Guidance on Making Policy Decisions in a Pandemic

Ethics-based guidelines for decision making in pandemic-related policy, with examples from COVID-19

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Executive Summary

Policy making for pandemics poses particular challenges, especially if the pandemic is ongoing and is the result of a previously unidentified pathogen. The emergence of scientific knowledge about the pandemic may be slow, and can also evolve rapidly. Pandemics, however, spread quickly and destructively, which means that policymakers often have to make quick decisions with relatively limited information.

This briefing paper summarizes several decision making challenges faced by policymakers in the context of COVID-19, drawing on ethics and the philosophy of science, and provides key takeaways for decision makers. We focus on four areas: decision making under uncertainty, privacy of the infected and exposed, the ethics of digital contact tracing, and restricting the movement of people in quarantine and during lockdown.

Under the area of "Decision Making Under Uncertainty," we highlight that governments need to proactively take precautions, even on the basis of limited evidence, without waiting for complete (scientific) certainty. Furthermore, governments need to honestly acknowledge uncertainty and maintain consistent messaging around health guidelines to avoid losing trust. To illustrate this, we explore how changing advice and messaging on whether or not the general public should wear face masks risked harming trust in the authorities, which could make people less likely to comply with health and safety guidelines.

In "Privacy of the Infected and Exposed," we explain the need to collect information about people who may be infected and exposed and their whereabouts, while preserving the privacy of these individuals. This becomes especially important when the infected and potentially exposed are stigmatized. There is a need to both identify those who have been infected with COVID-19 and warn those who have might have been exposed. Governments should be discerning about what kind of information is needed for this purpose, starting by asking - what is the minimum information the public needs to know to stay safe? For example, it may be enough to reveal that *an* infected or exposed person has resided or passed through a given area, without revealing the age and name of that person. Information exposure should also be correlated with threat levels - highly sensitive personal information should be revealed only if the threat is very high and the threat cannot be mitigated without that information. Furthermore, clear communication between the government and public, and education about disease transmission and risk are needed to combat stigma against those infected and exposed to COVID-19.

Digital contact tracing technologies (DCTT) have received significant attention as a way to combat COVID-19. However, concerns abound regarding the effectiveness and adoption rates of such technologies, as well the privacy of individuals who use DCTT apps. We note that Governments cannot rely on DCTTs alone for contact tracing. Manual methods (for example, calling and interviewing) will still be necessary, and can be used in tandem with DCTTs. If DCTTs are used, governments should stress that privacy concerns need to be addressed in tandem with app development, not as a side concern. Governments should review existing privacy legislation and identify gaps, in order to prevent overreach of the

use of data collected by DCTTs. If they do not already exist, legal mechanisms need to be put in place to ensure that data collected for contact tracing is used only for that purpose.

Finally, we address policy making on restricting people's movements in quarantine and lockdown. Both measures can help slow the spread of pandemics. However, digital technologies that may be used to monitor and enforce quarantine have raised privacy concerns. Others worry that individuals may fear the consequences of quarantine, and therefore may avoid disclosing symptoms. Lockdowns can have serious economic consequences, even resulting in unemployment for those unable to go to work. Therefore, governments should prepare for the economic fallout of lockdowns. Policy making needs to center and provide safety nets for those who are most vulnerable (e.g. those who work physically based jobs, are in informal employment). The government should clearly communicate the purpose and procedures of quarantine to the general public to reduce fear of the quarantine process. If digital technologies are being used to monitor individuals in quarantine, legal mechanisms (if they do not exist already) should be put in place to ensure that these technologies are used only for the purpose of monitoring quarantine, and will cease to be used after the relevant individuals' quarantine periods are over.

Policy making in pandemics involves managing the socio-economic fabric of a whole society. Accounting for the ethical conflicts faced by policymakers in pandemics enables policy to become more effective, holistic, and inclusive.

Introduction

Policy making during pandemics and public health emergencies involves making decisions with incomplete information and limited resources. Especially during an ongoing pandemic resulting from a previously unidentified pathogen, scientific knowledge may be slow to emerge and may evolve rapidly, creating challenges for evidence-based decision making. How can policy makers make good evidence-based decisions when the evidence itself is often uncertain? How do governments communicate with the public in ways that are transparent and consistent? Concerns about privacy underlie many of these debates, especially when it comes to identifying and isolating infected individuals, and those they have come into contact with. These concerns play a particular role when it comes to using digital solutions for pandemic responses (e.g. contact tracing). Even relatively privacy-conscious governments have begun to question to what extent privacy can be upheld in a pandemic.[1]

Pandemics have significant, real-world impacts on the lives of people, which linger even after the most serious waves of the disease have passed. Effective policy making is an essential part of minimizing the harms of a pandemic to the general public. However,

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[1] "Privacy in a pandemic", The Economist, Apr 23, 2020,
https://www.economist.com/europe/2020/04/23/privacy-in-a-pandemic

pandemic response policy itself is often invasive, and can cause serious disruptions to the lives and wellbeing of people. Good policy needs to balance these various needs.

This briefing paper seeks to summarize some of the decision making challenges faced by policy makers in a pandemic, drawing from the fields of ethics and the philosophy of science. We have situated this discourse in the current COVID-19 pandemic. At the end of each section, we provide some key takeaways for decision makers going forward.

Decision Making Under Uncertainty

When making policy decisions in a pandemic, decisions often have to be made with imperfect information, as knowledge about a pandemic takes time to evolve. Decisions often need to be made rapidly in order to prevent a pandemic from spiralling out of control, which affords policymakers little time to wait for the existing state of scientific knowledge to improve.

One prominent philosophy for decision making under such uncertainty is the Precautionary Principle (henceforth PP). The PP is has many different framings, however it essentially means that if there is a possible threat, precautionary measures should be taken against said threat, even if current scientific evidence is inadequate to confirm this threat with (scientific) certainty.[2] The PP has faced criticisms, including that it could result in resource depletion if vast amounts of resources are spent to try and prevent low-probability events.[3] Nonetheless, during pandemics, policymakers are likely to have to apply the PP to some extent. We discuss one prominent example from COVID-19 below: whether or not to recommend wearing face masks in public. Government policies in support of mask wearing by the general public have been linked to reduced per capita mortality due to COVID-19 in a June 2020 study.[4] However, there has been a long running debate throughout the pandemic on whether mask wearing in public should be recommended.

Wearing Face Masks in Public

The World Health Organization (WHO) had long maintained that those who were COVID-19 patients and their caregivers should wear face masks, but that mask wearing was not necessary for those who are healthy.[5] However, this advice was recently reversed. The WHO now advises that when in public situations where social distancing is difficult, those above

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[2] Per Sandin, Martin Peterson, Sven Ove Hansson, Christina Rudén & André Juthe. "Five Charges against the Precautionary Principle", Journal of Risk Research. 5. (2002) 287-299. https://doi.org/10.1080/13669870110073729

[3] For example, see Ibid; and Cass Sunstein, "Risk and Reason: Safety, Law, and the Environment" (Cambridge: Cambridge University Press, 2002)

[4] Christopher T Leffler, Edsel B Ing, Joseph D. Lykins V, Matthew C. Hogan, Craig A. McKeown & Andrzej Grzybowski, "Association of country-wide coronavirus mortality with demographics, testing, lockdowns, and public wearing of masks", (2020) (Update June 15, 2020). https://doi.org/10.1101/2020.05.22.20109231

[5] David Shukman, "Coronavirus: WHO advises to wear masks in public areas", BBC, June 6, 2020, https://www.bbc.com/news/health-52945210

60 and with health problems should wear medical masks, and others should wear a fabric mask with three layers.[6] The WHO had previously felt that there was not enough evidence to recommend wearing masks in public, and also expressed concerns that if the general public bought up medical masks, there would not be enough left for healthcare workers.[7] The WHO stated that the guidance had been altered due to findings from new studies.[8]

However, consistent messaging is vital to good risk communication during public health emergencies.[9] Even before the WHO reversed its advice, in early April the Chief Public Health Officer of Canada reversed guidance on masks, from stating that those who were not sick or exposed to a sick person need not wear masks, to stating that wearing non-medical masks could help mitigate COVID-19 transmission a week later.[10] It has been noted that such rapid reversals can reduce trust in authorities, making people less likely to follow guidelines.[11] It has also been noted that conflicting messages around mask wearing from public agencies in the United States could decrease trust in public health agencies.[12]

Key Takeaways

- Governments need to proactively take precautions, even on the basis of limited evidence, without waiting for complete (scientific) certainty.
- Governments need to honestly acknowledge uncertainty and maintain consistent messaging around health guidelines to avoid losing trust.

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[6] Sarah Bosely, "WHO advises public to wear face masks when unable to distance", The Guardian, June 5, 2020,
https://www.theguardian.com/world/2020/jun/05/who-changes-advice-medical-grade-masks-over-60s
[7] Ibid.
[8] David Shukman, "Coronavirus: WHO advises to wear masks in public areas", BBC, June 6, 2020, https://www.bbc.com/news/health-52945210
[9] World Health Organization, "Communicating risk in public health emergencies: A WHO guideline for emergency risk communication (ERC) policy and practice", (2017), https://www.ncbi.nlm.nih.gov/books/NBK540733/
[10] Robyn Urback, "Dr. Tam's about-face on masks damages trust at a crucial time", The Globe and Mail, Apr 7, 2020
https://www.theglobeandmail.com/opinion/article-dr-tams-about-face-on-masks-damages-trust-at-a-crucial-time/
[11] Ibid.
[12] Nicole Wetsman, "Masks may be good, but the messaging around them has been very bad", The Verge, April 3, 2020
https://www.theverge.com/2020/4/3/21206728/cloth-face-masks-white-house-coronavirus-covid-cdc-messaging

Privacy of the Infected and Exposed

In a pandemic, it is important to know where infections may have arisen and where those infected may have been physically present. This helps governments identify who might have been exposed and then ask them to take precautionary measures, for instance, self-isolation. Governments may make this information available in various ways. For example, Singapore's public COVID-19 dashboard contains a network diagram displaying infection clusters and cases, and reveals infected persons' information (except names), including place of work, address, age, and others, which are shown together with information about people's contacts and their medical condition.[13] Such a dashboard would no doubt be effective in mapping COVID-19 cases and how they may spread. It would also allow individual citizens to assess if they had possibly come into contact with a COVID-infected person. In the Indian state of Karnataka, it was reported that lists of people in quarantine had even found their way to the public domain. The list had been published by the state government of Karnataka so that citizens could report those breaking quarantine rules.[14] However, such moves raise questions about the privacy of affected individuals.

This question is particularly salient when infection and exposure to COVID-19 are stigmatized. It has been noted that the COVID-19 outbreak has resulted in social stigma against those who are perceived to be at risk of spreading the virus. This includes healthcare professionals (who may have been in contact with COVID-19 patients), those who have completed and left quarantine, and infected persons and their family and friends.[15] [16] To take one example, in India, many Air India crew members who had been on flights to COVID-infected countries were stigmatized by their neighbours and other local community members, who would ostracize the crew members or even report them to the police.[17] Hence, information that may reveal the identities of those potentially infected with or exposed to COVID-19 need to be handled with care and respect for privacy, as the exposure of such information can lead to harmful social consequences.

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[13] Rohan Samarajiva, "Data to help manage pandemics in the Global South.", LIRNEasia, March 27, 2020 https://lirneasia.net/2020/03/data-in-the-time-of-covid-19/

[14] Naveen Menezes, "Government publishes details of 19,240 home-quarantined people to keep a check", Bangalore Mirror, Mar 25, 2020, https://bangaloremirror.indiatimes.com/bangalore/others/government-publishes-details-of-19240-home-quarantined-people-to-keep-a-check/articleshow/74807807.cms.

[15] "COVID-19 (coronavirus) stigma: What it is and how to reduce it", Mayo Clinic, April 17, 2020, https://www.mayoclinic.org/diseases-conditions/coronavirus/in-depth/coronavirus-stigma/art-20484278

[16] "Reducing Stigma", Centers for Disease Control and Prevention, June 11, 2020, https://www.cdc.gov/coronavirus/2019-ncov/daily-life-coping/reducing-stigma.html

[17] V. Manju, "Air India crew being ostracised by neighbours, housing societies, for operating flights to COVID-19 countries", Times of India, Mar 22, 2020. https://timesofindia.indiatimes.com/business/india-business/air-india-crew-being-ostracised-by-neighbours-housing-societies-for-operating-flights-to-covid-19-countries/articleshow/74761456.cms

Key Takeaways

- The aim of these measures is to both identify those who have COVID-19 and warn those who have might have been exposed. Governments should be discerning about what kind of information is needed for this purpose, starting by asking - what is the minimum information the public needs to know to stay safe? For example, it may be enough to reveal that *an* infected or exposed person has resided or passed through a given area, without revealing the age and name of that person. Information exposure should also be correlated with threat levels - highly sensitive personal information should be revealed only if the threat is very high and the threat cannot be mitigated without that information.
- Clear communication between the government and public, and education about disease transmission and risk are needed to combat stigma against those infected and exposed to COVID-19.

The Ethics of Digital Contact Tracing Technology

While contact tracing has long been a key public health measure that helps curtail the spread of infectious diseases, some pathogens such as the current SARS-CoV-2 virus, have been found to spread too fast to be controlled using purely manual methods.[18] Therefore, digital contract tracing solutions that augment the speed and efficacy of traditional methods have been explored since the Ebola outbreak in 2014. The current COVID-19 pandemic has seen the development and deployment of digital contact tracing technologies (DCTT) at an unprecedented scale. Given the significant promise of DCTT, it is conceivable that these and related technologies will become part of not only the COVID-19 response but also the larger toolbox for future public health pandemic response. However, the use of DCTT also raises several ethical concerns that decision-makers need to grapple with to ensure that public health goals are met while minimizing harm and potential abuse. If safeguards are not installed around data collected for contact tracing, the concern is that such data could be used for other purposes, especially by nefarious / bad faith actors.

The risks associated with DCTT can manifest in different ways. For instance, contact tracing technologies can: compromise the privacy of diagnosed carriers, users, non-users, and local businesses; help spread misinformation and create panic; prompt risky behaviour; lead to fraud and abuse; and put the security of collected information at risk.[19] A

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[18] Luca Ferretti, Chris Wymant, Michelle Kendall, Lele Zhao, Anel Nurtay, Lucie Abeler-Dorner, Michael Parker, David G Bonsall & Christophe Fraser. "Quantifying SARS-CoV-2 transmission suggests epidemic control with digital contact tracing". Science. (2020). https://doi.org/10.1126/science.abb6936

[19] Ramesh Raskar, Isabel Schunemann, Rachel Barbar, Kristen Vilcans, Jim Gray, Praneeth Vepakomma, Suraj Kapa, Andrea Nuzzo, Rajiv Gupta, Alex Berke, Dazza Greenwood, Christian Keegan, Shriank Kanaparti, Robson Beaudry, David Stansbury, Beatriz Botero Arcila, Rishank Kanaparti, Vitor Pamplona, Francesco M Benedetti, Alina Clough, Riddhiman Das, Kaushal Jain, Khahlil Louisy, Greg Nadeau, Vitor Pamplona, Steve Penrod, Yasaman Rajaee, Abhishek Singh, Greg

foundational ethical consideration of DCTTs is whether the prompt deployment of DCTT is justified in the first place, given there are manual contact tracing methods whose capabilities are well established, while the efficacy and the dangers of novel technologies are less established and understood. Another critical ethical dimension of DCTT has to do with the collection of individual data. Addressing critical questions such as what data is collected, who has access to such data, how much agency a user has in withholding specific data, and what processes and safeguards are there to ensure data security are essential before deploying DCTT.

Concerns about the effectiveness of contact tracing apps also abound. Most DCTT applications that have been proposed and deployed thus far are smartphone-based and operate on Bluetooth or GPS technologies that require high adoption rates for their success. However, smartphone penetration and digital literacy are quite low in many countries of the Global South. For example, LIRNEasia's AfterAccess data reveal that smartphone ownership among the 15-65 aged populations in India, Pakistan, and Sri Lanka are at 17%, 13% and 37% respectively.[20] For the app to be effective, enough people need to download and use it, (though there is dispute over the precise rates of adoption necessary for effectiveness).[21] In populations such as these, where far less than half the population owns a smartphone in the first place, a DCTT app would have very low effectiveness. Even in populations where smartphone ownership is higher, enough people have to be willing to download it. For instance, in Singapore, (where 90% of the total population is estimated to be smartphone users in 2020[22]), only about one in five people have downloaded the TraceTogether contact tracing app (as of 21 April 2020).[23] Others point out that the imprecision of bluetooth technologies (which can "ping" phones up to 30m away) could lead to false positives, alerting users about those who they did not come into close contact with.[24]

Contact tracing technologies that address inequalities are needed in order to ensure that the benefits and risks of contact tracing are distributed fairly and equitably. As new surveillance technologies and associated policies are developed to enable the deployment of DCTT, privacy experts have raised concerns over governments potentially using such technology

Storm & John Werner, "Apps Gone Rogue: Maintaining Personal Privacy in an Epidemic", (2020) https://arxiv.org/pdf/2003.08567.pdf

[20] "AfterAccess: ICT access and use in Asia and the Global South (Version 3.0)". Colombo: LIRNEasia. (2019), https://lirneasia.net/2019/05/afteraccess-asia-report3/

[21] Patrick Howell O'Neill, "No, coronavirus apps don't need 60% adoption to be effective", MIT Technology Review, June 5, 2020. https://www.technologyreview.com/2020/06/05/1002775/covid-apps-effective-at-less-than-60-percent-download/

[22] J. Muller, "Smartphone market in Singapore - Statistics and facts", Statista, June 11, 2020, https://www.statista.com/topics/5842/smartphones-in-singapore/

[23] Aradhana Aravindan & Sankalp Phartiyal " Bluetooth phone apps for tracking COVID-19 show modest early results", Reuters, April 21, 2020. https://www.reuters.com/article/us-health-coronavirus-apps/bluetooth-phone-apps-for-tracking-covid-19-show-modest-early-results-idUSKCN2232A0

[24] Alex Lee, "If Bluetooth doesn't work for contact-tracing apps, what will?", Wired, April 17, 2020. https://www.wired.co.uk/article/bluetooth-contact-tracing-apps

beyond pandemics to establish/further surveillance states.[25] How governments address these concerns and their measures to build and maintain trust in DCTT and the COVID-19 public health response will be key in the general population adopting such technology and, in turn, the efficacy of any DCTT effort. Some have argued for countries to develop digital rights bills to preserve privacy and restrict overreach in the use of personal data.[26]

Key Takeaways

- Governments cannot rely on DCTTs alone for contact tracing. Manual methods (for example, calling and interviewing) will still be necessary, and can be used in tandem with DCTTs.
- If DCTTs are used, governments should stress that privacy concerns need to be addressed in tandem with app development, not as a side concern.
- Governments should review existing privacy legislation and identify gaps, in order to prevent overreach of the use of data collected by DCTTs. If they do not already exist, legal mechanisms need to be put in place to ensure that data collected for contact tracing is used only for that purpose.

Restricting Movement: Quarantine and Lockdown

In order to combat pandemics, people's movement often needs to be restricted so that contact between infected and non-infected individuals is reduced, helping limit the spread of disease. Limiting movement imposes serious restrictions on citizens' lives, including their ability to participate in social and economic activity. It can entail unemployment in the worst cases, and painful separations between family and friends. Balancing public health needs while trying to minimize disruptions is therefore a major challenge for policymakers. Here, we focus on the challenges posed by two such methods: Quarantines and Lockdowns.

Quarantine

Quarantine, during a pandemic or an epidemic, refers to the separation of people who are not ill but may have been exposed to the disease, so that their symptoms can be monitored and cases detected early. Quarantine forms a critical part of the public health response to an epidemic since it can delay the introduction of a disease to a country or a region, providing

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[25].“Digital Contact Tracing for Pandemic Response: Ethics and Governance Guidance”, Kahn, J. and Johns Hopkins Project on Ethics and Governance of Digital Contact Tracing Technologies, (2020), https://muse.jhu.edu/book/75831

[26] Dipayan Ghosh, Adrien Abecassis & Jack Loveridge. “Privacy and the Pandemic: Time for a Digital Bill of Rights”, Foreign Policy, April 20, 2020.
https://foreignpolicy.com/2020/04/20/coronavirus-pandemic-privacy-digital-rights-democracy/ ; see also Lilian Edwards, Michael Veale, Orla Lynskey, Rachel Coldicutt, Nóra Loideain, Frederike Kaltheuner, Marion Oswald, Rossana Ducato, Burkhard Schafer, Elizabeth Renieris, Aileen McHarg & Elettra Bietti “The Coronavirus (Safeguards) Bill 2020: Proposed protections for digital interventions and in relation to immunity certificates”, (2020), https://osf.io/preprints/lawarxiv/yc6xu/

valuable time for health systems to prepare and expand capacity. Quarantine is different from isolation, which is the separation of ill or infected people from others to prevent the spread of infection or contamination.[27]

Even though quarantining involves significant interference with individual rights, the members of the United Nations retain the rights, in accordance with the Charter of the United Nations and the principles of international law, to place certain restrictions on the movement of individuals in pursuit of their health policies.[28] Countries around the world have deployed quarantine enforcement measures of varying degrees of technological sophistication. In Hong Kong, authorities require the use of a wristband and an app that employs geofencing technology to detect movement beyond a defined perimeter.[29] South Korea monitors its citizens under quarantine with a GPS enabled app.[30] However, in addition to placing a burden on privacy and the fundamental rights of people, these quarantine enforcement measures can discourage people from disclosing their symptoms and getting tested if they are afraid of the consequences.[31]

Lockdowns

A widespread response to COVID-19 has been lockdowns of affected villages, cities, states, and often whole countries. Unlike quarantines, which limit the movements of the (potentially) exposed, lockdowns apply to all citizens living within a certain geographical area. The severity of lockdowns has varied by government - some have imposed total curfew, while others have allowed citizens to go out to access essential services such as food and other needs. There is evidence to show that lockdowns may help curb the spread of infections - for example, a study in *Nature* by a team from the University of California, Berkeley, claimed that policies such as closing businesses and schools, limiting travel, and shelter-in-place orders, helped ward off over 500 million infections across six major

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[27] "Considerations for quarantine of individuals in the context of containment for coronavirus disease (COVID-19)", World Health Organization, March 19, 2020,
https://www.who.int/publications-detail/considerations-for-quarantine-of-individuals-in-the-context-of-containment-for-coronavirus-disease-(covid-19)

[28] "We are all in this Together: Human Rights and COVID-19", United Nations, 23 Apr, 2020,
https://www.un.org/en/un-coronavirus-communications-team/we-are-all-together-human-rights-and-covid-19-response-and

[29] Mary Hui, "Hong Kong is using tracker wristbands to geofence people under coronavirus quarantine", Quartz, 20 Mar, 2020,
https://qz.com/1822215/hong-kong-uses-tracking-wristbands-for-coronavirus-quarantine/

[30] Max S. Kim,"South Korea is watching quarantined citizens with a smartphone app". MIT Technology Review, 6 Mar, 2020,
https://www.technologyreview.com/s/615329/coronavirus-south-korea-smartphone-app-quarantine/

[31] Adam Schwartz, "COVID-19 Patients' Right to Privacy Against Quarantine Surveillance", Electronic Frontier Foundation, 20 May, 2020,
https://www.eff.org/deeplinks/2020/05/covid-19-patients-right-privacy-against-quarantine-surveillance.

countries.[32] To combat infectious diseases, people need to stay as far from one another as possible.

Lockdowns, however, have serious opportunity costs. One of the most calamitous has been the effect on the work and livelihoods of many. While those who work in jobs that can be done remotely were able to transition to working from home, many of those employed in physically based jobs found themselves unable to go to work. This led to serious losses of income, and unemployment in the worst cases. For those who work daily wage jobs, where one is paid by day for work, the impact has been particularly devastating.[33] These effects are exacerbated in the developing world. Many Global South nations do not have the budget to spend on economic bailout packages.[34]

Policymakers, therefore, need to balance the importance of preventing infections from spreading with other costs, and these decisions will vary with context.

Key Takeaways

- Governments should prepare for the economic fallout of lockdowns. Policy making needs to center and provide safety nets for those who are most vulnerable (e.g. those who work physically based jobs, are in informal employment).
- The government should clearly communicate the purpose and procedures of quarantine to the general public to reduce fear of the quarantine process.
- If digital technologies are being used to monitor individuals in quarantine, legal mechanisms (if they do not exist already) should be put in place to ensure that these technologies are used only for the purpose of monitoring quarantine, and will cease to be used after the relevant individuals' quarantine periods are over.

Conclusion

Policy making often involves trade-offs between the needs of different actors. How these trade-offs are managed is particularly vital during crises such as pandemics, where both life and health hang in the balance. This briefing paper serves as a primer for some of the key conflicts policymakers may face during a pandemic. These conflicts need to be accounted for so that policy making is holistic, inclusive, and minimizes the damage inflicted by pandemics to the greatest extent possible.

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[32]Edward Lempinen, "Emergency COVID-19 measures prevented more than 500 million infections, study finds", UC Berkeley, June 8, 2020, https://news.berkeley.edu/2020/06/08/emergency-covid-19-measures-prevented-more-than-500-million-infections-study-finds/

[33] Rohan Samarajiva, "Curtailing liberty", Daily FT, April 28, 2020, http://www.ft.lk/columns/Curtailing-liberty/4-699335

[34] "The coronavirus could devastate poor countries", The Economist, March 26, 2020, https://www.economist.com/leaders/2020/03/26/the-coronavirus-could-devastate-poor-countries