recommendations. The result is **an overall score for the Mitigation Scenario of 5.8 out of 10**, as follows.

Mitigaion Scenario	Score (out of 10)	Rationale for score	Weight of this priority (%)	Weighted score (out of 10)
1 Health	6	Moderate social distancing methods appear effective at slowing virus transmission. Still some malnutrition, diversion of health resources. These outweigh virus given age profile. Health is inevitably damaged by a pandemic, hence score remains modest.	15%	0.9
2 Food security and nutrition	6	Hunger will continue to be an issue, but less serious.	20%	1.2
3 Education	7	Properly emphasised, school education will be able to proceed relatively uninhibited in moderate social distancing as we conceive it.	20%	1.4
4 Economy and unemployment	5	The economy will still be significantly impaired, but less so than under Full Lockdown.	18%	0.9
5 Vulnerable groups	4	Vulnerable groups remain vulnerable in the absence of wider systemic changes, but less so than under Full Lockdown.	17%	0.7
6 Governance and enforcement	7	Governance and enforcement will considerably improve when key restrictions on movement and activity are lifted.	10%	0.7
Overall		**Mitigation Scenario is no panacea, but represents a better set of trade-offs than full lockdown, considering not only health but also other dimensions of policy.**	**100%**	**5.8**

We did not score the Mitigation Scenario generously, reflecting the fact that even this scenario is a grim one. Spelling out the Mitigation Scenario in more detail would enable firmer scoring, and exploring specific measures in detail might shed light on ways forward that would yield higher scores.
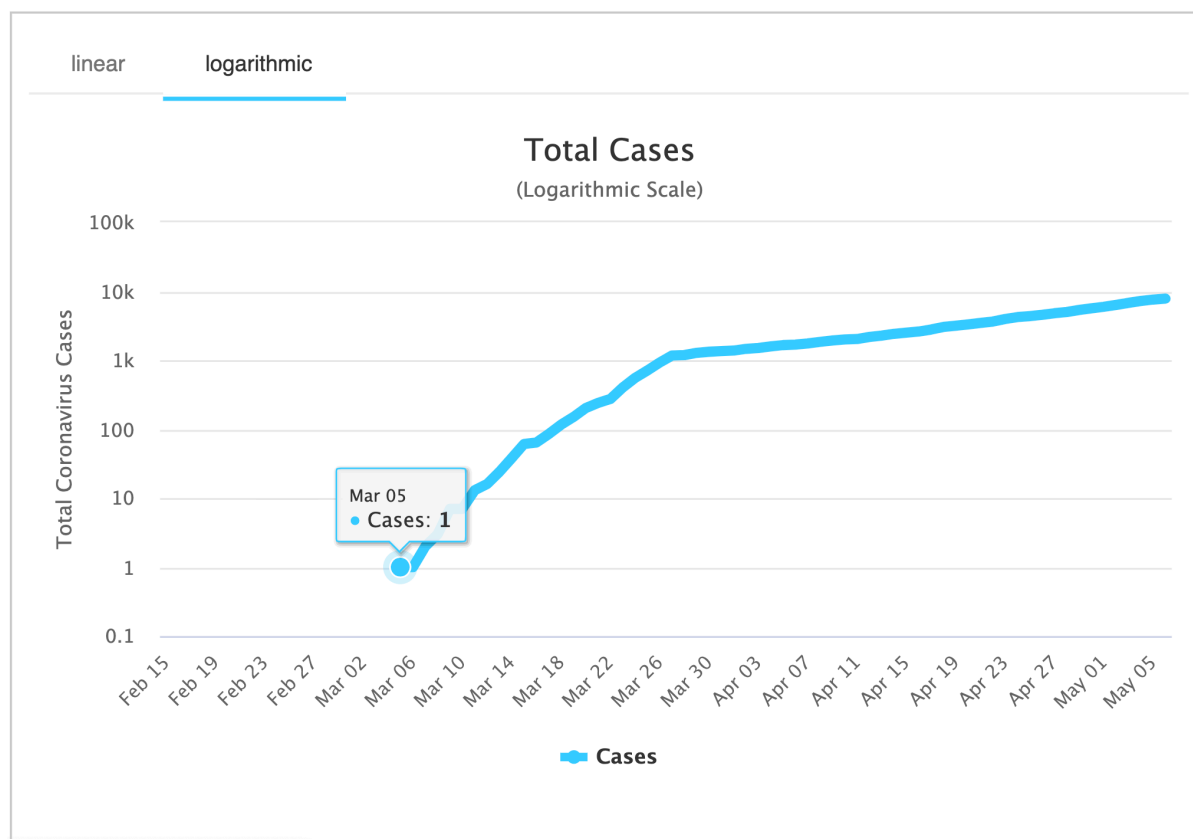
Appendix 1: Rate of Infection

This chart shows total cases on a logarithmic scale. A log scale illustrates the rate of change in the rate of infection, and provides a useful visual representation of the speed at which a disease is spreading. During an epidemic, infections will proliferate, resulting in an upward curve on a linear scale. It is not easy to see whether the curve is changing or not from looking at the linear graph. The log scale makes this immediately obvious, however: a straight line means that the curve is the same, that in this sense the infection is spreading at the same rate (despite the number of infections growing daily). An change in direction in the line on the log scale shows that the spread is speeding up or slowing down.

Here, the line was angled more steeply between 6 and 27 March, and less steeply since. It has also been remarkably smooth since that date.

It is important to remember that infection rates are highly influenced by testing. An increase in testing over time means that the true infection rate is lower, and that the straight line is a conseqwuence of the trajectory of infection coming down (i.e. the rate of growth slowing, not necessarily number of infections falling) the rate of testing goes up. Further analyses will need to factor in testing data, when it is available.

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Disclaimer

Notes

¹ World Bank (WB). 2019. *Life Expectancy at Birth, Total (Years)* (accessed from https://data.worldbank.org/indicator/SP.DYN.LE00.IN on 8 May 2020).

² Bradford, H.A. 1965. 'The Environment and Disease: Association or Causation?' *Proceedings of the Royal Society of Medicine* 58:259-300.

³ World Health Organisation (WHO). 2020a. *Who Saves Lives: Clean your Hands in the Context of COVID-19* (accessed from https://www.who.int/docs/default-source/coronaviruse/who-hh-community-campaign-finalv3.pdf?sfvrsn=5f3731ef_2 on 5 May, 2020).

⁴ World Health Organisation (WHO). 2002b. *Advice on the Use of Masks in the Context of COVID-19* (accessed from https://www.who.int/publications-detail/advice-on-the-use-of-masks-in-the-community-during-home-care-and-in-healthcare-settings-in-the-context-of-the-novel-coronavirus-(2019-ncov)-outbreak on 6 May, 2020).

⁵Farsalinos, K., Barbouni, A., and Niaura, R. 2020.'Smoking, Vaping and Hospitalization for COVID-19'.*Qeios*. doi:10.32388/Z69O8A.13.

⁶ World Health Organisation (WHO). 2020c. *African Countries Start Easing Covid-19 Confinement Measures.* (accessed from https://www.afro.who.int/news/african-countries-start-easing-covid-19-confinement-measures on 7 May 2020).

⁷ Howick, J.H. 2011. 'The Philosophy of Evidence-Based Medicine.' John Wiley and Sons. Page 5.

⁸ Walker, P.G.T., Whittaker, C et al. 2020. The Global Impact of COVID-19 and Strategies for Mitigation and Suppression. Imperial College London (accessed from https://www.imperial.ac.uk/media/imperial-college/medicine/sph/ide/gida-fellowships/Imperial-College-COVID19-Global-Impact-26-03-2020v2.pdf on 7 May, 2020).

⁹ We do not discuss laves saved due to reduction in road traffic accidents, violent crime, and other causes, as consequence of lockdown. This is because they cannot be considered as part of the justification of a lockdown, which must be in terms of the intended benefits, contemplated when the government declared a state of disaster in terms of the National Disaster Management Act 2002. Otherwise, this would amount to a wrongful creation of law by the executive, bypassing the legislature. If South Africa decides to create a lockdown in order to reduce road traffic mortality, for example, it needs to legislate to do so. The fact that this is a collateral benefit of locking down for another purpose cannot be weighed in favour of locking down without being explicitly included in the enactment of those regulations.

¹⁰ Open letter from Panda (Pandemic ~ Data Analysis) to President Ramaphosa, 5 May (accessed from https://www.businesslive.co.za/fm/features/2020-05-05-lockdown-disaster-dwarfs-covid-19-say-sa-actuaries/ on 7 May 2020).

¹¹ World Health Organisation (WHO). 2020d. *Malnutrition* (accessed from https://www.who.int/news-room/fact-sheets/detail/malnutrition on 7 May 2020).

¹² South Africa has the highest HIV infection rates in the world, with an estimated 7.7 million people living with the virus. HIV prevalence among the general population stands at 20.4% Avert. 2020. HIV and AIDS in South Africa (accessed from https://www.avert.org/professionals/hiv-around-world/sub-saharan-africa/south-africa on 29 April, 2020).

¹³ Roberton, Ti., Carter, E.D., Chou, V.B., Stegmuller, A., Jackson, B.D., Tam, Y., and Sawadogo-Lewis, T., and Walker, N. 2020. *Early Estimates of the Indirect Effects of the*

Coronavirus Pandemic on Maternal and Child Mortality in Low- and Middle-Income Countries (accessed from http://dx.doi.org/10.2139/ssrn.3576549 on April 15, 2020).

[14] World Health Organisation (WHO). 2020a. *The Potential Impact of Health Service Disruptions on the Burden of Malaria: A Modelling Analysis for Countries in Sub-Saharan Africa* (accessed from https://apps.who.int/iris/bitstream/handle/10665/331845/9789240004641-eng.pdf on 28 April, 2020). According to this source, the COVID-19 pandemic will likely be the biggest threat faced by global efforts to reduce the malaria burden, especially in Sub-Saharan Africa where health systems are fragile. WHO has further noted that efforts to contain COVID-19 will negatively affect the delivery of insecticide-treated nets and access to anti-malarial medicines, and this can potentially lead to over 760,000 deaths from malaria, twice the number of deaths reported on the continent in 2018.

[15] Nyathi, K. 2020. *Zimbabwe COVID-19 Focus Leaves Malaria Unmarked* (accessed from https://www.theeastafrican.co.ke/news/africa/Zimbabwe-Covid19-focus-leaves-malaria-unmarked/4552902-5534150-j9r0b9z/index.html on 28 April, 2020). While South Africa has not yet recorded any malaria incidents during the lockdown, its northern neighbour, Zimbabwe, has recorded more than 150 deaths due to malaria

[16] Open letter from Panda (Pandemic ~ Data Analysis) to President Ramaphosa, 5 May (accessed from https://www.businesslive.co.za/fm/features/2020-05-05-lockdown-disaster-dwarfs-covid-19-say-sa-actuaries/ on 7 May, 2020).

[17] Verity R., Okell L.C., Dorigatti I, Winskill P., et al. 2020. 'Estimates of the Severity of Coronavirus Disease 2019:
a Model-Based Analysis'. *The Lancet Infectious Diseases* (accessed from https://doi.org/10.1016/S1473-3099(20)30243-7 on 7 May, 2020).

[18] Statistics South Africa (Stats SA). 2019. *Mid-Year Population Estimates 2019* (accessed from https://www.statssa.gov.za/publications/P0302/P03022019.pdf on 7 May, 2020).

[19] South African Depression and Anxiety Group (SADAG). *SADAG's Online Survey Findings on COVID-19 and Mental Health* (accessed from http://www.sadag.org/index.php?option=com_content&view=article&id=3092%3Asadag-s-online-survey-findings-on-covid-19-and-mental-health-21-april-2020&catid=149%3Apress-releases&Itemid=226 on 30 April, 2020). In a novel survey on COVID-19 and mental health, the South African Depression and Anxiety Group (SADAG) found that: 55% of the participants self-reported to be suffering from anxiety and panic; 46% had financial stress and pressure (which was attributed to the loss of income due to the lockdown); 40% indicated that they were depressed; 30% highlighted their poor family relations; 12% had suicidal feelings; and 6% were abusing substances. SADAG's Operations Director Cassey Chambers, noted that, "COVID-19 and the lockdown has affected many South Africans, and it has had a serious impact on people living with a mental health issue often making their symptoms more heightened. SADAG has been receiving calls from people with no history of anxiety or depression who are feeling overwhelmed, anxious and stressed."

[20] The quality of the code has also been questioned (accessed from https://lockdownsceptics.org/code-review-of-fergusons-model/ on 7 May, 2020).

[21] South Africa's COVID Lockdown: Cigarettes and Outdoor Exercise could ease the Tension (accessed from https://theconversation.com/south-africas-covid-19-lockdown-cigarettes-and-outdoor-exercise-could-ease-the-tension-134931 on 7 May, 2020).

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[22] Food and Agricultural Organisation of the United Nations (FAO). 2020. *Seeds, Diversity and Development* (accessed from http://www.fao.org/economic/esa/seed2d/glossary/en/ on 28 April, 2020).

[23] Hall, K. *Income Poverty, Unemployment and Social Grants* (accessed from http://www.ci.uct.ac.za/sites/default/files/image_tool/images/367/Child_Gauge/South_African_Child_Gauge_2019/CC/CC2019%20-%20Income%20poverty%2C%20unemployment%20and%20social%20grants.pdf on 28 April, 2020).

[24] Vermeulen, H., Muller, C., and Schönfeldt, H. 2020. *Food Aid Parcels in South Africa could do with a Better Nutritional Balance* (accessed from https://theconversation.com/food-aid-parcels-in-south-africa-could-do-with-a-better-nutritional-balance-136417 on 28 April, 2020)

[25] Viner, R.M., Russell, S.J., Croker, H., Packer, J., Ward, J., Stansfield, C., Mytton, O., Bonnell, C., Booy, R,. 2020. 'School Closure and Management Practices during Coronavirus outbreaks including COVID-19: A Rapid Systematic Review'. *The Lancet Child and Adolescent Health,* 4:397-404 (accesed from https://doi.org/10.1016/S2352-4642(20)30095-X on 6 May, 2020).

[26] South African Government. 2020. *Statement by President Cyril Ramaphosa on Further Economic and Social Measures in Response to the COVID-19 Epidemic.* 21 April (accessed from http://www.thepresidency.gov.za/speeches/statement-president-cyril-ramaphosa-further-economic-and-social-measures-response-covid-19 on 7 May, 2020).

[27] South African Government. 2020. *Minister Tito Mboweni: Media Briefing on Economy and Coronavirus Covid-19* (accessed from https://www.gov.za/speeches/minister-tito-mboweni-media-briefing-economy-and-coronavirus-covid-19-14-apr-2020-0000 on 6 May, 2020).

[28] Southern Africa –Towards Inclusive Economic Development (SA-TIED) (2020). *Impact of Covid-19 on the South African Economy: An Initial Analysis*. Working Paper 111 (accessed from https://sa-tied.wider.unu.edu/article/impact-covid-19-south-african-economy-initial-analysis on 6 May, 2020).

[29] The Brenthurst Foundation (2020). *How to Turn Crisis into Opportunity After Covid-19: Choices for a Better South African Future*. Discussion Paper 3. Johannesburg: The Brenthurst Foundation.

[30] Ibid.

[31] International Monetary Fund (IMF). 2020a. *South Africa* (accessed from https://www.imf.org/en/Countries/ZAF on 29 April, 2020).

[32] International Monetary Fund (IMF). 2020b. *Six Charts Explain South Africa's Inequality* (accessed from https://www.imf.org/en/News/Articles/2020/01/29/na012820six-charts-on-south-africas-persistent-and-multi-faceted-inequality on 5 May, 2020).

[33] Violence against Women and Girls: The Shadow Pandemic (accessed from https://www.unwomen.org/en/news/stories/2020/4/statement-ed-phumzile-violence-against-women-during-pandemic on7 May, 2020).

[34] Phalatse, S. 2020. *Covid-19 and Women: This is what Government needs to do* (accessed from https://www.groundup.org.za/article/covid-19-women-what-govt-must-do/ on 7 May, 2020).

[35] Blouws, C. 2020. *Covid-19: Womxn in South Africa more Vulnerable than most* (accessed from https://www.dailymaverick.co.za/article/2020-03-24-covid-19-womxn-in-south-africa-more-vulnerable-than-most/ on 5 May, 2020).

[36] Hans, B. 2020. *Military Ombud is Probing 33 Human Rights Abuse Cases Against SANDF Members* (accessed from https://www.iol.co.za/news/politics/military-

ombud-is-probing-33-human-rights-abuse-cases-against-sandf-members-47191203 *on 7 May, 2020).*