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OPERATIONAL SUPPORT

Tools and methods for promoting vaccination acceptance and uptake: a social and behavioural science approach

April 2025

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Introduction

Public health authorities and vaccination programme managers pay close attention to epidemiological trends relating to suboptimal vaccination coverage, for example by analysing vaccination coverage rates by factors such as age, gender, geographical location, and education level. However, there is generally less focus on understanding the social and behavioural barriers and facilitators – including those relating to structural factors – that may lie behind an individual's decision to accept, delay or refuse vaccination for themselves or their children.

Successful vaccination programmes are built on understanding and taking into account individuals' and communities' beliefs, concerns and expectations regarding the vaccine and the disease. Trust in vaccination recommendations and in the relevant authorities also plays a key role. In this context, approaches from social and behavioural sciences can provide an important complement to analysis of epidemiological and vaccine coverage data when designing, implementing and evaluating strategies and interventions to enhance vaccination acceptance and uptake across the life course.

Scope and purpose

This report builds on more than 15 years of ECDC efforts to support EU/EEA countries in increasing vaccination acceptance and uptake. Specifically, it builds on the ECDC technical report 'Facilitating COVID-19 vaccination acceptance and uptake', published in 2021 [1]. It expands on the original report with the inclusion of operational tools and methods that incorporate the latest social and behavioural science approaches, with usable and adaptable formats that fit the real-life contexts of public health authorities and vaccination programmes.

The report is presented in two parts:

Part 1. Social and behavioural science approaches to enhancing vaccination acceptance and uptake in EU/EEA countries summarises the 5Cs Model that underpins the survey tool in Part 2 and provides EU/EEA-specific context for those who will be engaged in work or decision-making related to promoting vaccination acceptance and uptake.

Part 2. Tools and methods for promoting vaccination acceptance and uptake across the life course provides practical tools and methods that multidisciplinary teams can use to diagnose social and behavioural barriers and facilitators of vaccination, thereby supporting the design and implementation of strategies and interventions to address suboptimal vaccination coverage. This part of the document includes:

- Section 2.1: A **survey tool** to collect social and behavioural data on vaccination acceptance and uptake, and support the diagnosis of barriers and facilitators to vaccination in specific populations, comprised of:
  - A survey instrument with questions designed and organised based on the five Cs in the 5Cs Model;
  - Instructions for how to adapt the survey instrument and develop the study protocol and analysis plan;
  - An example analysis plan; and
  - Advice on complementary qualitative methods.
- Section 2.2: Methods for addressing behavioural barriers to vaccination, including:
  - A **library of interventions to increase vaccination acceptance** – classified by which particular Cs from the 5Cs Model they address – that have been implemented at national and subnational levels, to inspire and inform the design of targeted interventions to address suboptimal vaccination coverage;
  - Instructions on how to use the World Health Organization (WHO)'s '**5 Steps for the application of behavioural science**' **framework** to help structure the development of strategies and interventions, including how the tools and methods presented herein fit into this process [2].

Target audiences

Primary target audiences of this report include social and behavioural scientists, campaign and communications specialists, vaccination programme managers and teams, and epidemiological and biomedical experts working in national and regional public health authorities in EU/EEA countries.

Other audiences that may benefit from this report are policy-makers and public health leaders setting priorities and budgets in the area of vaccination, as well as academics, professional groups and civil society organisations working on vaccination.

All of these audiences have a role in ensuring that the population has appropriate and equitable access to vaccination programmes, and also that people fully understand the benefits of being vaccinated as well as the risks of postponing or refusing vaccination.

How to use this document

After reviewing the Introduction, which describes the latest trends in vaccination and some of the key terms used in this report, you can consult **Part 1** to get an overview of the 5Cs Model and a summary of recent work to improve vaccination acceptance and uptake in EU/EEA countries.

Refer to Part 2, **Section 2.1**, to consult the survey tool and instructions for how to adapt it to your research questions, setting, study population(s), and any specific vaccine(s), as well as to set up an analysis plan. Note that the survey tool is also available as an editable Word document and you can download the analysis code, written in both Stata and R.

Once you have defined and diagnosed the facilitators and barriers to vaccination using the survey tool, the library of interventions to increase vaccination acceptance in **Section 2.2** can support you in designing strategies and interventions to address suboptimal vaccination coverage, through examples of how particular Cs can be targeted. WHO's '5 Steps for the application of behavioural science' framework, also described in Section 2.2, can support the overall project planning for this work [2].

Background

Even though there are relatively high overall levels of vaccination coverage in the EU/EEA, in particular for the national childhood vaccination programmes, there are pockets of unvaccinated or under-vaccinated groups. Furthermore, vaccination coverage rates for adult populations, including seasonal vaccinations offered to healthcare workers and boosters offered to older adults and risk groups, are suboptimal in many EU/EEA countries. Continuous efforts are needed to identify immunity gaps in the population, including among those who may have missed or delayed vaccination, and then to implement tailored strategies and interventions to achieve and sustain the targeted levels of vaccination coverage.

The COVID-19 pandemic shone a spotlight on how social and behavioural factors are linked to whether or not recommendations are followed – for example, on mask wearing, movement restrictions and physical distancing. Behavioural factors also had a significant impact on vaccination acceptance and uptake during the rollout of COVID-19 vaccination programmes. Further, social inequalities created barriers to vaccination for certain population groups, which needed to be identified and addressed in order to ensure equitable access to COVID-19 vaccination programmes [3]. These recent examples demonstrate the current need for operational tools to address such challenges.

Latest trends in vaccination coverage across the EU/EEA

Lower numbers of infections with vaccine-preventable diseases were reported during the COVID-19 pandemic. However, the number of cases of diseases such as measles and pertussis increased afterwards, during 2023 and 2024. In several EU/EEA countries, routine childhood vaccination coverage against measles is below the level recommended (≥95% of the eligible population vaccinated with two doses of the measles containing vaccine) to prevent measles outbreaks and protect those that are too young to be vaccinated or those who cannot be immunised for medical reasons [4]. Several factors have contributed to the recent increase in pertussis cases, including the presence of unvaccinated or not up-to-date vaccinated individuals. In addition, less exposure to the virus – which can provide natural boosting – due to physical distancing during the COVID-19 pandemic may have led to waning immunity [5].

Uptake of seasonal influenza vaccination – which is recommended for older adults and other groups at higher risk of serious complications, as well as healthcare workers – remains suboptimal throughout the EU/EEA [6]. Coverage is most often far below the objective set in the 2009 Council Recommendation, which is 75% vaccination coverage of older adults and other risk groups. Furthermore, vaccination coverage rates for older adults, as well as for healthcare workers, showed a declining trend in the 2023–2024 influenza season compared with previous periods [6,7].

Given the ongoing circulation of SARS-CoV-2 virus, EU/EEA countries continue to have COVID-19 vaccination recommendations in place, with some differences across countries (e.g. varying age thresholds). National recommendations are mainly focused on specific population groups at higher risk of developing severe disease (e.g. older adults and people with underlying health conditions). But despite such recommendations, uptake of COVID-19 vaccination is generally low. For the 28 EU/EEA countries that provided data for the age group 60 years old and above, the median COVID-19 vaccination coverage from September 2023 to July 2024 was 14.0% (range: 0.02–66.1%), with high variation across countries. For the 27 EU/EEA countries that provided data for the age group 80 years old and above, the median coverage was 21.5% (range: 0.03–93.9%), also with high variation across countries [8].

Key target populations for vaccination throughout the life course

This report advocates for a 'life course approach' to facilitating vaccination acceptance and uptake. WHO's 2030 immunisation agenda states that 'All people benefit from recommended immunisations throughout the life course, effectively integrated with other essential health services' [9]. With a life course approach, individuals are recommended different vaccinations depending on their age and health needs throughout their life. Consequently, assessment of vaccination acceptance in a population should take into consideration the specific vaccines recommended for specific age groups and other target groups, as well as the local context regarding vaccination programmes.

Key target populations for vaccination throughout the life course include:

- Parents, who are offered vaccination for their children or adolescents as part of national immunisation programmes;
- Older adults;
- Pregnant people;
- Medically at-risk groups, such as people who are immunocompromised;
- Socially vulnerable individuals and communities; and
- Healthcare workers, who are not only important in terms of accepting vaccination for themselves, but also for their role in recommending and explaining the value of vaccination to their patients.

How terms related to vaccination are used in this report

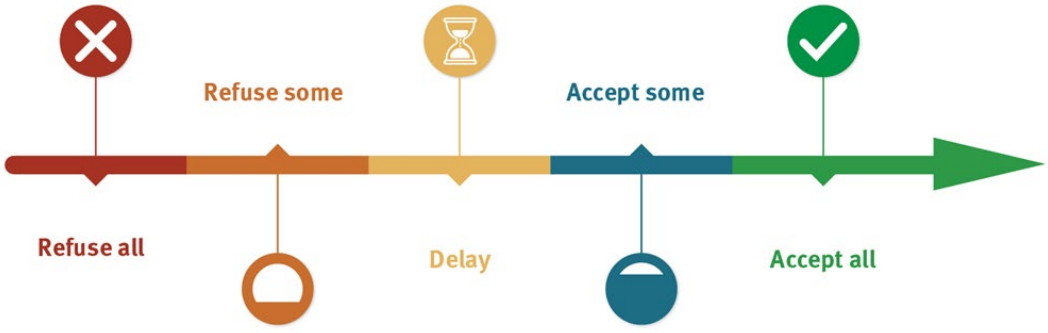
Reasons for suboptimal vaccination coverage rates in a population can be multifactorial, and may include behavioural, cultural, political, economic and societal factors. [10-12] Given the varied use of terms related to vaccination behaviour, as well as to vaccination more broadly, clarification on how these terms are used in this report is provided below.

Vaccination acceptance

This report focuses on vaccination acceptance. The term refers to the willingness and intention to receive a vaccination. It acknowledges the complexity of structures and environmental factors that influence a person's decision to vaccinate. Referring to vaccination acceptance also moves away from placing the blame on an individual, who may naturally have questions about vaccination and/or specific vaccines, and who may therefore be 'hesitant'. Further, acceptance is understood to exist along a continuum that goes from full acceptance to outright refusal, and the majority of vaccine-hesitant people will fall somewhere in the middle of that continuum (Figure 1) [13].

The term 'vaccination acceptance' implies that, when presented with an opportunity to vaccinate, an individual or a community chooses to do so [14]. However, it is also important to recognise that making vaccination available – for example, in a health centre – does not necessarily provide individuals with a viable opportunity to vaccinate. Factors contributing to vaccination acceptance are complex, context specific, and vary across time, place and type of vaccine.

Figure 1. The continuum of vaccination acceptance



Source: ECDC
The scale on the continuum refers to individuals' responses to vaccination.

Vaccine hesitancy

WHO's Behavioural and Social Drivers (BeSD) Framework – which provides an overview of the major domains relating to vaccination uptake – describes vaccine hesitancy as a 'motivational state of being conflicted about, or opposed to, getting vaccinated' [15]. This can then lead to delay in acceptance or refusal of vaccination. Working from this understanding, this report uses 'vaccine hesitancy' to refer to an individual's psychological state regarding their intention and willingness to get vaccinated.

Experts have discussed the complexities of the term 'vaccine hesitancy', and it is argued that this term should only be used to refer to a specific situation where there is concern about vaccines, rather than as a label for people [14]. Labelling people as 'vaccine hesitant' may not be helpful, given that having questions or concerns before agreeing to receive a medication such as a vaccine is natural.

Vaccination uptake

In this report, the term 'vaccination uptake' is used to refer to an individual's receipt of a vaccine. It is important to note that this term can be used to refer to both an individual's receipt of a vaccine, as well as the absolute number of people who received a specific vaccine. In the latter case, vaccination uptake is used as a vaccination indicator [16].

However, it should be noted that vaccination acceptance does not equate to vaccination uptake [17]. This is because 'acceptance' does not take into account factors such as availability of vaccines or structural factors that can inhibit access (i.e. that people may accept the vaccination but uptake is still low due to other issues). Further, some people may vaccinate even though they have questions and concerns; therefore, they do not psychologically fully 'accept' vaccination.

Vaccine coverage

'Vaccine coverage' is another vaccination indicator and term that is commonly used to report the proportion of a defined population that has received a specific number of doses of a particular vaccine.

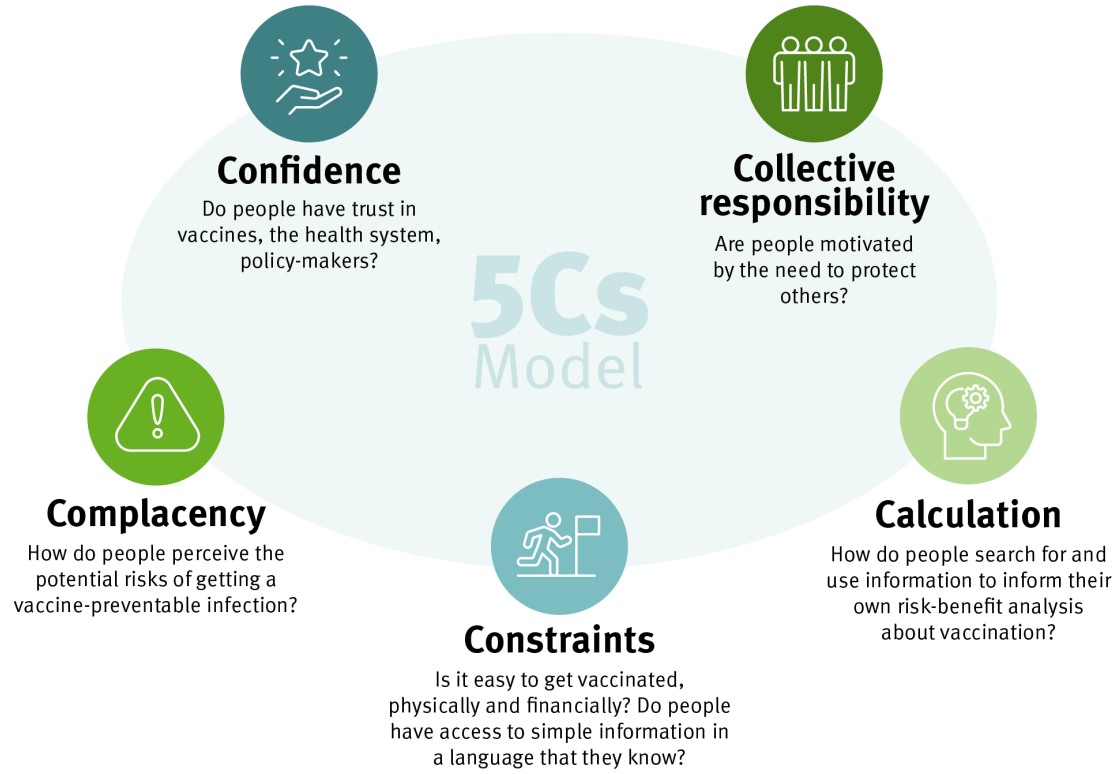
Part 1. Social and behavioural science approaches to enhancing vaccination acceptance and uptake in EU/EEA countries

1.1 The 5Cs Model

Several models from social and behavioural sciences have been introduced as tools to describe vaccination acceptance and uptake. These models are useful for practitioners and policy-makers working with vaccination policies and programmes, as they provide a systematic means of breaking down and understanding the complex factors that can facilitate or inhibit vaccination acceptance and uptake. However, all models have their strengths and limitations: there is no single model that can capture all factors and complexities. In practice, factors and constructs in the different models are often interrelated and overlapping.

The 5Cs Model was used to categorise the questions in the survey tool provided in this report (Section 2.1) [18] and to classify the examples in the library of interventions to increase vaccination acceptance (Section 2.2). The 5Cs Model provides a structured way of understanding the core areas that may influence an individual's willingness and readiness to get vaccinated (Figure 2). Developed in 2018, the model is based on five components that influence vaccination intentions and behaviour: Confidence, Complacency, Constraints, Calculation and Collective responsibility. It is informed by vaccination acceptance theories, as well as psychological models of health behaviours [18]. The model may be used for diagnosing barriers and facilitators of vaccination acceptance in a population at a specific point in time or serially, over time, facilitating early detection of lower vaccination acceptance rates in identified populations and enabling prompt action.

Figure 2. Overview of the 5Cs Model



Source: ECDC, based on [18]

The five components of the 5Cs Model are defined and described as follows:

- **Confidence** refers to an individual's trust in the safety and effectiveness of vaccination, trust in the professionals and policy-makers who recommend vaccination, and trust in the health authorities and health systems that provide them [18,19].
- **Complacency** refers to an individual's perceived risk of a serious outcome arising from contracting a given disease [19]. Complacency usually describes a relative lack of interest; for example, complacency can be high when the perceived risk of a disease is low, and therefore the vaccination is perceived as unnecessary [20].
- **Constraints** refers to the perceived or actual barriers to vaccination faced by an individual [19]. These constraints can be both psychological and structural; for example, referring to a person's self-efficacy or perceived ability to get themselves vaccinated, access a booking system, or take time off work to go to a vaccination appointment.
- **Calculation** refers to how an individual compares and weighs the personal benefits and potential risks of getting vaccinated [19]. How people search for and use information about vaccination may influence this construct, as well as the availability of information, its perceived quality and the individual's ability to understand health information [21].
- **Collective responsibility** refers to people's willingness to protect others by getting vaccinated as a means to prevent the spread of disease [19].

Social and behavioural scientists use data on these five constructs to understand and predict vaccination behaviour. This has illustrated that the importance of each C for an individual or community's acceptance of a given vaccine may change over time as contexts and situations change. More broadly, changes in a local context might lead to shifts in vaccination acceptance, either from acceptance to refusal or vice versa. Focusing on the specific Cs identified as barriers and facilitators of vaccination acceptance can support the development of empirically driven, targeted strategies and interventions to address suboptimal vaccination uptake [21].

While the 5Cs Model is predominantly focused on the psychological antecedents of vaccination, it is clear that suboptimal vaccination uptake occurs due to multiple other factors. For example, the Constraints component of the model includes structural factors that are beyond an individual's control, such as how easy it is to get vaccinated practically and financially, as well as the extent to which they can access appropriate information.

The 5Cs Model expands upon the 3Cs Model, initially proposed in 2015, in which the three major factors influencing vaccination decision-making were Complacency, Convenience, and Confidence [22]. During the COVID-19 pandemic, the 7Cs Model was developed, which include Compliance and Conspiracy in addition to the 5Cs. An adapted 7Cs scale has also been developed for parents to assess their willingness and readiness to vaccinate their children [20].

1.2 Work to improve vaccination acceptance and uptake in EU/EEA countries

For more than 15 years, ECDC has worked to support EU/EEA countries in increasing vaccination acceptance and uptake. Most recently, in 2021, ECDC published the technical report 'Facilitating COVID-19 vaccination acceptance and uptake', which this report builds upon [1]. In the same year, ECDC also focused on strategies to address online misinformation on vaccination, with the publication of a technical report and an e-learning [23,24]. Following the COVID-19 pandemic, and in view of the challenges in communicating the importance and impact of vaccination, ECDC also published a guide on effective communication around the benefit and risk balance of vaccination [25]. All of ECDC's guides, tools and research on communication on immunisation and vaccination acceptance are available on the ECDC website [26].

Further, to provide the public with a reliable, science-based information resource about vaccination, ECDC developed the European Vaccination Information Portal (EVIP) in collaboration with the European Commission (EC) and the European Medicines Agency (EMA). The portal, available in all EU/EEA languages, was launched during European Immunisation Week in 2020 [27].

The European Commission has also developed several actions for supporting countries' efforts to increase vaccination acceptance and uptake. Activities to boost vaccination confidence include, for example, coordinating efforts to increase vaccination uptake, facilitating good practice exchange, addressing mis- and disinformation, and providing guidance for building trust [28]. More recently, the Joint Research Centre of the European Commission has published several reports with a behavioural science focus on vaccination acceptance and demand [29,30].

Since 2018, the European Commission has engaged the Vaccine Confidence Project to conduct surveys every two years to monitor vaccination confidence in the EU [31]. The survey uses an index that measures across four dimensions: confidence in the i) importance, ii) safety and iii) effectiveness of vaccination, as well as iv) compatibility of vaccination with religious or personal beliefs. Results show that although a large proportion of respondents hold positive beliefs towards vaccination, confidence has varied over time – both in general but also in relation to specific vaccines and by age group. Large geographical variations in confidence persist, with lower confidence levels observed particularly in Eastern and Central European countries. In addition, older adults' confidence has been persistently higher than that of younger generations, and this gap appears to be widening across the majority of EU Member States.

In 2019, the European Commission established a Coalition for Vaccination that brings together European associations of healthcare professionals and student associations in the field of health and vaccination, with the aim to deliver better vaccination education to healthcare professionals and better information to the general public [32]. The European Commission has also been active with a campaign to promote vaccination (#UnitedInProtection) [33].

In addition, a number of multi-country projects have received funding through European Union Research and Innovation grants and the EU4Health programme for initiatives aimed at increasing vaccination uptake. These include JITSUVAX (Jiu Jitsu with misinformation in the age of COVID-19: using refutation-based learning to enhance vaccine uptake and knowledge), RIVER-EU (Reducing Inequalities in Vaccination uptake in the European Region) and AcToVax4NAM (Access to Vaccination for Newly Arrived Migrants) [34-36]. Descriptions of the overall projects, as well as some national and subnational interventions linked to JITSUVAX and RIVER-EU, are included in the library of interventions to increase vaccination acceptance in Section 2.2 of this report.

In the wider European region, the WHO Regional Office for Europe has developed the Tailoring Immunisation Programmes (TIP) approach to support countries in achieving high and equitable vaccination uptake [37].

Part 2. Tools and methods for promoting vaccination acceptance and uptake across the life course

2.1 Survey tool for collecting behavioural data on vaccination acceptance and uptake

This survey tool can be used to collect social and behavioural data on vaccination acceptance and uptake, thereby supporting the diagnosis of barriers and facilitators to vaccination in specific populations (Table 1; the tool is also available as an editable Word document). It was developed based on survey questions that have been psychometrically validated in previous studies [15,18,19,31,40-42]. It contains:

- Support to collect informed consent;
- Eight introductory questions around socio-demographic factors and vaccination behaviour;
- Fifteen items based on the 5Cs Model, where respondents can rank how strongly they agree or disagree with a series of statements; and
- Seven suggested qualitative questions.

In the 15 items based on the 5Cs Model, there are three items for each C, with one designated as the core indicator for each C. It is ideal that the survey is conducted using the full set of 15 items; however, if there are resource constraints, it can be limited to the five core items.

The list of suggested qualitative open-ended questions can either be added to a survey study to give more insight into people's thought processes and actions, or used as a basis for separate qualitative studies (Table 1; the questions are also available in the editable Word document version of the survey tool). Qualitative questions allowing for an open-ended response can be a valuable opportunity for the respondents to reply in their own words.

Before using the tool, it is important to gather a multidisciplinary research team, preferably including someone who is skilled in survey design and statistical analysis. The team should decide on the exact research questions and develop a study protocol and analysis plan together. Detailed information on how to adapt the survey tool and develop a study protocol are provided after the tool. An example analysis plan is presented later on in this Section and the analysis code (Boxes 1–3), written in both Stata and R, can also be downloaded.

Table 1. Survey tool for collecting behavioural data on vaccination acceptance and uptake

Informed consent
Thank you for your interest in our study. We are researchers from (insert name of institution) and we are interested in (insert aims of the study). Your answers will help us to inform and tailor our interventions to increase vaccination uptake. It will take approximately (estimate number of minutes) minutes to answer our questions. Before you agree to the study, please read the information below carefully. Your participation in this study is entirely voluntarily, and there are no right or wrong responses to the questions. The questions are about vaccination and your attitudes towards vaccination. We will also ask for some information about yourself, such as your gender, age and level of education. The answers you give will be anonymised, meaning that we cannot trace the data back to you. The data will be collected by (insert name of data collection agency) and will be shared with the research team at (insert name of researchers' institution). The Internal Review Board at (insert IRB institution) has reviewed the study protocol and has given their approval to conduct the study (insert approval number in round brackets). Your data will be stored on the servers of (insert data storage place) and will only be accessible by researchers affiliated with this project. Your data will be stored here for (indicate the number of years) years. Your data may be used for other research projects in the future that similarly aim to understand vaccination attitudes. Data usage and storage will be in accordance with the General Data Protection Regulation (GDPR) and national laws. If you have any questions or concerns about this study or about how we will use and store your data, you can get in touch with (insert name) at (insert email address).

Consent

By agreeing to participate, I understand that:

My participation is voluntary.

My data will be used for research around attitudes towards vaccination.

My data will be anonymised.

My data will be securely stored according to GDPR rules and national laws.

I can withdraw my participation at any time.

Do you agree to participate in this study?

Yes / No

Topic	Item	Question	Response options
Socio-demographics	1	How old are you?	Number of years
	2	What is your gender?	1. Male 2. Female 3. Non-binary 4. Other / I prefer not to say
	3	Where in the country do you live?	Region options adapted to country setting (to be numbered from 1)
	4	What is the highest level of education you have completed?	Options adapted to country setting (to be numbered from 1)
	5	Are you currently…?	1. Employed 2. Self-employed 3. Out of work 4. Student 5. Retired 6. Unable to work 7. Other 99. I prefer not to say
Vaccination behaviour	6	As far as you are aware, have you received all the vaccinations that have been recommended to you?	1. None 2. Some 3. All 99. I don't know / I prefer not to say
	7	Have you refused or delayed any vaccination that was recommended to you?	1. None 2. Some 3. All 99. I don't know / I prefer not to say
	8	In future, do you intend to get vaccinated according to the recommendations in your country?	1. Definitely not 2. Probably not 3. Maybe 4. Probably yes 5. Definitely 99. I don't know / I prefer not to say

5Cs	Item	Question	Response options for all 5C-related questions
To what extent do you agree or disagree with the following statements?			1. Strongly disagree 2. Partly disagree 3. Neutral 4. Partly agree 5. Strongly agree 99. I don't know / I prefer not to say
Confidence	**9 (core)**	**Overall, I think vaccines are safe [31].**	
	10	Overall, I think vaccines are effective [31].	
	11	I trust the public health authorities to only recommend safe and effective vaccines [19].	
Complacency	**12 (core)**	**I get vaccinated because it is too risky to get infected [19].**	
	13	Vaccinations are unnecessary for me because I rarely get ill anyway [19].	
	14	Vaccination is unnecessary because vaccine-preventable diseases are not common anymore [18].	
Constraints	**15 (core)**	**In practice, it will be difficult for me to get vaccinated [40].**	
	16	I make sure to receive the most important vaccines in good time [19].	
	17	It is easy for me to access vaccination services [15].	
Calculation	**18 (core)**	**When I think about getting vaccinated, I weigh benefits and risks to make the best decision possible [18].**	
	19	Generally, I do what my doctor or healthcare professional recommends about vaccination [41].	
	20	The information I receive about vaccines from the health authorities is reliable [42].	
Collective responsibility	**21 (core)**	**I get vaccinated because I am thereby protecting other people [19].**	
	22	When everyone is vaccinated, I don't have to get vaccinated too [18].	
	23	Most of my close family and friends want me to get vaccinated [15].	

Qualitative questions requiring an open-ended response
1. What questions or concerns do you have when you consider being vaccinated?
2. What are the first things that come to mind when you think of vaccines?
3. **Confidence**: Generally, what do you think about the safety and effectiveness of vaccines?
4. **Complacency**: How do you rate your risk of getting sick from diseases that are preventable through vaccination?
5. **Constraints**: What kind of obstacles do you experience when you try to get vaccinated? This can include physical, psychological or other types of challenges.
6. **Calculation**: What kind of information do you look for and read when you try to make a decision about whether or not to be vaccinated?
7. **Collective Responsibility**: How do you feel about being vaccinated as a means of protecting others?

How to adapt the survey tool and develop the study protocol and analysis plan

This survey tool should be adapted to the research questions, particularly the study population of interest and particular vaccine(s), if applicable. Important considerations and guidance on how to develop the study protocol and analysis plan are given below.

Target population

The research questions and study protocol should clearly indicate the target population of the study. The questions in the survey tool can then be adapted based on the target population. For instance, depending on the research questions, one could study vaccination acceptance and uptake in the general adult population or among caregivers of young children, migrant populations, healthcare workers, people over 65 years old or other vulnerable or underserved populations. For instance, if a study aims to understand attitudes towards childhood vaccination, the general statement 'Overall, I think vaccines are safe' can be updated to 'Overall, I think childhood vaccines are safe'.

The questions will also need to be adapted based on the target vaccine(s), if applicable. The survey tool targets vaccination attitudes in general but can be easily adapted to target specific vaccines.

The suggested socio-demographic questions will also need to be adapted to the local setting. For instance, when asking about a respondent's level of education, the answer options should reflect the educational system in the setting. Secondly, as the original survey tool was written in English, piloting translations of the survey among people of your target population will inform whether the translated survey items are understood, culturally appropriate, and/or need further revision.

Sample size

Together with a statistician, sample size calculations should inform the minimum number of respondents that are needed for the study to ensure adequate statistical power to detect meaningful effects. The sample size may need to be inflated to compensate for potential nonresponse and attrition. To enable an adequate number of respondents, a thorough understanding of the target population and how to reach them is needed before the start of the study.

Data collection

The data collection method should be selected based on considerations surrounding the target population, available resources and type of sampling. When targeting the general adult population in a country with high internet penetration, online surveys or interviews can be appropriate methods. Face-to-face interviews may be better suited for certain population groups (e.g. older adults).

Sampling

Sampling of the target study population can be done in several ways [43]. When a representative sample of the population is needed, the best approach is probability sampling. Some of the most common ways to do this include simple or systematic random sampling, as well as cluster or stratified sampling. If resources allow, the sampling can be outsourced to companies who have expertise in this field. If representativeness – and with that generalisability to the wider population – is not needed to meet the study objectives, non-probability sampling can be used. Some common ways of non-probability sampling include convenience sampling, snowballing and purposive sampling.

Survey presentation

How the survey is presented to the respondents depends on the data collection method that will be used for the survey. All of the 5C-related questions have the same answer options based on a 5-point Likert scale (from 'Strongly Disagree' to 'Strongly Agree'). Therefore, the survey could be presented in written form as one big table, with the Likert scale presented vertically next to each question (as in Table 1). Alternatively, questions can be asked one by one during a face-to-face or online interview, with the Likert scale shared with the interviewee as response options. It is best not to use the headers of the survey tool (e.g. Socio-demographic variables, Confidence, Constraints) in the actual survey so that respondents are not biased towards certain answers.

In the survey tool, each answer has an assigned numerical value (e.g. Question 6: 1 = None, 2 = Some, 3 = All, 99 = I don't know / prefer not to say). These assigned values do not need to be visible to survey respondents but should be used in the backend of the survey, so that the results are given in this format. The prewritten analysis code is based on these numbers.

Study protocol and analysis plan

The study protocol should outline the target population, sample size, data collection method and sampling approach. It should also contain a section on how the data analysis will be done.

The analyses should be concise and answer the research questions. For the descriptive analyses, summary tables of the study respondents' demographics could be created. Core indicators of each C can be summarised and stratified by demographic variables such as gender and education, if desired. The three key behavioural indicators of the survey tool – i) past vaccination uptake, ii) past refusal to vaccinate and iii) intention to vaccinate – can similarly be summarised descriptively and stratified by demographic variables. Inferential statistical analyses can be conducted to test the associations between the behavioural outcomes, the 5Cs and demographics.

To be able to carry out this analysis, it is important to follow the assigned numerical values of the answering options, as suggested in the survey tool. An example analysis plan that includes both descriptive and inferential analyses of the survey results is provided below (Boxes 1–3), and prewritten analysis code (in Stata and R) can also be downloaded.

Qualitative analysis

If open-ended, qualitative questions are included in the study, the questions suggested in Table 1 should be carefully reviewed and adapted to reflect the local setting. The written responses to the open-ended questions on a survey or the transcripts of the interviews should be carefully analysed and coded. Inductive analysis may help to identify overarching themes emerging from the codes to give richer insight into people's thought processes and actions. Analysis may also be conducted deductively using the 5Cs as themes or using a mix of both approaches. To capture the full benefit of this type of research, an experienced qualitative researcher should take the lead on the analysis. Additional advice on qualitative data collection and analysis can be found at the end of this Section.

Ethical clearance

Before the start of any data collection, it is important to ensure that national ethical guidelines are being followed. This may include the requirement to seek ethical clearance for the study. Internal Review Boards (IRBs) will review the plans of the study and determine whether clearance is needed and, if so, review study plans in detail to give the clearance. IRBs will likely review whether data collection and analysis plans follow the General Data Protection Regulation (GDPR). This means that the study proposal needs to clearly outline how to handle anonymisation, data storage and access to the data. All studies should inform the potential participants about the aims of the study and how their data will be used and stored, as well as highlight that their responses will be anonymised, their participation is voluntary and that they can stop the study at any moment without facing any adverse consequences. This information should be followed by a question asking the participant if they agree to this and are willing to take part in the study. This process provides informed consent, which must be obtained before any questions are introduced to the participant. A template for this is provided in the survey tool (Table 1), as well as in the editable Word document.

Reporting and interpreting the data

After data analysis, it is important to distil the main results and consider potential interventions. Main results can be summarised using tables and figures, and can be described in a report or published in a scientific peer-reviewed journal. The multidisciplinary team working on the study will need to consider the best way(s) to present the obtained data to concerned stakeholders and use it to diagnose barriers and facilitators of vaccination in specific populations. The data will likely give direction to potential strategies and interventions, specifically regarding which of the 5Cs may be of most relevance as focus areas. Examples of how EU/EEA countries have targeted particular Cs are presented in the library of interventions to increase vaccination acceptance (Section 2.2).

Example analysis plan

This example analysis plan provides a basic structure for the analysis of the survey data (Boxes 1–3; the full analysis code, written in both Stata and R, is also available to download). The analysis should ideally be done in three phases:

- Phase 1: preparing the data (Box 1);
- Phase 2: descriptive analysis (Box 2); and
- Phase 3: inferential analysis (Box 3).

Preparing the data means cleaning the data and getting them ready for analyses (Box 1). Data cleaning can entail checking whether answers are realistic (e.g. nobody can be 178 years old) and ensuring that all variables are in numerical form. With the prewritten code, you can double check that all variables have the correct assigned values and labels. For instance, for the gender variable, male may be assigned number 1 and female number 2.

As part of the data preparation, some variables need to be reverse coded. But before this is done, the meaning of a high score should be defined (Table 2).

Table 2. Meaning of a high score, based on the prewritten analysis code

Construct	Meaning of a high score
Confidence	High confidence in vaccination, high readiness to vaccinate
Complacency	High complacency, low readiness to vaccinate
Constraints	Constraints hinder vaccination, low readiness to vaccinate
Calculation	Highly engaged in cost-benefit analysis of vaccination, low readiness to vaccinate
Collective responsibility	Vaccination perceived as collective responsibility, high readiness to vaccinate

For instance, for Complacency, question 12 states 'I get vaccinated because it is too risky to get infected'. A high score on this question (i.e. someone who answers '5. Strongly agree') would reflect someone who is low in Complacency and therefore high in vaccination readiness. However, the numerical value is high, which could be incorrectly interpreted as high Complacency and thus low vaccination readiness. To mitigate this, it is important to reverse code these questions, as demonstrated in Box 3 (note that the analysis code for this is can be downloaded). After reverse coding is done, mean scores for each of the Cs can be calculated. The data are then ready for descriptive analysis.

For the descriptive analyses, the three key behavioural indicators of the survey tool – i) past vaccination uptake, ii) past refusal to vaccinate and iii) intention to vaccinate – can be summarised and stratified by relevant socio-demographic variables (Box 2). Next, the core indicators for each of the 5Cs can be summarised.

For the inferential analyses, several suggestions are given (Box 3). It could be interesting to understand the socio-demographic predictors for each of the 5Cs. For instance, do women have higher Complacency than men? The next part of the inferential analyses aims to understand the predictors of the three aforementioned key behavioural indicators. For these analyses, the socio-demographic variables and the 5Cs are treated as potential predictors. Additional advice on how to carry out these inferential analyses is also given below.

Box 1. Preparing the data

Reverse code the following items:

- Complacency (high scores = high complacency and thus low vaccination readiness)
  - Q12: I get vaccinated because it is too risky to get infected.
- Constraints (high scores = many constraints – i.e. every day obstacles hinder vaccination – and thus low vaccination readiness)
  - Q16: I make sure to receive the most important vaccines in good time.
  - Q17: It is easy for me to access vaccination services.
- Calculation (high scores = extensive cost-benefit considerations and low vaccination readiness)
  - Q19: Generally, I do what my doctor or healthcare professional recommends about vaccination.
  - Q20: The information I receive about vaccines from the health authorities is reliable.
- Collective responsibility (high scores = vaccination readiness to protect others).
  - Q22: When everyone is vaccinated, I don't have to get vaccinated too.

Calculate the mean scores of each C:

- Add up the scores of the three items in Confidence and divide by 3
- Add up the scores of the three items in Complacency and divide by 3
- Add up the scores of the three items in Constraints and divide by 3
- Add up the scores of the three items in Calculation and divide by 3
- Add up the scores of the three items in Collective Responsibility and divide by 3

Box 2. Descriptive analysis

Summaries of behavioural outcomes:

- % vaccinated as recommended:
  - By age
  - By gender
  - By education
  - By region
- % refused recommended vaccinations:
  - By age
  - By gender
  - By education
  - By region
- % that intend to get vaccinated according to the recommendations:
  - By age
  - By gender
  - By education
  - By region

Core indicators:

- Confidence: % who agree vaccines are safe (i.e. answered 4 or 5)
- Complacency: % who get vaccinated because it is too risky to get infected (i.e. answered 4 or 5)
- Constraints: % who say that, in practice, it will be difficult to get vaccinated (i.e. answered 4 or 5)
- Calculation: % who agree that when they think about getting vaccinated, they weigh benefits and risks to make the best decision possible (i.e. answered 4 or 5)
- Collective responsibility: % who agree that they get vaccinated because they are thereby protecting other people (i.e. answered 4 or 5)

Mean score per C stratified by age, gender, education, region and employment status.

Box 3. Inferential analysis

Socio-demographic predictors for each C:

Outcome: Confidence (mean score 1–5): Predictors: age, gender, education, region, employment status

Outcome: Complacency (mean score 1–5): Predictors: age, gender, education, region, employment status

Outcome: Constraints (mean score 1–5): Predictors: age, gender, education, region, employment status

Outcome: Calculation (mean score 1–5): Predictors: age, gender, education, region, employment status

Outcome: Collective responsibility (mean score 1–5): Predictors: age, gender, education, region, employment status

In this analysis, each of the 5Cs is treated as an outcome, and the socio-demographic variables are tested as the predictors. This will help to understand whether socio-demographic variables have an impact on the mean score of the each of the 5Cs. As the outcome is a mean score, a linear regression can be conducted. The output of these analyses is a coefficient that quantifies the relationship between the predictor and the outcome, indicating the expected change in the outcome's mean score for a one-unit change in the predictor variable.

Predictors of being vaccinated according to recommendations
Outcome: Received vaccinations according to recommendations (None, Some, All). Predictors: Mean scores of all 5Cs, age, gender, education, region, employment status

Predictors of vaccination delay or refusal
Outcome: vaccination refusal (None, Some, All). Predictors: Mean scores of all 5Cs, age, gender, education, region, employment status

Predictors of vaccination intention
Outcome: vaccination intentions (score 1–5). Predictors: Mean scores of all 5Cs, age, gender, education, region, employment status.

Additional advice on inferential analysis

When analysing an outcome variable with either three or five ordinal categories, the choice of an appropriate regression model depends on how the outcome is treated. Additionally, the number of observations in each category plays a crucial role. If some categories have too few observations, they may need to be collapsed to ensure statistical power.

If the outcome is retained in its ordinal form, an ordinal logistic regression model can be used, assuming the proportional odds assumption holds. This type of regression treats the responses as ordered steps, assuming that moving from a response of 1 ('Strongly disagree') to 2 ('Disagree') is similar to moving from 4 ('Agree') to 5 ('Strongly agree') in terms of influencing factors. For example, if being a woman increases the odds of moving from 1 to 2, it also increases the chance of moving from 3 ('Neutral') to 4 ('Agree') by the same proportion, compared to men. Similarly, if being older increases the odds of moving up one point (e.g. from 2 to 3), it is assumed to have the same proportional effect at every step of the scale (e.g. also from 4 to 5). This assumption is called the proportional odds assumption.

Alternatively, if the outcome is collapsed into only two categories (e.g. the outcome 'Received vaccinations according to recommendations' is divided into 0 = Not fully vaccinated (includes 'None' and 'Some') and 1 = Fully vaccinated ('Received all recommended vaccines'), then a binary logistic regression model is the most appropriate choice, estimating how these factors increase or decrease the likelihood of being fully vaccinated. For both an ordinal logistic regression and a binary logistic regression, the output will be presented in odds ratios.

If the five-category outcome is reduced to three categories, a multinomial logistic regression model can be used. Suppose that we group responses of vaccination intention (score 1–5) into three categories: low intention (1–2 = 'Unlikely to get vaccinated'), moderate intention (3 = 'Unsure' or 'Neutral') and high intention (4–5 = 'Likely to get vaccinated'). Since these three categories don't have a strict order (i.e. being 'Moderate' isn't necessarily halfway between 'Low' and 'High'), we can use multinomial logistic regression instead of an ordinal model. The model picks one category as the reference group (e.g. 'Low intention') and will estimate odds for 'Moderate' vs. 'Low and High' vs. 'Low'. The output of multinomial logistic regression is given in the form of relative risk ratios.

Ultimately, the choice of model depends on both theoretical considerations and practical constraints, such as the sample size of observations across categories. These considerations highlight the importance of a skilled statistician on the multidisciplinary research team.

Additional advice on qualitative methods

The results from the survey tool will provide a foundational understanding of the barriers and facilitators to vaccination acceptance in a specific population. They are unlikely, however, to explain why these barriers and facilitators exist. Qualitative methods can provide insights in this area by helping to uncover the nuances of the context, offering ideas regarding how to address the specific barriers and facilitators to vaccination acceptance [44].

Quantitative vs. qualitative methods

Quantitative methods are useful for acquiring numerical data and conducting statistical analysis regarding the research focus area. For instance, quantitative surveys can help provide an understanding of an individual or community's willingness to vaccinate and the obstacles they may be facing. However, as many quantitative data collection instruments – such as surveys or registries – are predesigned by the researchers with fixed responses, the insights generated are limited to issues that are already known to be inadequately understood. Quantitative methods also focus on understanding the central tendencies of a population, which may limit deeper examination of the reasons behind these tendencies or exceptions.

Qualitative methods, on the other hand, use the researcher as an instrument for data collection. They follow a systematic but flexible approach for collecting data, using emergent design with adaptations made throughout the process. The use of open-ended questions is central in qualitative methods, which allows respondents to answer and describe their experiences and views in their own words and language. Capturing the participants' thoughts, feelings and attitudes is crucial to gaining cultural and social insights, as participants can help define and raise the issues that are important to them.

Participant selection

A variety of sampling techniques can be used to select participants in qualitative research, with purposive sampling (i.e. choosing participants that are likely to be the most relevant to the research) being commonly used. The number of participants is usually defined based on 'data saturation', which is reached when no substantially new analytical/relevant information is gathered, at which point the data collection process can be concluded [45]. The data collection methods and analysis techniques used will be guided by the research questions.

Data collection

Two qualitative data collection methods that may be relevant in this context include [46]:

- **Semi-structured interviews**, which are conducted one-on-one with a researcher and a participant. They often use an interview guide, which has questions relevant to answering the overall research questions. Semi-structured interviews typically last 40–60 minutes and can take place face-to-face or online, preferably in a quiet, distraction-free environment. Interviews are ideal for understanding the views, experiences, beliefs and motivations of individuals without influence from others, as well as for discussing sensitive issues.
- **Focus group discussions** are, by contrast, conducted in groups, with a facilitator and typically three to eight participants. They also often use a discussion guide tailored to the overall research questions. In contrast to interviews, this method is useful for understanding group dynamics and norms in a community, including similarities and differences in perspectives. Focus groups need to be skilfully facilitated to ensure all participants feel comfortable sharing their opinions.

There are some common things to keep in mind with both methods:

- The interview/discussion guide must allow for time to establish trust between the researcher and the participant(s). Initial questions may be more casual icebreakers, followed by broad questions about the topic, and only then moving to more specific or sensitive questions.
- The questions should be open-ended, i.e. not answerable with 'yes' or 'no'. This is to encourage participants to share openly and broadly.
- Leading questions, i.e. questions that point the participants(s) towards a particular answer, should be avoided.
- Interviewing and facilitation should be flexible. The participant(s) may bring up topics that are relevant to the overall research questions but are not covered in the guide. Time should be given to these discussions, and the conversation can be brought back to the rest of the questions when appropriate.
- Interviewers and facilitators must be empathetic and mindful of pausing, changing or stopping the conversation to ensure participants' comfort, particularly when discussing sensitive issues.

Data analysis

Qualitative methods offer a variety of options for data analysis and flexibility in their usage, allowing you to choose those that suit your specific needs. Two of these are content analysis and thematic analysis. If qualitative data analysis can be seen on a spectrum, content analysis tends to be more descriptive, whereas thematic analysis tends to be more interpretative.

Content analysis is an umbrella term for 'systematic coding and categorisation' of textual data [47]. Founded on theories of communication, the trends and frequencies of words are analysed to find patterns and meaning. 'Codes' (i.e. small units of text with meaning) are organised into categories based on common patterns. This can be done both inductively (i.e. created from the data) and deductively (i.e. having pre-existing categories derived from a theory, framework or model). Content analysis can be performed quantitatively, for example, by counting the number of times a particular issue is raised in a discussion. However, with a qualitative approach, the context of the words is also taken into account to understand both apparent and underlying meaning.

Thematic analysis refers to the process of identifying themes or patterns of interest within the data [48]. Although it begins with a coding process similar to that in content analysis, thematic analysis goes beyond categorising data and tries to interpret the latent meaning in a text (i.e. inferring what ideas, assumptions, conceptualisations and ideologies may be shaping what is said by the participants). These themes can be created inductively or deductively; however, there will often be adjustments to deductive themes to reflect the latent meanings identified in your data set.

Tools to enable self-reflection and mitigate biases

It is important to remember that in any public health research, whether qualitative or quantitative, the researchers are not mere passive observers but can actively influence the research and its outcome. All steps taken by the researchers during the process, from establishing the research questions to analysing the data, are influenced by their specific backgrounds, perspectives, and conscious or unconscious biases. It is important to proactively address this during the research process and interpret the results accordingly. Qualitative research methodology has a few tools to enable this self-reflection process and to mitigate biases, including:

- **Reflexivity statements** – Researchers must self-reflect and ask themselves why they are engaging in the research, what biases they may have about the target group in relation to the topic of research, and how parts of their identity or background may influence how they conduct the research or interpret the results. This self-reflection is then summarised in a short paragraph and included with the dissemination of the results for transparency [49].

- **Investigator triangulation/Member-checking** – Two or more researchers can code a section of data independently, then compare codes to find differences and similarities, before reaching a consensus on how to interpret and categorise the data. This increases the credibility of the results. A similar process can also be conducted with participants from the target group, as a means of validating the insights derived from the data that they contributed to. This is known as member-checking [50].

Other resources

There are several resources available that describe the research process in more detail, including how to conduct data analysis and interpret findings. These include:

- WHO's 'A field guide to qualitative research for new vaccine introduction'
- WHO's 'Rapid qualitative research to increase COVID-19 vaccination uptake: a research and intervention tool'

The checklist 'Consolidated criteria for reporting qualitative research (COREQ)' is a useful guide for reporting and describing qualitative research.

2.2 Methods for addressing behavioural barriers to vaccination

Library of interventions to increase vaccination acceptance

The tables below offer a library of interventions from national and subnational levels to inspire and inform the design of interventions to address suboptimal vaccination coverage. The examples relate to childhood vaccination (Table 3), vaccination against human papillomavirus (HPV) (Table 4), vaccination against COVID-19 and influenza (Table 5), and vaccination against other diseases (pertussis and mpox) (Table 6). Many of the interventions focus on vulnerable populations, such as migrants, and are based on supporting the conversation between healthcare workers who are responsible for providing vaccination and patients. EU-funded or partially EU-funded multi-country interventions are also presented (Table 7).

To collect these national and subnational intervention examples, ECDC's Director contacted the Centre's Competent Coordinating Bodies on 4 September 2024. She asked them to nominate an expert or experts on vaccination acceptance in their country who could respond to a survey (Box 4) and be available to make any necessary further clarifications. A reminder was sent in the first week of October 2024.

Box 4. Questionnaire to national experts on vaccination acceptance and uptake

1. Lead organisation (i.e. name of the organisation that led the overall intervention)
2. Collaborators (i.e. names of any organisations that assisted with the design/implementation and/or evaluation of the intervention)
3. Intervention level (i.e. at what level was the intervention implemented?) – Single choice response:
    a. National
    b. Regional
    c. Local/Community
    d. Multiple levels
    e. Other: Please specify: *Free text*
4. Target Population (i.e. which were the target population group(s) for your intervention?) – Single choice response:
    a. General public
    b. Adults (18 years old and above)
    c. Children (up to and including 12 years old)
    d. Adolescents (13–17 years old)
    e. Parents/Caregivers
    f. Elderly
    g. Socially vulnerable populations
    h. Healthcare workers
    i. Media
    j. Other – Please specify: *Free text*
6. Please provide any further relevant details about your target population: *Free text*
7. Please briefly describe the intervention. We are interested in the following aspects (short but comprehensive answer):
    a. What was the specific objective of the intervention in relation to the target population(s)?
    b. What was the rationale behind the intervention? (Share any reasoning or motivation behind the intervention, including prior research/coverage data/experience, as applicable)
    c. When and where did the intervention take place?
    d. What were its key activities?
    e. What were the results or impacts of the intervention? (Share any details of formal or informal evaluations if applicable)
    f. What would you describe as the main lessons that you learned from the process of designing/implementing/evaluating the intervention? Please share details of any facilitators, barriers and challenges, as well as any solutions or insights that you gathered in the process.
8. Do you have an external public website or document that summarises the intervention or provides information on key activities? Share a link here (if applicable): *Free text* Or upload relevant files here (if applicable): *File upload box*

Is there anything else you would like to share about the intervention and your experience? *Free text*

Fourteen out of 30 EU/EEA countries responded, providing a total of 26 intervention examples, 24 of which are included in the tables below. The descriptions of the interventions below were lightly edited in order to ensure consistency in style and presentation, but are otherwise presented as shared by the countries in their survey responses (including links where provided). In some cases, information was complemented by email during the external review phase, and this has been incorporated into the text below.

A workshop was held with ECDC staff and an external expert to review the intervention examples and classify each intervention using the 5Cs model. Many of the interventions covered two or more of the 5Cs, with a majority addressing Confidence and/or Constraints. Fewer examples addressed Calculation or Complacency, and no examples addressed Collective responsibility.

ECDC also made contact with several EU-funded multi-country projects through coordination with Eurohealthnet, including RIVER-EU (Reducing Inequalities in Vaccination uptake in the European Region) and AcToVax4NAM (Access to Vaccination for Newly Arrived Migrants) [34,35]. A national expert in France, as identified by ECDC's Competent Coordinating Body in France, also provided contact with the coordinators of JITSUVAX (Jiu Jitsu with misinformation in the age of COVID-19) [36]. More information about these EU-funded multi-country projects is included in Table 7.

Table 3. Interventions relating to childhood vaccination programmes

Member State	Target audience	Description of intervention	Corresponding Cs
Denmark [51]	Healthcare workers	A half-day training module was conducted for public health nurses from many of the 98 municipalities in Denmark. The training included knowledge on the Danish Childhood Vaccination Programme and the vaccine-preventable diseases, as well as guidance on communicating with vaccine hesitant parents. Nurses were designated 'vaccination ambassadors' and encouraged to share lessons learned with other colleagues. Nurses were chosen as the target group for the training due to their regular visits to new parents and presence in schools. The programme was conducted in 2019, 2021, and 2022. A systematic evaluation was not conducted but feedback was collected at the end of each day. Nurses appreciated updated information on diseases covered by the vaccination programme and valued the opportunity to meet and discuss experiences with colleagues. Interest in the programme stayed consistent every year.	Confidence
France [52-54]	Parents/Caregivers	Midwives were trained on the use of motivational interviewing (MI) to prepare mothers who had just given birth and their partners for the vaccination of their newborns. Experience from Quebec has shown that by building a partnership with the healthcare professional, MI can help to reinforce a person's motivation and commitment to behaviour change. The intervention took place from November 2021 to April 2022 in two maternity wards: Sainte Musse, Toulon; Saint Joseph, Marseille in southeastern France. A randomised controlled trial was conducted which found a significant 33% reduction in concerns about vaccination in the MI arm compared to a 17% non-significant decrease in the control arm (leaflet). The initially measured reduction in concerns about vaccination remained equally large when mothers were contacted seven months after leaving the maternity ward. A collaborative working group is examining the transferability of this intervention to other target populations. This intervention was in part supported by the European Union Research and Innovation Horizon 2020 grant 964728 (JITSUVAX) described in Table 7. More information: www.jitsuvax.com	Confidence, Calculation
Sweden [55,56]	Healthcare workers	The WHO Tailoring Immunizations Programmes (TIP), including a stepwise process to identify barriers and facilitators for vaccination in their local context, design and develop tailored interventions, and implement and follow up activities, has been translated and adapted to the Swedish context for regional implementation. So far, four regions have started pilot projects based on this guide.	Confidence, Constraints, Complacency

		The key activities include workshops to facilitate the TIP method with each of the regional actors responsible for the implementation of the National Immunization Programme (NIP). Joint meetings and lectures have also been held with the regional actors, as well as cooperation and exchange of experiences. The adaptation is based on previous work on the TIP guide in 2013 focusing on a Somali community outside Stockholm. This was done as, despite generally high vaccination coverage in Sweden for childhood vaccination in the NIP, there is a need to better support regional and local actors to understand changes in vaccination coverage and acceptance. A clear learning is that in addition to translation, continuous contextual adaptation is needed. The pilot projects facilitate joint capacity building and collective learning and knowledge generation. The pilot projects started in 2021 and are ongoing until 2025, with an evaluation planned for later. The Swedish TIP guide will be revised and updated in 2025 based on the feedback and lessons learned in the work with the four pilot projects.	
Sweden [57,58]	Healthcare workers	Educational materials have been developed to support dialogue about vaccination. This intervention is targeted at nurses and physicians working with vaccination in the child or school healthcare services. It may also be used by other healthcare professionals working with vaccination. The objective is to support vaccinating nurses in building trust during conversation with parents, by providing a tool for a structured and open dialogue and training modules for reflecting and training together with colleagues in the local setting. Dialogue between healthcare personnel and parents is known to be a powerful tool for building trust in vaccination. Findings from a 2019 qualitative interview study by the Public Health Agency of Sweden with nurses (child healthcare and school healthcare) indicated a gap in support and structure for nurses to handle some occasions where they felt uncomfortable and did not know how they could meet parents' specific questions and/or general hesitancy prior to a vaccine decision. To address this need, the adapted training material was developed, inspired by the WHO training material 'Conversations to build trust in vaccination and other studies'. The key educational materials available to download since 2023 for healthcare workers include a user manual for how to conduct the training, a PowerPoint presentation for the training and a leaflet summarising the five-step tool for supporting the dialogue. The five-step approach aims to generate an open dialogue with parents regarding vaccination while exploring and addressing questions that they might have. The availability of materials has been communicated several times during European Immunization Week and through various emails to professional networks. During the development of the material, a number of workshops were held to test and co-create the material with the target groups in a couple of regions and professional networks. After the publication, a number of presentations and workshops have been performed to spread the material and follow up the reactions to it. The tool has not yet been systematically evaluated. This will start in 2025.	Confidence, Constraints, Complacency
Romania	Parents/Caregivers	The intervention focuses on sending reminder text messages to parents and caregivers. In Romania, a National Electronic Registry of Vaccination has been in place since 2011. Sending reminders by text message was an intervention put in place in 2018, aiming to increase the caregivers' adherence to the vaccination for children according to the national immunisation schedule. Adherence by caregivers to the vaccines recommended for children normally decreases, except for the vaccines recommended in the first days after birth. This could have been caused by hesitancy, but also due to insufficient information regarding the ages recommended for vaccination and the availability of the vaccines. The text messages are sent at the national level, for all children, before the estimated date for vaccination. There are plans to assess the impact of this intervention.	Constraints

Table 4. Interventions relating to vaccination against human papillomavirus (HPV)

Member State	Target audience	Description of intervention	Corresponding Cs
Denmark [59]	Socially vulnerable populations	The intervention focused on dialogue with people from ethnic minority backgrounds with the goal of sharing knowledge on HPV vaccination and other health services, gaining knowledge about the barriers in the target groups, and increasing trust in the health services, health professionals, and health authorities. The Danish Health Authority collaborated with Mino Danmark, to conduct 'Mino Talks', an event that promotes democratic conversation and gives the floor to citizens with a minority background to debate and share challenges. Six Mino Talks were held, and outreach efforts were launched in all areas which contributed to recruiting for the events. Each Mino Talk consisted of two panel discussions, the first of which was specifically about HPV vaccination and cervical cancer screening. The panels differed from city to city so that local voices could be heard. The events were held in October and November 2023 in the areas of Vejle, Brøndby, Gellerupparken (Aarhus), Vollsmose (Odense), Tingbjerg and Slagelse. The areas were selected on the basis of areas where many ethnic minority citizens live. Overall, the audience was very engaged, and they asked many questions. In addition, it worked well that the panels included individuals with lived experiences that could share their stories and that created a safe space.	Confidence, Constraints, Complacency
Germany [60]	Children (12 years old and below), Adolescents (13–17 years old)	The adolescent health check-up (J1) – provided by general practitioners and paediatricians – can be carried out between the ages of 12 and 14. It is an opportunity to check general state of health, vaccination status and puberty development. Such regular health check-ups are free of charge and allow for the interaction of the adolescents and their parents with healthcare professionals, therefore presenting a good opportunity to remind target groups about HPV vaccination. Results from evaluation suggested a higher chance of HPV vaccination uptake if adolescent females are utilising the J1 health check-up. The association of the J1 health check-up with HPV vaccination uptake was strongest in 12-year-olds and decreased with increasing age. This finding suggests both a positive association of the J1 health check-up with HPV vaccination in general, and also with timely vaccination uptake before sexual debut. However, the J1 health check-up is not yet sufficiently utilised by adolescents in Germany. Further information about the J1 health check-up: Every child in Germany has a statutory right to 10 U-examinations. The costs are covered by health insurance. The U-examinations take place in the first six years of life. At these appointments, the paediatrician checks whether the child is developing in an age-appropriate manner. This includes topics such as vaccination protection. The U-examinations help to detect illnesses or developmental delays at an early stage. Timely treatment or special support can prevent or at least reduce possible health consequences. In adolescence, a further preventive examination, the J1, is added.	Constraints, Confidence, Complacency
Germany [61]	Healthcare workers	Training of healthcare workers in motivational interviewing techniques, including paediatricians and medical assistants working in private practices in Bremen and Bavaria, was done to support patients in their decision on HPV vaccination. The intervention included an assessment of training needs of healthcare workers, such as what are the difficult topics on HPV vaccination, through a representative survey. Training activities were developed linking motivational interviewing techniques with HPV vaccination topics. Participating private practices received either a) classical training on HPV, b) training on motivational interviewing, or c) no training.	Confidence

		Evaluation of the capacities of participating healthcare workers to lead conversations on HPV vaccination using motivational interviewing techniques is ongoing at the time of submission of data to ECDC in October 2024. Limitations included difficulties to recruit healthcare workers and to convince them to learn new methods.	
Romania	Risk groups	Reimbursed vaccines (50% to 100%) are offered for some high-risk groups (HPV; varicella; meningococcal – B, ACWY; hepatitis B), focusing on people with chronic conditions. In Romania, adult vaccination, including healthcare worker vaccination, was not very well represented before September 2023. Only COVID-19, influenza, dTpa for pregnant women, hepatitis B vaccine for those unvaccinated under dialysis and HPV vaccination for female adolescents were provided free of charge within the national vaccination programme. At the end of August 2023, a new legal framework regulating the reimbursement of some vaccines for some high-risk groups was adopted, aiming to increase availability and uptake of some vaccines. Courses are offered for healthcare providers along with improved communication campaigns. Some of the reasons for low vaccination uptake among some high-risk groups is the cost of the vaccines, the difficulty in accessing it, as well as the lack of recommendation from the usual healthcare provider. The 2023–2024 assessment of this intervention showed an increase in HPV vaccination. In the first 10 months of reimbursed vaccination, more than 70 000 individuals started their vaccination scheme. An increase in uptake was also noticed for influenza vaccination, especially in children, compared to the previous season.	Constraints

Table 5. Interventions relating to vaccination against COVID-19 and influenza

Member State	Target audience	Description of intervention	Corresponding Cs
Bulgaria [62]	General public, Healthcare workers	An educational web-based platform '+men (+me)' about vaccination was launched during the COVID-19 pandemic to promote vaccination against COVID-19 and respond to concerns about vaccination. The aim was to assist the general public in making informed choices about vaccination by providing simple language information from trusted medical professionals. After the COVID-19 pandemic, the website was expanded to include the full immunisation programme. The topics covered include explanations of risks from vaccine-preventable diseases and the benefits of vaccination, as well as information about safety and access to vaccination. The information for different groups within the general public is differentiated according to their needs. Information aimed at healthcare workers includes scientifically based material on the benefits of vaccination, information about vaccine characteristics and recordings of webinars of interest to the professionals. In this way the project aspires to improve their preparedness to optimally apply immunoprophylaxis and respond to their patients' concerns.	Calculation, Complacency, Confidence
Denmark [63,64]	Socially vulnerable populations	During the COVID-19 pandemic vaccination programme, a number of community engagement interventions including pop-up vaccination and information sharing was implemented to reach socially vulnerable populations with lower-than-average vaccination uptake. A selection of these is listed below: A hotline was set up by the Danish Refugee Council where citizens with an ethnic minority background could get answers to their questions about COVID-19 vaccination in their native language and from employees with an understanding of and insights into their cultural background. A network of doctors with minority backgrounds carried out pop-up vaccination in local areas of the target group. Health professionals from the Health Dialogue Corps were present at pop-up vaccination sites at e.g. schools, high schools and in public places, workplaces and cultural events, to share information and respond to questions.	Constraints, Confidence

		The Foundation for Social Responsibility developed information materials distributed by voluntary district 'ambassadors', all of whom reflected the composition of the target group in terms of gender and ethnic background. Pop-up vaccination was made available to employees working in chain stores, where the organisation representing the stores made facilities and personnel available, including vaccination stands in warehouses. The Red Cross offered vaccination accompaniment to vulnerable citizens in all municipalities and were present at vaccination sites. Cooperation with the social housing association ('Danmarks Almene Boliger') led to their employees and residents being informed about vaccination through articles and other media channels. A qualitative evaluation of the experiences from the targeted efforts has been made. While causality could not be established, monitoring data at the local level showed an increase in vaccination coverage from before to after the targeted efforts. An important learning was that pop-up vaccination sites are significantly less successful if they are not accompanied by a substantial effort in regard to community engagement and information sharing.	
Estonia	Elderly, Risk groups	Personalised influenza and COVID-19 vaccination reminder messages via mobile phones were sent from the Health Insurance Fund to the elderly and other risk groups. Individuals who fall into the target risk groups for influenza and COVID-19 were identified, and a mobile phone messaging system was set-up to send timely reminders to identified groups with information on when and where they should get vaccinated. This intervention was designed due to a need to address questions on when, where and who should vaccinate, and to re-enforce existing campaigns on social and traditional media. The intervention began two years ago and continues today during the influenza season. Informal feedback from the general population and health workers has been positive, pointing to this as a comprehensive measure to improve vaccination uptake.	Constraints, Complacency
Finland	Children (6 years old and below), Parents/Caregivers	An initiative to provide influenza vaccination in daycare centres with vaccinators from municipal health centres was conducted. The target groups for vaccination included children five years old and below, as well as 6-year-olds who spend time in daycare before and after preschool, and their parents and caregivers if they belonged to risk groups. The intervention took place in Etelä-Savo from 2020–2022. The aim was to protect children and the community from influenza, which can spread easily, especially in closed environments like daycare centres. Posters were put up at the daycare centres to inform parents that vaccination was being offered, with no additional marketing needed. No separate appointments were needed with the vaccination being given when dropping off or picking up the child from daycare. Many families with children were able to be reached with minimal resources, and vaccination coverage increased locally.	Constraints, Complacency
Finland	General public, Adults (18 years old and above)	In many cities, for example Espoo and Tampere, vaccinations have been made available at large shopping centers. The staff came from the municipality/city's healthcare centre, with vaccines distributed from the local pharmaceutical centre/hospital pharmacy. Shopping centres were seen as centrally located and easily accessible, making them a convenient place for administering vaccinations. When vaccinations are offered in easily accessible locations, it can increase vaccination coverage and help protect communities from influenza and COVID-19, by saving individuals time and effort. Receiving vaccination in a familiar environment, such as a shopping centre, can reduce the stress and anxiety associated with medical procedures. The high customer traffic in shopping centres allows for vaccinations to be administered to a large number of people in a short period. However, vaccination events organised in shopping centres require good planning and organisation to ensure that everything runs safely and effectively.	Constraints

		Through discussions with areas where this was implemented from 2020–22, it became clear that the residents in these areas were satisfied with this option. People did not need to plan in extra time to be vaccinated, as the vaccination was handled alongside other errands.	
Greece [65]	Populations living in remote areas, Socially vulnerable populations	Since January 2021, many actions were implemented in order to facilitate access to COVID-19 vaccination for all citizens. The immunisation programme was implemented in remote areas and islands by the development of additional vaccination centres. The vaccination at home programme, including private doctors and mobile immunisation units, was developed to facilitate vaccination for those who were unable to go to a vaccination centre, including vulnerable population groups, such as refugees, migrants, and Roma people. To support this project, a new software application was developed for the planning and registration of appointments by private doctors and Health Centres. Vaccination data were collected by implementing for the first time an electronic immunisation registry (IIS).	Constraints
Ireland [66]	Healthcare professionals, Pregnant women	The intervention aimed to increase vaccination acceptance among pregnant women by responding to their questions and concerns, with a focus on developing materials and training for midwives. A national forum was established to hear and understand women's concerns, and to develop materials collaboratively with midwife tutors, including videos to support midwives in their communication with patients. Midwives are trusted voices who are influential in supporting women during their pregnancy. Additionally, regular webinars were held with community health workers to support them in their role as key messengers for the COVID-19 vaccination programme, so they can also address queries quickly with facts and support. Collaborative work was conducted with NGOs representing vulnerable communities such as the travelling community (e.g. Pavee Point), and with healthcare professionals to develop videos with clear and accurate advice in 10 languages. The vaccine was made available in pharmacy settings and in some maternity settings. The activities took place from September to December 2021 in maternity hospitals and pharmacies. Some maternity services delivered vaccination clinics in maternity settings with a high acceptance rate. During the intervention there was a 58% uptake among pregnant inpatients and a 77% uptake among their partners.	Confidence, Constraints
Ireland [67]	Socially vulnerable populations	Between 2021–2023, a community forum for migrant organisations was established to share updates about the COVID-19 vaccination programme, to understand their needs and support their requests for support. In 2022, nearly 12% of the Irish population were non-Irish citizens. The goal was to support everyone living in Ireland who was eligible for the COVID-19 vaccination and understand their requirements for information considering language, format of information and how we speak about vaccines and address concerns and questions. Activities included a monthly meeting online with community groups to hear their concerns and address queries they were receiving from their members, and a weekly update on campaign activity from the health service shared by email for groups to share with their members. Adapted motivational interviewing training was also provided to the community. A small amount of funding was made available to community groups to develop materials for their communities.	Constraints, Confidence
Ireland [68]	General public, Socially vulnerable populations	The goal was to make the COVID-19 vaccine accessible to as many as possible and reduce the disease burden. Activities ongoing from 2021 include clinics in the community, advice about the risks of COVID-19 disease and the benefits of vaccinating against COVID-19, and multiple opportunities to receive COVID-19 vaccination. Special consideration was given to those living in congregate settings by providing vaccines in those settings (e.g. those in prisons, long-term care facilities, and refugees seeking protection) and those in vulnerable populations (e.g. those accessing homeless services). Access to vaccination against COVID-19 was also provided in settings where outbreaks were occurring, for example in meat packing facilities.	Constraints

		Mobile vaccination clinics were provided in accessible community settings and shopping centres. Vaccine is available free of charge to eligible people at participating pharmacies as well as general practitioner practices. Outbreaks were reduced as a result of high vaccination uptake. Trust was built with communities through understanding and addressing their concerns. Accessibility of vaccination was a central point when considering how vaccination clinics should be established. Text messages and email reminders were also sent to eligible groups.	
Lithuania [69]	Healthcare professionals	An intervention to increase vaccination of risk groups against COVID-19 by including a financial incentive for healthcare professions to urge at-risk individuals to get both vaccination against seasonal influenza and COVID-19 updated during the same visit. Risk groups being recommended vaccination include those with chronic diseases, over 65 years of age, healthcare workers, individuals living in nursing homes, and pregnant women. Vaccination against COVID-19 can be given at all personal healthcare facilities that have COVID-19 vaccines, not necessarily at the personal healthcare facility where the person is registered. Registration for vaccination is carried out through the Advance Patient Registration System (IPR IS); COVID-19 vaccination is free for everyone.	Constraints
Slovakia [70]	Socially vulnerable groups	A campaign was conducted to address barriers to vaccination against COVID-19 specific to the Rožňava district, an area with sparsely populated villages large distances apart, with the aim to address misinformation and low awareness of the benefits of vaccination. The main target groups were marginalised and minority groups, i.e. Roma people and a Hungarian minority. The campaign took place between May 2021 and March 2022, and it entailed mobile vaccination teams visiting towns, small municipalities, workplaces and households, and meeting representatives from locations with low vaccination rates and extra vaccination days at hospitals. A telephone line was set up for registering for vaccination and answering queries on vaccination. Targeted information was provided through leaflets available in multiple languages, TV spots, a campaign webpage and social media posts. The result of this intervention was increased vaccination rates from 21% in May of 2021 to 42% in March 2022 in the Rožňava district, with a variation from 13–60 % in different municipalities. Other regional public health offices in Slovakia showed interest in applying insights from this experience for their own activities.	Confidence, Constraints, Complacency
Sweden	Risk groups	Individuals aged 18–64 years belonging to the medical risk groups for influenza vaccination are identified via electronic health records (based on ICD-10 codes). Information about seasonal influenza vaccination is sent to these individuals in the form of a letter to their home address. This takes place annually before the seasonal influenza vaccination campaign. By providing the information directly to those concerned, the healthcare staff can nudge them and thereby increase coverage.	Constraints
Romania	General population, Risk groups	Influenza vaccination was provided in community pharmacies along with a training programme for pharmacists for promoting and providing influenza vaccination. Pharmacies were authorised to provide influenza vaccination, and pharmacies with the service were promoted. In Romania, influenza vaccination uptake is low, both among at-risk groups and among the general population. This intervention, starting in 2022–2023, aimed to increase access to influenza vaccination, especially for the general population, and to reduce community circulation of influenza viruses. An increasing number of pharmacists were trained. The number of pharmacies enrolled also increased, as well as the number of influenza vaccinations carried out in pharmacies.	Constraints

Table 6. Interventions on vaccination against other diseases (mpox, pertussis)

Member State	Target audience	Description of intervention	Corresponding Cs
Finland [71]	Mpox risk groups	In 2022, the mpox vaccination was administered in HIV Point staff in their facilities. HIV Point is managed by the Finnish HIV Foundation and aims to promote health, well-being and equality for those most affected by HIV, focusing on prevention of HIV and other sexually transmitted infections. Testing, support, and counselling services are provided to those with HIV and other sexually transmitted infections. Individuals can receive their vaccination anonymously and get information about HIV and hepatitis B. The individuals were satisfied with the service. HIV Point was seen as a safe place where individuals in the risk group could go to be vaccinated without being singled out or stigmatised.	Constraints
Norway [72,73]	Pregnant women, Maternal healthcare workers	The intervention focused on equipping healthcare workers to vaccinate pregnant women against pertussis. Activities included adapting prenatal care guidelines, adding maternal vaccination to the midwife curriculum, a regulatory amendment to give midwives vaccine requisition rights, and legal clarifications regarding adequate surveillance of vaccination coverage, effectiveness and safety (i.e. legal access to personal data from several central health registries). The intervention is nationwide and administered during the routine prenatal check-up in week 24 of pregnancy. Those beyond week 24 are also offered a catch-up vaccination at the next convenient check-up. Surveys on attitudes, intentions and information needs of healthcare workers and pregnant women regarding maternal pertussis vaccination were conducted to inform the planning of the intervention. Moreover, healthcare workers unions were involved and letters were also sent to municipalities before and during the implementation. The implementation started in May 2024. During the first six months of the intervention, 27 058 pregnant women in the target group were vaccinated, resulting in an estimated 69% coverage rate.	Confidence, Constraints

Table 7. EU-funded or partially EU-funded multi-country interventions

Countries	Target audience	Description of intervention	Corresponding Cs
France, Germany, Romania, UK [36,74]	Healthcare workers	JITSUVAX (Jiu Jitsu with misinformation in the age of COVID-19) is an EU Horizon 2020 funded project coordinated by the University of Bristol working with five other EU institutions as well as one in Canada. The project will run from April 2021 until March 2025. A four-step framework to improve conversations about vaccination between healthcare workers and the public, called the Empathetic Refutational Interview (ERI) technique, has been developed and tested via online studies with members of the public having concerns about vaccination, and then implemented as a training intervention in the UK, France, Germany and Romania. The intervention included training healthcare workers to use ERI and assessing the impact of teaching this technique on healthcare workers' skills and confidence, and the subsequent impact on patients' vaccination confidence, attitudes, and uptake. The ERI has its foundations in motivational interviewing but additionally aims to directly tackle misinformation about vaccination. The intervention was done between 2022–2024. The online testing found that individuals having concerns about vaccination were more receptive to a healthcare worker using the ERI approach than a control approach of direct factual counters to vaccination misconceptions.	Confidence, Calculation

		Training interventions in all four countries found that training in the ERI increased healthcare professionals' skills and confidence in having conversations about vaccination and addressing misinformation. ERI intervention was in part supported by the European Union Research and Innovation Horizon 2020 grant 964728 (JITSUVAX).	
Greece, Poland, the Netherlands, Slovakia [34]	Underserved communities	Reducing Inequalities in Vaccine uptake in the European Region – Engaging Underserved communities (RIVER-EU) is an EU-funded five-year project (2021–2026) which has implemented various interventions to address health system barriers to vaccination for underserved groups across four European countries: Greece, Poland, the Netherlands and Slovakia. RIVER-EU began by studying the barriers and enablers to vaccination access in each underserved group, on the basis of the WHO Building Blocks of the Health System [75]. Further, a realist review identified 36 effective health system interventions to improve vaccination uptake in underserved communities. Based on those findings, 'participatory transferability research' was conducted in each context to identify and select useful and potentially transferable interventions to overcome barriers and enhance enablers in collaboration with all relevant stakeholder groups from the respective target context [76]. These included, for example, parents, adolescents, practitioners, school teachers, medical and local authorities, NGOs, and policy-makers. The intervention independently found to be most useful and selected by all countries was a 'health promoter intervention'. Health promoters leverage their cultural and linguistic alignment with the underserved community to provide tailored vaccination information, help overcome community-specific barriers, build trust, and support individuals in navigating the healthcare system to access vaccination. In addition, further intervention approaches from other evidence-based interventions were individually considered depending on the specific context [76]. Based on the evidence of health promoters in other settings, each country tailored the intervention with specific intervention elements and forms of delivery for implementation to their specific context, using the results of the participatory transferability analysis [77,78]. In all settings, the engagement of health professionals, primarily doctors, was an important aspect of acceptability. Either health professionals were trained as health promoters themselves (Poland), were paired with a health promoter (Greece, the Netherlands) or were present to provide specialised medical information when needed (Slovakia). The main common finding was that the intervention is adaptable, flexible and responds to community needs on site to remove access barriers to vaccination. RIVER-EU has maintained a focus on the perspectives of community members themselves through participatory research.	Confidence, Constraints, Complacency, Calculation
Cyprus, Germany, Greece, Italy, Malta, Poland, Romania, Spain [35]	Professionals FOR Health (PFH), All health and social care professionals involved in vaccination of newly arrived migrants	Access to Vaccination for Newly Arrived Migrants (AcToVax4NAM) was a three and a half year project, funded by the EU4Health programme. The AcToVax4NAM project used a comprehensive and multifaceted methodology aimed at improving vaccination access and uptake among newly arrived migrants in the EU/EEA. The project developed a comprehensive conceptual framework tool representing the entire vaccination process, dividing it into five hubs: entitlement, reachability, adherence, achievement, and evaluation. The tool is useful for characterising system barriers and proposing solutions to overcome them. To enhance the capacities of health and social care professionals, AcToVax4NAM designed specialised, country-specific training focused on Organizational Vaccine Literacy and Cultural Competence issues.	Constraints

		Other tools developed include a Glossary of Essential Terms on Vaccination that aims to increase health system responsiveness to vaccine literacy issues, informing and sharing, in an easily usable way, essential information related to vaccines. The glossary is primarily aimed at all non-health professionals who meet newly arrived migrants in their daily work and can therefore promote their health and invite them to vaccination. Flowcharts have also been produced to help countries identify specific barriers and apply targeted solutions in their specific context. A user-friendly database of identified and newly developed tools is also available. All the project results, along with the tested solutions and final recommendations, are available from the project website.	

How to use WHO's 5 Steps framework for structuring the development of vaccination acceptance strategies and interventions

WHO's '5 Steps for the application of behavioural science' is a step-by-step framework that can be useful for structuring the development of vaccination acceptance strategies and interventions [2]. It uses a 'systems thinking' approach – which takes into account how different parts of a system interact and influence each other – to address the complexity of public health issues. This section provides instructions on how the 5 Steps framework can be applied to the development of vaccination acceptance strategies and interventions, including how to incorporate the tools and methods presented in this report into this process.

The 5 Steps include:

- Step 1: **defining** the problem in terms of behaviour;
- Step 2: **diagnosing** the facilitators and barriers to the identified behaviour;
- Step 3 **designing** the strategy to account for the needs of the specific audiences;
- Step 4: **implementing** the strategy, and
- Step 5: **evaluating** the intervention in order to derive learning and make adjustments as needed.

Step 1: Define

The first step is to select a target behaviour for intervention by considering the likely impact of the behaviour change on the outcome you seek to influence, and the feasibility of changing the behaviour and measuring change. Defining a target behaviour that is as specific as possible will make it easier to focus the development and evaluation of the intervention.

Put simply, to define the problem in terms of behaviour, consider 'who' needs to do 'what' differently, as well as 'where', 'when' and 'how often' they need to do it. It's important to consider the behaviour of other people, as well as those of the target group.

Consider the following questions:

- Whose behaviour needs to change?
- What behaviour should change? Who needs to do what differently?
- Where do they need to do it?
- When and how often do they need to do it?

Step 2: Diagnose

The second step involves diagnosing barriers and facilitators to the desired behaviour, whether this is adopting a desired behaviour, ceasing an undesired behaviour, or changing a behaviour. Barriers and facilitators can be situated within a person (e.g. abilities, motivations), their social and cultural environment (e.g. what others do/expect, consciously or unconsciously), or beyond (e.g. infrastructure, affordability).

The survey tool (Section 2.1), which is based on the 5Cs Model (Complacency, Convenience, Confidence, Calculation and Collective responsibility), supports data collection for diagnosing the barriers and facilitators of vaccination, thereby enabling an understanding of what needs to change to enhance uptake. The survey tool can be used either cross-sectionally (a snapshot in time) or longitudinally (over time).

The survey tool includes both quantitative and qualitative questions, as well as questions to gather socio-demographic information. Combining quantitative and qualitative questions in a mixed-methods approach will help to provide more in-depth insights from multiple perspectives, helping to better identify areas for targeted interventions.

Even in the context of scarcity of expertise and resources, diagnosis is a step that should be systematically covered before moving onto the design of effective strategies and interventions.

Consider the following questions:

- What are the behavioural barriers to and facilitators of vaccination acceptance?
- Which of the 5Cs are important for the targeted population group(s) relating to the specific vaccination?
- Are more than one of the 5Cs important for some population groups in relation to the specific vaccination?

Step 3: Design

The findings from Step 2 (Diagnosis) provide the basis for designing the strategies and interventions most likely to positively impact vaccination. The library of interventions to increase vaccination acceptance, presented earlier in this Section, provides concrete examples that can inspire and inform the design of strategies and interventions tailored to particular Cs.

Strategies and interventions should be tailored to meet the unique needs and preferences of the target population. They should be co-designed with the target population and relevant stakeholders, and are likely to have the most impact when they include a mix of interventions that can work synergistically together.

Consider the following questions:

- What strategies and interventions could motivate and/or facilitate the target behaviour?
- Are the strategies and interventions acceptable and appropriate to the unique needs and preferences of the target population?
- Do your selected strategies and interventions involve a mix of synergistic approaches, for example covering more than one of the 5Cs?

Step 4: Implement

Planning the implementation of a strategy or intervention in terms of what, where, when and who is the next step. A detailed intervention plan, including specific components (e.g. mode of delivery, provider, setting) and potential barriers and facilitators relating to each component, can be useful. Taking advantage of synergies with other local, national and international initiatives, such as European Immunization Week, can help to increase reach and support [80].

Co-design with the target audience can be leveraged to increase the chances of successful implementation. Along with helping to increase acceptability with your target audience and other important stakeholders (such as those that deliver it), working with representatives from the target audience can also help to identify important implementation barriers and facilitators.

Examples of implementation barriers and facilitators include:

- Costs to people accessing the intervention, e.g. is it a low-cost/high-cost intervention for your target audience?
- Integrating into wider system, e.g. how does your intervention integrate into existing workflows? Does it have buy-in from other stakeholders?
- Technological constraints, e.g. does your target audience have access to the internet and digital literacy skills?
- Time constraints, e.g. does your target audience have time to engage in your intervention?
- Political context, e.g. how might the wider political context impact your intervention?
- Physical access, e.g. is your target audience physically able to access your intervention or are they too mobile in terms of location changes?

Consider the following questions:

- In what way will the intervention be delivered, e.g. face to face, digital media, print media, mobile app?
- What content is to be delivered?
- Who will deliver the content?
- Where will the implementation take place?
- Over what period of time will the implementation take place?

Step 5: Evaluate

Evaluation is an essential component of any strategy or intervention, in order to understand if the objectives are being met, to demonstrate impact and to inform any necessary adjustments along the way. Concretely, evaluation can help to:

- Collect evidence about the efficacy of an intervention;
- Understand why it worked (or not) and for whom;
- Identify unexpected outcomes;
- Estimate the generalisability of a programme;
- Justify the use of resources;
- Make adjustments or improvements to the intervention based on the monitoring and evaluation.

There are three main types of evaluation relating to different phases of the strategy or intervention:

- Process evaluation – What type of activities relating to the strategy or intervention can be monitored?
- Outcome evaluation – Can any conclusions be drawn about the effect of the strategies and interventions, usually providing comparisons between before (the intervention) and after (e.g. changes in knowledge, attitudes or behaviour)?
- Impact evaluation: What impact have the strategies and interventions had on vaccination uptake (e.g. potential changes in vaccine coverage in the at-risk population)?

Evaluation at a smaller scale can generate useful data and insights to refine and contextualise a strategy or intervention for greater health impact before scaling up. Data can be collected from various sources, including document reviews, as well as primary data collection using qualitative and/or quantitative methods.

Detailed guidance on how to evaluate the impact of interventions addressing health behaviours, including considerations and tools, has been published by WHO [81].

Consider the following questions:

- Is the strategy or intervention feasible and acceptable?
- Has the strategy or intervention been delivered as intended?
- What changes to the target behaviour can be observed that may be attributable to the strategy or intervention?

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