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Variation in government responses to COVID-19

BSG-WP-2020/032

Version 14.1

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This working paper is updated frequently. Check for most recent version here: www.bsg.ox.ac.uk/covidtracker
The most up-to-date version of technical documentation will always be found on the project's GitHub repo: www.github.com/OxCGRT/covid-policy-tracker

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Abstract: COVID-19 has prompted a wide range of responses from governments around the world. There is a pressing need for up-to-date policy information as these responses proliferate, so that researchers, policymakers, and the public can evaluate how best to address COVID-19. We introduce the Oxford COVID-19 Government Response Tracker (OxCGRT), providing a systematic way to track government responses to COVID-19 across countries and sub-national jurisdictions over time. We combine this data into a series of novel indices that aggregate various measures of government responses. These indices are used to describe variation in government responses, explore whether the government response affects the rate of infection, and identify correlates of more or less intense responses. Since 2021, most governments have applied differentiated policies to the vaccinated and non-vaccinated people. Our latest datasets track this differentiation.

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1. Introduction

The rapid spread of COVID-19 globally has created a wide range of responses from governments. Common measures include school closings, travel restrictions, bans on public gatherings, emergency investments in healthcare facilities, new forms of social welfare provision, contact tracing, vaccination campaigns, and other interventions to contain the spread of the virus, augment health systems, and manage the economic consequences of these actions. However, governments have varied substantially—both across countries, and often within countries—in the measures that they have adopted and how quickly they have adopted them. This variation has created debate as policymakers and publics deliberate over the level of response that should be pursued and how quickly to implement them or roll them back, and as public health experts learn in real time the measures that are more or less effective.

The Oxford COVID-19 Government Response Tracker (OxCGRT) provides a systematic cross-national, cross-temporal measure to understand how government responses have evolved over the full period of the disease's spread. The project tracks governments' policies and interventions across a standardised series of indicators and creates a suite of composite indices to measure the extent of these responses. Data is collected and updated in real time by a team of over one hundred Oxford students, alumni and staff, and project partners.

This working paper briefly describes the data OxCGRT collects and presents some basic measures of variation across governments. It will be updated regularly as the pandemic and governments' responses evolve, and as the technical specifications of the database evolve. However, for the most current and up-to-date technical documentation, please refer to our GitHub repository.[1]

2. Latest additions to the OxCGRT dataset

In order to ensure that our dataset continues to be of value and benefit to the many researchers, governments and public who use it, we continue to adapt and fine-tune our measurements, indicators and indices. With the rapid development and deployment of COVID-19 vaccines, and keeping in line with our goal of collating COVID-19 policy data, we have made four key changes to the database in 2022:

1. Record differentiated policies of vaccinated and non-vaccinated people across ten indicators: C1-8, H6, and H8
2. Add four new vaccination policy indicators to the OxCGRT dataset
3. Published subnational data for India and Australia

[1] https://github.com/OxCGRT/covid-policy-tracker

4. Retired fiscal indicators E3, E4, and H4

1. Differentiated vaccination policy coding

We have published new datasets containing this new differentiated coding based on vaccination status. These data are available on our Github, along with the codebook, interpretation guide, methodology, and summary of changes to detail these changes[2].

Ten of our indicators are now split into separate variables for non-vaccinated (NV) people and vaccinated (V) people where policies differ between these groups. Here we refer to this as a 'differentiated policy'. We define differentiated policies to mean policies where vaccinated people can access greater freedoms due to their vaccination status, and are subject to less stringent restrictions.

Our latest csvs publish differentiated policies in place due to vaccination status, for ten indicators (C1-8, H6, and H8). This reports the policies either applying to everyone (E), or the policies in place for vaccinated people (V), and for non-vaccinated people (NV).

Accordingly, the Containment and Health, Government Response and Stringency Indices are now published with four different versions of each index:

1. Non-vaccinated index (the policies that apply to non-vaccinated people)
2. Vaccinated index (the policies that apply to vaccinated people)
3. Simple average index (arithmetic mean of Vaccinated + Non-vaccinated / 2)
4. Population-weighted average index (weighted by the proportion of population fully vaccinated)

2. Vaccination policy indicators

The V1-4 indicators focus on 53 different groups- by occupation, risk status, and age group.

V1 – Vaccine prioritisation is a categorical indicator that captures eligible and prioritised groups of people (e.g. profession, age, vulnerability, etc.), and shows the order in which these groups are prioritised for vaccines by their country/region/territory (*de jure* policy). **V2 – Vaccine eligibility/availability** (also a categorical indicator) is linked to V1, and indicates which of the prioritised groups are actually eligible to receive the vaccine (de jure policy) and are actively being vaccinated at that time (*de facto* policy) . Unplanned categories can be added to V2 that were not captured or accounted for in V1. **V3 – Vaccine financial support** captures information on whether

[2] https://github.com/OxCGRT/covid-policy-tracker/documentation

vaccines are government funded, or otherwise, in an ordinal scale for each category in V2 that is receiving vaccines. **V4- Mandatory Vaccination** is a binary indicator which reports the existence of a requirement to be vaccinated for a group of people.

Data for the new vaccine policy indicators are available for the national dataset.

Current vaccine policy data for V1-4 can be found on our GitHub repository[3] in the following formats:

- Raw- OxCGRT_vaccines_full.csv[4]
- Summary- The main OxCGRT data files contain summary indicators for V1-4[5], highlighting the presence of prioritisation plans, different groups being vaccinated (healthcare staff, education sector, frontline workers), the cost of vaccination to the individual, and the presence of mandatory vaccination

We have also added two new categories to the four vaccine policy indicators in 2022: Government Officials, and Refugees/Migrants.

3. India and Australia subnational data

We are also pleased to announce the addition of sub-national data for both India and Australia. For India, this includes Containment and Health indicators for all sub-national levels of administration, i.e. the 28 Indian states and 8 Union Territories of India. For Australia, this data covers 8 States and Territories of Australia, the national government of Australia and 14 city level regions.

4. Fiscal indicators

We have stopped updating data on our E3, E4, and H4 fiscal indicators. The data for these indicators will still be present in the CSV files, but they are not being actively updated beyond August 2021. We plan to actively update the H5 fiscal indicator (government investment in vaccine research).

3. Data and measurement

OxCGRT reports publicly available information on 21 indicators and a miscellaneous notes field (see Table 1) of government response organised into five groups:

[3] https://github.com/OxCGRT/covid-policy-tracker
[4] https://github.com/OxCGRT/covid-policy-tracker/blob/master/data/OxCGRT_vaccines_full.csv
[5] https://github.com/OxCGRT/covid-policy-tracker/blob/master/documentation/codebook.md

- C - containment and closure policies
- E - economic policies
- H - health system policies
- V - vaccination policies
- M - miscellaneous policies

The indicators are of four types:

- **Ordinal**: These indicators measure policies on a simple scale of severity / intensity. These indicators are reported for each day a policy is in place.
    - Many have a further flag to note if they are "targeted", applying only to a sub-region of a jurisdiction, or a specific sector; or "general", applying throughout that jurisdiction or across the economy. (Note, the flag for indicators E1 and H7 means something different.)
- **Numeric**: These indicators measure a specific number, typically the value in USD. These indicators are only reported on the day they are announced.
- **Text**: This is a "free response" indicator that records other information of interest.
- **Categorical:** These indicators have a range of eligible categories to select, and in some instances, rank (i.e. vaccine prioritisation/eligibility policies).
- **Binary:** This measures the presence (1) or absence (0) of a requirement to be vaccinated for certain groups

All observations also have a "notes" cell that reports sources and comments to justify and substantiate the designation.

Table 1: OxCGRT Indicators
(See appendix for detailed descriptions and coding information.)

ID	Name	Type	Targeted/ General?	Differentiation based on vaccination status?
Containment and Closure				
C1	School closing	Ordinal	Geographic	Yes
C2	Workplace closing	Ordinal	Geographic	Yes
C3	Cancel public events	Ordinal	Geographic	Yes
C4	Restrictions on gathering size	Ordinal	Geographic	Yes

C5	Close public transport	Ordinal	Geographic	Yes
C6	Stay at home requirements	Ordinal	Geographic	Yes
C7	Restrictions on internal movement	Ordinal	Geographic	Yes
C8	Restrictions on international travel	Ordinal	No	Yes
Economic Response				
E1	Income support	Ordinal	Sectoral	No
E2	Debt/contract relief for households	Ordinal	No	No
~~E3~~	~~Fiscal measures~~	~~Numeric~~	~~No~~	~~-~~
~~E4~~	~~Giving international support~~	~~Numeric~~	~~No~~	~~-~~
Health Systems				
H1	Public information campaign	Ordinal	Geographic	No
H2	Testing policy	Ordinal	No	No
H3	Contact tracing	Ordinal	No	No
~~H4~~	~~Emergency investment in healthcare~~	~~Numeric~~	~~No~~	~~-~~
H5	Investment in Covid-19 vaccines	Numeric	No	No
H6	Facial coverings	Ordinal	Geographic	Yes
H7	Vaccination Policy	Ordinal	Cost	No
H8	Protection of elderly people	Ordinal	Geographic	Yes
Vaccine Policies				
V1	Vaccine prioritisation	Categorical	No	No
V2	Vaccine eligibility/availability	Categorical	No	No
V3	Vaccine financial support	Categorical	No	No

V4	Mandatory vaccination	Binary	No	No
Miscellaneous				
M1	Other responses	Text	No	n/a

Data is collected from publicly available sources such as news articles and government press releases and briefings. These are identified via internet searches by a team of over one hundred Oxford University students and staff. OxCGRT records the original source material so that coding can be checked and substantiated.

All OxCGRT data is available under the Creative Commons Attribution CC BY standard.

OxCGRT has added new indicators and refined old indicators as the pandemic has evolved.[6] Future iterations may include further indicators or more nuanced versions of existing indicators.

4. Relation between national and sub-national data

OxCGRT includes data for nearly all countries, territories, and regions in the world.[7] It also includes subnational-level data for selected countries, currently Brazil[8] (all states, the Federal District, state capitals and the next largest city that is not geographically connected to the state capital), the United States[9] (all states plus Washington, DC and a number of territories), Canada[10] (all provinces and territories), the United Kingdom[11] (the four devolved nations), China (all provincial level administrations), India (all states and union territories), and Australia (all states and territories).

OxCGRT data are typically used in three ways. First, and primarily, to describe all government responses relevant to a given jurisdiction. Second, less commonly, to describe policies put in place by a given level and lower levels of government. And third, they are used to compare government responses across different levels of government. To distinguish between these uses, different published versions of OxCGRT data are tagged in the database.

[6] For a description of these changes, see this link.
[7] The designations employed and the presentation of the material do not imply the expression of any opinion whatsoever on the part of OxCGRT concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. We code the policies of the de facto controlling authority of a jurisdiction without prejudice to conflicting authority claims.
[8] https://www.bsg.ox.ac.uk/research/publications/brazils-fight-against-covid-19-risk-policies-and-behaviours
[9] https://www.bsg.ox.ac.uk/research/publications/variation-us-states-responses-covid-19
[10] https://www.bsg.ox.ac.uk/research/publications/variation-canadian-provincial-and-territorial-responses-covid-19
[11] https://www.bsg.ox.ac.uk/research/publications/variation-response-covid-19-across-four-nations-united-kingdom

In the main dataset, all observations are tagged with a _TOTAL suffix as they simply represent the total package of policies that apply to residents in that jurisdiction. For example, observations labelled "BRA NAT_TOTAL" describe Brazil as a whole.

The jurisdiction label "WIDE" refers to policies put in place by a given level and lower levels of government. "WIDE" observations therefore do not incorporate general policies from higher levels of government that may supersede local policies. For example, if a country has an international travel restriction that applies country-wide, this would not be registered. Continuing to examine the case of Brazil, the data recorded for "BR_SC STATE_WIDE" would include any policies made by the state government of Santa Catarina in Brazil plus policies from municipal governments (e.g. cities) within Santa Catarina, but not policies from the Brazilian federal government.

The jurisdiction label "GOV", indicates that observations include only policies instigated by a particular level of government; higher- or lower-level jurisdictions do not inform this coding.

As noted, in the main OxCGRT dataset, we show the total set of policies that apply to a given jurisdiction: TOTAL. Specifically, in the main dataset, this means that we replace subnational-level responses with relevant national government (NAT_GOV) indicators when the following two conditions are met:

- The corresponding NAT_GOV indicator is general, not targeted, and therefore is applied across the whole country
- The corresponding NAT_GOV indicator is equal to or greater than the STATE_WIDE or STATE_GOV indicator on the ordinal scale for that indicator

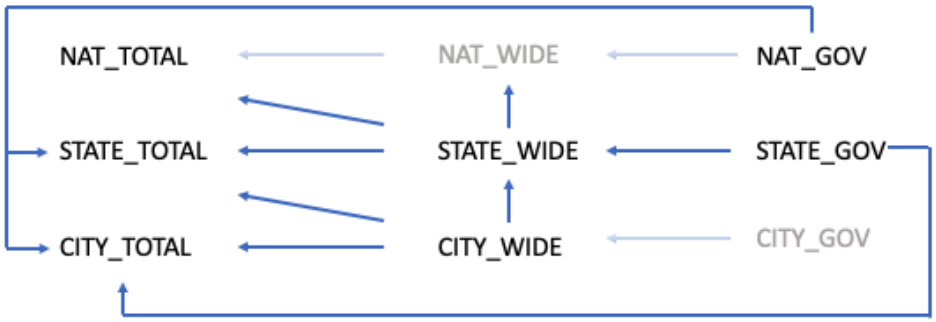
In this way, NAT_TOTAL and STATE_TOTAL measures in the core dataset are comparable, in that they show the totality of policies in effect within a given jurisdiction.

Note that STATE_WIDE observations at the subnational level, which code the totality of policies at a given level of government and its sub-levels, also capture policies that the national government may specifically target at a subnational jurisdiction. This is the case, for example, if a national government orders events to close in a particular city experiencing an outbreak. These kinds of policies are not inferred from NAT_GOV but coded directly at the sub-national level.

The logical relationships between TOTAL, WIDE, and GOV observations are summarised in Figure 1, below. From right to left, GOV observations describe only the responses a given level of government takes, and so are not informed by any other types or levels of observations. WIDE observations, which capture all policies at a given level of government and its sub-components, are informed by GOV observations at the same

level and WIDE observations at lower levels, with the latter registering as targeted policies (T). TOTAL observations, in turn, capture all policies that apply to a given level of government. As such, they are informed by both GOV and WIDE observations, and by higher and lower levels of government. Lower level TOTAL observations register as targeted policies in higher level TOTAL observations (T), and higher level TOTAL observations only apply to lower level TOTAL observations if they are general (G). Note that CITY_GOV and NAT_WIDE are not typically used, since these are functionally equivalent to CITY_WIDE and NAT_TOTAL, given that we do not consider units below city level or above national level.

Figure 1: Relationship between TOTAL, WIDE, and GOV observations for different levels of government



On GitHub our data is published across four different repositories, with our master repository containing NAT_TOTAL and STATE_TOTAL for all jurisdictions:

1. Master repository[12]: NAT_TOTAL for all countries and STATE_TOTAL for Australia, Brazil, US, Canada, UK, India and China
2. USA[13]: NAT_GOV and STATE_WIDE
3. Brazil[14]: NAT_TOTAL, NAT_GOV, STATE_TOTAL, STATE_WIDE, STATE_GOV, CITY_TOTAL, and CITY_WIDE (which in Brazil is equal to CITY_GOV)
4. Australia[15]: NAT_TOTAL, NAT_GOV, STATE_TOTAL, and CITY_WIDE

Table 2: Currently available OxCGRT data across different levels of government and types of observations

[12] https://github.com/OxCGRT/covid-policy-tracker
[13] https://github.com/OxCGRT/USA-covid-policy
[14] https://github.com/OxCGRT/Brazil-covid-policy
[15] https://github.com/OxCGRT/Australia-covid-policy

	TOTAL[16]	WIDE	GOV
National	187+ countries	N/A[17]	● USA federal ● Brazilian federal ● Canada federal ● UK central ● China central ● Australian federal
State/ province	● USA: 50 states & Washington DC ● Brazil: 26 states & Federal District ● UK: 4 devolved nations ● Canada: 13 provinces/territories ● China: 31 provinces ● Australia: 8 states/territories ● India: 28 states & 8 union territories	● USA: 50 states & Washington DC ● Brazil: 26 states & Federal District ● Australia: 8 states/territories	● Brazil: 26 states & Federal District ● Australia: 8 states/territories
City	● Brazil: 27 state capital cities and 27 second cities ● Australia: 7 state/territory capital cities and 7 rest of states and territories	● Brazil: 26 state capital cities, Brasilia, and 26 second cities ● Australia: 7 state and territory capital cities and 7 rest of states and territories	N/A[18]

5. Policy indices of COVID-19 government responses

Governments' responses to COVID-19 exhibit significant nuance and heterogeneity. Consider, for example, C1, school closing: in some places, all schools have been shut; in other places, universities closed on a different timescale than primary schools; in other places still, schools remain open only for the children of essential workers. Moreover, like any policy intervention, their effect is likely to be highly contingent on local political and

[16] This _TOTAL dataset is hand-coded at the national level, and at other subnational levels (ie. STATE_TOTAL and CITY_TOTAL) it combines the other datasets to report the overall policy settings that apply to residents within the jurisdictions.

[17] NAT_WIDE does not exist. The "WIDE" label refers to data that ignores policies implemented by higher levels of government (eg. reporting policies that apply to a state without including federal government policies). There are no higher levels of government above National, so any NAT_WIDE record would simply duplicate NAT_TOTAL.

[18] In practice, we would not record CITY_GOV. The data recorded as CITY_WIDE would include only decisions made by city governments and any lower level governments (if they existed), while ignoring policies from state and national governments.

social contexts. These issues create substantial measurement difficulties when seeking to compare national responses in a systematic way.

Composite measures – which combine different indicators into a general index – inevitably abstract away from these nuances. This approach brings both strengths and limitations. Helpfully, cross-national measures allow for systematic comparisons across countries. By measuring a range of indicators, they mitigate the possibility that any one indicator may be over- or mis-interpreted. However, composite measures also leave out much important information, and make strong assumptions about what kinds of information "counts." If the information left out is systematically correlated with the outcomes of interest, or systematically under- or overvalued compared to other indicators, such composite indices may introduce measurement bias.

Broadly, there are three common ways to create a composite index: a simple additive or multiplicative index that aggregates the indicators, potentially weighting some; Principal Component Analysis (PCA), which weights individual indicators by how much additional variation they explain compared to the others; Principal Factor Analysis (PFA), which seeks to measure an underlying unobservable factor by how much it influences the observable indicators.
Each approach has advantages and disadvantages for different research questions. In this paper we rely on simple, additive unweighted indices as the baseline measure because this approach is most transparent and easiest to interpret. PCA and PFA approaches can be used as robustness checks.

This information is aggregated into a series of four policy indices, with their composition described in the appendix:

- Government Response Index (GRI)
- Stringency Index (SI)
- Containment and Health Index (CHI)
- Economic Support Index (ESI)

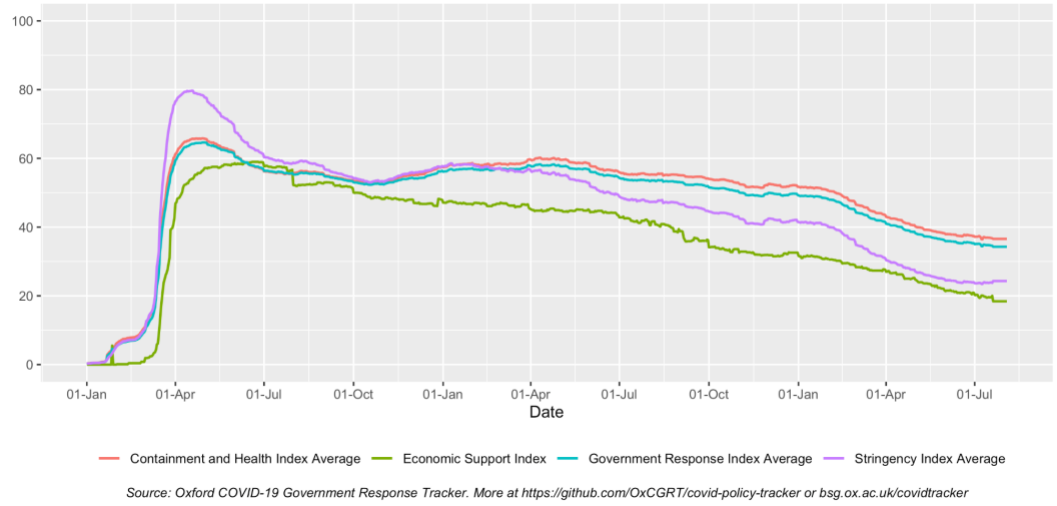
In the new differentiated coding csv[19], we publish four values for the GRI, SI, and CHI: non-vaccinated, vaccinated, simple average, and weighted average, as described in the section "Calculation of policy indices" in the appendix.

Each index is composed of a series of individual policy response indicators. For each indicator, we create a score by taking the ordinal value and subtracting an extra half-point if the policy is general rather than targeted, if applicable. We then rescale each of these by their maximum value to create a score between 0 and 100, with a missing value contributing 0.[20] These scores are then averaged to get the composite indices (Figure 1).

[19] https://github.com/OxCGRT/covid-policy-tracker/data
[20] We use a conservative assumption to calculate the indices. Where data for one of the component indicators are missing, they contribute "0" to the Index. An alternative assumption would be to not count missing indicators in the score,

Importantly, the indices should not be interpreted as a measure of the appropriateness or effectiveness of a government's response. They do not provide information on how well policies are enforced, nor does it capture demographic or cultural characteristics that may affect the spread of COVID-19. Furthermore, they are not comprehensive measures of policy. They only reflect the indicators measured by the OxCGRT (see Table 1), and thus will miss important aspects of a government response. For instance, the "economic support index" does not include support to firms or businesses, and does not take into account the total fiscal value of economic support. The value and purpose of the indices is instead to allow for efficient and simple cross-national comparisons of government interventions. Any analysis of a specific country should be done on the basis of the underlying policy, not on an index alone.

Figure 2: Global mean index values for over 180 countries over time



6. Variation in government responses

Early responses

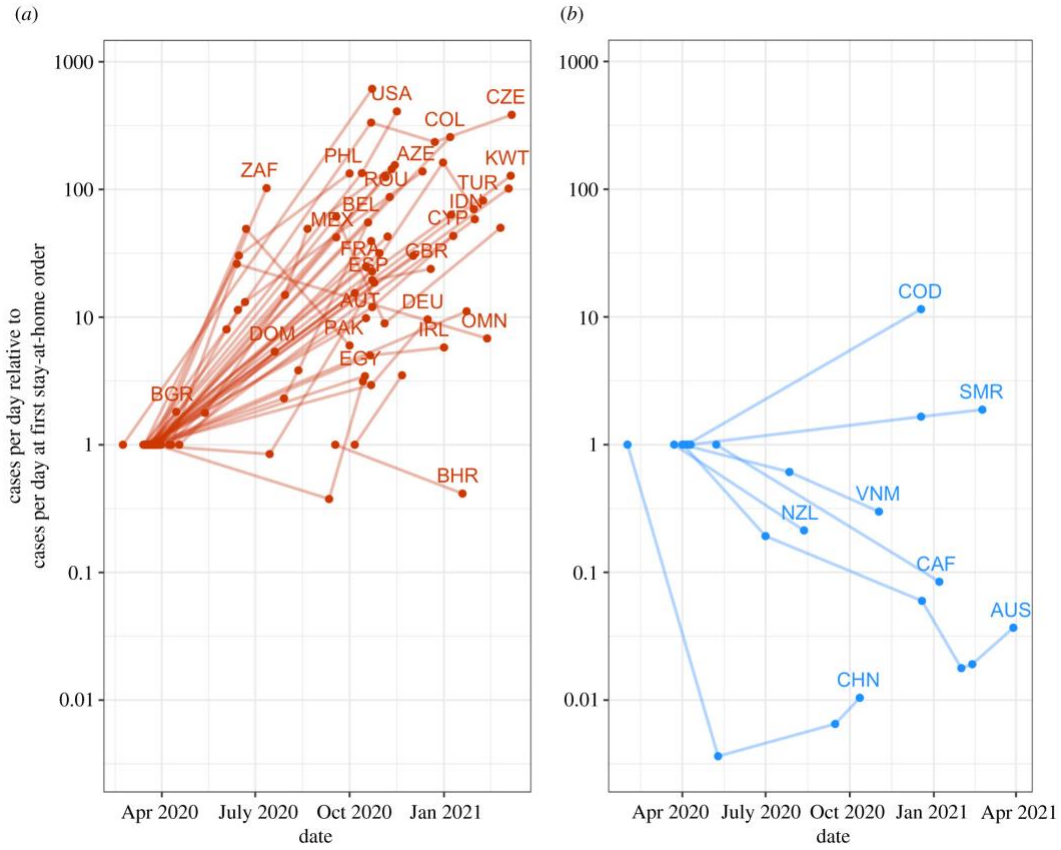
After the initial restrictions in March/April 2020 (Figure 2), we observed much more variation in governments' approaches, as many countries began to ease their restrictions going into the Northern hemisphere summer. A key distinction emerged between two groups of countries. So-called "zero Covid" countries sought to suppress or even eliminate COVID-19 through strict lockdowns, and then keep it at bay via stringent travel controls. When new outbreaks began, strict controls were quickly put in

essentially assuming they are equal to the mean of the indicators for which we have data for. Our conservative approach therefore "punishes" countries for which less information is available, but also avoids the risk of over-generalizing from limited information.

place to suppress them. For many of these countries we observe an increasing sensitivity to case numbers over 2020 and early-2021 (see panel b of Figure 3), where governments introduce stay-at-home orders at progressively lower and lower transmission rates. This approach was particularly common in the East Asia and Pacific region, and typically was accompanied by rigorous testing and contract tracing. Many of these countries – if not all them – eventually abandoned this approach in part due to the Omicron variant's higher transmissibility.

A second approach, more common in Europe, Africa, and the Americas, sought to reduce but not eliminate the spread of COVID-19 while attempting to maintain openness. Restrictions were ramped up and down as waves of infection occurred. In these countries, we observe a decreasing sensitivity to transmission rates – policymakers choose to "wait longer" during a wave before enacting a new stay-at-home order, resulting in subsequent stay-at-home orders being implemented at progressively higher case levels.

Figure 3. Across 2020 and the first delta wave into 2021, countries fall into two general categories regarding their choice to implement stay-at-home orders at different levels of daily confirmed COVID-19

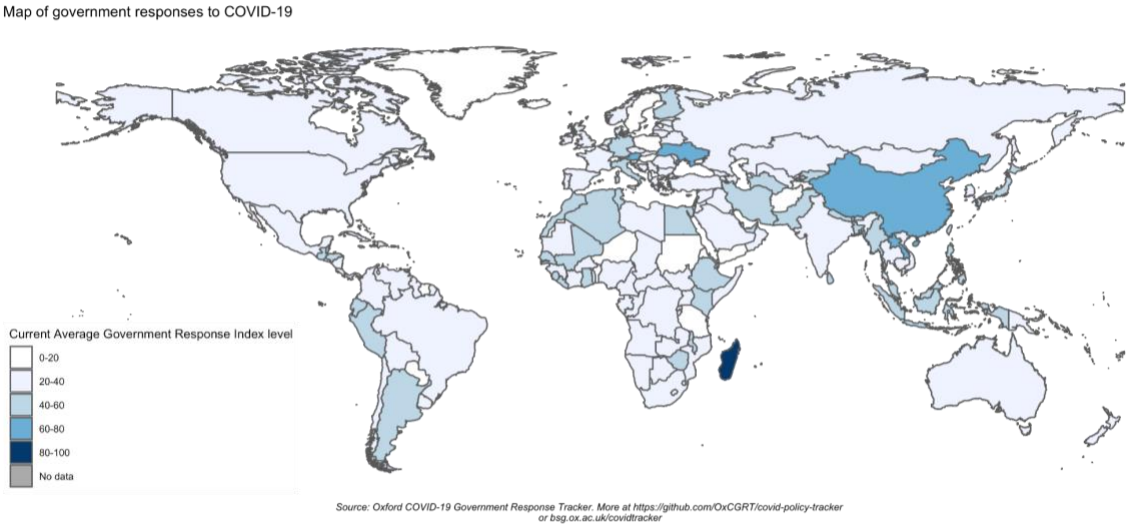


Note: each country is represented by a line connecting multiple dots, where each dot is the beginning of a new stay-at-home order. The position on the *y*-axis is the number of confirmed cases per day relative to the number of cases per day when that country implemented their first stay-at-home order. (*a*) Countries that have averaged more than 100 new cases reported per day since April 2020; (*b*) countries that have averaged 100 cases or fewer per day. Countries are only included if they implemented more than one stay-at-home order and had local community transmission (greater than 10 new cases per day) when they first implemented a stay-at-home order. **Source:** Phillips T., Zhang Y. & Petherick A. (2021) 'A year of living distantly: global trends in the use of stay-at-home orders over the first 12 months of the COVID-19 pandemic', *Royal Society Interface Focus*, 11: 20210041.

Long-term response (late 2022)

We currently observe a steady and consistent drop in average government response levels throughout 2022 – as shown in Figure 2 above. There is still, however, some variation remaining across countries. Figure 4 presents the Government Response Index in each country in August 2022.

Figure 4: COVID-19 Government Response Index by country, 05 August 2022



Vaccine rollout and differentiated policies

Vaccine rollout

In the second year of the pandemic, vaccines became an increasingly important layer of defence against COVID-19, following the remarkably fast development and, at least for some countries, deployment of effective vaccines. However, stark inequalities in vaccination remain.

Overall, we have seen government policies toward vaccination shift from prioritisation, to encouragement, to incentivisation, and, in some cases, to mandates.

As Figure 5 shows, a small number of countries began to make vaccines available to at least one category of their priority groups by the end of 2020. By February 2021 nearly 50% of countries were offering COVID-19 vaccines to at least one priority group, and by June 2021 nearly all were. However, the shift from priority lists to universal availability of COVID-19 vaccines has occurred in much less uniform fashion. Some countries began to provide vaccines to all those over the age of 16/18yrs (dependent on vaccine type) by March 2021, while others struggled to reach universal availability before the end of 2021. In some countries where significant vaccine hesitancy prevented available doses from being utilised, the move to universal availability was much quicker, often within three months of launching a vaccination campaign. Crucially, we observe that since early 2022 Covid vaccines are universally available among more than 90% of the countries.

Figure 5: Percentage of countries adoption vaccine prioritisation

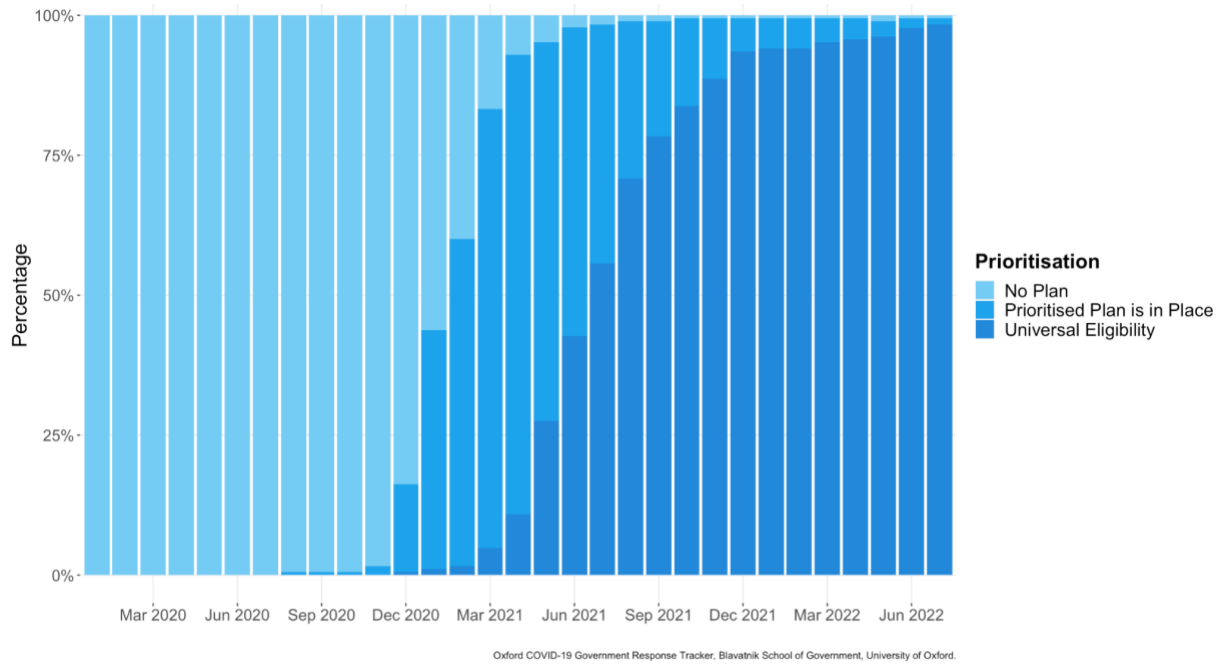
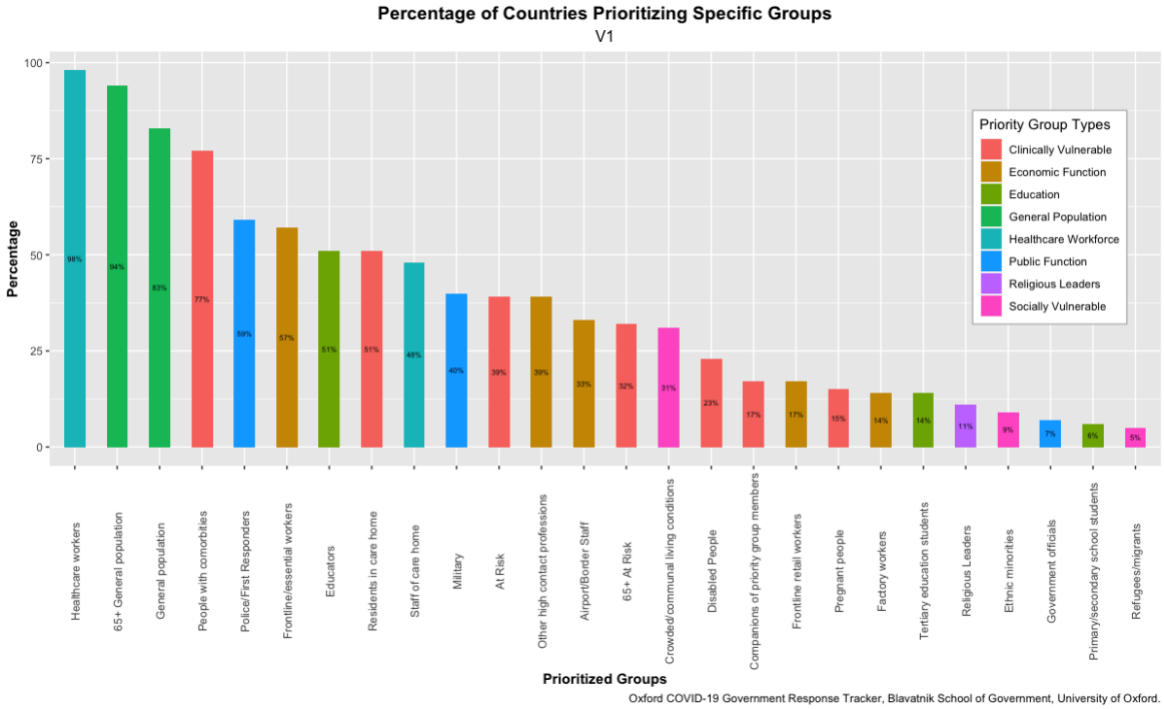


Figure 6 highlights how healthcare workers were by far the most commonly prioritised group, with 98% of the countries including them in their prioritisation list. The next most prioritised groups were the elderly general population, the general adult population at large, and people with comorbidities.

Figure 6. Countries vaccine rollout prioritisation (August 2022)



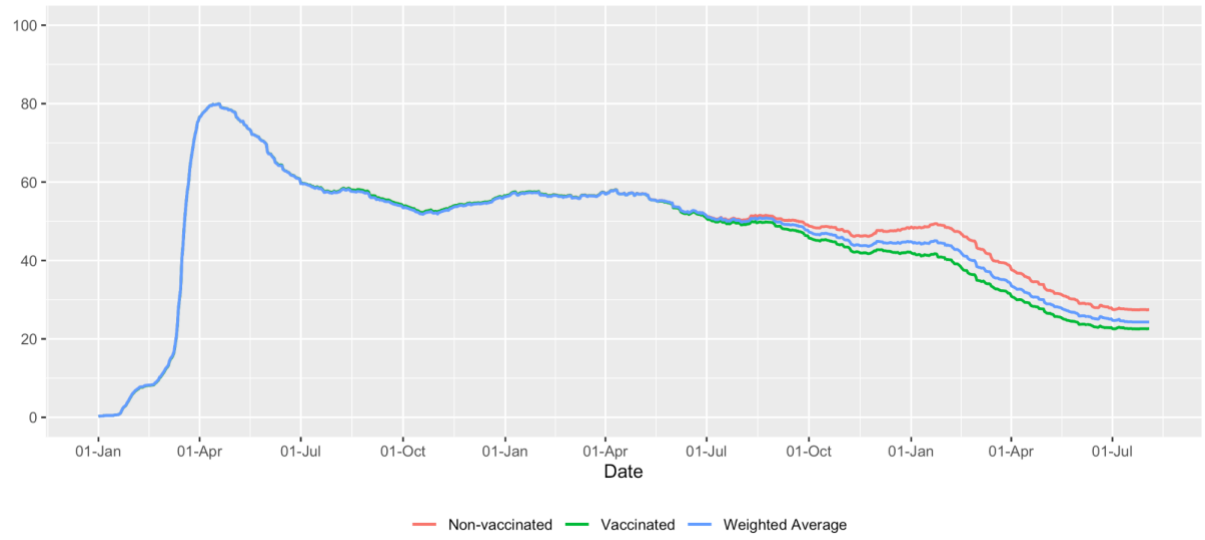
Differentiated policies based on vaccination status

Finally, as countries began to struggle to get a sufficient share of the population vaccinated, they increasingly applied two kinds of policy incentives. First, they began to differentiate restrictions based on people's vaccination status (see Figure 7). These policies focused on restricting access to public life based on vaccination status. Restrictions such as access to shops, public transport and schools would vary between vaccinated and unvaccinated people. For example, Israel introduced their 'Green Pass' in March 2021, enabling greater freedoms for those who had received two COVID-19 vaccinations. As of 8 August 2022, 140 countries have (or had) these types of differentiated restrictions and policies, which shows the prevalence of this kind of approach.

Figure 7. Countries with policies at different levels of restriction based on vaccination status at some point until 8 August 2022

We currently collect 10 indicators that account for differentiated policies for vaccinated and non-vaccinated people: C1-C8, H6, and H8. These differentiated policies can then be used to calculate different versions of our headline indices described above in section 5. Figure 8 displays how stringency, government response, and containment and health indices evolved over time for vaccinated and non-vaccinated people. We observe initial adoptions of differentiated policies in the second half of 2021, the period in which most developed countries had universal availability of vaccines.

Figure 8. Global mean Stringency Index values for vaccinated and non-vaccinated people, across 180 countries over time



Source: Oxford COVID-19 Government Response Tracker. More at https://github.com/OxCGRT/covid-policy-tracker or bsg.ox.ac.uk/covidtracker

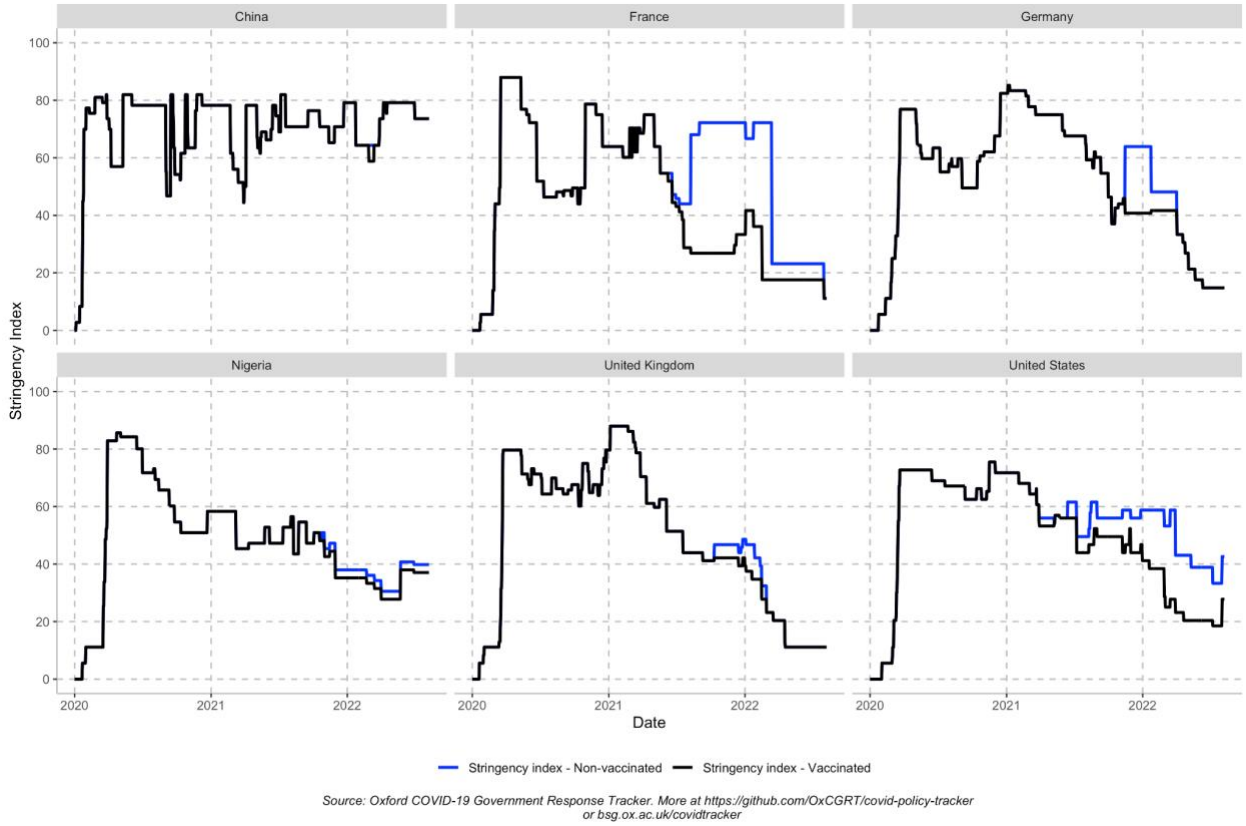
However, though many countries have differentiated policies to some degree (Figure 8), the stringency of restrictions for the non-vaccinated varies widely. In some cases, the values on the Stringency Index (SI) for vaccinated and non-vaccinated are very similar, and in others very different. Overall, in the 140 countries with differentiated policies, the average difference in the Stringency Index for vaccinated and non-vaccinated people in 2022 is 6.92 – which indicates very small differences on average. We observe the most variation between vaccinated and non-vaccinated in policies related to workplace closures (C2), public events (C3), public transport (C6), and internal movement (C7).

In some places non-vaccinated people face substantial restrictions. The example of Austria[21] is particularly notable, where local authorities introduced a stay-at-home order for non-vaccinated people in November 2021. France[22] has the largest difference in Stringency Index value between vaccinated and non-vaccinated people in Europe at the time of writing, with a difference of 51.85 points- as differentiated policies apply to multiple areas of public life. A vaccine pass is required to access inter-regional travel and long-distance public transport, and to visit venues including cinemas, theatres, bars, and some stores. In Germany[23], too, there has been a difference of 50 points in Stringency Index value. Their vaccine pass rules limit access rights based on vaccination, recovery, or PCR test status, for access to cultural and leisure facilities, retail, buses and trains, and long-term care facilities. Armed police in Uganda[24] are reported to have removed unvaccinated bus travellers to vaccinate them before

[21] https://www.bbc.co.uk/news/world-europe-59283128
[22] https://web.archive.org/web/20220210095345/https://www.gouvernement.fr/info-coronavirus/pass-vaccinal
[23] https://web.archive.org/web/20220126181506/https://www.bundesregierung.de/breg-de/themen/coronavirus/corona-regeln-und-einschrankungen-1734724
[24] https://www.wsj.com/articles/in-some-african-nations-armed-police-enforce-covid-19-vaccinations-11646056306

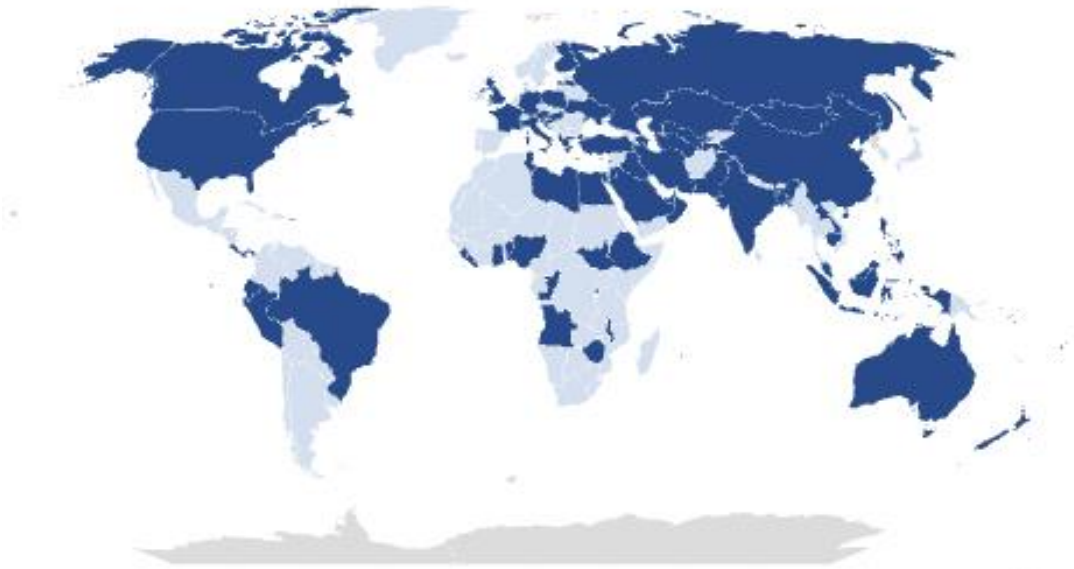
continuing, highlighting stringent approaches to enforcement for those without vaccination evidence.

Figure 9. Difference in Stringency Index between vaccinated and non-vaccinated people in six countries



The second policy incentive governments have introduced is mandating that certain categories of people, or sometimes whole populations, get vaccinated. 75 countries (in our dataset) have employed such policies to date (see Figure 10).

Figure 10. Countries with vaccine mandates at some point until 8 August 2022



The breadth of vaccine mandates varies widely. Countries including Indonesia, Tajikistan and Turkmenistan have had very wide-reaching mandates, having made vaccination mandatory for the entire adult population. Ecuador has mandated vaccination for all those over the age of 5, and Puerto Rico requires those over 5 to be vaccinated to attend school. Costa Rica mandates all children between 3 and 18 years be vaccinated. In the majority of places mandating vaccination - such as Poland, Pakistan, New Zealand, and Saudi Arabia - these policies tend to be targeted to selected groups based on occupation or clinical risk, with the most commonly mandated categories being government officials and public sector workers, healthcare workers, and teachers.

7. Conclusion

As governments continue to respond to COVID-19, it is imperative to study what measures are effective and which are not. While the data presented here do, of course, not measure effectiveness directly, they can be useful input to studies that analyse factors affecting disease progression. OxCGRT seeks to contribute to this knowledge gap by providing comparable measures of individual policy actions, as well as several comparable aggregate indices. We find significant variation in both the measures that governments adopt and when they adopt them. Going forward, governments will benefit from adopting an evidence-based approach to the measures they deploy.

OxCGRT will continue to evolve over the coming months as the pandemic progresses. We envision not only updating the data on a regular basis, but also refining and improving the indicators we record for each country. The most up-to-date technical documentation can always be found on our GitHub repository.[25]

It is our hope that scholars, medical professionals, policymakers, and concerned citizens will make use of the OxCGRT data to enhance all countries' responses to the COVID-19 pandemic. We welcome constructive feedback and collaboration on this project as it evolves.

[25] https://github.com/OxCGRT/covid-policy-tracker

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Zara Raheem	Yanshi
Morgan Grobin	Xutong Li
Viviane de Assis Ignacio	Anqi Tang
Scott Latham	Salome Waweru
Tais Pelinson Gomes da Silva	Momudat Maidoki
Alice Secheresse	Jiaming Ta
Siqi Liu	Zhang Kangning
Hana Dole	Javier Pardo-Diaz
Margie Morrison	Robert Gorwa
Suryodeep Mondal	James Green
Muhammad Ali	Serene Singh
Natasha Priyadarshini	Celso Coelho
Yuwei Wang	Felipe Paiva
Katherine Klemperer	Mark Deakin
Nao Ogura	Caroline Carthy
Isabela Gomes Pereira	Hermann Pais
Mariana Emy Adati	Xema Pathak
Hannah Dawson	Dan Fay
Akeemat Ayinla	Shirley Chen
Stephanie Buhle	Alexsander Silva Farias
Xin-Ci Lum	Giulia Pirolo
Ben Luria	Felipe Dias Gon√ßalves
Alejandrina Cripovich	Shreya Mulukuntla
Jake Lerner	Faroha Khan
Judy Cossins	Maliyah Goka
Joy Carveth	Paresh Chaudhari
Frederic Michaelsen	Kethmi Gamage
Liu Zhang	Ruiqiao Jiang
Zhengyu Zhang	Ailen Di Marzio
Joao Monteiro	Lakis Panteli
Keliang Zeng	Mphatso Kantonya
Ubah Daahir	Kathryn Hok
Atharva Deshmukh	Kate Whyte
Simran Kapoor	Dawit Bekele Tefera
Hartley Dutczak	Emma Thrower
Edson Maia Villela Filho	Jason Thomas
Esther Bosede Ilesanmi	Andy Hu
Qi Qi	Sam Darby

Maximilian Magnacca Sancho	Ashley McNeil
Bethel Zerai Gebremedhin	Amun Nadeem
Bayleigh Jefferson	Shu Wen Ong
Sam Webster	Michelle Park
Twan vanderTogt	Uttara Kudesia
Tiphaine Le Corre	Seorim Park
Anjali Viswamohanan	Niveditha Hari
Tilbe Atav	Viraj Aditya
Marie Mavrikios	Aaron Ni
Thiago William Pereira Barcelos	Akshata Gupta
Chuyun Dai	Bridget Ogbuagu
Mariana Costa Oliveira Morais	Ranithri Patuwathavithane
Fiona Hsu	Abey Blessing
Sasha Roberts	Yihao Sun
Julie Laura Mermet	Clara Calazans Espindola
Hailey Myers	Kiyomi Boyes
Yasmin de Sousa Pinheiro	Isaac Vzquez
Pranav Bhatia	Danlin Liu
Xiaoyue Zhong	Ian Chang
Bernard Lao	Madison Harris
Anna Casey	Shiyao Lu
Francisco Olivero	Arabella Abad
Mattia Casula	Yanina Borzykh
Gleice Kelly Donato Neves	Ilya Zlotnikov
Jin Zhanyu	Zoe Lin
Olena Skrypnikova	Hala Sheikh Al Souk
Leyan Liang	Joseph Ssentongo
Yang Zhao	Delgermaa Munkhgerel
Qinli Lin	Juliana Moura Bueno
Yue Zhang	Andrea Klaric
Maclawrence Famuyiwa	Lucia Soriano Espinel
Marcela Reynoso Jurado	Natsuno Shinagawa
Alfredo Ortega	Ohk SeungCheol
Karoline Becker	Emmanuel Mawuli Abalo
Rushay Naik	Rafael Goldszmidt
Megan McDowell	Lorena Barberia
Will Marshall	Luiz Cantarelli
Hakim Ronaque	Elisabeth Mira Rothweiler
Matilde Stronell	Rhona Rahmani
Paul Anderson	Deborah Palacio do Sacramento
Meskerem Aleka Kebede	Derek Messling
Xinrui Wang	Felipe Natil Martins Moreira
Yishan Yuan	Sze Oh
Lila Klein	Winni Yang

Mariana Resende	Emily Nguyen
Jonathan Chan	Allen Haugh
Rafael Silva	Giovanna Valentim
Grace Xu	Ying Yu
Annika Browne	Vinicius Sanches Pontirolle
Jodie Elms	Beatriz Cristina Rodrigues Silva
Kiitan Bolajoko	Daniela Costanzo de Assis Pereira
Pham Thao Ly Nguyen	Marco Antonio Silva Costa
Augusto Guajardo	Helirya Santiago de Souza
Jinghuan Ma	Vara Anoosha Vijjapu
Jiahao Zhao	Yue (Nicole) Wu
Yujin Kim	Thao Nguyen
Ojonugwa Abubakar	Cindy Chung
Selam Iyasu	George Youssef
Zicheng Mai	Harriet Williams
Sidney Chung	Clemence Verbrugghe
Zejing Wu	Patricia Hernandez
Jiayi Zhang	Mauricio Montelongo Quevedo
Gabrielly Gon√ßalves de Lima Dal Pozzo	Vivek Mynam
	Varun Vivek Bansal
Tatiani Schmitt	Scarlett Harbin-Owens
Laissa Maria da Silva Guimaraes	Varad Dinesh Godase
Niki Ziai	Vian Wagatsuma
Julia Paoli	Inara Bezerra Ferreira de Sousa
Yuyin Yao	Logan Powell
Priyanka Bijlani	Abigale Shettig
Maria Puolakkainen	Zirui Jerry Yao
Nicole Barros	Manya Sinha
Ruwa Mahdi	Marina Tovar
Ulla Mikkelsen	Marina Navarro Montilla
Thomas Stubbs	Xinyu Shi
Matheus Ricardo Goncalves Barbosa	Manasvini Moni
Juliet O'Brien	Finney Israel
Mikafui Dzotsi	Aline Sayuri Konno
Mahita Yerramsetti	Xiuyi Zheng
Andrew Wagner	Avneesh Beejah
Catherine O'Donnell	Sandra Wohlauf
Camila Fernanda Ugaz Rojas	Henok Mulatu Teferi
Enyuan Zhang	Angus Padley
Clarissa Fisher	Adebanwo Kuye
Dhruv Shetty	Camille Bailly
Melissa Leon Pons	Katherine Wang
Isabela Abade Granzieri	Ira Benson
Anika Buch	Charlette Kokoi

Piyasha Chowdhury	Stephanie Poling
Maeve Rolland	Anita Kerubo
Nina Acharya	Riley Ylagan
Sam Aboubacar Coulibaly	Dylan Kruse
Lilian Achieng Owino	Andrew Wong
Emily Huang	Jennice Herrera
Weiyi Zhang	Aviery Boone
Emily Milan	Jennifer Kim
Qi Zhou	Zeyu Zhang
Wenqing Wu	Axel Nurdin
Oluwaseun Odusanwo	Glaucia Grellmann
Sabrina Nanua	Miao Wang
Carla Danielli Fonseca	Shenyue Huang
Hin Yeung	Ikeoluwa Adeniji-Fashola
Alexandre Duponcheele	Ritesh Soule
Xinyi Cui	Maha Baig
Luyang Liu	Yashaswini Gannabathul
Iyone Agboraw	Xinhui Ma
Dane Alivarius	Udit Chauhan
Francesca Lovell-Read	Denise Koller
Sophie Pearlman	Fangda Yu
Hakeem Onasanya	Peihao Xu
Nadine Dogbe	Tzina Xazinah
Zilin Tu	Bernardo Andretti
Denilson Soares Gomes Junior	Yaqub Yousuf
Charlie Newton	Jiaxin Chai
Paul Lawson	Gai Shurui
David McKinnon	Lily McCrohan
Alice Graham	Elinor Tsen
Isabella Borges Avila	Sanjeev Sabhlok
Marcelo Arruda Candido	Louisa-Madeline Singer
Debora Nery Schwartz	Joanna Klimczak
Xingyue	Juhi Kore
Malin Bornemann	Thomas Hale
Callum Ryan	Hyerean Yoo Kang
Maebh Gallagher	Gaia Lisi
Maria Luiza Barreto Cazumba	Nicole Nanci
Daphne Nakawesi	Haiyun Deng
Eera Fatima Bangi	Yizhou Pan
Kala Pham	Katie Tehas
Tamaghn Kasibhatta	Ashton Wagner
Yago Evangelista Tavares de Souza	Anahi Alvarez-Amaro
Weiyi Huang	Maha Al-Areeqi
Morgan Woods	Ziya Utku Karadeniz

Joseph Hudson Du Yanrong Jessica Liana Claire Chiang Thin Pa Pa Hlaing Callum Rodgers Linchen Xie Karolina Helnarska Juan David Gutierrez Manikarnika Dutta Dutta Dang Dao Nguyen Andre Houang Sasidhar Gali Qing Yang Shelly Lim	Yanjun Lu Luiz Philipe de Souza Ferreira Digvijay Uddhav Patil Martina Eleonora Podesta Jueqiong Zhao Kashvi Chandok Muhammad Ali Shah Uma Mani Charlotte Hsu Mai Sugimoto Manav Mutneja Jaykumar Nasra Habane Jack Kendrick

Codebook

This coding scheme is tweaked and revised from time-to-time. Please refer to our GitHub repository for the most up-to-date technical documentation:
https://github.com/OxCGRT/covid-policy-tracker/blob/master/documentation/codebook.md

Closures and containment

ID	Name	Description	Measurement	Coding instructions
C1	C1E_School closing C1NV_School closing C1V_School closing C1M_School closing	Record closings of schools and universities	Ordinal scale + binary for geographic scope	0 - No measures 1 – Recommend closing, or all schools open with alterations resulting in significant differences compared to usual, non-Covid-19 operations 2 - Require closing (only some levels or categories, eg just high school, or just public schools) 3 - Require closing all levels No data - blank 0 - Targeted 1- General No data - blank
C2	C2E_Workplace closing C2NV_Workplace closing C2V_Workplace closing C2M_Workplace closing	Record closings of workplaces	Ordinal scale + binary for geographic scope	0 - No measures 1 - recommend closing (or work from home) 2 - require closing (or work from home) for some sectors or categories of workers 3 - require closing (or work from home) all-but-essential workplaces (e.g. grocery stores, doctors) No data - blank 0 - Targeted 1- General No data - blank
C3	C3E_Cancel public events C3NV_Cancel public events	Record cancelling public events	Ordinal scale + binary for geographic scope	0- No measures 1 - Recommend cancelling 2 - Require cancelling No data - blank 0 - Targeted

	C3V_Cancel public events C3M_Cancel public events			1- General No data - blank
C 4	C4E_Restrictions on gatherings C4NV_Restrictions on gatherings C4V_Restrictions on gatherings C4M_Restrictions on gatherings	Record the cut-off size for bans on gatherings	Ordinal scale + binary for geographic scope	0 - No restrictions 1 - Restrictions on very large gatherings (the limit is above 1000 people) 2 - Restrictions on gatherings between 101-1000 people 3 - Restrictions on gatherings between 11-100 people 4 - Restrictions on gatherings of 10 people or less No data - blank 0 - Targeted 1 - General No data - blank
C 5	C5E_Close public transport C5NV_Close public transport C5V_Close public transport C5M_Close public transport	Record closing of public transport	Ordinal scale + binary on geographic scope	0 - No measures 1 - Recommend closing (or significantly reduce volume/route/means of transport available) 2 - Require closing (or prohibit most citizens from using it) No data - blank 0 - Targeted 1- General No data - blank
C 6	C6E_Stay at home requirements C6NV_Stay at home requirements C6V_Stay at home requirements C6M_Stay at home requirements	Record orders to "shelter-in- place" and otherwise confine to home.	Ordinal scale + binary on geographic scope	0 - No measures 1 - recommend not leaving house 2 - require not leaving house with exceptions for daily exercise, grocery shopping, and 'essential' trips 3 - Require not leaving house with minimal exceptions (e.g. allowed to leave only once a week, or only one person can leave at a time, etc.) No data - blank 0 - Targeted 1- General

				No data – blank
C 7	C7E_Restrictions on internal movement C7NV_Restrictions on internal movement C7V_Restrictions on internal movement C7M_Restrictions on internal movement	Record restrictions on internal movement	Ordinal scale + binary on geographic scope	0 - No measures 1 - Recommend not to travel between regions/cities 2 – internal movement restrictions in place No data - blank 0 - Targeted 1- General No data - blank
C 8	C8E_International travel controls C8NV_International travel controls C8V_International travel controls C8EV_International travel controls	Record restrictions on international travel	Ordinal scale	0 - No measures 1 - Screening 2 - Quarantine arrivals from high-risk regions 3 - Ban on arrivals from some regions 4 – Ban on all regions or total border closure No data - blank

Economic measures

ID	Name	Description		Coding instructions
E 1	Income support *no differentiated policies reported in	Record if the government is covering the salaries or providing direct cash payments, universal basic income, or similar, of people who lose their jobs or cannot work. (Includes payments to firms if explicitly linked to payroll/ salaries)	Ordinal scale + binary scale for **sectoral** scope	0 - no income support 1 - government is replacing less than 50% of lost salary (or if a flat sum, it is less than 50% median salary)

	this indicator			2 - government is replacing 50% or more of lost salary (or if a flat sum, it is greater than 50% median salary) No data - blank 0 - formal sector workers only 1 - transfers to informal sector workers too No data - blank
E 2	Debt / contract relief for households *no differentiated policies reported in this indicator	Record if govt. is freezing financial obligations (e.g. stopping loan repayments, preventing services like water from stopping, or banning evictions)		0 - No 1 - Narrow relief, specific to one kind of contract 2 - broad debt/contract relief No data - blank
E 3	Fiscal measures *no differentiated policies reported in this indicator	What economic stimulus policies are adopted?	USD	Record monetary value USD of fiscal stimuli, including spending or tax cuts NOT included in E4, H4, or H5 (see below) -If none, enter 0 No data - blank Please use the exchange rate of the date you are coding, not the current date. Exchange rate info here.
E 4	Providing support to other countries	Announced offers of COVID-19 related aid spending to other countries	USD	Record monetary value announced if additional to previously announced spending -if none, enter 0

	*no differentiated policies reported in this indicator			No data - blank Please use the exchange rate of the date you are coding, not the current date. Exchange rate info here.

Health measures

ID	Name	Description	Measurement	Coding instructions
H1	Public info campaigns *no differentiated policies reported in this indicator	Record presence of public info campaigns	Binary + binary on geographic scope	0 -No COVID-19 public information campaign 1 - public officials urging caution about COVID-19 2 - coordinated public information campaign (e.g. across traditional and social media) No data - blank 0 - Targeted 1- General No data - blank
H2	Testing policy *no differentiated policies reported in this indicator	Who can get tested?	Ordinal scale	0 – No testing policy 1 – Only those who both (a) have symptoms AND (b) meet specific criteria (e.g. key workers, admitted to hospital, came into contact with a known case, returned from overseas) 2 – testing of anyone showing COVID-19 symptoms 3 – open public testing (e.g. "drive through" testing available to asymptomatic people) No data - blank N.B. we are looking for policies about testing for having an infection (PCR tests) - not for policies about testing for immunity (antibody tests).
H3	Contact tracing	Are governments doing contact tracing?	Ordinal scale	0 - No contact tracing 1 - Limited contact tracing - not done for all cases

	*no differentiated policies reported in this indicator			2 - Comprehensive contact tracing - done for all identified cases No data - blank
H4	Emergency investment in health care *no differentiated policies reported in this indicator	Short-term spending on, e.g., hospitals, masks, etc	USD	-Record monetary value in USD of new short-term spending on health -If none, enter 0 No data - blank Please use the exchange rate of the date you are coding, not the current date. Exchange rate info here.
H5	Investment in vaccines *no differentiated policies reported in this indicator	Announced public spending on vaccine development	USD	Record monetary value announced if additional to previously announced spending -If none, enter 0 No data - blank Please use the exchange rate of the date you are coding, not the current date. Exchange rate info here.
H6	H6E_Facial Coverings H6NV_Facial Coverings H6V_Facial Coverings H6M_Facial Coverings	Record policies on the use of facial coverings outside the home	Ordinal scale + binary on geographic scale	0- No policy 1- Recommended 2- Required in **some** specified shared/public spaces outside the home with other people present, or **some** situations when social distancing not possible 3- Required in **all** shared/public spaces outside the home with other people present or **all** situations when social distancing not possible 4- Required outside the home at all times regardless of location or presence of other people No data – blank 0 - targeted 1- general No data – blank

H 7	Vaccination Policy *no differentiated policies reported in this indicator	Record policies for vaccine delivery for different groups	Ordinal scale+ binary on cost scope	0 - No availability 1 - Availability for ONE of following: key workers/ clinically vulnerable groups / elderly groups 2 - Availability for TWO of following: key workers/ clinically vulnerable groups / elderly groups 3 - Availability for ALL of following: key workers/ clinically vulnerable groups / elderly groups 4 - Availability for all three plus partial additional availability (select broad groups/ages) 5 - Universal availability No data - blank 0 - At cost to individual (or funded by NGO, insurance, or partially government funded) 1- No or minimal cost to individual (government funded or subsidised) No data - blank
H 8	H8E_Protection of elderly people H8NV_Protection of elderly people H8V_Protection of elderly people H8M_Protection of elderly people	Record policies for protecting elderly people (as defined locally) in Long Term Care Facilities and/or the community and home setting	Ordinal scale + binary on geographic scope	0 - no measures 1 - Recommended isolation, hygiene, and visitor restriction measures in LTCFs and/or elderly people to stay at home 2 - Narrow restrictions for isolation, hygiene in LTCFs, some limitations on external visitors and/or restrictions protecting elderly people at home 3 - Extensive restrictions for isolation and hygiene in LTCFs, all non-essential external visitors prohibited, and/or all elderly people required to stay at home and not leave the home with minimal exceptions, and receive no external visitors No data-blank 0 - targeted 1- general No data – blank

Vaccine Policies

ID	Name	Description	Measurement	Coding
V1	V1_Vaccine prioritisation (summary)	Reports the existence of a prioritised plan for vaccine rollout.	Ordinal scale	0 – no plan 1 – a prioritised plan is in place 2 – no prioritised plan; there is universal eligibility and availability
V1	Vaccine prioritisation V1_Clinically vulnerable/chronic illness/significant underlying health condition (excluding elderly and disabled) V1_Healthcare workers/carers (excluding care home staff) V1_Residents in an elderly care home V1_Staff working in an elderly care home V1_Frontline retail workers V1_Military V1_Police/ first responders V1_Ethnic minorities V1_Educators V1_Other 'high contact' professions/groups (taxi drivers, security guards) V1_Pregnant people V1_Young people 5-16 yrs V1_People living with a vulnerable/shielding person or other priority group V1_Airport/Border/Airline Staff V1_Factory workers V1_Disabled People V1_Infants 0-4 yrs V1_Young people 5-16 yrs V1_General 16-19 yrs V1_General 20-24 yrs V1_General 25-29 yrs V1_General 30-34 yrs V1_General 35-39 yrs V1_General 40-44 yrs V1_General 45-49 yrs V1_General 50-54 yrs V1_General 55-59 yrs V1_General 60-64 yrs V1_General 65-69 yrs V1_General 70-74 yrs	Record the ranked position for different groups within a countries prioritisation plan.	Rank order	Blank – category not selected for prioritisation 1, 2, 3, 4…. – category has been selected for prioritisation; number represents the rank of prioritisation.

	V1_General 75-79 yrs V1_General 80+ yrs V1_At Risk 16-19 yrs V1_At Risk 20-24 yrs V1_At Risk 25-29 yrs V1_At Risk 30-34 yrs V1_At Risk 35-39 yrs V1_At Risk 40-44 yrs V1_At Risk 45-49 yrs V1_At Risk 50-54 yrs V1_At Risk 55-59 yrs V1_At Risk 60-64 yrs V1_At Risk 65-69 yrs V1_At Risk 70-74 yrs V1_At Risk 75-79 yrs V1_At Risk 80+ yrs V1_Religious/Spiritual Leaders V1_Frontline/essential workers (when subcategories not specified) V1_Primary and secondary school students V1_Crowded/communal living conditions (dormitories for migrant workers, temporary accommodation) V1_Tertiary education students V1_ Government officials V1_ Refugees/migrants			
V2	Vaccine eligibility/availability (summary)	Reports whether any categories of people are receiving vaccines.	Ordinal scale	Blank – no data 0 – no categories are receiving vaccines 1 – vaccines are available to some categories
V2	Vaccine eligibility/availability V2_Clinically vulnerable/chronic illness/significant underlying health condition (excluding elderly and disabled) V2_Healthcare workers/carers (excluding care home staff) V2_Residents in an elderly care home V2_Staff working in an elderly care home V2_Frontline retail workers V2_Military V2_Police/ first responders	Record which categories of people – regardless of their position in a prioritised rollout plan – are currently receiving vaccines.	Ordinal (binary) scale	Blank – no data 0 – vaccines are not being made available to this category 1 – vaccines are being made available to this category

	V2_Ethnic minorities V2_Educators V2_Other 'high contact' professions/groups (taxi drivers, security guards) V2_Pregnant people V2_Young people 5-16 yrs V2_People living with a vulnerable/shielding person or other priority group V2_Airport/Border/Airline Staff V2_Factory workers V2_Disabled People V2_Infants 0-4 yrs V2_Young people 5-16 yrs V2_General 16-19 yrs V2_General 20-24 yrs V2_General 25-29 yrs V2_General 30-34 yrs V2_General 35-39 yrs V2_General 40-44 yrs V2_General 45-49 yrs V2_General 50-54 yrs V2_General 55-59 yrs V2_General 60-64 yrs V2_General 65-69 yrs V2_General 70-74 yrs V2_General 75-79 yrs V2_General 80+ yrs V2_At Risk 16-19 yrs V2_At Risk 20-24 yrs V2_At Risk 25-29 yrs V2_At Risk 30-34 yrs V2_At Risk 35-39 yrs V2_At Risk 40-44 yrs V2_At Risk 45-49 yrs V2_At Risk 50-54 yrs V2_At Risk 55-59 yrs V2_At Risk 60-64 yrs V2_At Risk 65-69 yrs V2_At Risk 70-74 yrs V2_At Risk 75-79 yrs V2_At Risk 80+ yrs V2_Religious/Spiritual Leaders V2_Frontline/essential workers (when subcategories not specified) V2_Primary and secondary school students V2_Crowded/communal living conditions (dormitories for migrant workers, temporary accommodation) V2_Tertiary education students V2_ Government officials V2_ Refugees/migrants			

V 3	V3_Vaccine financial support (summary)	Reports the overall approach taken to vaccine funding – whether paid by the individual or the government.	Ordinal scale	0 – no data 1 – full cost to the individual for all categories identified in V2 2 – full cost to the individual for some categories identified in V2, some subsidy for other categories 3 – partial funding by the government for all of the categories identified in V2 4 – partial funding by the government for some categories identified in V2, full funding for other categories 5 – all categories fully funded by the government
V 3	Vaccine financial support V3_Clinically vulnerable/chronic illness/significant underlying health condition (excluding elderly and disabled) V3_Healthcare workers/carers (excluding care home staff) V3_Residents in an elderly care home V3_Staff working in an elderly care home V1_Frontline retail workers V3_Military V3_Police/ first responders V3_Ethnic minorities V3_Educators V3_Other 'high contact' professions/groups (taxi drivers, security guards) V3_Pregnant people V3_Young people 5-16 yrs V3_People living with a vulnerable/shielding person or other priority group V3_Airport/Border/Airline Staff V3_Factory workers V3_Disabled People V3_Infants 0-4 yrs V3_Young people 5-16 yrs	Record how vaccines are funded for each category of people identified in V2 as currently receiving vaccines.	Ordinal scale	0 – full cost borne by the individual (or through private health insurance) 1 – partially funded by government and individual pays nominal fee 2 – fully covered by government funding, FREE

	V3_General 16-19 yrs V3_General 20-24 yrs V3_General 25-29 yrs V3_General 30-34 yrs V3_General 35-39 yrs V3_General 40-44 yrs V3_General 45-49 yrs V3_General 50-54 yrs V3_General 55-59 yrs V3_General 60-64 yrs V3_General 65-69 yrs V3_General 70-74 yrs V3_General 75-79 yrs V3_General 80+ yrs V3_At Risk 16-19 yrs V3_At Risk 20-24 yrs V3_At Risk 25-29 yrs V3_At Risk 30-34 yrs V3_At Risk 35-39 yrs V3_At Risk 40-44 yrs V3_At Risk 45-49 yrs V3_At Risk 50-54 yrs V3_At Risk 55-59 yrs V3_At Risk 60-64 yrs V3_At Risk 65-69 yrs V3_At Risk 70-74 yrs V3_At Risk 75-79 yrs V3_At Risk 80+ yrs V3_Religious/Spiritual Leaders V3_Frontline/essential workers (when subcategories not specified) V3_Primary and secondary school students V3_Crowded/communal living conditions (dormitories for migrant workers, temporary accommodation) V3_Tertiary education students V3_ Government officials V3_ Refugees/migrants			
V4	V4_Clinically vulnerable/chronic illness/significant underlying health condition (excluding elderly and disabled) V4_Healthcare workers/carers (excluding care home staff) V4_Residents in an elderly care home V4_Staff working in an elderly care home V1_Frontline retail workers V4_Military V4_Police/ first responders V4_Ethnic minorities V4_Educators	Reports the existence of a requirement to be vaccinated	Binary	Blank – no data 0 - no requirement 1 – requirement

	V4_Other 'high contact' professions/groups (taxi drivers, security guards) V4_Pregnant people V4_Young people 5-16 yrs V4_People living with a vulnerable/shielding person or other priority group V4_Airport/Border/Airline Staff V4_Factory workers V4_Disabled People V4_Infants 0-4 yrs V4_Young people 5-16 yrs V4_General 16-19 yrs V4_General 20-24 yrs V4_General 25-29 yrs V4_General 30-34 yrs V4_General 35-39 yrs V4_General 40-44 yrs V4_General 45-49 yrs V4_General 50-54 yrs V4_General 55-59 yrs V4_General 60-64 yrs V4_General 65-69 yrs V4_General 70-74 yrs V4_General 75-79 yrs V4_General 80+ yrs V4_At Risk 16-19 yrs V4_At Risk 20-24 yrs V4_At Risk 25-29 yrs V4_At Risk 30-34 yrs V4_At Risk 35-39 yrs V4_At Risk 40-44 yrs V4_At Risk 45-49 yrs V4_At Risk 50-54 yrs V4_At Risk 55-59 yrs V4_At Risk 60-64 yrs V4_At Risk 65-69 yrs V4_At Risk 70-74 yrs V4_At Risk 75-79 yrs V4_At Risk 80+ yrs V4_Religious/Spiritual Leaders V4_Frontline/essential workers (when subcategories not specified) V4_Primary and secondary school students V4_Crowded/communal living conditions (dormitories for migrant workers, temporary accommodation) V4_Tertiary education students V4_ Government officials V4_ Refugees/migrants			

Miscellaneous

ID	Name	Description	Measurement	Coding instructions
M1	Misc. wild card *no differentiated policies reported in this indicator	Record policy announcements that do not fit anywhere else	Free text	Note unusual or interesting interventions that you think are worth flagging. Include relevant documentation.

Calculation of policy indices

The composition and calculation of our indices is updated from time-to-time. Please refer to our GitHub repository for the most up-to-date technical documentation:
https://github.com/OxCGRT/covid-policy-tracker/blob/master/documentation/index_methodology.md

Policy indices

The Oxford Covid-19 Government Response Tracker (GitHub repo, university website) tracks individual policy measures across 21 indicators. We also calculate several indices to give an overall impression of government activity, and this page describes how these indices are calculated. Changes to this methodology are recorded in the changelog below.

The different indices are comprised as follows:

Index	*k*	C 1	C 2	C 3	C 4	C 5	C 6	C 7	C 8	E1	E2	E3	E4	H1	H2	H3	H4	H5	H6	H7	H8	M 1	V1	V2	V3	V4
Government response index	16	x	x	x	x	x	x	x	x	x	x			x	x	x			x	x	x					
Containment and health index	14	x	x	x	x	x	x	x	x					x	x	x			x	x	x					
Stringency index	9	x	x	x	x	x	x	x	x					x												
Economic support index	2									x	x															
Legacy stringency index (see end of doc)	7	x	x	>	?	x	?	?	x					x												

We now publish 8 versions of each index – four different versions with different treatment of vaccine-differentiated policies, and then for each of those four, two different versions that handle gaps in data differently.
The four versions with substantial differences are denoted as follows:

- "_Nonvax" – constructs the index using 'non-vaccinated' (NV) policies if present, or otherwise using 'everyone' (E) policies.
- "_Vax" – constructs the index using 'vaccinated' (V) policies if present, or otherwise using 'everyone' (E) policies.
- "_SimpleAverage" – takes the sum of "_Nonvax" and "_Vax" indices and divides them by 2.

- "_WeightedAverage" – takes an average of the "_Nonvax" and "_Vax" indices and weights this by the proportion of the fully vaccinated population.

For each of these four versions of each index, we then publish two versions:

- A regular version which will return "null" values if there is not enough data to calculate the index
- A "_ForDisplay" version which will extrapolate the index to smooth over the last seven days where there is incomplete data.

In our legacy repository, we publish indices as simple averages of the individual component indicators. Calculations of these indices can be found below.

Index calculation

In this section, we explore how indices are calculated following differentiation of policies.

- **Non-vaccinated and Vaccinated Indices**

For a given country/region/jurisdiction, our non-vaccinated and vaccinated indices are simple averages of the individual component indicators for each group. This is described in equation 1 below where k is the number of component indicators in an index and Ij is the sub-index score for an individual indicator. If a component indicator is one of the ten for which we record differentiated policy, then we will use either:

- the NV or V version of the policy (in the non-vaccinated or vaccinated index respectively) where there is a differentiated policy
- the E (everyone) version of the policy for both the non-vaccinated and vaccinated index where there is no differentiated policy

$$(1) \qquad index = \frac{1}{k}\sum_{j=1}^{k} I_j$$

- **Simple Average Indices**

For a given country/region/jurisdiction, our simple average indices are the sum of the vaccinated and the non-vaccinated indices divided by two. This is described in equation 2 below where v is the index for the vaccinated, and nv is the index for the non-vaccinated.

$$(2) \quad index = (index_v + index_{nv})/2$$

- **Weighted Average Indices**
    - This weights the index value using the non-vaccinated/vaccinated values based on the proportion of the population that are vaccinated with a complete initial protocol using the data from Our World in Data vaccination dataset's 'fullyvaccinatedperhundred' (with gaps filled) repository available here: https://ourworldindata.org/covid-vaccinations.
        - This value is also published in our CSVs in a column labelled "Population Vaccinated", next to the cases/deaths columns.
    - Dealing with gaps for display purposes/ The population-weighted average uses the following display logic:
        - If no data available before or equal to the date -> 0% vaccination is assumed
        - If no "fully_vaccinated_per_hundred" for a specific date -> pull forward the value from the last day it was present

For a given country/region/jurisdiction, we first calculated indices for the vaccinated and the non vaccinated. We then weight these values by the % of population fully vaccinated (we primarily source this data from Our World In Data's 'fullyvaccinatedperhundred' data series). This is described in equation 3 below where v indicates the index for the vaccinated, nv indicates the index score for the non-vaccinated, W_v is the weight of population vaccinated (i.e., % vaccinated), and W_{nv} is the weight of population non-vaccinated (i.e., % non-vaccinated). Note that the denominator always adds up to 100 (i.e., sum of % of vaccinated and non-vaccinated people in a given country).

$$(3) \quad index = [(index_v * W_v) + (index_{nv} * W_{nv})]/100$$

Note: Two versions of each index are present in the database. A regular version which will return null values if there is not enough data to calculate the index, and a "display" version which will extrapolate to smooth over the last seven days of the index based on the most recent complete data. This is explained below under the heading 'dealing with gaps for display purposes'.

- **Legacy Repo Indices**

All of our indices in our legacy folder are simple averages of the individual component indicators. This is described in equation 4 below where k is the number of component indicators in an index and Ij is the sub-index score for an individual indicator.

$$(4) index = \frac{1}{k} \sum_{j=1}^{k} I_j$$

Two versions of each indicator are present in the database. A regular version which will return null values if there is not enough data to calculate the index, and a "display" version which will extrapolate to smooth over the last seven days of the index based on the most recent complete data. This is explained below.

Calculating sub-index scores for each indicator

All of the indices use ordinal indicators where policies are ranked on a simple numerical scale. The project also records six indicators – H5, V1, V2, V3, V4 and M1 – that are not used in our index calculations.

Some indicators – C1-C7, E1 and H1, H6, H7, and H8– have an additional binary flag variable that can be either 0 or 1. For C1-C7, H1 and H6 this corresponds to the geographic scope of the policy. For E1, this flag variable corresponds to the sectoral scope of income support. For H7, this flag variable corresponds to whether the individual or government is funding the vaccination.

The codebook has details about each indicator and what the different values represent.

Because different indicators (*j*) have different maximum values (N_j) in their ordinal scales, and only some have flag variables, each sub-index score must be calculated separately. The different indicators are:

Indicator	**Max value (N_j)**	**Flag? (F_j)**
C1	3 (0, 1, 2, 3)	Yes=1
C2	3 (0, 1, 2, 3)	Yes=1
C3	2 (0, 1, 2)	Yes=1
C4	4 (0, 1, 2, 3, 4)	Yes=1
C5	2 (0, 1, 2)	Yes=1
C6	3 (0, 1, 2, 3)	Yes=1
C7	2 (0, 1, 2)	Yes=1
C8	4 (0, 1, 2, 3, 4)	No=0

E1	2 (0, 1, 2)	Yes=1
E2	2 (0, 1, 2)	No=0
H1	2 (0, 1, 2)	Yes=1
H2	3 (0, 1, 2, 3)	No=0
H3	2 (0, 1, 2)	No=0
H6	4 (0, 1, 2, 3, 4)	Yes = 1
H7	5 (0, 1, 2, 3, 4, 5)	Yes=1
H8	3 (0, 1, 2, 3)	Yes=1

Each sub-index score (*I*) for any given indicator (*j*) on any given day (*t*), is calculated by the function described in equation 6 based on the following parameters:

- the maximum value of the indicator (N_j)
- whether that indicator has a flag (F_j=1 if the indicator has a flag variable, or 0 if the indicator does not have a flag variable)
- the recorded policy value on the ordinal scale ($v_{j,t}$)
- the recorded binary flag for that indicator, if that indicator has a flag ($f_{j,t}$)

This normalises the different ordinal scales to produce a sub-index score between 0 and 100 where each full point on the ordinal scale is equally spaced. For indicators that do have a flag variable, if this flag is recorded as 0 (i.e. if the policy is geographically targeted or for E1 if the support only applies to informal sector workers) then this is treated as a half-step between ordinal values.

Note that the database only contains flag values if the indicator has a non-zero value. If a government has no policy for a given indicator (i.e. the indicator equals zero) then the corresponding flag is blank/null in the database. For the purposes of calculating the index, this is equivalent to a sub-index score of zero. In other words, $I_{j,t}$=0 if $v_{j,t}$=0.

$$(5) I_{j,t} = 100 \frac{v_{j,t} - 0.5(F_j - f_{j,t})}{N_j}$$

Here is an explicit example of the calculation for a given country on a single day:

Indicator	$v_{j,t}$	$f_{j,t}$
C1	2	1

N_j	F_j
3	yes=1

$I_{j,t}$
66.67

C2	No data	no data	3	yes=1	0.00
C3	2	0	2	yes=1	75.00
C4	2	0	4	yes=1	37.50
C5	0	null	2	yes=1	0.00
C6	1	0	3	yes=1	16.67
C7	1	1	2	yes=1	50.00
C8	3	N/A	4	no=0	75.00
E1	2	0	2	yes=1	75.00
E2	2	N/A	2	no=0	100.00
H1	2	0	2	yes=1	75.00
H2	3	N/A	3	no=0	100.00
H3	2	N/A	2	no=0	100.00
H6	2	0	4	yes=1	37.50
H7	2	1	5	Yes=1	40.00
H8	2	1	3	Yes=1	66.66

	Index
Government response	57.18
Containment and health	52.86
Stringency	43.98
Economic support	87.50

Dealing with gaps in the data for display purposes

Because data are updated on regular cycles, but not every country is updated in every cycle, recent dates may be prone to missing data. If fewer than *k-1* indicators are present for an index on any given day, the index calculation is rejected and no value is

returned. For the economic support indicator, where *k*=2, the index calculation is rejected if either of the two indicators are missing.

To increase consistency of recent data points which are perhaps mid contribution, index values pertaining to the past seven days are rejected if they have fewer policy indicators than another day in the past seven days, i.e. if there is another recent data point with all *k* indicators included, then no index will be calculated for dates with *k-1*.

Further, we produce two versions of each index. One with the raw calculated index values, plus we produce a "display" version which will "smooth" over gaps in the last seven days, populating each date with the last available "good" data point.

For example, the date at the time of writing was 22 May. The table below gives an example of which index calculations would be rejected based on the number of policy indicators with data on each data. In this table, we will consider the overall government response index where *k*=13.

Date	No. of valid indicators	No. of indicators in index (*k*)	Raw index	"Display" index
10/05/2020	11	13	null	null
11/05/2020	12	13	60	60
12/05/2020	10	13	null	null
13/05/2020	13	13	65	65
14/05/2020	10	13	null	null
15/05/2020	10	13	null	null
16/05/2020	10	13	null	65
17/05/2020	13	13	70	70
18/05/2020	13	13	75	75
19/05/2020	12	13	null	75
20/05/2020	12	13	null	75
21/05/2020	6	13	null	75
22/05/2020 (today)	4	13	null	75

April 2020 legacy stringency index

We also report a legacy stringency index (from pre-April 2020) that approximates the logic of the very first version of the Stringency Index, which only had seven components under our original database structure with the old indicators S1-S7. We generally do not recommend using this legacy index, but it may be useful for continuity purposes.

The legacy indicator only uses seven indicators, and it chooses a single indicator between C3 and C4, and between C6 and C7, selecting whichever of those pairs provides a higher sub-index score. This is because C3 and C4 aim to measure the information previously measured by S3, and similarly for C6, C7 and the old S6. This method, shown in equation 3, faithfully recreates the logic of the old stringency index.

$$(6) SI_{legacy} = \frac{1}{7}\left(I_{C1} + I_{C2} + max(I_{C3}, I_{C4}) + I_{C5} + max(I_{C6}, I_{C7}) + I_{C8} + I_{H1}\right)$$

The individual sub-index scores for the legacy index are calculated through a slightly different formula to the one described in equation 2 above. This formula is described in equation 4 below (with a separate formula for C8, the only indicator in this index without a flagged variable).

$$(7) I_{j,t} = 100\left(\frac{v_{j,t} + f_{j,t}}{N_j + 1}\right) \quad | \quad I_{C8,t} = 100\left(\frac{v_{C8,t}}{N_{C8}}\right)$$