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Use and Acceptance of Mandatory COVID-19 Vaccination Policies in Selected Countries

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Summary

Where initially demand was high, many countries around the world are experiencing a stagnation in COVID-19 vaccination coverage levels. Historically, mandatory vaccination policies have been used to increase vaccination uptake for other diseases, and this approach is now being taken in a number of countries for COVID-19. Given that the introduction of mandatory COVID-19 vaccination policies is new, there have been few attempts to date to compile information on the different approaches policymakers have taken and the levels of support the policies find amongst different populations. This report examines existing evidence on the use and acceptance of mandatory COVID-19 vaccination policies in select countries.

The report presents mandatory COVID-19 vaccination policies in nine countries: Australia, Canada, Germany, Indonesia, Latvia, Malta, Russia, the United States of America and the Vatican. These countries illustrate the range of implemented policies. Among the selected countries, mandatory COVID-19 vaccination policies frequently target occupational groups, including healthcare workers (HCW). In only one country do mandatory COVID-19 vaccinations target the entire adult population.

Several peer-reviewed studies find that mandatory vaccination policies are more likely to be accepted by individuals that are willing to get vaccinated voluntarily against COVID-19. Across peer-reviewed and non-peer-reviewed studies, there appears to be greater approval of mandatory COVID-19 vaccination policies for selected population groups than for entire populations.

In the peer-reviewed studies presented in this report, mandatory COVID-19 vaccinations are not always precisely defined. The observed diversity of definitions of mandatory COVID-19 vaccination policies suggests that decision-makers should not assume a shared understanding of these policies in public debate. Accordingly, they should ensure clear communication regarding these policies' scope and conditions.

Recommendations:

- Decision-makers should continue to communicate the benefits of COVID-19 vaccinations to the public, based on what is known about vaccine effectiveness.
- If and when decision-makers raise mandatory COVID-19 vaccination policies in public discussions, they should communicate clearly the scope and conditions of such policies.
- The spectrum of policy options should be considered when decision-makers discuss introducing mandatory COVID-19 vaccinations, considering the specificities of the target population and any resistance that may be introduced by such a policy.

Zusammenfassung

In vielen Ländern der Welt stagniert die COVID-19 Durchimpfungsrate, obwohl die Nachfrage nach Impfungen ursprünglich hoch war. Impfpflichten wurden in der Vergangenheit eingesetzt, um die Durchimpfungsrate gegen andere Krankheiten zu erhöhen. Dieser Ansatz wird nun in einer Reihe von Ländern für COVID-19 verfolgt. Da die Einführung von COVID-19 Impfpflichten recht neu ist, wurden bisher wenig systematische Informationen über die verschiedenen Arten von COVID-19 Pflichtimpfungen und den Grad der Unterstützung dieser Maßnahmen durch verschiedene Bevölkerungsgruppen zusammengestellt. In diesem Bericht werden einige Erkenntnisse zur Verwendung und Akzeptanz von COVID-19 Impfpflichten in ausgewählten Ländern vorgestellt.

Der Bericht präsentiert COVID-19 Impfpflichten in neun Ländern: Australien, Kanada, Deutschland, Indonesien, Lettland, Malta, Russland, die Vereinigten Staaten von Amerika und der Vatikan. Diese Länder veranschaulichen die Bandbreite der umgesetzten Maßnahmen. In den ausgewählten Ländern sind die COVID-19 Impfpflichten häufig auf bestimmte Berufsgruppen begrenzt, darunter auch Beschäftigte des Gesundheitswesens (HCW). Unter den untersuchten Ländern gibt es nur in einem Land eine COVID-19 Impfpflicht für die gesamte erwachsene Bevölkerung.

Einige begutachtete Studien, die in diesem Bericht vorgestellt werden, zeigen, dass COVID-19 Impfpflichten eher von Personen akzeptiert werden, die bereit sind, sich auch freiwillig gegen COVID-19 impfen zu lassen. In einigen hier vorgestellten begutachteten und nicht begutachteten Studien scheint die Zustimmung der Befragten zu COVID-19 Impfpflichten für ausgewählte Bevölkerungsgruppen größer zu sein als die Zustimmung zu COVID-19 Impfpflichten für die Gesamtbevölkerung.

In den begutachteten Studien werden COVID-19-Pflichtimpfungen nicht immer präzise definiert. Die beobachtete Vielfalt der Definitionen von COVID-19 Impfpflichten suggeriert, dass Entscheidungstragende in der öffentlichen Debatte nicht von einem gemeinsamen Verständnis dieser Maßnahme ausgehen sollten. Dementsprechend sollten sie den Umfang, die Bedingungen und auch die Grenzen von COVID-19 Impfpflichten klar kommunizieren.

Empfehlungen:

- Entscheidungstragende sollten der Öffentlichkeit weiterhin die Vorteile von COVID-19-Impfungen auf der Grundlage des aktuellen Wissensstandes über die Wirksamkeit dieser Impfstoffe vermitteln.
- Falls Entscheidungstragende in der öffentlichen Diskussion COVID-19 Impfpflichten ansprechen, sollten sie den Umfang, Bedingungen und Grenzen solcher Maßnahmen klar kommunizieren.
- Wenn Entscheidungstragende über die Einführung von COVID-19 Impfpflichten diskutieren, sollte ebenfalls das gesamte Spektrum der politischen Optionen zur Erhöhung von Durchimpfungsraten betrachtet werden, wobei relevante Charakteristika der Zielbevölkerung und mögliche Ablehnung, die durch eine solche Maßnahme hervorgerufen werden könnte, zu berücksichtigen sind.

1. Problem Statement

Where initially demand was high, many countries around the world are experiencing a stagnation in COVID-19 vaccination coverage levels. A diversity of strategies is being used to increase vaccine uptake, including the use of mandatory COVID-19 vaccination policies.[1] Mandatory vaccination policies have been used in a variety of circumstances preceding the COVID-19 pandemic.[1]

This report examines existing evidence on the use and acceptance of mandatory COVID-19 vaccination policies. Nine countries were selected that illustrate the range of policies that are being implemented. These countries are Australia, Canada, Indonesia, Latvia, Malta, Russia, the United States of America and the Vatican. Germany is included in this report for comparison. In the report, selected aspects of the epidemiological situation regarding COVID-19 is described in these countries, followed by selected evidence on COVID-19 vaccine effectiveness, an overview of the mandatory vaccination policies in these countries and select evidence on the acceptance of COVID-19 mandatory vaccination policies in general.

2. Epidemiological Situation

2.1 Weekly COVID-19 Incidence in Australia, Canada, Germany, Indonesia, Latvia, Malta, Russia, the United States and the Vatican, Weeks 33-47, 2021 (Figure 1)

The epidemiological situation of COVID-19 remains dynamic and differs greatly between countries. Weekly COVID-19 incidence per 100,000 population has been decreasing in Indonesia and Latvia since late October 2021, whilst in Germany, Malta and Russia, incidence has been increasing since late October. Incidence has been mostly stable in Australia, Canada, the United States and in the Vatican. As of 28 November 2021, weekly COVID-19 incidence per 100,000 population stood at 0 in the Vatican, 0.91 in Indonesia, 36.8 in Australia, 53.4 in Canada, 102.03 in Malta, 147.38 in the United States (as of 2 December 2021), 159.4 in Russia, 337.29 in Latvia and 480.87 in Germany.

2.2 Weekly COVID-19 Deaths in Australia, Canada, Germany, Indonesia, Latvia, Malta, Russia, the United States and the Vatican, Weeks 33-47, 2021 (Figure 1)

Weekly COVID-19 deaths per 100,000 population have been decreasing in Australia, Canada and the United States since late October. They have been mostly stable in Indonesia and rising in Germany, Latvia, Malta and Russia during the same time period. As of 28 November 2021, weekly COVID-19 deaths per 100,000 population stood at 0.02 in Indonesia, 0.19 in Australia, 0.36 in Canada, 0.97 in Malta, 1.53 in the United States, 2.18 in Germany, 5.77 in Russia and 10.50 in Latvia. Data on COVID-19 deaths was not available for the Vatican.

2.3 Full COVID-19 Vaccination Coverage in the Total Population in Australia, Canada, Germany, Indonesia, Latvia, Malta, Russia, the United States and the Vatican, Weeks 33-47, 2021 (Figure 1)

As of 28 November 2021, 34.1% of the population in Indonesia, 38.5% of the population in Russia, 58.7% of the population in the United States (2 December 2021), 63.2% of the population in Latvia, 67.8% of the population in Germany, 72.5% of the population in Australia, 76.1% of the population in Canada and 84.0% of the population in Malta, was fully vaccinated against COVID-19. Data on vaccination coverage is not available for the Vatican.

3. Selected Evidence on COVID-19 Vaccine Effectiveness

Evidence from a range of countries shows that COVID-19 vaccinations are effective against severe disease and death from COVID-19. Here, selected evidence from the UK, France, Germany, the Netherlands and Singapore is highlighted.

[1] Mandatory COVID-19 vaccination policies are defined in section 4.

In England, weekly deaths involving COVID-19 (weekly age-standardized mortality rates) were consistently lower for those who were fully vaccinated than for those who were not vaccinated during weeks 1-26, 2021.[2] The UK Health Security Agency also reports that for weeks 37-40, 2021, hospitalization rates were higher in unvaccinated than fully vaccinated persons across all age groups. Likewise, death rates were higher in unvaccinated than fully vaccinated persons across all age groups.[3]

In France, in week 38, 2021, non-vaccinated persons represented 77% of intensive care admissions and 74% of conventional hospital admissions (78% and 74%, respectively, in the previous week), while non-vaccinated persons represented only 26% of the total population. There were 10 deaths per million (11 the previous week) among unvaccinated persons, compared to 1 among those who were fully vaccinated (2 the previous week). Thus, there were approximately 8 times more deaths among unvaccinated persons than among fully vaccinated persons when adjusting for population size.[4]

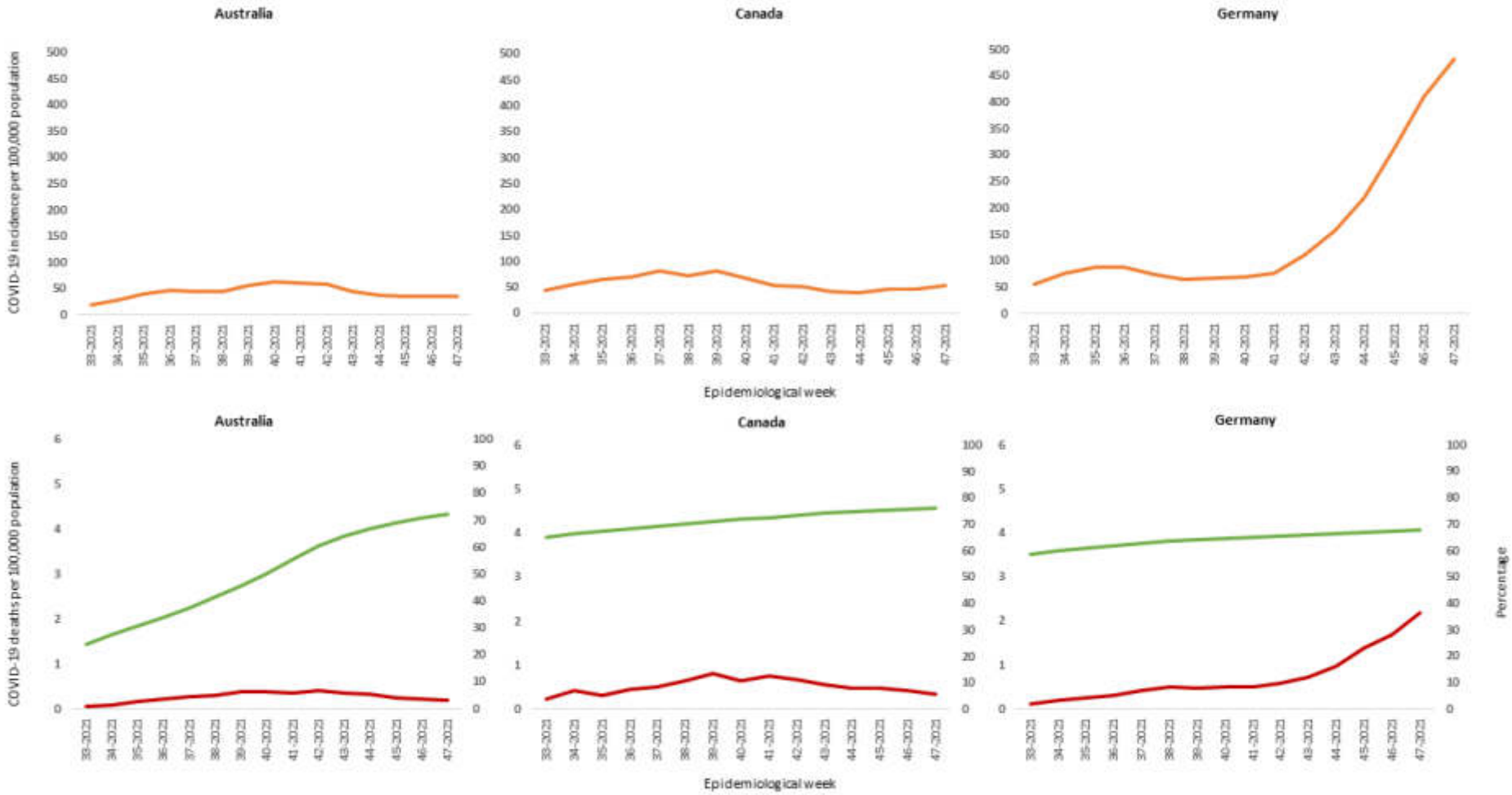
Analysis from Germany showed that between early June and late August 2021, fully vaccinated persons who were 18 years and older showed consistently lower hospital occupancy than those in the same age groups who were not vaccinated.[2][5]

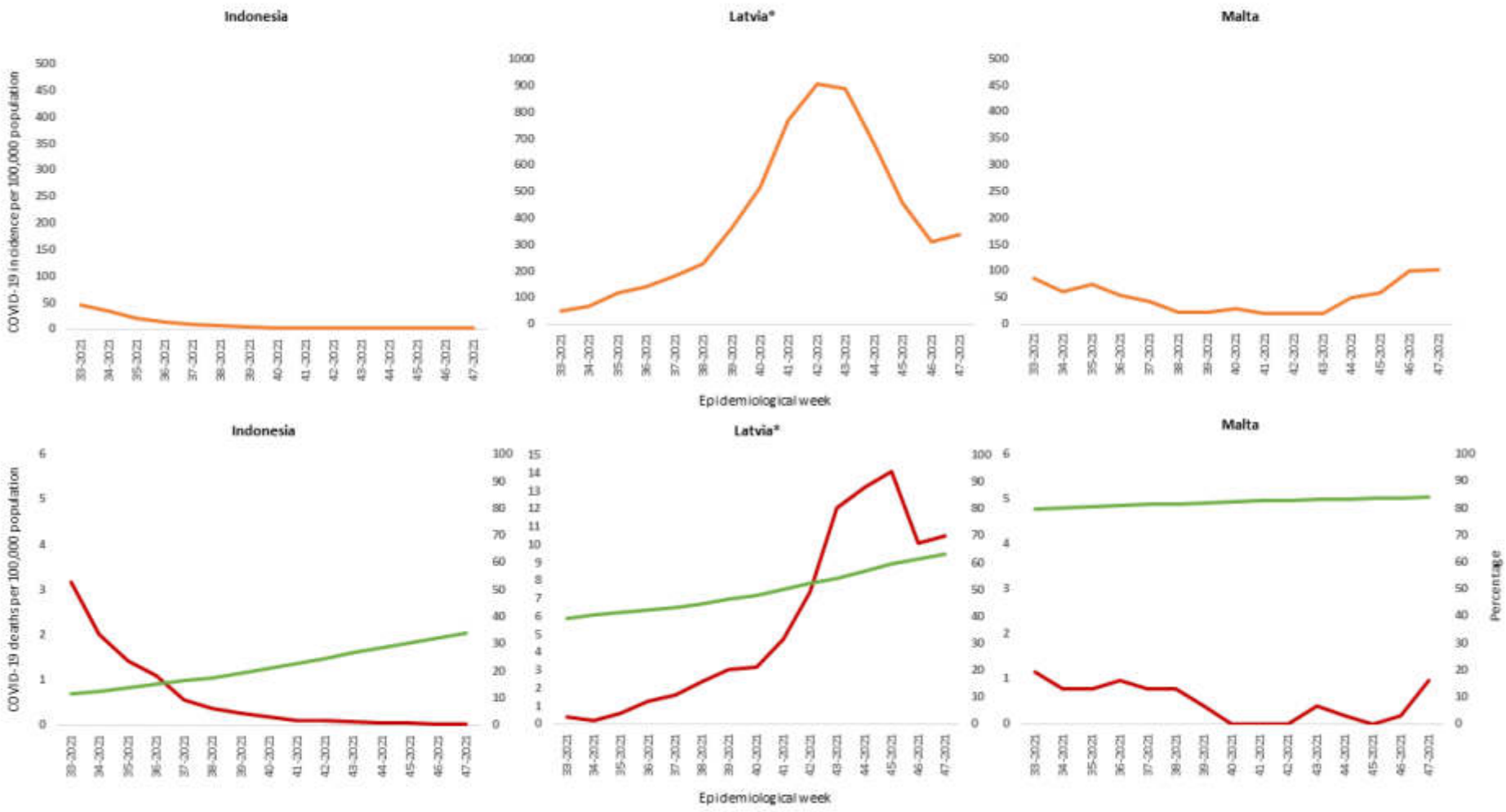
In the Netherlands, in week 28, 2021 the national coordination center for patient distribution surveyed lung specialists in Dutch hospitals to find out the vaccination status of COVID-19 patients admitted that week. Out of 370 admitted patients, the COVID-19 vaccination status was known for 320. Out of those, 74% were either not vaccinated or not yet fully vaccinated.[6]

The Singapore Ministry of Health reported that between 13 August and 10 September 2021, out of 616 unvaccinated cases, 4% became severely ill and 0.5% died. Out of 293 partially vaccinated cases, 3.8% became severely ill and 0.3% died. Out of 3516 fully vaccinated cases, 0.7% became severely ill and none died.[7]

In the United States, data collected by the CDC between January and March 2021 showed that receiving a full COVID-19 vaccination course was effective in preventing hospitalization due to COVID-19 in older adults. CDC reported that in adults aged 65 years and older, adjusted vaccine effectiveness against hospitalization due to COVID-19 was estimated at 94% for complete COVID-19 vaccination. Comparing younger and older adults before and after the introduction of COVID-19 vaccines, the CDC also reported that *inter alia* hospital admissions declined more in older population groups, likely partially due to higher vaccination coverage in older population groups.[8, 9]

[2] Data stems from notifications submitted by local health departments to Robert Koch Institute.


Australia
Canada
Germany
COVID-19 incidence per 100,000 population
Epidemiological week
COVID-19 deaths per 100,000 population
Percentage


Indonesia
Latvia*
Malta
COVID-19 incidence per 100,000 population
Epidemiological week
COVID-19 deaths per 100,000 population
Percentage

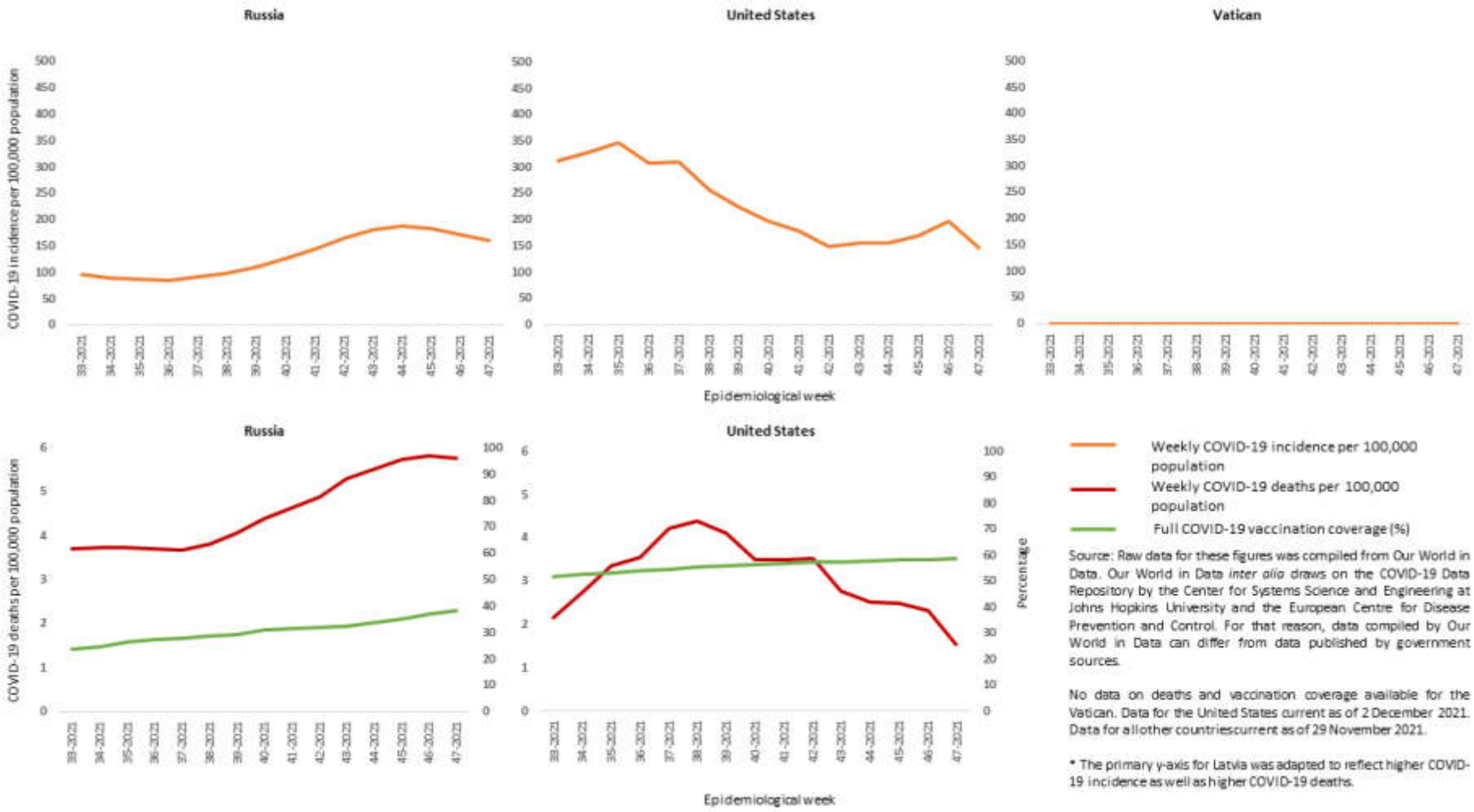


Figure 1: Weekly COVID-19 Incidence per 100,000 Population, Weekly COVID-19 Deaths per 100,000 Population and Full COVID-19 Vaccination Coverage in Australia, Canada, Germany, Indonesia, Latvia, Malta, Russia, the United States and the Vatican, Weeks 33-47, 2021

4. Overview of Mandatory COVID-19 Vaccination Policies in Selected Countries

According to media reports, mandatory COVID-19 vaccination policies are being implemented by countries in all five WHO regions – Africa, Americas, Eastern Mediterranean, Europe, South-East Asia and Western Pacific. Which provisions mandatory COVID-19 vaccinations entail differs across national contexts. To clarify the meaning of "mandatory vaccination policy", three prominent uses of the term are highlighted here.

1. First, the Nuffield Council on Bioethics distinguishes between three types of policies, or strategies, related to vaccinations: mandatory, quasi-mandatory and incentivized. Under mandatory vaccination policies, it is compulsory for individuals to be vaccinated without exception. Quasi-mandatory vaccinations are those under which "individuals are required to be vaccinated unless they qualify for an exemption and where there are penalties for those who do not comply".[3] As part of incentivized vaccination policies, vaccinations are voluntary and incentives are provided to individuals to encourage uptake.

2. Second, according to Gravagna et al (2020), who recently conducted an overview of the worldwide use of mandatory vaccination policies, a mandatory vaccination policy is defined as "(1) a policy established by a national authority that requires that eligible individuals, including all or some subgroup of those over whom the authority has jurisdiction, receive at least one vaccination and (2) a policy that establishes a requirement that an individual be vaccinated based on the age of the individual, their status in school or enrollment in educational services, or their eligibility to access societal or governmental benefits."[4]

3. Third, the World Health Organization (WHO) has defined mandatory vaccinations in a recent policy brief on COVID-19 vaccinations as "compel[ing] vaccination by direct or indirect threats of imposing restrictions in cases of non-compliance."[5] The definition includes the possibility of limited exceptions.

This report follows the definition provided by WHO, as it is deemed both authoritative and comprehensive.

A closer look at the national mandatory COVID-19 vaccination policies in Table 1 shows that countries have defined and operationalized 'mandatory vaccinations' for COVID-19 in different ways. In order to showcase the range of policies in use, eight countries were selected for this report: Australia, Canada, Indonesia, Latvia, Malta, Russia, the United States and the Vatican. Among the selected countries, mandatory COVID-19 vaccination policies frequently target an occupational group, often healthcare workers (HCW). Employees of the state, including civil servants and members of the armed forces, are also subject to mandatory COVID-19 vaccinations in a number of countries. Among the countries included in the overview, only one country – Indonesia – implemented mandatory COVID-19 vaccinations targeting the entire adult population. In several countries, sanctions are applied for non-compliance with the vaccination policy. Sanctions range from restrictions of access to fines to suspension from work and dismissal from employment. While incentives are also used in different countries to encourage COVID-19 vaccination uptake, it is beyond the scope of this report to include these.

[3] Nuffield Council on Bioethics, *Public health: ethical issues*. 2007. p. 181
[4] Gravagna, K., et al., *Global assessment of national mandatory vaccination policies and consequences of non-compliance*. Vaccine, 2020. **38**(49): p. 7866.
[5] World Health Organization, *COVID-19 and mandatory vaccination: Ethical considerations and caveats*. 2021. p. 1.

Table 1: Overview of Mandatory COVID-19 Vaccination Policies in Selected Countries[6]

	Description	Target Group	Date Enforced	Sanctions	Exceptions
Australia [10, 11]	Requirement of full COVID-19 vaccination for occupational groups	Healthcare workers (HCW) in care homes for the elderly and in residential care	Mid-September 2021	No data	Legitimate exceptions for HCW vary by federal state/territory and can include medical exceptions
Canada [10, 12, 13]	Requirement of full COVID-19 vaccination for occupational groups and specific categories of travelers	Federal public servants in the Core Public Administration (CPA)	30 October 2021	Public servants who refuse to disclose their status or who are not fully vaccinated will be placed on administrative leave without pay	No data
		Employees in federally regulated air and rail transportation	12 August 2021	Each organization is required to guarantee employees are fully vaccinated or they will be unable to work. Staff fined $25,000 per violation	No data
		Employees in federally regulated marine transportation	30 October 2021		No data
		Travelers on federally regulated transport by air, rail and sea, aged 12+	30 October 2021	No data	Emergency travel, and those medically unable to be vaccinated
Germany [14, 15]	Requirement of full COVID-19 vaccination for occupational group	HCW and staff in care and medical establishments, including hospitals and care homes	16 March 2022	No data	Medical exceptions
Indonesia [10, 16]	Requirement that all those eligible to obtain a COVID-19 vaccination must receive it	Population	February 2021	Sanctions range from fines, delays or suspension of social aids to delays or suspension of access to public services	No data
Latvia [17-19]	Requirement of full COVID-19 vaccination for occupational groups	National Armed Forces	14 July 2021	No data	No data
		Civil servants	14 July 2021	No data	No data
		Judicial officials	14 July 2021	No data	No data
		Medics, social workers, and staff of educational	14 July 2021	Dismissal from employment	No data

[6] The table may not adequately reflect differences in mandatory COVID-19 vaccination policies at the sub-national level. This holds especially for states with federal systems of government.

		establishments in contact with students			
Malta [10, 20]	Requirement for all individuals aged 12 and older to be fully vaccinated against COVID-19 as a condition of entry to the country	Entering travelers, regardless of citizenship	17 September 2021	No data	Medical reasons and 14-day quarantine
Russian Federation [10, 21]	Requirement of full COVID-19 vaccination for occupational groups and some other population groups	Workers with public-facing roles	14 June/ 15 July/ 1 September 2021, depending on region	Company staff: fine or temporary closure	No data
		Civil servants (60-80% of staff)	No data	Employees can be suspended from work without pay for the duration of the pandemic	No data
		Company staff (60% of staff)	No data	Businesses will be fined or closed for up to three months	No data
		Residents over 60 years old, people with certain chronic illnesses (St. Petersburg only)	No data	No data	No data
United States of America [10, 17, 22, 23]	Requirement of full COVID-19 vaccination for occupational groups	Federal workers and contractors of the federal government	9 September 2021	Escalating up to dismissal	Religious and medical reasons
		Employees of the state in some federal states	6 September 2021	No data	No data
		All service members of US armed forces	24 August 2021	Administrative or non-judicial punishment	Weekly test can replace vaccination
		Staff of Medicare- and Medicaid-certified healthcare providers	4 November 2021	Possibility of sanctions, but no details available	No data
		Staff of federally-controlled schools	July 2021	No data	Medical, religious or administrative reasons
		Employers with 100 or more employees must ensure their workers are fully vaccinated	4 November 2021	No data	Adoption of a policy requiring employees to choose either to be vaccinated or undergo weekly COVID-19 testing and wear a face covering at work

Vatican [17, 24]	Requirement of full COVID-19 vaccination for all staff and individuals entering Vatican	All employees of the Roman Curia and related institutions	1 October 2021	Employees not in possession of the necessary certifications cannot access the workplace and will not be paid for the duration of their absence	Exemptions will be decided on a case-by-case basis
		All those entering Vatican state, regardless of citizenship	1 October 2021	No data	No data

5. Selected Evidence on the Acceptance of Mandatory COVID-19 Vaccination Policies

Over the past year, a number of studies have been conducted to explore the acceptance of mandatory COVID-19 vaccination policies. These have been published as peer-reviewed and non-peer reviewed papers. This section reports on select evidence drawn from this research.

5.1 Selected Empirical Peer-Reviewed Evidence on the Acceptance of Mandatory COVID-19 Vaccination Policies

The evidence presented in Table 2 is derived from studies conducted in Germany, Greece, Italy, Russia, the United Kingdom and the United States. Five out of seven studies gathered empirical data before COVID-19 vaccination campaigns had begun.

Several studies reported that mandatory vaccination policies were more likely to be accepted by individuals that were willing to get vaccinated voluntarily against COVID-19, but also found that some individuals who do not wish to be vaccinated themselves are still in favor of mandatory vaccinations.[25-28] A survey conducted in the United States found that participants showed higher levels of support for mandatory vaccinations enforced by the State among specific groups, in this case children attending school and company employees, than among the general adult population (48.6% and 47.7% vs. 40.9%).[27] In Russia, however, a survey found that only 12.7% of respondents said that a mandatory vaccination at their workplace would lead to them getting vaccinated.[29] An experimental study conducted in Germany and the United States suggested that restricting people's choices regarding vaccinations (i.e. by making vaccinations compulsory) fosters an intention on behalf of the respondent to act against those restrictions. The authors suggested that the introduction of mandatory COVID-19 vaccinations could lead to reduced uptake of other voluntary vaccinations and reduced application of protective measures against COVID-19 for individuals with a low *a priori* intention to get vaccinated.[26]

Table 2: Selected Empirical Peer-Reviewed Evidence on the Acceptance of Mandatory COVID-19 Vaccination Policies[7]

Authors and Setting	Objectives	Method	Definition of 'Mandatory COVID-19 Vaccination' used in the study	Results Relevant to Acceptance of Mandatory COVID-19 Vaccination Policies
Graeber et al. (2021) [25] Germany	Study willingness to be vaccinated against COVID-19 and reasons for an acceptance or rejection of mandatory COVID-19 vaccination policy	Sub-sample of German Socio-Economic Panel study, „Socio-economic factors and consequences of the spread of coronavirus in Germany" (SOEP-CoV) Vaccination module was introduced in June and July 2020 n=851 persons aged 19 and older, representative of the German population Outcome: Vaccination intention and acceptance of mandatory COVID-19 vaccination policy Explanatory variables: Socio-demographic characteristics, personality traits, health, political orientation Uni- and bivariate results are reported as weighted means or percentages for the outcome variables. Two-tailed t-test was used to assess the differences in attitudes or characteristics between groups	"Legal duty to be vaccinated against COVID-19" (p. 3)	• 59% of the participants who said they would get vaccinated voluntarily against COVID-19 agreed with a policy of mandatory vaccination as opposed to 27% of the participants not willing to get vaccinated voluntarily • Participants that refused a policy of mandatory COVID-19 vaccinations had fewer risk diseases (at the time of the survey) • Mandatory COVID-19 vaccinations were more likely to be accepted by the elderly and people living in the Eastern federal states of Germany, and more likely to be rejected by adult women in all of Germany.
Largent et al. (2020) [27] USA	Assess the acceptability of COVID-19 vaccine mandates	Cross-sectional online survey, conducted from 14 to 27 September 2020 n=2730 adults in the United States Sample was demographically representative of the US population. Outcome: Acceptance of mandatory COVID-19 vaccination Explanatory variables: demographic characteristics and political affiliation	"[S]tates requiring adults and children and employers requiring employees to 'get the COVID-19 vaccine (unless they have a medical reason not to be vaccinated).'" (p. 1)	• 48.6% of participants were supportive of mandatory COVID-19 vaccinations for children attending school (95% CI [44.8%-53.0%]) whereas 38.4% found them unacceptable (95% CI [34.6%-42.0%]). • 40.9% (95% CI [37.2%-45.0%]) of participants found mandatory COVID-19 vaccinations for adults enforced by the state acceptable, compared to 44.9% (95% CI [41.0%-49.0%]) that found them unacceptable.

[7] The studies in Table 2 are listed in alphabetical order and not ranked by quality. Riccò et al. (2021), Sprengholz et al. (2021) and Tran et al. (2021) did not collect a representative sample.

		Descriptive statistics were calculated with the survey weights to generate nationally representative estimates. χ2 test was used to compare respondents' answers.		• 47.7% (95% CI [43.8%-52.0%]) of respondents found mandatory COVID-19 vaccinations enforced by the employer acceptable, whereas 38.1% (95% CI [34.4%-42.0%]) found them unacceptable. • In general, participants that stated they were likely to get vaccinated against COVID-19 accepted mandatory COVID-19 vaccinations at higher rates than participants unlikely to do so. • Participants with a higher educational level (bachelor's degree or higher) were more likely to agree with mandatory COVID-19 vaccinations.
Maltezou et al. (2021) [28] Greece	Investigate the intention rates to be vaccinated against COVID-19 among healthcare workers (HCW)	Cross-sectional survey, conducted from 1 September to 31 October 2020 n=1591 participants HCW from 8 hospitals Outcome: Intention to be vaccinated against COVID-19 Explanatory variables: Individual characteristics including gender and occupation, as well as attitudes and practices towards occupational vaccinations Categorial variables: Chi square test was performed Continuous variables with normal distribution: Two-tailed t-test was performed. Regression analysis was used to identify the predictors of the HCW's intention to receive a Covid-19 vaccination.	COVID-19 vaccination should be mandatory for HCW (p. 192)	• Acceptance of a mandatory COVID-19 vaccination was 49.8% in the general sample, and 83.9% among HCW intending to get vaccinated against COVID-19. • A number of variables were associated with increased intention to get the COVID-19 vaccine: being male (OR 2.20, 95% CI [1.57-3.08]), being a physician (OR 1.95, 95% CI [1.33-2.87]), being completely vaccinated against hepatitis B (OR 1.50, 95% CI [1.06-2.14]), having been vaccinated against pandemic A (H1N1) (OR 1.90, 95% CI [1.31-2.75]), belief that COVID-19 vaccination should be mandatory for HCW (OR 11.6, 95% CI [7.98-17.07]), and increased confidence in vaccines in general during the ongoing COVID-19 pandemic (OR 1.50, 95% CI [1.06-2.12]).
Riccò et al. (2021) [30] Italy	Investigating the acceptance (i.e. knowledge, attitudes and practices) of	Cross-sectional online survey, conducted from 1 to 13 January 2021	Compulsory COVID-19 vaccination with fines in case of non-compliance, or compulsory COVID-19	• 60.2% of study participants reported acceptance of mandatory COVID-19 vaccinations.

	occupational physicians regarding COVID-19 vaccination mandates	n=166 occupational physicians, non-representative sample Outcomes: Acceptance of COVID-19 vaccinations, willingness to pay for COVID-19 vaccination, acceptance of mandatory COVID-19 vaccination Explanatory variables: knowledge, attitudes and practices towards COVID-19 vaccinations Normal distributed variables: Student's test or ANOVA were used to compare the variables Non-normal distributed: Comparison of the variables was done using Mann– Whitney or Kruskal–Wallis test Categorical variables: Chi-squared test After the univariate analysis, all categorical variables significantly associated with a positive attitude towards a mandatory vaccination policy (P<0.005) were included in the binary logistic regression to calculate aOR and 95%CI	vaccination for high risk groups, including healthcare workers (p. 7)	• A higher rate of acceptance was associated with: acknowledgement of COVID-19 as a common disease (OR 3.462, 95% CI [1.060; 11.310]), acceptance of a payment/copayment for COVID-19 vaccination (OR 3.896 95% CI [(1.607; 9.449]), perception that unvaccinated HCW are unfit for work (OR 4.562, 95% CI [1.935; 10.753]).
Sherman et al. (2020) [31] United Kingdom	Investigate association between vaccination intention and contextual or sociodemographic factors	Cross-sectional survey, conducted from 14 to 17 July 2020 n=1500; Sample was representative for UK population Outcome: Vaccination intention Explanatory variables: personal and clinical characteristics and, psychological factors Linear regression model to identify variables associated with a vaccination intention as well as principal component analysis on items investigating beliefs and attitudes about COVID-19 and a COVID-19 vaccination	Not defined; focus on intention to be vaccinated	• The strongest predictors of intention to get vaccinated against COVID-19 were COVID-19 vaccination beliefs and attitudes (19.3% of variance explained), which also included the belief that COVID-19 vaccinations should be made mandatory, and vaccination adverse effects and novelty (8.2% of variance explained).

Sprengholz et al. (2021) [26] Study 1: Germany Study 2: USA	Study 1: Explore the effects of scarce vaccination or mandatory vaccination on triggering reactance[8] Study 2: Test hypotheses of Study 1 and extend the analysis to the consequences of increased reactance	Study 1: Experiment as part of a cross-sectional survey, conducted on 22 and 23 December 2020 n=973 German participants, non-probabilistic sampling and quota-representative for age, gender and federal states in Germany T1: assesses the intention to get vaccinated against COVID-19 before the experiment T2: assesses reactance after random assignment of participants to 3 conditions (unrestricted vaccination, mandatory vaccination, scarce vaccination) Outcome: Reactance Explanatory variable: Vaccination intention Linear regression analysis Study 2: Data collection on 7 January 2021 n=1394 US-American participants Same intervention categories as in Study 1 T1: assesses the intention to get vaccinated against COVID-19 before the experiment T2: after random assignment of participants to 3 conditions assesses: reactance, activism, avoidance, agreeing to get vaccinated against chickenpox and behavioral intentions to show COVID-19 related health behaviors (such as mask wearing, etc.)	Vaccination is compulsory and non-compliance is sanctioned (p. 4)	Study 1: • Mandatory and scarce vaccinations both cause reactance, especially when the participants' behavioral intentions were influenced by the restriction. • Increase of reactance with stronger vaccination intention, especially in the scarce vaccination condition (interaction: b = 0.24; 95% CI [0.13, 0.34]). On the other hand, in the mandatory vaccination condition, a decrease in reactance was observed with a stronger previous intention to get vaccinated (interaction: b = –1.06; 95% CI [–1.17, –0.95]) Study 2: • Reactance declined with higher a priori vaccination intention in the mandatory vaccination condition (interaction: b= -0.72; 95% CI [-0.82, -0.61]) • Reactance increased with a stronger a priori vaccination intention in the scarce vaccination condition (interaction: b=0.57; 95% CI [0.46, 0.67]). • Behavioral intentions: Higher reactance led to stronger activism intention, especially in the mandatory vaccination condition (interaction: b=0.67; 95% CI [0.59, 0.74]) • Avoidance increased with higher reactance in the mandatory vaccination condition (interaction: b=0.19; 95% CI [0.07, 0.32]), and decreased with higher reactance in the scarce vaccination condition (interaction: b= -0.70; 95% CI [-0.26, -0.04]). • Agreeing to get vaccinated against chickenpox increased with higher levels of reactance in the scarce vaccination

[8] "Psychological reactance theory assumes that the restriction of valued behaviors elicits anger and negative cognitions, motivating actions to regain the limited freedom" (Sprengholz et al. 2021, p. 1).

		Outcome: reactance, activism, avoidance, chickenpox vaccination and behavioral intentions regarding COVID-19 protective health behaviors Explanatory variable: Vaccination intention and the study condition (unrestricted vaccination, mandatory vaccination, scarce vaccination) Linear regression analysis		condition (interaction: b=0.42; 95% CI [0.30, 0.54]) and in contrast decreased with higher reactance in the mandatory vaccination group (interaction: b= -0.15; 95% CI [-0.26, -0.04]) • COVID-19-related protective health behaviors increased with higher reactance in the scarce vaccination scenario (interaction: b=0.19; 95% CI [0.11, 0.26]) and on the contrary, decreased when vaccination was made mandatory and reactance was high (interaction: b= -0.11; 95% CI [-0.17, -0.04]
Tran et al. (2021) [29] Russia	Investigate intention to receive COVID-19 vaccine if it were to become available as well as predictors of COVID-19 vaccine acceptance	Cross-sectional online survey, conducted from 26 September-9 November 2020 with adults living in Russia n=876; Snowball sampling Outcome: COVID-19 vaccine acceptance Explanatory variables: Sociodemographic, health-related and health belief variables Binary linear regression was performed to explore associations between each explanatory variable and the outcome	Not defined; focus on intention to be vaccinated	• 12.7% of respondents reported that a mandatory COVID-19 vaccination being required at the workplace would impact their decision to get vaccinated against COVID-19.

5.2 Selected Empirical Non-Peer-Reviewed Evidence on Acceptance of Mandatory COVID-19 Vaccination Policies

In addition to peer-reviewed research, there exist a number of non-peer-reviewed studies addressing acceptance of mandatory COVID-19 vaccinations. Results from these studies are presented in Table 3.

Across Europe, mandatory vaccination policies find support in approximately half of the population in several European countries, varying from 61% in the United Kingdom to 43% in Denmark.[32] In Germany, implementing a mandatory COVID-19 vaccination policy for the general population was favored by 32.2% of the participants in a survey, whereas 68.1% were in favor of mandatory COVID-19 vaccinations for healthcare workers (HCW). Introducing sanctions for non-compliance was rejected by the majority of survey participants in Germany (62.4%). Unvaccinated survey respondents stated that restricting their movement and limiting access to certain places could result in them considering a vaccination.[33] Evidence on this is not consistent, however. In a different German survey participants who were unwilling to get vaccinated against COVID-19 stated that restricting their movement and limiting their access to certain places, as is the case with the so-called "2G-rule"[9], together with out-of-pocket payments for rapid antigen tests, are unlikely to increase their willingness to be vaccinated against COVID-19.[32]

Evidence from a non-peer-reviewed preprint study from France also suggests that support for a mandatory vaccination policy for HCW is higher than for the general population, as 30.05% of the participants rejecting such a policy for the general population were in favor of mandatory COVID-19 vaccination for HCW. The study identified a number of characteristics associated with rejecting a mandatory vaccination policy, such as young age, low fear of getting infected oneself, no intention to get vaccinated oneself, lack of trust in the government and feeling close to the French Green party or far left parties.[34]

[9] "2G-rule": The requirement that certain facilities and events may only be visited by people who have been vaccinated or have recovered from COVID-19 – a negative COVID-19 test is not sufficient.

Table 3: Selected Empirical Non-Peer-Reviewed Evidence on the Acceptance of Mandatory COVID-19 Vaccination Policies

Survey or Authors and Setting	Objectives	Methods	Dimensions of Mandatory COVID-19 Vaccinations Addressed in Survey	Results Relevant to Mandatory COVID-19 Vaccinations
BfR-Corona-Monitor [35, 36] Germany	Providing a regular update on the risk perception of the population in Germany towards coronavirus, including the risk of an infection and the protective measures the population has taken	Cross sectional telephone survey Population 14+ years in Germany Sample representative of the national population As of 12 and 13 October 2021: n = 1002 As of 28 and 29 September 2021: n = 1003 Conducted weekly since 24 March 2020, biweekly since 26 May 2020	• 3G-rule: The requirement that certain facilities and events may only be attended by people who have been vaccinated, have recovered from COVID-19 or have tested negative • 2G-rule: The requirement that certain facilities and events may only be visited by people who have been vaccinated or have recovered from COVID-19 - a negative test is not sufficient	As of 12 and 13 October 2021: • 80% of participants considered the 3G-Rule appropriate for COVID-19 containment while 57% considered the 2G-rule appropriate. • 46% of participants aged 14 to 39 considered the 2G-Rule appropriate, whereas 78% of those 60 years and older found it appropriate for containing the spread of COVID-19. As of 28 and 29 September 2021: • 83% of participants considered the 3G-Rule appropriate for COVID-19 containment in contrast to 56% that considered the 2G-Rule appropriate for containment. • The share of participants considering the 3G-Rule appropriate increased between 31 August to 28 September 2021 from 75% to 83%. The question addressing the 2G-Rule was only added on 28 September 2021. • 45% of participants aged 14 to 39 considered the 2G-Rule appropriate, whereas 72% of those 60 years and older found it appropriate for containing the spread of COVID-19.
COVIMO – COVID-19 Impfquoten Monitoring in Deutschland [33] Germany	Record the willingness and acceptance of different population groups in Germany to be vaccinated, to identify potential barriers to vaccination uptake in a timely manner, and to be able to derive appropriate communication measures	Cross sectional telephone survey Population 18+ years in Germany 26 July – 18 August 2021: n = 1005, weighted to be nationally representative Since January 2021 (every 2-4 weeks)	• Exclusion of unvaccinated individuals from public events • Mandatory COVID-19 vaccination for HCW • Mandatory COVID-19 vaccination for the entire population	As of 26 July – 18 August 2021: • 54% of respondents rather agreed that "all necessary means to achieve high COVID-19 vaccination rates" could include, for example, the exclusion of unvaccinated individuals from public events. • Sanctions for individuals not following the recommendation to get vaccinated against COVID-19 were rejected by 62.4% of participants. • 68.1% of participants rather agreed that COVID-19 vaccination should be mandatory for HCW. • A mandatory vaccination policy for the general population was only favored by 32.2% of respondents.

				• Unvaccinated participants said that further restriction of their freedom could result in them getting vaccinated.

European COVID Survey (ECOS) [32]
 	
Denmark, France, Germany, Italy, Netherlands, Portugal, Spain (since September 2021), United Kingdom
	Assessing attitudes, concerns, and confidence about the COVID-19 pandemic	Cross-sectional survey
		
		Sample from 7 countries that was representative of region, gender, age and education level
		
		Since April 2020 (every 2 months)
			• 2G-rule: The requirement that certain facilities and events may only be visited by people who have been vaccinated or have recovered from COVID-19 - a negative test is not sufficient
			• Requiring people who are voluntarily unvaccinated to pay for their COVID-19 antigen test out of pocket
				As of 7 September – 21 September 2021:
				• In Germany: 2G-rule and out-of-pocket payments for COVID-19-tests led 4% of unvaccinated participants to consider a vaccination, whereas 30% of unvaccinated participants stated that this led to them being less likely to receive a COVID-19 vaccination.
				• Approval of 2G-rule and out-of-pocket payments for COVID-19 tests:
				  ○ United Kingdom 61%, 53%,
				  ○ Spain 60%, 62%,
				  ○ Germany 57%, 64%,
				  ○ Italy 55%, 56%,
				  ○ Portugal 50%, 62%,
				  ○ France 49%, 56%,
				  ○ Netherlands 47%, 49%,
				  ○ Denmark 43%, 38%.

Gagneux-Brunon et al. (2021)[10] [34] France	Evaluate attitudes to mandatory COVID-19 vaccination for the general population and HCW in France	Cross-sectional online survey, conducted from 10 to 23 May 2021 n=1314 adults Sample representative for French population Outcome: Attitudes towards mandatory COVID-19 vaccinations for the general population and for HCW Explanatory variables: socio-economic background, concern about COVID-19, political affiliation	• Mandatory COVID-19 vaccination for the general population and for HCW	• 43.0% of participants were in favor of mandatory COVID-19 vaccinations for the general population, 41.9% against and 15.1% were undecided. • 30.05% of participants rejecting a mandatory vaccination for the general population were in favor of a mandatory vaccination for HCWs. • Young age (aOR 4.67, 95%, CI [1.73-12.61]), low fear of getting infected (aOR 1.82, 95%, CI [1.19-2.78]), no intention to get vaccinated oneself (aOR 10.67, 95%, CI [6.41-17.76]), lack of trust in the government (aOR 1.78, 95%, CI [1.29-2.45]) and feeling close to the Green party (aOR 2.08, 95%, CI [1.14-3.81]) or parties in the far left (aOR 1.89, 95%, CI [1.06-3.38]) were associated with rejecting a mandatory vaccination policy in general.

[10] Non-peer-reviewed preprint study.

		Bivariate and logistic regressions were performed to investigate factors associated with opposition to mandatory vaccination against COVID-19 for the general population and for HCW		

6. Synthesis and Recommendations

In the face of stagnating COVID-19 vaccine uptake, some countries have implemented mandatory COVID-19 vaccination policies in an effort to increase vaccination coverage. Mandatory vaccination policies have been used in a variety of circumstances preceding the COVID-19 pandemic.[1] The report found that the term "mandatory COVID-19 vaccinations" has varying use, ranging from compulsory vaccinations without exceptions, to compulsory vaccinations with exceptions, to compelling vaccinations through restrictions. Similarly, the country overview shows great diversity in the types of mandatory COVID-19 vaccination policies that have been implemented. Among the countries presented in this report, policies usually address specific occupational groups. Some countries provide for sanctions in case of non-compliance with the mandatory COVID-19 vaccination policy. Mandatory COVID-19 vaccination policies that do not allow for exceptions and that cover the entire eligible population were rarely found among the countries included in the overview. In the peer-reviewed studies presented in this report, mandatory COVID-19 vaccinations were not always precisely defined. The observed diversity of definitions of mandatory COVID-19 vaccination policies suggests that decision-makers should not assume a shared understanding of these policies in public debate. Accordingly, they should ensure clear communication regarding these policies' scope and conditions.

Several peer-reviewed studies found that mandatory vaccination policies were more likely to be accepted by individuals that were willing to get vaccinated voluntarily against COVID-19.[25-28] Across peer-reviewed and non-peer-reviewed studies, there appears to be greater approval of mandatory COVID-19 vaccination policies for selected population groups than for entire populations. For example, mandatory COVID-19 vaccinations do not find majority approval in a non-peer-reviewed German study, whereas mandatory COVID-19 vaccinations for HCW do.[33] Indirect approaches like negative incentives to receive a COVID-19 vaccination such as out-of-pocket payments for rapid antigen tests or access restrictions to events and venues for non-vaccinated individuals find majority approval in Germany, yet may be ineffective in increasing vaccination coverage among those currently not vaccinated against COVID-19. [32]

Recommendations:

- Decision-makers should continue to communicate the benefits of COVID-19 vaccinations to the public, based on what is known about vaccine effectiveness.
- If and when decision-makers raise mandatory COVID-19 vaccination policies in public discussions, they should communicate clearly the scope and conditions of such policies.
- The spectrum of policy options should be considered when decision-makers discuss introducing mandatory COVID-19 vaccinations, considering the specificities of the target population and any resistance that may be introduced by such a policy.

7. Methodology and Evidence Rating

The epidemiological evidence presented in this report builds on public data collected from a variety of sources. Weekly COVID-19 incidence and deaths per 100,000 population was calculated by the report authors on the basis of the dataset by Appel et al. from Our World in Data.[37] COVID-19 cases in the Our World in Data-dataset stem from the Center for Systems Science and Engineering at Johns Hopkins University. Full vaccination coverage was calculated by the authors on the basis of Our World in Data's vaccination dataset by Mathieu et al.[38] Data on national policies governing mandatory COVID-19 vaccinations stems from media and government sources. Out of eight peer-reviewed studies included in table 2, data for five was gathered before COVID-19 vaccination campaigns had begun.

Data on weekly COVID-19 incidence was complete for nine out of nine countries. Data on weekly COVID-19 deaths was complete for eight out of nine countries. Data on full COVID-19 vaccination coverage was complete for eight out of nine countries (Table 4). Further data gaps are mentioned in Table 1.

Table 4: Data completeness of COVID-19 Incidence, Deaths and Full Vaccination Coverage in Australia, Canada, Germany, Indonesia, Latvia, Malta, Russia, the United States and the Vatican. Green = data available, grey = no data.

	Weekly COVID-19 Incidence per 100,00 Population	Weekly COVID-19 Deaths per 100,00 Population	Full COVID-19 Vaccination Coverage
Australia			
Canada			
Germany			
Indonesia			
Latvia			
Malta			
Russia			
United States			

Vatican			

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