European Commission

STATE OF VACCINE CONFIDENCE IN THE EU 2018

A report for the European Commission by
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LONDON SCHOOL of HYGIENE &TROPICAL MEDICINE

VACCINE CONFIDENCE PROJECT™

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1 Executive summary

The World Health Organization's Strategic Advisory Group of Experts on Immunization (SAGE) define vaccine hesitancy as: "[a] delay in acceptance or refusal of vaccines despite availability of vaccine services. Vaccine hesitancy is complex and context specific, varying across time, place and vaccines. It is influenced by factors such as complacency, convenience, and confidence" (WHO, Report of the SAGE Working Group on Vaccine Hesitancy, 2014). This definition – known as the "3Cs" model of hesitancy encapsulates the possible drivers of vaccine acceptance or refusal. While complacency and convenience relate to the perceived risk of disease and the ease with which vaccine services can be reached (respectively), **vaccine confidence** is defined as the trust in the effectiveness and safety of vaccines and trust in the healthcare system that delivers them. Throughout this report, confidence is measured through perceived vaccine safety and effectiveness and, in addition, through the perceived importance and religious compatibility of vaccines.

High confidence in vaccination programmes is crucial for maintaining high coverage rates, especially at levels that exceed those required for herd immunity. Across the European Union (EU), however, vaccine delays and refusals are contributing to declining immunisation rates in a number of countries and are leading to increases in disease outbreaks. Recent measles outbreaks – the highest in the EU for seven years – illustrate the immediate impact of declining coverage on disease outbreaks.

In this report we assess the overall state of confidence in vaccines among the public in all 28 EU member states and among general practitioners (GP) in ten EU member states. As vaccine confidence varies by vaccine, confidence is assessed for vaccines in general as well as for the measles and seasonal influenza vaccines, in order to reflect vaccines targeting different population groups. Confidence in (and demand for) vaccines is influenced by a number of factors, including the importance, safety, and effectiveness of vaccines. To examine the extent of public and GP confidence in vaccines, we have conducted the largest ever study on attitudes to vaccines and vaccination in the EU. We find a range of novel EU-wide and country-specific insights into vaccination behaviours that may immediately impact on public policy.

We report a number of key findings. We find that younger adults in the survey have less confidence in the safety and importance of both the MMR and seasonal influenza vaccines (and vaccines generally) than older age groups. The results of the survey suggest that a number of member states – including France, Greece, Italy, and Slovenia – have become more confident in the safety of vaccines since 2015; while Czech Republic, Finland, Poland, and Sweden have become less confident over the same period. While GPs generally hold higher levels of vaccine confidence than the public,

the survey found that 36% of GPs surveyed in Czech Republic and 25% in Slovakia do not agree that the MMR vaccine is safe and 29% and 19% (respectively) do not believe it is important. We find that the majority of GPs surveyed in these countries report that they are not likely to recommend the seasonal influenza vaccine, yet Czech Republic, Poland, and Slovakia all report to the WHO that they recommend the seasonal influenza vaccine to pregnant women (WHO, Immunization Schedule by Antigens, 2018).

We find a correlation between GP confidence and confidence among general public in the survey: countries whose GPs hold higher confidence in vaccines tend to have a larger proportion of the public expressing positive vaccination beliefs. We provide rankings of member states by overall level of confidence in the safety of vaccines and provide raw data summaries for each member state.

2 Introduction

Vaccine confidence is the trust in the effectiveness and safety of vaccines and trust in the healthcare system that delivers them. Vaccine confidence refers to the belief that vaccination serves the best health interests of the public and its constituents (VCP, 2015). While public confidence in vaccination is fundamental for ensuring high vaccination uptake, so are provider and political confidence. Understanding the drivers of confidence in vaccines when supply, access and information are available involves understanding belief-based factors, which can have strong local and contextual roots and can vary over time and by vaccine.

In 2016, a 67-country survey conducted by the Vaccine Confidence Project™ (VCP) found that the European region[1] had lower confidence in the safety of vaccines than other world regions. Moreover, the European region accounted for seven of the ten countries with the lowest levels of safety-based confidence issues (Larson, 2016) four of which (France, Greece, Slovenia, and Italy) are in the European Union (EU).

Vaccine refusal has been increasing in many EU member states: between 2000 and 2017, routine immunisation coverage of the first dose of a measles-containing vaccine -- typically measles-mumps-rubella (MMR) – has decreased in nine EU member states and since 2010, it has increased to 12 (Fig. 1) (WHO, WHO-UNICEF coverage estimates, 2017). In 2017, the number of confirmed measles cases was at their highest levels since 2010. Of the 9,420 cases recorded in 2010, 86% were recorded in France, Greece, Italy, Romania, or the UK (WHO-UNICEF, 2017), countries whose first-dose measles immunisation rates are below the threshold required to achieve herd immunity (93-95%) (Funk, 2017). Currently, 17 EU member states have measles vaccination rates above these herd immunity levels. However, eight of these countries (Bulgaria, Finland, Greece, Lithuania, Poland, Slovakia, and Spain) have witnessed declining immunisation rates since 2010 (Fig. 1).

It is not only measles which carries a large disease burden across the EU: between 4-50 million cases of seasonal influenza are reported every year in the EU/EEA, with 5,000-17,000 deaths (annually) as a result of flu infection (ECDC, Factsheet about seasonal influenza, 2018). In spite of this, coverage of the seasonal influenza vaccination is low across the EU, even within the high-risk 65+ age group (Table 1). Although financial and access barriers may inhibit optimal seasonal influenza vaccine uptake (a recipient of the flu vaccine in Austria, Estonia, Poland or Slovenia would incur the full cost, whereas in Latvia the vaccine is partially funded (Mereckiene, 2014; Jorgensen, 2018)) confidence in the vaccine (such as its perceived importance) has not been monitored

[1] As defined by the World Health Organization www.euro.who.int/en/countries

across all EU member states. (See Appendix A for full vaccination schedules across the EU.)

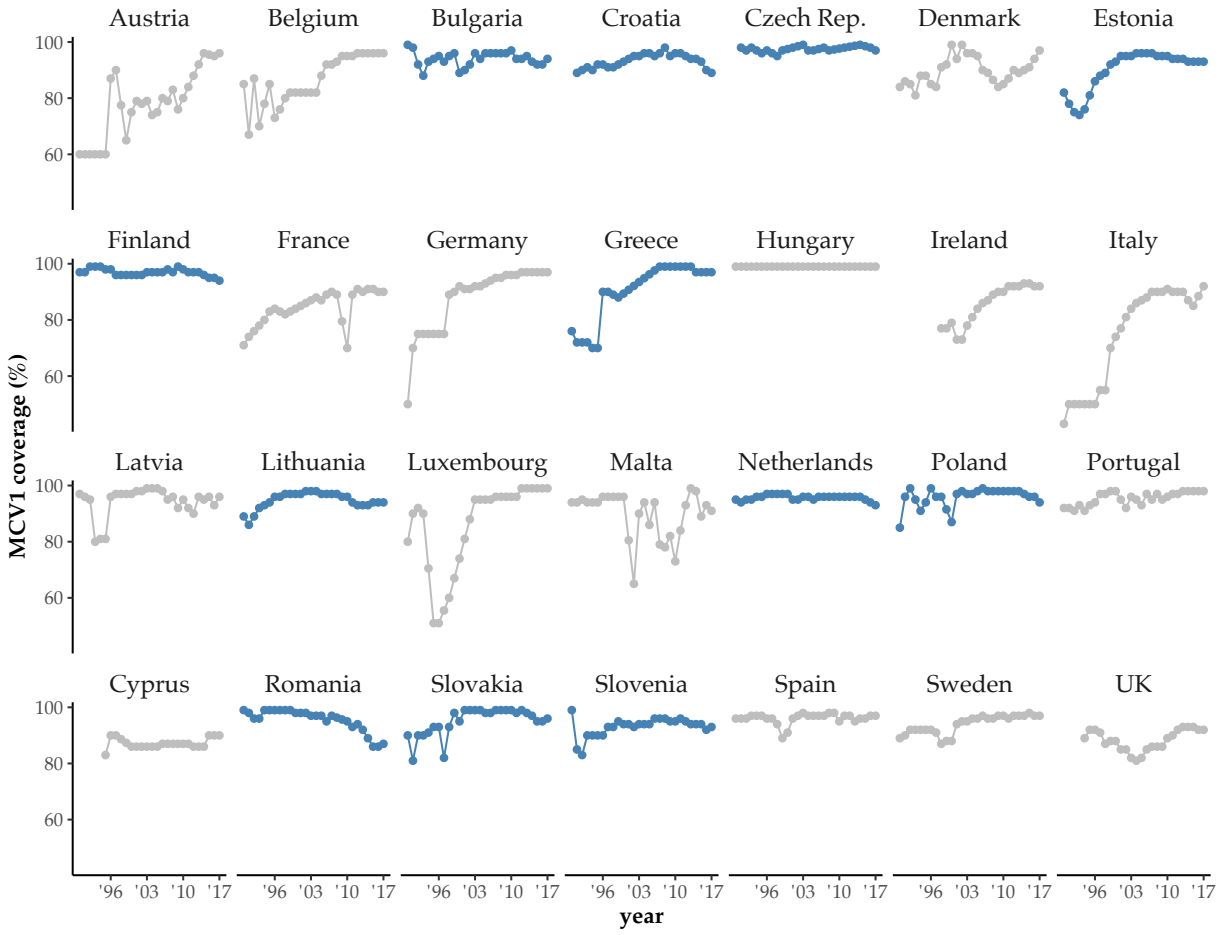


Figure 1: **Measles coverage has declined in 12 EU member states**. Since 2010, MCV1 coverage (the first dose of a measles-containing vaccine such as MMR) has decreased in 12 EU member states (blue time-series): Bulgaria, Croatia, Czech Republic, Estonia, Finland, Greece, Lithuania, Netherlands, Poland, Romania, Slovakia, and Slovenia. Data are from (WHO, WHO-UNICEF coverage estimates, 2017).

The study presented in this report was commissioned and financed by the European Commission to compare confidence rates between those reported in the 2016 VCP confidence report and those in 2018 and to extend the survey to all 28 EU member states[2]. As vaccine confidence is known to be not only context- but also vaccine-specific, views towards seasonal influenza and the MMR vaccine (two vaccines with different target populations) were also surveyed due to the high burdens of influenza and measles. In order to understand the relationship between provider and public confidence, vaccine perceptions (and recommendations) of general practitioners in ten

[2] In the 2016 study, only 20 EU member states were surveyed.

EU member states are established. As pregnant women are at particularly high risk of complications if they have contracted influenza (ECDC, ECDC Report, 2018), we also establish whether GPs would be likely to recommend the seasonal influenza vaccine to pregnant women. This 2018 survey data is compared with data collected in 2015 (and published in 2016) to examine changes in vaccine confidence across the EU.

2.1 Report overview

The outline of this report is as follows.

In Section 3, we outline survey methodologies used to probe vaccination views among both the general public (Section 3.1) and GPs (Section 3.2).

In Section 4 results are presented for the general public: we provide both EU-wide and country-specific estimates of vaccine confidence and rank member states by their overall level of confidence in the safety of vaccinations (Sections 4.1 and 4.2). In Section 4.3 we present changes in member state confidence since 2015. Section 4.4 considers socio-economic determinants of vaccine confidence at both the EU-wide and national levels.

Section 5 concerns the extent of GP confidence in vaccines and their propensity to recommend the MMR vaccine, the seasonal influenza vaccine, and the seasonal influenza vaccine to pregnant women. Country-level trends in GP confidence are explored in Section 5.1 and their relation to GP sex and years in the medical profession are examined in Section 5.3. In Section 5.2 we examine differences between GP and public confidence in vaccines, and we correlate GP and public confidence in Section 5.4.

Section 6 interprets our findings in light of current policy and proposes potential areas for improvement for vaccine policy across the European Union. We also address survey limitations.

Country	Year	65+ coverage
Austria	2014	20.3
Belgium	2013	58
Bulgaria	-	-
Croatia	-	-
Cyprus	-	-
Czech Republic	2014	15.5
Denmark	2016	40.8
Estonia	2016	2.8
Finland	2017	45.7
France	2016	49.8
Germany	2017	34.8
Greece	2014	48.9
Hungary	2016	19.9
Ireland	2017	53.5
Italy	2017	52
Latvia	2016	4.3
Lithuania	2016	22.6
Luxembourg	2016	38
Malta	-	-
Netherlands	2015	66.8
Poland	2014	50.9
Portugal	2015	50.1
Romania	-	-
Slovakia	2016	13.3
Slovenia	2016	9.8
Spain	2017	51.4
Sweden	2016	49.1
United Kingdom	2016	70.5

Table 1: **Seasonal influenza coverage in the EU for over-65s**. Percentage of over-65s vaccinated against seasonal influenza in each EU member state (data not available for Bulgaria, Croatia, Cyprus, Malta, and Romania). Data from the OECD (OECD, 2017).

3 Vaccine confidence surveys in the EU

The Vaccine Confidence Project™ has developed a four-question core survey (the Vaccine Confidence Index™) to measure confidence in vaccines across four dimensions: the perceived importance, safety, and effectiveness of vaccines, and their compatibility with the subjects' religious beliefs. In 2015, this questionnaire was deployed on nationally representative samples (in the same way as described in Section 3.1) to almost 70,000 individuals across 67 countries (Larson, 2016). This four-question survey asked respondents the extent to which they agree (strongly agree, tend to agree, do not know (or no response), tend to disagree, or strongly disagree) to the following statements:

1. Overall, I think vaccines are important for children to have;
2. Overall, I think vaccines are safe;
3. Overall, I think vaccines are effective; and,
4. Vaccines are compatible with my religious beliefs.

This four-question "core" survey is here extended to explore individuals' perceptions on the importance and safety of both the MMR and seasonal influenza vaccines. Respondents are therefore also asked the extent to which they agree with the additional four statements:

5. Overall, I think the MMR vaccine is important for children to have;
6. Overall, I think the MMR vaccine is safe;
7. Overall, I think the seasonal influenza vaccine is important; and,
8. Overall, I think the seasonal influenza vaccine is safe.

The public and GPs are asked the above eight survey questions. In addition, to probe recommendation patterns, GPs are asked the extent to which they would recommend the MMR and seasonal influenza vaccine to patients, and the extent to which they would recommend the seasonal influenza vaccine to pregnant women:

1. How likely are you to recommend the MMR vaccination to patients?
2. How likely are you to recommend the seasonal flu vaccine to patients? and,
3. How likely are you to recommend the seasonal flu vaccine to pregnant women?

These survey questions are summarised in Fig. 2.

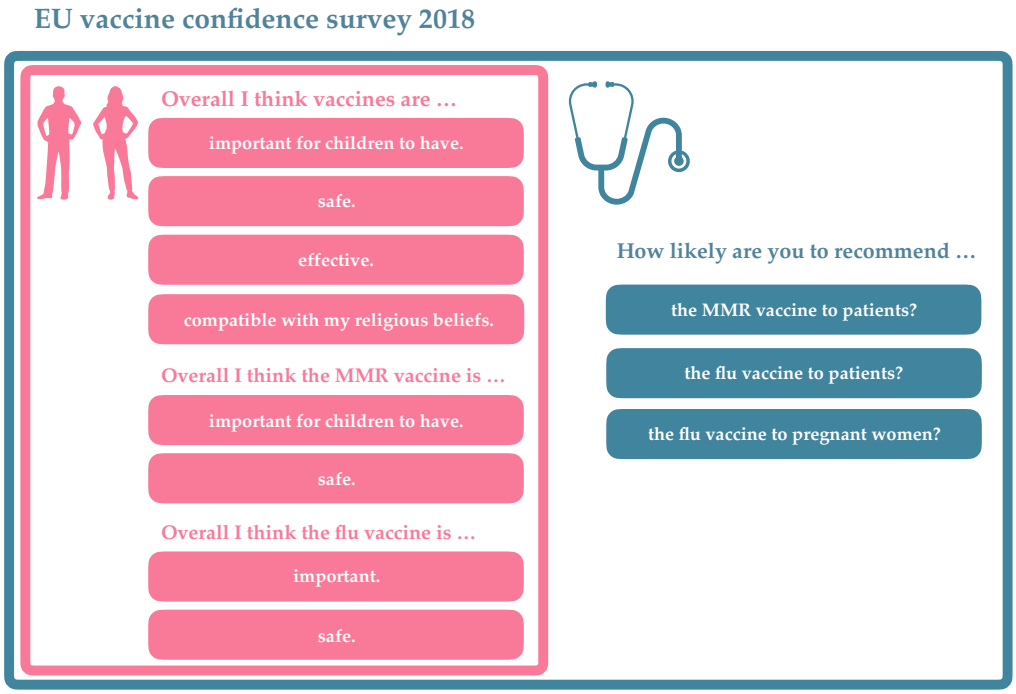


Figure 2: **Vaccine confidence survey items for the public and GPs**. Vaccine confidence among the public and GPs is captured using the eight-question confidence survey in dark pink (as outlined in the main text). Vaccine recommendations among GPs are monitored using an additional three survey items (right-hand side).

3.1 The public

A total of 28,782 respondents were surveyed across the 28 EU member states by ORB[3] in conjunction with Gallup International[4] and the King Baudouin Foundation[5]. Nationally representative samples for each member state are obtained by obtaining distributions of sex, age, and sub-national region which matches national demographics. Under- and over-sampled groups are proportionately weighted to match these national demographics. An EU weighting is also calculated for each individual which allows unbiased EU-wide confidence summaries to be computed: for example, individuals from countries with larger populations are assigned more weight than those with smaller populations.

Approximately 1,000 respondents were sampled in each member state, though there was slight variation around this figure based on availability. For example, only 530, 500, and 970 respondents were interviewed in Luxembourg, Malta, and Finland

[3] www.orb-international.com
[4] www.gallup-international.com
[5] www.kbs-frb.be

(respectively), but every other member state had at least 1,000 responses (see Appendix B, Table 7). The average sample size across all member states was 1,028.

Surveys were completed online in all but seven member states: face-to-face surveys were conducted in Finland and Latvia, and telephone surveys were used in Croatia, Cyprus, Hungary, Malta, and Romania. Fieldwork took place between 3 May and 7 June 2018. (See Appendix B, Table 7 for further methodological details.)

3.2 General practitioners

A total of 1,000 GPs were surveyed from ten EU member states (approximately 100 GPs in each member state, see Appendix B.2): Czech Republic, Estonia, France, Germany, Italy, Poland, Romania, Slovakia, Spain and the United Kingdom. This sample of GPs was randomly drawn from a panel of 227,658 doctors in both private and public sectors across the ten countries. About half of these interviews were conducted online and half via telephone between the 1 and 18 June 2018. A lack of official statistics on GP populations across doctors inhibited nationally representative samples of GPs. (See Appendix B, Table 8 for further methodological details.) (GP surveys have been completed in ten EU member states only, due to the unavailability of GP panels in some countries, we are currently exploring other avenues of data collection.)

In addition to the eight vaccine confidence questions and three vaccine recommendation questions, auxiliary information on a GPs age, gender, and years in profession were collected.

4 Public vaccine confidence in the EU

Vaccine confidence among the EU population in 2018 is investigated using the eight survey questions introduced in Section 3. We begin by examining EU-wide vaccine confidence. Summary tables for each EU member state are provided in Appendix C.1.

4.1 EU-wide vaccine confidence

Across the 28 EU member states, public perceptions towards vaccines is largely positive, with the majority of the EU public agreeing (strongly or tend to agree) that vaccines are important (90.0%), safe (82.8%), effective (87.8%), and compatible with religious beliefs (78.5%). The majority of the EU public also agree that MMR and seasonal influenza vaccines are important and safe. The MMR vaccine is much more likely than the seasonal flu vaccine to be perceived as important (83.8% versus 65.2%) and safe (81.7% versus 69.4%). These results are displayed in Fig. 3.

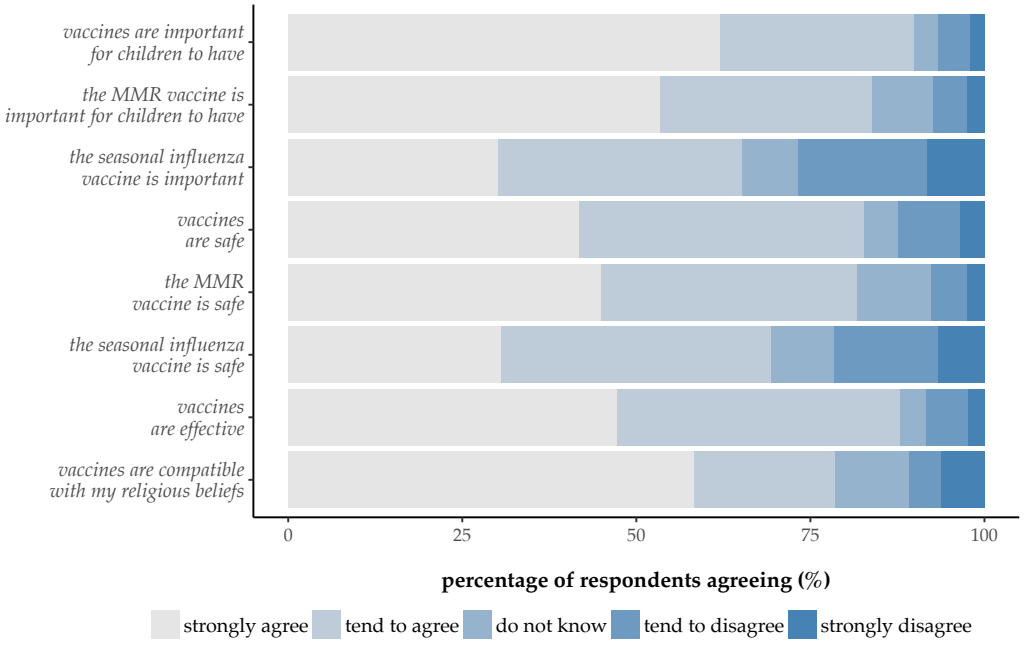


Figure 3: **The majority of the EU public agree that vaccines are important, safe, and effective**. Most of the EU public either strongly or tend to agree that vaccines – including the MMR and seasonal influenza vaccines – are important, safe, and effective. However, the seasonal influenza vaccine is viewed as both less important and less safe than the MMR vaccine and vaccines generally.

4.2 Vaccine confidence by member state

There are large variations in perceptions towards vaccine importance, safety and effectiveness between member states. Vaccine confidence for each EU member state for each of the eight survey questions is shown in Table 2 as the overall weighted percentages of respondents who agree (either strongly agree or tend to agree) with the vaccine survey statements. Countries are ranked (numbers in parentheses) by the overall percentage of (weighted) respondents agreeing with the statements. These values are also mapped in Fig. 4 and 5.

4.2.1 General perceptions towards vaccine importance, safety, and effectiveness

Portugal has the highest percentage of respondents agreeing that vaccines generally are safe (95.1%), effective (96.6%), and important for children to have (98.0%) (Table 2). **Finland** has the second highest percentage of respondents agreeing that vaccines are important for children (97.6%), but the sixth highest percentage of respondents agreeing that vaccines are safe (89.0%) after **Portugal (95.1%)**, **Denmark** (94.0%), **Spain** (91.6%), **Hungary** (91.4%), and the **UK** (89.9%). (See also Fig. 4 a-c.)

Respondents from **Bulgaria** are least likely to agree that vaccines are safe, with only 66.3% agreeing that they are, followed by Latvia (68.2%) and **France** (69.9%). **Bulgaria** (78.4%), **Poland** (75.9%), and **Slovakia** (85.5%) are the three countries least likely to agree that vaccines are important for children to have.

Portugal again has the highest percentage of respondents agreeing that vaccines are effective (96.6%) followed by **Denmark** (94.6%), **Spain** (94.0%), and the **UK** (92.0%). **Latvia** has the least highest percentage of respondents agreeing that vaccines are effective (70.9%), followed by **Bulgaria** (72.7%) and **Poland** (74.9%).

4.2.2 The MMR vaccine

With specific regard to the MMR vaccine, **Portugal** has the largest percentage of respondents agreeing that the vaccine is both safe (95.1%) and important for children (97.2%). **Finland** and **Hungary** also rank highly: Finland has the second highest proportion of respondents agreeing that the MMR vaccine is important (93.0%) and the third highest for safety (90.1%); **Hungary**, follows Finland for MMR importance (92.8%) and precedes for MMR safety (92.8%). **Sweden** has the lowest percentage of respondents agreeing that the MMR vaccine is safe and important for children: only 57.1% of respondents in Sweden believe the MMR is important for children and 56.5%

believe it is safe. These values are well-below the EU averages[6] of 83.3% and 79.9% for MMR importance and safety, respectively. Although **Belgium** has the second lowest confidence in MMR safety and importance, with 64.7% and 64.9% agreeing it is important and safe (respectively), there is roughly a 10% difference in survey question agreement between Belgium and Sweden on these survey items. (See also Fig. 5 a-b.)

The difference in those agreeing that the MMR vaccine is safe and important between the most and least confident countries is large: 39.3% and 40.1% (respectively) between **Portugal** and **Sweden**.

4.2.3 The seasonal influenza vaccine

Respondents from the **UK** (85.4%), **Spain** (79.6%), and **Portugal** (79.2%) are the most likely to agree the seasonal influenza vaccine is safe, while respondents from **France** (51.8%), **Latvia** (55.2%), and **Austria** (55.8%) are the least likely (Table 2 and Fig. 5). **Romania** (81.0%), the **UK** (80.7%), and **Portugal** (77.9%) are most likely to think the seasonal influenza vaccine is important, while **Austria** (40.4%), **Denmark** (42.6%), and the **Czech Republic** (49.4%) are the least likely. (See also Fig. 5 c-d). **Sweden** is the only member state that perceives the seasonal influenza vaccine to be more important than the MMR vaccine (Table 2), and **Sweden** and **Belgium** view the seasonal influenza vaccine as safer than the MMR vaccine, while the **UK** views them as equally safe.

On average across the EU, 21.6% more respondents are likely to agree that MMR is more important than the seasonal influenza vaccine, while 12% more respondents are likely to agree that MMR is safer than the seasonal influenza vaccine.

[6] These averages are calculated as the mean percentage in each column in Table 2, they are therefore not weighted to adjust for population size

	Vaccines are important for children to have	The MMR vaccine is important for children to have	The seasonal influenza vaccine is important	Vaccines are safe	The MMR vaccine is safe	The seasonal influenza vaccine is safe	Vaccines are effective	Vaccines are compatible with my religious beliefs
Austria	90.5% (13)	87.8% (8)	40.4% (28)	82.7% (14)	86.1% (8)	55.8% (26)	88.1% (13)	85.1% (5)
Belgium	87.3% (22)	64.7% (27)	61.7% (14)	78.9% (20)	64.9% (27)	68.0% (13)	84.0% (21)	78.1% (14)
Bulgaria	78.4% (27)	74.6% (26)	50.2% (24)	66.3% (28)	65.6% (26)	56.1% (25)	72.7% (27)	70.8% (24)
Croatia	88.9% (17)	91.4% (4)	59.7% (17)	78.4% (22)	86.8% (6)	63.0% (17)	85.9% (19)	71.2% (22)
Cyprus	93.4% (6)	86.3% (12)	60.6% (16)	79.9% (19)	80.2% (16)	62.1% (18)	86.1% (18)	79.4% (11)
Czech Rep.	92.9% (8)	81.0% (19)	49.4% (26)	78.6% (21)	76.1% (21)	62.1% (19)	87.3% (15)	79.0% (13)
Denmark	95.6% (4)	86.6% (11)	42.6% (27)	94.0% (2)	84.2% (11)	72.7% (11)	94.6% (2)	77.8% (15)
Estonia	89.5% (16)	86.0% (15)	65.7% (9)	81.1% (16)	77.5% (18)	74.8% (9)	86.9% (16)	70.9% (23)
Finland	97.6% (2)	93.0% (2)	73.1% (7)	89.0% (6)	90.1% (3)	79.2% (4)	91.1% (5)	92.0% (2)
France	85.8% (24)	79.7% (22)	52.4% (21)	69.9% (26)	77.4% (19)	51.8% (28)	82.8% (23)	77.4% (16)
Germany	92.2% (11)	89.9% (5)	61.0% (15)	83.6% (13)	86.4% (7)	65.2% (16)	90.6% (6)	79.1% (12)
Greece	92.8% (9)	85.2% (16)	76.4% (5)	84.5% (11)	81.5% (14)	78.8% (5)	89.4% (10)	82.2% (6)
Hungary	95.3% (5)	92.8% (3)	62.0% (13)	91.4% (4)	90.4% (2)	66.4% (15)	90.5% (7)	76.7% (17)
Ireland	90.4% (14)	86.1% (14)	74.8% (6)	84.9% (10)	82.2% (13)	77.6% (7)	88.8% (12)	70.1% (26)
Italy	91.7% (12)	80.6% (20)	67.5% (8)	85.3% (9)	80.6% (15)	72.9% (10)	90.0% (9)	80.8% (9)
Latvia	85.8% (25)	74.7% (25)	54.0% (20)	68.2% (27)	68.4% (25)	55.2% (27)	70.9% (28)	81.9% (7)
Lithuania	87.0% (23)	86.1% (13)	50.1% (25)	81.0% (17)	78.0% (17)	60.6% (21)	81.4% (24)	92.2% (1)
Luxembourg	93.2% (7)	88.3% (7)	52.2% (22)	87.2% (8)	86.9% (5)	60.0% (23)	90.2% (8)	80.8% (10)
Malta	88.8% (18)	84.9% (17)	64.4% (10)	74.9% (23)	75.7% (22)	60.5% (22)	83.2% (22)	70.1% (25)
Netherlands	90.3% (15)	84.6% (18)	62.2% (12)	87.9% (7)	83.9% (12)	76.2% (8)	89.2% (11)	67.3% (27)
Poland	75.9% (28)	76.0% (23)	59.7% (18)	72.4% (25)	72.9% (23)	60.0% (24)	74.9% (26)	59.3% (28)
Portugal	98.0% (1)	97.2% (1)	77.9% (3)	95.1% (1)	95.8% (1)	79.2% (3)	96.6% (1)	89.0% (4)
Romania	88.1% (20)	87.2% (9)	81.0% (1)	82.2% (15)	85.5% (9)	78.2% (6)	85.2% (20)	74.8% (19)
Slovakia	85.5% (26)	75.9% (24)	50.5% (23)	74.7% (24)	70.5% (24)	61.0% (20)	80.2% (25)	73.7% (20)
Slovenia	88.1% (21)	80.3% (21)	56.8% (19)	81.0% (18)	76.9% (20)	68.4% (12)	86.8% (17)	76.6% (18)
Spain	96.1% (3)	88.8% (6)	77.5% (4)	91.6% (3)	88.1% (4)	79.6% (2)	94.0% (3)	90.7% (3)
Sweden	88.3% (19)	57.1% (28)	63.2% (11)	83.7% (12)	56.5% (28)	66.8% (14)	87.3% (14)	72.8% (21)
UK	92.7% (10)	86.6% (10)	80.7% (2)	89.9% (5)	85.4% (10)	85.4% (1)	92.0% (4)	81.6% (8)
EU average	90.0%	83.3%	61.7%	82.1%	79.8%	67.8%	86.5%	77.9%

Table 2: **Percentage of respondents in each member state agreeing with confidence survey questions** For each country, the percentage of respondents agreeing with each survey statement is shown. Numbers in parentheses denote the country's ranking out of 28 EU member states.

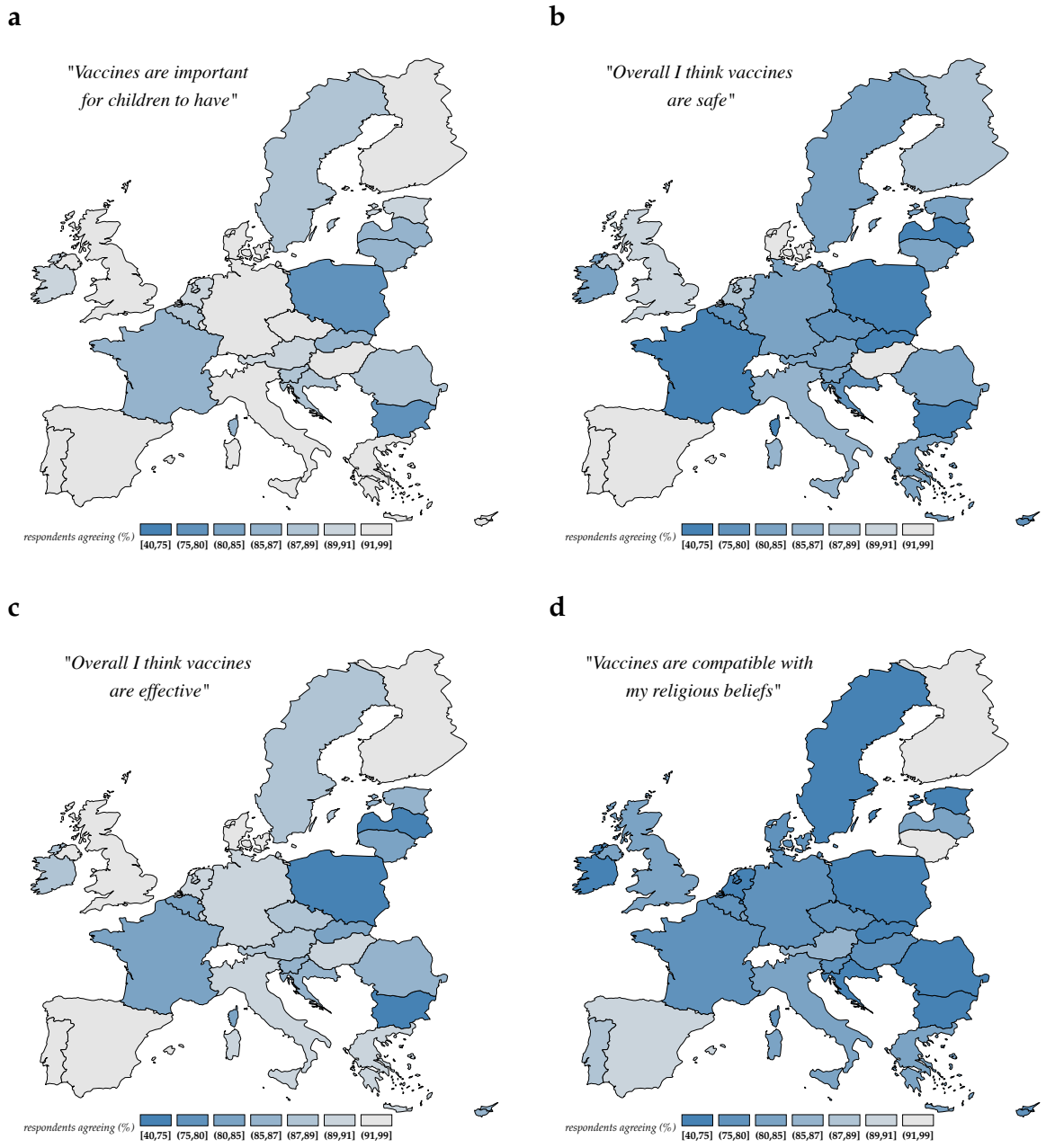


Figure 4: **Percentage of respondents in each EU member state agreeing with the four core survey statements**. Percentage of respondents agreeing that vaccines are important for children to have (a), safe (b), effective (c), and compatible with religious beliefs (d).

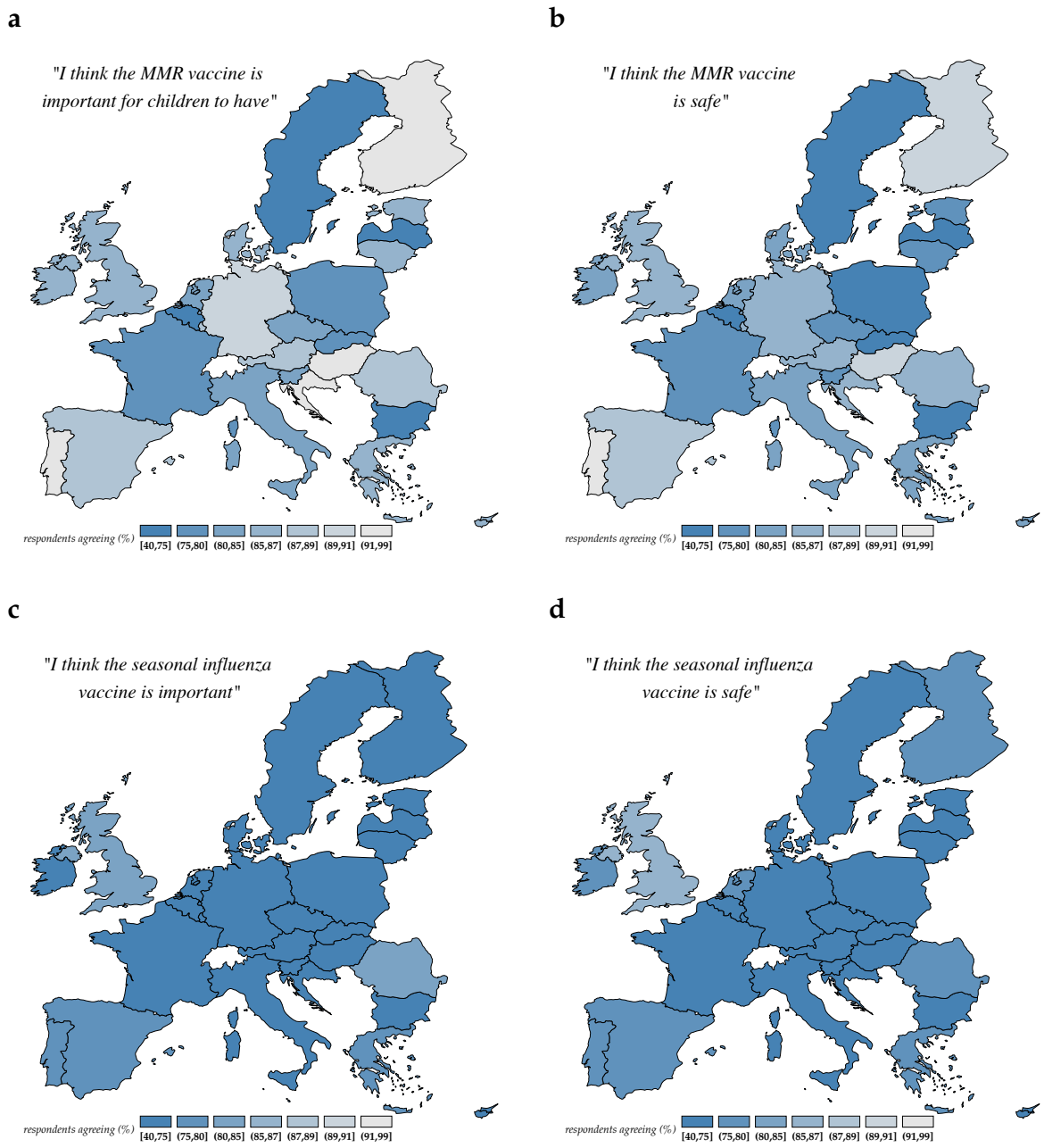


Figure 5: **Percentage of respondents in each EU member state agreeing with survey statements on the importance and safety of the MMR and seasonal influenza vaccines**. Percentage of respondents agreeing that the MMR vaccine is important for children to have (a) and safe (b) and that the seasonal influenza vaccine is important (c) and safe (d).

4.3 Changes in public confidence between 2015 and 2018

As described in (Larson, 2016) and Section 3, vaccine confidence survey data were collected for 20 EU member states as part as a larger global survey in 2015. Nationally representative samples of 19,689 individuals across 20 EU member states were surveyed in 2015 (Austria, Belgium, Bulgaria, Czech Republic, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Latvia, Netherlands, Poland, Portugal, Romania, Slovenia, Spain, Sweden, and the UK).

As previously described, the four core survey statements were presented to respondents in 2015: I think vaccines are important for children to have; I think vaccines are safe; I think vaccines are effective, and vaccines are compatible with my religious beliefs. Changes in the percentage of respondents agreeing with these four vaccination survey questions between 2015 and 2018 are shown in Fig. 6, where positive values denote an increase in vaccine confidence since 2015. (A Bayesian hierarchical model is fit to these data with prior distributions weighted towards no change in the level of agreement between 2015 and 2018.)

The percentage of respondents agreeing (strongly agree or tend to agree) with all four statements has increased since 2015 in **Slovenia** (where the average increase across all statements has been the greatest), **Greece**, **Italy**, and the **UK** (Fig. 6). Additionally, the results of the survey suggest that confidence in the safety of vaccines has increased in **Denmark** (3.1%), **France** (16.0%), the **Netherlands** (9.2%), and **Romania** (5.8%).

The results of the survey suggest, further, that confidence has decreased across all four statements in **Poland**, where the percentage of respondents agreeing that vaccines are important for children has decreased by 9.2%, vaccines are safe by 7.3%, effective by 7.7%, and compatible with religious beliefs by 17.1%. In 2018, the survey results suggest that Poland is the least confident towards the importance of vaccines for children and ranks 25th, 23rd, and 24th (out of 28) for the safety of vaccines generally, and the safety of the MMR and seasonal influenza vaccines, respectively. Confidence in the safety of vaccines has also decreased in **Czech Republic, Finland**, and **Sweden**.

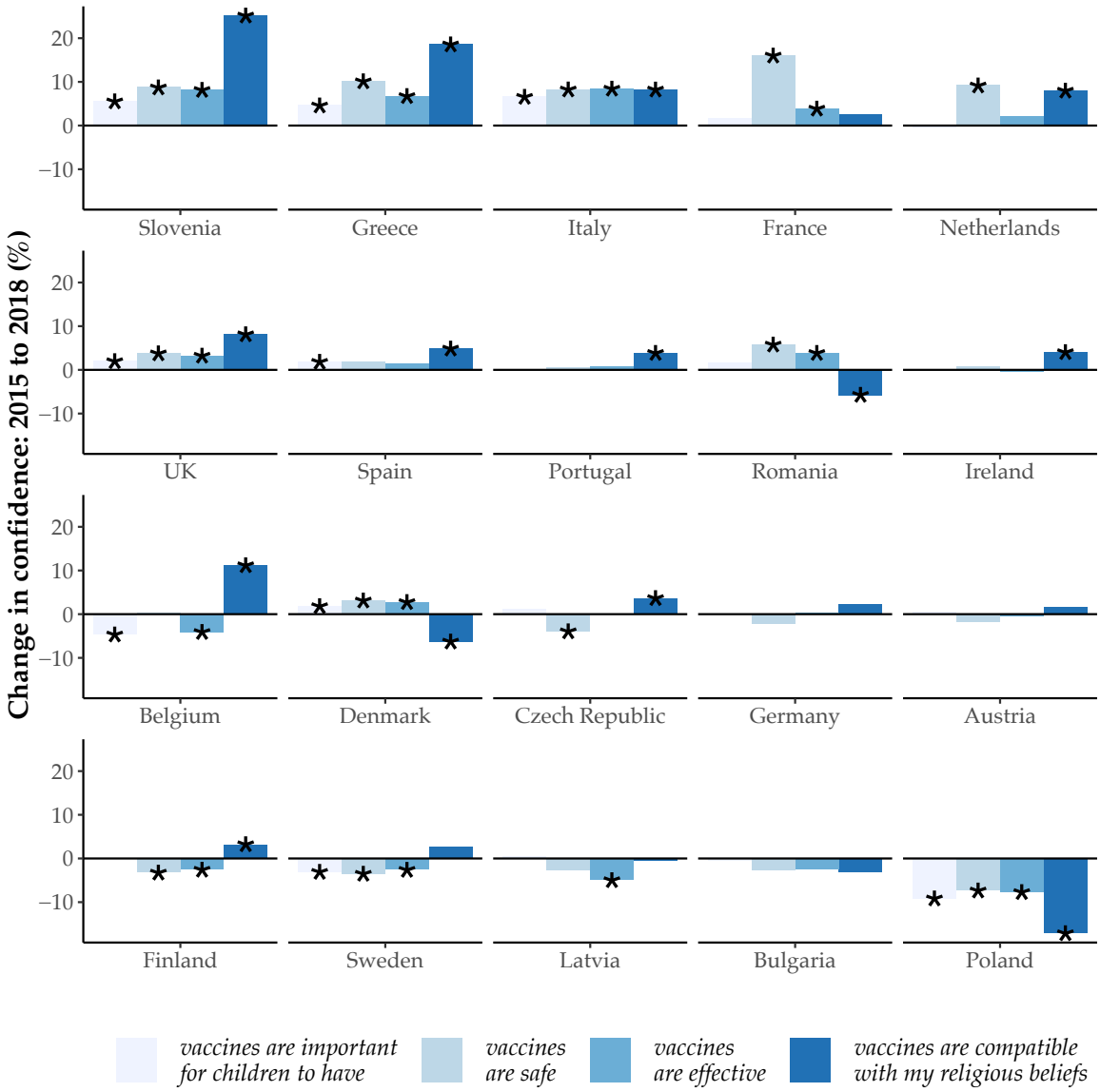


Figure 6: **Change in vaccine confidence between 2015 and 2018 across 20 EU member states**. The change in the percentage respondents agreeing with the four vaccination survey questions in the 2016 study (Larson, 2016) (and see Section 3). Positive values represent higher agreement in 2018 and significant results (at the multiple hypothesis-controlled 95% level) are denoted with an asterisk (*). Countries are sorted by the highest average change in agreement across all questions (confidence in **Slovenia** is the most improved; confidence in **Poland** is the most deteriorated).

4.4 Socio-economic determinants of public vaccine confidence

Bayesian hierarchical logistic regression is used to establish EU-wide trends in the socio-economic determinants of vaccine confidence as measured through the eight survey questions (Gelman A. a., 2007). We note that as these EU-wide trends are derived from surveys of roughly the same size in each country, they are not weighted by EU member states' population structures. These trends therefore represent an average association between socio-economic group and vaccine confidence across the individuals surveyed across EU member states.

This hierarchical modelling approach pools country-level trends towards EU-wide averages. As vaccine confidence is highly context (and country) specific, trends within each EU member state are established via independent Bayesian regressions (see Appendix E.2 for methodological details). This method prevents (possibly falsely) claiming a within-country association between socio-economic determinants and vaccine confidence based on associations in other member states.

Summary data for socio-economic case counts for each country are shown in Appendix D.

4.4.1 Regression methodology

Vaccination survey responses are dichotomised such that those agreeing with statements are assigned a positive view (1) and those not agreeing are assigned a non-positive view (0). Thus, logistic regression can be deployed to establish socio-economic factors that are associated with positive (1) vaccination beliefs.

For EU-wide trends, individuals' sex (male or female), age (18-24, 25-34, 35-44, 45-54, 55-64, or 65+), highest education level[7], and religion (Roman Catholic/Protestant/Other Christian[8], Russian or Eastern Orthodox, Muslim, other religions[9], and agnostics/atheists) are recorded. Religion is not recorded for individuals in Luxembourg, and Luxembourg is therefore removed from the analysis of EU-wide trends. After the removal of Luxembourg, a total of 8.0% of respondents

[7] ORB collects individuals' education level and then recodes the data into highest education level: none, primary, secondary, university (undergraduate or postgraduate/PhD, and "other". We recode respondents who report that they haven't completed primary education into the primary education group).

[8] These groups are joined due to low denomination response counts across multiple countries, for convenience we call this group "Christian" though we note that we consider Russian or Eastern Orthodox as a distinct group due to higher counts across countries.

[9] Due to low response counts across a number of countries, respondents identifying as Jewish are grouped into "other religions'".

did not provide a response for at least one of the socio-economic factors and these individuals were removed from the analysis.

For country-specific trends, the same variable coding as described above is used for sex, age, and education; however, each religious group is entered individually into the regression model. The missing data fraction is country-dependent and varies from 0% missing data (Bulgaria) to 29% (Estonia) with a median missing data fraction of 6.3% (see Appendix E.3). Again, complete case analyses are performed which remove an individual record from the analysis if they have at least one missing value

For both the EU-wide model and individual country regressions, the effect size of the association between a socio-economic factor and a survey response is measured using odds ratios. In this case, odds ratios are the odds of a positive vaccination[10] view given the presence of a socio-economic factor, divided by the odds of a positive vaccination view given its absence (whilst holding other variables in their respective baseline groups). A baseline group for each socio-economic characteristic is required to make these relative comparisons. For the EU-wide associations, the baseline categories for each socio-economic factor are as follows: sex (male), age (65+), highest education level (secondary), religious beliefs (no religious beliefs, that is, atheist or agnostic). The odds-ratios for the individual level regressions are the same for sex, age, and highest education level, however, for religion, the group with the most surveyed responses is assigned the baseline group (this group is labelled 'B' in Figures 7-9).

An odds ratio of one means that there are no differences in reported survey response between the given socio-economic group and the baseline group. An odds ratio greater than one signifies that given socio-economic group is more likely to agree to the survey sentiments than the baseline group (and vice versa for odds ratios of below one).

4.4.2 EU-wide trends

Overall EU-wide associations between positive vaccination views and socio-economic characteristics are shown in Table 3.

Across the surveyed respondents, the results of the survey suggest that females are less likely than males to agree that the seasonal influenza vaccine is important (odds ratio, OR, 0.76; 95% confidence interval, CI, [0.67, 0.85]) and safe (OR 0.74; CI [0.65, 0.83]), but more likely to agree that the MMR vaccine is important for children to have (OR 1.20 [1.94, 1.36]). (See Table 3.)

[10] The relative probability of positive (1) to non-positive (0) views.

Across all survey questions, age is strongly associated with vaccination views, with younger age groups less likely than older groups to have positive vaccination views. However, this is not universally true across all statements: 18-24 year-olds are as likely as over-65s to agree that the seasonal influenza vaccine is safe (OR 0.96; CI [0.80, 1.12]) and 45-54 and 55-64 year-olds are as likely to agree that MMR is important and safe, and that vaccines are compatible with religious beliefs than over-65s (95% confidence interval includes 1.00 for all these effects -- see Table 3).

The survey results suggest that those for whom primary education is the highest level of education are less likely to agree (compared to those with secondary education) that vaccines are important for children (OR 0.72; CI [0.57, 0.87]), that the MMR vaccine is important for children (OR 0.83; CI [0.69, 0.98]), that vaccines are safe (OR 0.73; CI [0.60, 0.86]), that the MMR vaccine is safe (OR 0.84; CI [0.70, 0.98]), that vaccines are effective (OR 0.68; CI [0.57, 0.81]), and that vaccines are compatible with religious beliefs (OR 0.73; CI [0.61, 0.86]). The survey also suggests that individuals with levels of education higher than secondary (undergraduate and postgraduate) are more likely to agree that vaccines generally and both the MMR vaccine and the seasonal influenza vaccines are safe. However, although these higher education groups are more likely than those with secondary education to perceive vaccines generally and the MMR vaccine specifically as important, there is no association between education level and the likelihood of agreeing that the seasonal influenza vaccine is important (Table 3).

The survey responses suggest that – overall across the EU – individuals identifying as Russian or Eastern Orthodox are less likely to agree that vaccines are safe than atheists/agnostics (OR 0.67; CI [0.51, 0.83]) and also less likely to agree that the MMR vaccine is safe (0.79; CI [0.60, 1.00]) and that vaccines are effective (0.76; CI [0.58, 0.96]). The survey also suggests that individuals identifying as Muslim are much less likely than atheists/agnostics to think that vaccines generally (0.46; CI [0.34, 0.58]), and the MMR (0.59; CI [0.46, 0.74]) and seasonal influenza (0.83; CI [0.64, 1.01]) vaccines specifically, are important; safe (0.54; CI [0.41, 0.67], 0.59; CI [0.46, 0.72], and 0.76; CI [0.60, 0.92], respectively for vaccines generally, MMR, and seasonal influenza); and effective (0.56; CI [0.43, 0.70]).

	Vaccines are important for children to have	The MMR vaccine is important for children to have	The seasonal influenza vaccine is important	Vaccines are safe	The MMR vaccine is safe	The seasonal influenza vaccine is safe	Vaccines are effective	Vaccines are compatible with my religious beliefs
male (baseline)								
female	1.13 (0.98, 1.3)	1.2 (1.04, 1.36)*	0.76 (0.67, 0.85)***	0.96 (0.84, 1.09)	1.13 (0.98, 1.26)	0.74 (0.65, 0.83)***	1.09 (0.95, 1.24)	0.97 (0.85, 1.1)
65+ (baseline)								
18-24	0.71 (0.56, 0.86)***	0.66 (0.54, 0.79)***	0.8 (0.67, 0.93)**	0.72 (0.58, 0.86)***	0.67 (0.55, 0.8)***	0.96 (0.8, 1.12)	0.73 (0.59, 0.88)***	0.82 (0.66, 0.99)*
25-34	0.59 (0.47, 0.71)***	0.73 (0.61, 0.87)***	0.61 (0.51, 0.71)***	0.61 (0.5, 0.72)***	0.76 (0.64, 0.89)***	0.72 (0.61, 0.83)***	0.62 (0.5, 0.74)***	0.76 (0.59, 0.92)*
35-44	0.7 (0.57, 0.84)***	0.82 (0.68, 0.96)*	0.58 (0.5, 0.66)***	0.63 (0.53, 0.75)***	0.82 (0.7, 0.94)**	0.73 (0.63, 0.84)***	0.7 (0.58, 0.84)***	0.83 (0.69, 0.98)*
45-54	0.8 (0.64, 0.96)*	0.95 (0.8, 1.12)	0.68 (0.59, 0.78)***	0.76 (0.64, 0.9)***	0.96 (0.82, 1.11)	0.82 (0.7, 0.94)***	0.79 (0.65, 0.93)**	0.92 (0.77, 1.07)
55-64	0.83 (0.67, 0.99)*	1 (0.83, 1.18)	0.77 (0.67, 0.88)***	0.8 (0.66, 0.94)**	1 (0.85, 1.16)	0.83 (0.71, 0.95)*	0.85 (0.71, 1)*	0.97 (0.83, 1.13)
secondary (baseline)								
primary or lower	0.72 (0.57, 0.87)***	0.83 (0.69, 0.98)*	0.95 (0.8, 1.11)	0.73 (0.6, 0.86)***	0.84 (0.7, 0.98)*	0.91 (0.77, 1.07)	0.68 (0.57, 0.81)***	0.73 (0.61, 0.86)***
undergraduate	1.19 (0.98, 1.4)	1.21 (1.05, 1.38)**	1.04 (0.91, 1.18)	1.17 (1.01, 1.36)*	1.22 (1.06, 1.38)**	1.17 (1.02, 1.32)*	1.25 (1.06, 1.47)*	1.42 (1.22, 1.64)***
postgraduate	1.32 (1.03, 1.62)*	1.36 (1.11, 1.62)***	1.05 (0.89, 1.24)	1.28 (1.04, 1.54)*	1.35 (1.1, 1.57)***	1.3 (1.08, 1.53)**	1.41 (1.13, 1.7)***	1.62 (1.3, 1.95)***
other qualification	1.04 (0.69, 1.4)	1.07 (0.77, 1.37)	0.97 (0.74, 1.21)	0.99 (0.75, 1.25)	0.95 (0.72, 1.19)	0.98 (0.72, 1.21)	1.07 (0.79, 1.38)	1.12 (0.83, 1.42)
atheist (baseline)								
Christian	1.17 (0.95, 1.38)	1.17 (0.99, 1.34)	1.27 (1.11, 1.45)***	1.13 (0.96, 1.3)	1.12 (0.95, 1.3)	1.17 (1.01, 1.33)*	1.13 (0.95, 1.31)	1.77 (1.49, 2.05)***
Russian/Eastern Orth.	0.83 (0.62, 1.05)	0.84 (0.66, 1.05)	1.03 (0.8, 1.26)	0.67 (0.51, 0.83)***	0.79 (0.6, 1)*	0.9 (0.72, 1.11)	0.76 (0.58, 0.96)*	1.25 (0.95, 1.54)
Muslim	0.46 (0.34, 0.58)***	0.59 (0.46, 0.74)***	0.83 (0.64, 1.01)	0.54 (0.41, 0.67)***	0.59 (0.46, 0.72)***	0.76 (0.6, 0.92)**	0.56 (0.43, 0.7)***	0.94 (0.75, 1.16)
other religion	0.56 (0.4, 0.74)***	0.59 (0.4, 0.79)***	1.04 (0.77, 1.35)	0.61 (0.43, 0.77)***	0.55 (0.41, 0.71)***	0.71 (0.52, 0.93)*	0.59 (0.44, 0.77)***	0.81 (0.58, 1.03)

Table 3: **Odds ratios measuring the effect size of the association between agreeing with the eight survey statements and socio-economic determinants**. Odds ratios, 95% (posterior) confidence intervals, and the overall level of significance (* = significant at the 95% level; ** = significant at the 99% level; *** = significant at the 99.5% level) are shown.

4.4.3 Country-specific socio-economic determinants

The associations between confidence and socio-economic determinant in Table 3 represent overall EU-wide associations across all individuals surveyed. Each country, however, has its own specific associations which are explored here. For each survey question, country-specific associations (as measured through odds ratios) are shown in Fig. 7, 8, and 9 and these are obtained via independent regressions. Country-specific odds ratios are shown for each member state as coloured circles across each of the eight vaccination questions: red circles denote that a category is less likely to agree with the vaccine survey statement than the baseline group, while blue circles denote a category that is more likely. Significance is illustrated via the size of the circle, with larger circles denoting more significant results.

Vaccines are important for children to have (Fig. 7a)
Sex: Our survey suggests that females in **Malta** and **Latvia** are more likely than males to agree that vaccines are important, but there are no significant effects (at the 95% level) between the sexes in any other EU member state. **Age**: All age groups from 18-64 are as likely as over-65s to report that vaccines are important in the majority of EU member states. However, many age groups below 65 are less likely to report that vaccines are important than over-65s and this effect is particularly strong in **Austria** and **Czech Republic** (for 25-34 year-olds), **Sweden** (18-34 year-olds) and the **UK** (18-54 year olds). **Education**: Higher education levels are not found to impact views on vaccine importance (with the exception of those with undergraduate degrees in **Austria**, who are more likely to agree that vaccines are important than those with secondary education and undergraduates in **Hungary** who are less likely); however, those for whom primary education is the highest education level are less likely to agree that vaccines are important for children to have in a number of countries including **Bulgaria**, **Hungary**, **Poland**, and **Sweden**. **Religion**: Our survey results suggest that agnostics / atheists in **Italy** and "other Christians" in **Poland** are less likely than Roman Catholics (the baseline "B" group) to report that vaccines are important. Our survey also suggests that those responding "other religion" are less likely than the country's predominant religious group surveyed to agree that vaccines are important in a range of countries including **Portugal**, **Slovenia**, and **Slovakia**.

The MMR vaccine is important for children to have (Fig. 7b)
Sex: Females in **Greece**, **Latvia**, and **Malta** are more likely than males to believe that the MMR vaccine is important for children to have. **Age**: 18-24, 25-34, and 35-44 year-olds are again less likely (than over-65s) to agree that vaccines are important in a range of countries including **Austria** (25-34 year-olds), **Bulgaria** (25-34 year-olds), **Cyprus** (18-34 year-olds), **Germany** (18-24 year-olds), **Ireland** (35-44 year-olds), **Italy** (18-24 year-olds), **Lithuania** (18-24 year-olds), **Romania** (25-34 year-olds), **Slovakia** (25-34 year-olds), **Sweden** (multiple age groups below 65), and the **UK** (25-44 year-olds). **Education**: Those with undergraduate degrees are more likely (than those with

secondary education) to agree that the MMR is important in **Belgium** and **Bulgaria**, and those with postgraduate degrees are more likely to agree in **Italy**. Those for whom primary education is the highest level of education are less likely to agree the MMR is important in **Bulgaria**, **Germany**, and **Poland**. **Religion**: As with vaccine importance generally, there is a tendency "other" religious groups to have lower agreement that vaccines are important for children to have than the baseline category. Our survey suggests that Muslim respondents in **Bulgaria**, **France**, **Ireland**, and the **UK** are less likely to agree that the MMR vaccine is important than the religious group with most respondents. Agnostics/atheists in **Italy** and **Romania** – where the effect is particularly strong – are less likely to agree that the MMR vaccine is important than Roman Catholics and those subscribing to Russian/Eastern Orthodoxy (respectively). Agnostics/atheists are more likely to agree that the MMR vaccine is important than those subscribing to Russian/Eastern-Orthodoxy in **Latvia**.

The seasonal influenza vaccine is important (Fig. 7c)
Sex: Females across multiple countries are less likely than males to agree that the seasonal influenza vaccine is important. **Age**: There is a striking relationship between age and level of agreement that the seasonal influenza vaccine is important. Across the majority of EU member states 25-34, 25-44, and 45-54 year-olds are much less likely to agree (than over-65s) that the seasonal influenza vaccine is important. Interestingly, however, there is no significant difference between the level of agreement between 18-24 year-olds and over-65s in the majority of EU member states. **Education**: The level of education plays little role in modulating beliefs about the importance of the seasonal influenza vaccine, though respondents with an undergraduate degree in **Portugal** and **Slovakia** (and postgraduate in **Estonia**) are more likely to agree (than those with secondary education) the vaccine is important, and respondents for whom primary education is the highest level of education in **Bulgaria** and **Poland** are less likely to agree (than those with secondary education). **Religion**: Our survey suggests that those with "other" religious beliefs in **Portugal**, **Slovakia**, **Slovenia**, **Spain**, and the **UK**, are less likely to agree the seasonal influenza vaccine is important than the respective baseline categories (Roman Catholics for all countries stated but "other Christian" in the UK). In **Germany** our findings suggest that Muslims and Protestants are much more likely to report that the seasonal influenza vaccine is important than atheists/agnostics.

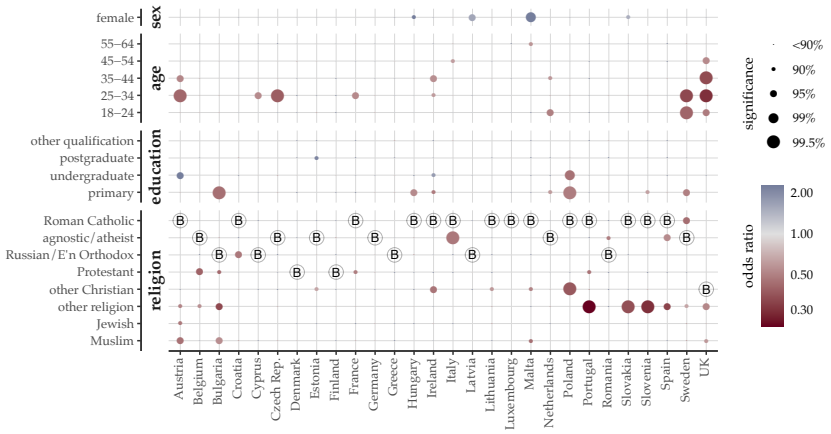
Vaccines are safe (Fig. 8a)
Sex: Only four countries, **Czech Republic**, **Germany, Hungary**, and **Italy**, show a statistically significant difference in the way the two sexes answer this statement, with females less likely than males to agree that vaccines are safe in **Czech Republic**, **Germany**, and **Italy**, but the reverse in Hungary. **Age**: As with vaccine importance (Fig. 7a), 18-24, 25-34, and 35-44 year-olds in a range of countries are less likely to agree that vaccines are important for children than over-65s, and this is again particularly striking in **Sweden** and the **UK**. There is not a single instance of any group under 65

being more likely to agree that vaccines are safe than over-65s. **Education**: Those for whom primary education is the highest education level are less likely to agree that vaccines are safe in a number of countries. **Religion**: Our survey suggests that there is a tendency for the "other" religious group to have lower agreement that vaccines are safe in a range of countries. Our survey suggests that Muslims surveyed in **Austria**, **Bulgaria**, **France**, **Malta**, **Sweden**, and the **UK** are less likely to agree that vaccines are safe than the most surveyed religious group in that country.

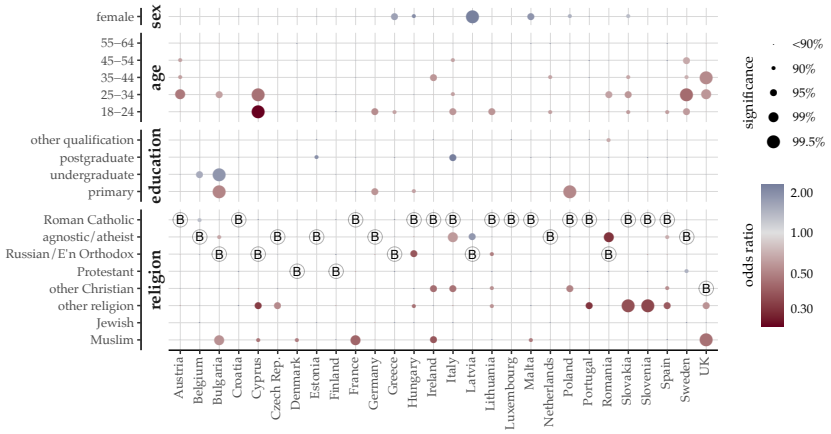
The MMR vaccine is safe (Fig. 8b)
Sex: Females are more likely than males to agree that the MMR vaccine is safe in **France** and **Latvia**. **Age**: 18-24, 25-34, and 35-44 year-olds are again less likely (than over-65s) to agree that the MMR vaccine is safe in a range of countries, with particularly large effect sizes in **Cyprus**, **Ireland**, and **Sweden**. **Education**: Higher education levels are associated with more positive views on the safety of the MMR in **Belgium**, **Bulgaria**, and **Sweden**. Primary education is again associated with less positive views in **Hungary** and **Poland**. **Religion**: Our results suggest that Muslims across some EU member states such as **Austria**, **Bulgaria**, **France**, and the **UK** are less likely to view the MMR vaccine as safe than the baseline categories. "Other" religious groups in **Denmark**, **Portugal**, **Slovakia**, **Sweden**, **Spain**, and the **UK** are typically less likely to view the MMR vaccine as safe than the respective baseline categories.

The seasonal influenza vaccine is safe (Fig. 8c)
Sex: Males are more likely than females to agree that the seasonal influenza vaccine is safe across the majority of EU member states, mirroring views on the importance of seasonal influenza in Fig. 7a. **Age**: 25-34, 25-44, and 45-54 year-olds are less likely to agree (than over-65s) that the seasonal influenza vaccine is safe in a large number of member states; however, this effect is less striking than the relationship between age and the importance of seasonal influenza. Interestingly 18-24 year-olds surveyed in **Czech Republic** are more likely to agree that the seasonal influenza vaccine is safe than over-65s. **Education**: The level of education again plays little role in modulating beliefs about the safety of the seasonal influenza vaccine across the majority of EU member states, though respondents with postgraduate degrees in a number of member states (**Finland**, **France**, **Netherlands**, and **Sweden**) are more likely (than those with secondary education) to agree that the seasonal influenza vaccine is safe. **Religion**: Religion appears to play less of a role in determining views on the safety of the seasonal influenza vaccine than it does with the MMR vaccine (Fig. 8b). "Other" religious groups in **Portugal**, **Slovakia**, **Spain**, and the **UK** are again less likely to report that the seasonal influenza vaccine is safe than the respective baseline religious group.

a *Vaccines are important for children to have*



b *The MMR vaccine is important for children to have*



c *The seasonal influenza vaccine is important*

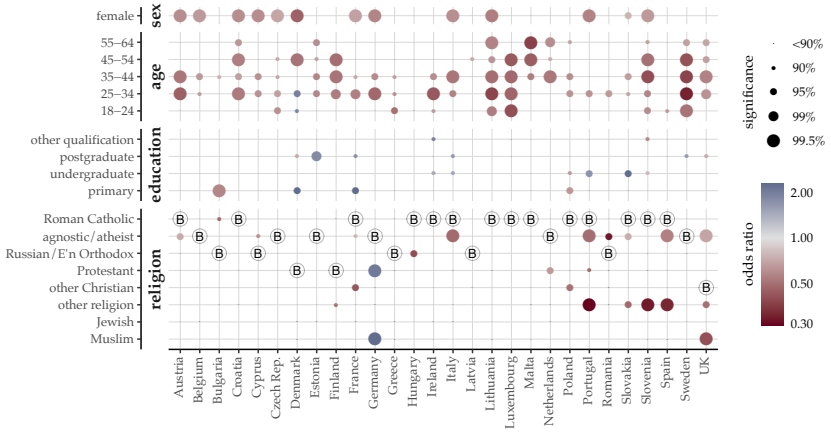
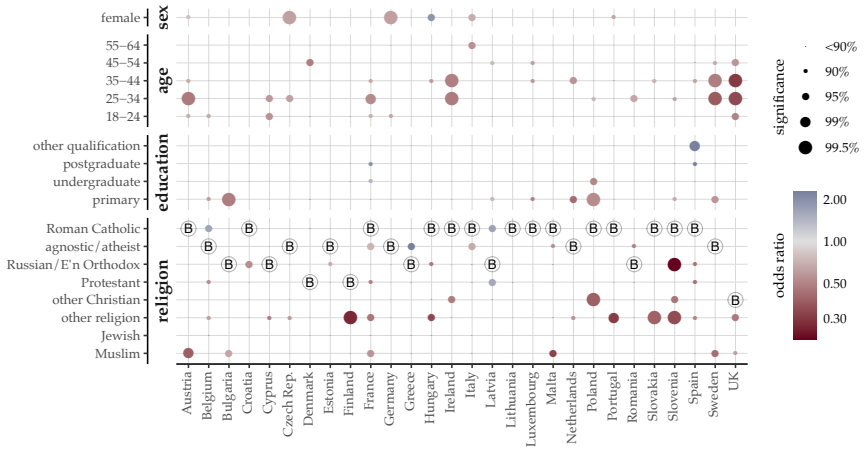
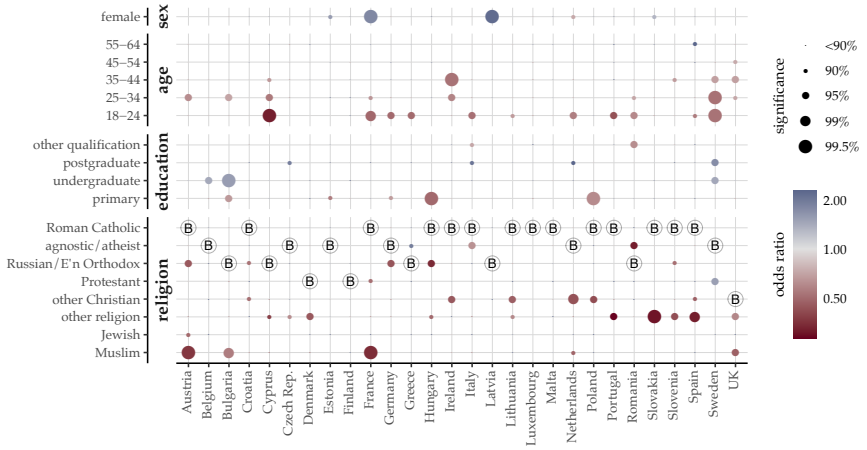


Figure 7: **Country-specific odds ratios for the association between socio-economic determinants and the importance of vaccines**. Odds ratios and associated significance for the association between socio-economic determinants and the probability of agreeing that: vaccines are important for children to have (a); the MMR vaccine is important for children to have (b); and, the seasonal influenza vaccine is important (c). Odds ratios are shown through the colour of circles (red circles denote odds ratios less than one, blue circles denote odds ratios greater than one). The significance of the odds ratio is represented by the size of the circle (see legends). The religious baseline category varies by country and is denoted "B".

a *Vaccines are safe*



b *The MMR vaccine is safe*



c *The seasonal influenza vaccine is safe*

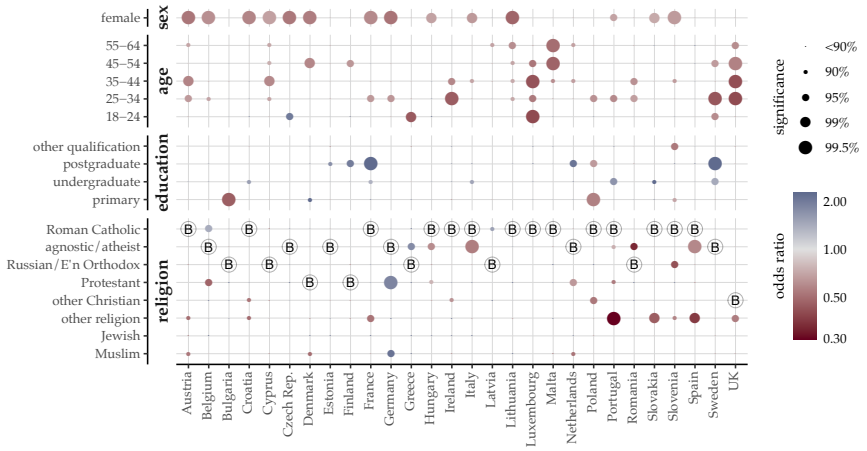
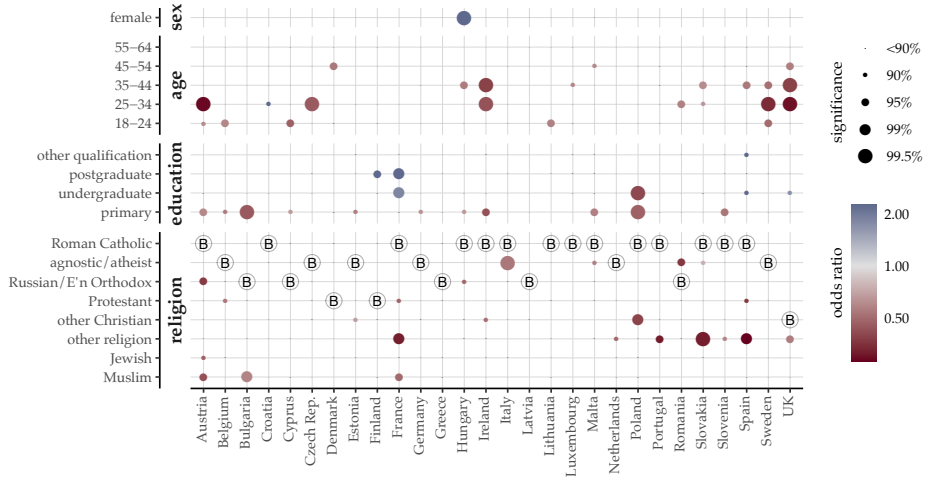


Figure 8: **Country-specific odds ratios for the association between socio-economic determinants and the safety of vaccines**. Odds ratios and associated significance for the association between socio-economic determinants and the probability of agreeing that: vaccines are safe (a); the MMR vaccine is safe (b); and, the seasonal influenza vaccine is safe (c). Odds ratios are shown through the colour of circles (red circles denote odds ratios less than one, blue circles denote odds ratios greater than one). The significance of the odds ratio is represented by the size of the circle (see legends). The religious baseline category varies by country and is denoted "B".

Vaccines are effective (Fig. 9a)
Sex: Females in **Hungary** are more likely than males to believe that vaccines are effective, but there are no significant differences found between the sexes in any other member state. **Age**: Younger age groups are again less likely to agree that vaccines are effective than over-65s in a number of EU member states. **Education**: Higher levels of education than secondary are not found to impact views on vaccine effectiveness except in **Finland** and **France**. Primary education is associated with less positive views on the effectiveness of vaccines across six EU member states (**Austria**, **Bulgaria**, **Ireland**, **Malta**, **Poland**, and **Slovenia**). **Religion**: Our survey results suggest that "other" religious groups are less likely to agree that vaccines are effective than the baseline religious group in **France**, **Portugal**, **Slovakia**, **Spain**, and the **UK**.

Vaccines are compatible with my religious beliefs (Fig. 9b)
Sex: Females are slightly more likely than males to agree vaccines are compatible with their religious beliefs in **Cyprus**, whereas the opposite is true in **Denmark**, **Germany**, and the **Netherlands** (though these effect sizes are again small). **Age**: Younger age groups are less likely than over-65s to agree that vaccines are compatible with their religious beliefs in a number of member states, including **Austria**, **Germany**, **Ireland**, **Sweden**, and the **UK**, where the effect sizes are all particularly large. **Education**: The highest level of education attained is strongly associated with whether individuals agree that vaccines are religious beliefs in a number of countries, and this effect is strongest in **Czech Republic, Denmark**, **France**, **Greece**, **Luxembourg**, **Netherlands** and the **UK**. **Religion**: Our survey suggests that Muslim respondents in **Austria** and the **UK** report religious-compatibility issues; however, due to the ambiguity in the way atheists/agnostics may respond to this question it is difficult to interpret these findings when atheists/agnostics form the baseline group.

a *Vaccines are effective*



b *Vaccines are compatible with my religious beliefs*

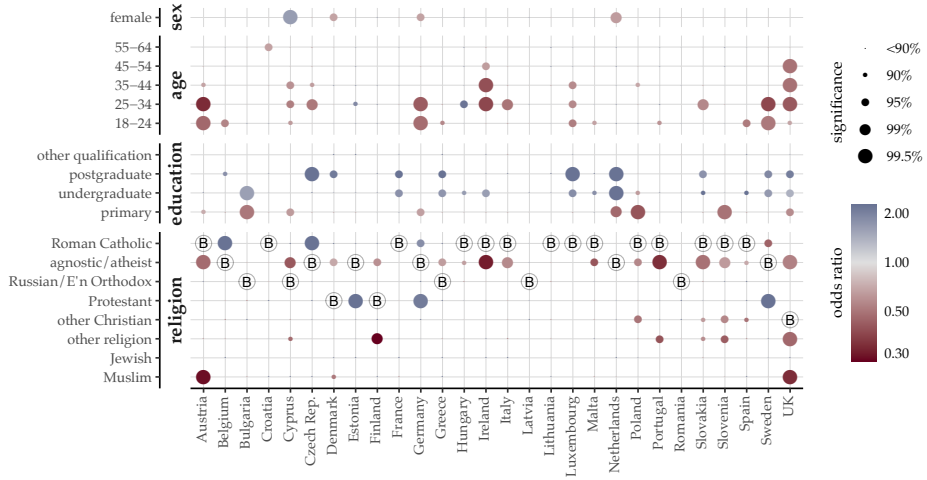


Figure 9: **Country-specific odds ratios for the association between socio-economic determinants and the effectiveness and religious compatibility of vaccines**. Odds ratios and associated significance for the association between socio-economic determinants and the probability of agreeing that: vaccines are effective (a) and vaccines are compatible with religious beliefs (b). Odds ratios are shown through the colour of circles (red circles denote odds ratios less than one, blue circles denote odds ratios greater than one). The significance of the odds ratio is represented by the size of the circle (see legends).

5 GP vaccine confidence

Vaccine confidence among GPs is investigated across ten EU member states[11] using the eight-question survey issued to the general public and, in addition, GPs propensity to recommended MMR and seasonal influenza vaccines are recorded using an additional three questions (see Section 3). Summary tables for GP responses across each of the ten EU member states are provided in Appendix C.2.

5.1 Country-level trends in GP confidence

5.1.1 GP confidence on vaccine importance, safety, effectiveness, and religious compatibility

GP responses to the eight vaccination confidence survey questions to which the public were also surveyed on are shown in Table 4. The number (and percentage) of GPs agreeing (strongly agree or tend to agree) with the survey questions are shown with the country's ranking relative to others.

The survey suggests that GP confidence is generally very high: we find that GPs in **France**, **Germany**, **Romania**, **Spain**, and the **UK** have at least 85% of GPs agreeing with each survey statement and we find that GPs in **Romania**, **Spain**, and the **UK** have particularly high confidence in vaccines, consistently ranking within the top three across most survey questions.

In **Czech Republic**, 71% of GPs agree that the MMR vaccine is important for children to have, and only 63.6% believe that MMR is safe: these values are lower than the general public (and is the only country for which GP confidence is lower than that of the public) – this is discussed further in Section 5.2. In **Slovakia**, there are also considerable importance and safety concerns regarding the MMR vaccine (but not vaccines generally): 19% of GPs in Slovakia do not agree the MMR vaccine is important for children, and 24.5% of GPs do not believe the MMR vaccine is safe. Although low, confidence among GPs is higher than the general public (Section 5.2) suggesting that improvements to GP confidence in the MMR vaccine may elevate public confidence.

[11] Surveys have been completed in ten EU member states but, due to the unavailability of GP panels in some countries, we are currently exploring other avenues of data collection in the other 18 member states

A large number of GPs surveyed in **Czech Republic** (29%) and **Slovakia** (19%) do not believe the seasonal influenza vaccine is important, while 36.4% of GPs in Czech Republic and 24.8% in Slovakia do not believe the seasonal influenza is safe.

In **Estonia**, **Italy**, and **Poland** religious compatibility concerns are high: 19%, 20%, and 29% of GPs surveyed (respectively) do not agree that vaccines are compatible with their religious beliefs.

	number of GPs	Vaccines are important for children to have	The MMR vaccine is important for children to have	The seasonal influenza vaccine is important	Vaccines are safe	The MMR vaccine is safe	The seasonal influenza vaccine is safe	Vaccines are effective	Vaccines are compatible with my religious beliefs
Czech Rep.	107	103 (9) 96.3%	76 (10) 71.0%	100 (7) 93.5%	104 (8) 97.2%	68 (10) 63.6%	105 (2) 98.1%	106 (3) 99.1%	100 (3) 93.5%
Estonia	100	99 (3) 99.0%	98 (6) 98.0%	92 (10) 92.0%	99 (2) 99.0%	97 (7) 97.0%	96 (7) 96.0%	100 (2) 100.0%	81 (8) 81.0%
France	100	99 (3) 99.0%	99 (4) 99.0%	98 (2) 98.0%	98 (6) 98.0%	98 (5) 98.0%	97 (5) 97.0%	98 (7) 98.0%	88 (6) 88.0%
Germany	100	98 (6) 98.0%	98 (6) 98.0%	94 (6) 94.0%	98 (6) 98.0%	99 (4) 99.0%	94 (9) 94.0%	98 (7) 98.0%	85 (7) 85.0%
Italy	100	93 (10) 93.0%	96 (8) 96.0%	96 (5) 96.0%	94 (10) 94.0%	97 (7) 97.0%	96 (7) 96.0%	94 (10) 94.0%	80 (9) 80.0%
Poland	100	99 (3) 99.0%	98 (6) 98.0%	93 (9) 93.0%	98 (6) 98.0%	96 (8) 96.0%	94 (9) 94.0%	98 (7) 98.0%	71 (10) 71.0%
Romania	131	131 (1) 100.0%	131 (2) 100.0%	128 (3) 97.7%	131 (1) 100.0%	131 (2) 100.0%	120 (10) 91.6%	131 (2) 100.0%	130 (1) 99.2%
Slovakia	105	102 (7) 97.1%	85 (9) 81.0%	98 (8) 93.3%	103 (3) 98.1%	79 (9) 75.2%	102 (4) 97.1%	104 (4) 99.0%	97 (4) 92.4%
Spain	100	98 (6) 98.0%	100 (2) 100.0%	98 (2) 98.0%	98 (6) 98.0%	100 (2) 100.0%	98 (3) 98.0%	99 (5) 99.0%	97 (2) 97.0%
UK	100	97 (8) 97.0%	100 (2) 100.0%	97 (4) 97.0%	95 (9) 95.0%	99 (4) 99.0%	99 (1) 99.0%	96 (9) 96.0%	90 (5) 90.0%

Table 4: **GP vaccine confidence in the importance, safety, effectiveness, and religious compatibility of vaccines**. The level of agreement (responding "strongly agree" or "tend to agree") towards each of the eight survey questions on which the public were also surveyed are shown above. The raw number and percentage (below) of GPs agreeing with the survey statements is shown along with the countries rank compared to other countries.

5.1.2 GP propensity to recommend vaccines

GP responses to the three vaccine recommendation questions (how likely are you to recommend the MMR vaccination to patients?; how likely are you to recommend the seasonal flu vaccine to patients?; and, how likely are you to recommend the seasonal flu vaccine to pregnant women?) are shown in Table 5.

Overall, the likelihood of recommending vaccines across GPs is very high, though there are some striking exceptions. The majority of GPs surveyed in **Czech Republic** and **Slovakia** are likely (highly likely or somewhat likely) to recommend the MMR vaccine to patients (Table 5).

Almost every GP surveyed (across all countries) is likely to recommend the seasonal influenza vaccine: only 28 GPs out of 1,024 (2.7%) did not state that they were either highly likely or somewhat likely to recommend the vaccine. However, GPs across several countries surveyed express significant hesitancy in recommending the seasonal influenza vaccine to pregnant women, despite the serious complications that can arise if pregnant women contract influenza while pregnant (Jamieson, 2009; ECDC, Factsheet about seasonal influenza, 2018). Only 25.2% of GPs surveyed in **Czech Republic**, 30.5% of GPs in **Slovakia**, 49.0% of GPs in **Poland**, and 65.0% of GPs in **Estonia** state that they are likely to recommend the seasonal influenza vaccine to pregnant women. Only in the **UK** are more than 95% of GPs surveyed likely to recommend the seasonal influenza vaccine to pregnant women (Table 5).

	number of GPs	... the MMR vaccine to patients?	...the seasonal influenza vaccine to patients?	... the seasonal influenza vaccine to pregnant women?
Czech Rep.	107	39 (10)	102 (9)	27 (10)
		36.4%	95.3%	25.2%
Estonia	100	94 (7)	97 (6)	65 (6)
		94.0%	97.0%	65.0%
France	100	98 (5)	99 (3)	83 (5)
		98.0%	99.0%	83.0%
Germany	100	99 (3)	97 (6)	87 (4)
		99.0%	97.0%	87.0%
Italy	100	95 (6)	97 (6)	87 (4)
		95.0%	97.0%	87.0%
Poland	100	87 (8)	93 (10)	49 (8)
		87.0%	93.0%	49.0%
Romania	131	131 (1)	131 (1)	78 (7)
		100.0%	100.0%	59.5%
Slovakia	105	49 (9)	101 (8)	32 (9)
		46.7%	96.2%	30.5%
Spain	100	98 (5)	99 (3)	93 (2)
		98.0%	99.0%	93.0%
UK	100	99 (3)	99 (3)	96 (1)
		99.0%	99.0%	96.0%

Table 5: **Propensity of GPs to recommend the MMR and seasonal influenza vaccine**. The number of GPs likely to recommend (responding "highly likely" or "somewhat likely") the MMR and seasonal influenza vaccines to patients. The raw number and percentage (below) of GPs likely to recommend vaccines is shown along with the countries rank compared to other countries. Column questions proceed the statement "How likely are you to recommend…".

5.2 GP versus public vaccine confidence

The difference in confidence between the public and GPs in the ten EU member states for which GPs were surveyed is shown in Fig. 10. For each country the difference in percentage of respondents agreeing between the public and GPs are shown; dark blue bars represent significant differences at the 95% multiple hypothesis-controlled level and light blue bars are insignificant at this level.

GP confidence is significantly higher than that of the public across all countries and all statements except for in a select few cases. GPs in **Czech Republic**, for example, are less likely to agree that the MMR vaccine is safe and important than the general public: this is the only country for which GP confidence is lower than that of the public. In **Poland**, there is no statistical difference between GP and public perception towards the importance and safety of the MMR vaccine.

The largest differences between GP and public confidence is with regards to the importance and safety of the seasonal influenza vaccine, with GPs much more likely to agree that the vaccine is important and safe.

5.3 Determinants of GP vaccination beliefs

Hierarchical logistic regression is again used to investigate the relationship between vaccination views and characteristics. General practitioner's sex and years spent in the medical profession are used to explain whether or not a GP has a positive vaccination view (agreeing to the eight public survey questions or being likely to recommend a vaccine) or not. Survey responses were again dichotomised so sex and years in medical profession were associated with positive (1) or non-positive (0) views.

Odds ratios for females (males form the baseline group) and for years in profession are shown in Table 6. Years in profession is a continuous variable which has been standardised, so the odds ratios represent the increase associated with a unit increase in years in the medical profession. Across the 10 EU member states for which GPs were surveyed, there is no association between sex and GP response; however, the greater the number of years spent in the medical profession is associated with less positive views on the safety of the MMR vaccine (OR 0.51; CI [0.18, 0.86]) and on recommending the MMR vaccine to patients (OR 0.56; CI [0.23, 0.96]).

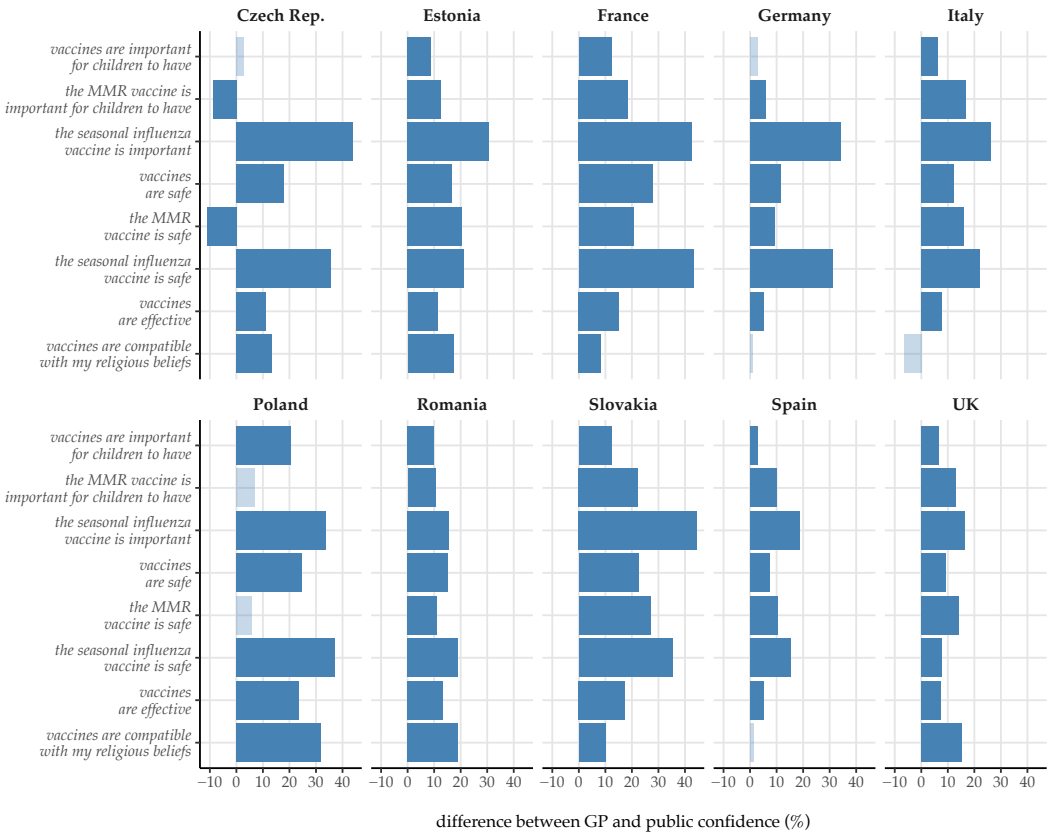


Figure 10: **Difference between public and GP confidence in vaccination across ten EU member states**. The percentage difference between the number of GPs and the public agreeing to the survey statements is shown as blue horizontal bars. Positive values denote higher GP agreement. Dark blue bars represent statistically significant results at the 95% level.

5.3.1 Country-specific determinants

Although the trends outlined above illustrate general trends for GPs across the ten countries surveyed, there is country-wide variation about these values. In Fig. 11, odds values (and associated significance values) are shown for the ten EU member states for the MMR and seasonal influenza survey questions.

We find that GPs with more years in the profession are less likely to believe that the MMR vaccine is important and safe and less likely to recommend the MMR vaccine in **Poland** and **Spain**. GPs with higher years in the profession are also less likely to recommend the MMR vaccine in **France** and the **UK**.

Female GPs in **Germany** and **Poland** are less likely than males to believe the seasonal influenza vaccine is safe (at the 95% confidence level) but are equally likely to recommend the flu vaccine to pregnant women. Female GPs in **Slovakia** and the **UK**, however, are less likely than male GPs to recommend the seasonal influenza vaccine to pregnant women.

	female	years in profession
Vaccines are important for children to have	2.67 (0.76, 5.34)	1.22 (0.55, 1.95)
The MMR vaccine is important for children to have	1.3 (0.36, 2.54)	0.54 (0.19, 0.95)*
The seasonal influenza vaccine is important	1.06 (0.41, 1.91)	0.96 (0.51, 1.44)
Vaccines are safe	1.94 (0.59, 3.72)	1.02 (0.46, 1.66)
The MMR vaccine is safe	1.18 (0.37, 2.23)	0.51 (0.18, 0.86)*
The seasonal influenza vaccine is safe	0.64 (0.2, 1.22)	0.8 (0.44, 1.25)
Vaccines are effective	2.74 (0.63, 5.7)	1.03 (0.44, 1.73)
Vaccines are compatible with my religious beliefs	1.05 (0.5, 1.74)	1.12 (0.64, 1.6)
... recommend MMR to patients?	1.23 (0.43, 2.21)	0.56 (0.23, 0.96)*
... recommend the seasonal influenza vaccine to patients?	1.57 (0.47, 3.06)	0.86 (0.4, 1.43)
... recommend the seasonal influenza vaccine to pregannt women?	0.74 (0.37, 1.12)	0.88 (0.52, 1.28)

Table 6: **Odds ratios and confidence intervals for the regression of vaccination views against GP characteristics**

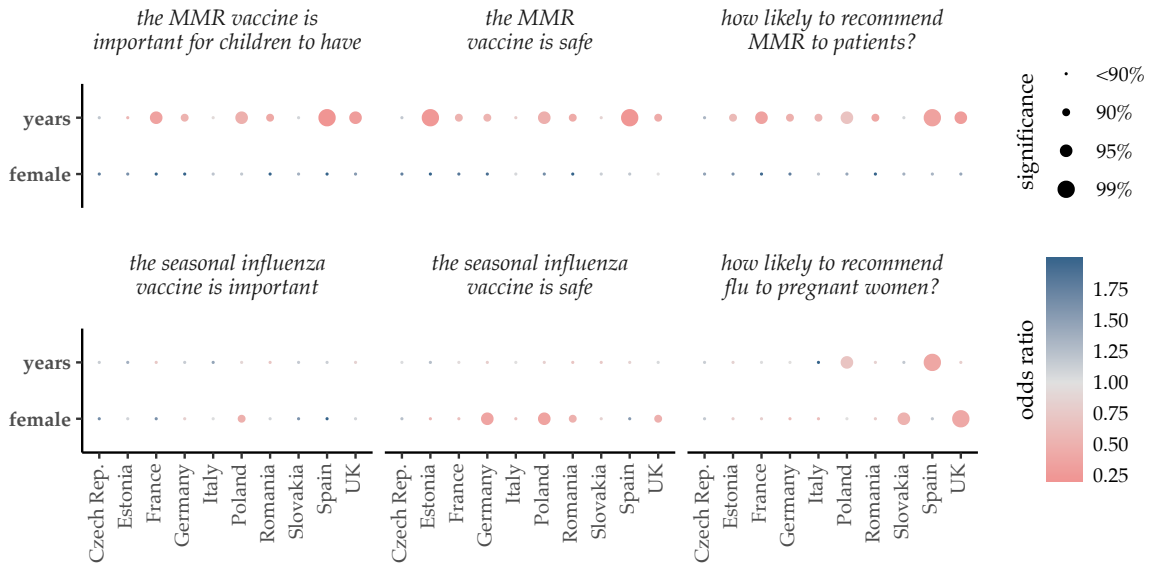


Figure 11: **Associations between sex and years in the medical profession and vaccination views in the ten EU member states surveyed**. Odds ratios (coloured circles) of the association between sex and years in medical profession and MMR and seasonal influenza survey questions. The significance of the odds ratio is represented by the size of the circle.

5.4 Correlation between GP and public confidence

We find a positive association between the percentage of GPs and the percentage of the public agreeing with survey statements through fitting a robust regression model insensitive to outlying data. Across the six of the eight survey questions there is some evidence to suggest that countries whose GPs are more likely to agree that vaccines are important, safe, and effective have a higher percentage of the public agreeing also (Fig. 12). Vaccines are important for children to have (b=0.085 [0.006, 0.149]); the MMR vaccine are important for children to have (b = 0.053 [-0.042, 0.142]); the seasonal influenza vaccine is important (b = 0.071 [0.023, 0.119]); vaccines are safe (b = 0.058 [-0.009, 0.117]); the MMR vaccine is safe (b = 0.033 [-0.080, 0.138]); vaccines are effective (b = 0.059 [-0.023, 0.133]; here b denotes the gradient of the association for each question with corresponding 95% confidence intervals.

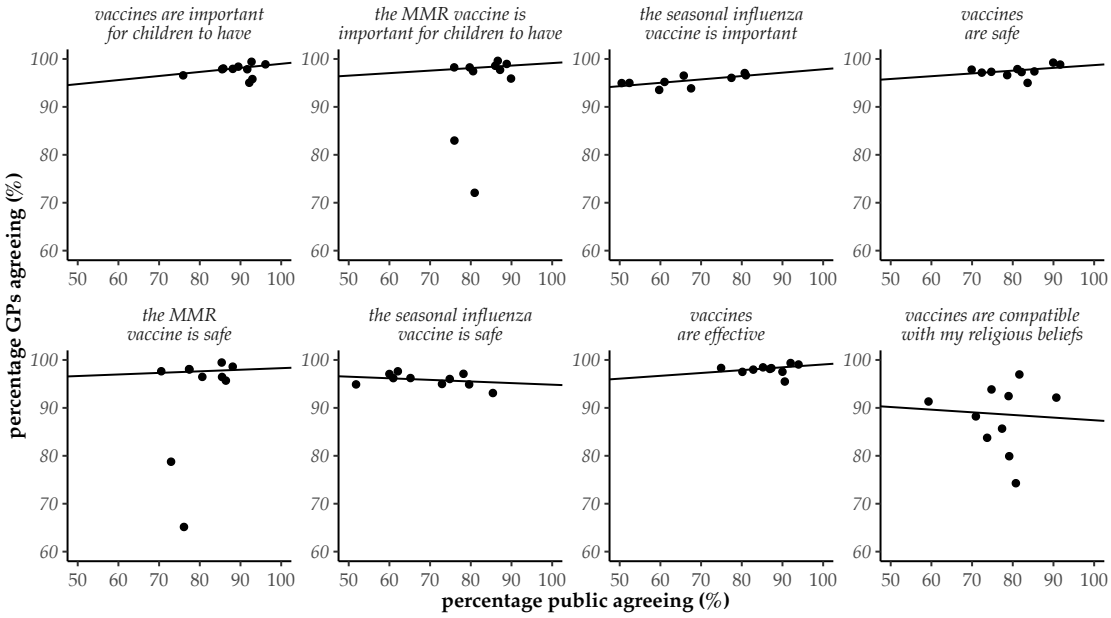


Figure 12: **Countries whose GPs are more confident in the importance, safety, and effectiveness of vaccines are more likely to have higher confidence among the public also**. Percentage of GPs agreeing against the percentage of public agreeing with each survey statement.

6 Discussion and interpretation of findings

The Vaccine Confidence Project™ in its 2015 global survey on vaccine confidence, found that the European region had the lowest level of confidence in the safety and effectiveness of vaccines (Larson, 2016). The survey across the 28 EU member states in this report builds on this previous survey to provide a more comprehensive picture of vaccine confidence across the EU and establishes spatial and temporal trends in confidence.

6.1 Seasonal influenza

This survey revealed that confidence in the importance of the seasonal influenza vaccine is notably low in **Austria**, **Czech Republic**, and **Denmark**, who rank 28th, 26th, and 27th (out of 28 EU member states) respectively. Despite these low perceptions of the importance of the seasonal influenza vaccine, the public in Czech Republic and Denmark do not rank among the lowest countries for the perceived safety of the seasonal influenza (ranking 19th and 11th, respectively) in the study. Austria, however, also ranks low (26th) for the perceived safety of the influenza vaccine. Multiple studies have found that EU citizens, including at-risk groups (such as the recommendation for the seasonal influenza vaccine to over-65s in many EU member states – see Appendix A), often fail to perceive the need for the influenza vaccine because they do not believe they will contract influenza themselves or because they do not perceive influenza as a serious, dangerous illness (Karafillakis E. a., 2017; Schmid, 2017; Yaqub, 2014). In some countries, concerns about the safety of seasonal influenza vaccines are more prominent. Confidence in the seasonal influenza vaccine in **France** – which, in this study, ranks 28th and 21st for the perceived safety and importance of the seasonal influenza vaccine, respectively – partly reflects the 2009 controversies that surrounded the AH1N1 pandemic influenza vaccination campaign (Peretti-Watel, 2013).

The differentials between the perceived importance and safety of the seasonal influenza vaccine suggest a number of countries whose seasonal influenza coverage rates could be improved through changes to national public health policy. A total of 25 EU member states in the study have a higher fraction of the public agreeing that the seasonal influenza vaccine is more safe than important: in **Denmark**, for example, only 42.6% of study participants believe that the seasonal influenza vaccine is important (the second lowest rate in the EU), while 72.7% believe that the vaccine is safe. Only **France**, **Malta**, and **Romania** have a higher percentage of participants who agree that the seasonal influenza vaccine is important than it is safe.

The survey found a striking relationship between age and the perceived importance of the seasonal influenza vaccine. Most age groups under 65 across the majority of EU

member states are less likely to agree that the seasonal influenza vaccine is important than over-65s, highlighting the tendency of most member states to heavily promote the vaccine to older age groups. Interestingly, 18-24 year-olds were found to be more likely to hold similar levels of agreement towards seasonal influenza vaccine than 65+ year-olds than other age groups (Fig. 9). Across 13 surveyed member states, females are significantly less likely than males to believe the seasonal influenza vaccine is important, which is an unexpected result that needs to be further investigated.

6.2 MMR

Confidence in the safety and importance of the MMR vaccine exceeds confidence in the seasonal influenza vaccination in the majority of EU member states in the survey (Table 2 and Fig. 5). However, in **Sweden**, **Belgium** and **Bulgaria**, only 57.1%, 64.7%, and 74.6% of the public (respectively) agree that the MMR vaccine is safe.

Our findings also reveal that 18-24 and 25-34 year-olds in a number of EU member states are less likely to agree the MMR vaccine is safe than over-65s (Fig. 8b). Whether these age groups are less confident because they are typical birth-giving age groups is unclear and future surveys should attempt to understand this link more explicitly. Although there is a general trend for individuals to have lower confidence in the safety of the MMR vaccine than individuals of any older age group, in the **UK –** which was highly exposed to newspaper reporting of the Wakefield scandal following his publication in 1998 (Godlee, 2011) – it is 35-44 year-olds surveyed who are least likely to agree the MMR is safe. (The same finding is true for **Ireland** which also experienced decreases to measles vaccination rates post-Wakefield – see Fig. 1.)

6.3 Changes in confidence since 2015

This 2018 survey shows that confidence in vaccination has improved since 2015 in a number of countries, including **Slovenia**, **Greece**, **Italy**, and the **UK**: these countries recorded increases in confidence across all four survey statements measured in the 2016 study (Larson, 2016). Despite these gains in a number of settings, the study found that confidence has significantly decreased across all four statements in **Poland,** and increases in vaccine safety concerns are recorded in the **Czech Republic**, **Finland**, and **Sweden**.

The increase in measles outbreaks across the EU since the 2016 paper , has contributed to increasing media conversations about the importance of vaccination as well as **France** and **Italy**'s decision to increase the number of mandatory vaccines under their national immunisation programmes (Chirico, 2018; Filia, 2017; Ward, 2018). The

serious outbreaks may also have motivated some of the increased confidence in why vaccines are important. However, more research needs to be conducted to confirm the effect of mandatory vaccination and the different components of the communication strategies on public confidence in vaccination.

In 2016, **France** was identified as the country with the lowest confidence in the safety of vaccines out of all of the 67 countries surveyed, which has been explained by a historical context of vaccine controversies and mistrust. These controversies are still visible in the 2018 survey: France remains one of the countries with the lowest confidence in the safety of vaccines, even if overall confidence in vaccine safety has increased. There is a striking difference between the percentage of survey respondents in France agreeing that the MMR vaccine (77.3%) and the seasonal influenza vaccine (51.8%) is safe. However, the results from the 2015 survey, together with recurring measles outbreaks, have highlighted the importance of addressing public concerns around vaccination to maintain optimal coverage rates and have led researchers, scientists and health authorities in France to implement a comprehensive communication strategy, including public consultations, to improve confidence in and uptake of vaccination in the country. The effect of these actions could explain the observable increase in public confidence in the safety and effectiveness of vaccines since 2016 but also highlight that rebuilding public trust is a lengthy task.

Poland is the country in Europe which has had the largest decrease in confidence in the importance, effectiveness, religious compatibility and safety of vaccines in this study. The results have also shown that participants from Poland have low confidence in MMR vaccination, for which uptake has been decreasing in the last 10 years, which could trigger serious measles outbreaks, especially with the high number of cases occurring in neighbouring Ukraine. Vaccination is mandatory and provided free of charge to all children residing in Poland, yet the number of refusals of any vaccine has been increasing, from 4,893 in 2007 to 23,147 in 2016 according to the Polish National Institute of Public Health (NIPH, 2017) and studies have shown a decrease in confidence in vaccination, particularly in certain regions of the country (Braczkowska B. a., 2017; Braczkowska B. a., 2018; Kuchar, 2018; Stefanoff, 2010). These refusals and decrease in confidence can partially be explained by the growth of anti-vaccine movements in Poland, and more particularly the STOP NOP group which has been campaigning against mandatory vaccination by sending a signed petition to the president and organising large demonstrations in major Polish cities. Anti-vaccine groups and figures, including doctors, are also strongly involved in Polish politics with members in the Polish parliament and have a strong presence on social and mass media. The influence of these figures is further exacerbated by the lack of strong government support for vaccination. Data from the Polish National Sanitary Inspection shows that anti-vaccination movements in Poland influence 32% of parents of unvaccinated children (Inspection, 2016). Confidence has also been shown to

decrease among Polish immigrant communities in the UK, which could indicate an influence of national Polish anti-vaccine groups on vaccination beliefs and behaviours in Polish communities in other countries (Sim, 2011).

Other countries in the survey where confidence in two or more aspects of vaccination has decreased significantly since 2015 include **Sweden** (effectiveness, safety, and importance), **Finland** (effectiveness and safety), and **Belgium** (effectiveness and importance). While the decrease in confidence remains small, these results are surprising and should therefore be monitored closely as both **Finland** and **Sweden** have traditionally constituted examples of successful vaccination programmes with high confidence in vaccination. Individuals in Scandinavian countries have always expressed high trust in national health authorities and in vaccination, particularly when compared to countries from Eastern Europe (Petrelli, 2018). Anti-vaccine groups are present in those countries, as in almost every country, but their impact on public opinion has until now been rather limited. More recently, inaccurate rumours about the Swedish government banning mandatory vaccination because of a long list of alleged side effects were posted online. While the government indeed rejected a proposition to make vaccines mandatory, this was not linked to alleged vaccine side effects but to the already successful voluntary system in Scandinavia. However, the misinformation circulated on multiple online and social media sources and could have contributed to the decrease in confidence in Sweden observed in this study.

Belgium and **Sweden** were also found to have extremely low confidence in the MMR vaccine in this survey. Sweden has reported issues with MMR vaccination coverage in certain communities, including anthroposophic communities, Somali communities, and undocumented migrants (Folkhälsomyndighetens, 2015). The communities raise varied concerns, with a preference for natural immunity, fear of side effects, and lack of access to health care reported by each, respectively. The vaccination programme in Belgium is complex and varies between the Flanders and the Wallonia regions of the country where vaccines are administered differently, which contributes to differences in coverage rates between the two regions (Gerkens, 2010). Coverage rates have traditionally been lower in Wallonia, particularly for some vaccines such as that to prevent Human papilloma virus (HPV), which has been explained by some as being influenced by negative media reports and concerns from France -- as Wallonia is the French-speaking part of Belgium. More recently, Wakefield and his new anti-vaccine, anti-MMR film, "VAXXED", also brought a lot of media attention in **Belgium** where he organized launch events and debates. In both **Sweden** and **Belgium**, the results from this survey could show how concerns among specific community groups or regions in a country can slowly influence the general population but also highlights the need for further local research to understand differences between population groups and identify where pockets of hesitancy are located.

In the last few years, Europe has also witnessed important confidence crises around HPV vaccination, particularly in **Denmark** and **Ireland** where coverage for the first dose of the HPV vaccine dropped to less than 50% due to public concerns around the safety of the vaccine (Corcoran, 2018; WHO D. , 2018). Only after resource- and time-intensive communication strategies, including strong social media presence and sharing of personal -- and highly emotional -- stories, have coverage and confidence levels increased again. Considering these challenges, it is interesting to note that overall vaccine confidence levels reported by the 2018 survey in both countries have increased or remained stable since the 2016 survey. This could be an indirect effect of the powerful communication strategies implemented to restore trust in HPV vaccination but could also indicate that public confidence in one vaccine may not influence public confidence in vaccines in general or in other specific vaccines. These results certainly warrant further research to understand the long-lasting impact of confidence crises on vaccination confidence levels in general.

6.4 GP vaccine confidence

This survey also explored GPs' confidence in vaccination in ten EU countries and found that overall, GPs are confident in the safety, importance and effectiveness of vaccination and have higher levels of confidence than the general population. While these findings are reassuring and confirm results from other studies that only a minority of healthcare professionals have concerns about vaccines (Karafillakis E. a., 2016; Paterson, 2016), confidence of GPs in MMR vaccination is lower in certain countries in the survey, particularly in Eastern Europe. **Czech Republic** and **Slovakia** are two countries where findings shoed particularly low levels of confidence in the importance and safety of MMR vaccination, and where GPs would hesitate to recommend the vaccine to their patients. The Czech Republic is also the only country in Europe where GPs were found to have lower levels of confidence in the importance and safety of MMR vaccination than the country's citizens. Additionally, while the safety, importance and effectiveness of seasonal influenza vaccination was generally well perceived by GPs across Europe in the study, GPs in many Eastern European countries would choose not to recommend the vaccine to pregnant women. This could be linked to differences in national recommendations with regards to pregnant women and an associated lack of awareness but needs to be evaluated further. More research is needed on Eastern European healthcare professionals' views about vaccines. The findings from this survey certainly warrant the need for more evidence to further explain reasons for their low levels of confidence. Eastern European countries have a shared history and their vaccination programmes, often mandatory, have been strongly influenced by times under communist leadership. A better understanding of the influence of historical and political contexts in European Europe

on confidence in vaccination among GPs but also the general public is therefore essential.

6.5 Limitations

This is the largest survey exploring the public's confidence in vaccines across the EU both in its size (approximately 28,000 respondents) and in its scope (all 28 EU member states). There are a number of limitations with the survey designs for both the general public and GPs that we account for here. First of all, we lack a causal connection between vaccination confidence attitudes and vaccination histories and uptake decisions. Although we may be able to speculate that individuals who do not believe vaccines are important or safe may not take vaccinations, we currently lack data providing evidence for this claim. Although we investigate the connection between socio-economic characteristics and vaccine confidence, we cannot thoroughly investigate the role religion plays in vaccine confidence across all countries as a) we often lack a sufficient survey size of particular religious groups within those countries (for example, many religious groups are categorised into "other" from which we cannot tell if any religious group therein has differential views to other groups) and b) because this survey does not explore the precise reasons for religious objections to vaccines. Moreover, more contextual information is required to understand local-level concerns as these may vary from national-level trends.

Further investigation would also be required to establish which type of healthcare provider (and in which EU member state) plays the largest role in influencing vaccination behaviours. We have only studied GPs here (rather than other health professionals such as nurses or those who administer vaccines) and only in ten EU member states. Further surveys probing individual trust towards a range of healthcare providers would allow us to develop these correlative analyses to understand the causal factors affecting vaccination beliefs and behaviours.

6.6 Concluding remarks

Awareness about the public losing confidence in vaccination has increased, especially in Europe where a number of countries have faced important confidence crises in the past 20 years which partly resulted in the devastating measles outbreaks seen today. While this survey shows that a majority of citizens in the EU still believe in the importance, effectiveness and safety of vaccines, it has also revealed important declines in confidence in certain countries since 2016, highlighting the need for continuous monitoring, preparedness and response plans. In a number of EU countries, anti-vaccine groups, aided by social and mainstream media, are gaining traction and have started influencing politics and political elections. The examples of

Sweden and Poland more generally illustrate how confidence can rapidly decline in any country, even those with optimal coverage rates and successful vaccination programmes. The survey has also confirmed that European countries are varied and come with important historical and political contexts. Each area of confidence and each vaccine addressed in the survey triggered different results in different countries, showing how political and media discourse can shape a country's confidence in the importance, effectiveness and safety of vaccines, including MMR and seasonal influenza. The survey also shows that confidence varies for different vaccines, highlighting the need for targeted responses to rebuild trust. Overall, the survey found that healthcare professionals in Europe remain confident in vaccination but their confidence is being tested with certain vaccines and the increasing number of public confidence crises. If healthcare professionals are to remain the most effective way of building and maintaining trust in the general population, a continuous monitoring system should be established to detect any potential changes in their own beliefs and behaviours.

Overall confidence levels have slightly improved in many countries across the EU, but have decreased in others, most notably **Poland**. It is therefore likely that the European region still has the lowest confidence levels across the world. However, countries such as France have shown that it is possible to reverse this trend. The recent measles outbreaks should be used as an opportunity to remind people of the importance of vaccination and the dangers of vaccination-preventable diseases. Coordinated approaches across sectors but also countries should be favoured to facilitate the exchange of best practice and effective communication methods. Finally, this survey has also confirmed the importance of continuous monitoring systems to detect changes in confidence levels and allow rapid responses.

7 Bibliography

ASSET. (2017). *ASSET Reports*. Retrieved from http://www.asset-scienceinsociety.eu/reports/page1.html

Braczkowska, B. a. (2017). Determinants of vaccine hesitancy. *Prz. Epidemiol*, 227-236.

Braczkowska, B. a. (2018). Parental Opinions and Attitudes about Children?s Vaccination Safety in Silesian Voivodeship, Poland. *International journal of environmental research and public health*, 756.

Chirico, F. (2018). The new Italian mandatory vaccine Law as a health policy instrument against the anti-vaccination movement. *Annali di igiene: medicina preventiva e di comunita*, 251-256.

Corcoran, B. a. (2018). Rapid response to HPV vaccination crisis in Ireland. *The Lancet*, 2103.

ECDC. (2018). *ECDC Report*. Retrieved from Low uptake of seasonal influenza vaccination in Europe may jeopardise capacity to protect people in next pandemic, European Centre for Disease Prevention and Control, PRESS RELEASE: https://ecdc.europa.eu/en/news-events/low-uptake-seasonal-influenza-vaccination-europe-may-jeopardise-capacity-protect-people

ECDC. (2018). *Factsheet about seasonal influenza.* European Centre for Disease Prevention and Control, Press release. Retrieved from https://ecdc.europa.eu/en/seasonal-influenza/facts/factsheet

Filia, A. a. (2017). Ongoing outbreak with well over 4,000 measles cases in Italy from January to end August 2017- what is making elimination so difficult? *Eurosurveillance*.

Folkhälsomyndighetens. (2015). *Barriers and motivating factors to MMR vaccination in communities with low coverage in Sweden*. Retrieved from www.folkhalsomyndigheten.se/contentassets/5db4b41a40f94e98b0e1d0d4a596bae8/barriers-motivating-factors-mmr-vaccination-communities-low-coverage-sweden-15027.pdf

Funk, S. (2017). *Critical immunity thresholds for measles elimination*. Retrieved from http://www.who.int/immunization/sage/meetings/2017/october/2._target_immunity_levels_FUNK.pdf

Gelman, A. a. (2007). *Data analysis using regression and multilevel/hierarchical models.* New York, USA: Cambridge University Press .

Gelman, A., Hill, J., & and Yajima, M. (2012). Why we (usually) don't have to worry about multiple comparisons. *Journal of Research on Educational Effectiveness*, 189-211.

Gerkens, S. a. (2010). Belgium: Health system review. *Health systems in transition*, 1-266.

Godlee, F. a. (2011). Wakefield's article linking MMR vaccine and autism was fraudulent. *British Medical Journal*.

Inspection, S. S. (2016). *Sanitary State of the Country in 2015; State Sanitary Inspection: Warsaw, Poland, 2016*.

Jamieson, D. J. (2009). H1N1 2009 influenza virus infection during pregnancy in the USA. *The Lancet*, 451-458.

Jorgensen, P. a. (2018). How close are countries of the WHO European Region to achieving the goal of vaccinating 75% of key risk groups against influenza? Results from national surveys on seasonal influenza vaccination programmes, 2008/2009 to 2014/2015. *Vaccine*, 442-452.

Karafillakis, E. a. (2016). Vaccine hesitancy among healthcare workers in Europe: A qualitative study. *Vaccine*, 5013-5020.

Karafillakis, E. a. (2017). The benefit of the doubt or doubts over benefits? A systematic literature review of perceived risks of vaccines in European populations. *Vaccine*, 4840-4850.

Kuchar, E. a.--.--. (2018). Knowledge Regarding Influenza and Influenza Vaccination in General Population: Results of a National Survey in Poland. *Springer*.

Larson, H. J. (2016). The state of vaccine confidence 2016: global insights through a 67-country survey. *EBioMedicine*, 295-301.

Mereckiene, J. a.-B. (2014). Seasonal influenza immunisation in Europe. Overview of recommendations and vaccination coverage for three seasons: pre-pandemic

(2008/09), pandemic (2009/10) and post-pandemic (2010/11). *Robert Koch-Institut, Infektionsepidemiologie*.
NIPH. (2017). *Increasing problem with vaccine hesitancy, Polish National Institute of Public Health*. Retrieved from http://szczepienia.pzh.gov.pl/en/stories/increasing-vaccine-hesitancy/
OECD. (2017). *Influenza vaccination rates, Organisation for Economic Co-operation and Development*. Retrieved from https://data.oecd.org/healthcare/influenza-vaccination-rates.htm
Paterson, P. a. (2016). Vaccine hesitancy and healthcare providers. *Vaccine*, 6700-6706.
Peretti-Watel, P. a. (2013). Dramatic change in public attitudes towards vaccination during the 2009 influenza A (H1N1) pandemic in France. *Eurosurveillance*, 20-23.
Petrelli, F. a. (2018). Vaccine hesitancy, a public health problem. *Ann Ig*, 86-103.
Schmid, P. a.-L. (2017). Barriers of influenza vaccination intention and behavior--a systematic review of influenza vaccine hesitancy, 2005-2016. *PloS one*, e0170550.
Sim, J. a. (2011). Out of two bad choices, I took the slightly better one: Vaccination dilemmas for Scottish and Polish migrant women during the H1N1 influenza pandemic. *Public health*, 505-511.
Stefanoff, P. a. (2010). VACSATC working group on standardization of attitudinal studies in Europe Tracking parental attitudes on vaccination across European countries: The Vaccine Safety, Attitudes, Training and Communication Project (VACSATC). *Vaccine*, 7.
VCP. (2015). *The State of Vaccine Confidence 2015*. Retrieved from Vaccine Confidence: http://www.vaccineconfidence.org/research/the-state-of-vaccine-confidence/
Ward, J. K. (2018). Why France is making eight new vaccines mandatory. *Vaccine*, 1801-1803.
WHO. (2014). *Report of the SAGE Working Group on Vaccine Hesitancy*. Geneva: WHO.
WHO. (2017). *WHO-UNICEF coverage estimates*. Retrieved from http://apps.who.int/immunization_monitoring/globalsummary/timeseries/tscoveragemcv1.html
WHO. (2018). *Immunization Schedule by Antigens*. Retrieved from Immunization Schedule by Antigens: http://apps.who.int/immunization_monitoring/globalsummary/schedules
WHO, D. (2018). *Denmark* . Retrieved from Denmark campaign rebuilds confidence in HPV vaccination, World Health Organization, February 2018: www.who.int/features/2018/hpv-vaccination-denmark/en/
WHO-UNICEF. (2017). *WHO-UNICEF disease incidence data*. Retrieved from http://apps.who.int/immunization_monitoring/globalsummary/timeseries/tsincidencemeasles.html
Yaqub, O. a.-C. (2014). Attitudes to vaccination: a critical review. *Social Science & Medicine*, 1-11.

A EU vaccination schedules

Vaccine Scheduling across the 28-EU members; R - General Recommendation, R* - Recommended for Specific groups only, M - Mandatory, M* - Mandatory for specific groups only, C - Scheduled catch-up e.g. If previous dose was missed, N - not scheduled ('N' implies said vaccine is not part of the National immunisation Schedule and should not be seen as an indicator of vaccine availability should one need it). Colours indicate whether the scheduled vaccine is free(fuchsia) or not(green). Age ranges are shown in superscript for adults; for Meningitis vaccine type is indicated(MENB/C/MCV4/MPSV4). For example, In Austria; the influenza vaccine is recommended for both children and adults, but is not funded by the national health system for both; Hepatitis A is recommended for children(not free) and is not part of the national schedule for adults; HPV vaccine is recommended to children and a catch-up is available for adults aged 18+, and is free for both. Table adapted from - https://vaccine-schedule.ecdc.europa.eu/ .

EU-member	Diphtheria		Haemophilus influenzae type-B		Hepatitis A		Hepatitis B		Human Papillomavirus (♀ - indicates females only)		Influenza		Meningitis		Tick-borne encephalitis		Rabies		EU-member	Pneumococcal disease		Measles- mumps-rubella		Pertussis		Polio		Rotavirus		Tetanus		Tuberculosis (with Bacillus Calmette-Guérin)		Varicella	
	Child	Adult	Child	Adult	Child	Adult	Child	Adult	Child	Adult	Child	Adult	Child	Adult	Child	Adult	Child	Adult		Child	Adult	Child	Adult	Child	Adult	Child	Adult	Child	Adult	Child	Adult	Child	Adult	Child	Adult
Austria	R	R	R	N	R	N	R, C$^{16-18}$	C	R$^{\varphi 11}$, C$^{12-18}$	C^{18+}	R	R	R^{MENC}, R^{MENB}	N	R	C	N	N	Austria	R	R^{65+}	R	C	R	R	R	R	R	N	R	R	N	N	R	R^{65+}
Belgium	R	R	R	N	R*	R*	R	R*	R$^{\varphi 10-13}$	N	R*	R*, R^{65+}	R^{MENC}	N	N	N	N	N	Belgium	R	R$^{\varphi 13-67}$, R^{65+}	R	N	R	R	M	R*	R	N	R	R	N	N	R*	R*$^{R+}$
Bulgaria	M	M	M	N	N	N	M	N	R$^{\varphi 12}$	N	N	R^{65+}	N	N	N	N	N	N	Bulgaria	M	N	M	N	M	N	M	N	N	N	M	M	M	N	N	N
Croatia	M	C	M	N	N	N	M	N	R^{14}	N	R*	R*, R^{65+}	N	N	N	N	N	N	Croatia	N	N	M	N	M	N	M	C	N	N	M	C, M^{65}	R	N	N	N
Cyprus	R	R	R	N	R*	R*	R	N	R$^{\varphi 12-13}$	N	R*	R*, R^{65+}	R^{MENC}, R^{+MPSV4}	R^{+MPSV4}	N	N	N	N	Cyprus	R	R*	R	N	R	N	R	N	N	N	R	R	R*	N	R	N
Czech Republic	M	N	M	R, R*	R, M*	R, M*	M	M*	R$^{13-14}$	R$^{18-26}$, R^{26+}	R*	R*, R^{65+}	R^{+MENB}, R^{+MCV4}	R^{+MENB}, R^{+MCV4}	R	R	R*	R*	Czech Republic	R, M*	M^{+10-14}, R^{65+}	M	M	M	R	M	N	R	N	M	M	M*	N	R*	R^{+B-P}, R^{R+}
Denmark	R	N	R	N	N	N	R*	N	R$^{\varphi 12}$, C$^{13-18}$	C^{18}	N	R^{65+}	N	N	N	N	N	N	Denmark	R	R^{+65+}	R	N	R	N	R	N	N	N	R	N	N	N	N	N
Estonia	R	R	R	N	N	N	R	N	R$^{\varphi 12-14}$	N	N	R^{65+}	N	N	N	N	N	N	Estonia	N	N	R	N	R	N	R	N	R	N	R	R	R	N	N	N
Finland	R	R	R	N	N	N	R*	N	R$^{11-12}$	N	R	R^{65+}	N	N	R*	R*	N	N	Finland	R	R^{65+}	R	N	R	N	R	N	R	N	R	R	R*	N	R	N
France	M	R	M	N	N	N	M	N	R$^{11-12}$, C$^{\varphi 13-14}$	C$^{\varphi 11-14}$	N	R^{65+}	M^{MENC}	C$^{MENC\geq 12}$	N	N	N	N	France	M	N	M	C$^{\leq 18}$	M	C	M	R	N	N	M	R	R*	N	N	R^{65+}	
Germany	R	R	R	N	N	N	R	N	R$^{\varphi 9-14}$, C$^{\leq 17}$	N	N	R^{65+}	R^{MENC}	N	N	N	N	N	Germany	R	R^{65+}	R	R	R	R	R	C	R	N	R	R	N	N	R	N	
Greece	R	R	R	R*	R	C	R	R	R$^{\varphi 11-14}$	R$^{\varphi 45}$, R$^{\leq 18+}$	R*	R*, R^{65+}	R^{MENC}, R^{MCV4}, R^{+MENB}	R^{MCV4}, R^{+MENB}	N	N	N	N	Greece	R	R*, R^{65+}	R	C	R	R	R	C$^{\leq 18}$	R	N	R	R	R*	N	R	C, R^{65+}	
Hungary	M	N	M	N	N	N	M	N	R$^{\varphi 12-13}$	N	N	R^{65+}	N	N	N	N	N	N	Hungary	M	R^{65+}	M	N	M	N	M	N	N	N	M	N	M	N	N	N
Ireland	R	R*	R	N	N	N	R	N	R$^{\varphi 12-13}$	N	N	R^{65+}	R$^{MENB/C}$	N	N	N	N	N	Ireland	R	R^{65+}	R	N	R	R*	R	N	R	N	R	R*	R	N	N	N
Italy	M	R^{R+}	M	N	N	N	M	N	R$^{12-18}$	R$^{\leq 15}$	N	R^{65+}	R$^{MENB/C/MCV4}$	N	N	N	N	N	Italy	R	R^{65+}	M	N	M	R^{R+}	M	N	R	N	M	R^{R+}	N	N	M	R^{+18-64}, R^{65+}
Latvia	M	M	M	N	N	N	M	N	M$^{\varphi 12}$	N	R*	R* R^{65+}	N	N	R, M*	N	N	N	Latvia	M	N	M	N	M	N	M	N	M	N	M	M	M	N	M	N
Lithuania	R	N	R	N	N	N	R	N	R$^{\varphi 13}$	N	N	R*, R^{65+}	N	N	N	N	N	N	Lithuania	R	N	R	N	R	N	R	N	N	N	R	N	R	N	N	N
Luxembourg	R	N	R	N	N	N	R	N	R$^{\varphi 12-18}$, C$^{\varphi 7-18}$	N		R^{65+}	R^{MENC}	N	N	N	N	N	Luxembourg	R	R^{+65+}, R^{65+}	R	C	R	N	R	N	R	N	R	N	N	N	R	N	
Malta	R	N	R	N	N	N	R	N	R$^{\varphi 12}$	N	R	R^{65+}	N	N	N	N	N	N	Malta	N	R^{65+}	R	N	R	N	R	N	N	N	R	N	R*	N	N	N	
The Netherlands	R	N	R	N	N	N	R	N	R$^{\varphi 12}$	N	N	R^{65+}	R^{MENC}	N	N	N	N	N	The Netherlands	R	N	R	N	R	N	R	N	N	N	R	N	N	N	N	N	
Poland	M	M*^{R}	M	N	N	N	M	N	R$^{\varphi 11-12}$	N	R	R^{65+}	R^{MENC}	R$^{MENC\geq 19}$	N	N	N	N	Poland	M	R^{R+}	M	C	M	N	M	N	R	N	M	M*^{R}	M	N	R*	N	
Portugal	R	R	R	N	R	N	R	N	R$^{\varphi 10}$	N	N	R^{65+}	R^{MENC}	N	N	N	N	N	Portugal	R	N	R	N	R	R*	R	N	N	N	R	R	R*	N	N	N	
Romania	R	N	R	N	N	N	R	N	R$^{\varphi 11-14}$	N	N	R^{65+}	N	N	N	N	N	N	Romania	R	N	R	N	R	N	R	N	N	N	R	N	R	N	N	N	
Slovakia	M	R	M	N	N	N	M	N	R^{12}	N	R, M*	R^{65+}, M*	N	N	N	N	N	N	Slovakia	M	R, M*	M	N	M	N	M	N	N	N	M	R	N	N	N	N	
Slovenia	M	M	M	N	N	N	M	N	R$^{\varphi 11-12}$	N	R	R	N	N	R*	R*	N	N	Slovenia	R	R^{65+}	M	N	M	M	M	N	N	N	M	R	N	N	R	N	
Spain	R	R^{65+}	R	N	N	N	R	N	R$^{\varphi 12}$	N	N	R*, R^{65+}	R^{MENC}	N	N	N	N	N	Spain	R	R^{65+}	R	N	R	N	R	N	N	N	R	R^{65}	N	N	R	N	
Sweden	R	N	R	N	N	N	R	N	R$^{\varphi 11-12}$	N	R*	R*, R^{65+}	N	N	N	N	N	N	Sweden	R	R*, R^{65+}	R	N	R	N	R	N	N	N	R	N	R*	N	N	N	
United Kingdom	R	N	R	N	N	N	R	N	R$^{\varphi 12-13}$	N	R, R*	R*, R^{65+}	R$^{MENB/C/MCV4}$	R$^{\varphi 13-23\ MCV4}$	N	N	N	N	United Kingdom	R	R^{65}	R	N	R	R*	R	N	R	N	R	N	R*	N	R*	R*, R^{19+}	

Figure 13: **Vaccination schedules across EU member states** Table adapted from www.vaccine-schedule.ecdc.europa.eu.

B Survey methodology

B.1 The general public

Country	Method	Sample size	Fieldwork dates
Austria	Online	1,000	18 May - 2 June
Belgium	Online	1,000	25 May - 29 May
Bulgaria	Online	1,198	17 May - 3 June
Croatia	Telephone	1,001	9 May - 30 May
Cyprus	Telephone	1,010	14 May - 21 May
Czech Republic	Online	1,048	16 May - 24 May
Denmark	Online	1,020	16 May - 23 May
Estonia	Online	1,016	15 May - 22 May
Finland	Face-to-face	970	17 May - 6 June
France	Online	1,000	21 May - 26 May
Germany	Online	950	18 May - 6 June
Greece	Online	1,000	18 May - 7 June
Hungary	Telephone	1,003	17 May - 30 May
Ireland	Online	1,014	3 May - 9 May
Italy	Online	1,000	21 May - 28 May
Latvia	Face-to-face	1,015	9 May - 29 May
Lithuania	Online	1,018	16 May - 22 May
Luxembourg	Online	530	31 May - 4 June
Malta	Telephone	500	21 May - 4 June
Netherlands	Online	1,034	30 May - 1 June
Poland	Online	1,022	21 May - 28 May
Portugal	Online	1,000	21 May - 29 May
Romania	Telephone	1,223	9 May - 7 June
Slovakia	Online	1,047	16 May - 24 May
Slovenia	Online	1,053	18 May - 7 June
Spain	Online	1,005	21 May - 26 May
Sweden	Online	1,031	25 May - 28 May
UK	Online	2,074	14 May - 15 May

Table 7: **Survey methodologies for the public across the 28 member states** The survey method, sample size, and fieldwork dates for each member state. (All fieldwork dates are in 2018.)

B.2 General practitioners

Country	Method	Sample size	Fieldwork dates	Directory size
Czech Republic	Telephone	107	1 - 12 June	4,583
Estonia	Telephone	100	6 - 15 June	1,000
France	Online	100	8 - 13 June	93,507
Germany	Online	100	8 - 13 June	33,190
Italy	Online	100	8 - 15 June	17,014
Poland	Telephone	100	6 - 13 June	11,615
Romania	Telephone/Online	131	6 - 18 June	7,000
Slovakia	Telephone	105	4 - 13 June	1,123
Spain	Online	100	8 - 13 June	18,663
UK	Online	100	7 - 12 June	39,963

Table 8: **Survey methodologies for GPs** The ten countries in which GPs were surveyed, the survey method used, field work dates, and sample and directory sizes. (All fieldwork dates are in 2018.)

C Country data tables

C.1 Public surveys

Austria

	Vaccines are important for children to have	The MMR vaccine is important for children to have	The seasonal influenza vaccine is important	Vaccines are safe	The MMR vaccine is safe	The seasonal influenza vaccine is safe	Vaccines are effective	Vaccines are compatible with my religious beliefs
base	1000	1000	999	1001	999	1000	999	999
Strongly agree	604	592	142	386	473	203	465	726
	60.4%	59.2%	14.2%	38.6%	47.3%	20.3%	46.5%	72.5%
Tend to agree	301	286	262	441	387	354	416	125
	30.1%	28.6%	26.2%	44.1%	38.7%	35.4%	41.6%	12.5%
Tend to disagree	47	55	335	102	61	245	75	21
	4.7%	5.5%	33.5%	10.2%	6.1%	24.5%	7.5%	2.1%
Strongly disagree	30	34	215	39	37	137	23	58
	3.0%	3.4%	21.5%	3.9%	3.7%	13.7%	2.3%	5.8%
Do not know / NR	18	33	45	33	41	61	20	69
	1.8%	3.3%	4.5%	3.3%	4.1%	6.1%	2.0%	6.9%
Agree	905	878	404	827	860	557	881	851
	90.5%	87.8%	40.4%	82.6%	86.1%	55.7%	88.2%	85.2%
Disgree	77	89	550	141	98	382	98	79
	7.7%	8.9%	55.1%	14.1%	9.8%	38.2%	9.8%	7.9%

Belgium

	Vaccines are important for children to have	The MMR vaccine is important for children to have	The seasonal influenza vaccine is important	Vaccines are safe	The MMR vaccine is safe	The seasonal influenza vaccine is safe	Vaccines are effective	Vaccines are compatible with my religious beliefs
base	1000	1001	1000	1000	1000	1001	1000	999
Strongly agree	544	306	242	328	267	248	383	520
	54.4%	30.6%	24.2%	32.8%	26.7%	24.8%	38.3%	52.0%
Tend to agree	329	341	375	462	382	432	457	260
	32.9%	34.1%	37.5%	46.2%	38.2%	43.2%	45.7%	26.0%
Tend to disagree	58	103	202	94	86	158	74	65
	5.8%	10.3%	20.2%	9.4%	8.6%	15.8%	7.4%	6.5%
Strongly disagree	25	39	107	53	42	78	38	64
	2.5%	3.9%	10.7%	5.3%	4.2%	7.8%	3.8%	6.4%
Do not know / NR	44	212	74	63	223	85	48	90
	4.4%	21.2%	7.4%	6.3%	22.3%	8.5%	4.8%	9.0%
Agree	873	647	617	790	649	680	840	780
	87.3%	64.6%	61.7%	79.0%	64.9%	67.9%	84.0%	78.1%
Disgree	83	142	309	147	128	236	112	129
	8.3%	14.2%	30.9%	14.7%	12.8%	23.6%	11.2%	12.9%

Bulgaria

	Vaccines are important for children to have	The MMR vaccine is important for children to have	The seasonal influenza vaccine is important	Vaccines are safe	The MMR vaccine is safe	The seasonal influenza vaccine is safe	Vaccines are effective	Vaccines are compatible with my religious beliefs
base	1197	1198	1200	1198	1198	1198	1198	1199
Strongly agree	527	472	234	331	336	291	407	522
	44.0%	39.4%	19.5%	27.6%	28.0%	24.3%	34.0%	43.6%
Tend to agree	411	422	368	463	450	381	464	326
	34.3%	35.2%	30.7%	38.7%	37.6%	31.8%	38.7%	27.2%
Tend to disagree	75	58	221	162	97	159	102	76
	6.2%	4.8%	18.4%	13.5%	8.1%	13.3%	8.5%	6.3%
Strongly disagree	55	58	164	78	57	110	72	91
	4.6%	4.8%	13.7%	6.5%	4.8%	9.2%	6.0%	7.6%
Do not know / NR	129	188	213	164	258	257	153	184
	10.8%	15.7%	17.8%	13.7%	21.6%	21.5%	12.8%	15.3%
Agree	938	894	602	794	786	672	871	848
	78.4%	74.6%	50.2%	66.3%	65.6%	56.1%	72.7%	70.7%
Disgree	130	116	385	240	154	269	174	167
	10.9%	9.7%	32.1%	20.0%	12.9%	22.5%	14.5%	13.9%

Croatia

	Vaccines are important for children to have	The MMR vaccine is important for children to have	The seasonal influenza vaccine is important	Vaccines are safe	The MMR vaccine is safe	The seasonal influenza vaccine is safe	Vaccines are effective	Vaccines are compatible with my religious beliefs
base	1000	1000	1000	1000	1000	1000	1000	1000
Strongly agree	690	728	240	392	566	261	538	561
	69.0%	72.8%	24.0%	39.2%	56.6%	26.1%	53.8%	56.1%
Tend to agree	200	187	358	393	303	370	321	152
	20.0%	18.7%	35.8%	39.3%	30.3%	37.0%	32.1%	15.2%
Tend to disagree	40	30	160	103	55	144	60	33
	4.0%	3.0%	16.0%	10.3%	5.5%	14.4%	6.0%	3.3%
Strongly disagree	46	27	202	84	33	172	56	119
	4.6%	2.7%	20.2%	8.4%	3.3%	17.2%	5.6%	11.9%
Do not know / NR	24	28	40	28	43	53	25	135
	2.4%	2.8%	4.0%	2.8%	4.3%	5.3%	2.5%	13.5%
Agree	890	915	598	785	869	631	859	713
	89.0%	91.5%	59.8%	78.5%	86.9%	63.1%	85.9%	71.3%
Disgree	86	57	362	187	88	316	116	152
	8.6%	5.7%	36.2%	18.7%	8.8%	31.6%	11.6%	15.2%

Republic of Cyprus

	Vaccines are important for children to have	The MMR vaccine is important for children to have	The seasonal influenza vaccine is important	Vaccines are safe	The MMR vaccine is safe	The seasonal influenza vaccine is safe	Vaccines are effective	Vaccines are compatible with my religious beliefs
base	1011	1010	1010	1009	1010	1009	1009	1011
Strongly agree	776	731	349	489	577	344	584	674
	76.8%	72.4%	34.6%	48.4%	57.1%	34.1%	57.9%	66.8%
Tend to agree	167	141	263	318	233	283	285	129
	16.5%	14.0%	26.1%	31.5%	23.1%	28.0%	28.2%	12.8%
Tend to disagree	22	22	135	52	29	95	47	36
	2.2%	2.2%	13.4%	5.1%	2.9%	9.4%	4.6%	3.6%
Strongly disagree	36	52	188	103	57	148	63	86
	3.6%	5.1%	18.6%	10.2%	5.6%	14.7%	6.2%	8.5%
Do not know / NR	10	64	75	47	114	139	30	86
	1.0%	6.3%	7.4%	4.7%	11.3%	13.8%	3.0%	8.5%
Agree	943	872	612	807	810	627	869	803
	93.3%	86.3%	60.6%	80.0%	80.2%	62.1%	86.1%	79.4%
Disgree	58	74	323	155	86	243	110	122
	5.7%	7.3%	32.0%	15.4%	8.5%	24.1%	10.9%	12.1%

Czech Republic

	Vaccines are important for children to have	The MMR vaccine is important for children to have	The seasonal influenza vaccine is important	Vaccines are safe	The MMR vaccine is safe	The seasonal influenza vaccine is safe	Vaccines are effective	Vaccines are compatible with my religious beliefs
base	1048	1049	1047	1048	1048	1049	1048	1047
Strongly agree	642	500	168	289	332	214	384	604
	61.3%	47.7%	16.0%	27.6%	31.7%	20.4%	36.6%	57.6%
Tend to agree	332	349	349	535	466	437	531	223
	31.6%	33.3%	33.3%	51.0%	44.4%	41.7%	50.7%	21.3%
Tend to disagree	34	48	328	123	68	217	73	63
	3.2%	4.6%	31.3%	11.7%	6.5%	20.7%	7.0%	6.0%
Strongly disagree	14	33	112	32	36	61	14	81
	1.3%	3.1%	10.7%	3.1%	3.4%	5.8%	1.3%	7.7%
Do not know / NR	26	119	90	69	146	120	46	76
	2.5%	11.3%	8.6%	6.6%	13.9%	11.4%	4.4%	7.3%
Agree	974	849	517	824	798	651	915	827
	92.9%	80.9%	49.4%	78.6%	76.1%	62.1%	87.3%	79.0%
Disgree	48	81	440	155	104	278	87	144
	4.6%	7.7%	42.0%	14.8%	9.9%	26.5%	8.3%	13.8%

Denmark

	Vaccines are important for children to have	The MMR vaccine is important for children to have	The seasonal influenza vaccine is important	Vaccines are safe	The MMR vaccine is safe	The seasonal influenza vaccine is safe	Vaccines are effective	Vaccines are compatible with my religious beliefs
base	1019	1020	1020	1020	1021	1020	1019	1019
Strongly agree	810	705	179	672	621	391	647	711
	79.5%	69.1%	17.5%	65.9%	60.8%	38.3%	63.5%	69.7%
Tend to agree	165	178	256	287	238	351	317	82
	16.2%	17.5%	25.1%	28.2%	23.3%	34.4%	31.1%	8.0%
Tend to disagree	11	20	255	27	19	82	24	15
	1.1%	2.0%	25.0%	2.6%	1.9%	8.0%	2.4%	1.5%
Strongly disagree	9	16	153	13	13	26	8	65
	0.9%	1.6%	15.0%	1.3%	1.3%	2.5%	0.8%	6.4%
Do not know / NR	24	101	177	21	130	170	23	146
	2.4%	9.9%	17.4%	2.1%	12.8%	16.7%	2.3%	14.3%
Agree	975	883	435	959	859	742	964	793
	95.7%	86.6%	42.6%	94.0%	84.1%	72.7%	94.6%	77.8%
Disgree	20	36	408	40	32	108	32	80
	2.0%	3.5%	40.0%	3.9%	3.1%	10.6%	3.1%	7.9%

Estonia

	Vaccines are important for children to have	The MMR vaccine is important for children to have	The seasonal influenza vaccine is important	Vaccines are safe	The MMR vaccine is safe	The seasonal influenza vaccine is safe	Vaccines are effective	Vaccines are compatible with my religious beliefs
base	1017	1016	1017	1017	1017	1017	1017	1016
Strongly agree	589	505	202	277	303	244	324	448
	57.9%	49.7%	19.9%	27.3%	29.8%	24.0%	31.9%	44.1%
Tend to agree	320	368	466	548	484	517	559	272
	31.5%	36.2%	45.8%	53.9%	47.6%	50.8%	55.0%	26.7%
Tend to disagree	40	42	192	96	65	100	56	50
	3.9%	4.1%	18.9%	9.4%	6.4%	9.8%	5.5%	4.9%
Strongly disagree	21	20	68	38	26	40	23	79
	2.1%	2.0%	6.7%	3.7%	2.6%	3.9%	2.3%	7.8%
Do not know / NR	47	81	89	58	139	116	55	167
	4.6%	8.0%	8.8%	5.7%	13.7%	11.4%	5.4%	16.4%
Agree	909	873	668	825	787	761	883	720
	89.4%	85.9%	65.7%	81.1%	77.4%	74.8%	86.8%	70.9%
Disgree	61	62	260	134	91	140	79	129
	6.0%	6.1%	25.6%	13.2%	8.9%	13.8%	7.8%	12.7%

Finland

	Vaccines are important for children to have	The MMR vaccine is important for children to have	The seasonal influenza vaccine is important	Vaccines are safe	The MMR vaccine is safe	The seasonal influenza vaccine is safe	Vaccines are effective	Vaccines are compatible with my religious beliefs
base	971	971	970	970	970	970	970	971
Strongly agree	824	765	331	574	652	423	597	841
	84.9%	78.9%	34.1%	59.1%	67.2%	43.6%	61.5%	86.7%
Tend to agree	124	138	378	289	222	345	287	52
	12.8%	14.2%	39.0%	29.8%	22.9%	35.6%	29.6%	5.4%
Tend to disagree	13	22	169	90	34	132	65	14
	1.3%	2.3%	17.4%	9.3%	3.5%	13.6%	6.7%	1.4%
Strongly disagree	5	10	80	13	7	34	7	44
	0.5%	1.0%	8.2%	1.3%	0.7%	3.5%	0.7%	4.5%
Do not know / NR	5	36	12	4	55	36	14	20
	0.5%	3.7%	1.2%	0.4%	5.7%	3.7%	1.4%	2.1%
Agree	948	903	709	863	874	768	884	893
	97.6%	93.0%	73.1%	89.0%	90.1%	79.2%	91.1%	92.0%
Disgree	18	32	249	103	41	166	72	58
	1.9%	3.3%	25.7%	10.6%	4.2%	17.1%	7.4%	6.0%

France

	Vaccines are important for children to have	The MMR vaccine is important for children to have	The seasonal influenza vaccine is important	Vaccines are safe	The MMR vaccine is safe	The seasonal influenza vaccine is safe	Vaccines are effective	Vaccines are compatible with my religious beliefs
base	999	1000	1001	1000	999	1000	1000	1001
Strongly agree	414	364	170	213	321	152	299	489
	41.4%	36.4%	17.0%	21.3%	32.1%	15.2%	29.9%	48.9%
Tend to agree	443	433	354	486	452	366	529	285
	44.3%	43.3%	35.4%	48.6%	45.2%	36.6%	52.8%	28.5%
Tend to disagree	73	64	238	173	52	253	85	46
	7.3%	6.4%	23.8%	17.3%	5.2%	25.3%	8.5%	4.6%
Strongly disagree	31	28	123	64	25	113	40	74
	3.1%	2.8%	12.3%	6.4%	2.5%	11.3%	4.0%	7.4%
Do not know / NR	38	111	116	64	149	116	47	107
	3.8%	11.1%	11.6%	6.4%	14.9%	11.6%	4.7%	10.7%
Agree	857	797	524	699	773	518	828	774
	85.8%	79.7%	52.3%	69.9%	77.4%	51.8%	82.8%	77.3%
Disgree	104	92	361	237	77	366	125	120
	10.4%	9.2%	36.1%	23.7%	7.7%	36.6%	12.5%	12.0%

Germany

	Vaccines are important for children to have	The MMR vaccine is important for children to have	The seasonal influenza vaccine is important	Vaccines are safe	The MMR vaccine is safe	The seasonal influenza vaccine is safe	Vaccines are effective	Vaccines are compatible with my religious beliefs
base	949	951	951	950	950	950	951	950
Strongly agree	663	647	273	389	496	237	463	602
	69.9%	68.1%	28.7%	40.9%	52.2%	24.9%	48.7%	63.4%
Tend to agree	212	207	307	406	325	382	398	150
	22.3%	21.8%	32.3%	42.8%	34.2%	40.2%	41.9%	15.8%
Tend to disagree	40	45	239	91	55	188	53	41
	4.2%	4.7%	25.2%	9.6%	5.8%	19.8%	5.6%	4.3%
Strongly disagree	19	23	94	34	31	84	17	64
	2.0%	2.4%	9.9%	3.6%	3.3%	8.8%	1.8%	6.7%
Do not know / NR	15	29	38	30	43	59	20	93
	1.6%	3.0%	4.0%	3.2%	4.5%	6.2%	2.1%	9.8%
Agree	875	854	580	795	821	619	861	752
	92.2%	89.8%	61.0%	83.7%	86.4%	65.2%	90.5%	79.2%
Disgree	59	68	333	125	86	272	70	105
	6.2%	7.2%	35.0%	13.2%	9.1%	28.6%	7.4%	11.1%

Greece

	Vaccines are important for children to have	The MMR vaccine is important for children to have	The seasonal influenza vaccine is important	Vaccines are safe	The MMR vaccine is safe	The seasonal influenza vaccine is safe	Vaccines are effective	Vaccines are compatible with my religious beliefs
base	999	1000	1000	1000	1000	1000	1000	1000
Strongly agree	664	513	336	424	437	341	506	589
	66.5%	51.3%	33.6%	42.4%	43.7%	34.1%	50.6%	58.9%
Tend to agree	264	339	428	420	378	447	388	233
	26.4%	33.9%	42.8%	42.0%	37.8%	44.7%	38.8%	23.3%
Tend to disagree	46	49	149	83	64	121	75	36
	4.6%	4.9%	14.9%	8.3%	6.4%	12.1%	7.5%	3.6%
Strongly disagree	11	14	55	42	14	46	14	37
	1.1%	1.4%	5.5%	4.2%	1.4%	4.6%	1.4%	3.7%
Do not know / NR	14	85	32	31	107	45	17	105
	1.4%	8.5%	3.2%	3.1%	10.7%	4.5%	1.7%	10.5%
Agree	928	852	764	844	815	788	894	822
	92.9%	85.2%	76.4%	84.4%	81.5%	78.8%	89.4%	82.2%
Disgree	57	63	204	125	78	167	89	73
	5.7%	6.3%	20.4%	12.5%	7.8%	16.7%	8.9%	7.3%

Hungary

	Vaccines are important for children to have	The MMR vaccine is important for children to have	The seasonal influenza vaccine is important	Vaccines are safe	The MMR vaccine is safe	The seasonal influenza vaccine is safe	Vaccines are effective	Vaccines are compatible with my religious beliefs
base	1003	1003	1004	1004	1003	1003	1003	1002
Strongly agree	747	664	321	574	617	335	556	571
	74.5%	66.2%	32.0%	57.3%	61.5%	33.4%	55.4%	56.9%
Tend to agree	208	267	301	343	289	330	352	198
	20.7%	26.6%	30.0%	34.2%	28.8%	32.9%	35.1%	19.7%
Tend to disagree	21	29	205	39	25	163	47	47
	2.1%	2.9%	20.4%	3.9%	2.5%	16.2%	4.7%	4.7%
Strongly disagree	9	8	118	16	15	97	12	87
	0.9%	0.8%	11.8%	1.6%	1.5%	9.7%	1.2%	8.7%
Do not know / NR	18	35	59	32	57	78	36	99
	1.8%	3.5%	5.9%	3.2%	5.7%	7.8%	3.6%	9.9%
Agree	955	931	622	917	906	665	908	769
	95.2%	92.8%	62.0%	91.3%	90.3%	66.3%	90.5%	76.7%
Disgree	30	37	323	55	40	260	59	134
	3.0%	3.7%	32.2%	5.5%	4.0%	25.9%	5.9%	13.4%

Ireland

	Vaccines are important for children to have	The MMR vaccine is important for children to have	The seasonal influenza vaccine is important	Vaccines are safe	The MMR vaccine is safe	The seasonal influenza vaccine is safe	Vaccines are effective	Vaccines are compatible with my religious beliefs
base	1014	1014	1014	1014	1014	1013	1013	1014
Strongly agree	592	542	390	438	449	403	447	448
	58.4%	53.5%	38.5%	43.2%	44.3%	39.7%	44.1%	44.2%
Tend to agree	325	331	368	423	385	383	453	263
	32.1%	32.7%	36.3%	41.7%	38.0%	37.8%	44.7%	25.9%
Tend to disagree	23	33	124	54	41	94	41	17
	2.3%	3.3%	12.2%	5.3%	4.0%	9.3%	4.0%	1.7%
Strongly disagree	24	21	45	32	30	41	16	36
	2.4%	2.1%	4.4%	3.2%	3.0%	4.0%	1.6%	3.6%
Do not know / NR	50	87	87	67	109	92	56	250
	4.9%	8.6%	8.6%	6.6%	10.7%	9.1%	5.5%	24.7%
Agree	917	873	758	861	834	786	900	711
	90.4%	86.1%	74.8%	84.9%	82.2%	77.6%	88.8%	70.1%
Disgree	47	54	169	86	71	135	57	53
	4.6%	5.3%	16.7%	8.5%	7.0%	13.3%	5.6%	5.2%

Italy

	Vaccines are important for children to have	The MMR vaccine is important for children to have	The seasonal influenza vaccine is important	Vaccines are safe	The MMR vaccine is safe	The seasonal influenza vaccine is safe	Vaccines are effective	Vaccines are compatible with my religious beliefs
base	1000	1001	1000	999	1000	1000	1000	999
Strongly agree	663	482	303	438	444	318	521	624
	66.3%	48.2%	30.3%	43.8%	44.4%	31.8%	52.1%	62.5%
Tend to agree	253	324	372	415	362	411	379	183
	25.3%	32.4%	37.2%	41.5%	36.2%	41.1%	37.9%	18.3%
Tend to disagree	48	50	180	75	43	127	54	39
	4.8%	5.0%	18.0%	7.5%	4.3%	12.7%	5.4%	3.9%
Strongly disagree	15	26	76	30	18	58	19	46
	1.5%	2.6%	7.6%	3.0%	1.8%	5.8%	1.9%	4.6%
Do not know / NR	21	119	69	41	133	86	27	107
	2.1%	11.9%	6.9%	4.1%	13.3%	8.6%	2.7%	10.7%
Agree	916	806	675	853	806	729	900	807
	91.6%	80.5%	67.5%	85.4%	80.6%	72.9%	90.0%	80.8%
Disgree	63	76	256	105	61	185	73	85
	6.3%	7.6%	25.6%	10.5%	6.1%	18.5%	7.3%	8.5%

Latvia

	Vaccines are important for children to have	The MMR vaccine is important for children to have	The seasonal influenza vaccine is important	Vaccines are safe	The MMR vaccine is safe	The seasonal influenza vaccine is safe	Vaccines are effective	Vaccines are compatible with my religious beliefs
base	1015	1015	1014	1015	1015	1015	1016	1014
Strongly agree	428	306	186	235	253	165	241	511
	42.2%	30.1%	18.3%	23.2%	24.9%	16.3%	23.7%	50.3%
Tend to agree	442	452	362	457	441	395	479	320
	43.5%	44.5%	35.7%	45.0%	43.4%	39.0%	47.2%	31.5%
Tend to disagree	52	68	192	147	71	179	134	52
	5.1%	6.7%	18.9%	14.5%	7.0%	17.6%	13.2%	5.1%
Strongly disagree	18	22	106	35	25	72	27	53
	1.8%	2.2%	10.4%	3.5%	2.5%	7.1%	2.7%	5.2%
Do not know / NR	75	167	168	141	225	204	135	78
	7.4%	16.5%	16.5%	13.9%	22.2%	20.1%	13.3%	7.7%
Agree	870	758	548	692	694	560	720	831
	85.7%	74.7%	54.0%	68.2%	68.4%	55.2%	70.9%	82.0%
Disgree	70	90	298	182	96	251	161	105
	6.9%	8.9%	29.4%	17.9%	9.5%	24.7%	15.8%	10.4%

Lithuania

	Vaccines are important for children to have	The MMR vaccine is important for children to have	The seasonal influenza vaccine is important	Vaccines are safe	The MMR vaccine is safe	The seasonal influenza vaccine is safe	Vaccines are effective	Vaccines are compatible with my religious beliefs
base	1015	1017	1016	1016	1017	1015	1015	1017
Strongly agree	549	485	161	354	346	187	322	732
	54.1%	47.8%	15.8%	34.8%	34.0%	18.4%	31.7%	72.0%
Tend to agree	336	392	349	471	449	430	506	207
	33.0%	38.6%	34.4%	46.4%	44.2%	42.3%	49.8%	20.4%
Tend to disagree	50	54	272	94	65	198	101	19
	4.9%	5.3%	26.7%	9.2%	6.4%	19.5%	10.0%	1.9%
Strongly disagree	21	21	134	28	27	72	24	20
	2.1%	2.1%	13.2%	2.8%	2.7%	7.1%	2.4%	2.0%
Do not know / NR	59	65	100	69	130	128	62	39
	5.8%	6.4%	9.9%	6.8%	12.8%	12.6%	6.1%	3.8%
Agree	885	877	510	825	795	617	828	939
	87.2%	86.2%	50.2%	81.2%	78.2%	60.8%	81.6%	92.3%
Disgree	71	75	406	122	92	270	125	39
	7.0%	7.4%	40.0%	12.0%	9.0%	26.6%	12.3%	3.8%

Luxembourg

	Vaccines are important for children to have	The MMR vaccine is important for children to have	The seasonal influenza vaccine is important	Vaccines are safe	The MMR vaccine is safe	The seasonal influenza vaccine is safe	Vaccines are effective	Vaccines are compatible with my religious beliefs
base	530	530	530	531	529	530	531	530
Strongly agree	322	307	97	181	220	81	229	328
	60.8%	57.9%	18.3%	34.2%	41.6%	15.3%	43.1%	61.8%
Tend to agree	172	161	179	281	240	237	249	100
	32.5%	30.3%	33.7%	53.0%	45.3%	44.7%	47.0%	18.9%
Tend to disagree	21	27	169	36	27	110	37	17
	4.0%	5.1%	31.9%	6.8%	5.1%	20.7%	7.0%	3.2%
Strongly disagree	8	11	60	20	15	57	10	32
	1.5%	2.1%	11.3%	3.8%	2.8%	10.8%	1.9%	6.0%
Do not know / NR	7	24	25	13	27	45	6	53
	1.3%	4.5%	4.7%	2.4%	5.1%	8.5%	1.1%	10.0%
Agree	494	468	276	462	460	318	478	428
	93.2%	88.3%	52.1%	87.0%	87.0%	60.0%	90.0%	80.8%
Disgree	29	38	229	56	42	167	47	49
	5.5%	7.2%	43.2%	10.5%	7.9%	31.5%	8.9%	9.2%

Malta

	Vaccines are important for children to have	The MMR vaccine is important for children to have	The seasonal influenza vaccine is important	Vaccines are safe	The MMR vaccine is safe	The seasonal influenza vaccine is safe	Vaccines are effective	Vaccines are compatible with my religious beliefs
base	500	500	500	499	500	499	501	500
Strongly agree	257	173	107	119	124	77	124	139
	51.4%	34.7%	21.4%	23.8%	24.8%	15.4%	24.8%	27.9%
Tend to agree	187	252	215	255	255	225	292	212
	37.4%	50.3%	43.1%	51.0%	51.1%	45.0%	58.4%	42.4%
Tend to disagree	25	28	119	74	44	127	47	50
	5.0%	5.6%	23.8%	14.8%	8.8%	25.5%	9.4%	10.0%
Strongly disagree	9	6	28	15	10	38	10	30
	1.8%	1.2%	5.6%	3.0%	2.0%	7.6%	2.0%	6.0%
Do not know / NR	22	41	31	36	67	32	28	69
	4.4%	8.2%	6.2%	7.2%	13.4%	6.4%	5.6%	13.8%
Agree	444	425	322	374	379	302	416	351
	88.8%	85.0%	64.4%	74.9%	75.8%	60.5%	83.0%	70.2%
Disgree	34	34	147	89	54	165	57	80
	6.8%	6.8%	29.4%	17.8%	10.8%	33.1%	11.4%	16.0%

Netherlands

	Vaccines are important for children to have	The MMR vaccine is important for children to have	The seasonal influenza vaccine is important	Vaccines are safe	The MMR vaccine is safe	The seasonal influenza vaccine is safe	Vaccines are effective	Vaccines are compatible with my religious beliefs
base	1034	1035	1034	1034	1034	1034	1034	1034
Strongly agree	652	543	277	474	457	353	511	501
	63.1%	52.5%	26.8%	45.8%	44.2%	34.1%	49.4%	48.5%
Tend to agree	282	332	366	434	411	435	412	195
	27.2%	32.1%	35.4%	42.0%	39.7%	42.1%	39.8%	18.9%
Tend to disagree	47	43	230	57	54	118	54	56
	4.5%	4.2%	22.2%	5.5%	5.2%	11.4%	5.2%	5.4%
Strongly disagree	12	22	69	18	15	29	17	134
	1.2%	2.1%	6.7%	1.7%	1.5%	2.8%	1.6%	13.0%
Do not know / NR	41	95	92	51	97	99	40	148
	4.0%	9.2%	8.9%	4.9%	9.4%	9.6%	3.9%	14.3%
Agree	934	875	643	908	868	788	923	696
	90.3%	84.5%	62.2%	87.8%	83.9%	76.2%	89.3%	67.3%
Disgree	59	65	299	75	69	147	71	190
	5.7%	6.3%	28.9%	7.3%	6.7%	14.2%	6.9%	18.4%

Poland

	Vaccines are important for children to have	The MMR vaccine is important for children to have	The seasonal influenza vaccine is important	Vaccines are safe	The MMR vaccine is safe	The seasonal influenza vaccine is safe	Vaccines are effective	Vaccines are compatible with my religious beliefs
base	1023	1023	1021	1021	1021	1022	1022	1022
Strongly agree	435	446	233	333	357	238	376	305
	42.5%	43.6%	22.8%	32.6%	35.0%	23.3%	36.8%	29.9%
Tend to agree	341	331	377	406	388	375	390	301
	33.3%	32.4%	36.9%	39.7%	38.0%	36.7%	38.2%	29.5%
Tend to disagree	94	93	187	116	99	171	101	114
	9.2%	9.1%	18.3%	11.3%	9.7%	16.7%	9.9%	11.2%
Strongly disagree	47	47	70	54	46	68	50	80
	4.6%	4.6%	6.8%	5.3%	4.5%	6.7%	4.9%	7.8%
Do not know / NR	106	106	154	112	131	170	105	222
	10.4%	10.4%	15.1%	11.0%	12.8%	16.6%	10.3%	21.7%
Agree	776	777	610	739	745	613	766	606
	75.9%	76.0%	59.7%	72.4%	73.0%	60.0%	75.0%	59.3%
Disgree	141	140	257	170	145	239	151	194
	13.8%	13.7%	25.2%	16.7%	14.2%	23.4%	14.8%	19.0%

Portugal

	Vaccines are important for children to have	The MMR vaccine is important for children to have	The seasonal influenza vaccine is important	Vaccines are safe	The MMR vaccine is safe	The seasonal influenza vaccine is safe	Vaccines are effective	Vaccines are compatible with my religious beliefs
base	1000	1001	1000	1001	1002	1001	1001	999
Strongly agree	673	595	309	514	478	306	539	603
	67.3%	59.4%	30.9%	51.5%	47.7%	30.6%	53.8%	60.2%
Tend to agree	307	378	470	438	481	486	427	286
	30.7%	37.8%	47.0%	43.8%	48.1%	48.6%	42.7%	28.5%
Tend to disagree	5	7	131	18	5	132	13	36
	0.5%	0.7%	13.1%	1.8%	0.5%	13.2%	1.3%	3.6%
Strongly disagree	5	2	20	6	2	14	7	25
	0.5%	0.2%	2.0%	0.6%	0.2%	1.4%	0.7%	2.5%
Do not know / NR	10	19	70	25	36	63	15	49
	1.0%	1.9%	7.0%	2.5%	3.6%	6.3%	1.5%	4.9%
Agree	980	973	779	952	959	792	966	889
	98.0%	97.2%	77.9%	95.1%	95.7%	79.1%	96.5%	89.0%
Disgree	10	9	151	24	7	146	20	61
	1.0%	0.9%	15.1%	2.4%	0.7%	14.6%	2.0%	6.1%

Romania

	Vaccines are important for children to have	The MMR vaccine is important for children to have	The seasonal influenza vaccine is important	Vaccines are safe	The MMR vaccine is safe	The seasonal influenza vaccine is safe	Vaccines are effective	Vaccines are compatible with my religious beliefs
base	1224	1224	1223	1223	1224	1223	1222	1224
Strongly agree	793	796	700	674	738	651	728	704
	64.8%	65.1%	57.2%	55.1%	60.3%	53.2%	59.6%	57.6%
Tend to agree	285	271	290	331	308	306	314	211
	23.3%	22.2%	23.7%	27.0%	25.2%	25.0%	25.7%	17.2%
Tend to disagree	61	51	96	98	65	115	81	57
	5.0%	4.2%	7.8%	8.0%	5.3%	9.4%	6.6%	4.7%
Strongly disagree	47	55	79	70	53	87	55	175
	3.8%	4.5%	6.5%	5.7%	4.3%	7.1%	4.5%	14.3%
Do not know / NR	38	51	58	50	60	64	44	77
	3.1%	4.2%	4.7%	4.1%	4.9%	5.2%	3.6%	6.3%
Agree	1078	1067	990	1005	1046	957	1042	915
	88.1%	87.2%	80.9%	82.2%	85.5%	78.3%	85.3%	74.8%
Disgree	108	106	175	168	118	202	136	232
	8.8%	8.7%	14.3%	13.7%	9.6%	16.5%	11.1%	19.0%

Slovakia

	Vaccines are important for children to have	The MMR vaccine is important for children to have	The seasonal influenza vaccine is important	Vaccines are safe	The MMR vaccine is safe	The seasonal influenza vaccine is safe	Vaccines are effective	Vaccines are compatible with my religious beliefs
base	1046	1047	1046	1048	1046	1047	1046	1047
Strongly agree	515	408	172	265	289	189	320	493
	49.2%	39.0%	16.4%	25.3%	27.6%	18.1%	30.6%	47.0%
Tend to agree	380	387	356	518	449	449	519	279
	36.3%	37.0%	34.0%	49.5%	42.9%	42.9%	49.6%	26.7%
Tend to disagree	81	97	319	139	115	206	105	80
	7.7%	9.3%	30.5%	13.3%	11.0%	19.7%	10.0%	7.6%
Strongly disagree	34	44	127	59	42	103	53	111
	3.2%	4.2%	12.1%	5.6%	4.0%	9.8%	5.1%	10.6%
Do not know / NR	36	111	72	67	151	100	49	84
	3.4%	10.6%	6.9%	6.4%	14.4%	9.6%	4.7%	8.0%
Agree	895	795	528	783	738	638	839	772
	85.6%	75.9%	50.5%	74.7%	70.6%	60.9%	80.2%	73.7%
Disgree	115	141	446	198	157	309	158	191
	11.0%	13.5%	42.6%	18.9%	15.0%	29.5%	15.1%	18.2%

Slovenia

	Vaccines are important for children to have	The MMR vaccine is important for children to have	The seasonal influenza vaccine is important	Vaccines are safe	The MMR vaccine is safe	The seasonal influenza vaccine is safe	Vaccines are effective	Vaccines are compatible with my religious beliefs
base	1053	1053	1053	1053	1054	1054	1054	1053
Strongly agree	490	421	159	308	311	188	364	420
	46.5%	39.9%	15.1%	29.2%	29.5%	17.9%	34.5%	39.9%
Tend to agree	437	424	440	545	499	533	551	387
	41.5%	40.2%	41.8%	51.8%	47.3%	50.6%	52.3%	36.7%
Tend to disagree	52	67	259	94	85	160	65	44
	4.9%	6.4%	24.6%	8.9%	8.1%	15.2%	6.2%	4.2%
Strongly disagree	43	45	127	62	45	87	43	96
	4.1%	4.3%	12.0%	5.9%	4.3%	8.3%	4.1%	9.1%
Do not know / NR	31	96	68	44	114	86	31	106
	2.9%	9.1%	6.5%	4.2%	10.8%	8.2%	2.9%	10.1%
Agree	927	845	599	853	810	721	915	807
	88.0%	80.2%	56.9%	81.0%	76.9%	68.4%	86.8%	76.6%
Disgree	95	112	386	156	130	247	108	140
	9.0%	10.6%	36.7%	14.8%	12.3%	23.4%	10.2%	13.3%

Spain

	Vaccines are important for children to have	The MMR vaccine is important for children to have	The seasonal influenza vaccine is important	Vaccines are safe	The MMR vaccine is safe	The seasonal influenza vaccine is safe	Vaccines are effective	Vaccines are compatible with my religious beliefs
base	1005	1005	1005	1004	1005	1005	1005	1005
Strongly agree	823	705	459	642	646	439	703	848
	81.9%	70.1%	45.7%	63.9%	64.3%	43.7%	70.0%	84.5%
Tend to agree	143	188	319	279	239	361	241	64
	14.2%	18.7%	31.8%	27.8%	23.8%	35.9%	24.0%	6.4%
Tend to disagree	26	37	134	61	29	117	36	25
	2.6%	3.7%	13.3%	6.1%	2.9%	11.7%	3.6%	2.5%
Strongly disagree	2	5	43	6	3	35	8	29
	0.2%	0.5%	4.3%	0.6%	0.3%	3.5%	0.8%	2.9%
Do not know / NR	11	70	50	16	88	53	17	39
	1.1%	7.0%	5.0%	1.6%	8.8%	5.3%	1.7%	3.9%
Agree	966	893	778	921	885	800	944	912
	96.1%	88.9%	77.4%	91.7%	88.1%	79.6%	93.9%	90.7%
Disgree	28	42	177	67	32	152	44	54
	2.8%	4.2%	17.6%	6.7%	3.2%	15.1%	4.4%	5.4%

Sweden

	Vaccines are important for children to have	The MMR vaccine is important for children to have	The seasonal influenza vaccine is important	Vaccines are safe	The MMR vaccine is safe	The seasonal influenza vaccine is safe	Vaccines are effective	Vaccines are compatible with my religious beliefs
base	1030	1032	1031	1031	1031	1030	1032	1032
Strongly agree	667	352	304	436	292	294	511	601
	64.8%	34.2%	29.5%	42.2%	28.3%	28.5%	49.5%	58.3%
Tend to agree	243	237	348	427	291	394	390	150
	23.5%	23.0%	33.8%	41.5%	28.3%	38.2%	37.8%	14.5%
Tend to disagree	48	64	131	81	55	94	55	36
	4.7%	6.2%	12.7%	7.8%	5.3%	9.1%	5.3%	3.5%
Strongly disagree	20	37	86	31	33	66	27	85
	1.9%	3.6%	8.3%	3.0%	3.2%	6.4%	2.6%	8.2%
Do not know / NR	52	342	162	56	360	182	49	160
	5.0%	33.1%	15.7%	5.4%	35.0%	17.7%	4.8%	15.5%
Agree	910	589	652	863	583	688	901	751
	88.3%	57.1%	63.2%	83.7%	56.5%	66.8%	87.3%	72.8%
Disgree	68	101	217	112	88	160	82	121
	6.6%	9.8%	21.0%	10.9%	8.5%	15.5%	7.9%	11.7%

UK

	Vaccines are important for children to have	The MMR vaccine is important for children to have	The seasonal influenza vaccine is important	Vaccines are safe	The MMR vaccine is safe	The seasonal influenza vaccine is safe	Vaccines are effective	Vaccines are compatible with my religious beliefs
base	2074	2074	2075	2074	2073	2074	2074	2074
Strongly agree	1316	1060	843	974	887	911	951	1184
	63.5%	51.1%	40.6%	47.0%	42.8%	43.9%	45.9%	57.1%
Tend to agree	607	737	831	891	883	861	957	508
	29.3%	35.5%	40.1%	43.0%	42.6%	41.5%	46.1%	24.5%
Tend to disagree	52	66	166	73	71	82	69	63
	2.5%	3.2%	8.0%	3.5%	3.4%	4.0%	3.3%	3.0%
Strongly disagree	26	29	58	31	39	42	17	63
	1.3%	1.4%	2.8%	1.5%	1.9%	2.0%	0.8%	3.0%
Do not know / NR	73	182	177	105	193	178	80	256
	3.5%	8.8%	8.5%	5.1%	9.3%	8.6%	3.9%	12.3%
Agree	1923	1797	1674	1865	1770	1772	1908	1692
	92.7%	86.6%	80.7%	89.9%	85.4%	85.4%	92.0%	81.6%
Disgree	78	95	224	104	110	124	86	126
	3.8%	4.6%	10.8%	5.0%	5.3%	6.0%	4.1%	6.1%

C.2 GP surveys

Czech Republic

	Vaccines are important for children to have	The MMR vaccine is important for children to have	The seasonal influenza vaccine is important	Vaccines are safe	The MMR vaccine is safe	The seasonal influenza vaccine is safe	Vaccines are effective	Vaccines are compatible with my religious beliefs	...recommend the MMR vaccine?	...recommend the seasonal influenza vaccine?	...recommend the seasonal influenza vaccine to pregnant women?
base	107	107	107	107	107	107	107	107	107	107	107
Strongly agree	93	60	78	72	37	83	84	84	18	81	8
	86.9%	56.1%	72.9%	67.3%	34.6%	77.6%	78.5%	78.5%	16.8%	75.7%	7.5%
Tend to agree	10	16	22	32	31	22	22	16	21	21	19
	9.3%	15.0%	20.6%	29.9%	29.0%	20.6%	20.6%	15.0%	19.6%	19.6%	17.8%
Tend to disagree	1	2	6	3	2	1	1	2	16	4	40
	0.9%	1.9%	5.6%	2.8%	1.9%	0.9%	0.9%	1.9%	15.0%	3.7%	37.4%
Strongly disagree	0	0	1	0	0	1	0	1	7	1	37
	0.0%	0.0%	0.9%	0.0%	0.0%	0.9%	0.0%	0.9%	6.5%	0.9%	34.6%
Do not know / NR	3	29	0	0	37	0	0	4	45	0	3
	2.8%	27.1%	0.0%	0.0%	34.6%	0.0%	0.0%	3.7%	42.1%	0.0%	2.8%
Agree	103	76	100	104	68	105	106	100	39	102	27
	96.3%	71.0%	93.5%	97.2%	63.6%	98.1%	99.1%	93.5%	36.4%	95.3%	25.2%
Disgree	1	2	7	3	2	2	1	3	23	5	77
	0.9%	1.9%	6.5%	2.8%	1.9%	1.9%	0.9%	2.8%	21.5%	4.7%	72.0%

France

	Vaccines are important for children to have	The MMR vaccine is important for children to have	The seasonal influenza vaccine is important	Vaccines are safe	The MMR vaccine is safe	The seasonal influenza vaccine is safe	Vaccines are effective	Vaccines are compatible with my religious beliefs	...recommend the MMR vaccine?	...recommend the seasonal influenza vaccine?	...recommend the seasonal influenza vaccine to pregnant women?
base	100	100	100	100	100	100	100	100	100	100	100
Strongly agree	93	96	70	81	88	80	86	83	93	79	49
	93.0%	96.0%	70.0%	81.0%	88.0%	80.0%	86.0%	83.0%	93.0%	79.0%	49.0%
Tend to agree	6	3	28	17	10	17	12	5	5	20	34
	6.0%	3.0%	28.0%	17.0%	10.0%	17.0%	12.0%	5.0%	5.0%	20.0%	34.0%
Tend to disagree	0	0	2	1	1	3	1	0	1	1	14
	0.0%	0.0%	2.0%	1.0%	1.0%	3.0%	1.0%	0.0%	1.0%	1.0%	14.0%
Strongly disagree	1	1	0	1	0	0	1	3	0	0	3
	1.0%	1.0%	0.0%	1.0%	0.0%	0.0%	1.0%	3.0%	0.0%	0.0%	3.0%
Do not know / NR	0	0	0	0	1	0	0	9	1	0	0
	0.0%	0.0%	0.0%	0.0%	1.0%	0.0%	0.0%	9.0%	1.0%	0.0%	0.0%
Agree	99	99	98	98	98	97	98	88	98	99	83
	99.0%	99.0%	98.0%	98.0%	98.0%	97.0%	98.0%	88.0%	98.0%	99.0%	83.0%
Disgree	1	1	2	2	1	3	2	3	1	1	17
	1.0%	1.0%	2.0%	2.0%	1.0%	3.0%	2.0%	3.0%	1.0%	1.0%	17.0%

Germany

	Vaccines are important for children to have	The MMR vaccine is important for children to have	The seasonal influenza vaccine is important	Vaccines are safe	The MMR vaccine is safe	The seasonal influenza vaccine is safe	Vaccines are effective	Vaccines are compatible with my religious beliefs	...recommend the MMR vaccine?	...recommend the seasonal influenza vaccine?	...recommend the seasonal influenza vaccine to pregnant women?
base	100	100	100	100	100	100	100	100	100	100	100
Strongly agree	95	94	65	82	86	75	90	82	95	78	45
	95.0%	94.0%	65.0%	82.0%	86.0%	75.0%	90.0%	82.0%	95.0%	78.0%	45.0%
Tend to agree	3	4	29	16	13	19	8	3	4	19	42
	3.0%	4.0%	29.0%	16.0%	13.0%	19.0%	8.0%	3.0%	4.0%	19.0%	42.0%
Tend to disagree	1	1	5	1	0	5	1	2	0	2	7
	1.0%	1.0%	5.0%	1.0%	0.0%	5.0%	1.0%	2.0%	0.0%	2.0%	7.0%
Strongly disagree	1	1	1	1	1	1	1	3	1	1	4
	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	3.0%	1.0%	1.0%	4.0%
Do not know / NR	0	0	0	0	0	0	0	10	0	0	2
	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	10.0%	0.0%	0.0%	2.0%
Agree	98	98	94	98	99	94	98	85	99	97	87
	98.0%	98.0%	94.0%	98.0%	99.0%	94.0%	98.0%	85.0%	99.0%	97.0%	87.0%
Disgree	2	2	6	2	1	6	2	5	1	3	11
	2.0%	2.0%	6.0%	2.0%	1.0%	6.0%	2.0%	5.0%	1.0%	3.0%	11.0%

Italy

	Vaccines are important for children to have	The MMR vaccine is important for children to have	The seasonal influenza vaccine is important	Vaccines are safe	The MMR vaccine is safe	The seasonal influenza vaccine is safe	Vaccines are effective	Vaccines are compatible with my religious beliefs	...recommend the MMR vaccine?	...recommend the seasonal influenza vaccine?	...recommend the seasonal influenza vaccine to pregnant women?
base	100	100	100	100	100	100	100	100	100	100	100
Strongly agree	88	85	79	76	84	83	85	75	86	91	47
	88.0%	85.0%	79.0%	76.0%	84.0%	83.0%	85.0%	75.0%	86.0%	91.0%	47.0%
Tend to agree	5	11	17	18	13	13	9	5	9	6	40
	5.0%	11.0%	17.0%	18.0%	13.0%	13.0%	9.0%	5.0%	9.0%	6.0%	40.0%
Tend to disagree	1	3	2	2	1	2	2	0	3	1	8
	1.0%	3.0%	2.0%	2.0%	1.0%	2.0%	2.0%	0.0%	3.0%	1.0%	8.0%
Strongly disagree	6	1	2	4	2	2	4	9	2	2	4
	6.0%	1.0%	2.0%	4.0%	2.0%	2.0%	4.0%	9.0%	2.0%	2.0%	4.0%
Do not know / NR	0	0	0	0	0	0	0	11	0	0	1
	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	11.0%	0.0%	0.0%	1.0%
Agree	93	96	96	94	97	96	94	80	95	97	87
	93.0%	96.0%	96.0%	94.0%	97.0%	96.0%	94.0%	80.0%	95.0%	97.0%	87.0%
Disgree	7	4	4	6	3	4	6	9	5	3	12
	7.0%	4.0%	4.0%	6.0%	3.0%	4.0%	6.0%	9.0%	5.0%	3.0%	12.0%

Poland

	Vaccines are important for children to have	The MMR vaccine is important for children to have	The seasonal influenza vaccine is important	Vaccines are safe	The MMR vaccine is safe	The seasonal influenza vaccine is safe	Vaccines are effective	Vaccines are compatible with my religious beliefs	...recommend the MMR vaccine?	...recommend the seasonal influenza vaccine?	...recommend the seasonal influenza vaccine to pregnant women?
base	100	100	100	100	100	100	100	100	100	100	100
Strongly agree	92	90	70	79	82	78	84	66	76	67	30
	92.0%	90.0%	70.0%	79.0%	82.0%	78.0%	84.0%	66.0%	76.0%	67.0%	30.0%
Tend to agree	7	8	23	19	14	16	14	5	11	26	19
	7.0%	8.0%	23.0%	19.0%	14.0%	16.0%	14.0%	5.0%	11.0%	26.0%	19.0%
Tend to disagree	0	1	5	0	2	4	1	1	3	4	25
	0.0%	1.0%	5.0%	0.0%	2.0%	4.0%	1.0%	1.0%	3.0%	4.0%	25.0%
Strongly disagree	1	0	2	2	0	2	1	3	1	3	17
	1.0%	0.0%	2.0%	2.0%	0.0%	2.0%	1.0%	3.0%	1.0%	3.0%	17.0%
Do not know / NR	0	1	0	0	2	0	0	25	9	0	9
	0.0%	1.0%	0.0%	0.0%	2.0%	0.0%	0.0%	25.0%	9.0%	0.0%	9.0%
Agree	99	98	93	98	96	94	98	71	87	93	49
	99.0%	98.0%	93.0%	98.0%	96.0%	94.0%	98.0%	71.0%	87.0%	93.0%	49.0%
Disgree	1	1	7	2	2	6	2	4	4	7	42
	1.0%	1.0%	7.0%	2.0%	2.0%	6.0%	2.0%	4.0%	4.0%	7.0%	42.0%

Slovakia

	Vaccines are important for children to have	The MMR vaccine is important for children to have	The seasonal influenza vaccine is important	Vaccines are safe	The MMR vaccine is safe	The seasonal influenza vaccine is safe	Vaccines are effective	Vaccines are compatible with my religious beliefs	...recommend the MMR vaccine?	...recommend the seasonal influenza vaccine?	...recommend the seasonal influenza vaccine to pregnant women?
base	105	105	105	105	105	105	105	105	105	105	105
Strongly agree	92	68	61	71	43	73	82	88	25	63	8
	87.6%	64.8%	58.1%	67.6%	41.0%	69.5%	78.1%	83.8%	23.8%	60.0%	7.6%
Tend to agree	10	17	37	32	36	29	22	9	24	38	24
	9.5%	16.2%	35.2%	30.5%	34.3%	27.6%	21.0%	8.6%	22.9%	36.2%	22.9%
Tend to disagree	2	0	5	2	0	2	1	2	14	3	46
	1.9%	0.0%	4.8%	1.9%	0.0%	1.9%	1.0%	1.9%	13.3%	2.9%	43.8%
Strongly disagree	0	0	0	0	0	0	0	1	8	1	26
	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.0%	7.6%	1.0%	24.8%
Do not know / NR	1	20	2	0	26	1	0	5	34	0	1
	1.0%	19.0%	1.9%	0.0%	24.8%	1.0%	0.0%	4.8%	32.4%	0.0%	1.0%
Agree	102	85	98	103	79	102	104	97	49	101	32
	97.1%	81.0%	93.3%	98.1%	75.2%	97.1%	99.0%	92.4%	46.7%	96.2%	30.5%
Disgree	2	0	5	2	0	2	1	3	22	4	72
	1.9%	0.0%	4.8%	1.9%	0.0%	1.9%	1.0%	2.9%	21.0%	3.8%	68.6%

Spain

	Vaccines are important for children to have	The MMR vaccine is important for children to have	The seasonal influenza vaccine is important	Vaccines are safe	The MMR vaccine is safe	The seasonal influenza vaccine is safe	Vaccines are effective	Vaccines are compatible with my religious beliefs	...recommend the MMR vaccine?	...recommend the seasonal influenza vaccine?	...recommend the seasonal influenza vaccine to pregnant women?
base	100	100	100	100	100	100	100	100	100	100	100
Strongly agree	94	97	73	88	93	83	88	92	92	82	69
	94.0%	97.0%	73.0%	88.0%	93.0%	83.0%	88.0%	92.0%	92.0%	82.0%	69.0%
Tend to agree	4	3	25	10	7	15	11	5	6	17	24
	4.0%	3.0%	25.0%	10.0%	7.0%	15.0%	11.0%	5.0%	6.0%	17.0%	24.0%
Tend to disagree	1	0	2	1	0	2	0	0	2	1	6
	1.0%	0.0%	2.0%	1.0%	0.0%	2.0%	0.0%	0.0%	2.0%	1.0%	6.0%
Strongly disagree	1	0	0	1	0	0	1	2	0	0	1
	1.0%	0.0%	0.0%	1.0%	0.0%	0.0%	1.0%	2.0%	0.0%	0.0%	1.0%
Do not know / NR	0	0	0	0	0	0	0	1	0	0	0
	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.0%	0.0%	0.0%	0.0%
Agree	98	100	98	98	100	98	99	97	98	99	93
	98.0%	100.0%	98.0%	98.0%	100.0%	98.0%	99.0%	97.0%	98.0%	99.0%	93.0%
Disgree	2	0	2	2	0	2	1	2	2	1	7
	2.0%	0.0%	2.0%	2.0%	0.0%	2.0%	1.0%	2.0%	2.0%	1.0%	7.0%

UK

	Vaccines are important for children to have	The MMR vaccine is important for children to have	The seasonal influenza vaccine is important	Vaccines are safe	The MMR vaccine is safe	The seasonal influenza vaccine is safe	Vaccines are effective	Vaccines are compatible with my religious beliefs	...recommend the MMR vaccine?	...recommend the seasonal influenza vaccine?	...recommend the seasonal influenza vaccine to pregnant women?
base	100	100	100	100	100	100	100	100	100	100	100
Strongly agree	92	90	61	79	88	82	82	80	96	83	86
	92.0%	90.0%	61.0%	79.0%	88.0%	82.0%	82.0%	80.0%	96.0%	83.0%	86.0%
Tend to agree	5	10	36	16	11	17	14	10	3	16	10
	5.0%	10.0%	36.0%	16.0%	11.0%	17.0%	14.0%	10.0%	3.0%	16.0%	10.0%
Tend to disagree	0	0	2	2	1	1	3	2	0	1	1
	0.0%	0.0%	2.0%	2.0%	1.0%	1.0%	3.0%	2.0%	0.0%	1.0%	1.0%
Strongly disagree	3	0	0	2	0	0	1	3	0	0	1
	3.0%	0.0%	0.0%	2.0%	0.0%	0.0%	1.0%	3.0%	0.0%	0.0%	1.0%
Do not know / NR	0	0	1	1	0	0	0	5	1	0	2
	0.0%	0.0%	1.0%	1.0%	0.0%	0.0%	0.0%	5.0%	1.0%	0.0%	2.0%
Agree	97	100	97	95	99	99	96	90	99	99	96
	97.0%	100.0%	97.0%	95.0%	99.0%	99.0%	96.0%	90.0%	99.0%	99.0%	96.0%
Disgree	3	0	2	4	1	1	4	5	0	1	2
	3.0%	0.0%	2.0%	4.0%	1.0%	1.0%	4.0%	5.0%	0.0%	1.0%	2.0%

Estonia

	Vaccines are important for children to have	The MMR vaccine is important for children to have	The seasonal influenza vaccine is important	Vaccines are safe	The MMR vaccine is safe	The seasonal influenza vaccine is safe	Vaccines are effective	Vaccines are compatible with my religious beliefs	...recommend the MMR vaccine?	...recommend the seasonal influenza vaccine?	...recommend the seasonal influenza vaccine to pregnant women?
base	100	100	100	100	100	100	100	100	100	100	100
Strongly agree	94	87	64	83	82	73	80	74	87	65	31
	94.0%	87.0%	64.0%	83.0%	82.0%	73.0%	80.0%	74.0%	87.0%	65.0%	31.0%
Tend to agree	5	11	28	16	15	23	20	7	7	32	34
	5.0%	11.0%	28.0%	16.0%	15.0%	23.0%	20.0%	7.0%	7.0%	32.0%	34.0%
Tend to disagree	0	1	8	1	2	2	0	4	3	2	13
	0.0%	1.0%	8.0%	1.0%	2.0%	2.0%	0.0%	4.0%	3.0%	2.0%	13.0%
Strongly disagree	0	0	0	0	0	1	0	3	1	1	13
	0.0%	0.0%	0.0%	0.0%	0.0%	1.0%	0.0%	3.0%	1.0%	1.0%	13.0%
Do not know / NR	1	1	0	0	1	1	0	12	2	0	9
	1.0%	1.0%	0.0%	0.0%	1.0%	1.0%	0.0%	12.0%	2.0%	0.0%	9.0%
Agree	99	98	92	99	97	96	100	81	94	97	65
	99.0%	98.0%	92.0%	99.0%	97.0%	96.0%	100.0%	81.0%	94.0%	97.0%	65.0%
Disgree	0	1	8	1	2	3	0	7	4	3	26
	0.0%	1.0%	8.0%	1.0%	2.0%	3.0%	0.0%	7.0%	4.0%	3.0%	26.0%

Romania

	Vaccines are important for children to have	The MMR vaccine is important for children to have	The seasonal influenza vaccine is important	Vaccines are safe	The MMR vaccine is safe	The seasonal influenza vaccine is safe	Vaccines are effective	Vaccines are compatible with my religious beliefs	...recommend the MMR vaccine?	...recommend the seasonal influenza vaccine?	...recommend the seasonal influenza vaccine to pregnant women?
base	131	131	131	131	131	131	131	131	131	131	131
Strongly agree	128	131	114	123	122	102	125	125	128	123	50
	97.7%	100.0%	87.0%	93.9%	93.1%	77.9%	95.4%	95.4%	97.7%	93.9%	38.2%
Tend to agree	3	0	14	8	9	18	6	5	3	8	28
	2.3%	0.0%	10.7%	6.1%	6.9%	13.7%	4.6%	3.8%	2.3%	6.1%	21.4%
Tend to disagree	0	0	3	0	0	9	0	0	0	0	18
	0.0%	0.0%	2.3%	0.0%	0.0%	6.9%	0.0%	0.0%	0.0%	0.0%	13.7%
Strongly disagree	0	0	0	0	0	1	0	0	0	0	31
	0.0%	0.0%	0.0%	0.0%	0.0%	0.8%	0.0%	0.0%	0.0%	0.0%	23.7%
Do not know / NR	0	0	0	0	0	1	0	1	0	0	4
	0.0%	0.0%	0.0%	0.0%	0.0%	0.8%	0.0%	0.8%	0.0%	0.0%	3.1%
Agree	131	131	128	131	131	120	131	130	131	131	78
	100.0%	100.0%	97.7%	100.0%	100.0%	91.6%	100.0%	99.2%	100.0%	100.0%	59.5%
Disgree	0	0	3	0	0	10	0	0	0	0	49
	0.0%	0.0%	2.3%	0.0%	0.0%	7.6%	0.0%	0.0%	0.0%	0.0%	37.4%

D Socio-economic data tables

	Male	Female	18-24	25-34	35-44	45-54	55-64	65+	None	Primary	Secondary	Undergraduate	Postgraduate	Other	No Answer	Roman Catholic	Protestant	Russian/Eastern-Orthodox	Other Christian	Jewish	Muslim	Other religious affiliation	Agnostic/Atheist/no religion	No Answer
Austria	485	515	129	167	173	186	164	181	0	223	653	124	0	0	0	555	52	14	20	3	22	10	294	30
Belgium	474	526	98	143	169	183	170	237	33	13	472	312	155	0	15	403	14	14	6	3	41	33	445	41
Bulgaria	582	616	135	193	216	181	236	237	0	152	633	413	0	0	0	9	5	1030	14	0	84	9	47	0
Croatia	475	526	85	168	170	191	167	220	23	108	521	219	14	116	0	770	6	23	8	0	5	6	134	49
Republic of Cyprus	488	522	64	138	230	208	168	202	5	194	316	316	179	0	0	4	0	963	4	0	2	5	27	5
Czech Republic	518	530	100	211	229	202	144	162	1	136	747	56	108	0	0	205	21	11	32	0	1	30	625	123
Denmark	473	547	88	138	154	180	159	301	0	78	322	423	185	12	0	20	530	0	106	1	8	15	190	150
Estonia	499	517	114	161	173	176	165	227	0	43	384	310	271	8	0	17	53	124	144	2	0	46	334	296
Finland	429	541	111	151	117	150	177	264	0	139	538	84	205	0	4	2	677	13	7	0	3	9	245	14
France	500	500	119	181	190	190	180	140	12	53	466	357	83	29	0	431	15	2	23	6	37	21	368	97
Germany	484	466	115	152	148	193	199	143	0	155	626	169	0	0	0	231	232	13	23	1	86	5	290	69
Greece	447	553	129	203	233	208	166	61	1	11	317	476	169	26	0	5	4	717	0	3	4	43	132	92
Hungary	464	539	50	203	203	185	177	185	0	284	544	175	0	0	0	501	240	10	20	5	0	6	83	138
Ireland	496	518	115	173	195	160	168	203	0	15	512	314	78	93	2	632	44	9	32	2	9	12	274	0
Italy	489	511	98	160	210	210	172	150	0	155	313	247	126	159	0	725	6	9	13	3	7	4	178	55
Latvia	449	566	102	194	188	180	170	181	4	101	623	287	0	0	0	202	177	295	7	0	0	163	144	27
Lithuania	502	516	116	156	179	195	147	225	0	0	122	656	238	2	0	717	10	17	35	5	1	25	93	115
Luxembourg	274	256	54	108	100	122	82	64	0	15	271	165	64	15	0	0	0	0	0	0	0	0	0	0
Malta	247	253	61	89	80	80	88	102	4	52	211	116	36	81	0	445	3	3	9	0	3	4	20	13
Netherlands	527	507	89	186	131	176	214	238	10	55	656	181	132	0	0	241	190	0	54	1	18	22	276	232
Poland	514	508	83	199	229	169	173	169	0	463	289	83	187	0	0	688	6	4	26	2	1	5	82	208
Portugal	493	507	112	181	222	192	162	131	0	111	325	541	0	23	0	689	13	0	16	0	0	21	205	56
Romania	581	642	122	254	243	212	177	215	12	152	410	395	75	165	14	24	3	1123	23	0	0	42	8	0
Slovakia	503	544	89	199	225	197	218	119	1	99	731	30	186	0	0	584	37	13	58	1	0	32	230	92
Slovenia	539	514	108	178	211	231	226	99	12	82	480	377	67	35	0	544	6	14	34	0	9	20	289	137
Spain	504	501	90	191	243	201	150	130	15	26	467	206	116	175	0	511	4	14	20	0	3	24	355	74
Sweden	514	517	115	178	149	159	148	282	0	93	468	317	140	0	13	13	285	16	0	5	14	68	572	58
UK	1030	1044	237	333	350	343	310	501	25	17	1393	410	152	53	24	0	0	0	1109	11	44	62	812	36

Table 9: **The number of respondents surveyed within each country broken down by their sex, age, education, and reported religious affiliation** For the purposes of the regression analyses some groups are combined (see main text). For example, "none" and "primary" education groups are classified together, as are "Catholics", "Protestants", and "Other Christian" as these groups have a zero respondent count in some countries.

E Regression methodologies

E.1 Bayesian hierarchical regression model for EU-wide determinants of vaccine confidence

A Bayesian hierarchical logistic regression model is used to evaluate the relationship between socio-economic characteristics and responses to the eight vaccine confidence survey questions. Survey responses to the eight-question survey are dichotomised into positive (1; strongly agree or tend to agree) and non-positive (0; do not know (or no response), strongly disagree, or tend to disagree) responses.

The hierarchical regression model is given by,

$$\begin{aligned} Y_{ijq} &\sim \text{Bern}\big(\pi_{ijq}\big) \\ \pi_{ijq} &= \frac{1}{1+\exp\big(-X_{ij}\beta_{jq}\big)}, \\ \beta_{jq} &\sim \mathcal{MVN}\big(\gamma_q, T_q^{(1)}\big), \end{aligned}$$

where Y_{ijq} is the dichotomous survey response for individual i in country j for question q; X_{ij} is a vector of socio-economic responses for individual i; π_{ijq} is the probability of a positive (1) response; β_{jq} is a vector of country-level associations between socio-economic factor and survey response (random-effects); γ_q is a vector of the EU-wide associations between socio-economic factor and survey response (fixed-effects, and reported in the main text, Tab. 3).

Prior distributions are placed on the precision matrices and fixed-effect parameters,

$$\begin{aligned} \gamma_q &\sim \mathcal{MVN}(\delta, T_q^{(2)}), \\ T_q^{(1)} &\sim \text{Wishart}\big(T^{(1),\,\text{hyp}}, \nu^{(1),\,\text{hyp}}\big) \\ T_q^{(2)} &\sim \text{Wishart}(T^{(2),\,\text{hyp}}, \nu^{(2),\,\text{hyp}}) \\ \delta &\sim \mathcal{MVN}\big(\epsilon, \mathbb{1}\big) \\ \epsilon &\sim \mathcal{MVN}\big(0, \mathbb{1}\big). \end{aligned}$$

Uninformative Wishart distributions are used above (setting T to the identity matrix with ν equal to one greater than the dimension of T).

E.2 Bayesian regression models for country-specific determinants of vaccine confidence

Survey responses to the eight-question survey are dichotomised as described in Appendix E.1. The model is given by,

$$\begin{aligned} Y_i &\sim \text{Bern}(\pi_i) \\ \pi_i &= \frac{1}{1+\exp(-X_i\beta)}, \end{aligned}$$

where Y_i is the dichotomous survey response for individual i, π_i is the probability of a 'positive' (1) response, X_i is a vector of socio-economic responses (sex, age, education, and religion) for individual i, and β are model parameters describing the association between socio-economic factors and agreement to a given survey question. The probability π_i is related to these response data via the logistic function.

The informative prior distribution,

$$\beta \sim \mathcal{MVN}(\mu, \Sigma), \tag{1}$$

is placed over the parameters β, where $\mu = (1, 0, \ldots, 0)$ and $\Sigma = \mathbb{1}$. The choice of μ is such that the prior over the baseline category is centred at 73%, which is in line with previous observations (Larson, 2016) and a 2 sigma range in the marginal distribution of 27-95%. Also encoded in this prior is the belief that socio-economic determinants have no effect size (an odds ratio of 1), though the prior distribution has flexibility in the range of possible odds ratios (2 sigma range in marginal distribution $\sim$ 0.14-7.00). The model outlined above is fit independently for each survey question and each country.

E.3 Missing data

The values below denote the percentage of respondents who have at least one missing data value across the socio-economic factors sex, age, education, or religion. Individuals with at least one missing data value were removed from the analyses.

country	missing
Austria	3.00
Belgium	5.30
Bulgaria	0.00
Croatia	4.90
Cyprus	0.50
Czech Rep.	11.70
Denmark	14.70
Estonia	29.10
Finland	1.90
France	9.70
Germany	7.30
Greece	9.20
Hungary	13.80
Ireland	0.20
Italy	5.50
Latvia	2.70
Lithuania	11.30
Luxembourg	0.00
Malta	2.60
Netherlands	22.40
Poland	20.40
Portugal	5.60
Romania	1.10
Slovakia	8.80
Slovenia	13.00
Spain	7.40
Sweden	6.30
UK	2.70

Table 10: **Missing percentage of socio-economic determinants for each country**

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