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The European COvid Survey (ECOS): Technical report

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The European COvid Survey (ECOS): Technical Report

Iryna Sabat, Sebastian Neumann-Böhme, Tom Stargardt,
Jonas Schreyögg

Research Paper
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The European COvid Survey (ECOS): Technical Report

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1. Introduction

The European COvid Survey (ECOS) is a multi-country longitudinal study with samples representative of eight European countries. It was set up early at the beginning of the COVID-19 pandemic and sought to understand public perceptions of risks, public trust and worries, knowledge, attitudes to COVID-19 mitigation policies, and protective and preparedness behaviours, including vaccination against COVID-19. The purpose of this longitudinal study was to allow a timely and adaptive monitoring of these variables over time and to assess the relations between them to produce policy- and research-relevant evidence in Europe.

The objective of ECOS was to continuously elicit information from the European public during the COVID-19 pandemic. We followed a two-fold aim. First, upon the end of the fieldwork we carried out a quick descriptive analysis to produce policy-relevant evidence and communicate new findings (e.g., on the current sentiment towards containment policies, vaccinations or types of vaccines, etc.) to inform the public and policy makers through our press work and events. Those findings were highly informative as they were timely and representative of national populations. The second aim was to answer health economic-related research questions with the ECOS data targeted at the academic audience with the help of advanced analytic methodologies.

ECOS data-based research offers an empirical foundation for capturing longitudinal phenomena and relationships, leading to a deeper understanding of socioeconomic processes and behaviours during the COVID-19 pandemic, as well as provides policymakers with informed findings to shape effective policies and responses.

This technical report provides an account of the design, development, and methodology of 11 data collections henceforth referred to as waves of the survey, which were fielded between April 2020 and December 2022.

1.1. Background and objectives

ECOS consists of 11 consecutive data collections carried out with a frequency of three months on average starting in April 2020 and ending in December 2022¹. The data for all 11 waves were collected in Denmark, France, Germany, Italy, the Netherlands, Portugal, and the United Kingdom. Starting from wave 7 Spain was added. The selection of these countries provided a broad geographic coverage across different parts of Europe, which experienced different levels of COVID-19 impact, infection rates, and policy responses, allowing for a broader perspective on the impact of COVID-19 and related policies across the continent. Moreover, the selected countries have varying population sizes, providing a mix of large and small samples, allowing to examine nuanced differences in public sentiment.

Each data collection consisted of about 1,000 respondents per country, representative in terms of age category, gender, region and in part education level. ECOS was designed as an online study both because data collection was carried out at a time when COVID-19 was a major public health concern, and because an online approach was suitable to conduct fieldwork and receive responses quickly, so that the policy relevance of results could be preserved.

¹ More details on ECOS webpage <https://www.hche.uni-hamburg.de/en/forschung/corona/vergangene-befragungswellen.html>

ECOS covered a variety of topics and adopted a structure that included both a core part and wave-specific modules. The core part remained largely the same during 11 waves, whereas the part that addressed certain specific research and policy questions was only part of some (or one) data collections (semi-panels). The core part addressed such topics as willingness to get vaccinated against COVID-19, risk perceptions, protective behaviours, assessment of ongoing policy measures, trust and worries, wellbeing, etc., while wave-specific modules covered such topics as attitudes to new mitigation policies, expectations about the future, vaccine allocation, etc. Through this structured framework, the core part provided a consistent baseline for analysing key indicators throughout the pandemic, allowing for trend analysis and cross-country comparisons, while the inclusion of wave-specific modules allowed for a timely response to emerging issues, ensuring that the study remained relevant and insightful. This structured approach ensured that ECOS remained both adaptable and comprehensive.

The study was initiated within the European Training Network - Improving Quality of Care in Europe "IQCE" and carried out as a joint project between Nova School of Business and Economics (Portugal), Bocconi University (Italy), Erasmus University Rotterdam (Netherlands) and the Hamburg Center for Health Economics at the Universität Hamburg (Germany).

1.2. Ethics

This study received ethical approval from the Universität Hamburg in Germany under the umbrella project "Countering COVID-19: A European survey on the acceptability and commitment to preventive measures.

Ethics approval was obtained by the Universität Hamburg Social Science (WiSo) Research Laboratory for the complete ECOS study in April 2020 prior to the first data collection. No personal or identifiable information was recorded. The study is compliant with the terms of use of the WiSo Laboratory the guidelines for safeguarding good scientific practice and avoiding scientific misconduct at the Universität Hamburg, as well as the RESPECT code of practice released by the RESPECT project by order of the European Commission. All authors of the study declared to follow and uphold these scientific and ethical standards.

The participants provided their informed consent to participate in this study as the answer to the first question. Participants who did not consent were not able to access the questionnaire.

Each participant provided written informed consent to Dynata. The confidentiality and anonymity of the participants were ensured. All data collected were anonymised through alphanumeric characters, hence it was only Dynata that had personal information of the respondents. No collection of personal information like email address, name or birth date was performed by the researchers.

2. Sample design

2.1. Target population, sampling frame and coverage

The target population to be represented by the ECOS was the adult resident population in each of the eight European countries covered by the study. The data collection was performed online by the market research company Dynata. Their online panels allowed recontacting participants for subsequent waves, thereby ensuring a panel data collection design, which was one of the objectives of the ECOS project.

Quota sampling was used to ensure representativeness in terms of sex, age categories, region, and education (all non-interlocked) in each country separately using national census data for quotas. Table 1 summarises census sources used in each country to construct quotas for nationally representative samples.

Table 1. Census sources by country

Country	Source	Link
Denmark	Statistics Denmark	https://www.dst.dk/en
France	National Institute of Statistics and Economic Studies (INSEE)	https://www.insee.fr/en/accueil
Germany	Federal Statistical Office	https://www.destatis.de/EN
Italy	Italian National Institute of Statistics	https://www.istat.it/en/
The Netherlands	Centraal Bureau voor de Statistiek (CBS)	https://www.cbs.nl/
Portugal	Instituto Nacional De Estatistica (INE) / Statistics Portugal	https://www.ine.pt/
Spain	Instituto Nacional de Estadística (INE)	http://www.ine.es/en/
The UK	Office of National Statistics (ONS)	https://www.ons.gov.uk/

While online sampling implies that some elements of the population (e.g., people who do not use the internet) have no chance of being selected, the company undertook a rigorous approach to sourcing the participants by employing various channels of recruiting different parts of the population (i.e., affiliate networks, open recruitment, loyalty programs, mobile apps, etc.), thereby ensuring that wide categories of the population were reached in every country.

The data for all 11 waves were collected in Denmark, France, Germany, Italy, the Netherlands, Portugal, and the United Kingdom. The data for Spain were collected in waves 7-11. Additionally, in wave 1 we collected extra 500 responses representative of the Italian province Lombardy in terms of age and gender, since this region was the most severely impacted by COVID-19 early in the pandemic. The extra data collected from Lombardy were not included in the representative sample of Italy². Thus, no weighting was used as the additional Lombardian sample was kept separately.

² The boost sample from Lombardy from wave 1 is not included henceforth.

2.2. Regions

Table 2 summarises the regions that were used for the quota sampling to ensure regional representativeness of the sample in each country. The included regions vary between the nomenclature of territorial units for statistics (Nomenclature des Unités territoriales statistiques – NUTS) levels 1 and 2 depending on the size of the country and its population, to achieve a similar number of regions. The larger countries, the UK, Germany, France, Italy, and Spain use the NUTS 1 level. This level would not have been informative for smaller countries e.g., in the case of Portugal, where all of continental Portugal is one region at the NUTS 1 level, therefore the NUTS 2 level was used for Portugal, the Netherlands and Denmark.

Table 2. Regions targeted by country.

	Germany	Netherlands	France	Denmark	Portugal	UK	Italy	Spain
1	Baden-Württemberg	Drenthe	Alsace	Region Hovedstaden	Alentejo	East Anglia	Abruzzo	Andalucía
2	Bayern	Flevoland	Aquitaine	Region Midtjylland	Algarve	East Midlands	Basilicata	Aragón
3	Berlin	Friesland	Auvergne	Region Nordjylland	Azores	London	Calabria	Asturias (Principado de)
4	Brandenburg	Gelderland	Basse-Normandie	Region Sjælland	Centro	North East	Campania	Balears (Illes)
5	Bremen	Groningen	Bourgogne	Region Syddanmark	Lisboa	North West	Emilia-Romagna	Canarias
6	Hamburg	Limburg	Bretagne		Norte	Northern Ireland	Friuli-Venezia Giulia	Cantabria
7	Hessen	Noord-Brabant	Centre			Scotland	Lazio	Castilla -La Mancha
8	Mecklenburg-Vorpommern	Noord-Holland	Champagne-Ardenne			South East	Liguria	Castilla y León
9	Niedersachsen	Overijssel	Corse			South West	Lombardia	Cataluña
10	Nordrhein-Westfalen	Utrecht	Franche-Comté			Wales	Marche	Comunidad Valenciana
11	Rheinland-Pfalz	Zeeland	Haute-Normandie			West Midlands	Molise	Extremadura
12	Saarland	Zuid-Holland	Île-de-France			Yorkshire & Humberside	Piemonte	Galicia
13	Sachsen		Languedoc-Roussillon				Puglia	Madrid (Com. De)
14	Sachsen-Anhalt		Limousin				Sardegna	Murcia (Región de)
15	Schleswig-Holstein		Lorraine				Sicilia	Navarra (C. Foral de)
16	Thüringen		Midi-Pyrénées				Toscana	País Vasco
17			Nord-Pas-de-Calais				Trentino-Alto Adige	Rioja (La)
18			Pays de la Loire				Umbria	
19			Picardie				Valle d'Aosta	
20			Poitou-Charentes				Veneto	
21			Provence-Alpes-Côte d'Azur					
22			Rhône-Alpes					

2.3. Gender and age

The age categories targeted by the quota sampling were the following: 18-24, 25-34, 35-44, 45-54, 55-64, 65+. Noteworthy, in several waves in Portugal it was problematic to achieve representativeness in the age category 65+, a requirement we had to relax eventually.

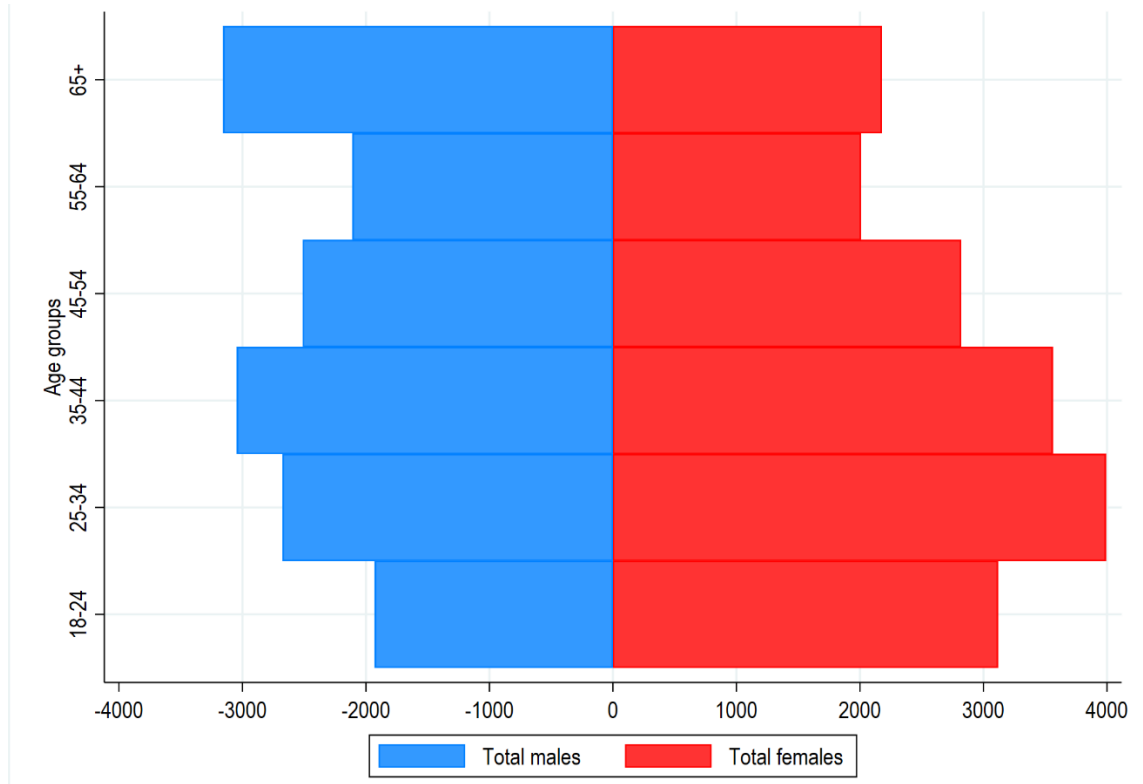


Figure 1. ECOS respondents by gender and age

Pooled data for eight countries and 11 waves, number of distinct respondents

2.4. Education

Table 3 summarises the education qualifications that were used for the quota sampling to ensure educational representativeness of the sample in each country. It should be noted that in some waves educational representativeness was not achieved, hence we refer to ECOS as only in part representative with respect to education.

Table 3. ECOS educational qualification and assigned education level.

Country	Education level	Educational qualification/ educational institution
Denmark	Low	Folkeskolen - f.eks. 9. eller 10. klasse
	Middle	Gymnasial uddannelse - f.eks. Almen Gymnasium, HHX, HTX osv. (HHX - Højere Handelseksamen, HTX - Højere Teknisk Eksamen)

	High	En videregående erhvervsuddannelse - f.eks. landbrugs-, social- og sundheds uddannelser, produktionsskole En mellemlang videregående uddannelse Universitets uddannelse
France	Low	École Primaire Collège
	Middle	Lycée d'Enseignement général et technologique Lycée professionnel
	High	Grande École de Commerce et de Gestion/ scientifique, Établissement d'Enseignement supérieur catholique/ artistique/ agricole Grand Établissement/ École normale supérieure/ d'Ingénieur/ d'Architecture/ nationale vétérinaire Université, Institut universitaire de Technologie/ national polytechnique/ d'Études politiques/ universitaire de Formation des Maîtres
Germany	Low	Grundschule Hauptschule Realschule
	Middle	Gymnasium/ Berufliches Gymnasium/ Fachgymnasium, Gesamtschule Fachoberschule, Fachschule, Berufsschule, Berufsfachschule
	High	Technische Hochschule, Pädagogische Hochschule, Kunsthochschule/ Musikhochschule Fachhochschule Universität, Technische Universität
Italy	Low	Scuola elementare Scuola media inferiore
	Middle	Istituto professionale Scuola superiore
	High	Università Master Dottorato
Netherlands	Low	Lager Onderwijs LO (lagere school, Lagere Algemeen Voortgezet Onderwijs LAVO, Voortgezet Gewoon Lager Onderwijs VGLO) Lager beroepsonderwijs LBO (LBO, Lagere Technische School LTS, Individueel Technisch Onderwijs ITO, Lager Economisch en Administratief Onderwijs LEAO, Huishoudschool, Leven Lang Ontwikkelen LLO) Middelbaar Algemeen Onderwijs MAO (Middelbaar Algemeen Voortgezet Onderwijs MAVO, Individueel Voortgezet Onderwijs IVO, Meer Uitgebreid Lager Onderwijs MULO, Uitgebreid Lager Onderwijs ULO, 3jr HBS, 3jr Voorbereidend Wetenschappelijk

		Onderwijs, Wetensch VWO, 3jr Voorbereidend Hoger en Middelbaar Onderwijs VHMO)
	Middle	Middelbaar beroepsonderwijs MBO (Middelbare Technische School MTS, Uitgebreide Technische School UTS, - Middelbaar Economisch en Administratief Onderwijs MEAO) Hoger Algemeen Onderwijs HAO (Hoger Algemeen Voortgezet Onderwijs HAVO, VWO, Atheneum, Gymnasium, Nederlandse Middelbare School NMS, Hogere Burgerschool HBS, Lyceum)
	High	Hoger beroepsonderwijs HBO (Hogere Technische School HTS, Hoger Economisch en Administratief Onderwijs HEAO, Wetensch. kand., Univers. onderwijs kand.) Wetenschappelijk Onderwijs WO (Universitair onderwijs, Doctoraalopleiding, technische hogeronderwijsinstellingen TH)
Portugal	Low	Sem Estudos Primário Incompleto Primário Completo
	Middle	Nível Médio Incompleto Nível Médio Completo
	High	Superior Incompleto Superior Completo
United Kingdom	Low	Combined Junior and Infant School/ Infant School Junior School Comprehensive School
	Middle	Comprehensive School (College and Graduate School of Education GCSE) / Secondary Modern (General Certificate of Secondary Education GCSE) / Grammar School (GCSE)/ City Technology College (CGSE) / Sixth Form
	High	College and Institution of Higher education Open College -College of Technology - Institute/ Teacher Training College University/ Open University

3. Overview of questionnaires

3.1. Development

The questionnaire was designed by the whole ECOS team. The scientific and technical development of the questionnaires was supported by senior researchers, members of the ECOS consortium. The questionnaire was translated from English into other languages by native speakers (mainly by researchers in health economics with the background knowledge of survey methods) and reviewed by the multinational ECOS team. No back translation was performed. In each country, respondents could choose between the language of their country or English (only two choices).

While nearly all ECOS questions were novel and developed by the ECOS team, other relevant surveys were consulted, and several pre-existing instruments were used or adapted where possible, to build on prior experience and ensure comparability.

The questionnaire therefore includes established and validated instruments such as the EQ-5D-5L (health-related quality of life) [1] and ICECAP-A (capability well-being) [2] in all waves, the 5C psychological antecedents of vaccination (vaccination hesitancy) [3] in waves 2-11, the Patient Health Questionnaire PHQ-4 (mental health) [4] in waves 4-11, an evaluation of the Mental Health Quality of Life (MHQoL) instrument [5] in wave 4, Satisfaction with Life Scale [6] in wave 5, the threatening medical situation inventory (coping style) [7] in waves 8-9, the General Health Literacy Questionnaire HLS19 - Q12 [8] in wave 11, and the 10-item Well-being instrument (WiX) in wave 11 for UK and Germany [9], [10].

The re-used questions included the following:

- self-assessed measure of household income were adopted from the Survey of Health, Ageing and Retirement in Europe [11] (*“Thinking of your household's total monthly income, would you say that your household is able to make ends meet...”: with great difficulty; with some difficulties; fairly easily; easily*);
- elicitation of respondents risk preferences through their answers to two lottery-type questions were adopted from Barsky et al. [12] (*“Would you take the opportunity of a 50 percent chance of doubling your income and a 50 percent chance of reducing your income by one third?”: yes, no*);
- beliefs about the safety of vaccines in general were adopted from Figueiredo et al. [13] (*“Overall I believe that vaccines are safe”: strongly agree; agree; strongly disagree; disagree; I don't know*).
- worry items were adopted from the World Health Organization (WHO) COVID-19 Snapshot Monitoring project [14] (*“At the moment, how much do you worry about ...”: do not worry at all, slightly worry, moderately worry, worry quite a bit, worry a lot*).

3.2. Overview of content

The questionnaire consisted of the core part (that is, questions that were tracked on the longitudinal basis, i.e., during all or at least several waves) and the wave-specific part (that is, questions pertaining to a specific wave due to policy/health/pandemic-related reasons).

3.2.1. Core questionnaire

The core questionnaire covered the following topics (Annex 1 for more details):

- Demographic characteristics: age, gender, education, field of profession, region of residence, self-assessed income, household composition, relationship status.
- Personal characteristics and well-being: risk-aversion, EQ-5D-5L, ICECAP-A.
- COVID-19 related questions: COVID-19 past diagnoses, contact with infected individuals, extent of following COVID-19 news, sources of information, risk perceptions.
- COVID-19 mitigation policy attitudes.
- Trust in information from sources such a GP, WHO, government, media, friends, etc.

- COVID-19 related worries.
- General confidence in vaccines.
- Vaccination against COVID-19: willingness to get vaccinated, reasons to get vaccinated, reasons against vaccination, willingness to pay for an effective vaccine, vaccination information sources, vaccine preferences and refusal, opinion about the speed of vaccination campaign, vaccine brand received, access to vaccination, vaccination of peers, vaccination incentives, booster vaccination, willingness to pay for boosters, vaccine equity, self-reported vaccination against COVID-19 status.
- Preventive behaviours (washing hands, covering nose, keeping distance, avoiding handshakes, use of alcohol-based hand rub, avoiding touching face parts): personal adherence, intention to adhere in future, perceptions of the community's current and future adherence.
- The 5C model, i.e., five person-level determinants of vaccine hesitancy: confidence, complacency, constraints, risk calculation, and collective responsibility (waves 2-11).
- Patient Health Questionnaire (PHQ-4) (waves 4-11).
- Economic impact of COVID-19 (waves 4, 6-10).
- Vaccination of children against COVID-19 (waves 7-11).
- Forgone care (waves 3, 5-6, 9-11).

3.2.2. Wave-specific modules

Wave 1

Wave 1 covered the following additional topics:

- Health risk attitudes.
- Willingness to wait for a free COVID-19 vaccine.
- Information provision intervention in a form of a poster listing five basic protective measures recommended by the WHO and a tailored bottom-line message.

Wave 2

Wave 2 covered the following additional topics:

- Attitudes toward the end of various containment policies and lifting the restrictions, support for COVID-19 contact tracing apps.
- Confidence in various organisations to oblige measures after the lockdown's end, public trust in additional sources of information.
- Vaccine allocation: priority decision-making, priority allocation.
- Blood donation.

Wave 3

Wave 3 covered the following additional topics:

- Altruism.
- Attitudes toward the end of various containment policies and lifting the restrictions, support for opening of various leisure activities to the general public, probability of attending opened leisure activities.

- School attendance and teaching arrangement before and after Covid.
- Attitudes to quarantine restrictions and vacations.

Wave 4

Wave 4 covered the following additional topics:

- Altruism.
- Attitudes to new policies.
- Attitudes to quarantine restrictions.
- Expectations about the future.
- Vaccination against the flu.
- Masks information intervention.
- Mental Health Quality of Life (MHQoL).
- Reference points.

Wave 5

Wave 5 covered the following additional topics:

- Occupation field.
- Employment.
- Subjective well-being.
- Assessment of the strictness of COVID-19 regulations.
- Vaccine allocation: priority decision-making, priority allocation.
- Work from home, work presenteeism, sick leave.
- Life satisfaction.

Wave 6

Wave 6 covered the following additional topics:

- Assessment of the strictness of COVID-19 regulations, assessment of the pandemic handling by the government and the EU.
- Attitudes and reactance towards vaccination policies, attitudes towards sporting events policies.
- Expectations about the future.

Wave 7

Wave 7 covered the following additional topics:

- Assessment of the strictness of COVID-19 regulations, assessment of the pandemic handling by the government and the EU, attitude toward the COVID-19 tracing app.
- Pandemic-acquired habits.

Wave 8

Wave 8 covered the following additional topics:

- Assessment of the pandemic handling by the government and the EU, attitude toward the COVID-19 tracing app.
- Additional pandemic-related worries.

- Pro-social behaviour.
- Threatening Medical Situations Inventory questionnaire (coping style).
- Influence of government incentives on willingness to get vaccinated.
- Pandemic-acquired habits.
- Altruism.

Wave 9

Wave 9 covered the following additional topics:

- Assessment of the strictness of COVID-19 regulations, assessment of the pandemic handling by the government and the EU, attitude toward the COVID-19 tracing app.
- Additional pandemic-related worries.
- COVID infections in participants proximity.
- Influence of government incentives on willingness to get vaccinated, vaccination mandates.
- Willingness to take health risks.
- Measures of regret, measures of near-sightedness (myopia) in monetary matters, measures of Machiavellianism, measures of egotism, psychopathic tendencies.

Wave 10

Wave 10 covered the following additional topics:

- Risk-averse behaviour.
- Voluntary mask wearing.
- Perceived danger of virus variants.
- Assessment of the adequacy of protective measures.
- Altruism.
- Support for policies: quarantine mandates, COVID-19 tracing app, pandemic management, other mitigation measures, vaccination mandates.
- COVID infections in participants proximity.
- Equity during the pandemic.
- Implications of the pandemic for aspects of life.

Wave 11

Wave 11 covered the following additional topics:

- Risk-adverse behaviour.
- Voluntary mask wearing.
- Willingness to pay (WTP) for well-being.
- Health literacy survey.
- Concern about recent crises.
- Use of COVID tracing app.
- Implications of the pandemic for aspects of life.
- Perceptions of policies.
- Future pandemics.
- 10-item Well-being instrument (WiX).

- Long COVID and implications of COVID-19 on job performance.

4. Fieldwork

4.1. Fieldwork strategy

Each data collection was carefully designed and programmed by the authors in the Qualtrics platform. On behalf of the Principal Investigators (PIs), a professional market research company Dynata recruited at least 1000 participants per wave in each country using multi-source online panels.

After the design, internal review process and translation of the questionnaire was completed, we set a period (typically up to 1 day) for the pilot soft launch of the questionnaire with the market research company. The aim of the soft launch was to test the questionnaire flow, fieldwork processes and survey time duration.

At the soft launch, 10% of the data were collected and analysed by the authors to ensure the integrity of the data in terms of the questionnaire duration, missing data and if the programming of the technically more sophisticated questions worked, e.g. valuation questions with conditional pathways or using piped text from previous answers.

After a complete quality check of the soft launch, we proceeded with a full launch in a stacked approach. To maximise the number of respondents whom we tracked on a longitudinal basis, we asked the market research company to first only invite respondents of previous data collections for about half of the fieldwork's duration. Afterwards, we allowed new respondents to fill the quotas required to ensure the representativeness of the data.

Towards the end of the fieldwork, a trade-off was required between the representativeness in some categories and the duration of the fieldwork, which was highly relevant in several dynamic stages of the pandemic. For example, it appeared to be problematic to achieve representativeness in the age category 65 and above in Portugal, a requirement we therefore relaxed to not overextend the fieldwork duration. Overall, the duration of the fieldwork increased over time, due to the necessity to maximise the number of previous respondents to preserve the panel component of the data.

4.2. Fieldwork process and incentives

In each wave, former respondents were invited first. New participants (i.e., refreshment samples) were invited only after several reminders to ensure that the sample composition remained consistent with the original quotas and sampling design and to finish the fieldwork within the reasonable time span. Reminders were not sent manually but by an electronic tool set up by Dynata called "Picker" which allows to control the sampling speed and the quota performance by increasing or slowing down the progress for the recontacts and the refreshment samples. Given that the primary aim of the survey was to collect nationally representative data with respect to region, gender, age group and education, this approach also helped to reduce the bias that could arise from the selective attrition of certain groups or characteristics.

Regarding incentives, there were none offered by the researchers for answering the questionnaire. In contrast, Dynata may have utilized various forms of motivation, such as reward gift cards and loyalty points, to stimulate participation in its panels, not as compensation for time spent.

4.3. Key fieldwork dates

The survey was repeated with the frequency of three months on average with the following periods of fieldwork.

- Wave 1: 02.04.2020 - 15.04.2020
- Wave 2: 09.06.2020 - 22.06.2020
- Wave 3: 08.09. 2020 - 19.09.2020
- Wave 4: 05.11. 2020 - 16.11.2020
- Wave 5: 19.01. 2021 - 01.02.2021
- Wave 6: 02.04. 2021 - 19.04.2021
- Wave 7: 21.06. 2021 - 05.07.2021
- Wave 8: 07.09. 2021 - 21.09.2021
- Wave 9: 23.12.2021 - 11.01.2022
- Wave 10: 04.05.2022 - 24.05.2022
- Wave 11: 18.11.2022 - 07.12.2022

5. Survey Data

5.1. Quality checks

High data quality is crucial for research. Beyond the usual test routines to check data plausibility and consistency that took place after data collection, the ECOS team undertook various efforts to ensure data quality. The quality assurance was implemented at several levels.

At the questionnaire design stage, all translations were performed by native speakers, checked by the multilingual ECOS team and tested before the launch by fellow researchers.

We also applied a set of measures to facilitate the understanding of the questions, for example:

- Style changes in question text (bold, italics, underlining, etc.)
- Images where appropriate or necessary
- Page breaks and adaptation the ease of use to a mobile telephone screen
- Different question types (matrix, Likert scale, open-ended, etc.).

When programming the survey, a set of quality control measures were used, such as:

- Conditional pathways
- Opt-out answers (no and/or don't know)
- Block randomizer to mitigate the order bias (Qualtrics automatically performed randomization, so that the researchers had no influence on the randomization process)
- Dynamic validation of answers
- Piped text as a reminder of previous answers.

To test comprehension and validity of questions, derive approximate timing estimates and ensure the questionnaire flow, several rounds of testing were carried out with fellow colleagues and translators for each wave. Their feedback informed our decisions around the final wording and content of some questions.

As a quality control at the end of the fieldwork, respondents who declined the consent form or indicated age below 18 right in the beginning of the survey were not allowed to take the survey. In case of multiple responses submitted by the same individuals, we removed the later response and kept only the first one. Similarly, incomplete responses (i.e., respondents who did not reach the completion threshold) were disregarded.

Finally, we also performed quality assurance of the data across a range of quality flags. For example, based on examining the distribution of interview lengths, responses of participants who completed the questionnaire in less than a third of a country-specific median survey duration time, so-called 'speeders', were excluded. After excluding them, the sample was increased again to meet the criteria for representativeness. Data cleaning and data quality checks were performed using Stata software. The cleaning procedures were applied in parallel by two researchers to ensure consistency and data quality. The data from the soft launch was included in the total sample. The original uncleaned datasets were archived separately.

5.2. Survey response and attrition

From the perspective of the survey design and given a long duration of our study, the patterns of participation in the survey varied significantly. Figure 2 illustrates the flow of respondents between the survey waves and across participating countries.

There were two possibilities for respondent's non-participation:

- complete dropouts, i.e., a respondent's decision to withdraw from the study entirely after participating one time (panel attrition), and
- temporary dropouts, i.e., respondents who missed participating in certain waves of data collection while still being part of the study in other waves, which resulted in intermittent or missing data for specific time points (gap in the data).

As Table 4 shows, wave-specific attrition was relatively high ranging between 23-45%, but so was the share of returning participants that varied between 54-78%. Overall, 42.7% of ECOS respondents participated in at least two survey waves (Table 5). However, only 6% of wave 1 participants persistently participated in each wave until the end of the study (persistence of the first cohort's participation in Table 4).

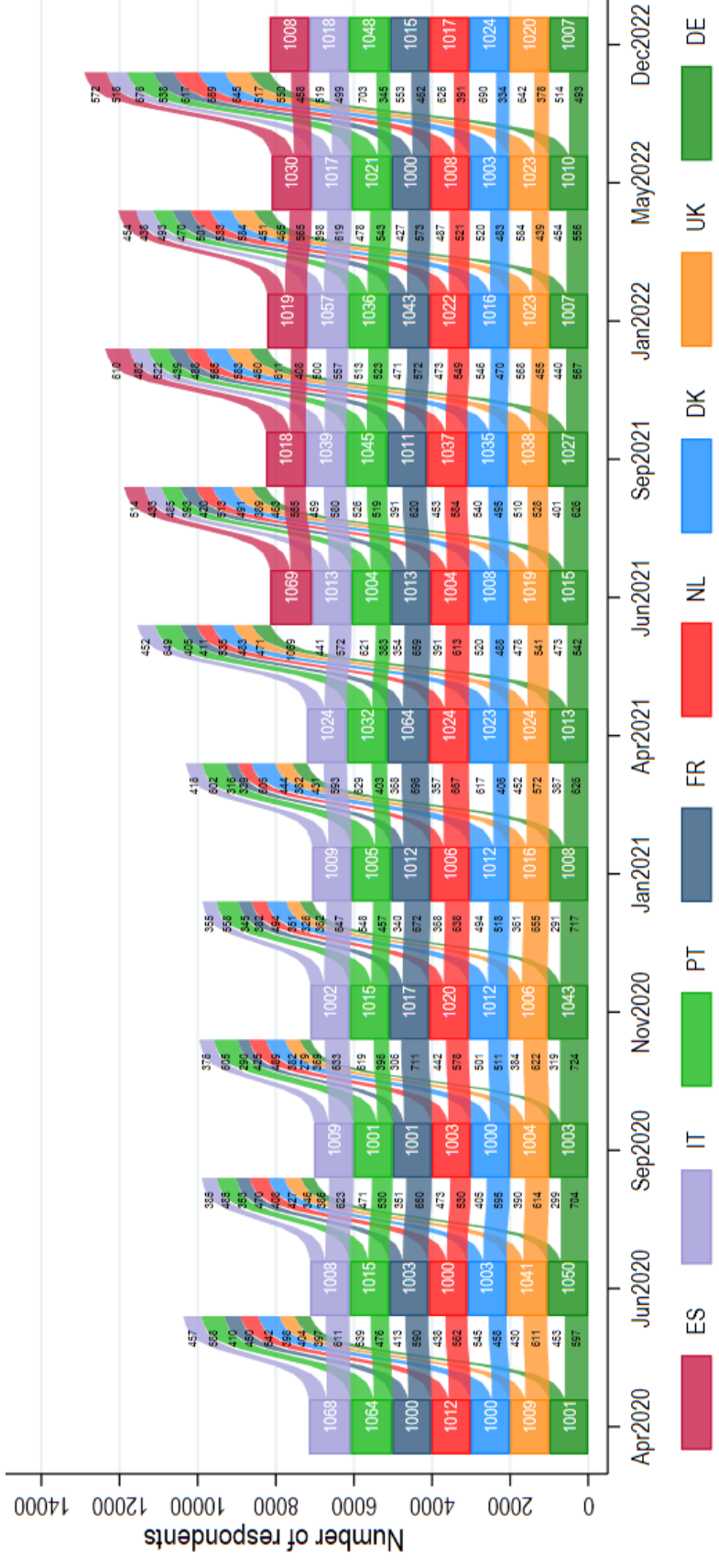


Figure 2. Flows of respondents across the ECOS waves and countries

Each wave is represented by a bar and is split into seven/eight countries, denoting in white colour the number of respondents in each country. Numbers of respondents flowing between the waves and across the countries are denoted in black colour. Flows directed above the bars reflect the dropouts of a specific wave (which could return in further waves).

Table 4. Survey response rates - inflows (representative samples only³).

	Number of participants in a given wave	Number of returning participants in a given wave ⁴	Share of returning participants in a given wave	Number of new participants in a given wave	Wave-to-wave retention rate ⁵	Persistence of the first cohort's participation ⁶
Wave 1 (April 2020)	7 154	n/a	n/a	7 154	n/a	n/a
Wave 2 (June 2020)	7 120	3 905	55%	3 215	55%	3 905
Wave 3 (September 2020)	7 021	4 786	68%	2 235	59%	2 608
Wave 4 (November 2020)	7 115	4 859	68%	2 256	59%	1 801
Wave 5 (January 2021)	7 068	5 483	78%	1 585	60%	1 470
Wave 6 (April 2021)	7 204	4 911	68%	2 293	56%	1 116
Wave 7 (June 2021)	8 145	4 946	61%	3 199	53%	931
Wave 8 (September 2021)	8 250	5 880	71%	2 370	55%	792
Wave 9 (January 2022)	8 223	5 485	67%	2 738	50%	636
Wave 10 (May 2022)	8 112	5 778	71%	2 334	52%	519
Wave 11 (December 2022)	8 157	4 444	54%	3 713	41%	403
Total number of responses	83 569					
Total number of distinct respondents				33 092		

³ The boost sample from Lombardy from wave 1 is not included henceforth.

⁴ Individuals who participated in at least one previous wave in addition to a given wave.

⁵ Share of returning participants from wave t-1 to wave t

⁶ Respondents from wave 1 that participated in subsequent waves without dropping out.

Table 5. Survey response rates - outflows (representative samples only⁷).

	Number of participants in a given wave	Number of dropouts in a given wave ⁸	Wave-specific dropout rate ⁹	Number of temporary dropouts	Number of complete dropouts in a given wave ¹⁰	Wave-specific complete dropout rate ¹¹
Wave 1 (April 2020)	7 154	3 249	45%	934	2 315	32%
Wave 2 (June 2020)	7 120	2 894	41%	1 793	1 101	16%
Wave 3 (September 2020)	7 021	2 846	41%	2 133	713	10%
Wave 4 (November 2020)	7 115	2 811	40%	1 555	1 256	18%
Wave 5 (January 2021)	7 068	3 105	44%	2 254	851	12%
Wave 6 (April 2021)	7 204	3 406	47%	2 112	1 294	18%
Wave 7 (June 2021)	8 145	3 638	45%	1 746	1 892	23%
Wave 8 (September 2021)	8 250	4 149	50%	2 430	1 719	21%
Wave 9 (January 2022)	8 223	3 924	48%	1 959	1 965	24%
Wave 10 (May 2022)	8 112	4 752	59%	2 612	2 140	26%
Wave 11 (December 2022)	8 157	n/a	n/a	n/a	n/a	n/a
Total number of responses	83 569					
Total number of distinct respondents	33 092				15 246	

⁷ The boost sample from Lombardy from wave 1 is not included henceforth.

⁸ Respondents in wave t who did not respond in wave t+1 (but could show up in later waves).

⁹ Ratio of dropouts (temporary and complete) in wave t to participants in wave t

¹⁰ Respondents in wave t who did not participate neither before nor after wave t, i.e., participants of one wave only.

¹¹ Ratio of complete dropouts in wave t to participants in wave t

Table 6. Survey participation summary

Number of waves of participation / X	Number of distinct respondents	Share of participants of exactly X waves	Participation in at least X number of waves	Share of participants of at least X waves
1	18 959	57.29%	33 092	100%
2	4 160	12.57%	14 133	43%
3	2 521	7.62%	9 973	30%
4	1 726	5.22%	7 452	23%
5	1 422	4.30%	5 726	17%
6	989	2.99%	4 304	13%
7	802	2.42%	3 315	10%
8	827	2.50%	2 513	8%
9	714	2.16%	1 686	5%
10	569	1.72%	972	3%
11	403	1.22%	403	1%
Total	33 092			

Additionally, we performed the attrition analysis of complete dropouts and evaluated whether the participants who dropped out from the study differed systematically from those who remained in terms of their personal, socioeconomic and COVID-related characteristics. This analysis let us assess the randomness of attrition and the potential for bias.

We modelled the decision to drop out using the random effects probit regression model, where the dependent variable equalled to 1 if the respondent dropped out after having participated in one wave only (any wave between 1-10). As can be seen from the coefficient plot below, male gender, high education level, younger age categories, very low income and risk aversion levels, and not following COVID-19 news closely appeared to be important factors predicting the decision to drop out of the study. We can also conclude that the reasons for attrition did not show to be directly related to COVID-19 variables, therefore the attrition bias is likely to be small.

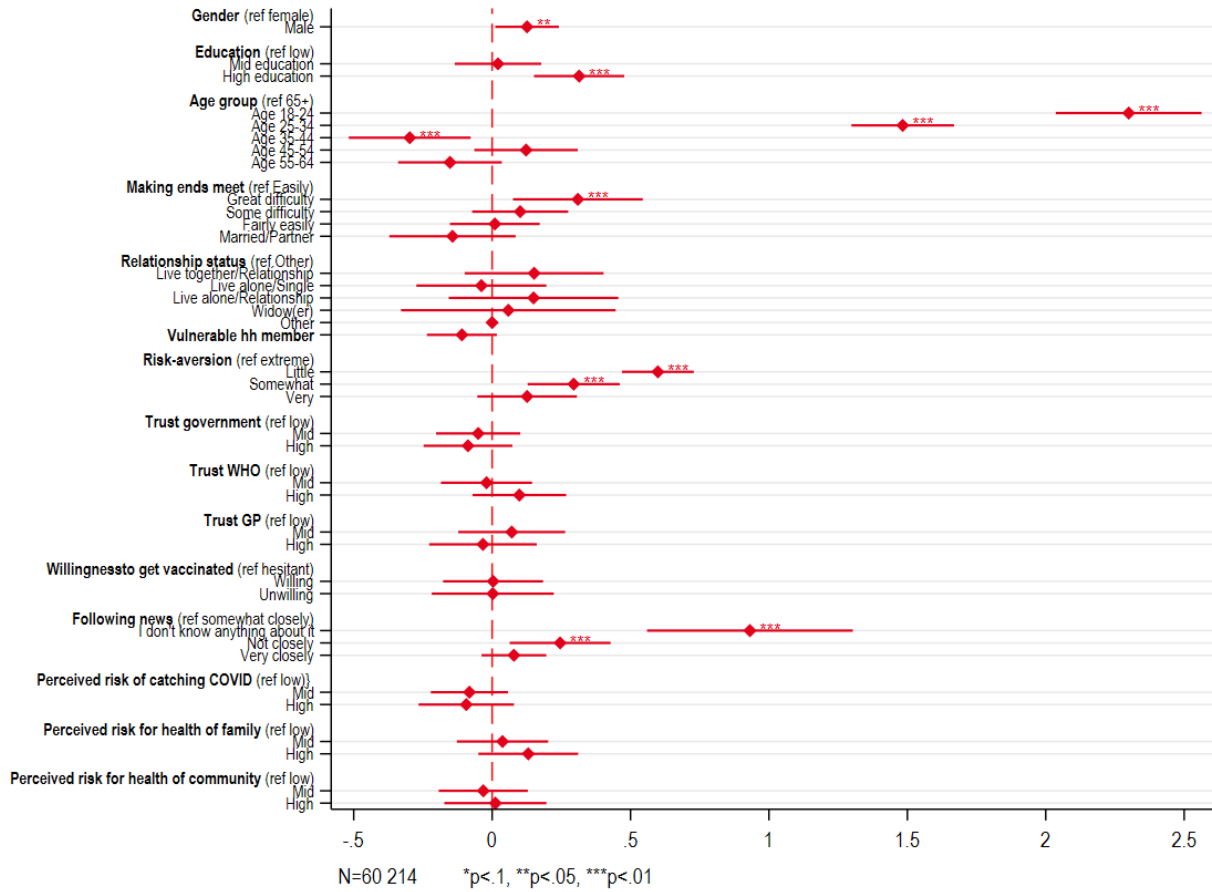


Figure 3. Respondent's decision to drop out of the survey (complete dropouts)

Note: dependent variable: $y=1$ iff respondent participates in one wave only, zero otherwise. Pooled data for waves 1-10 (wave 11 excluded)

Living alone (in a relationship)	438 (4.8%)	386 (4.2%)	516 (5.6%)	410 (4.5%)	298 (3.2%)	497 (5.4%)	429 (4.7%)	176 (3.4%)	3150 (4.6%)
Widow / widower	381 (4.2%)	225 (2.5%)	292 (3.2%)	321 (3.5%)	221 (2.4%)	143 (1.6%)	347 (3.8%)	150 (2.9%)	2080 (3%)
Other	155 (1.7%)	326 (3.6%)	308 (3.4%)	278 (3.0%)	420 (4.6%)	1146 (12.4%)	1191 (13.0%)	402 (7.8%)	4226 (6.1%)
Little risk-averse	2505 (22.4%)	2929 (26.1%)	2159 (19.4%)	1957 (17.5%)	2584 (23.2%)	3848 (34.1%)	3195 (28.4%)	1875 (36.5%)	21052 (25.2%)
Somewhat risk-averse	1333 (11.9%)	1308 (11.7%)	1192 (10.7%)	1282 (11.5%)	1190 (10.7%)	1561 (13.8%)	1890 (16.8%)	880 (17.1%)	10636 (12.7%)
Very risk-averse	1201 (10.7%)	1207 (10.8%)	1127 (10.1%)	1315 (11.8%)	1277 (11.5%)	640 (5.7%)	1269 (11.3%)	430 (8.4%)	8466 (10.1%)
Extremely risk-averse	6145 (54.9%)	5779 (51.5%)	6658 (59.8%)	6599 (59.2%)	6079 (54.6%)	5237 (46.4%)	4910 (43.6%)	1959 (38.1%)	43366 (51.9%)
Know nothing about	159 (1.4%)	159 (1.4%)	243 (2.2%)	96 (0.9%)	392 (3.5%)	55 (0.5%)	63 (0.6%)	74 (1.4%)	1241 (1.5%)
Not closely at all	1148 (10.3%)	1376 (12.3%)	1459 (13.1%)	611 (5.5%)	1686 (15.1%)	4746 (42.1%)	4460 (39.6%)	1773 (34.5%)	7788 (9.3%)
Somewhat closely	5631 (50.3%)	5014 (44.7%)	4076 (36.6%)	5330 (47.8%)	5595 (50.0%)	5863 (51.9%)	6177 (54.8%)	2975 (57.8%)	36625 (43.8%)
Very closely	4246 (38.0%)	4674 (41.6%)	5358 (48.1%)	5116 (45.9%)	3506 (31.4%)	5863 (51.9%)	6177 (54.8%)	2975 (57.8%)	37915 (45.4%)
Yes	7924 (70.9%)	9118 (81.2%)	8947 (80.3%)	8160 (73.2%)	7025 (62.8%)	8740 (77.4%)	8325 (73.9%)	4407 (85.7%)	62646 (75%)
No	1739 (15.5%)	1059 (9.4%)	1103 (9.9%)	1576 (14.1%)	2446 (21.9%)	923 (8.2%)	1456 (12.9%)	425 (8.3%)	10727 (12.8%)
Not sure	1521 (13.6%)	1046 (9.3%)	1086 (9.8%)	1417 (12.7%)	1708 (15.3%)	1623 (14.4%)	1483 (13.2%)	312 (6.1%)	10196 (12.2%)
Low	2722 (24.3%)	3636 (32.4%)	2086 (18.7%)	2109 (18.9%)	4783 (42.8%)	2213 (19.6%)	3150 (28.0%)	2115 (41.1%)	22814 (27.3%)
Mid	3350 (30.0%)	3533 (31.5%)	2737 (24.6%)	2992 (26.8%)	3372 (30.2%)	3656 (32.4%)	3457 (30.7%)	1498 (29.1%)	24595 (29.4%)
High	5112 (45.7%)	4054 (36.1%)	6313 (56.7%)	6052 (54.3%)	3024 (27.1%)	5417 (48.0%)	4657 (41.3%)	1531 (29.8%)	36160 (43.3%)
Low	1549 (13.9%)	1710 (15.2%)	1266 (11.4%)	1292 (11.6%)	1354 (12.1%)	1163 (10.3%)	1648 (14.6%)	621 (12.1%)	10603 (12.7%)
Mid	2639 (23.6%)	2851 (25.4%)	2381 (21.4%)	2483 (22.3%)	2643 (23.6%)	2742 (24.3%)	2861 (25.4%)	1131 (22.0%)	19731 (23.6%)
High	6996 (62.6%)	6662 (59.4%)	7489 (67.3%)	7378 (66.2%)	7182 (64.2%)	7381 (65.4%)	6755 (60.0%)	3392 (65.9%)	53235 (63.7%)
Low	2814 (25.2%)	2634 (23.5%)	2183 (19.6%)	2505 (22.5%)	3105 (27.8%)	1780 (15.8%)	3018 (26.8%)	1305 (25.4%)	19344 (23.1%)
Mid	3239 (29.0%)	3226 (28.7%)	3106 (27.9%)	3426 (30.7%)	3502 (31.3%)	2983 (26.4%)	3003 (26.7%)	1383 (26.9%)	23868 (28.6%)

	High	5131 (45.9%)	5363 (47.8%)	5847 (52.5%)	5222 (46.8%)	4572 (40.9%)	6523 (57.8%)	5243 (46.5%)	2456 (47.7%)	40357 (48.3%)
Perceived likelihood of catching COVID	Low	3667 (32.8%)	3159 (28.1%)	4279 (38.4%)	2365 (21.2%)	3042 (27.2%)	3478 (30.8%)	3067 (27.2%)	1473 (28.6%)	24530 (29.4%)
	Mid	4604 (41.2%)	5224 (46.5%)	4799 (43.1%)	6346 (56.9%)	5238 (46.9%)	5219 (46.2%)	4975 (44.2%)	2315 (45.0%)	38720 (46.3%)
	High	2913 (26.0%)	2840 (25.3%)	2058 (18.5%)	2442 (21.9%)	2899 (25.9%)	2589 (22.9%)	3222 (28.6%)	1356 (26.4%)	20319 (24.3%)
	Low	3267 (29.2%)	2717 (24.2%)	3542 (31.8%)	2685 (24.1%)	2248 (20.1%)	2367 (21.0%)	2520 (22.4%)	1267 (24.6%)	20613 (24.7%)
Perceived severity for family	Mid	3915 (35.0%)	4081 (36.4%)	3807 (34.2%)	4615 (41.4%)	4002 (35.8%)	3846 (34.1%)	3703 (32.9%)	1813 (35.2%)	29782 (35.6%)
	High	4002 (35.8%)	4425 (39.4%)	3787 (34.0%)	3853 (34.5%)	4929 (44.1%)	5073 (44.9%)	5041 (44.8%)	2064 (40.1%)	33174 (39.7%)
	Low	2815 (25.2%)	2375 (21.2%)	3618 (32.5%)	2870 (25.7%)	2497 (22.3%)	2155 (19.1%)	2103 (18.7%)	1131 (22.0%)	19564 (23.4%)
Perceived severity for community	Mid	4932 (44.1%)	4835 (43.1%)	5083 (45.6%)	5289 (47.4%)	4291 (38.4%)	4907 (43.5%)	4411 (39.2%)	2259 (43.9%)	36007 (43.1%)
	High	3437 (30.7%)	4013 (35.8%)	2435 (21.9%)	2994 (26.8%)	4391 (39.3%)	4224 (37.4%)	4750 (42.2%)	1754 (34.1%)	27998 (33.5%)
	Vulnerable household member	3345 (29.9%)	2827 (25.2%)	3015 (27.1%)	4321 (38.7%)	2080 (18.6%)	3114 (27.6%)	3511 (31.2%)	1163 (22.6%)	23276 (28%)
Total	11184	11223	11136	11153	11179	11286	11264	5144	83569	

GP-general practitioner / family doctor, WHO – World Health Organisation. Vulnerable household member defined as yes if the household includes any of the following members: very young children and babies, children, disabled person(s), someone with diagnosed chronic medical conditions (such as heart or lung conditions or diabetes), elderly person(s)

5.4. Data outputs

Data specifications

The table below provides general information on the ECOS dataset.

Table 8. Data specifications table

Subject	Social Sciences / Health Economics
Specific subject area	ECOS is a longitudinal study spanning European countries, analysing public perceptions, behaviours, and policies during the COVID-19 pandemic.
Data format	.sav (raw data as downloaded from Qualtrics) .dta (dataset with cleaned data) .xls file (codebook) .pdf file (ECOS technical report)
Type of data	Longitudinal survey data representative of eight European countries in terms of age, gender, region and in part education, part of which has a panel structure.
Data collection	Data were collected using online panels of respondents owned by a market research company Dynata during 11 waves of the ECOS fieldwork carried out with a frequency of three months on average between April 2020 and December 2022. The questionnaire was designed by the whole ECOS team and consisted of the core part (questions tracked on a longitudinal basis) and the wave-specific part (questions pertaining to a specific wave). The target population was the adult resident population in each of eight European countries. The sampling for this study was based on age, gender, region and education. The data for all 11 waves were collected in Denmark, France, Germany, Italy, the Netherlands, Portugal, and the United Kingdom, and for waves 7-11 also in Spain.
Data source location	Respondents registered in Dynata's (marketing research company) online panels who live in eight European countries (Denmark, France, Germany, Italy, the Netherlands, Portugal, the United Kingdom, and Spain) and within each of the targeted regions as defined by national census, took part in the survey. The data are permanently stored at the Universität Hamburg.
Data accessibility	The data referred to in this article have not yet been made publicly available in a data repository. The ECOS data are currently being analysed

by a variety of researchers who are part of the ECOS consortium or are collaborating with the authors.
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Researchers who want to use ECOS data can approach the ECOS consortium with a research proposal for collaboration.
--

The data are expected to be available under open access in 2025.
--

Individual and interview identifiers

Each individual was assigned an individual number (pid), which allowed the identification of the same individuals across different waves. Each “observation was assigned an individual serial number (psid), which was unique for each wave.

Variable names

Questionnaire variables in the data files were named to match the question name whenever possible. The standard convention used here for the naming of multi-responses and grid variables was to add a numeric suffix to the variable name in form of “VARNAME_01”, for example, Household_comp_1 - Household_comp_6 (multi-response question), Trust_1 – Trust_8 (grid variable).

Variable description

For questionnaire variables the variable labels used in the data files are based on the wording from the survey questionnaire, shortened and kept comprehensible.

Missing values

There are several cases when data values can appear coded as missing:

- questions that were not asked (country- or wave-specific questions, conditional questions),
- responses denoting “do not know”,
- items in multi-response question that were not selected by the respondent,
- optional questions,
- non-participation in the survey wave.

Variable order

The order of variables in the data files follow the questionnaire order as below:

- Identifier variables
- Sample information and interview-related variables
- Demographic information
- Core questionnaire variables
- Wave-specific variables

6. Value of the data

The ECOS data are useful in understanding the attitudes and experiences of the European adults in the context of the COVID-19 pandemic. ECOS captures evolving public perceptions, behaviours, and policy sentiments during the pandemic, offering a real-time lens on societal responses to the COVID-19 crisis.

The ECOS data can benefit researchers, health and public sector leaders, and policymakers providing opinion- and experience-based insights alongside sociodemographic variables. It allows to explore socioeconomic dynamics, public trust, vaccine acceptance, and other topics, enriching interdisciplinary COVID-19 research, as well as longitudinally analyse changes in risk perceptions, behaviours, and societal attitudes, enabling deeper understanding of pandemic impacts. It also enables a comparative analysis of European nations, which can provide nuanced insights into regional variations, contributing to a comprehensive understanding of COVID-19 effects. Policymakers can gain evidence-based insights to design effective containment and vaccination strategies, fostering informed decision-making.

6.1. Use of data for research

After each data collection, first descriptive analyses were run to communicate new insights to the public and to policymakers. Subsequently, the authors proceeded with various quantitative in-depth analyses of the data addressing topics such as the willingness to be vaccinated, the support of containment measures, mental health aspects of the pandemic as well as topics around the valuation of COVID-19 vaccines, for publication in scientific journals. As of September 2023, 13 papers have been published in peer-reviewed journals (see section 6.4 for a list of publications). To make wider use of the data, the ECOS team is engaged in own research, research collaborations and joint projects with scholars Europe-wide, whose discipline-specific expertise adds to the depth and diversity of the ECOS data. Currently, around 20 paper projects are ongoing.

6.2. Linking ECOS with additional variables and data sets

There are various possibilities to augment ECOS data with complementary information i.e., it is possible to link ECOS data with context variables. For example, the date of the respondents' interview or fieldwork execution can be used to link data on COVID-19 incidence from Our World in Data [15] or the stringency of non-pharmaceutical containment policies using the Oxford COVID-19 Government Response Tracker (OxCGRT) [16], that describe the time period around the interview. Moreover, given that ECOS included several well-established scales, e.g., PHQ-4, EQ-5D-5L, ICECAP-A, TMSI, etc., it is possible to link these data with those from other countries.

6.3. Selected findings

Below we present selected highlights from the ECOS survey illustrating trends and findings from the study.

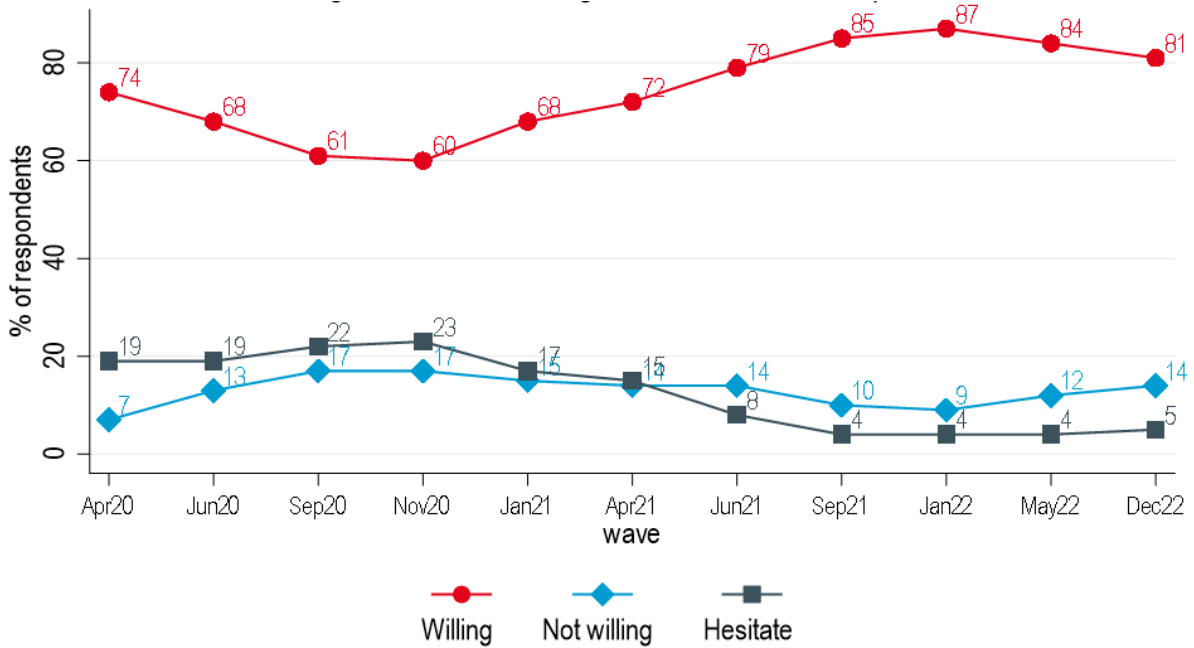


Figure 4. Willingness to get vaccinated against COVID-19 in Europe during 2020-2022
 Pooled data with Spain included from wave 7 onwards.

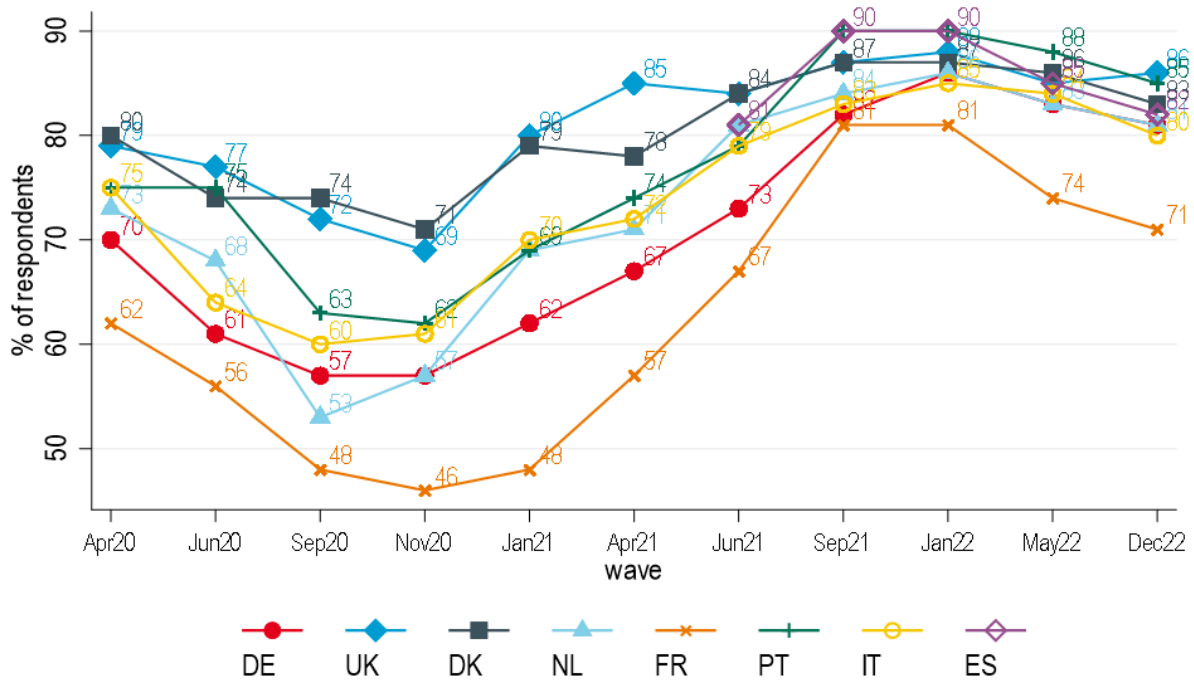


Figure 5. Country-specific willingness to get vaccinated against COVID-19 during 2020-2022

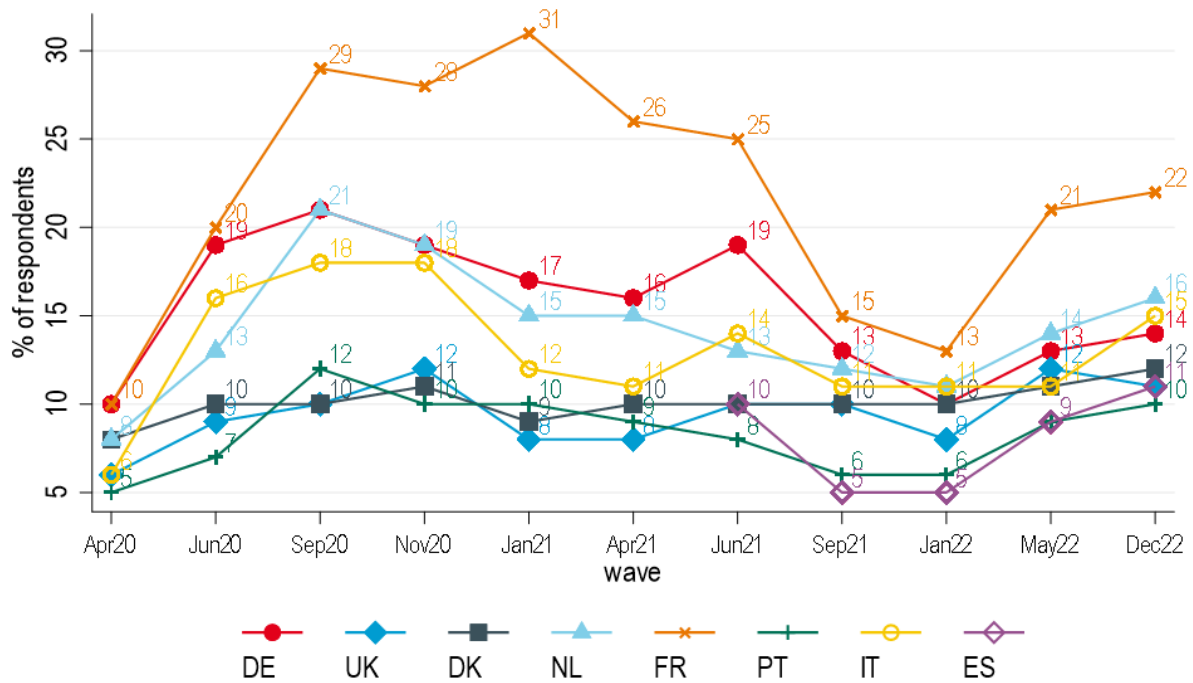


Figure 6. Country-specific unwillingness to get vaccinated against COVID-19 during 2020-2022

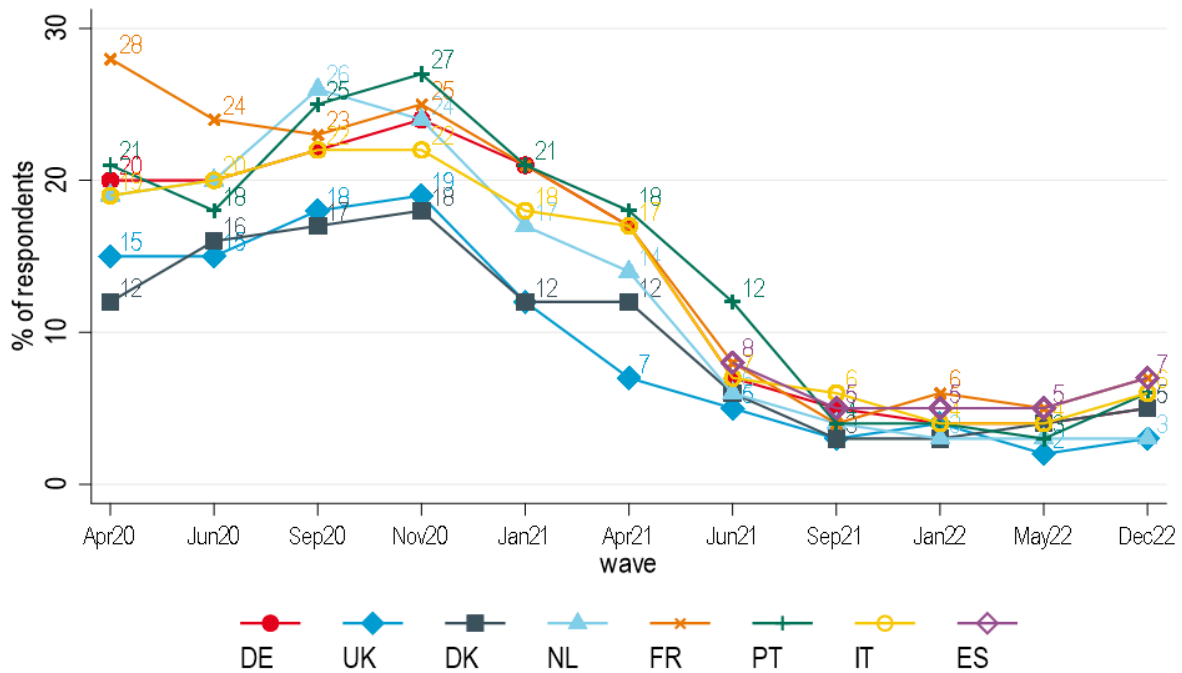


Figure 7. Country-specific hesitancy to get vaccinated against COVID-19 during 2020-2022

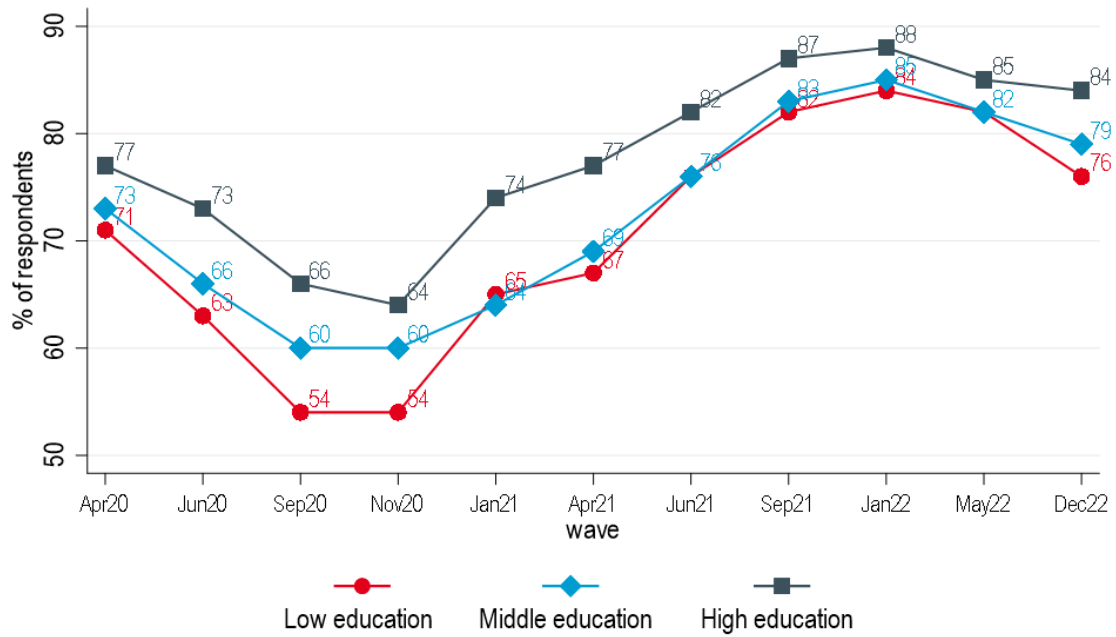


Figure 8. Willingness to get vaccinated against COVID-19 by education
Pooled data for seven countries, no Spain

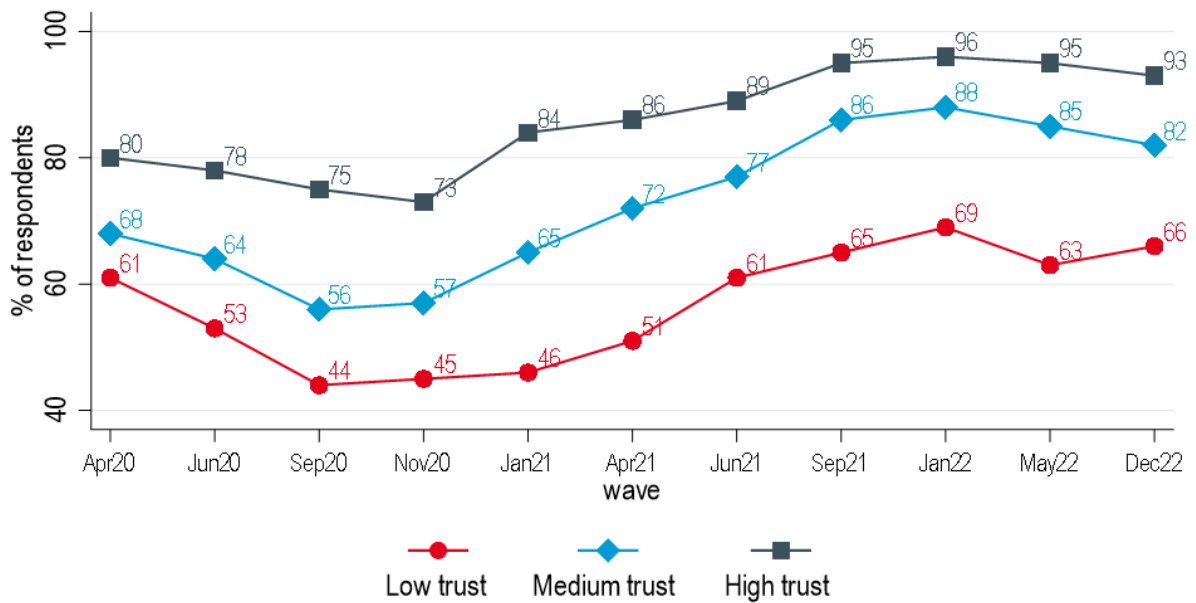


Figure 9. Willingness to get vaccinated against COVID-19 by trust in information from the national government
Pooled data for seven countries, no Spain

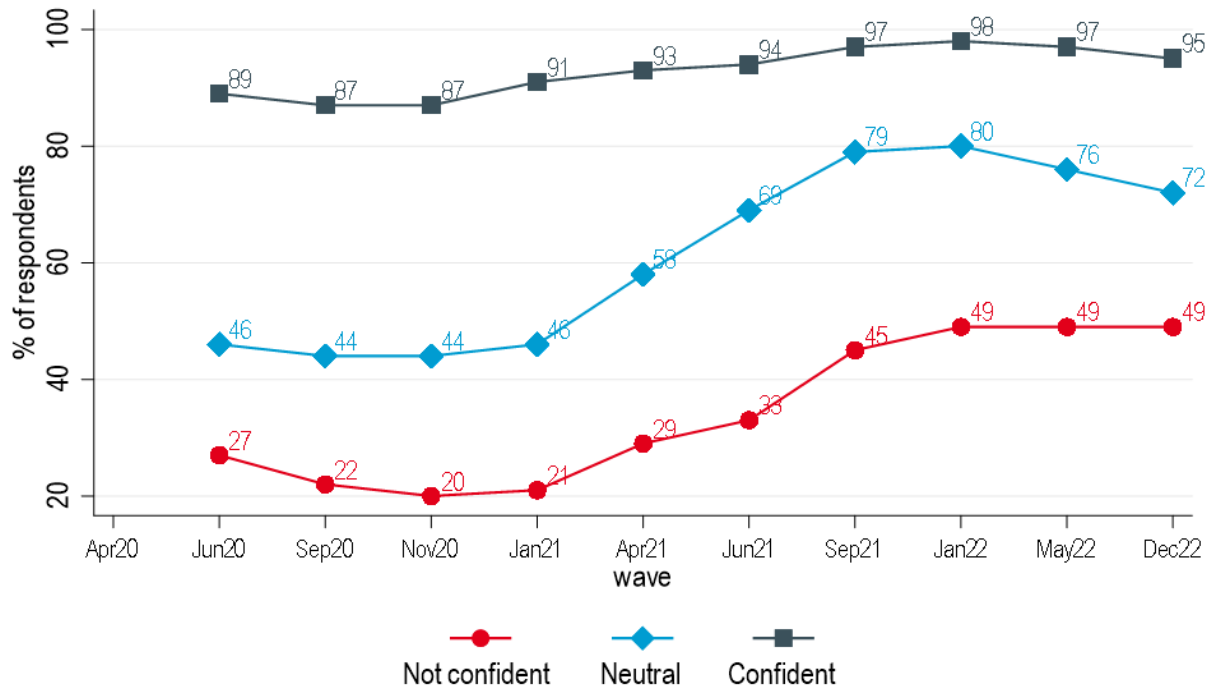


Figure 10. Willingness to get vaccinated against COVID-19 by confidence in COVID-19 vaccine safety

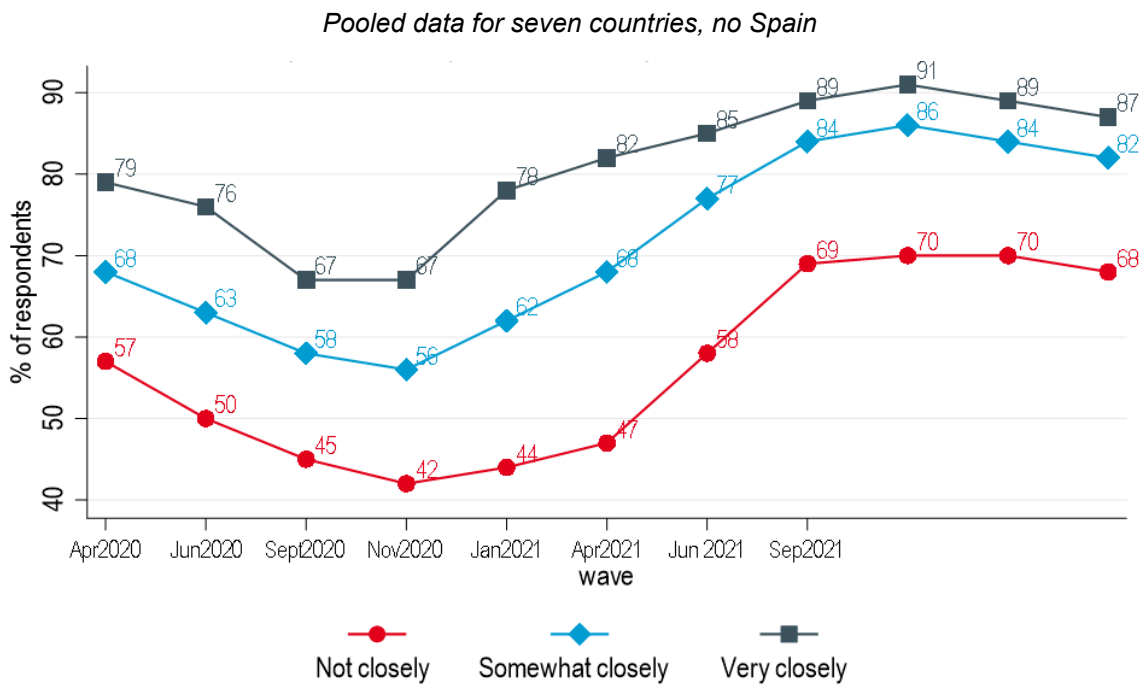


Figure 11. Willingness to get vaccinated against COVID-19 by the extent of following news about COVID-19

Pooled data for seven countries, no Spain

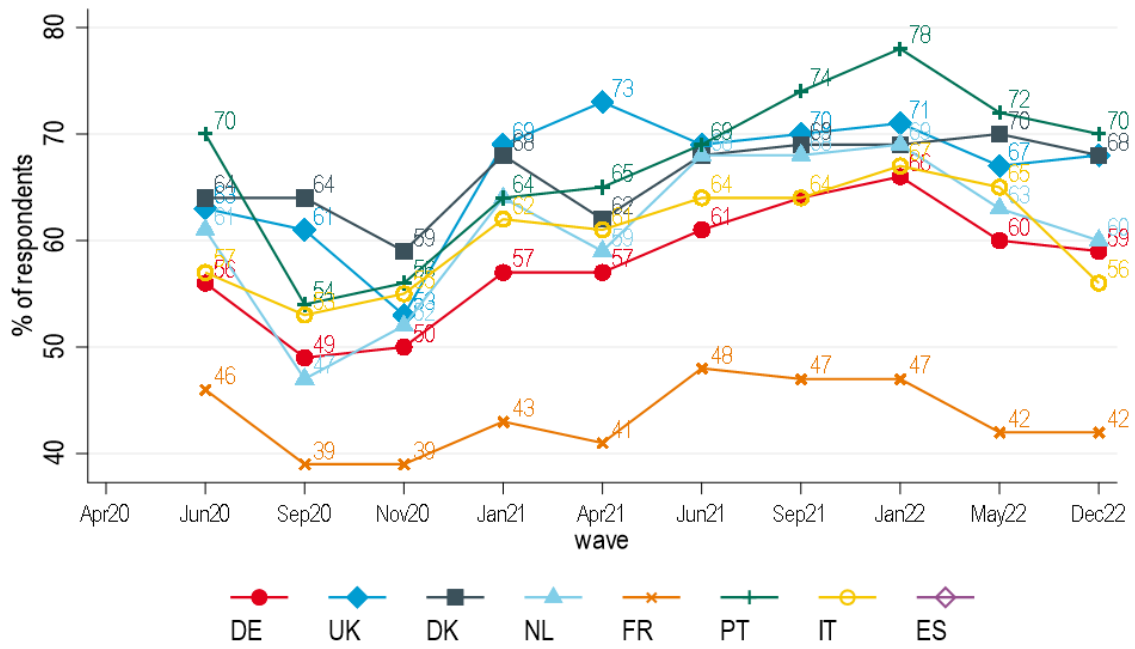


Figure 12. Country-specific share of respondents confident in COVID-19 vaccine safety

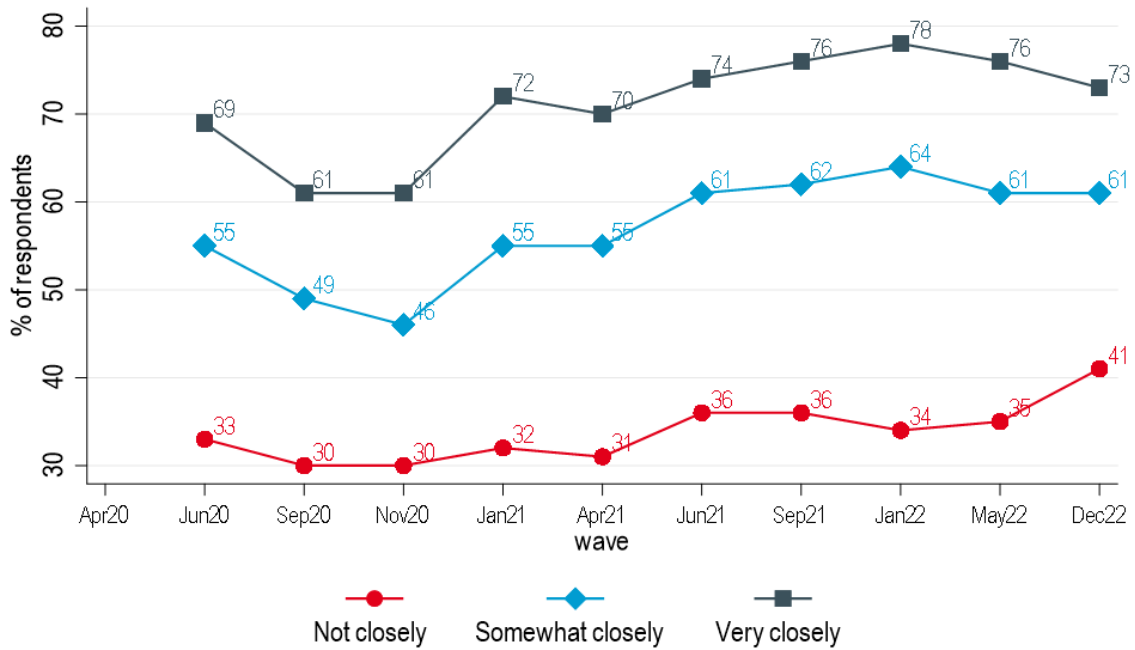


Figure 13. Share of respondents confident in COVID-19 vaccine safety by extent of following news about COVID-19

Pooled data for seven countries, no Spain

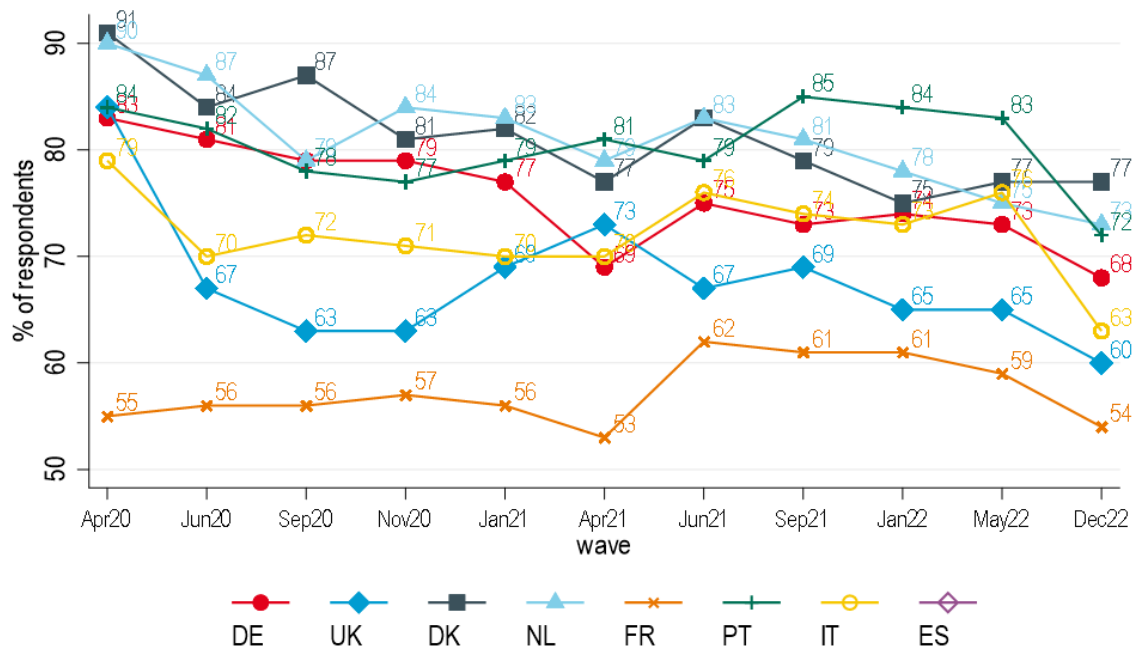


Figure 14. Country-specific share of respondents who trust much or very much in information in the context of COVID-19 from the national government

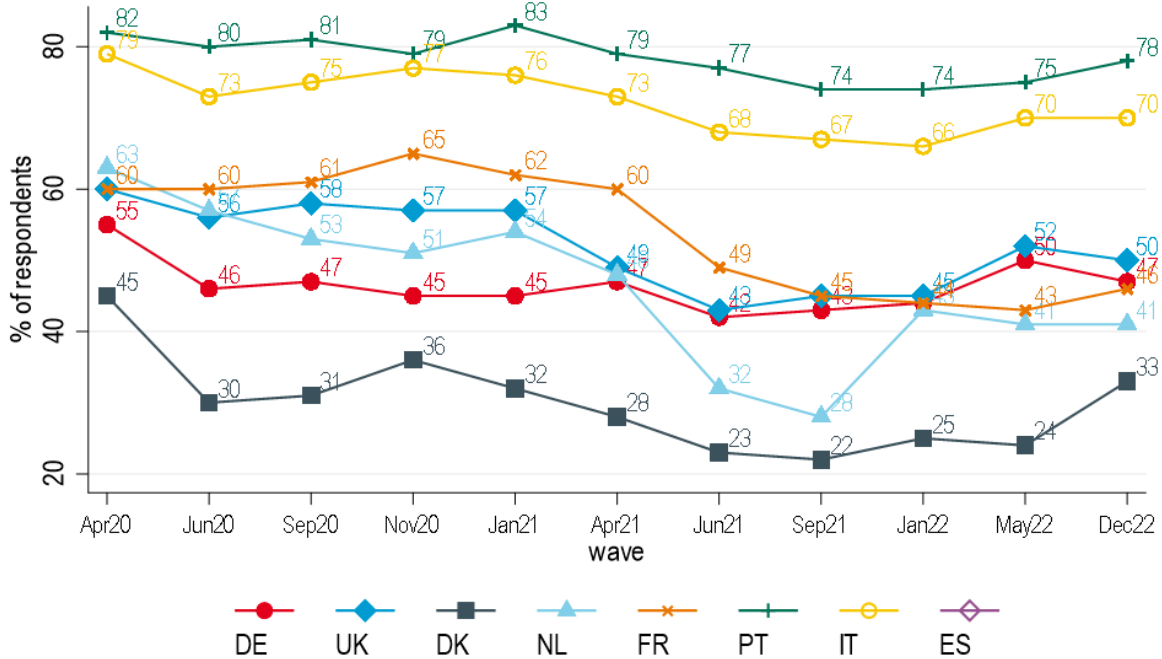


Figure 15. Country-specific share of respondents who worry quite a bit or a lot about recession

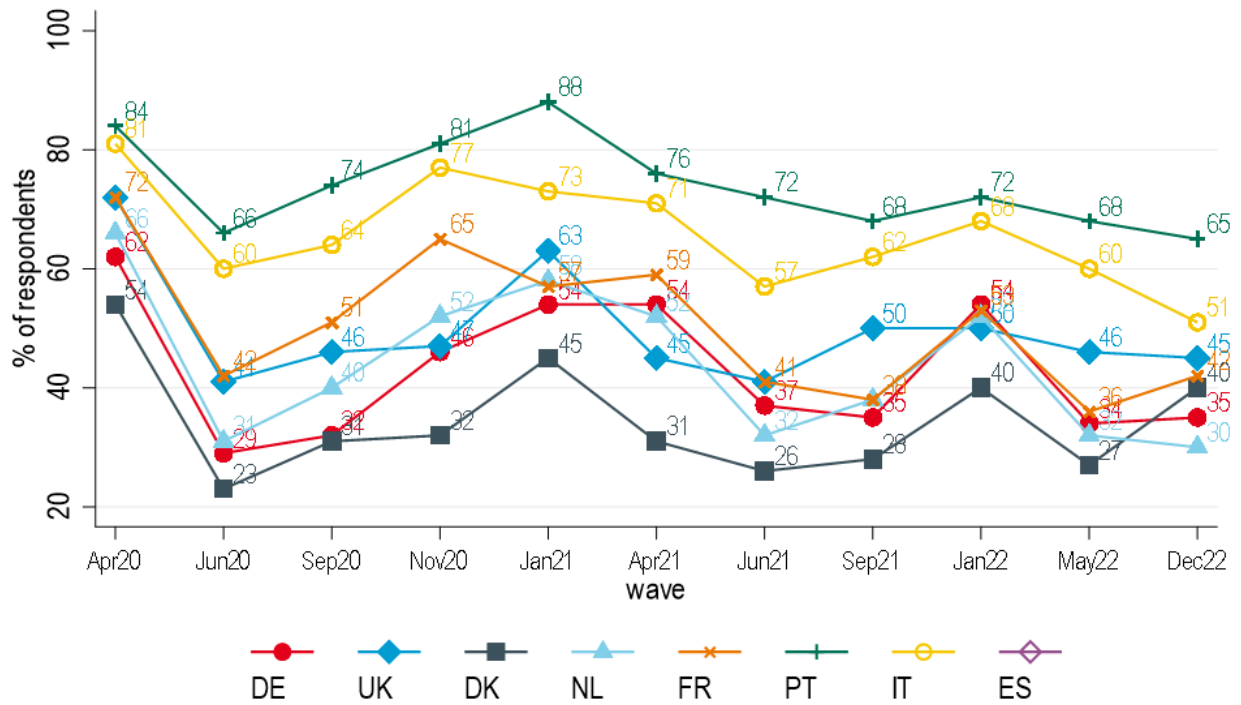


Figure 16. Country-specific share of respondents who worry quite a bit or a lot about the health system getting overloaded

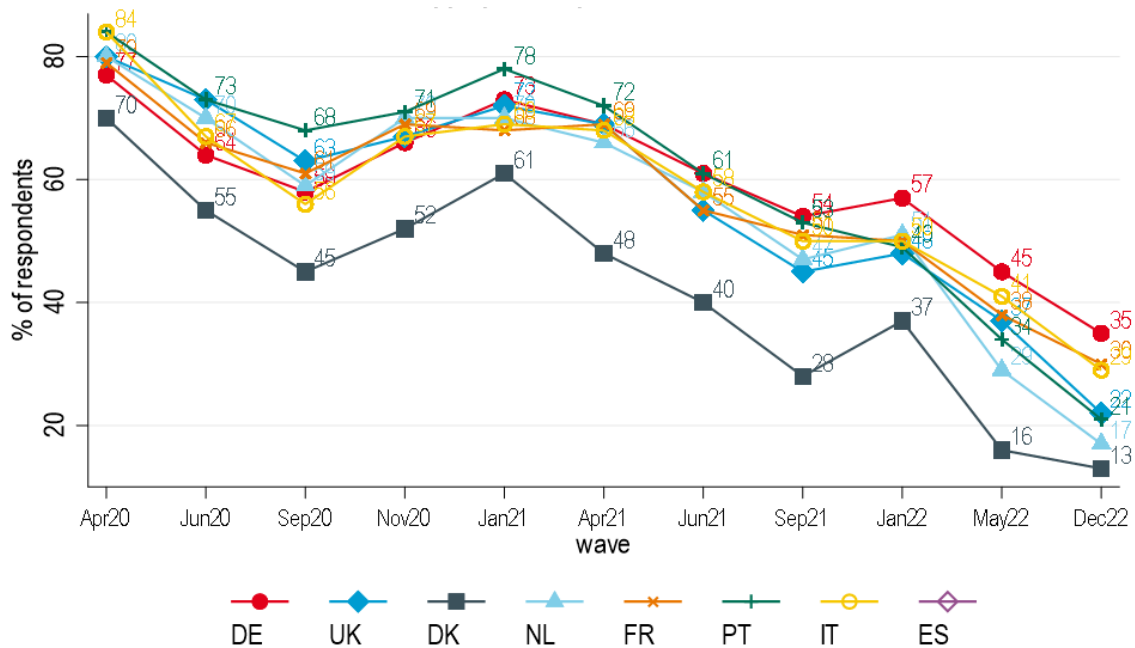


Figure 17. Country-specific share of respondents with full adherence to avoiding hugging, kissing and handshaking as a recommended protective measure against COVID-19

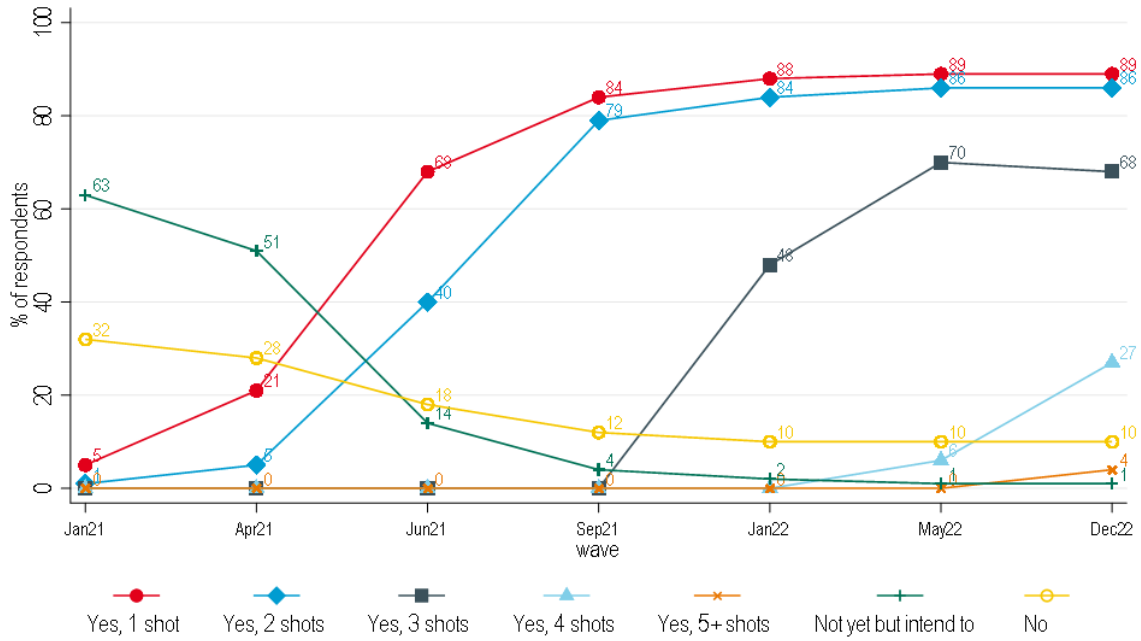


Figure 18. Self-reported vaccination status

Vaccinated with x shots=at least x shots. Pooled data for seven countries, no Spain

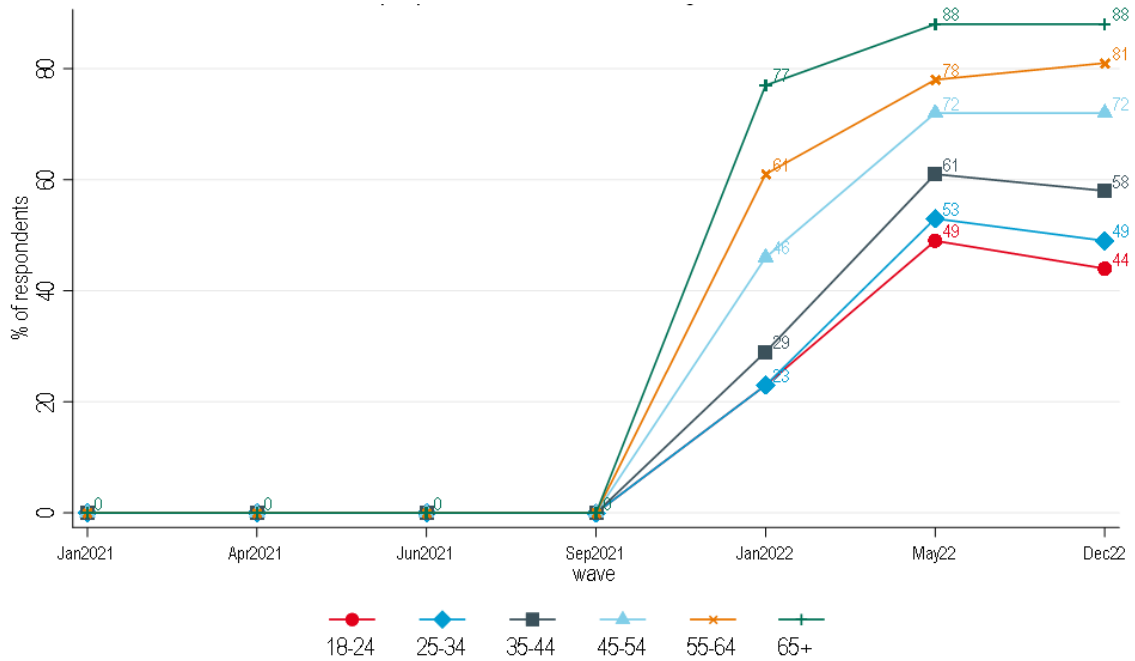


Figure 19. Share of respondents vaccinated with at least 3 shots against COVID-19 (self-reported status)

Pooled data for seven countries, no Spain

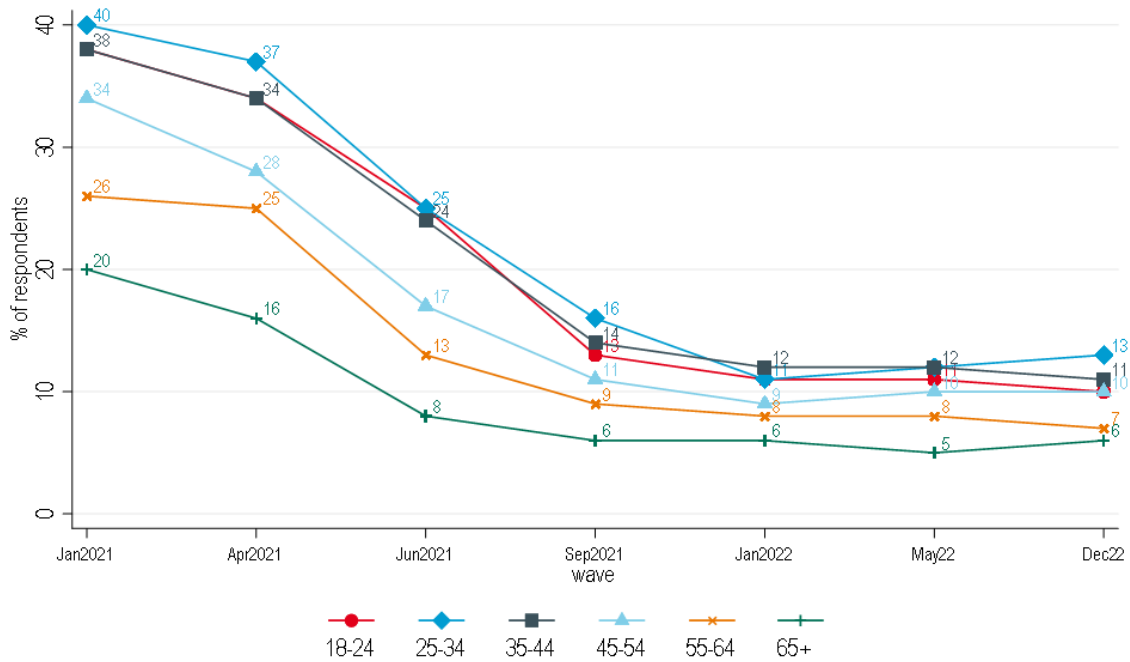


Figure 20. Share of respondents unvaccinated against COVID-19 (self-reported status)

Pooled data for seven countries, no Spain

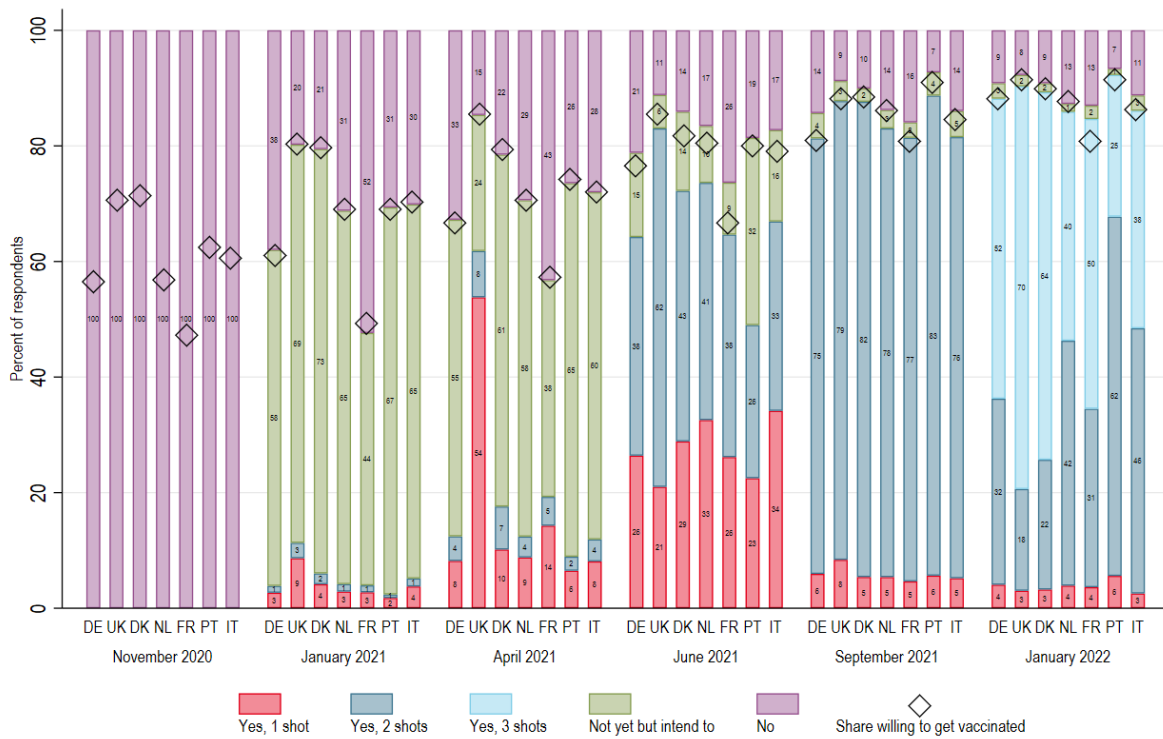


Figure 21. Willingness to get vaccinated against COVID-19 and self-reported vaccination status

6.4. Publications

As of August 2023, the following research papers based on the ECOS data have been published.

6.4.1. Peer-reviewed publications

1. Sabat, I., Neumann-Böhme, S., Barros, P. P., Torbica, A., van Exel, J., Brouwer, W., Stargardt, T., & Schreyögg, J. (2023). Vaccine hesitancy comes in waves: Longitudinal evidence on willingness to vaccinate against COVID-19 from seven European countries. *Vaccine*.
2. Neumann-Böhme, S., Sabat, I., Brinkmann, C., Attema, A. E., Stargardt, T., Schreyögg, J., & Brouwer, W. (2023). Jumping the Queue: Willingness to Pay for Faster Access to COVID-19 Vaccines in Seven European Countries. *PharmacoEconomics*, 1-14.
3. König, HH., Neumann-Böhme, S., Sabat, I., Schreyögg, J., Torbica, A., van Exel, J., Barros, P., Stargardt, T., Hajek, A. Health-related quality of life in seven European countries throughout the course of the COVID-19 pandemic: evidence from the European COvid Survey (ECOS). *Qual Life Res* 32, 1631–1644 (2023).
4. Himmler, S., van Exel, J., Brouwer, W., Neumann-Böhme, S., Sabat, I., Schreyögg, J., Stargardt, T., Barros, P., Torbica, A. (2023). Braving the waves: exploring capability well-being patterns in seven European countries during the COVID-19 pandemic. *Eur J Health Econ*.
5. Neumann-Böhme, S., Sabat, I., & Attema, A. E. (2022). Altruism and the link to pro-social pandemic behavior. *Frontiers in Health Services*, 2, 871891.
6. Hajek, A., Sabat, I., Neumann-Böhme, S., Schreyögg, J., Barros, P. P., Stargardt, T., & König, H. H. (2022). Depression and anxiety in later COVID-19 waves across Europe: New evidence from the European COvid Survey (ECOS). *Psychiatry Research*, 317, 114902.
7. Enzing, J. J., van Krugten, F. C., Sabat, I., Neumann-Böhme, S., Boer, B., Knies, S., & Brouwer, W. B. (2022). Psychometric evaluation of the Mental Health Quality of Life (MHQoL) instrument in seven European countries. *Health and Quality of Life Outcomes*, 20(1), 1-11.
8. Hajek, A., Sabat, I., Neumann-Böhme, S., Schreyögg, J., Barros, P. P., Stargardt, T., & König, H. H. (2022). Prevalence and determinants of probable depression and anxiety during the COVID-19 pandemic in seven countries: Longitudinal evidence from the European COvid Survey (ECOS). *Journal of affective disorders*, 299, 517-524.
9. Varghese, N. E., Sabat, I., Neumann-Böhme, S., Schreyögg, J., Stargardt, T., Torbica, A., ... & Brouwer, W. (2021). Risk communication during COVID-19: A descriptive study on familiarity with, adherence to and trust in the WHO preventive measures. *Plos one*, 16(4), e0250872.
10. Chandler, T., Neumann-Böhme, S., Sabat, I., Barros, P. P., Brouwer, W., van Exel, J., ... & Stargardt, T. (2021). Blood donation in times of crisis: Early insight into the impact of COVID-19 on blood donors and their motivation to donate across European countries. *Vox Sanguinis*.

11. Sabat, I., Neuman-Böhme, S., Varghese, N. E., Barros, P. P., Brouwer, W., van Exel, J., ... & Stargardt, T. (2020). United but divided: Policy responses and people's perceptions in the EU during the COVID-19 outbreak. *Health Policy*, 124(9), 909-918.
12. Neumann-Böhme, S., Varghese, N. E., Sabat, I., Barros, P. P., Brouwer, W., ... & Stargardt, T. (2020). Once we have it, will we use it? A European survey on willingness to be vaccinated against COVID-19. *The European Journal of Health Economics: HEPAC*, 21(7), 977-982.
13. Varghese, N. E., Sabat, I., Neumann-Böhme, S., Schreyögg, J., Stargardt, T., ... & Brouwer, W. (2020). Risk Communication during COVID-19: Familiarity with, Adherence to and Trust in the WHO Preventive Measures. *Covid Economics: Vetted and Real-Time Papers*, 48(10), 226-241.

6.4.2. Other publications:

14. Sabat, I., Varghese, N. E., Neuman-Böhme, S., Barros, P. P., Brouwer, W., van Exel, J., ... & Stargardt, T. (2020). Battling the infodemics: health communication effectiveness during COVID-19. *European Journal of Public Health*, 30(Supplement_5), ckaa166-072.
15. Sabat, I., Elsem Varghese, N., Neuman-Böhme, S., Pita Barros, P., Brouwer, W., van Exel, J., ... & Stargardt, T. (2020). Countering COVID-19: A European survey on acceptability of and commitment to preventive measures. *European Journal of Public Health*, 30, ckaa166-619.
16. Neumann-Böhme, S., & Sabat, I. (January 2021). Now, we have it. Will we use it? New results from ECOS on the willingness to be vaccinated against COVID-19. IQCE Policy Brief No.13.
17. Varghese, N. E., Sabat, I., Neumann-Böhme, S., Schreyögg, J., Stargardt, T., ... & Brouwer, W. (October, 2020). Europeans know and act on WHO recommendations during COVID-19. *VoxEU*
18. Sabat, I. (September, 2020). Policy Responses and People's Perceptions During the COVID-19 Pandemic. IQCE Policy Brief IQCE No. 9

7. Author Contributions

Project idea: IS, SNB, NEV. Survey design: IS (waves 1-11), SNB (waves 1-11), PPB (waves 1-11), WB (waves 1-11), AT (waves 1-11), JE (waves 1-11), JS (waves 1-11), TS (waves 1-11), NEV (wave 1), CB (waves 9-11), LF (waves 10-11), BH (waves 10-11). Survey programming, fieldwork management, data collection and cleaning: IS (waves 1-11), SNB (waves 1-11), NEV (wave 1), CB (waves 9-11), LF (waves 7-11), BH (waves 9-11). Data visualisations: IS. Drafted the manuscript: IS. Revised the manuscript: SNB, CB, LF, BH, JE, JS, TS, PPB, WB, AT.

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Annex 1: Core questionnaire

Start of Block: Consent form

consent

Dear Participant,

Thank you for participating in this survey on the novel coronavirus (COVID-19). The goal of this study is to understand people's attitudes towards the disease and the associated risks. Please answer the survey to the best of your knowledge and abilities.

Before you start, please:

- Make sure you have about 20 minutes of uninterrupted time;
- Maximise your browser window;
- Switch your phone to a silent mode;
- Switch off your e-mail, phone notifications and anything else that may distract you.

Please, do not use external sources of information like the Internet to search for information. Many people may not know the answers to some questions, but please answer every question according to your belief if you are not sure what the right answer is.

Your data will be treated in accordance with the provisions of the European Data Protection Regulation (GDPR EU).

CONSENT FORM

I consent to participate in this survey. I understand that all data will be kept confidential by the researcher. My personal information will not be stored with the data. I am free to withdraw at any time, without giving a reason.

I voluntarily consent to participate in this study. (1)

I do not wish to participate. (2)

End of Block: Consent form

Start of Block: Age

age How old are you currently?

▼ 15 (2) ... 99 (86)

End of Block: Age

Start of Block: Demographics

gender What is your gender?

Male (1)

Female (2)

education How many years of full-time education (including school and university education, if applicable) have you completed?

0 3 6 9 13 16 19 22 25

years of education ()



field Which of the following categories best corresponds to your profession (or education if you are a full-time student):

Health-related sector (medical staff, pharmacist, medical student) (1)

Education (e.g. schools, nurseries) (2)

Food retail (Supermarkets) (3)

Research (4)

Other (5)

region_ge In which region of <country> do you live?

Income Thinking of your household's total monthly income, would you say that your household is able to make ends meet ...

With great difficulty (1)

With some difficulty (2)

Fairly easily (3)

Easily (4)

Household_comp Does your household include any of the following members (other than you)?

- Very young children and babies (1)
- Children (2)
- Disabled person(s) (3)
- Someone with diagnosed chronic medical conditions (such as heart or lung conditions or diabetes) (4)
- Elderly person(s) (5)
- None of the ones mentioned above (6)

End of Block: Demographics

Start of Block: Risk attitudes

lottery_a Would you take the opportunity of a 50 percent chance of doubling your income and a 50 percent chance of reducing your income by one third?

- Yes, I would take this opportunity (1)
- No, I wouldn't take this opportunity (2)

Display This Question:
If lottery_a = Yes, I would take this opportunity

lottery_b Would you take the opportunity of a 50 percent chance of doubling your income and a 50 percent chance of reducing your income by one half ?

- Yes, I would take this opportunity (1)
- No, I would not take this opportunity (2)

Display This Question:
If lottery_a = No, I wouldn't take this opportunity

lottery_c Would you take the opportunity of a 50 percent chance of doubling your income and a 50 percent chance of reducing your income by one fifth?

- Yes, I would take this opportunity (1)
- No, I would not take this opportunity (2)

End of Block: Risk attitudes

Start of Block: EQ-5D 5L

[EQ-5D-5L and VAS blocks¹³]

End of Block: EQ-5D 5L

Start of Block: ICECAP-A

ICECAP1

We would like to know about your overall quality of life.

Please indicate which statements best describe your overall quality of life at the moment

Feeling settled and secure

- I am able to feel settled and secure in **all** areas of my life (1)
 - I am able to feel settled and secure in **many** areas of my life (2)
 - I am able to feel settled and secure in **a few** areas of my life (3)
 - I am **unable** to feel settled and secure in **any** areas of my life (4)
-

¹³ Not publicly displayed due to copyright limitations. The UK English sample version of the EQ-5D-5L used in this study is available at <https://euroqol.org/support/how-to-obtain-eq-5d/>

ICECAP2 Love, friendship and support

- I can have **a lot** of love, friendship and support (1)
 - I can have **quite a lot** of love, friendship and support (2)
 - I can have **a little** love, friendship and support (3)
 - I **cannot** have **any** love, friendship and support (4)
-

ICECAP3 Being independent

- I am able to be **completely** independent (1)
 - I am able to be independent in **many** things (2)
 - I am able to be independent in **a few** things (3)
 - I am **unable** to be at all independent (4)
-

ICECAP4 Achievement and progress

- I can achieve and progress in **all** aspects of my life (1)
 - I can achieve and progress in **many** aspects of my life (2)
 - I can achieve and progress in **a few** aspects of my life (3)
 - I **cannot** achieve and progress in **any** aspects of my life (4)
-

ICECAP5 Enjoyment and pleasure

- I can have **a lot** of enjoyment and pleasure (1)
- I can have **quite a lot** of enjoyment and pleasure (2)
- I can have **a little** enjoyment and pleasure (3)
- I **cannot** have **any** enjoyment and pleasure (4)

End of Block: ICECAP-A

Start of Block: Risk-perceptions and info sources

diagnose Are you or have you been infected with the novel coronavirus?

- Yes, confirmed (1)
 - Yes, but not yet confirmed (2)
 - No (3)
 - Don't know (4)
-

contact Do you know people in your immediate social environment who are or have been infected with the novel coronavirus?

- Yes, confirmed (1)
 - Yes, but not yet confirmed (2)
 - No (3)
 - Don't know (4)
-

knowledge

How closely have you been following the news about the COVID-19 outbreak?

I don't know anything about it (1)

- Not closely at all (2)
- Somewhat closely (3)
- Very closely (4)

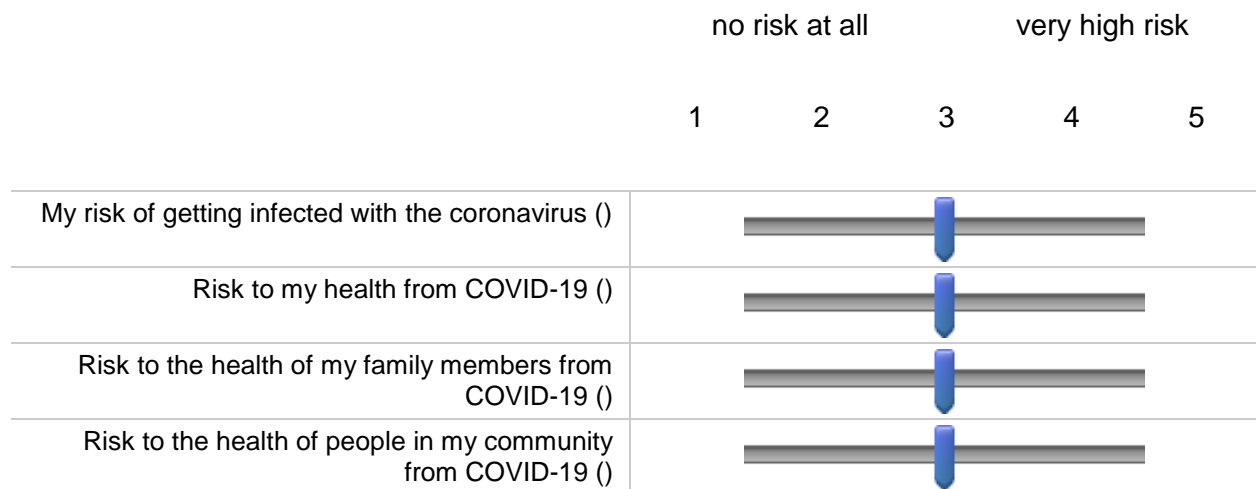
info_source What is the main source of information from where you get information on COVID-19? (several answers possible)

- TV (1)
- Internet search (2)
- Social media (3)
- Newspapers (4)
- Relatives and friends (5)
- I don't follow any (6)
- Other sources (7)

severity

Next, we would like to understand what you think and how you feel about the risks related to the COVID-19 outbreak.

Please use the scale below to assess your likelihood of getting infected with the novel coronavirus and possible consequences of COVID-19.



End of Block: Risk-perceptions and info sources

Start of Block: Policy response

policy response

Next, we would like to ask you about your opinion on different governmental policies that could be/were be taken to contain the spread of the novel coronavirus.

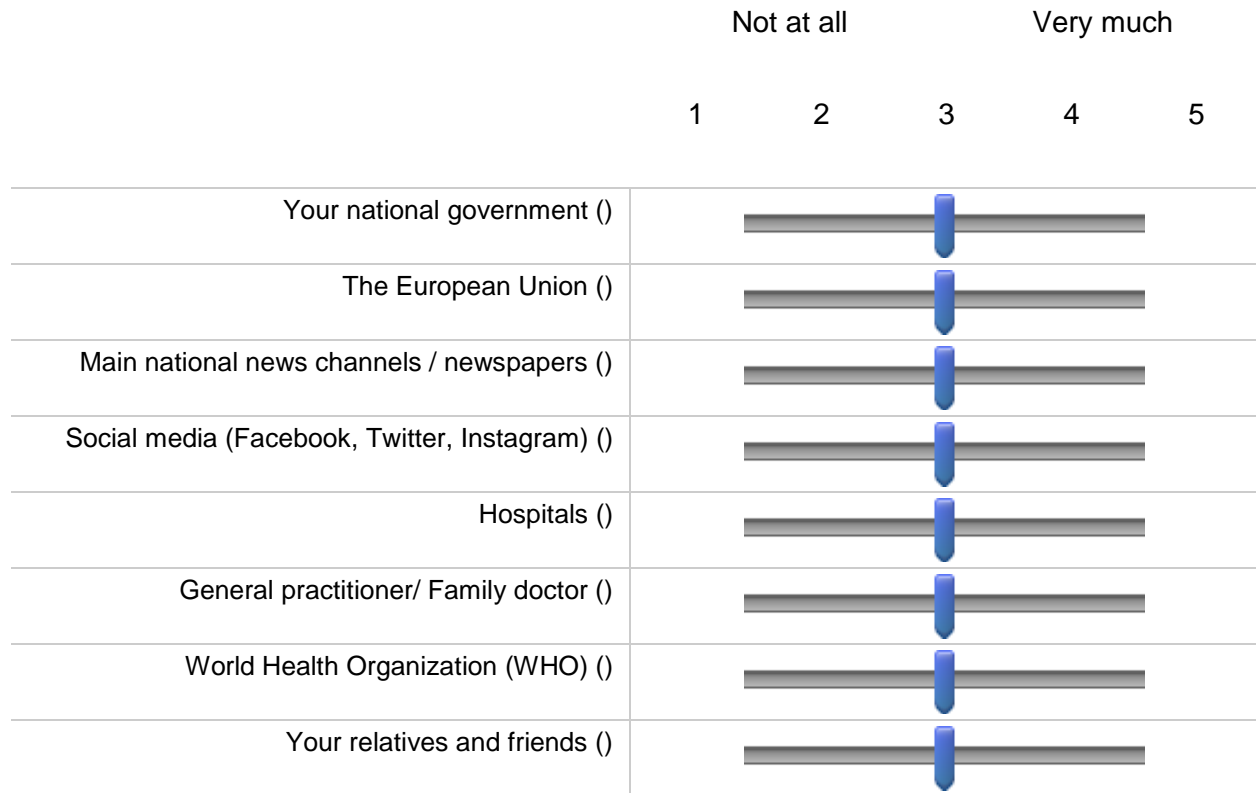
Please indicate on the scale below to which extent you approve or disapprove the following government measures related to COVID-19 outbreak.

	Strongly disapprove (1)	Disapprove (2)	Indifferent (3)	Approve (4)	Strongly approve (5)
Close schools and universities for three months (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Fine people who violate the 14 days home quarantine knowingly (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Close all borders to deny entry to foreign travellers for three months (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Impose a curfew (allowed to go out only to buy groceries/medicine) for three months (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Random and regular temperature checks on the streets (5)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ban on export of medical equipment (e.g. masks) from your country (6)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Suspend public transport for three month (7)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Suspend all public gatherings (e.g. concerts, religious services, cinemas) for three months (8)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Use mobile phone data for tracking people infected with coronavirus and others they had contact with to identify and quarantine them (9)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

End of Block: Policy response

Start of Block: Trust

Trust On the scale below, please indicate to which extent you trust the information from the following sources in the context of COVID-19 situation.



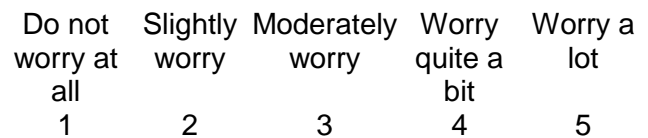
End of Block: Trust

Start of Block: WHO_worry

worry_who

Crises often involve fears and worries. Please let us know:

At the moment, how much do you worry about:





End of Block: WHO_worry

Start of Block: Vaccination

vac_confi Next, we would like to ask you about your confidence in vaccines in general.

To which extent do you agree with the following statements:

	Strongly agree (1)	Tend to agree (2)	Tend to disagree (3)	Strongly disagree (4)	Don't know (5)
Overall, I think vaccines are important for children to have (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Overall, I think vaccines are safe (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Overall, I think vaccines are effective (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Vaccines are compatible with my religious beliefs (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Text_WTP **Researchers are currently working hard to find a safe and effective vaccine against the novel coronavirus. For the following questions please imagine that the vaccine became available**



antivacs Would you be willing to get vaccinated against the novel coronavirus?

- Yes (1)
- No (2)
- Not sure (3)

vaccinated Have you already received a vaccination against COVID-19?

- Yes, the first shot (1)
 - Yes, both shots (2)
 - Yes, three shots (booster) (6)
 - Yes, four shots (with boosters) (7)
 - Yes, five shots or more (with boosters) (8)
 - Not yet, but I intend to (3)
 - No (5)
-

Display This Question:

If antivacs = No

Or antivacs = Not sure

reason_no_vac Please, explain why you wouldn't consider taking a vaccination or why you are hesitant? (more than one answer can be selected)

- I don't think that COVID-19 is dangerous to my health (1)
 - I think COVID-19 vaccine may not be safe enough (2)
 - I am against vaccination in general (3)
 - I believe natural or traditional remedies can treat COVID-19 (4)
 - The best way is to leave nature take its course (5)
 - I'm afraid of injections (6)
 - I'm concerned about potential side effects (7)
 - Religious reasons (8)
 - Other (10)
-

Display This Question:

If reason_no_vac = Other

Reason_no_vac_text Can you, please, indicate your reason for not considering getting vaccination against the novel coronavirus

End of Block: Vaccination

Start of Block: 5C Block

5c Please evaluate how much you disagree or agree with the following statements about a vaccination against the coronavirus, to be immune against the disease COVID-19.

	strongly disagree (1)	moderately disagree (2)	slightly disagree (3)	neutral (4)	slightly agree (5)	moderately agree (6)	strongly agree (7)
I am completely confident that the vaccines against COVID-19 will be safe (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
A vaccination against the novel coronavirus is unnecessary because COVID-19 does not represent a major threat (5)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
When I think about getting vaccinated against COVID-19, I will carefully weigh the benefits and risks to make the best decision possible (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
When everyone is vaccinated against the novel coronavirus, I don't have to get vaccinated too (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

End of Block: 5C Block

Start of Block: WTP

wtp100 Suppose a highly effective vaccine for COVID-19 becomes available, meaning that 100 persons out of every 100 cases become immune (are able to resist COVID-19).

The Ministry of Health has decided to vaccinate high-risk groups first, and you have been informed that you will not be vaccinated through the public health care system yet. Some private clinics are offering the vaccination and you could get it immediately, but you would have to pay for it out of your pocket, and it would not be reimbursed later. What is the maximum amount you would be willing to pay out of your pocket for a highly effective COVID-19 vaccine?

more than 150

0 30 60 90 120 150

Maximum amount in Euros ()



Display This Question:

If wtp100 [Maximum amount in Euros] Is Empty

wtp100oe You indicated that you would be willing to pay more than 150 Euros to be vaccinated with a highly effective COVID-19 vaccine. Could you please specify how much exactly you would be willing to pay to be vaccinated.

Maximum amount in Euros (1)

Display This Question:

If wtp100 [Maximum amount in Euros] = 0

wtp_0_s You indicated that you would be willing to pay 0 Euros, so nothing to be vaccinated with a highly effective COVID-19 vaccine. Could you please specify why?

- To me a vaccination is worth nothing (1)
- Vaccinations should be paid by the government (2)
- It's worth nothing to me because of the potential side effects (3)
- I'm unable to pay more than 0 Euros for the vaccine (5)
- Other reason (6)

wtp_60 Research showed that the influenza vaccine has an average effectiveness of 60% for 18-65-year-olds.

Suppose that a similar moderately effective COVID-19 vaccine becomes available, meaning that on average 60 persons out of every 100 cases becomes immune (are able to resist COVID-19).

The Ministry of Health has decided to vaccinate high-risk groups first, and you have been informed that you will not be vaccinated through the public health care system yet. Some private clinics are offering the vaccination and you could get it immediately, but you would have to pay for it out of your pocket, and it would not be reimbursed later.

What is the maximum amount you would be willing to pay out of your pocket for a moderately-effective COVID-19 vaccine?

More than 150

0 30 60 90 120 150

Maximum amount in Euros ()



Display This Question:

If wtp_60 [Maximum amount in Euros] Is Empty

wtp_60_open You indicated that you would be willing to pay more than 150 Euros to be vaccinated with a moderately-effective COVID-19 vaccine. Could you please specify how much exactly you would be willing to pay to be vaccinated.

Amount in Euros (1) _____

Display This Question:

If wtp_60 [Maximum amount in Euros] = 0

wtp_60_0 You indicated that you would be willing to pay 0 Euros, so nothing to be vaccinated with a moderately effective COVID-19 vaccine. Could you please specify why?

- To me a vaccination is worth nothing (1)
- Vaccinations should be paid by the government (2)
- It's worth nothing to me because of the potential side effects (3)
- I'm unable to pay more than 0 Euros for the vaccine (5)
- Other reason (6)

End of Block: WTP

Start of Block: Adherence

pre_beh Next, we would like to know about your own practices related to the novel coronavirus. Thinking about the last four weeks, did you adhere to the following activities due to concerns about the novel coronavirus?

	No (1)	Yes, a bit (3)	Yes, quite strongly (4)	Yes, fully (5)
Regularly wash my hands with soap for at least 20 seconds (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Cover my nose and mouth when coughing or sneezing (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Keep a distance of at least 1 meter from other people (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Avoid shaking hands, hugging or kissing when greeting others (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Use alcohol-based hand rub (5)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Avoid touching my nose, eyes and mouth (6)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

con_ia Do you **intend to adhere** to the activities listed in the previous question due to the coronavirus concerns?

- No (1)
 - Yes, a bit (2)
 - Yes, quite strongly (3)
 - Yes, fully (4)
-

con_familiarcom In your opinion, how familiar are others in your community with the WHO basic protective measures against the novel coronavirus ?

- Not at all familiar (1)
- Slightly familiar (2)
- Somewhat familiar (3)
- Moderately familiar (4)
- Very familiar (5)

con_acom In your opinion, do others in your community adhere to the WHO basic protective measures against the novel coronavirus these days?

	No (1)	Yes, a bit (2)	Yes, quite strongly (3)	Yes, fully (4)
Regularly wash their hands with soap for at least 20 seconds (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Cover their nose and mouth when coughing or sneezing (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Keep a distance of at least 1 meter from other people (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Avoid handshakes, kisses and hugs when greeting others (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Use alcohol-based hand rub (5)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Avoid touching their eyes, nose and mouth (6)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

con_iacom In your opinion, do others in your community **intend to adhere** to the protective measures recommended by the WHO?

- No (1)
 - Yes, a bit (2)
 - Yes, quite strongly (3)
 - Yes, fully (4)
-

Start of Block: Mental health

phq Over the **last 2 weeks**, how often have you been bothered by the following problems?

	Not at all (1)	Several days (2)	More than half the days (3)	Nearly every day (4)
Little interest or pleasure in doing things (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Feeling down, depressed, or hopeless (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Feeling nervous, anxious or on edge (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Not being able to stop or control worrying (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

End of Block: Mental health

- 2011/1 Mathias Kifmann and Kerstin Roeder, Premium Subsidies and Social Insurance: Substitutes or Complements?
- 2011/2 Oliver Tiemann and Jonas Schreyögg, Changes in Hospital Efficiency after Privatization.
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- 2023/29 Benedicta Hermanns, Nadja Kairies-Schwarz, Johanna Kokot, Markus Vomhof, Heterogeneity in Health Insurance Choice: An Experimental Investigation of Consumer Choice and Feature Preferences, April 2023
- 2024/30 Iryna Sabat, Sebastian Neumann-Böhme, Tom Stargardt, Jonas Schreyögg, The European COvid Survey (ECOS): Technical Report

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