CovidRestrict: mobility restrictions in German Federal States in 2020

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1   General principles

The CovidRestrict project collected data on mobility-related restrictions that were adopted by the governments of six German Federal States in the first wave of the COVID-19 pandemic (01 January - 31 July 2020). In building the dataset, we were motivated by several considerations.

First, there is a need to analyse the German restrictions on a sub-national level in order to meaningfully understand its Covid-19 response. In Germany, the federal government has only a limited power to implement non-pharmaceutical interventions and therefore national-level analysis holds a limited analytical utility. The federal government provides general recommendations, controls external borders and certain aspects of the healthcare provisions. The 16 Federal States have the autonomy to enact corresponding legislation and directives with a great degree of discretion as provided for in the constitution. Although national recommendations were influential and regional governments also listened to reputable scientific authorities, such as the Robert Koch Institute (Büthe *et al.*, 2020), the actual degree of restrictions that the Federal States enacted varied significantly across the country.

The second consideration comes from the limited availability of relevant data. We scoped out the datasets that collect data on government restrictions using the Oxford Supertracker, the global directory of policy trackers and surveys related to Covid-19 (Daly *et al.*, 2020). We then assessed the datasets that document sub-national restrictions for Germany: the Coronanet project, Oxford Covid-19 Government Response Tracker, the WHO database of public health and social measures, Covid-19 policy tracker (Peking University), Complexity Science Hub Covid-19 Control Strategies List (CCCSL), and the ACAPS Covid-19 Government Measures Dataset (Hale *et al.*, 2021; Cheng *et al.*, 2020; Lun Liu *et al.*, 2020; WHO, 2020; Desvars-Larrive *et al.*, 2020; ACAPS, 2020). We found significant differences in coverage and the categorisation principles of restrictions

across these datasets. Although these datasets tend to distinguish between measures on different levels of governance, our manual check showed that the coding of the German sub-national data was inconsistent. Among the rising interest in understanding sub-national responses to the pandemic (Bailey *et al.*, 2020; Cameron-Blake *et al.*, 2021), we therefore identified the need to produce a dataset with the sufficient quality data for Germany.

Third, the datasets we surveyed provide classifications of the COVID-19 pandemic restrictions heavily based on epidemiology. All of them made the key division between pharmaceutical and non-pharmaceutical interventions. The way non-pharmaceutical interventions were categorised varied significantly across the datasets (Appendix 1). For most of these datasets, the categorisation principles are also not clearly explained in the technical documentation. Such classifications limit the possibilities for social science analyses.

As the result of the three considerations - the need for a sub-national approach for Germany, the lack of consistency of sub-national data in available datasets, and the lack of consistency in classifying the restrictions - we developed the CovidRestrict dataset. This dataset categorises mobility-related restrictions in six German Federal States. The data also discerns between stringency levels of these regulations.

2   Data Sources and Processing

Focusing on one of the most central aspects of the first round of lockdowns, the dataset collects and codes COVID-19 mobility restrictions in a selection of German Federal States:
- Saxony
- Lower Saxony
- Bremen
- Bavaria
- North Rhine-Westphalia
- Baden-Wurttemberg

The timeline is 01 January 2020 - 31 July 2020, which we term as the 'first wave' of the COVID-19 pandemic in Germany. We collected decrees issued by each Federal State (*Verordnungen*) during the target period and coded the data regulating people's mobility.

Verordnungen are secondary legislation passed by the governments of German Federal States. They became the main instrument of regulating people's mobility in Germany during the first wave of the COVID-19 pandemic. Passed by and large without parliamentary consultation and cast in the legal format of decrees, relevant government directives assumed, in practice, the character of rapidly shifting decrees that created a constantly changing legal framework. These documents must be made publicly available. In some particular cases, legal responsibility for enacting restrictions was delegated to smaller areas, e.g. municipalities, this was less common procedure during the first wave that at later stages of the pandemic. For the timespan covered in

CovidRestrict, we therefore only collected and coded the ordinances from the official websites of the respective States.

The restrictions data from the decrees was cross-referenced with two datasets that collected information about sub-national restrictions data: the Coronanet project and the CCCSL. We found that the decrees overall provide more robust and comprehensive overview of the restrictions, but the two datasets offer some supporting information: (i) data on some of the early restrictions in January and February before the majority of the Federal States started issuing restrictions via ordinances; and (ii) certain national-level restrictions regarding inter-regional and international mobility, which are typically not included in the ordinances of the federal States.

The data from the three sources was merged, with preference given to the data from the decrees when conflicts in coverage were detected. This approach helped to verify the key events during the first wave and also add data before and after our main observation period.

3 Conceptual Approach and Coding

CovidRestrict classifies the measures that control people's mobility, which is one of the ways to reduce frequency and closeness of contact between people in order to reduce the spread of an infectious disease (Reluga, 2010). The structure of the dataset was adapted to the restrictions implemented specifically in Germany. We classified mobility-related social distancing measures into three categories:

1. Measures aiming to control **access to spaces** where people congregate. Such measures include the restriction on operations on, or closure of shops, schools, restaurants and other businesses, as well as restrictions for private gatherings.
2. Measures aiming to control **flows of people**: their ability to travel internationally, inter-regionally, locally, and whether or not they are allowed to leave their residences at all.
3. Shielding of **vulnerable populations**. To avoid severe impacts of the disease, specific population groups were officially disentitled from free movement in public spaces altogether.

Other 'behavioural' non-pharmaceutical interventions, such as enforcing social distancing rules, the mask-wearing mandate, and increases in provision of public transport in order to reduce the density of people on board, were not coded in the dataset, because they do not influence people's mobility directly.

Measures that control **access to spaces** reduce social contacts via restrictions on gatherings and closure of organisations. They include the following categories:
- **Closure of educational institutions**: limiting the operation of, or closing, educational institutions, including daycares, kindergartens, schools, universities and other educational organisations.
- **Closure of organisations**, including various private companies, not-for-profits, government buildings, cultural, recreational, and religious institutions. Two sub-

categories of businesses received special policy attention and were coded as separate categories as follows:

- **Closure of the gastronomy**: a sub-category that encompasses restaurants, canteens and other catering establishments. The catering industry was for the most part a subject to separate restrictions compared to other businesses.
- **Closure of retail stores**: a sub-category of that includes shops and supermarkets. These businesses were a subject to separate restrictions compared to other businesses.
- **Prohibition of gatherings**: regulations concerning public or private events that bring people in close contact for extended periods. They include planned indoors/outdoors mass gatherings, private meetings, congregations and events for any purpose, including religious service.

Control of flows of people includes measures that restrict and allow movements of people from their places of residence. We distinguish the following categories:

- **Stay-at-home**: measures implemented to restrict people's movements away from their place of residence within their locality
- **Border crossing**: measures to limit people's ability to come to or leave the Federal State, including both domestic and international travel

Shielding of vulnerable populations are measures that restrict the mobility of and the contact with certain groups of vulnerable people. The following categories are distinguished:

- **Hospitals**: restriction or prohibition of hospital visits
- **Care homes**: restriction or prohibition of visits to care facilities for the elderly.
- **Other populations**: similar measures regarding other vulnerable populations (e.g. disabled persons)

The restrictions were coded on an ordinal scale according to their stringency. Stringency refers to both the scale and the strictness of government response. The standardised coding of mobility restrictions enacted by the Federal States opens up possibilities for comparisons of the overall restriction profiles and allows to link mobility restrictions with other indicators and variables. Our coding was informed by previous research (Hale *et al.*, 2020), but adapted to the German context. The coding strategy and scale was developed inductively by the research team.

The codebook is presented in Table 1.

Table 1: Codebook, Restrictions Types and Weights

Variable	Category	Coding
S	Control of spaces	
S-edu	Closure of educational institutions	0 - no restrictions or closures 1 - open with partial restrictions (type of institution, pupil age) 2 - significant restrictions (mostly closed with a few exceptions) 3 - full closure
S-bus	Closure of businesses	0 - no or minimal restrictions 1 - closure of only some businesses 2 - closure of many businesses

		3 - full closure except essential businesses
S-gas	Closure of restaurants and catering establishments (Gastronomie)	0 - no restrictions
		1 - operation with restrictions (e.g. Hygienekonzept)
		2 - operation with significant restrictions (e.g.opening hours)
		3 - full closure (take away only)
S-shop	Closure of retail stores	0 - no or minimal restrictions
		1 - operation with restrictions (e.g. size)
		2 - full closure except essential shops
S-meet	Prohibition of gatherings	0 - no or minimal restrictions (e.g. only gatherings with over 1000 ppl prohibited)
		1 - most gatherings (51-999 ppl) allowed
		2 - only small gatherings (3-50 ppl) allowed
		3 - full ban on gatherings
P	Control of flows of people	
P-stay	Stay-at-home	0 - no restrictions
		1 - Curfew and similar enforceable restrictions
		2 - Lockdown, leave for essential reasons only
P-border	Border crossing	0 - no or minimal restrictions / voluntary self-isolation
		1 - requirement to self-isolate / test for incoming travelers
		2 - restrictions on incoming/outgoing travelers, restrictions on staying in hotels
		3 - full closure of Federal State borders
V	Shielding of vulnerable populations	
V-hosp	Hospitals	0 - no or minimal restrictions
		1 - ban on contacts
V-care	Care homes	0 - no or minimal restrictions
		1 - ban on contacts
V-other	Other	0 - no or minimal restrictions
		1 - ban on contacts

4   Limitations

The CovidRestrict dataset opens up opportunities for analyses, but several important limitations should also be considered.

The first limitation comes from the data source. Government decrees contain information about the mandated closures of buinesses and restrictions on people's mobility. We did not have contextual information about the 'softer' instruments that attempted to influence people's behaviour during the pandemic, such as recommendations, advice and public information

campaigns. Some of these were captured to a certain extent in the public datasets we reviewed, but not consistently enough to incorporate in the CovidRestrict project.

The second limitation comes from the restriction of this dataset to the non-pharmaceutical interventions that attempted to directly restrict the mobility of people. We admit that various public health and social measures can influence people's mobility indirectly, for example, when the measures target the ease of, or convenience of doing something (e.g. the need to get tested in order to eat at a restaurant). Such indirect strategies became more widely used in the later months of the pandemic.

5   Data and Usage Policy

This dataset is published under a Creative Commons 4.0 BY license. The data is provided free of charge and in good faith. However, we cannot make any guarantees about the completeness, reliability and accuracy of the data and therefore we do take responsibility for actions taken as the consequence of information provided by the dataset or this paper. By using the dataset, you consent to this data and usage policy. Any updates, improvements, and corrections to the dataset will be posted on the research repository page where it will be permanently stored. These will be clearly marked.

6   References

ACAPS (2020), "Covid-19 Government Measures Dataset", available at: https://www.acaps.org/covid-19-government-measures-dataset.

Bailey, D., Clark, J., Colombelli, A., Corradini, C., Propris, L. de, Derudder, B., Fratesi, U., Fritsch, M., Harrison, J., Hatfield, M., Kemeny, T., Kogler, D.F., Lagendijk, A., Lawton, P., Ortega-Argilés, R., Otero, C.I. and Usai, S. (2020), "Regions in a time of pandemic", Regional Studies, Vol. 54 No. 9, pp. 1163–1174.

Büthe, T., Messerschmidt, L. and Cheng, C. (2020), "Policy Responses to the Coronavirus in Germany", in Gardini, G.L. (Ed.), The World Before and After COVID-19: Intellectual Reflections on Politics, Diplomacy and International Relations, European Institute of International Studies/Instituto Europeo de Estudios Internacionales, Salamanca.

Cameron-Blake, E., Breton, C., Sim, P., Tatlow, H., Hale, T., Wood, A., Smith, J., Sawatsky, J., Parsons, Z. and Tyson, K. (2021), Variation in the Canadian Provincial and Territorial responses to COVID19, Blavatnik School of Government Working Paper, available at: https://www.bsg.ox.ac.uk/research/publications/variation-canadian-provincial-and-territorial-responses-covid-19.

Cheng, C., Barceló, J., Hartnett, A.S., Kubinec, R. and Messerschmidt, L. (2020), "COVID-19 Government Response Event Dataset (CoronaNet v.1.0)", Nature human behaviour, Vol. 4 No. 7, pp. 756–768.

Desvars-Larrive, A., Dervic, E., Haug, N., Niederkrotenthaler, T., Chen, J., Di Natale, A., Lasser, J., Gliga, D.S., Roux, A., Sorger, J., Chakraborty, A., Ten, A., Dervic, A., Pacheco, A., Jurczak, A., Cserjan, D., Lederhilger, D., Bulska, D., Berishaj, D., Tames, E.F., Álvarez, F.S., Takriti, H., Korbel, J., Reddish, J., Grzymała-Moszczyńska, J., Stangl, J., Hadziavdic, L., Stoeger, L., Gooriah, L., Geyrhofer, L., Ferreira, M.R., Bartoszek, M., Vierlinger, R., Holder, S., Haberfellner, S., Ahne, V., Reisch, V., Servedio, V.D.P., Chen, X., Pocasangre-Orellana, X.M., Garncarek, Z., Garcia, D. and Thurner, S. (2020), "A structured open dataset of government interventions in response to COVID-19", Scientific data, Vol. 7 No. 1, p. 285.

Hale, T., Angrist, N., Beatriz, K., Petherick, A., Phillips, T. and Webster, S. (2020), Variation in government responses to COVID-19, BSG Working Papers, available at: https://www.bsg.ox.ac.uk/sites/default/files/2020-05/BSG-WP-2020-032-v6.0.pdf (accessed 12 July 2020).

Hale, T., Angrist, N., Goldszmidt, R., Kira, B., Petherick, A., Phillips, T., Webster, S., Cameron-Blake, E., Hallas, L., Majumdar, S. and Tatlow, H. (2021), "A global panel database of pandemic policies (Oxford COVID-19 Government Response Tracker)", Nature human behaviour, Vol. 5 No. 4, pp. 529–538.

Lun Liu, Yifan Wang, Chi On Chio (Zian Zhao), Tingmiao Lv, Rina Dao and Chuchang Tang (2020), "Covid-19 Policy-Tracker", available at: https://www.citiesandregions.cn/research/Covid-19-Policy-Tracker.

M. Daly, B. Ebbinghaus, L. Lehner, M. Naczyk and T. Vlandas (2020), "Oxford Supertracker: The Global Directory for COVID Policy Trackers and Surveys", available at: https://supertracker.spi.ox.ac.uk/.

Reluga, T.C. (2010), "Game theory of social distancing in response to an epidemic", PLoS computational biology, Vol. 6 No. 5, e1000793.

WHO (2020), "A global database of public health and social measures applied during the COVID-19 pandemic", available at: https://www.who.int/emergencies/diseases/novel-coronavirus-2019/phsm.

Appendix 1 Government Response Categorisation in major existing datasets

Note: The comparison focused on mobility-related measures. Empty cells mean the measure is not explicitly stated in the methodology.

Coronanet	Oxford Tracker	CCCSL	WHO	ACAPS
Restriction of non-essential businesses	Workplace closing	Small gathering cancellation (non-essential shops, resturants, home office etc)	Offices, businesses, institutions, and operations	Closure of businesses and public services
Restriction of non-essential government services				
Closure of schools	Schools closing (incl universities)	Closure of educational institutions	School measures (all levels of education)	Schools closure
				Change in prison policies
Restrictions of mass gatherings (sub-cat for public private events, religious services)	Restrictions on gatherings	Mass gathering cancellation (including orgs, private, worship, indoor, outdoor etc)	Gatherings, businesses and services (sub-cats for private/public, inside/outside)	Limit public gatherings (same subcategory for events and private gatherings)
	Cancellation of public events			
	Close public transport	Measures for public transport	Part of 'domestic travel'	
Social distancing		Part of other measures	Under public health measures	

Quarantine/lockdown	Stay at home requirements			Lockdown (partial, full, for specific groups)
Curfew				Curfews
External border restrictions	International travel controls	Return operation of nationals	International travel measures	Separate sub-cats for: docs required on arrival, border checks, border closure, international flight suspension, visa restrictions
Internal border restrictions	Restrictions on internal movement		Domestic travel	Separate sub-cats for: checkpoints within the country, domestic travel restrictions
		Measures for special populations	Special populations	
		Special measures for certain establishments (to stay open)		