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Germany Country Report

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Executive Summary

Germany is a parliamentary democracy (The Federal Government, 2021) with two politically independent levels of 1) Federal (Bund) and 2) State (Länder or Bundesländer), and has a highly differentiated decentralized system of Government and administration (Deutsche Gesellschaft für Internationale Zusammenarbeit, 2021). The 16 states in Germany have their own government and legislations which means the federal authority has the responsibility of formulating policy, and the states are responsible for implementation (Franzke, 2020). The Federal Government supports the states in dealing with extraordinary danger and the Federal Ministry of the Interior (BMI) supports the states' operations with technology, expertise and other services (Federal Ministry of Interior, Building and Community, 2020). Due to the decentralized system of government, the Federal Government does not have the power to impose pandemic emergency measures. In the beginning of the COVID-19 pandemic, in order to slowdown the spread of coronavirus, on 16 March 2020 the federal and state governments attempted to harmonize joint guidelines, however one month later State governments started to act more independently (Franzke & Kuhlmann, 2021).

In Germany, health insurance is compulsory and more than 11% of Germany's GDP goes into healthcare spending (Federal Statistical Office, 2021). Health related policy at the federal level is the primary responsibility of the Federal Ministry of Health. This ministry supervises institutions dealing with higher level of public health including the Federal Institute for Drugs and Medical Devices (BfArM), the Paul-Ehrlich-Institute (PEI), the Robert Koch Institute (RKI) and the Federal Centre for Health Education (Federal Ministry of Health, 2020).

The first German National Pandemic Plan (NPP), published in 2005, comprises two parts. Part one, updated in 2017, provides a framework for the pandemic plans of the states and the implementation plans of the municipalities, and part two, updated in 2016, is the scientific part of the National Pandemic Plan (Robert Koch Institut, 2017).

The joint Federal-State working group on pandemic planning was established in 2005. A pandemic plan for German citizens abroad was published by the German Foreign Office on its website in 2005 (Robert Koch Institut, 2017). In 2007, the federal and state Governments, under the joint leadership of the Federal Ministry of the Interior and the Federal Ministry of Health, simulated influenza pandemic exercise called LÜKEX 07, and trained cross-states and cross-department crisis management (Bundesanstalt Technisches Hilfswerk, 2007b). In 2017, within the context of the G20, Germany ran a health emergency simulation exercise with representatives from WHO and the World Bank to prepare for future pandemic events (Federal Ministry of Health et al., 2017).

By the beginning of the COVID-19 pandemic, on 27 February 2020, a joint crisis team of the Federal Ministry of the Interior (BMI) and the Federal Ministry of Health (BMG) was established (Die Bundesregierung, 2020a). On 4 March 2020 RKI published a Supplement to the National Pandemic Plan for COVID-19 (Robert Koch Institut, 2020d), and on 28 March 2020, a law for the protection of the population in an epidemic situation of national scope (Infektionsschutzgesetz) came into force (Bundesgesundheitsministerium, 2020b).

In the first early phase of the COVID-19 pandemic in 2020, Germany managed to slow down the speed of the outbreak but was less successful in dealing with the second phase. Coronavirus-related information and measures were communicated through various platforms including TV, radio, press conferences, federal and state government official homepages, social media and applications.

In mid-March 2020, the federal and state governments implemented extensive measures nationwide for pandemic containment. Step by step, social distancing and shutdowns were enforced by all Federal

States, involving closing schools, day-cares and kindergartens, pubs, restaurants, shops, prayer services, borders, and imposing a curfew. To support those affected financially by the pandemic, the German Government provided large economic packages (Bundesministerium der Finanzen, 2020). These measures have adopted to the COVID-19 situation and changed over the pandemic. On 22 April 2020, the clinical trial of the corona vaccine was approved by Paul Ehrlich Institute, and in late December 2020, the distribution of vaccination in Germany and all other EU countries.

Contents

1 Introduction

This report is a summary of the preparedness for, and the response to the COVID-19 pandemic in Germany. In addition to this report, four other reports were prepared for Norway, Sweden, the United Kingdom and Switzerland respectively, as part of the research project Fighting pandemics with enhanced risk communication: Messages, compliance and vulnerability during the COVID-19 outbreak (PAN-FIGHT).

The period covered by the report is the calendar year 2020. The report is divided into three parts. The first part provides a country overview with information on the organization of Germany's health system and its pre-COVID-19 preparedness. The second part presents the measures taken to contain the pandemic and mitigate the spread at the national (Bundesebene), federal states (Länderebene) and local levels (Landkreisebene/Stadtkreisebene). The third part of the report focuses on Germany's risk communication strategies pertaining to COVID-19.

2 Germany: Pre-COVID-19

2.1 Country Overview: Population, Governance and Health

Germany is a parliamentary democracy (The Federal Government, 2021) and has a highly differentiated and decentralised system of government and administration (Deutsche Gesellschaft für Internationale Zusammenarbeit, 2021). There aretwo politically independent levels, namely Federal (Bund) and State (Länder or Bundesländer), and three independent administrative levels of federal, state and municipality (Bund, Länder und Kommunen). The 16 states enjoy a high levels of autonomy with respect to their own government, legislation, administration, and judicial authorities, as well as a high degree of discretion, especially with regard to the implementation of federal and European Union laws (Franzke, 2020). According to this principle, the federal level is mainly responsible for policy formulation, while the states and local governments are mainly involved in policy implementation (Franzke, 2020). The organization of the governance has had key implications for the management of the pandemic, particularly on how policy decisions were made and implemented. Researchers argue/note that this complex structure of actors created the consistent implementation of communication strategies difficult (Broer et al., 2021).

Germany has Europe's strongest economy (Sharma et al., 2018) and the fourth largest economy in the world (FocusEconomics, 2021). It has a population of 83 million, 21.2 million of whom have a migration background (The Federal Government, 2021). Germany has one of the highest population densities within the European Union (German Medical Association, 2019).

Germany has traditionally held the most restriction-free and consumer-oriented health care system in Europe with patients allowed to seek almost any type of care they wish wherever they want it (Bjornberg & Yung Phang, 2019). According to The Commonwealth Fund (2010) survey, it has the shortest waiting times among the PAN-FIGHT project studied countries including Norway, Sweden, Switzerland, and the United Kingdom, for elective surgery and consultations with specialists.

In Germany, life expectancy is lower than other PAN-FIGHT project studied (WorldData, 2019), yet higher than the EU average. Despite the improvement in the health status since 2000, cardiovascular disease is the leading cause of death (42% of all deaths), and chronic conditions are the leading cause of disability-adjusted life years. Moreover, although alcohol consumption and smoking have reduced in the last two decades, behavioural risk factors such as increasing obesity remain a significant public health concern (OECD, 2017).

Table 1 Country characteristics (pre-COVID-19).

Germany			
Themes	**Indicators**	**Data**	**Any notes and references**
Population characteristics	Population size (millions)	83.1 (Destatis, 2019)	https://www.destatis.de/EN/Themes/Society-Environment/Population/Current-Population/_node.html
	Life expectancy at birth (years)	Both sexes: 81 Male: 78.6 Female: 83.3 (Worldbank, 2018)	https://data.worldbank.org/indicator/SP.DYN.LE00.FE.IN?locations=DE https://data.worldbank.org/indicator/SP.DYN.LE00.IN
	Population above the age of 65 (%)	21.1 (2015)	https://gateway.euro.who.int/en/hfa-explorer/#UskGqt3opA
	Population density (per km^2)	237.308 (Worldbank, 2018)	https://data.worldbank.org/indicator/EN.POP.DNST?locations=DE
	Official languages	German	
	Percentage of people who speak official language	Over 95% of the population speaks German	Minority languages include Sorbian, spoken by 0.09% in the east of Germany and North Frisian spoken in Nordfriesland by 0.01%, who also speak German. Danish is spoken by 0.06%, mainly in the area along the Danish border. Romani, an indigenous language is spoken by around 0.08%. Immigrant languages include Turkish, which is spoken by around 1.8%, and Kurdish, by 0.3%. http://www.bbc.co.uk/languages/european_languages/countries/germany.shtml
	Average household size (number of persons)	2.1 (UN, 2019)	Note: German households are amongst the smallest in the OECD https://www.un.org/en/development/desa/population/publications/pdf/ageing/household_size_and_composition_around_the_world_2017_data_booklet.pdf

			https://population.un.org/Household/index.html#/countries/276
	Average living floor space per person (m2)	47 (Destatis, 2019)	https://www.destatis.de/EN/Themes/Society-Environment/Housing/Tables/dwellings-germany.html
	Single person household (%)	42.3 (Destatis, 2019)	https://www.destatis.de/EN/Themes/Society-Environment/Population/Households-Families/Tables/lrbev05.html
	Living in care home (Number and/or %)	4.2% of the population 65 years and older and 11.5% of the population 80 years and older are living in a nursing home (Gaertner et al., 2019). 80+ population living in care home: 11.6 (OECD, 2017)	https://surveyinsights.org/?p=10807 https://www.researchgate.net/figure/Share-of-80-population-in-care-homes-in-various-OECD-countries_tbl1_325271960
	Urban population (%)	77 (Worldbank, 2019)	https://data.worldbank.org/indicator/SP.URB.TOTL.IN.ZS?view=chart
Prevalence of known COVID-19 risk factors in population	Cardiovascular disease (%) (mortality rates among men and women /100,000)	Men=374 Women=269 Cardiovascular diseases are the leading cause of death in Germany, causing a total of approximately 40% of all deaths(Schmitz et al., 2012)	https://www.thelocal.de/20150617/germany-among-worst-countries-for-heart-disease/ https://www.rki.de/EN/Content/Health_Monitoring/Main_Topics/Chronic_Disease/Cardiovascular_Disease/cardiovascular_disease_node.html
	Cardiovascular diseases proportional mortality (%)	37 (WHO, 2018)	https://www.who.int/nmh/countries/deu_en.pdf
	Cancer proportional mortality (%)	26 (WHO, 2018)	

	Chronic respiratory diseases proportional mortality (%)	6 (WHO, 2018)	
	Age-standardised cancer rate	313.1 (WCRF, 2018)	https://www.wcrf.org/dietandcancer/cancer-trends/data-cancer-frequency-country
	Estimated number of prevalent cases (5-year) as a proportion in 2020, all cancers, both sexes, all ages	2611.7 (IARC, 2020)	https://gco.iarc.fr/today/home
	Prevalence of diabetes (%)	7.4% (World Health Organization – Diabetes country profiles, 2016)	https://www.who.int/diabetes/country-profiles/deu_en.pdf
	Prevalence of Obesity (%)	22.7 (World Health Organization – Diabetes country profiles, 2016)	https://www.who.int/diabetes/country-profiles/deu_en.pdf
	Probability (%) of dying between age 30 and exact age 70 from cardiovascular diseases, cancer, diabetes or chronic respiratory diseases	Both sexes: 12.1 Male: 15.2 Female: 8.9 (WHO, 2016)	https://apps.who.int/gho/data/view.main.GSWCAH21v
	Estimated prevalence of sufficient physical activity levels	3-6 years: 46% 7-10 years: 27% 11-13 years: 19% 14-17 years: 12% 18-64 years: 46% > 65 years: 42% (WHO, 2018)	https://www.euro.who.int/en/countries/germany/data-and-statistics/germany
	Member of World Health Organization	yes	

Government / economy / transport	European Union membership	yes	
	Governments	Germany is a parliamentary and federal democracy. The German Bundestag, the constitutional body most present in the public eye, is directly elected by citizens eligible to vote every four years.	
	Number of states/regions	16 federal states (Bundesländer)	
	Autonomy of states/regions	The 16 states have their own government, legislation, administration, and judicial authorities, as well as a high degree of discretion, especially with regard to the implementation of federal and European Union laws.	Franzke, 2020
	GDP per capita (USD)	56278.2 (Worldbank, 2019)	https://data.worldbank.org/indicator/NY.GDP.PCAP.PP.CD
	Unemployment level (%)	4.5 (Destatis, 2020)	https://www.destatis.de/EN/Themes/Labour/Labour-Market/_Graphic/_Interactive/unemployment-rates-eu-27.html
	Inequality (Gini index)	31.9 (Worldbank, 2016)	https://data.worldbank.org/indicator/SI.POV.GINI
Social security	Sick pay (weekly pay and length)	When people fall ill and have been employed continuously for four weeks beforehand, then they are entitled to sickness benefits from the day on which medical doctors determines they are is unable to work for six weeks.	https://www.vdk.de/deutschland/pages/themen/artikel/gesundheit/73840/krankengeld_die_wichtigsten_regeln?dscc=ok

		Health insurance companies pay for a maximum of 78 weeks for the same illness. However, if employers pay for sickness benefits for the first 6 weeks, health insurance companies pay said benefits for 72 weeks. Sick pay is 70 percent of gross earnings, but a maximum of 90 percent of net earnings. Anyone who is unable to work after 78 weeks, should register as unemployed - if he or she is entitled to a disability pension. (Vdk, 2020)	
	Sick pay (freelance and self-employed) (weekly pay and length)	"If you are self-employed, you can receive sickness benefit starting the 7th week of being ill for up to 78 weeks under public health insurance. In case you want to receive payment also before the 7th week, you would need to buy additional health insurance to cover that period".	https://www.mylifeingermany.com/sick-leave-germany/
Health infrastructure	Acute care beds per 100,000	621 (WHO,2014)	https://gateway.euro.who.int/en/hfa-explorer/#UskGqt3opA
	Intensive care beds per 100,000*	33.9 (OECD, 2017)	https://www.oecd.org/coronavirus/en/data-insights/intensive-care-beds-capacity

2.2 Organisation of health system

The primary responsibility of the Federal Ministry of Health ("Bundesministerium für Gesundheit" – BMG) is to develop health policy at the federal level in Germany. This sector is regulated by the Joint Federal Committee (Expatica, 2021). The Federal Ministry of Health supervises and directs several institutions which deal with higher-level issues of public health. These institutions include: (1) the Federal Institute for Drugs and Medical Devices (BfArM), which manage the approval of

pharmaceuticals, (2) the Paul-Ehrlich-Institut (PEI), which is the Federal Institute for Vaccines and Biomedicines, (3) the Robert Koch Institute (RKI) which is the government's central scientific institution in the field of biomedicine (Robert Koch Institut, 2021), and (4) the Federal Centre for Health Education (BZgA) (Federal Ministry of Health, 2020; NCBI, 2015). Figure 1 provides a visual representation of the structure of the healthcare system in Germany.

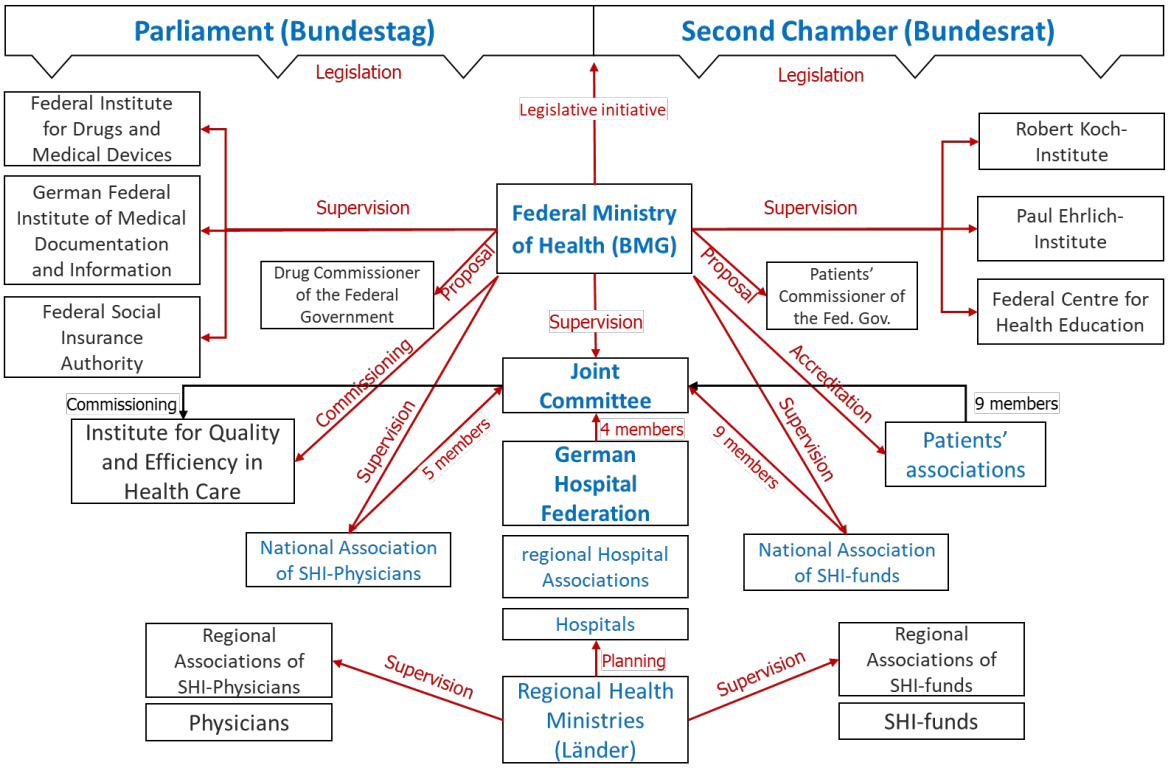

Figure 1 German System of Healthcare (Federal Ministry of Health, 2021)

Germany has a self-administered healthcare system. Each state defines the framework of responsibilities for medical care. Self-administration is then carried out jointly by four leading organisations: (1) the National Associations of Statutory Health Insurance, (2) representatives of doctors, dentists, psychotherapists, (3) the German Hospital Federation, and (4) representatives of the insurance sector. Its supreme decision-making body is the Federal Joint Committee or G-BA, which defines the guidelines for healthcare services and what treatments are covered by statutory health insurance or so-called Gesetzliche Krankenversicherung (GKV) (Federal Ministry of Health, 2020; Gemeinsamer Bundesausschuss, 2021).

Healthcare is funded by statutory and private schemes. The statutory health insurance's service has two large sectors of ambulatory care and inpatient care, where ambulatory care includes primary care and highly specialised outpatient services (Busse et al., 2017) .Outpatient medical care is provided by general practitioners and specialists in private practice, and has played an important role during the coronavirus pandemic to support hospitals with testing and taking care of people with mild symptoms (Franzke & Kuhlmann, 2021).

Health insurance has been compulsory since January 2009 for everyone registered or usually resident in Germany. Employees earning less than 5,212.50 euros per month (as of 2020) are required to have statutory health insurance. Those earning more than this are able to voluntarily decide between

statutory or private health insurance (Federal Ministry of Health, 2020). In 2020, 87.7% of the population held statutory health insurance. The general contribution rate in the statutory health insurance is 14.6% of one's salary, of which employers pay half. Since contributions are salary-based percentages, individuals with higher incomes contribute more to statutory insurance but have the same insurance coverage as those with lower incomes. Doctors, hospitals and pharmacies directly receive payment from statutory insurance without patients paying out-of-pocket payments of their medical treatment (Federal Ministry of Health, 2020; German Medical Association, 2019). The cost of private health insurance depends on various factors such as insurance holders' age, specific risk factors, and the type of private coverage (Federal Ministry of Health, 2020)

According to OECD (2017) Germany spends a 11.2% of its GDP on health and In 2019, health expenditure in Germany amounted to 410.8 billion euros, or 4,944 euros per inhabitant (Federal Statistical Office, 2021).

Germany has 813 beds per 100,000 people, which is the highest ratio in the EU. Nevertheless, the ratio of physicians to bed is comparatively low (OECD, 2017). The number of critical beds per 100,000 inhabitants in 2020 was 33.9, and acute care hospital beds per 100,000 people was about 600 beds (OECD, 2020). According to Haarhoff (2020), the occupancy rate in the intensive care units in mid-march 2020 was 70% to 80% with potential to increase the number of intensive care beds. This means that about 100,000 hospitals beds were available and another 50,000 beds could have been added (Franzke & Kuhlmann, 2021). The number of physicians per 1,000 people was 4.6 in 2019 (The German Medical Association, 2019)

2.3 Pandemic Preparedness for Germany Prior to COVID-19

The first country "Federal Health Office Guideline for the Detection, Prevention and Control of Hospital Infections" was published by the German Federal Health Office in 1976 (Frank et al., 2001). Since 2001, systematic pandemic planning has been carried out by the federal and state governments in Germany (Schaade et al., 2010). In October 2001, the Federal Ministry of Health (BMG) commissioned RKI to establish an expert group on influenza pandemic planning. This expert group drew up a pandemic plan that considered the federal structure of the Federal Republic of Germany and the fundamental responsibility of the states (Länder) and municipalities (Kommunen) for the implementation of infection and disaster control measures. This resulted in the publication of the first German National Pandemic Plan (NPP) in 2005 by the public health journal "Bundesgesundheitsblatt" (Robert Koch Institut, 2017; Schaade et al., 2010) within the portfolio of the Federal Ministry of Health (Robert Koch Institut, 2016c). A revision of the NPP was published in 2007 (Robert Koch Institut, 2017). In April 2009, during the A(H1N1) pandemic, the National Pandemic Plan was tested (Robert Koch Institut, 2017).

The German National Pandemic Plan (NPP) consists of two parts.

Part one:

The first part has been prepared by the Supreme State Health Authorities in cooperation with the Federal Ministry of Health, the Robert Koch Institute, the Paul Ehrlich Institute and the Federal Centre for Health Education. It provides a framework for the pandemic plans of the states and the implementation plans of the municipalities. It is aimed primarily at those responsible and accountable authorities at the federal, state, and local levels (Robert Koch Institut, 2017).

In addition to the National Pandemic Plan, all 16 states have their own Pandemic Influenza Plan. For example, the Influenza Pandemic Plan of the state of Baden-Württemberg was created in May 2009 at

the beginning of the first influenza pandemic A(H1N1), and is aligned as far as possible to the National Pandemic Plan Part 1, and is primarily aimed at authorities, but also at other institutions and persons involved in the event of a pandemic, such as hospitals or physicians in private practice (Ministry of Social Affairs, Health and Integration Baden-Württemberg, 2020).

The aims of the National Pandemic Plan and the 16 states' pandemic plans are similar, namely: (1) reducing morbidity and mortality in the general population, (2) ensuring that sick people are cared for, (3) maintaining essential public services, and (4) providing reliable and timely information for political decision-makers, specialists, the public and the media (Ministry of Social Affairs, Health and Integration Baden-Württemberg, 2020). In 2017, the National Pandemic Plan Part 1 was updated by applying the lessons learned from 2009 pandemic as well as the content of the Pandemic Influenza Risk Management - WHO Interim Guidance 2013 (Robert Koch Institut, 2016b).

The various pandemic plans include the following important steps (Robert Koch Institut, 2017):

1. Interpandemic period
    - Planning/preparedness (e.g., establish communication strands, create pandemic plans at all levels, determining responsibilities)
    - Risk assessment/early detection (e.g., surveillance of humans and animals, risk analysis)
    - Raising awareness among the population/involvement of key stakeholders (e.g., improvement of vaccination readiness, early involvement of the press and media)
2. First individual cases and the start of transmission in the population
    - Assessment of the situation (e.g., intensified monitoring and risk assessment)
3. Continued transmission in the population
    - Assessment of the situation (e.g., activation of crisis structures)
    - Influencing the dynamics of propagation to reduce spread (e.g., contact reduction and encouraging populations to adopt behavioural measures related to social interaction and hand hygiene)
    - Special measures (e.g., contact tracing, vaccinations)
    - Consequence reduction (e.g., rapid medical care, creation of additional treatment capacities)
    - Information of decision-makers and population (e.g., regular communication with decision-makers and mass media)

4. Transition to an interpandemic period
    - Acquisition of knowledge and optimisation (e.g., evaluation of the pandemic and measures takes, preparation for future)

Since the publication of the pandemic plan, preparations for an influenza pandemic have been strongly advanced by the federal and state governments, particularly with regard to the stockpiling of antiviral drugs and the contractual commitment of vaccine production capacities (Robert Koch Institut, 2017).

To coordinate federal and state measures, a joint federal-state working group on pandemic planning (BundLänderArbeitsgruppe Pandemieplanung) was established in 2005. Initially, the group had representatives from five states, but expanded to include all 16 states in 2006. Following the initial publication of the NPP in 2005, an influenza pandemic planning task force was established at the RKI. In 2006, States finalized their pandemic plans and the Influenza Pandemic Commission (Influenzakommission für den Pandemiefall) was appointed to provide technical advice to the RKI in the event of a pandemic. In 2005, the German Foreign Office published a pandemic plan for German citizens abroad on its website (Robert Koch Institut, 2017).

In the event of an influenza pandemic, the Interministerial Coordination Group, at the Federal Office of Civil Protection and Disaster Assistance (Interministerielle Koordinierungsgruppe am Bundesamt für Bevölkerungsschutz und Katastrophenhilfe) coordinates federal and state action, which has three essential tasks:

- Joint situation assessment, risk assessment and forecasting
- Jointly supported, situation-adapted recommendations for action
- Coordinated federal and state communication strategy.

Within the state, the State Ministry of Social Affairs and Integration coordinates the planning of medical care (Ministry of Social Affairs, Health and Integration Baden-Württemberg, 2020). However, the Federal Government has responsibility for the procurement and general distribution of pandemic vaccination and states are responsible for correct storage and distribution at the local level.

In the event of an escalation of a pandemic, it is possible to switch from the existing constitutional emergency regulations to a disaster mode and apply civil protection laws of the federal states (Franzke, 2020).

Part two:

The second part of the National Pandemic Plan (updated in 2016), is the scientific part which is divided into 9 chapters. It serves as a technical basis for decisions on measures to prepare for the event of a pandemic, as well as measures in the event of a pandemic (Robert Koch Institut, 2016a). It describes the current scientific knowledge on pandemic influenza preparedness planning and response to pandemic. However, Part 1 contains all action statements and recommendations for interventions or implementation (Robert Koch Institut, 2016a, 2016b).

In preparation for an emergency, the federal government puts its crisis management system to test every two years. The resulting federal Government and the federal states special exercise "Länderübergreifende Krisenmanagement Übung = LÜKEX" (Transnational Crisis Management Exercise) is a cross-departmental and transnational crisis management exercise. It offers all partners the chance to practice their processes, skills and reactions (Federal Ministry of Interior, Building and Community, 2020).

In 2006, two planning exercise meetings of the Interministerial Coordination Group of the Federation and the Länder (IntMinKoGr) were held to test pandemic scenarios for Germany and to practice efficient interaction between federal and state crisis management personnel (The Federal Ministry of the Interior, Building and Community, 2015). In November 2007, federal and state governments, under the leadership of the Federal Ministry of the Interior (BMI) and with expert advice from the Robert Koch Institute, jointly conducted training in cross-state and cross-departmental crisis management. The exercise, LÜKEX 07 (Länderübergreifendes Krisenmanagement Exercise) in which seven federal states participated, simulated an influenza pandemic. The Bundesanstalt Technisches Hilfswerk (THW[1]) was involved in the exercise, sending task forces from five national associations as well as the THW management. The focus of LÜKEX 07 was on the cooperation of public and private health systems, police and non-police security, civil-military cooperation and the involvement of private companies

[1] THW has a unique structure. It belongs to the department of the Federal Ministry of the Interior but only 1% of the staff are full time employees and 99% or more than 80,000 people are volunteers. Its aim is to provide professional help to people in disaster Bundesanstalt Technisches Hilfswerk (2021).

and organisations for the effective protection of the population in the event of a crisis situation. After this exercise the German Federal Minister of Health, Ulla Schmidt, said Germany achieved a high level of precaution for an influenza pandemic (Bundesanstalt Technisches Hilfswerk, 2007a; Bundesgesundheitsministerium, 2017; Robert Koch Institut, 2017). One of the focuses of this exercise was on the psychological aspects of an influenza pandemic, and the results showed scientific research in this area is still very limited (Neumann et al., 2021).

In 2017, Hermann Gröhe, a former Federal Minister of Health during Germany presidency of G20 in Berlin said, "The wellbeing of all people – in industrialised, emerging and developing countries alike – depends on whether we manage to effectively address global health challenges" (Federal Ministry of Health, 2017). That same year, within the context of G20 and as part of the first ever meeting of the G20 Health Ministers, Germany decided to run a health emergency simulation exercise with representatives from WHO and the World Bank to rehearse and be better prepared for future transnational pandemic event (Federal Ministry of Health et al., 2017). This simulation provided an opportunity to raise awareness and promote understanding of the key issues, and to improve coordination, crisis management structure, preparedness and response capacities at all levels of local, national, regional and global (Federal Ministry of Health et al., 2017). According to the Federal Ministry of Health et al. (2017), the World Health Organisation identified this exercise as a central component in the validation of core capacities under the International Health Regulations Monitoring and Evaluation framework (2005). The simulation imagined a respiratory virus turning into a global pandemic. For this simulation, the characteristics for the influenza viruse included typical features such as droplet transmission through direct and indirect contact, referred to as "known knowns" by ECDC (Robert Koch Institut, 2016b). The simulation virus caused shortness of breath, fever and dry cough and many patients required intensive care, with high fatalities.

With some 13 million dollars, Germanyis the largest contributor to the WHO Contingency Fund for Emergencies (CFE), set up in 2015. Furthermore, in 2017 for the first time, Germany volunteered an additional contribution to the WHO, with 35 million euros out of the Federal Ministry of Health budget. As part of the Global Health Programme, The Health Ministry also deploys experts to provide in-country support in crisis situations, and help in the prevention of outbreak diseases (Federal Ministry of Health, 2017).

Prior experience with pandemics

H1N1:

On 17 March 2009, the first A(H1N1) influenza virus infection, commonly referred to as the 'swine flu', was documented in Mexico (Rossman, 2020). On 29 April 2009, as the WHO raised the level of influenza pandemic alert from phase 4 to phase 5 and asked all countries to immediately activate their pandemic preparedness plans (Centers for Disease Control and Prevention, 2019), the first three cases of A(H1N1) virus were confirmed in Germany (Ministry of Social Affairs, Health and Integration Baden-Württemberg, 2020). No new cases were reported after August 2010, but the first fatality was reported on 25 September 2010 (Husemann & Fischer, 2015; Wilking et al., 2010).

Poggensee et al. (2010) divide the A(H1N1) pandemic into two periods, namely the initial and the acceleration period. In Germany, the initial period was from week 18 to 41 of 2009 (end of April till the beginning of October) with 44% of the reported influenza cases, and the acceleration period from week 42 to 45, with 56% of the reported cases. Almost 61% of the cases in the first period were travel-related

as it coincided with school holidays, whereas about 94% in the second-period cases were autochthonous.

Figure 2 shows the pandemic A(H1N1)influenza trend in Germany as of 11 November 2009 (Poggensee et al., 2010). The first peak occurred in week 31, where most of the cases were imported, while in the second peak, which was in week 45 (Fig. 2), hardly any cases were imported. Moreover, in week 44, fatality increased for the first time, and in week 47 the first peak of the acceleration period occurred, with 37 fatalities and 45,000 infected cases recorded. The second peak of the acceleration periode occurred in the last week of 2009 and week 1 of 2010, with 20 deaths per week (Husemann & Fischer, 2015; Wilking et al., 2010).

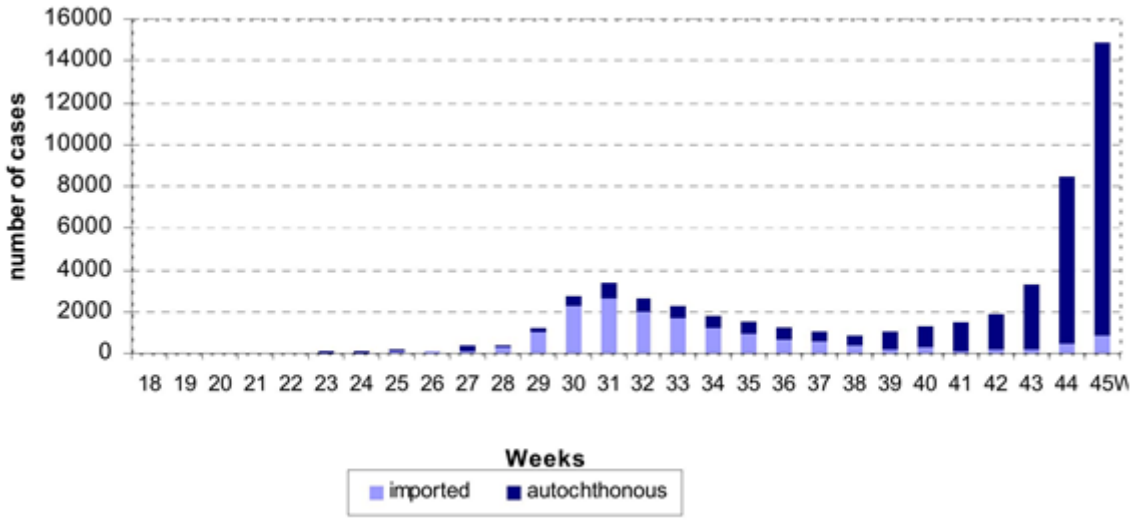

Figure 2 Pandemic influenza A(H1N1) cases in Germany, 2009 (Poggensee et al., 2010)

Despite 252 laboratory-confirmed fatal cases between April 2009 and March 31 2010, Wilking et al. (2010) say the mortality in Germany was one of the lowest in Europe.

The most frequent symptoms of H1N1 influenza were fever in 81% of the cases and cough in 78% (Poggensee et al., 2010), however, immunosuppression, diabetes and respiratory diseases were among the mains causes of fatality (Wilking et al., 2010).

The following table shows the distribution of fatalities by age and gender in Germany due to pandemic influenza A(H1N1) between 29 April 2009 till 31 March 2010, as reported by Wilking et al. (2010).

Table 2 Fatalities by age and gender due to influenza A(H1N1)

Age	0-1	2-4	5-14	15-34	35-59	59 <	Total
Number of cases	6	4	19	42	130	51	252
Percentage male	66	50	21	57	62	63	58

In October 2009, after authorising three vaccines against pandemic influenza A(H1N1) by the European Medicines Agency (EMA), the federal states purchased the AS03 (Adjuvant System 03) H1N1 vaccine. The German federal states were responsible for the implementation of the vaccination campaign and

the distribution of the vaccine. Vaccines were administered by primary healthcare physicians, and in some places by public health departments or company physicians (Walter et al., 2011).

On 26 October 26 2009, the German Standing Committee on Vaccination (STIKO) recommended that healthcare workers, persons with underlying chronic diseases, and pregnant women were included in the priority group for vaccination, and the vaccination campaign began. By mid-December 2009, 40 million doses of the AS03 vaccine, sufficient to cover nearly half of the population, were available and vaccination was expanded to the general population. One full dose of vaccine for people over the age of 10 was recommended by the German regulatory authority (Walter et al., 2011). Between week 47 in 2009 and week 14 in 2010, Walter et al. conducted telephone interviews with 13,010 people in the age range of 14 to 93, where about 52% of interviewees were women. The aim of these interviews was to monitor the immunization status and intention to receive vaccination. The result of this study showed the number of people who were undecided reduced over the time and meanwhile vaccination coverage increased (Figure 3).

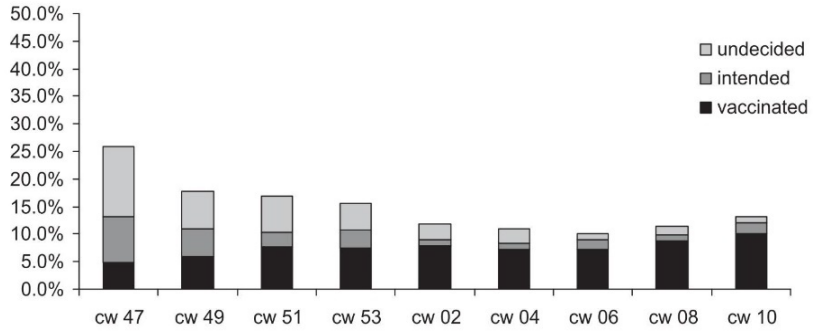

Figure 3 Status and intention to receive vaccination against Influenza H1N1. cw refers to the calendar week (Walter et al., 2011)

Measles:

Between 1 January 2016 and 31 March 2019, Germany had 2,093 measles cases and was among the top five EU/EEA countries in the number of infections (ECDC, 2019). To ensure full community protection from measles, researchers state that at least 95% of the population needs to be immune through prior exposure to the virus or receiving two doses of vaccination (Thornton, 2019).

In Germany, the Measles Protection Act came into force in March 2020, and according to this law, Measles vaccination has become mandatory. This applies to all children and staff at kindergartens, schools and daycares, residents at refugee shelters and holiday camps, and clinics. In Germany, children's attendance at school is mandatory, therefore children cannot be excluded from schools. However, schools are require to report children without vaccine to their local public health offices. The fine for vaccine omission is up to 2500 euros. Daycare facilities can avoid registering younger children (Bauomy, 2020; DW, 2019). The obligation to vaccinate and provide evidence only applies to people who were born after 31 December 1970 (Kassenärztliche Bundesvereinigung, 2021). This is the first mandatory vaccine in Germany in the last few decades (Neufeind et al., 2021).

Shortly before the adoption of the mandatory vaccine law, Neufeind et al. (2021) conducted a survey among physicians in Germany. Approximately 86% of 2,229 physicians in this survey were in favour of the mandatory measles vaccine for children.

However, in 2021 there are four constitutional complaints against the measle mandatory vaccine in Germany, and the Federal Constitutional Court will decide about continuing to retain it in the near future (Wortmann, 2021).

3 Germany's Response to COVID-19

3.1 The First Known Case and Progression of COVID-19 in Germany

On 27 January 2020, the first coronavirus case was identified in the Bavaria region of Germany, and the first two death cases were confirmed on 9 March 2020 (Ritchie et al., 2020). Germany faced the first COVID-19 wave during spring, in the weeks 10 to 22 of 2020, with a mortality of about 8,000. The second wave began in October 2020 and lasted until mid-February 2021 (week 41-7) with about 56,000 deaths in this period (Weber, 2021). The third wave in Germany started in March 2021 and the country faces more waves in 2021.

The rapid response to the corona pandemic with the early development of a new laboratory test to detect the coronavirus in January 2020 at Charité – Universitätsmedizin Berlin by Corman et al. (2020), a good public health care system, and expert scientific institutions helped Germany slow down the speed of outbreak in the early phase (Wieler et al., 2021b). Additional factors that influenced the low number of corona cases at the beginning of the pandemic include a containment strategy for elderly people (such as social distancing and doing more tests), and changing the hospitals'/clinics' capacity usage (Wieler et al., 2021b). For example, on 12 March 2020, the Federal Minister of Health asked all hospitals to recruit additional staff as a result of the corona crisis. He also asked clinics to postpone planned operations and interventions to create capacity to treat people with severe respiratory diseases. Two months later, the Federal Minister of Health together with the federal states decided on reusing 25-30% of capacity for non-corona treatments in hospital care from May 2020 (Bundesgesundheitsministerium, 2020b).

In the summer of 2020, there were several outbreaks linked to slaughterhouses and travellers returning from abroad. However, by October 2020 the origin of corona cases were mostly domestic and resulted mostly from exposures in households, nursing homes, and religious events (Wieler et al., 2021a).

Table 3, and figures 4 and 5 are extracted from the online database of Ritchie et al. (2020) and WHO (2021).

Table 3 Statistics on cases and mortality in Germany

Event	**Date (Ritchie et al., 2020)**
First known case	27 January 2020
First known death	09 March 2020
Peak of wave 1 (cases) 7-day average	02 April 2020, with 5,792 cases
Peak of wave 1 (deaths) 7-day average	21 April 2020, with 248 deaths
Peak of wave 2 (cases) 7-day average	23 December 2020, with 25,757
Peak of wave 2 (deaths) 7-day average	13 January 2021, with 894 deaths
Cumulative Recorded Cases (by specimen date)	**Date surpassed (WHO, 2021)**

100	01 March 2020
10.000	20 March 2020
50.000	29 March 2020
100.000	08 April 2020
150.000	24 April 2020
200.000	16 July 2020
250.000	07 September 2020
300.000	5 October 2020
400.000	23 October 2020
500.000	31 Oct. 2020
1.000.000	27 November 2020
1.500.000	21 December 2021
2.000.000	15 January 2021
Cumulative Recorded Deaths	**Date surpassed**
100	24 March 2020
1.000	3 April 2020
10.000	24 October 2020
20.000	10 December 2020
30.000	28 December 2020
50.000	22 January 2021

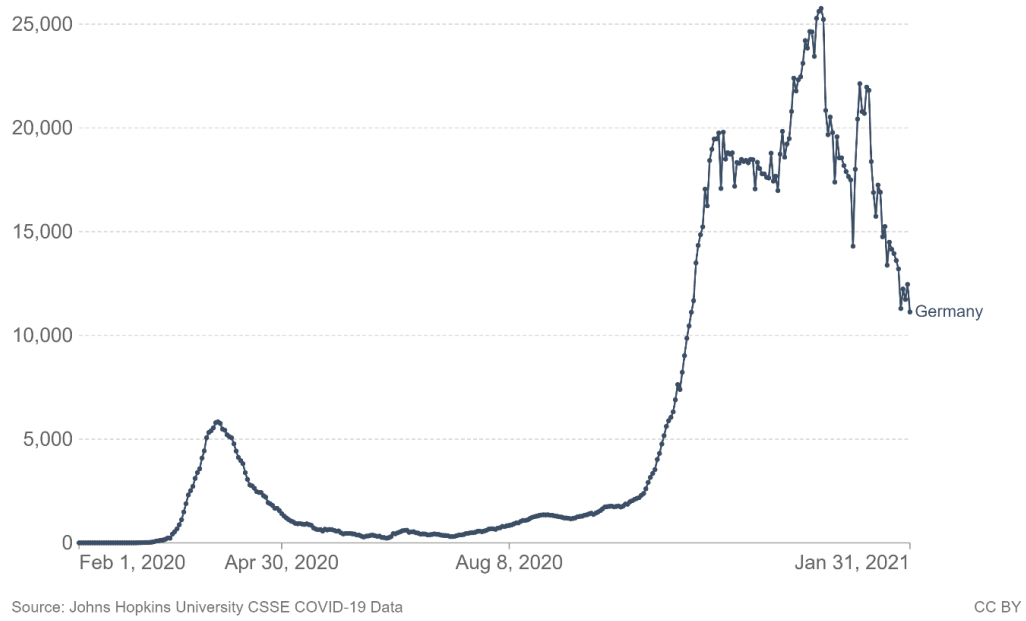

Figure 4 Daily corona confirmed case in 2020 based on the rolling 7-day average (Ritchie et al., 2020)

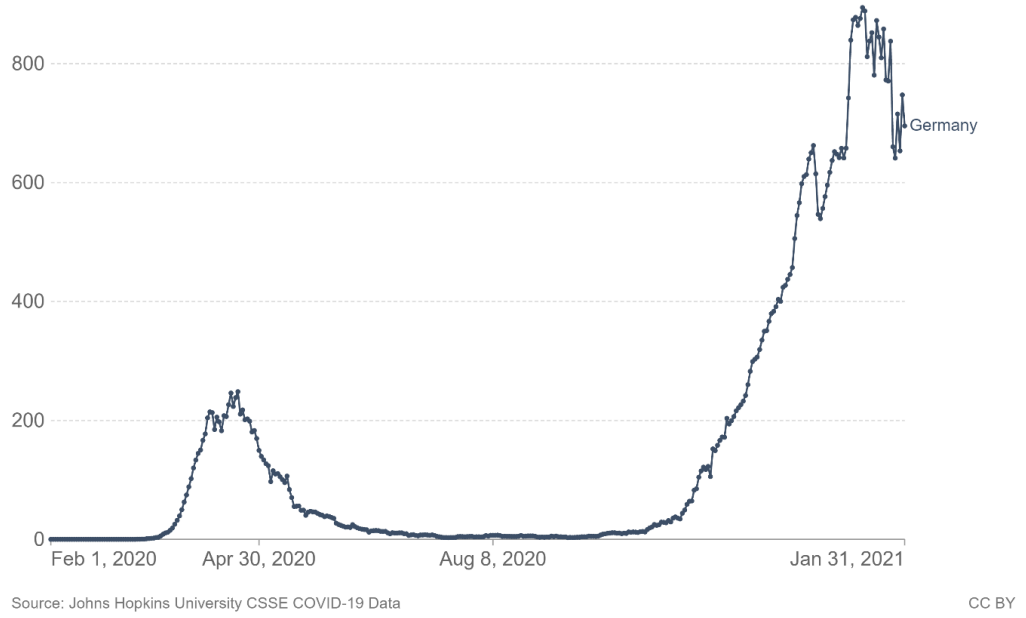

Figure 5 Daily corona confirmed deaths in 2020 (Ritchie et al., 2020)

3.2 Emergency COVID-19 Related Legislation

According to Franzke (2020), between January 2020 and mid-August 2020 the federal and state governments issued more than 350 laws, regulations, orders, and notices to contain the COVID-19 pandemic, including lists of fines for related violations. Here are some of the most important legal changes:

- On 16 January 2020, about 10 days before the first corona case in Germany was reported, ten risk assessment and technical guidelines as well as various documents, all related to contact tracing, testing, hygiene and management of disease were made available by public health infrastructure in Germany (Wieler et al., 2021b).
- On 4 March 2020, RKI published a Supplement to the National Pandemic Plan - COVID-19 - novel coronavirus disease which are specific recommendations and measures for coping with the COVID-19 events in Germany (Robert Koch Institut, 2020d)
- On 27 March 2020, two legislative packages received the approval of the Bundesrat (Federal Council which represents the Länder), following the resolution of the German Bundestag (German federal parliament). These two are including “COVID-19 Hospital Relief Act”, and the "Law for the Protection of the Population in the Event of an Epidemic Situation of National Concern" (Bundesgesundheitsministerium, 2020a; Robert Koch Institut, 2020c). The Law for the Protection of the Population gave the Federal Government far-reaching, time-limited powers to manage the crisis (Franzke, 2020) .
- On 28 March 2020, law for the protection of the population in an epidemic situation of national scope came into force (Bundesgesundheitsministerium, 2020b; Franzke & Kuhlmann, 2021).
- On 22 May 2020, the Bundestag, with the consent of the Bundesrat (Federal Council), passed a second law on the protection of the population in the event of an epidemic situation of national concern (Bundesgesetzblatt, 2020). The aim was to protect particularly vulnerable people as much as possible from infection with the coronavirus and to gain better insight into the course of the epidemic (Bundesgesundheitsministerium, 2020b).
- On 18 November 2020, the Federal Parliament and the Bundesrat passed the amendments to the Infection Protection Act laid out in the ‘Third Act for protecting the Public in an Epidemic Situation of National Importance’ (European Observatory on Health Systems and Policies, 2021)

3.3 Coordination of Response within Germany

According to the Federal Government (Die Bundesregierung, 2020a), the COVID-19 pandemic has changed the way the Federal Government and its employees work. As an example, meetings switched to digital, and followed by severe changes later on in 2021.

On 27 February 2020, the Federal Ministry of the Interior (BMI) and the Federal Ministry of Health (BMG) established a joint crisis team to directly deal with Corona crisis (Fig. 6) (Die Bundesregierung, 2020a).

A summary of Bopp and Schibberges (2020) explaination about the corona crisis organisational chart is as follow:

- From the beginning of the pandemic, strategic leadership was with a “small corona cabinet”. The small corona cabinet met on Mondays. Its members were the Federal Chancellor and the head of the German Chancellery as well as the Ministers of Defence, Finance, Interior, Foreign affairs and Health. Important decisions pertaining to the crisis are made by this small corona cabinet and passed to secretaries of state for implementation.
- The “big corona cabinet” met on Thursdays. In addition to the small cabinet members, ministers responsible for the topics to be discussed were also invited to attend, e.g. the Minister of Agriculture would be invited for topics concerning the harvest season, for example.

- Regular legislation continues to be the responsibility of the (regular) Cabinet meeting on Wednesdays. Cabinet members were involved in decisions requiring a formal Cabinet decision. In addition, the current situation regarding the Corona crisis was presented at Cabinet meetings.
- The “joint crisis team”, consist of the Federal Ministry of the Interior (BMI) and the Federal Ministry of Health (BMG), met on Tuesdays and Thursdays and was responsible for the operational implementation of cabinet resolutions and also for preparing situation reports and coordinating requests for assistance from the federal states. It was chaired by State Secretaries Hans-Georg Engelke (BMI) and Dr. Thomas Steffen (BMG). Additional members are staff from the AA, BMVg, Federal Ministry of Economics (BMWi), Federal Ministry of Transport (BMVI) and the Federal Chancellery as well as liaison officers from the Federal States.
- The newly created procurement unit headed by the BMG assisted the joint crisis team with the purchase and logistics of required goods, mainly protective equipment. Except for the BMG, the BMF (finance), the AA (foreign affairs) and five major German companies are involved in this unit.
- A Task Force with representatives from the BMG, BMI, AA, BMVg, BMWi, BMVI and the Federal Chancellery ensured the rapid processing of procurement topics in-house
- In addition, a "Production of Medical Protective Equipment in Germany" staff was established by the BMWi and BMG under the leadership of the BMWi.

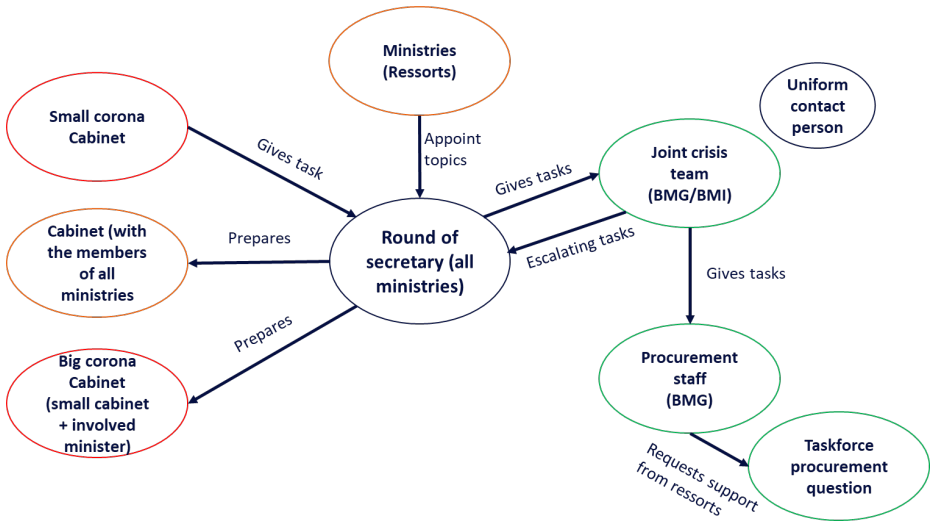

Figure 6 Government action in times of COVID-19. Adopted from Die Bundesregierung (2020a)

- Decision-making for pandemic responses

Generally, due to the decentralized system, the Federal Government is limited to monitoring, surveillance, research and legislative functions, and the main responsibility for combating the pandemic lies with subnational and local institutional actors, self-governing bodies and sub-state authorities. Länder (states) ministries of health are institutionally assigned with tasks such as supervision of professions and health care facilities as well as health protection and aid (Franzke & Kuhlmann, 2021). In the beginning of the COVID-19 pandemic, the Federal Government recommended the social distancing policy and protecting the population in Germany, with states individually deciding how to implement the regulations in detail in their territories. For instance, this included decisions about whether and when to close the schools, shopping centres, restaurants and museums.

Based on the principle of subsidiarity, municipalities are responsible for their local residents, then the states, or Länder (Federal Ministry of Health, 2020). On 25 March 2020, the Bundestag (the German Federal Parliament), stated that the new type of coronavirus SarsCoV-2 had created an epidemic situation of national importance in Germany (Franzke, 2020). However, as the result of the decentralized Government, the Federal Government does not have the power to impose pandemic emergency measures, including shutdown and lockdown during the corona crisis. It is the state-level authorities that have the authority to impose restrictions on their population (Franzke & Kuhlmann, 2021).

On 16 March 2020, the federal and state Governments attempted better harmonization with joint guidelines to slow down the coronavirus spread. This was only partly successful and some states decided to impose the lockdown on 21 March 2020. On 15 April 2020, State governments were granted more freedom in self-determination at a local level (Franzke & Kuhlmann, 2021). These guidelines were primarily aimed at authorities, but also at other institutions and persons involved in the event of a pandemic, such as hospitals or physicians in private practice (Ministry of Social Affairs, Health and Integration Baden-Württemberg, 2020).

According to Wieler et al. (2021b), the quality of response in Germany was measured by three main indicators: 1) infection rate, 2) disease severity, and 3) health system capacity.

- Characteristics of the task forces

In the event of a pandemic, when a disease spreads across countries or even continents, the Federal Ministry of the Interior forms a joint crisis team with the Federal Ministry of Health (Federal Ministry of Interior, Building and Community, 2020). Please refer to figure 6 and its explanations for more detail.

At the start of the pandemic, the Federal Ministry of Education and Research (BMBF) allocated 150 million euros to gather all relevant expertise to support COVID-19 related research across the country, aiming to steer and coordinate the activities of the various stakeholders from academic medicine and politics (Charité – Universitätsmedizin Berlin). The COVID-19 Public Health Research Network, an ad hoc consortium of more than 25 active scientific societies and organisations in the field of public health, was established on 5 April 2020. This research network brings together expertise in research methods, epidemiology, statistics, social sciences, demography, and medicine (COVID-19 Public Health Research Network, 2021).

- A brief overview of the key political/medical/experts figures and institutions

In June 2020, Arnold (2020) emphasized that the relatively positive course of the infection in Germany had been due to the effective cooperation of political decision-makers and scientific advisors. Medical experts have been involved in policy advice more than previously, in particular virologists, epidemiologists, intensive care physicians, infectious disease specialists, hygienists and interdisciplinary bodies with a strong focus on medicine, biological and natural sciences.

Below is a list of some of the organisations and public figures advising decision makers during the corona pandemic (Arnold, 2020):

- RKI with its president Prof. Lothar Wieler rose to become the leading advisory institute, with close connections to the Federal Government and a strong media presence.

- Deutsche Akademie der Naturforscher Leopoldina (German National Academy of Sciences Leopoldina). The mission and working methods of the Leopoldina differ from RKI. Since 2008, the National Academy of Sciences also advises politicians.
- The Helmholtz Initiative "Systemic Epidemiological Analysis of the COVID-19 Epidemic" and the Expert Council of the North Rhine-Westphalia (NRW) state government also acted as policy advisors. The Helmholtz Initiative was more homogeneous in terms of expertise, and the NRW Expert Council acted closer to policy than the Leopoldina. The methodological approaches also differed from those of the Leopoldina, and the recommendations of both bodies were correspondingly more concrete.
- Der Deutsche Ethikrat (German Ethics Council). The German Ethics Council also presented recommendations on the corona crisis (The German Ethics Council, 2020). A range of further analyses and advice were provided by other scientific institutions - not only on medical and social aspects (Franzen, 2020), but also from an economic perspective.
- Among other policies, a policy paper on "strategy for containing the COVID-19 pandemic" presented at the end of April 2020, by the presidents of the four major science organisations, the Max Planck Society, the Fraunhofer Society, the Helmholtz Association and the Leibniz Association (Arnold, 2020; Pfützner, 2020).

Some of the public figures in 2020: Mr Jens Spahn, Federal Minister of Health; Professor Christian Drosten, Director of the Institute of Virology at Charité; Professor Alexander Kekulé, Director of the Institute of Medical Microbiology at the University Hospital Halle; Professor Alena Buyx, the chairman of the German Ethics Council; Professor Lothar Wieler, President of the Robert Koch Institute; Professor Hendrik Streeck, Director of the Institute of Virology at the University Hospital Bonn, Professor Karl Lauterbach, member of the federal parliament, Professor Melanie Brinkmann at the Helmholtz Center, and Professor Thomas Mertens, the chairman of the Standing Vaccination Commission (STIKO) at the Robert Koch Institute.

- Personal protective equipment (PPE)

Like many other nations, Germany was affected by the global shortages of key protective supplies such as face mask at the beginning of the Covid-19 pandemic in 2020. On 4 March 2020, the crisis team noted the extraordinary urgency of procuring medical protective equipment (Bundesgesundheitsministerium, 2020c).

On 3 April 2020, the Federal Ministry of Health announced the arrival of 37 million masks in Germany (Bundesgesundheitsministerium, 2020b) and on 7 April 2020, the first eight million face masks from China were delivered (deutschland.de, 2021)

On 3 and 4 March 2020, the export of medical protective equipment was forbidden and medical protective equipment for medical practices, hospitals and federal authorities was stockpiled centrally. Moreover, pharmacists were allowed to manufacture hand disinfectants and market them with no quantitative limit (Bundesgesundheitsministerium, 2020b). By 22 April 2020, 108 million protective masks and 50 million gloves had been purchased and were being distributed to hospitals and doctors (Die Bundesregierung, 2020b)

3.4 Timeline of Mitigation Measures

An overview of the implementation of mitigation measures is presented in this section. However, these measures have adopted to the COVID-19 situation and changed over the pandemic. These changes are not described in detail in this report.

On 26 February 2020, various states, with the support of RKI and the Federal Ministry of Health, set up crisis teams. One day later, the Federal Government set up an inter-ministerial national crisis management group.

On 12 March 2020, the Federal Minister of Health asked all hospitals to recruit additional staff and postpone planned operations and interventions where possible.

On 20 April 2020, medical students and personnel from other areas of public administration were recruited to support staff of the health service in following up the contacts of infected persons (Bundesgesundheitsministerium, 2020b).

On 27 April 2020, a decentralized Corona-Warn-App was promoted by the head of the Chancellery and the Federal Minister of Health (deutschland.de, 2021). The app, an official open-source corona contact tracing application, was released on 16 June 2020 (Köppen et al., 2021) with 24,2 Million downloads by Mid-December 2020 (CORONA Warn-App, 2020).

Lockdown

- On 16 March 2020, the Federal and the State governments implemented extensive nationwide measures to contain the pandemic. Enforced social distancing and shutdowns were brought in step by step by all Federal States. Schools, day-cares and kindergartens, pubs, prayer services, and similar types of institutions were closed. (Franzke & Kuhlmann, 2021; Wieler et al., 2021b).
- On 20 March 2020, shops and restaurants were closed in almost all States (Franzke & Kuhlmann, 2021).
- On 21 March 2020, Bavaria and Saarland implemented a limited curfew (Robert Koch Institut, 2020e). People were allowed to go shopping for essentials. To go to work, people needed to have a letter from their employer saying they were employed in essential services (DW, 2020a). A minimum fine of 500 euros was imposed for violation of the curfew.
- In mid-April, the federal and states Governments agreed on an extension of the limitation measures until the beginning of May (Franzke & Kuhlmann, 2021). A new rule came to force whereby shops with a sales area of up to 800 square metres and, irrespective of the size, bicycle and car dealers and bookshops could reopen under corona regulations (deutschland.de, 2021).
- Large events were prohibited until August 31, 2020. Barber stores remained closed. They could reopen from 4 May 2020, subject to compliance with hygiene regulations.
- On 1 May 2020, federal and states Governments agreed that opening playgrounds, museums, zoos, exhibitions and prayer events was the responsibility of states. The exact opening dates varied from state to state by a couple of days (deutschland.de, 2021).
- From 4 May 2020, according to deutschland.de (2021), schools slowly resumed operation, prioritising graduating classes and the last level of primary school. Nationwide, people from two households were allowed to meet in public spaces; people in nursing homes were allowed to receive visits from “a fixed contact person”.

- On 6 May 2020, an "incidence" rule, monitored by RKI, was introduced for localizing the containment. According to this rule, severe containment, including contact bans and local lockdowns, applied to cities with more than 50 new cases per 100,000 inhabitants registered within seven days.
- States were responsible for easing the rules (Franzke & Kuhlmann, 2021). From the beginning of May 2020 the first loosening of lockdown measures began. See examples below:
- Restaurants (tagesschau, 2020b):
  - **Baden-Württemberg:** Outdoor restaurants were able to resume operations on 18 May 2020
  - **Berlin:** Restaurants and cafes were allowed to serve guests again starting on 15 May 2020, but only from 6 a.m. to 10 p.m.
  - **Bremen:** Restaurants and pubs could reopen from 18 May 2020 under strict conditions
  - **Niedersachsen:** As of 11 May 2020, restaurants were allowed to reopen, with 50 percent occupancy indoors and outdoors
  - **Nordrhein-Westfalen**: All stores including the restaurant were allowed to open on the condition that strict hygiene requirements and enough space for social distancing were respected.

- On 15 June 2020, theatre, cinema, and concerts were allowed for up to 100 people; contact sports, for instance, could be held outdoors (GEW Baden-Württemberg, 2020).
- On 28 October 2020, federal and state governments agreed on partial lockdown (light lockdown) from the beginning of November (Imöhl & Ivanov, 2020).
- On 2 November 2020, a light lockdown began which meant limited social contacts, closing food-serving venues, sports and culture. Schools and day care centres remained open (Imöhl & Ivanov, 2020).
- On 25 November 2020, the partial lockdown was extended to 20 December 2020 with tighter contact restriction.
- On 16 December 2020, meetings between two households with a maximum of five people were permitted (Imöhl & Ivanov, 2020).
- Christmas markets and other public events (ZDF, 2020b):
  - **Baden-Württemberg**: It was up to the municipalities to decide whether and how Christmas markets were held.
  - **Bavaria**: Christmas markets were generally possible with appropriate concepts and in locations with low rates of new infections.
  - **Berlin**: Christmas markets were allowed to take place under strict conditions such as limited numbers of guests and face mask requirements.
  - **Hesse**: The state wanted to allow Christmas markets in principle, but the stands should have been distributed throughout the city centres if possible.
- Curfew in mid-December (tagesschau, 2020c):
  - **Baden-Württemberg**: Curfew restrictions were in effect on 12 December 2020 between 8 p.m. and 5 a.m. and leaving one's home was only permitted for valid reasons (Swr, 2020).
  - **Bavaria**: Curfew restrictions from 6 December 2020 applied throughout the state during the day. People were only allowed to leave their homes with good reason (Heim & Jerabek, 2020).
  - **Saxony**: All-day curfew restrictions were in effect in Saxony since 14 December 2020. Leaving the house was possible only for valid reasons (tagesschau, 2020c).

- **Berlin**: According to the Senate Chancellery, people were "encouraged" to reduce contacts to a minimum and only leave their own homes for a valid reason. This could be shopping, trips to the authorities, visits to the doctor, caring for relatives, walking the dog or sports activities (ZDF, 2020c).

- On 2 December 2020, the partial lockdown was extended until 10 January 2021 (Imöhl & Ivanov, 2020).
- On 13 December 2020, the Chancellor and state leaders decided to implement a hard lockdown from 16 December 2020 with no end date. Only stores for daily needs were allowed to open. Over Christmas, small groups of up to two households with a maximum of five people were allowed. Curfew restrictions in Baden-Württemberg applied also on New Year's Eve (GEW Baden-Württemberg, 2020).
- From 16 December 2020 until 10 January 2021, schools and day care centres were closed, distance learning for graduating classes continued until the regular start of vacations (GEW Baden-Württemberg, 2020).
- From 23 December 2020 to 1 January 2021, meetings "within the closest circle of family or friends" were possible – up to a maximum of ten people in total. Children up to the age of 14 were exempt. However the easing up of measures did not apply in Berlin and groups of up to five people were allowed to meet (tagesschau, 2020a).

Quarantine of arrivals

- On 12 March 2020, Federal Health Minister Jens Spahn called on all travellers returning to Germany from high-risk countries to avoid unnecessary contacts and stay at home for 14 days regardless of having symptoms or not.
- On 7 April 2020, the Federal Government proposed applying 14 days of quarantine to anyone entering Germany (regardless of their origin) if the federal states agreed to the decision (deutschland.de, 2021).
- On 19 April 2020, state governments recommended 14 days of quarantine if the country of origin had a high corona infection rate, meaning more than 50 cases per 100,000 inhabitants within a week (Robert Koch Institut, 2020b).

Border closure and opening

- After 15 February 2020, anyone entering Germany from countries considered high risk had to provide their contact details and possible exposure, and from 28 February 2020 they had to submit disembarkation cards (Bundesgesundheitsministerium, 2020b).
- On 16 March 2020 Federal Foreign Office discouraged unnecessary travel abroad and Germany closed its borders with high risk European countries.
- On 18 March 2020, non-European citizens were banned from entering the EU (Wieler et al., 2021b). The Federal Government planned a 50 million euro budget to bring back German travellers from other countries (deutschland.de, 2021).
- On 15 June 2020 Germany opened its borders for other EU and Schengen countries' citizens and residence permit holders.

Use of face masks in indoor public settings

- RKI announced that wearing a face mask (protecting mouth and nose) is useful when people with respiratory diseases are in public areas.

- From 27 April 2020, in most of German states, the wearing of a face mask (covering mouth and nose) at public areas such as public transport, shopping, etc. became mandatory (U.S. Embassy & Consulates in Germany, 2020). Some states implemented the rule a few days earlier or later. For example, Saxony was the first German State to introduce face mask on 20 April 2020. However, the exact regulations differed. While in most federal state's masks were compulsory when shopping and on public transport, in Berlin and Brandenburg the measure was limited to buses and trains, and in North Rhine-Westphalia, the measures were even stricter.
- Some examples of different regulations for face masks in different states as of November 2020 (ZDF, 2020b):
  - **Baden-Württemberg**: In secondary schools, face masks were compulsory during lessons. During recess, the mask could be removed outdoors if the distance to others was at least 1.5 metres.
  - **Bavaria**: The general mask requirement for all secondary school students and teachers in class was lifted
  - **Hesse**: Students and teachers were required to wear face masks on school grounds, but not during lessons. However, municipalities could order mandatory mask use in classrooms if there was a local increase in infection rates.
  - **North Rhine-Westphalia**: At schools, students and teachers were required to wear masks even during lessons - exceptions were only made for elementary school students.
  - **Rhineland-Palatinate**: Pupils were required to wear mask outside the classroom. However, in the event of an increase in the number of infections, local authorities were able to require pupils to wear masks during lessons.

Handwashing etiquette

- On 2 March 2020, sneezing into the elbow and washing hands carefully were recommended. The most effective measures against coronavirus on 30 March 2020 were considered to be keeping hands away from the virus, good hand hygiene, coughing and sneezing into the elbow (deutschland.de, 2021).

Physical distancing measures

- On 10 March, the joint crisis team of the Federal Ministry of the Interior (BMI) and the Federal Ministry of Health (BMG) recommended the cancellation of all major events with more than 1,000 people.
- On 22 March 2020, in a joint decision, the Federal States and national Government introduced a "contact ban". This meant limiting all gatherings of more than 2 people (exception applied to families and household members), imposing a physical distance of 1.5 metres and closing many businesses concerned with body care (Wieler et al., 2021a). On 15 April, contact restrictions were extended until the beginning of May 2020.

- Meeting people in October 2020 (Weinmann & Endt, 2020):

  - **Baden-Württemberg**: Up to 20 people
  - **Bayern**: Up to 10 people
  - **Berlin**: Up to 5 people outside

- Meeting people in November 2020 (ZDF, 2020b):

- **Baden-Württemberg**: Only members of two households were allowed to meet in public, with a maximum of ten people. The restriction also applied in private.
- **Bavaria**: A maximum of ten people from a maximum of two households were allowed to meet. In Bavaria, the regulation applied not only to public spaces, as decided by the federal and state governments, but also explicitly to private spaces.
- **Berlin**: Children up to the age of twelve were exempt from the rule that only members of two households and a maximum of ten people were allowed to meet.
- **North Rhine-Westphalia**: The rules adopted by the federal Government that only ten people from a maximum of two households were allowed to meet applied.

Work from home policies

- On 3 March 2020, according to Bichat (2020), the employer were not obliged to grant home office in Germany. Many scientific publications in Germany pointed to the importance of home office in slowing down the spread of coronavirus, including Alipour et al. (2020) and (Kunze et al., 2020). Many German employers followed this advice in 2020. On 27 January 2021 a mandatory rule for working from home came into force in Germany (Carter, 2021).

Opening windows for ventilation

Since 30 September 2020, the Federal Ministry of Health recommended ventilating indoor rooms regularly to limit the spread of coronavirus through aerosol transmission.

Targeted and mass testing

- On 10 March 2020, the first corona test station with drive-through facility opened (Wieler et al., 2021b). At the beginning of March 2020, the capacity for corona testing was about 150,000 per week, and this increased to 350,000 tests weekly by the beginning of April. By July, the capacity had increased to half a million weekly, and by the end of the summer of 2020, it had increased to more than a million, which was about 12,000 tests per one million inhabitants per week (Franzke & Kuhlmann, 2021).
- After developing one of the first COVID-19 tests in Germany, the government scaled up the capacity of public and private laboratories. On 28 March 2020, it mandated all insurance companies to pay for corona tests of people with symptoms and use rapid tests for people in contact with them (Wieler et al., 2021a).
- In mid-October 2020, the national COVID-19 testing strategy was updated to promote the use of rapid tests in clinics and nursing homes. In mid-November 2020, the first corona rapid test (*Schnelltest*) station opened in Berlin and by the end of November, the Berlin Senate considered the use of rapid test in schools (Steppat, 2020).
- On 15 December 2020, Steppat (2020) from Tip Berlin Media Group wrote that rapid corona antibody test were available at the high-street drugstores for home use and delivered a result in less than 30 minutes, with a reliability of 95% and at a much lower price than the PCR test.

Vaccination begins

According to the Coronavirus pandemic measures of the Federal Ministry of Health in Germany (Bundesgesundheitsministerium, 2020b):

- On 22 April 2020, it was announced that the clinical trial of the corona vaccine was approved by Paul Ehrlich Institute and that Germany could start its first vaccination studies.

- On 9 November 2020, prioritizing different risk groups was announced by the federal minister of health to protect those most at risk of serious or fatal disease as well as those who take care of this risk group, especially in health care and nursing homes.
- On 23 November 2020, the Federal Ministry of Health ordered 5 million corona vaccine doses from IDT Biologika.
- On 11 December 2020, the Federal Minister of Health said there will be around 400 vaccination centres, plus mobile teams to reach those who cannot go to the vaccination centres.
- On 18 December 2020, the Federal Minister of Health signed the Coronavirus Vaccination Ordinance which determines who would be vaccinated first. According to this, vaccination in nursing homes and elderly people's homes would be the first step.
- On 26 December 2020, the Federal Minister of Health welcomed the start of vaccinations against the coronavirus at a press conference in Berlin, which initiated the distribution of vaccination in Germany and all other EU countries.

3.5 Governmental Support to Enable the Population to Adopt Best Measures

Some examples of German Government financial support:

- Anyone with COVID-19 disease who is unable to work was entitled to a continuing salary and sick pay if applicable (deutschland.de, 2021).
- The Federal Government planned a supplementary budget of 122.5 billion euros to finance measures to deal with the corona pandemic on 25 March 2020 (deutschland.de, 2021).
- On 30 March 2020, the Federal Government made 50 billion euros available for small businesses, the self-employed, freelancers and farmers affected by corona situation, which can be called up by Federal States Länder (deutschland.de, 2021).
- A temporary decrease in the standard value-added tax rate was allowed for businesses suffering losses in the coronavirus pandemic, including catering, hotel industry and stores (Brancolini, 2020; deutschland.de, 2021).
- In March 2020, it was announced that the health system would receive an economic rescue package of 9.5 billion euro (Bundesgesundheitsministerium, 2020b; Wieler et al., 2021b).
- In March and June 2020, two rescue economic packages of about 800 billion euro and 130 billion euro respectively were passed by Government (Wieler et al., 2021b).
- The "KfW Quick Loan 2020" which is fully exempt from liability was announced on 7 April 2020 for small and medium enterprises and businesses affected by the situation. More than 48,000 applications were submitted as of 20 May 2020, in which 95% received a positive response (deutschland.de, 2021).
- On 27 April 2020, compensation for loss of earnings due to corona on the basis of the Protection against Infection Act was announced, and could be applied for from the beginning of May (deutschland.de, 2021).
- On 28 April 2020, the Federal Government granted a 550 million euro loan to a German charter airline, Condor Flugdienst GmbH. The State of Hesse is responsible for a 50% share of the risk (deutschland.de, 2021).
- On 1 May 2020, one billion euros of interest-free loans were available for students from Kreditanstalt für Wiederaufbau (KfW). Moreover, 100 million euros of emergency aid funds for the German Student Union were provided by the Federal Ministry of Education and Research (deutschland.de, 2021).
- Parents experiencing reduced income due to child care needs received compensation from Government (Robert Koch Institut, 2020c). On 29 May 2020, the Government announced

support for parents who were looking after their children at home due to closure of kindergartens and schools (deutschland.de, 2021).

- New regulations on 13 December 2020 were introduced by federal and state Governments, which provided additional opportunities for parents to take paid leave for childcare.

4 Risk Communication

In Germany, the structure of communication during pandemics is complex and it is difficult to implement a consistent communication strategy. For example, the Federal Centre for Health Education (BZgA) is responsible for informing the general population in the field of prevention and health promotion. The Paul Ehrlich Institute (PEI) is responsible for the approval, delivery of and information on vaccines. RKI is responsible for expert risk assessments and communication between experts, the general public and the media with regular situation reports. Political communication and control of communicative measures in this area are the responsibility of the Federal Ministry of Health (BMG) (Broer et al., 2021).

4.1 Communication Sources

From January 2020, RKI provided daily reports on the COVID-19 situation for the national and international public health sector in German and English (Robert Koch Institut, 2020a). The Federal Ministry of Health created a page about the coronavirus pandemic on their website, where they provided frequent (almost daily) bulletins (Bundesgesundheitsministerium, 2020b). The web portal "deutschland.de", which is a service provided by FAZIT Communication GmbH, provided English content information about what the German Government was doing to combat the spread of the coronavirus, was updated a couple of times a week in 2020 (deutschland.de, 2021).

Wiedemann (2016) explains that risk information has to be correct, must be understood, has to be useful, and finally, the recipient should be able to translate it into action. Regarding the clarity of corona communication in Germany, the study published by the University of Hohenheim analysed press releases by the Federal Government. They found that they are difficult to understand because of excessively long sentences, technical terms and compound words. Considering the range from 0 (difficult to understand) to 20 (easy to understand), the press releases of the federal Government rated on average 7.4 (Brettschneider & Keller, 2021).

There were several hotlines available for the public for different purposes such as Federal Ministry of Health corona hotline, an emergency telephone number for the treatment of patients, an emergency medical service, and a hotline for grief counselling.

Below are some corona risk related communications in 2020:

- On 27 February 2020, after a Minister of Health meeting with representatives from physicians, pharmacists, health insurers, hospitals and nursing staff, people were advised not to go to hospital every time they cough, but to call a doctor if they have respiratory problems or fever after staying in an infected area or being in contact with infected people. Later, on 26 April, the Federal Minister of Health talked about his concern that people were not going to hospital despite having a heart attack, needing vaccination for their child, or having chronic illness. (Bundesgesundheitsministerium, 2020b).
- On 18 March 2020, the German Chancellor, Angela Merkel, announced on national TV that the coronavirus is Germany's greatest challenge since World War II and asked citizens to help to overcome the outbreak with national unity (DW, 2020b)

- Between 20 and 22 March, several social organisations together with the German Government, organised a hackathon on the initiative of tech4Germany. All citizens and ministries were encouraged to submit their challenges and issues in order to understand and solve their problems (deutschland.de, 2021).
- Due to the pandemic the agricultural sector was short of 300,000 workers. On 23 March, a joint initiative of the Bundesverband der Maschinenringe e.V. (Federal Association of Machine Rings eV) and the Federal Ministry of Food and Agriculture for established an online platform to contact farmers and citizens to cover for these missing migrant foreign workers. On 3 April, a limited number of seasonal workers were allowed to enter Germany under strict conditions such as 14 days of quarantine upon arrival and a health check (deutschland.de, 2021).
- On 6 April, according to deutschland.de (2021), there was a 20% increase in the number of calls to the telephone helpline " against grief".
- On 13 April, the German Federal Office for Information Security and the police crime prevention departments of the federal and state governments warned people about fake information and fake websites offering corona emergency aid.
- On 24 April, the Federal Minister of Health answered corona related questions on Facebook Live (Bundesgesundheitsministerium, 2020b).

4.2 Communication Channels

The public was informed about health risks by the federal Government and Ministry of Health through various channels, including information campaigns, announcements and press releases shared on public and private television stations (e.g. ARD , ZDF), broadcast radio (e.g. SWR, Deutschlandfunk), social media (e.g. Facebook, Twitter, YouTube, Instagram, tiktok, podcasts, app), and print media (Deutscher Bundestag, 2020; Die Bundesregierung, 2020b; Erstes Deutsches Fernsehen, 2020; ZDF, 2020a).

In addition, the Government of the individual federal states as well as the associated ministries communicated measures and information regarding the pandemic situation through their own websites, press releases, and social media channels (e.g. in the state Baden-Württemberg via Twitter, YouTube, Flickr, Instagram, Mastodon, Telegram, Threema (Baden-Württemberg.de, 2020).

Citizen engagement was used by the Government as part of the information campaign. For example, with videos of celebrities such as athletes, moderators, and actors for people to stay at home during the lockdown (#WeStayHome), or videos in which various citizens like students, retirees, entrepreneurs, and others speak openly about their illness (#IHadCorona) (Bundesministerium für Gesundheit, 2020).

Below is an overview of the main webpages and communication channels. National campaign messages and social media popular Hashtags can be seen in the following tables:

Table 4 Federal and states Government main webpages and communication channels

Federal government	
Federal Government	• https://www.bundesregierung.de/breg-de/themen/coronavirus
Federal Ministry of Health	• https://www.bundesgesundheitsministerium.de/ • https://www.zusammengegencorona.de/
Federal centre for health education	• https://www.infektionsschutz.de/coronavirus/alltag-in-zeiten-von-corona.html
Federal Agency for Civic Education (Bpb)	• https://www.bpb.de/politik/innenpolitik/coronavirus/
Corona warning app and App of the Federal Government	• https://www.bundesregierung.de/breg-de/themen/corona-warn-app • https://www.bundesregierung.de/breg-de/service/regierungs-app • https://www.bundesregierung.de/breg-de/themen/coronavirus/podcast-corona-aktuell
Social Media	• https://www.facebook.com/Bundesregierung/
Facebook	• https://www.youtube.com/user/BMGesundheit
Youtube	• https://www.youtube.com/user/bundesregierung
Instagram	• https://www.instagram.com/bundeskanzlerin/
Twitter	• https://twitter.com/RegSprecher
Podcast of the Federal Government	• https://www.bundesregierung.de/breg-de/themen/coronavirus/podcast-corona-aktuell
Federal states	
State government ministry of social affairs ministry of education ministry of transport ministry of economy ministry of science ministry of the interior	E.g.: • https://www.baden-wuerttemberg.de/de/service/aktuelle-infos-zu-corona/aktuelle-corona-verordnung-des-landes-baden-wuerttemberg/ • https://www.stmgp.bayern.de/coronavirus/ • Ministry for Social Affairs and Integration Baden-Württemberg (https://sozialministerium.baden-wuerttemberg.de/de/gesundheit-pflege/gesundheitsschutz/infektionsschutz-hygiene/informationen-zu-coronavirus/)

4.3 Key National Campaign Messages Adopted

Ministry Following table shows COVID-19 main campaign messages that were developed in Germany in 2020.

Table 5 National Campaign messages during the COVID-19 pandemic in 2020

Date	**Key Campaign Messages**		
23.03.2020	Reduce personal contacts		https://www.youtube.com/watch?v=SnvtModlTFE&ab_channel=Bundesministeriumf%C3%BCrGesundheit
25.03.2020	How does keeping your distance work in everyday life? - Keep your distance (1.50m) - Meet with max. one other person at the same time - Wash hands regularly - Avoid indoor spaces with more than 2 people - Use home office options - Avoid public transport and unnecessary travel	The regulation on personal contact changed based on the lock down regulations and loosening measures	https://www.youtube.com/watch?v=PM4AmgwzIGo&ab_channel=Bundesministeriumf%C3%BCrGesundheit
14.04.2020	Top 3 protective measures - Keep your distance (min. 1,50m) - Wash hands regularly - Follow coughing and sneezing rules		https://www.youtube.com/watch?v=3PatjRnDxJo&ab_channel=Bundesministeriumf%C3%BCrGesundheit
19.04.2020	The **AHA** formula: - **A:** Keep your distance (*keep a minimum distance of 1.5 metres from others in public*) - **H:** Follow hygiene rules regarding sneezing, coughing and washing hands (*Correct coughing and sneezing into the crook of your arm as* well as 30 seconds with soap and water) - **A:** Wear a mask in everyday life	The mask rule changed from “not necessary” in March to “obligatory” at the end of April 2020	https://www.zusammengegencorona.de/informieren/sich-und-andere-schuetzen/die-aha-formel/ https://www.youtube.com/watch?v=P8XBDlvz-80&ab_channel=Bundesministeriumf%C3%BCrGesundheit https://www.zdf.de/nachrichten/politik/coronavirus-maskenpflicht-mundschutz-100.html

16.06.2020	#CoronaWarnApp - Break infection chains - Follow recommendations for measures depending on the risk of infection		https://www.youtube.com/watch?v=--qujehPw4Y&ab_channel=Bundesministeriumf%C3%BCrGesundheit
30.09.2020	AHA+A+L - Extension of the existing AHA formula by an A for App (use Corona Warn App for contact tracing) - Extension of the existing AHA formula by an L for "Lüften" (Ventilation) -> Ventilate indoor rooms regularly so that coronaviruses cannot spread through aerosols in the room		https://www.zusammengegencorona.de/informieren/sich-und-andere-schuetzen/die-aha-formel/

Table 6 shows some of the social media popular Hashtags developed in 2020 during the COVID-19 pandemic:

Table 6 Popular hashtags during the COVID-19 pandemic in 2020

#Zusammen gegen Corona	#Together against Corona
#WIRBLEIBENZUHAUSE	#WE STAY AT HOME
#flattenthecurve	#flattenthecurve
#ApplausFuerDieHelden	#ApplauseForTheHeroes
#besonderehelden	#specialheroes
#wirhaltenzusammen	#westaytogether
#Ichhattecorona	#Ihadcorona
#ÄrmelHoch	#sleevesup
#HierWirdGeimpft	#HereWillBeVaccinated

5 Summary/Conclusions

The National Pandemic Plan in Germany comprises two parts that were updated in 2016 and 2017 by applying the lessons learned from the 2009 A(H1N1) pandemic and the Pandemic Influenza Risk Management – WHO Interim Guidance 2013 (Robert Koch Institut, 2016b). Additionally, all 16 states have their own Pandemic Influenza Plan (Ministry of Social Affairs, Health and Integration Baden-Württemberg, 2020).

Germany has a decentralized system of Government and administration with three independent administrative levels of federal, state and municipality (Franzke, 2020). During the first year of the pandemic which is the focus of this study, the decentralized structure of government had distinct advantages for managing the pandemic (Franzke, 2020), such as allowing local authorities to make decisions quickly based on local realities, and to move resources between different departments and

sectors, which helped them to successfully respond to the challenges of the pandemic (Kuhlmann & Franzke, 2021). Municipalities in particular played an important role in this success (Franzke, 2020). On the other hand, decentralization had disadvantages, including complexity, over-regulation, variation between states and contradictory regulation.

Germany faced two coronavirus waves in 2020 and at the beginning of 2021. The peaks of confirmed cases occurred on 2 April 2020 with 5,792 cases and on 23 December 2020 with 25,757 cases. The peaks in fatalities occurred on 21 April 2020 with 248 deaths and on 13 January 2021 with 894 deaths (Ritchie et al., 2020). Similar to A(H1N1), the start of the cold season and returning from holiday destinations increased the number of cases and, despite the high number of hospital beds in Germany, the demands on the health system in some areas exceeded capacity during the second wave (Wieler et al., 2021a).

The German government communicated its data analysis findings with the public, which generally lead to a high degree of trust in the government among the citizens (Wieler et al., 2021a). That said, a study from Brettschneider and Keller (2021) describes how press releases by the Federal Government were difficult to understand because of excessively long sentences, technical terms and compound words.

The early development of a COVID-19 test, expert scientific institutions, a good public health system and effective containment strategy (such as lockdown, border control and social restrictions) were among the reasons for successfully reducing the infection rate during the first wave in Germany (Wieler et al., 2021b). According to the survey of 2,027 people by YouGov (2020), about 70% of German people in March 2020 thought the government was doing very or fairly well in dealing with COVID-19.

During the second wave, reintroducing restrictions faced more prominent political resistance and states deviating from federal recommendations. For example, on 28 April 2020, Saarland was the first state to rescind the order to stay at home when its Constitutional Court voted against the lockdown (Franzke, 2020).

German chancellor Angela Merkel frequently cited RKI surveillance data. The German Government measured the quality of their response to COVID-19 based on infection rate, disease severity, and health system capacity, with data provided by local health authorities, RKI and other scientific institutions (Wieler et al., 2021b). However to avoid contradictory expert advice, the government presented professors Drosten and Lothar Wieler to the public, in order to simplify the leadership of policy makers (Dostal, 2020).

According to Dostal (2020), the crisis management of German policy makers can be explained rather elegantly in terms of Luhmann's 'systems theory'. All political measures were declared to be covered by the 'infection protection law' (Infektionsschutzgesetz). An expanded version of the infection protection law was proposed by the federal parliament on 25 March 2020 and came into force on 28 March 2020. The law had never been expected to cover decisions at this scale and failed to answer how the closure of the economy would be dealt with from a legal point of view (Dostal, 2020).

In summary, although the German approach to the COVID-19 pandemic was hampered in various ways by its federal structure, and largely failed to deal effectively with the second wave of the pandemic, it did relatively well compared to most other European countries in the first phase of the pandemic (Wieler et al., 2021b). The Mayor of Mannheim, for instance, received the International World Mayor Award in 2021, partly because of Mannheim's commitment and success in combating the corona pandemic (Swr, 2021). It is hoped that the federal and state governments will be better prepared for future pandemics and better able to effectively coordinate its response.

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