Service contract to identify obstacles of physical, practical and administrative nature to develop recommendations

Final Report

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Directorate-General for Health and Food Safety (DG SANTE)

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Acronyms

Acronym	Description
AReSS	Apulian Regional Agency for Health and Social Care (Italy)
BART	Bayesian Additive Regression Trees
BeSD	World Health Organization's Behavioural and Social Drivers
BP	Best Practice
CIPH	Croatian Institute of Public Health
COVID-19	Coronavirus Disease 2019
CP	Civil Protection (context: not explicitly defined, but common in EU health docs)
DG SANTE	Directorate-General for Health and Food Safety
DID	Difference-in-Difference
DTaP/IPV	Diphtheria, Tetanus, Pertussis / Inactivated Poliovirus Vaccine
DTP	Diphtheria, Tetanus, Pertussis
EAP	European Academy of Paediatrics
ECAP	Electronic Clinical Assessment Platform (context: Catalonia health IT system)
ECDC	European Centre for Disease Prevention and Control
EHMA	European Health Management Association
EU	European Union
EU MS	European Union Member States
EUREGHA	European Regional and Local Health Authorities
GDPR	General Data Protection Regulation
GGD	Gemeentelijke Gezondheidsdienst (Municipal Public Health Service, Netherlands)
GP(s)	General Practitioner(s)
HaDEA	European Health and Digital Executive Agency
HA	Health Authority
HCP(s)	Healthcare Professional(s)
HPV	Human Papillomaviruses
HSE	Health Service Executive (Ireland)
IL	Intervention Logic
IT	Information Technology
KIIs	Key Informant Interviews
KPIs	Key Performance Indicators
LIWG	Local Implementation Working Group
MenACWY	Meningococcal ACWY
MenC	Meningococcal C
MMR	Measles, Mumps, and Rubella

Acronym	Description
MMRV	Measles, Mumps, Rubella, Varicella
NGO(s)	Non-Governmental Organisation(s)
PDSA	Plan-Do-Study-Act (cycle)
Q&A	Questions and answers
RCT	Randomised Control Trials
RIVM	Rijksinstituut voor Volksgezondheid en Milieu (National Institute for Public Health, Netherlands)
SWOT	Strenghts, Weaknesses, Opportunities, Threats
SGPP	Steering Group on Health Promotion, Disease Prevention and Management of Non-Communicable Diseases
SMS	Short Message Service (text message)
TD	Tetanus, Diphtheria
WHO	World Health Organisation

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Abstract

The 'Obstacles to vaccination' project looked at obstacles to vaccination of a practical, physical, and administrative nature. The project mapped vaccination services and barriers in all Member States; identified country-level determinants of vaccination through large-scale surveys among citizens and health professionals in the EU27 Member States; identified innovative practices in Europe and implemented mutual learning visits to showcase five practices, and implemented nine pilots transferring and adapting innovative practices in different contexts.

Designing effective vaccination programmes requires a multifaceted approach that addresses multiple barriers to vaccination. Reminder schemes, mobile units, and school vaccination programmes can improve vaccination coverage and protect public health. Reminder schemes are crucial in addressing outreach and information barriers that hinder vaccination uptake. Effective reminder systems can significantly increase vaccination rates by ensuring that individuals are aware of their vaccination schedules and the importance of timely vaccination. Mobile vaccination units address geographical and convenience barriers by bringing vaccination services closer to underserved populations. These units have the potential to improve vaccination coverage in hard-to-reach areas or for hard-to-reach groups. School vaccination programmes leverage the school environment to streamline access to vaccinations for children and adolescents. These programmes can notably reduce logistical and proximity barriers and improve vaccination rates.

Résumé

Le projet « Obstacles à la vaccination » examine les obstacles à la vaccination d'ordre pratique, physique et administratif. Il cartographie les services de vaccination et les barrières existant dans l'ensemble des États membres; identifie les déterminants nationaux de la vaccination à partir d'enquêtes de grande ampleur menées auprès des citoyens et des professionnels de santé dans les 27 États membres de l'Union européenne; recense des pratiques innovantes en Europe et organise des activités d'apprentissage mutuel afin de présenter cinq de ces pratiques, et met en œuvre neuf projets pilotes destinés à transférer et adapter ces pratiques innovantes dans différents contextes.

La conception de programmes de vaccination efficaces requiert une approche globale et multidimensionnelle, capable de répondre à la diversité des obstacles à la vaccination. Les systèmes de rappel, les unités mobiles et les programmes de vaccination en milieu scolaire sont des pratiques contribuant à améliorer la couverture vaccinale et à protéger la santé publique. Les systèmes de rappel jouent un rôle essentiel pour lever les obstacles liés à l'information et à la sensibilisation, qui freinent l'adhésion à la vaccination. Des dispositifs de rappel efficaces peuvent sensiblement accroître les taux de vaccination, en garantissant que les personnes soient informées de leur calendrier vaccinal et de l'importance de respecter les échéances. Les unités mobiles de vaccination permettent de surmonter les obstacles géographiques et pratiques, en rapprochant les services de vaccination des populations à accès limité aux services de santé. Ces unités contribuent à améliorer la couverture vaccinale dans les zones isolées ou auprès des groupes vulnérables. Les programmes de vaccination en milieu scolaire tirent parti du cadre éducatif pour faciliter l'accès à la vaccination des enfants et des adolescents. Ces programmes réduisent de manière significative les obstacles logistiques et de proximité et renforcent la couverture vaccinale.

1. Introduction: context and purpose of the study

The European Health and Digital Executive Agency (hereinafter "HaDEA") appointed Verian, in collaboration with the European Health Management Association (EHMA), ifok GmbH, the European Academy of Paediatrics (EAP) and the European Regional and Local Health Authorities (EUREGHA), to carry out a Service Contract to identify obstacles to vaccination of a practical, physical, and administrative nature and to develop recommendations (HaDEA/2021/OP/0010). This document is the final report which presents the work completed throughout the project.

To increase vaccination rates, 'convenience' factors relating to vaccination journeys - namely systemic elements supporting vaccination services - have been identified as playing an important role in facilitating or obstructing vaccination journeys. Vaccine 'confidence' and 'complacency' are key drivers of vaccination behaviour, with vaccine hesitancy due to concerns about the safety and efficacy of vaccines being a prominent and widely researched issue.

While confidence and complacency factors place the focus on the behaviour and attitudes of individuals when it comes to getting vaccinated, convenience factors, related to physical, practical, and administrative steps, instead address the extent to which available vaccination services are patient-friendly in facilitating vaccination uptake. Accordingly, this project investigated administrative, practical, and physical obstacles to vaccination.

As part of this project, vaccination journeys were mapped to identify physical, practical and administrative obstacles to vaccination in all Member States. The following vaccination journeys were considered:

Parents and legal guardians taking their child to get vaccinated against Measles, Mumps and Rubella (MMR), Poliomyelitis, Meningococcal C (MenC/MenACWY);

Adolescents getting their Human Papillomaviruses (HPV) vaccine; and

Adults getting a tetanus booster and getting vaccinated against seasonal influenza and COVID-19.

The project comprises six tasks (presented in figure 1), namely:

Task 1 – Mapping of vaccination services in the EU27 Member States to identify obstacles to vaccination of a physical, practical and administrative nature;

Task 2 – Assessment of obstacles to vaccination through large-scale surveys among citizens and health professionals in the EU27 Member States;

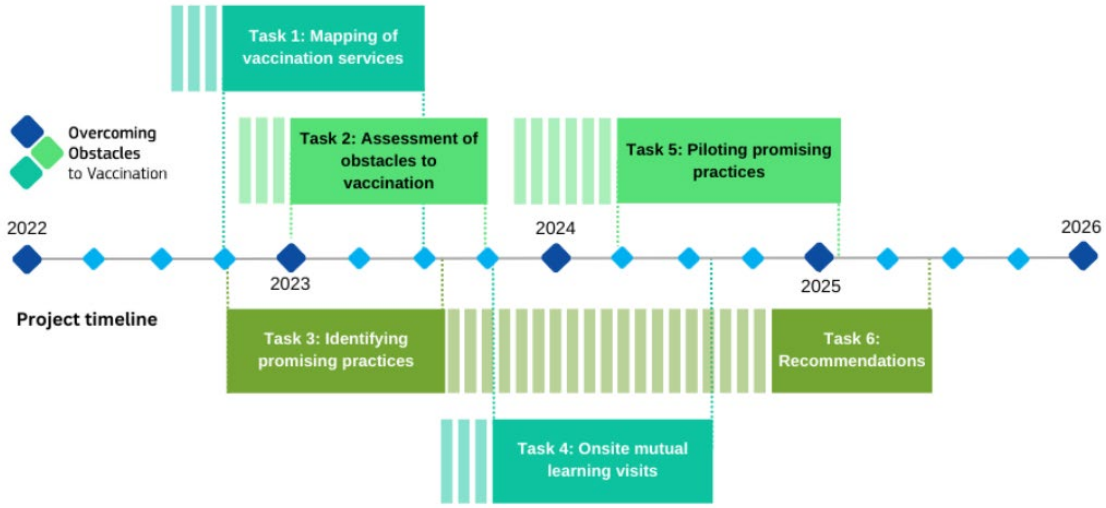
Task 3 – Identification of best practices in EU Member States to tackle obstacles to vaccination;

Task 4 – On-site mutual learning visits to showcase five practices;

Task 5 – Piloting three practices in nine EU Member States; and

Task 6 – Developing recommendations on how to overcome 'convenience' obstacles to vaccination.

Figure 1 Overview of project tasks



This report is structured as follows:

Section 2 outlines the methodological approach to each task;

Section 3 presents the results of the mapping of the vaccination services;

Section 4 provides details of the barriers identified;

Section 5 outlines the determinants of vaccine uptake in the large-scale surveys;

Section 6 presents interesting and good vaccination practices identified in Europe and selected to be showcased in on-site learning visits;

Section 7 presents an overview of the pilots and the activities implemented in the pilots;

Section 8 presents results of the pilots and impact of the practices under the three clusters;

Section 9 presents the added value and sustainability of the practices; and

Section 10 outlines the communication activities implemented.

Section 11 presents a set of recommendations derived from the activities undertaken throughout the project.

2. Methodology

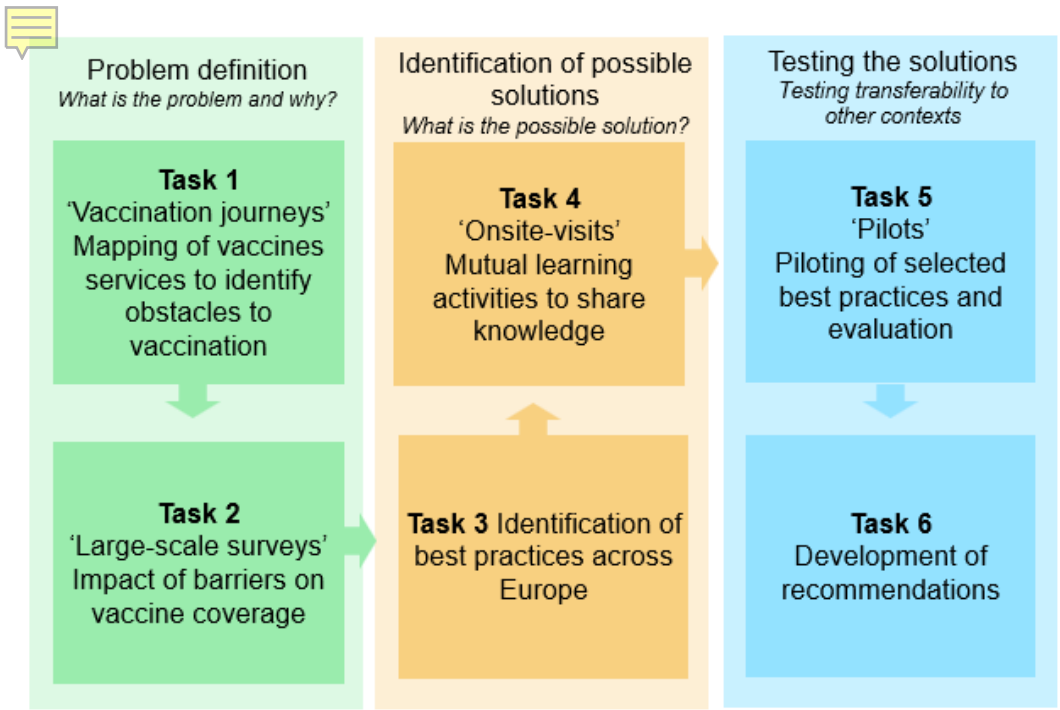
The overall methodological approach and interlinkages between the individual tasks (Tasks 1-6) ensured that these tasks did not operate in silos; rather, synergies were created where the implementation of subsequent steps integrates and builds on the previous results. This assignment can thus be seen as consisting of a logical chain of three main building blocks (see figure 2), each building towards identifying the best solution going forward:

The first building block (Tasks 1 and 2) defines the problem, based on the mapping and survey research to identify practical barriers to accessing vaccination in Member States.

The second building block (Tasks 3 and 4) identifies possible solutions where existing good practices for addressing vaccination barriers have been identified and collected (Task 3), along with knowledge from good practices exchanged between health authorities in on-site visits (Task 4).

The third building block focuses on testing the possible solutions, i.e. piloting and evaluating practices (Task 5), before looking forward (Task 6) with recommendations based on the results of problem definition and developing possible solutions to enable evidence-based future actions.

Figure 2 Chain of project methodological building blocks



A rigorous, multi-stage methodology integrated mapping, assessment, mutual learning, and piloting to address vaccination barriers across the EU. By combining qualitative and quantitative research, stakeholder engagement, and

iterative evaluation, the project delivered actionable insights and recommendations for improving vaccination uptake and overcoming systemic obstacles.

2.1. Mapping of vaccination services and barriers

Under this assignment multiple consultation activities were carried out as part of Task 1 and Task 2 to collect data on vaccination practices and barriers.

Task 1 entailed mapping vaccination services and vaccination journeys in all Member States, with the aim of identifying obstacles to vaccination across the EU27 countries. The methodology used involved primary and secondary data collection through literature review and in-depth interviews with health authorities. The country-level research was conducted by national experts with relevant expertise in vaccination and immunology, health and social research. Each national expert conducted literature and desk reviews using national sources and interviews with relevant health authorities.

To ensure the comparability of data collected across different countries, research tools and templates were designed to facilitate qualitative data collection in a systematic way. Country experts completed country reports which were then used to conduct a comparative analysis of results across all Member States.

The core team provided the national experts with standardised data collection tools, comprising a preliminary list of relevant sources, an interview guide for interviews with health authorities, a template for the country fiche (a report resulting from the primary and secondary data collection at country level), a standardised tool representing the vaccination journey, a letter of presentation and standardised instructions.

National experts conducted between one and three interviews per country, depending on whether the country's vaccination governance was regionalised or centralised. In some cases, group interviews were conducted, i.e. more than one person was present at the interview, depending on the allocation of different responsibilities. Interviews were complemented with written exchanges, also including the collection of relevant documents as needed. In some cases, other national-level experts were interviewed to complete the data collection.

In total, 59 interviews were conducted with respondents from national, regional or local authorities. For countries with centralised healthcare systems, the project targeted respondents within national health authorities; in countries where healthcare competences are devolved to the regional level (e.g. DE, ES, IT) the study targeted local and regional health authorities.

To validate the findings on vaccination journeys and barriers, seven validation focus groups were organised with citizens from different regions in Bulgaria (two

focus groups), Estonia (two focus groups) and Spain (three focus groups). Participants were citizens with diverse sociodemographic characteristics in terms of age, gender, parenthood (mix of people who have children aged 0-16 years and people with no children), location (mix of people living in urban and rural areas), income level and employment status (employed and unemployed).

Under Task 2 “Assessment of obstacles to vaccination” two large-scale surveys were conducted across all 27 EU Member States, one targeting the general population and another focused on healthcare professionals. These surveys aimed at capturing both individual and system-level determinants of vaccine uptake.

The general population survey collected responses from 25,889 individuals aged 16 and above. Sampling was stratified by gender, age, and region to ensure national representativeness. The survey was conducted online to reduce social desirability bias, especially for questions related to attitudes and personal vaccination status.

The questionnaire was structured around the World Health Organization’s Behavioural and Social Drivers (BeSD) framework, which identifies four domains influencing vaccine uptake:

Thinking and Feeling: Cognitive and emotional responses to vaccines and vaccine-preventable diseases.

Social Processes: Influence of social norms and recommendations from trusted sources.

Motivation: Willingness, intention, and hesitancy to get vaccinated.

Practical barriers: Barriers encountered when accessing vaccination services, such as cost, location, and scheduling.

The healthcare professionals survey gathered 2,510 responses from general practitioners, paediatricians, midwives, nurses, and pharmacists via Healthcare Panels. Sample targets were set per country to reflect the diversity of vaccinators and institutional structures. While regional-level data were not captured, the survey ensured broad national coverage.

The questionnaire was developed with medical experts and covered eight thematic areas: practice characteristics, patient attitudes and behaviours, professional views on vaccination, information systems and monitoring, training and competence, communication and recommendation practices, vaccine supply and logistics, and perceived systemic barriers.

To analyse the survey data, the project employed advanced statistical modelling. A multilevel logistic regression approach was used, incorporating both individual-level and country-level variables. The modelling process included:

Bayesian Additive Regression Trees (BART) to identify the most predictive country-level variables from over 150 indicators.

Post-stratification and reweighting to align survey responses with population-level distributions.

Scenario modelling to estimate potential improvements in vaccine coverage if specific barriers were addressed.

Country-level data were enriched with indicators from the World Bank, Eurostat, Transparency International, and national experts. These included metrics on governance, healthcare infrastructure, internet access, outreach methods, and vaccination financing models.

The following indicators related to the implementation of the surveys:

- Indicator 1: Number of citizens per EU Member State participating in the large-scale survey of citizens.
- Indicator 2: Number of health professionals per professional category and per EU Member State participating in the large-scale survey of health professionals.

Table 1 Number of citizens and health care professionals participating in the large scale surveys

Country	HCP survey respondents	Population survey respondents
AT	20	1013
BE	25	1020
BG	40	1018
CY	20	520
CZ	15	1020
DE	441	1010
DK	40	1020
EE	15	1022
GR	20	971
ES	441	1034
FI	60	1007
FR	452	1020
HR	10	1010
HU	57	1014
IE	20	1023
IT	453	1025
LT	20	1024
LU	0	514
LV	15	1031

Country	HCP survey respondents	Population survey respondents
MT	0	442
NL	55	1014
PL	80	1020
PT	55	1021
RO	65	1028
SE	40	1024
SK	25	1012
SI	26	1012
Total	2,510	25,889

The health professionals survey included nurses (231), midwives (16), GPs (1,721), pharmacists (171) and paediatricians (371).

2.2. Collection of good practices and mutual learning activites

Under Task 3 and Task 4, activities were carried out to collect vaccination practices addressing physical, practical and administrative issues and to implement mutual learning exchanges between health authorities.

The call was launched on DG SANTE's Best Practice (BP) Portal[1] in collaboration with HaDEA and remained open to Member State health authorities from 29 September until 27 November 2022, including an extension of two weeks to allow health authorities to refine their submissions and encourage additional health authorities to submit a practice.

A revised set of evaluation criteria was agreed by the Steering Group on Health Promotion, Disease Prevention and Management of Non-Communicable Diseases (SGPP) during a long revision process aiming to make the criteria more inclusive. As a result, 'promising practices' were also included alongside 'best practices' in the revised criteria. According to the SGPP, "*a best practice is a relevant policy or intervention implemented in a real life setting and which has been favourable [sic] assessed in terms of adequacy (ethics and evidence) and equity as well as effectiveness and efficiency related to process and outcomes. Other criteria are important for a successful transferability of the practice such as a clear definition of the context, sustainability, intersectorality and participation of stakeholders.*[2]" Promising practices follow the same evaluation criteria as best

[1] https://webgate.ec.europa.eu/dyna/bp-portal/

[2] European Commission,Directorate-General for Health and Food Safety (n.d.), Criteria to select best practices in health promotion and disease prevention and management in Europe,

practices; however for some of the sub-criteria the requirements are less strict for promising practices, specifically by:

Requiring less detail than the best practice criteria. For instance, one best practice criterion was 'An evaluation plan was designed including elements of effectiveness and/or efficiency and equity', while the corresponding promising practice criterion was 'The practice presents ideas on how it can be evaluated in the future'.

Eliminating some evaluation criteria. For instance, a best practice criterion was 'The practice has been evaluated with a sufficient level of independence and takes into account social and economic aspects from both the target population and the perspectives of relevant other stakeholders concerned (e.g. formal or informal caregivers, health professionals, teachers, health authorities)' while the promising practice criterion was 'Not yet required / can be left empty'.

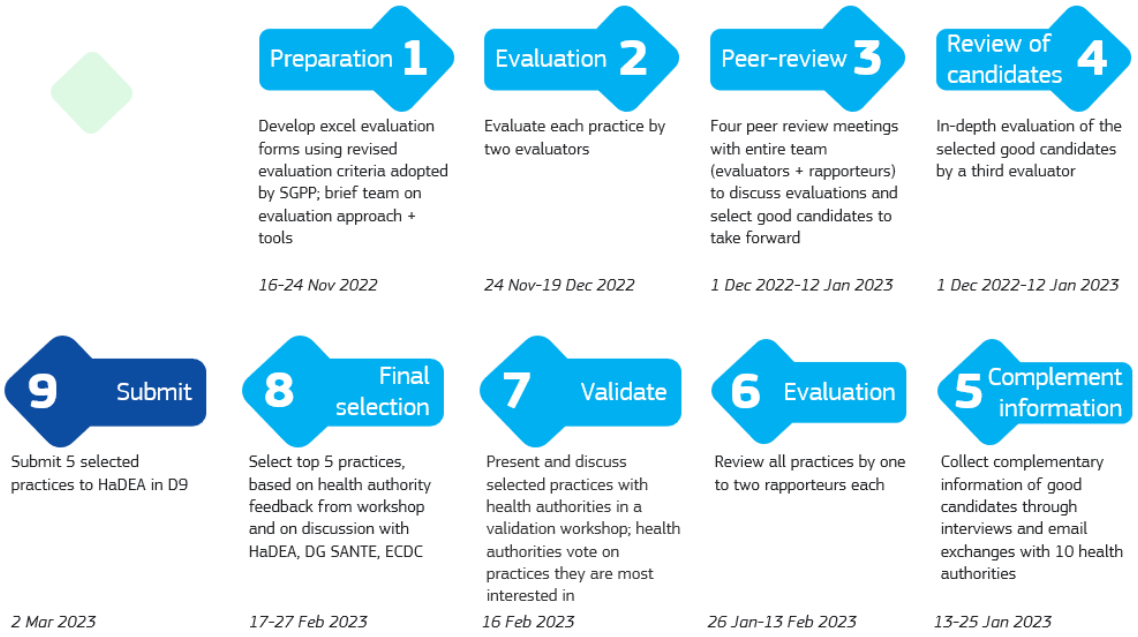
Requiring fewer points in the quantitative scoring to pass the evaluation thresholds, as further described in Chapter 6.1 on scoring thresholds.

The rationale behind including promising practice criteria was to ensure that practices which are relevant and designed to overcome vaccination obstacles but are not as fully developed as best practices could be included in the selection. For instance, during the COVID-19 pandemic, Member States designed and implemented some relevant, effective COVID-19 vaccination practices; however, because these practices are relatively recent, their evaluation may not have been initiated yet by the practice owners. Since the best practice criteria require an evaluation of the practice, these COVID-19 practices could not have been included in the selection if it were not for the introduction of the promising practice criteria. For this project, it was seen as important to give promising practices the opportunity to be considered for the final selection, as they offer useful measures and lessons learnt from which other Member States can benefit. The evaluation also examined closely whether such practices could be deemed fit for mutual learning (Task 4) and piloting (Task 5).

A total of 24 practices were submitted by 16 health authorities via the Best Practice Portal. Figure 3 provides an overview of the methodological process implemented to assess the practices received.

available at: https://health.ec.europa.eu/system/files/2021-01/sgpp_bestpracticescriteria_en_0.pdf

Figure 3 Methodological steps of evaluation of practices



The assessment framework built on the methodology designed for the inclusion of practices in the European Commission Best Practices (BP) Portal. The evaluation criteria used for the selection of practices were:

- Relevance: The practice must address physical, practical, or administrative obstacles to vaccination.
- Effectiveness: The practice should demonstrate measurable improvements in vaccination rates or other relevant outcomes.
- Transferability: The practice should be adaptable to different contexts and settings.
- Sustainability: The practice should have the potential for long-term implementation and impact.
- Innovation: The practice should introduce new or creative approaches to overcoming obstacles to vaccination.

The practices were assessed by a multidisciplinary panel comprising experts in vaccination programmes, practitioners and specialists in health policy implementation. The assessment followed an iterative methodology: each expert conducted an independent review first following the assessment framework, after which the scores were sysematically weighted and refined through structured discussions to ensure the consistency and robustness of final results. The scores were then used to rank the practices and identify the good or most promising practices.

Promising practices included those that showed potential for effectiveness based on preliminary data or theoretical rationale. These practices had not been fully evaluated or had demonstrated limited evidence of their impact (due to recent implementation) but were considered innovative and had the potential to be effective in addressing the identified obstacles to vaccination.

Good practices referred to practices that had been evaluated and demonstrated effectiveness in achieving their intended outcomes, with strong evidence of impact and considered effective in identifying the obstacles to vaccination. No practices could be identified that met all the criteria in the assessment framework and that therefore fully met the criteria for best practices.

The on-site visits were a core component of the project, designed to foster mutual learning among health authorities across EU Member States. Their primary purpose was to identify and showcase exemplary practices that had successfully addressed physical, practical, or administrative barriers to vaccination. By bringing together public health professionals from diverse backgrounds, the visits aimed to facilitate in-depth exchange of knowledge, and to promote the transfer of effective strategies at both national and regional levels.

Under Task 4, five on-site visits were conducted to showcase the practices selected and facilitate learning exchanges with health authorities across Member States.

To ensure the effective design and implementation of the mutual learning activities, a set of structured methodological steps were carried out before, during and after the visits.

Six months before the visits the team organised online scoping meetings with the national authorities in the host country of the good practice, and meetings with HaDEA and DG SANTE to discuss the content of the on-site visits.

Each practice was looked at from a 360-degree viewpoint, collecting the perspectives of:

- Policy-makers, such as national or regional health ministries;
- Funding and auditing authorities, such as national or regional public health authorities;
- Practitioners on the ground, managers and staff implementing the practice, such as health services;
- Target groups affected by the practice, e.g. service users.

Exchanges were organised with several actors to allow the practice to be considered from all angles. On the basis of this information, the team prepared a concept note for each on-site visit, which included background information and a draft agenda.

Each visit followed a structured programme which included presentations from the hosting health authorities on the local health system, vaccination governance, and specific exemplary practices; site visits to vaccination centres, schools, or community settings to observe practices in action; interactive workshops, including reflection sessions, Strengths, Weaknesses, Opportunities, Threats (SWOT) analyses, and "Impact Canvas" exercises, to encourage critical discussion and peer learning; stakeholder engagement with local health authorities, NGOs, community leaders, and, where relevant, target populations (e.g. migrants, schoolchildren); evaluation and feedback sessions to capture participant experiences and suggestions for improvement.

After the visits, follow-up activities included the distribution of material presented during the visits, feedback surveys and communication activities with health authorities about the subsequent visits.

The following key performance indicators are related to the implementation of these activities:

- Number of potential best practices to overcome obstacles to vaccination of a physical, practical and administrative nature collected, from at least three different EU Member States: 24 practices collected.
- Number of participants per EU Member State per on-site visit: Murcia (27), Netherlands (25), Ireland (21), Italy (20), Denmark (28).

2.3. Piloting and evaluation activities

The on-site visits served as forums for health authorities to exchange information about the practices, express interest in potential pilots and discuss feasibility and transferability in other contexts. The selection of pilots was finalised between December 2023 and January 2024 through an interactive process with interested health authorities. Chapter 6 provides a detail overview of the selection process and the activities conducted to design and tailor the nine pilots.

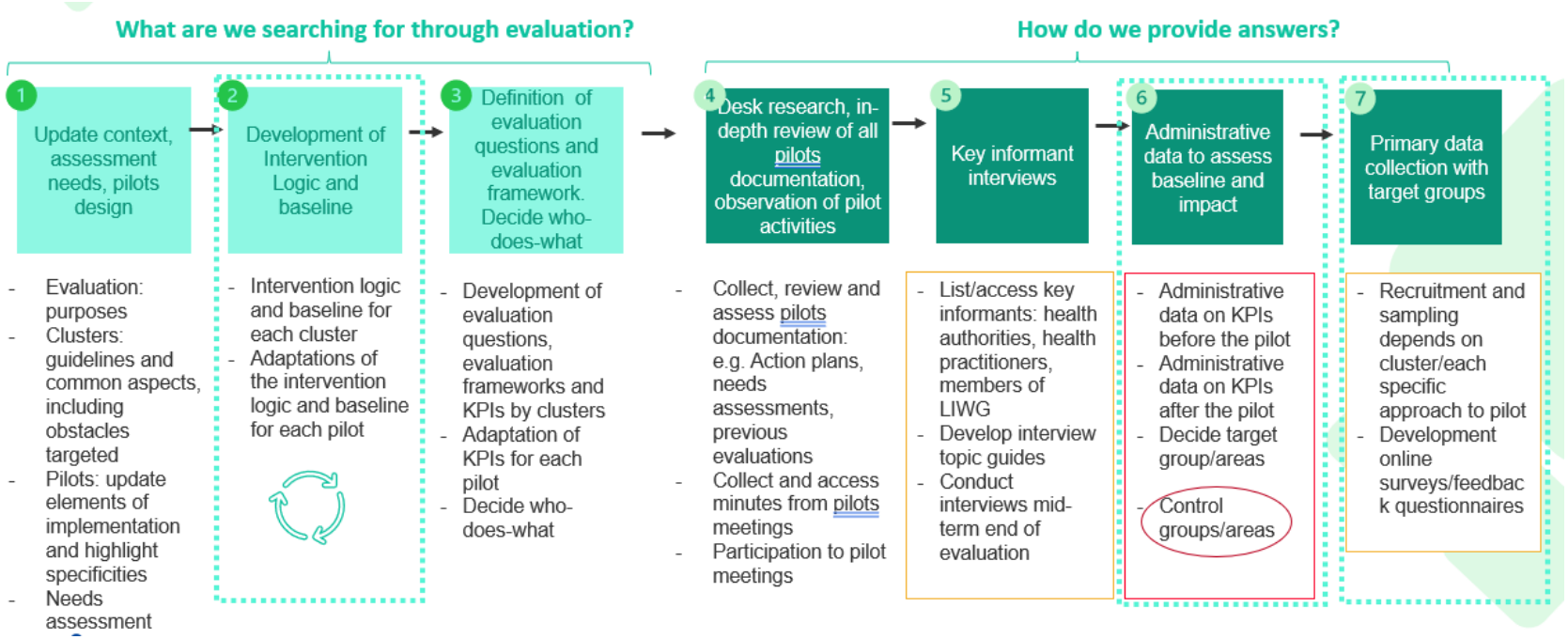
The methodological design of the pilots followed a three-phase methodology: pre-implementation phase, implementation phase, and post-implementation phase. Including the design phase, the evaluation and the implementation of the piloted activities, each pilot lasted approximately one year from Q1 2024 to Q1 2025.

The evaluation was integrated into the design of the pilots during the pre-implementation phase. The evaluation approach developed ensured the monitoring of the pilots as well as the measurement of results and impact. These guidelines for the monitoring and evaluation of pilots were inspired by the framework of the CHRODIS PLUS Joint Action and the European Commission Better Regulation Guidelines on the implementation of evaluations.

Evaluation guidelines were prepared for the health authorities and the overall evaluation methodology of the pilot projects was presented at the peer-learning activities during the design of the pilots.

The evaluation methodology was designed to provide an overall framework for the three clusters to be adapted to each cluster and to the specific activities implemented in each pilot project. Within each cluster, health authorities adapted their pilot projects to exemplary practices (i.e. best practices recognised for their effectiveness in similar contexts) and tailored their evaluation strategies to the specific needs and circumstances of the pilots. Figure 4 presents the high-level methodological approach presented to health authorities and adapted to the circumstances of each pilot.

Figure 4 Stages of the evaluation methodology for pilots evaluation



The evaluation method was theory-based to assess the underlying causal chain from input to output to results and effects. This type of evaluation is based on an explicit theoretical model supported by an intervention logic (IL) that will depict the sequence of causation between the activities developed, the outcomes, and the final impact of each pilot.

The intervention logic formed the basis for the development of the Key Performance Indicators (KPIs) and the evaluation matrix. The data collection methods included quantitative and qualitative methods, such as analysis of vaccination data and statistics, interviews and focus groups with staff and target groups (where relevant), analysis of pilot documents. Key performance indicators on vaccination rates and outreach to target groups were measured and analysed before and after the pilot (depending on the availability of administrative data and health authority capacity). The monitoring and evaluation methodology built on data already collected by health authorities and integrated with additional ad hoc data collection.

Data sources for the evaluations included:

Administrative data collected by the health authorities: depending on the type of data available and the pilots, the type of analysis conducted on the administrative data varied from more advanced statistical analysis such as Randomised Control Trials (RCT), Difference-in-Difference (DID) to more descriptive statistics.

Key Informant interviews (KIIs): in-depth interviews were conducted with stakeholders directly involved in the design and implementation of the pilot. These included health authority representatives, members of the LIWG, school personnel, personnel involved in the mobile units, and technical teams. The interviews lasted approximately one hour and gathered qualitative insights into implementation processes, stakeholder cooperation, contextual challenges, and perspectives on sustainability and added value.

Online surveys of target groups or parents and legal guardians and one online survey with GPs (Croatia pilot). The surveys used online panels or were disseminated to parents via e-mail or e-platforms by school nurses (in school vaccination pilots). The surveys included an introductory battery of questions testing eligibility criteria, including a few sociodemographic questions (location, gender, age); a section including questions related to vaccination status; a section including questions assessing attitudes towards vaccination, either in general or towards specific vaccines and/or diseases; a section gathering information related to participation in the pilot and its helpfulness or efficacy in terms of vaccination uptake by their child; and a section dedicated to questions assessing satisfaction, either generally or about specific outreach activities. A set of quality checks was embedded within the survey questionnaire to check the attention of respondents and detect potential speeders and straightliners. The surveys were not designed to be

representative of any population, but rather to gather some insights into the potential impact of the practices. The number of completed survey responses varied from approximately 40 to 370.

The results of the evaluation were used to write up nine pilot evaluation reports, which have been used for the comparative analysis presented in Chapters 7 and 8 of this report.

3. Mapping of vaccination services

Key messages

This section provides an overview of the vaccination journeys of children, adolescents, and adults. Some steps in the vaccination journey involve similar practices while in some cases differences exist across Member States (or regions), vaccines and target populations.

Outreach methods: general practitioners (GPs) are the main communication channel for most vaccines, while National Health Institutes also play a key role in awareness-raising and the provision of reliable information to the general population.

Specific communication channels have been identified for each journey: for childhood vaccination journeys: paediatricians and Well Baby clinics are the main outreach channels; while for adolescent and adult vaccination journeys the main channels are information websites and national awareness campaigns.

Pre-administrative requirements: for many vaccines there is a need for a medical prescription and, in the case of childhood and adolescents, the need for oral/written parental consent.

Booking systems differ considerably across Member States. However the most common booking system is via a phone call to the GP or the relevant healthcare centre. The use of electronic booking systems is widespread in Europe with diverse designs and approaches to implementation.

Vaccination locations: overall GP surgeries and healthcare centres are the main locations where vaccines are administered in EU Member States. While in some countries, vaccines are administered in a range of locations, other countries have a limited spectrum of vaccination locations.

Financing of vaccines: in most Member States adult vaccines are free of charge at the point of delivery for all groups targeted by national vaccination programmes. For child vaccines, the situation can vary greatly between 'free for all children' and 'free for target group' vaccinations, depending on the vaccine and on the Member State.

This chapter provides an overview of vaccination journeys across Member States for seven vaccines targeting adults, children and adolescents. The following sections cover the different steps in a patient's vaccination journey: outreach methods to inform and notify the population, pre-administration requirements, vaccine administrators, booking systems implemented across the European Union to ease the vaccination journey, the vaccination location and diverse financing systems.

3.1. Provision of vaccination services

As part of this project, vaccination journeys were mapped to identify physical, practical and administrative obstacles to vaccination in all Member States. The following vaccination journeys were considered:

parents and legal guardians taking their child for vaccination against Measles, Mumps and Rubella (MMR), Poliomyelitis, Meningococcal C (MenC/MenACWY);

adolescents receiving their Human Papillomaviruses (HPV) vaccine; and

adults getting a tetanus booster and being vaccinated against seasonal influenza and COVID-19.

The process of mapping vaccination services to identify barriers first entailed the identification of the steps covered by citizens across the EU27 Member States during their vaccination journeys:

the outreach methods used by healthcare services to notify citizens about their scheduled vaccinations (i.e. how citizens are informed about the vaccines and what they need to do to get vaccinated),

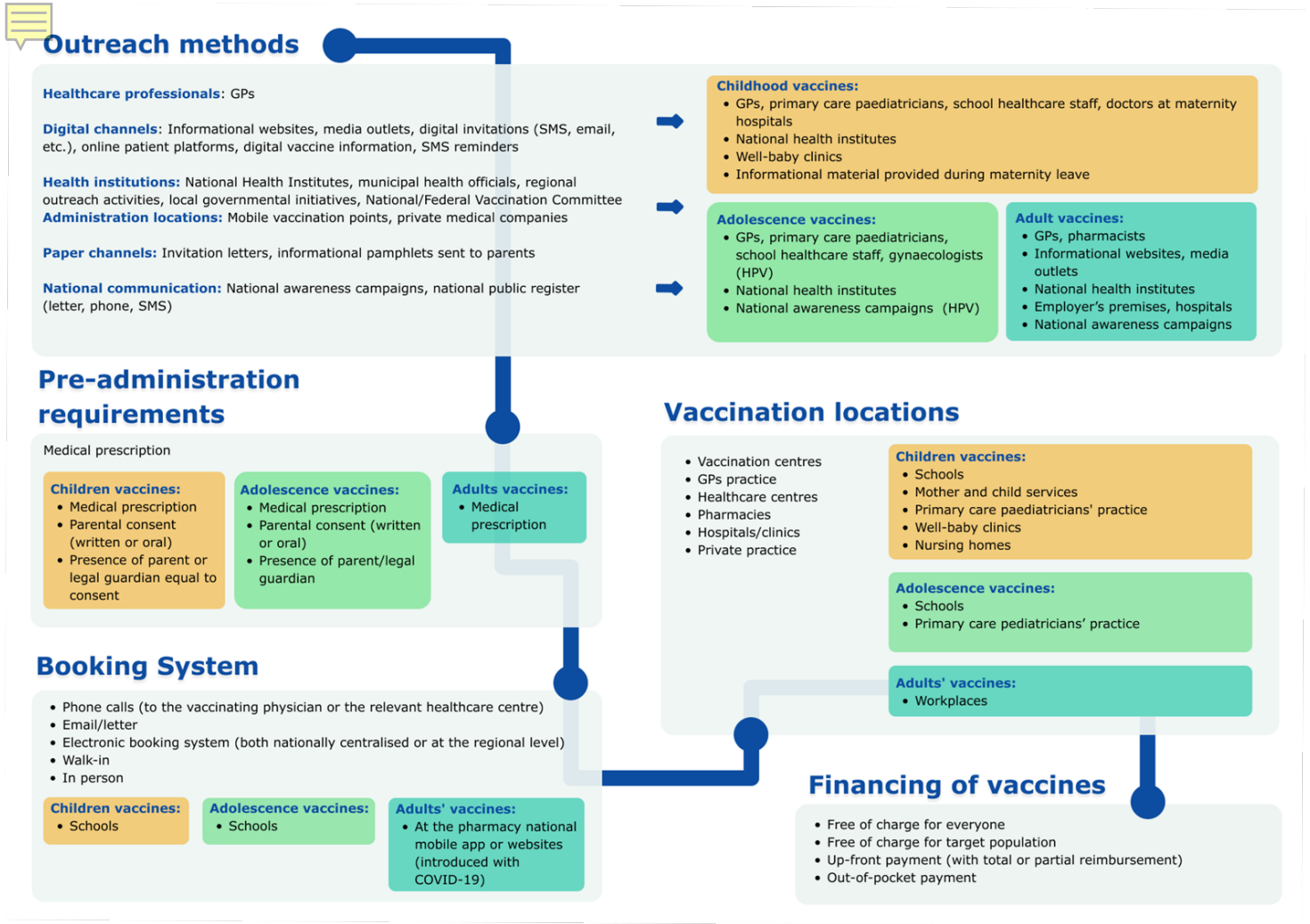
pre-administration requirements (e.g. whether a medical prescription is needed),

booking procedures (e.g. whether citizens need to make an appointment through their general practitioner or online),

travel distance to the vaccination venue and the cost if any of the vaccine and its administration.

Vaccination programmes across Member States follow broadly similar guidelines and schedules. Nonetheless, depending on the governance system, the degree of centralisation and the epidemiological situation, the implementation of vaccination programmes can differ significantly between Member States. This leads to similarities across vaccination journeys as well as differences. Figure 5 presents a high level overview of vaccination journeys. It includes activities applicable to all vaccines and specificities for childhood, adolescence and adult vaccines.

Figure 5 Overview of vaccination journeys



A vaccination journey starts when citizens are informed and reminded of their vaccination schedules. Health authorities across the EU implement different strategies to invite citizens to receive their required vaccinations. These include:

National communication campaigns to raise awareness of vaccination programmes and visual media (e.g. pamphlets and posters) at vaccine administration locations, such as well-baby clinics, hospitals, GP surgeries, etc. and digital channels (e.g. information websites, media outlets, dedicated COVID-19 websites, etc).

Direct invitations by health authorities to be vaccinated, or to bring children to be vaccinated are sent digitally (through online patient platforms, SMS reminders, emails) or via paper-based channels, such as invitation letters, or information pamphlets sent to parents.

Prior to vaccine administration, some vaccinations require prescriptions and/or parental consent, in the case of childhood and adolescent vaccinations. For adult vaccinations, although recommended or mandatory vaccination schedules can facilitate the vaccination journey, additional steps may be required, such as booking an appointment, out-of-pocket payments, reimbursement etc.

Many Member States have an electronic booking system for vaccination appointments. However, there are differences in the design and implementation of these electronic systems, especially in countries where the health system is regionalised. The COVID-19 pandemic led to the introduction of electronic booking and monitoring systems where these were not previously in place. Although booking options vary according to vaccine type, a wide range of options was available for COVID-19 vaccines in order to maximise the uptake in a short time-span: appointments could be booked in different venues (vaccination centres, pharmacies, etc), via national websites or national mobile applications. Booking options for seasonal influenza vaccines include electronic and traditional means, such as physical letters with set appointments or emails.

Across EU Member States, opt-out options, such as the use of letters to invite patients to pre-booked appointments, are less common than opt-in ones. Nonetheless, opt-out approaches have proven to be relevant in mitigating the digital gap that elderly and hard-to-reach groups are likely to experience. School vaccinations also follow an opt-out route, which simplifies the vaccination journey for children and their parents.

Healthcare professionals across the EU play a fundamental role in the vaccination journey because of their availability and their role in reminding patients of vaccination appointments and sharing reliable and scientific information about vaccines with them.

In most countries, GPs and paediatricians are the only healthcare professionals qualified to administer vaccines. However, in some countries nurses and

pharmacists are also qualified to vaccinate. For childhood vaccinations, the surgeries and clinics of GPs and paediatricians are the main vaccination venues, with some countries also offering school vaccination programmes.

During COVID-19, many countries authorised broader categories of healthcare professionals to administer vaccines in response to the increased need for vaccinators because of the public health emergency. Access to vaccination was also simplified through administration of the influenza vaccine, and in some countries the COVID-19 vaccine too, in pharmacies. While this was already the case for other vaccines (mainly the influenza vaccine) in some countries prior to the pandemic, this practice was extended with the advent of COVID-19. For vaccination against seasonal influenza, and in some cases COVID-19, access was simplified by administration in pharmacies.

Finally, adult vaccinations are mostly free of charge at the point of delivery for recommended target groups. However, in some countries, an out-of-pocket payment is required. Childhood vaccinationsare mostly free for recommended target groups, either at the point of delivery, or through the reimbursement of out-of-pocket payments. For the MenC vaccine, financing varies across Europe, as this vaccine is not always included in vaccination programmes due to a low incidence of disease outbreaks..

The centralisation or regionalisation of services also plays a role in the vaccination journey. Local municipalities and regional governments can be the main actors in a patient's steps to vaccination. Regionalised Member States have more complex systems involving numerous bodies with a variety of competences throughout the vaccination provision chain.

3.2. Outreach methods

Diverse outreach methods with a view to informing and reminding citizens of the benefits of vaccination may improve uptake among the general population. A variety of outreach methods have been identified across Member States, which can be clustered into six outreach categories:

Healthcare professionals: including general practitioners (GPs), paediatricians, specialised doctors where travel risks are involved, school healthcare staff, healthcare professionals (HCPs), pharmacists, doctors in maternity hospitals, child health clinic nurses, HCPs in hospitals/emergency rooms, HCP home visits during maternity leave, recommendations from specialised doctors treating high-risk groups, family doctors, gynaecologists, midwives, health services.

Administration locations: including Well-baby clinics, employers' premises, hospitals, schools, mobile vaccination points, private medical companies.

Digital channels: including information websites, media outlets, digital invitations (SMS, email, etc.), online patient platforms, digital vaccine information, dedicated COVID-19 vaccination website, SMS reminders.

Paper channels: including invitation letters, information pamphlets and material provided during pregnancy and maternity leave, information pamphlets sent to parents.

National communication: including national awareness campaigns, national public register (letter, phone, SMS).

Health institutions: including National Health Institutes, municipal health officials, regional outreach activities, local governmental initiatives, National/Federal Vaccination Committee, local governmental vaccination programmes, NGOs.

3.2.1. Outreach methods for childhood vaccination

Healthcare professionals play a key role in outreach to promote childhood vaccination across EU Member States. In particular, general practitioners (GPs) and paediatricians are the main communicators and sources of information throughout the vaccination journey for children and adolescents, in particular for the Polio, MMR, MenC, and HPV vaccines.

The HCPs survey revealed that on average across Member States, vaccines are discussed with patients in more than half of consultations with both GPs (54%) and pediatricians (62%). However, a non-negligible proportion of HCPs think that patients would (often, or always) leave if they tried to persuade them to be vaccinated, with rates ranging from 13% to 15%. This perception might have implications for how vaccine-related conversations are approached in practice, including HCPs' communication style and willingness to initiate discussions.

School healthcare personnel, school nurses and school doctors play a key role in promoting vaccination uptake among children and adolescents. Their involvement goes beyond clinical care, encompassing direct engagement with students and families, as school health professionals actively inform and remind children, adolescents, and their parents about vaccination. This outreach method is particularly prominent in 11 EU Member States (BE, EE, IE, ES, HR, CY, LU, HU, SI, FI, SE) for HPV and in 7 (BE, IE, ES, HR, AT, FI, SE) for Polio, MMR, and MenC vaccines.

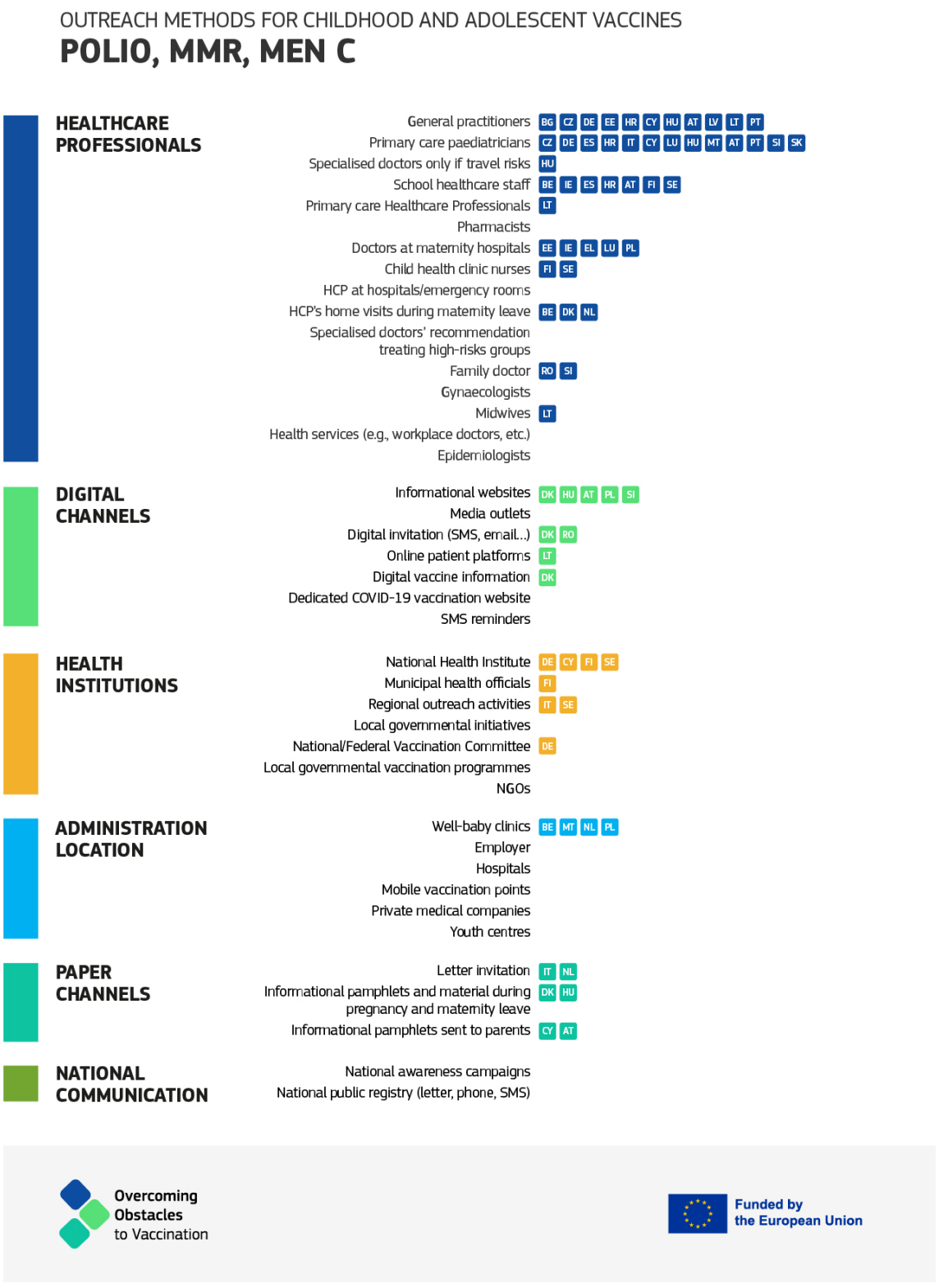
National Health Institutes are an important source of information around childhood and adolescent vaccination. Despite this, a majority of parents (from 66% to over 88% across Member States) in the survey population reported that vaccines for children were never recommended by international, national or local health institutes. The most frequently recommended vaccine was COVID-19, reported by respondents at a rate ranging from 12.4% in Lithuania to 33.5% in Malta. Recommendations of other vaccinations were reported comparatively

less. This suggests that communications from these organisations may lack sufficient visibility or resonance with the general population. In contrast, healthcare professionals report a high level of trust in official sources of information. This finding may suggest a disconnection between the credibility of these sources among experts and their actual impact on public awareness.

In the HCPs survey, HCPs report high levels of trust in information from official sources. National health authorities, international organisations, and pharmaceutical companies are considered highly reliable, with at least 85% of HCPs expressing trust. Trust in national governments (77%) and EU institutions (75%) is a little lower, and falls sharply for the media (38%) and online platforms like social networks (28%).

Figure 6 sets out the most common outreach methods in the EU Member States for Polio, MMR and Men C vaccines. These methods do not differ from the main outreach approaches described above for all vaccines. The only notable distinction, when compared with the methods used for HPV vaccination, concerns the role of Well-baby clinics which have a specific role in promoting these vaccines and providing information.

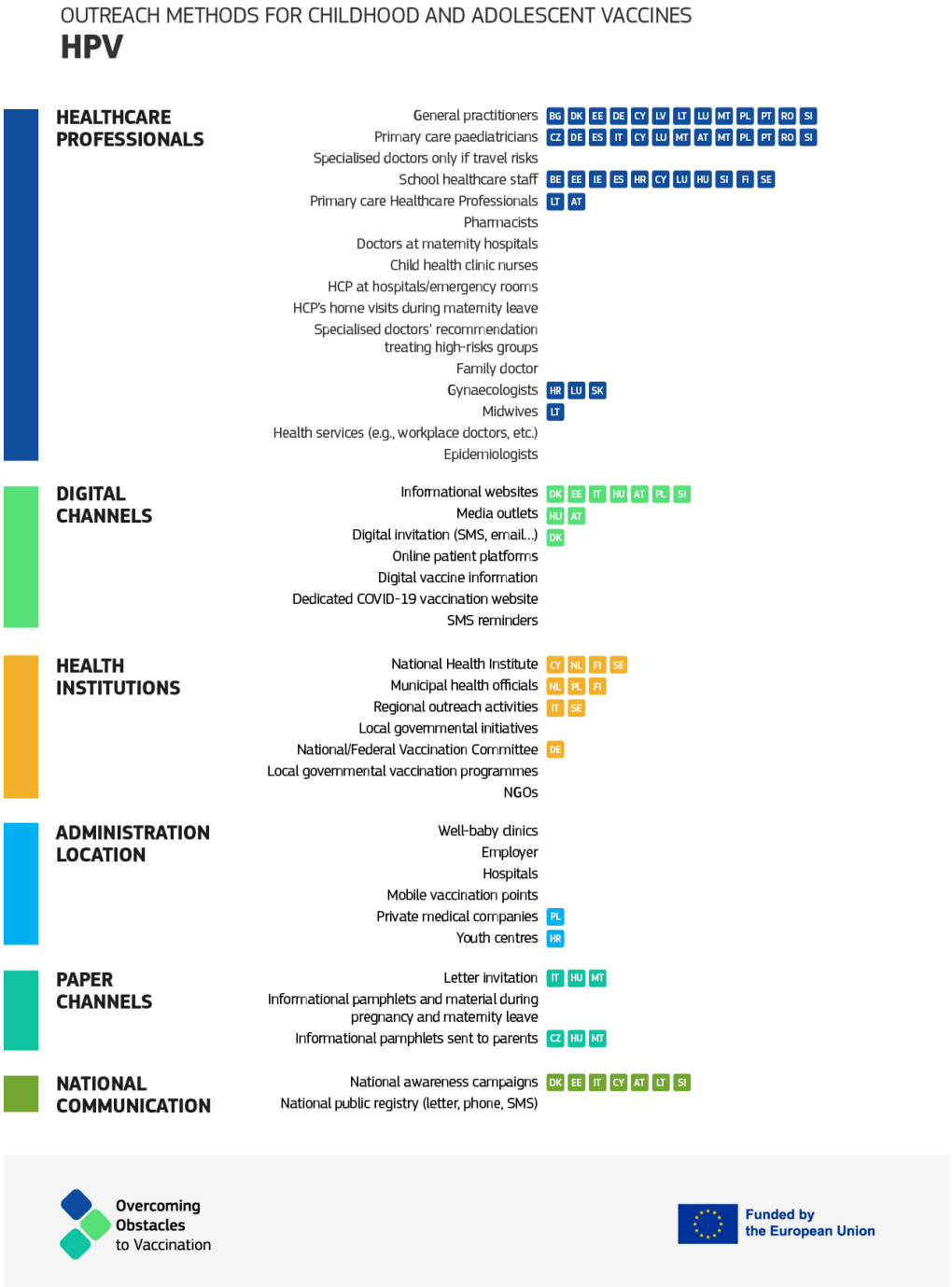
Figure 6 Outreach methods for childhood and adolescent vaccines



Reaching HPV target populations involves certain outreach methods distinct from those used for other childhood vaccines. As for other vaccines, general practitioners, paediatricians and information websites remain the key communication channels for informing children and their parents about HPV

vaccination. Country-specific outreach methods for HPV vaccination exist across Member States, complementing more commonly used approaches. National awareness campaigns also play a significant role in informing the general population about the schedule and the benefits of HPV vaccine, especially given the unique challenges in reaching HPV target population compared with other childhood vaccines. This outreach method was identified as key in seven EU Member States (DK, EE, IT, CY, AT, LT, SI), where such campaigns are actively used to educate the general population about HPV vaccination.

Figure 7 Outreach methods for HPV vaccines



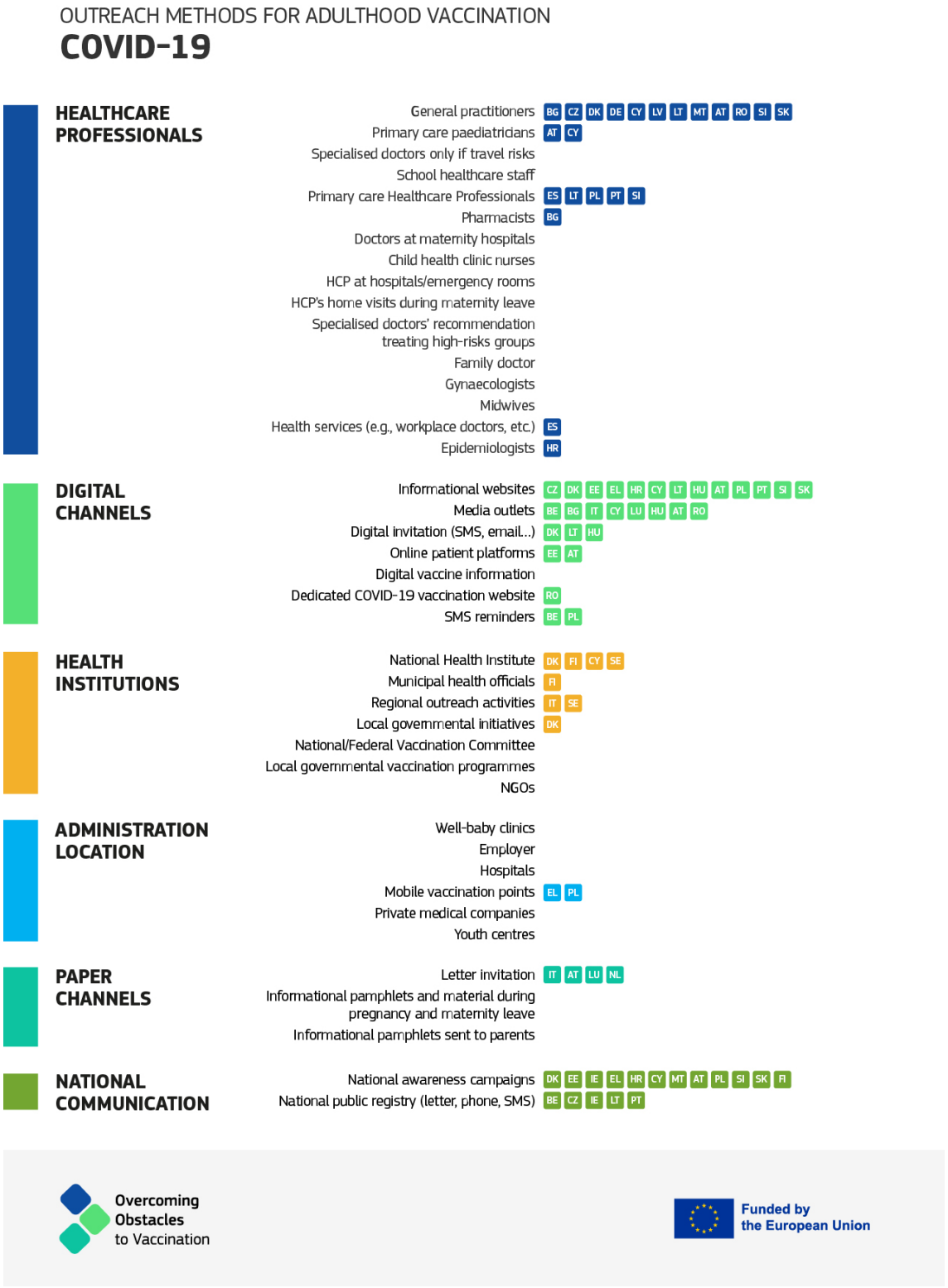
From the population survey it emerged that, unlike other childhood vaccines such as MMR and Polio, which are consistently recommended by both GPs and paediatricians across MS, the HPV vaccine is less frequently recommended by GPs except in France, where it is the vaccine most widely recommended by GPs (44%). National HPV awareness campaigns have a significant impact on public recall. The percentage of respondents remembering an HPV awareness campaign ranges from 29.7% in Luxembourg to 56.1% in France.

3.2.2. Outreach methods for adult vaccination

When it comes to adult vaccination, GPs and national awareness campaigns are the primary channels for informing patients across EU Member States. GPs serve as key sources of information for several vaccines: they were particularly active in communicating about COVID-19 in 12 countries (BG, CZ, DK, DE, CY, LV, LT, MT, AT, RO, SI, SK), influenza in 16 (BE, BG, CZ, DK, DE, EE, HR, LU, CY, LV, LT, NL, AT, PL, PT, HU), and tetanus in 17 (BG, CZ, DK, DE, EE, HR, IT, CY, LV, LT, NL, AT, PL, PT, RO, SI, SK). Among healthcare professionals, pharmacists too contribute to public information efforts around COVID-19 and influenza in some countries.

Digital channels and in particular national websites play a significant role in raising awareness and providing accessible information. Information websites are used as key outreach tools for COVID-19 vaccination in 13 Member States (CZ, DK, EE, EL, HR, CY, LT, HU, AT, PL, PT, SI, SK), and also support influenza vaccination efforts in eight countries (BE, CZ, DK, CY, HU, AT, PL, PT).

Figure 8 Outreach methods for adulthood vaccination (COVID-19)

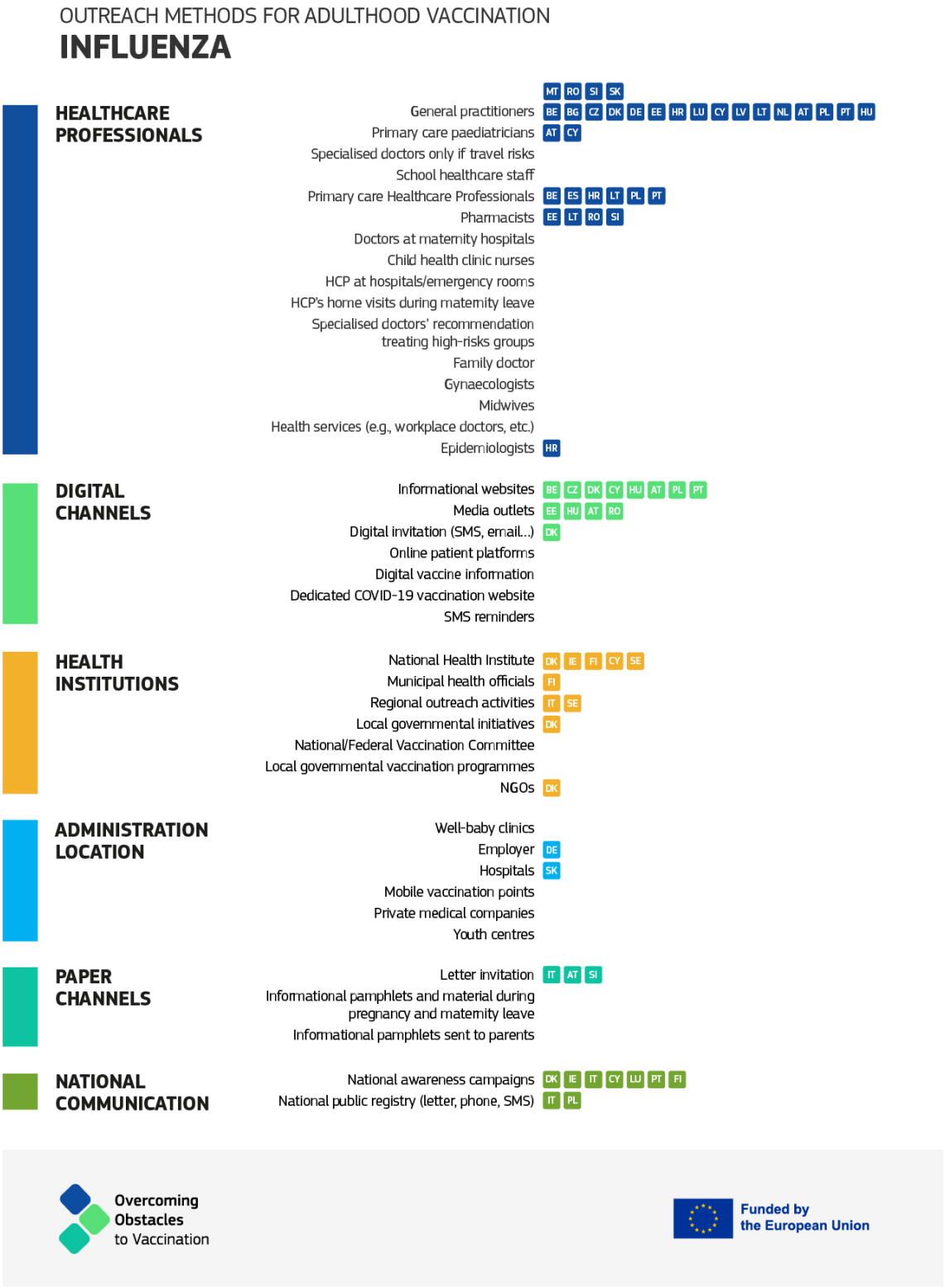


The population survey reported that across EU Member States, the influenza vaccine is the most widely recommended by GPs while HPV is the least

recommended. Influenza is the most recommended vaccine by GPs in 14 Member States, most prominently in Ireland (52.2%), Germany (49%), Italy (48.5%) and Spain (47.4%). The lowest rate is found in Sweden (17.5%). DTP is the vaccine most recommended by GPs in eight Member States, with the highest rates found in Germany (57.1%), Luxembourg (53.4%) and France (51%). COVID-19 is the most recommended vaccine in five Member States, among which Ireland has the highest rate (48.6%). In no Member State is HPV is reported to be the most recommended vaccine.

Outreach channels to promote the influenza vaccine and raise awareness of vaccination programmes include media outlets and annual campaigns (Figure 9). The appointment of ‘champions’ as advocates to raise awareness and encourage people to be vaccinated also plays a significant role across Member States. Targeted vaccination campaigns for specific population groups are also employed for vaccination against influenza. Some other outreach strategies to promote vaccination against influenza were also identified.

Figure 9 Outreach methods for adulthood vaccination (influenza)



At least half the survey respondents across the EU 27 recall seeing public campaigns for vaccination against influenza, with few exceptions. The highest

result was found in France, wheree 80.6% of respondents recalled seeing influenza campaigns.

3.3. Pre-administration requirements

Following the outreach stage, a series of steps have been identified that lead up to the administration of vaccines across Member States. These represent pre-administration requirements (e.g. the medical prescription and parental consent) and vary depending on national regulations, particularly when it comes to childhood and adolescent vaccination.

3.3.1. Pre-administration requirements for childhood vaccination

The two most common pre-administration requirements for childhood and adolescent vaccination across Member States are a medical prescription and parental consent (either oral or written). How these requirements are implemented in practice varies across countries.

In the HCP survey, 80% of HCPs reported that prescribing vaccines is among their responsibilities. Around 60% of HCPs reported being involved in childhood vaccinations, 18% work exclusively with children and 44% with both children and adults.

Parental consent is also commonly required, but the form it takes varies. In certain countries (e.g. MT, PT) the presence of a parent or legal guardian is equivalent to parental consent, thereby reducing administrative steps and improving access to vaccination. In other cases the rule is broader: parental consent is given orally if a parent is present when the vaccine is administered, or in writing if not, depending on the vaccination setting. In countries with school immunisation programmes, written parental consent is typically required and must be submitted to the school on the day of vaccination.

In the case of HPV vaccination, a prescription is required in eight Member States (BG, DK, FR, LT, AT, PL, SK, SE) and written parental consent is required in nine countries (EE, IE, HR, IT, HU, AT, PL, RO, SK). In France, for example, a prescription needs to be provided for the vaccination of adolescents against HPV outside the target group.

In Spain and Estonia, focus group participants who were parents or legal guardians of children perceived the HPV vaccination process as very straightforward, since it is administered in school, and they are only required to sign a consent form.

3.3.2. Pre-administration requirements for adult vaccination

For adult vaccines, i.e. COVID-19 and influenza, adults need a prescription prior to vaccination in six Member States (BE, DK, LT, NL, AT, PL). However, this requirement does not apply to all countries. In some countries and for certain vaccines no prescription is needed for individuals within the target group.

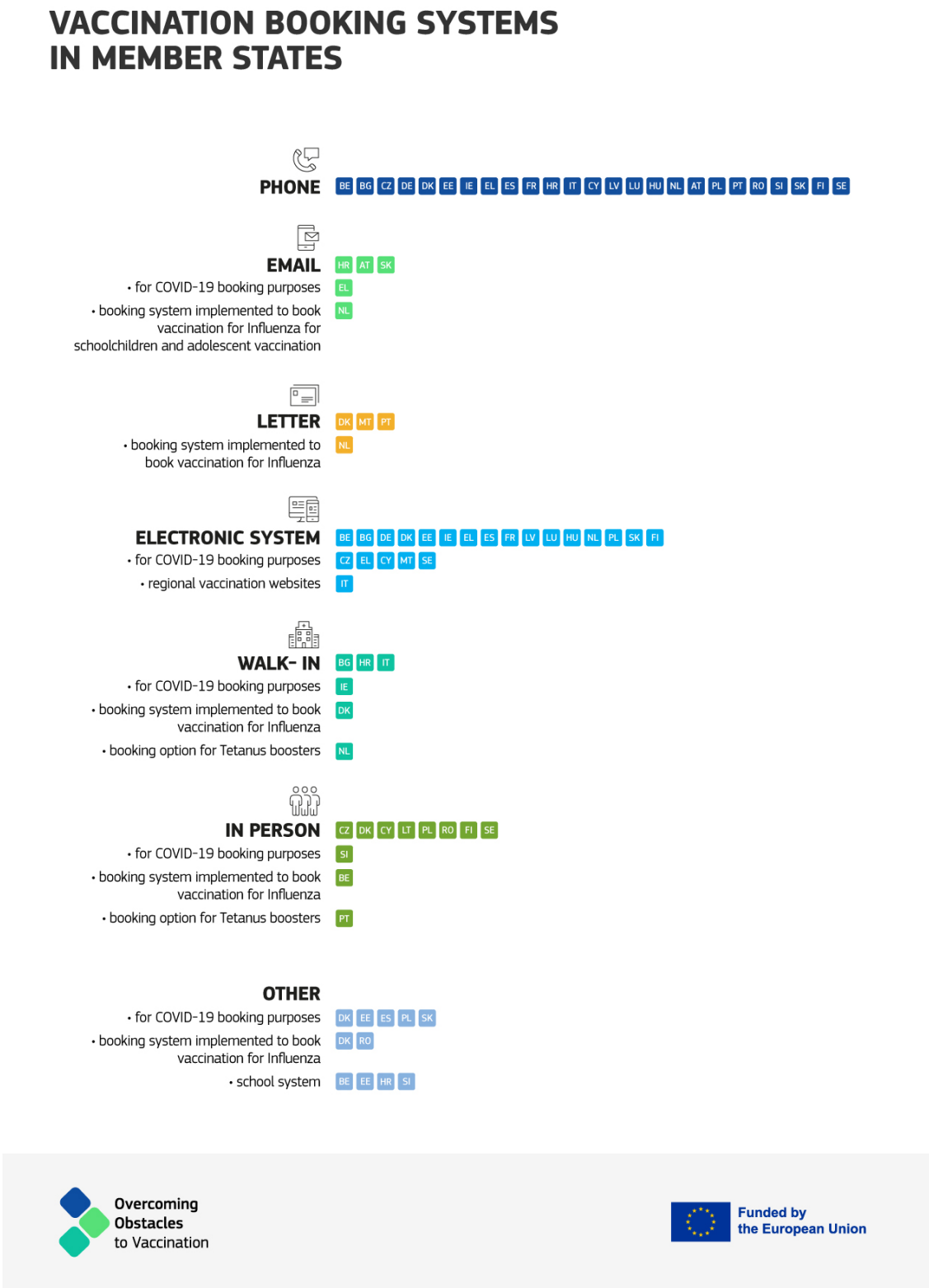
For influenza, the most common pre-administration requirement is a prescription. In some countries (DK, CY, LT, LU, AT, PL, PT, RO, SE) the vaccine needs to be purchased in a pharmacy with a medical prescription for patients outside the recommended target group. On the other hand, no prescription is required for patients within the target group. For tetanus boosters a prescription may be a requirement either for administration or for the purchase of the vaccine in pharmacies.

As noted for childhood vaccinations, the requirement for a medical prescription is reflected in the roles of HCPs surveyed, with 80% indicating involvement in prescribing vaccines. Of these respondents, 80% work in adult vaccinations, 34% exclusively so, and 44% work in both adult and children vaccinations.

3.4. Booking systems

A variety of booking systems exist across Member States (Figure 10). The most common booking system, used in 25 Member States, involves making a phone call to the vaccinating physician or the relevant healthcare centre. The use of electronic booking systems is also widespread (16 Member States: BE, BG, DE, DK, EE, IE, EL, ES, FR, LV, LU, HU, NL, PL, SK, FI), but the design and implementation of these systems vary greatly and not all online systems are necessarily implemented across the whole country, in particular in those countries where responsibility for the implementation of vaccination programmes is devolved to the regional level. For example, six Member States (DK, EE, LT, LU, HU, NL) have nationally centralised electronic systems, while in four countries (BG, IT, PL, FI) online booking systems are provided by health centres and are designed and implemented at regional level.

Figure 10 Vaccination booking systems in Member States



The COVID-19 pandemic forced most Member States to diversify their booking systems to ensure fast, efficient and effective bookings. The new booking options introduced as a result of the pandemic include an expansion of electronic booking

systems, the option to book an appointment at a pharmacy, and booking via national mobile applications or national websites.

Booking systems for influenza vaccination are diverse and include booking directly at a pharmacy, walk-in visits in different health centres, physical letters and emails to patients.

Finally, it is important to mention the role of schools in the booking system, as they facilitate the delivery of childhood vaccines in many Member States, specifically in the case of vaccination against HPV. When vaccination is organised in schools, the vaccination journey for parents is simplified, as they do not need to make an appointment or take the children to a vaccination centre.

3.5. Diversity of vaccination locations

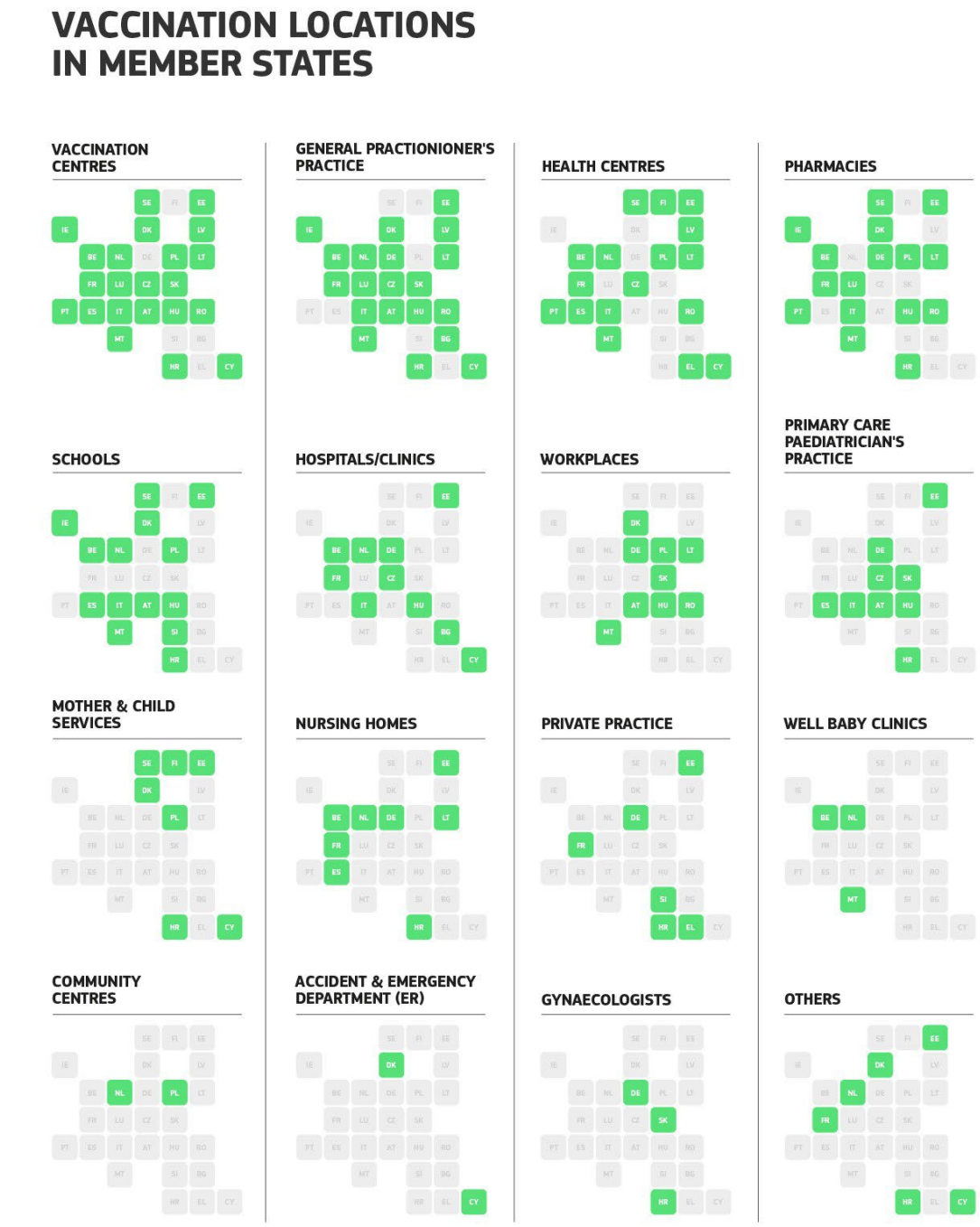
The vaccination location plays an important role in facilitating the vaccination journey. The most common locations across Member States are vaccination centres, GP practices, healthcare centres and pharmacies, as shown in figure 11. The degree of diversity of vaccination locations varies across Member States. While in some countries, vaccines are administered in a range of locations, thus facilitating the implementation of vaccination programmes, other countries have a limited range of vaccination locations.

Schools represent an important setting for vaccination delivery in 14 Member States (SE, EE, IE, DK, BE, NL, PL, ES, IT, AT, HU, MT, SI, HR), particularly through widespread school immunisation programmes targeting children and adolescents. For example, in Estonia and Ireland, the second shots of MMR and HPV vaccines are administered in schools. In Malta, the vaccines against polio, tetanus and MenACWY are administered at school, while in Spain, all childhood and adolescent vaccines are administered in schools.

The segmentation and regionalisation of Member States also affects the diversity of services and, therefore, the vaccination locations. In some countries, municipal health services can play an important role in providing physical locations for the administration of vaccines. For example Finland has established self-governing wellbeing counties under the national reform of healthcare, social welfare and rescue services to ensure more equal healthcare services (including vaccination)[3].

[3] https://stm.fi/en/wellbeing-services-counties

Figure 11 Vaccination locations in Member States



Overcoming Obstacles to Vaccination

Funded by the European Union

3.6. Financing of childhood and adult vaccines

Vaccination financing mechanisms vary across EU Member States, but childhood vaccines are generally well supported. In most countries, vaccines such as polio and MMR are provided free of charge at the point of delivery, either universally or for specific target groups. Specific financing mechanisms are in place for different vaccines depending on the Member State, reflecting differences in national immunisation policies and target population strategies.

For childhood and adolescent vaccination against MMR, tetanus, MenC and HPV, vaccines are free of charge for everyone in seven Member States (CZ, DE, IE, IT, LU, MT, PT) and free of charge for target groups in two Member States (EL, NL). Funding for MenC vaccination in Europe can be divided into three categories. The vaccination is free for everyone in eight EU Member States (CZ, DE, IE, HR, IT, LU, MT, PT), free only for a defined target group in six (DK, EL, ES, CY, NL, SI, SE) and free for at-risk groups in two (EE, FI). Seven countries (BE, BG, FR, HU, AT, PL, RO) require up-front payment for this vaccine. The financing of HPV vaccination can be divided along similar lines. The vaccine is free of charge at the point of delivery in most EU Member States (BE, BG, CZ, DK, DE, EE, IE, EL, ES, HR, IT, CY, LV, LT, LU, HU, MT, NL, AT, PT, RO, SI, FI, SE). Three Member States (FR, PL, SK) require an up-front payment (reimbursed subsequently) for administration of the HPV vaccine.

Financing mechanisms for adult vaccination also vary across Member States, with many offering full or partial coverage depending on the vaccine and the target population. For vaccination against COVID-19, all Member States (27) provide vaccination free of charge at points of delivery for the entire adult population[4]. Most Member States (BG, CZ, DE, DK, EE, IE, EL, ES, FR, HR, IT, CY, LV, LT, LU, HU, MT, AT, PL, PT, RO, SI, SK, FI, SE) provide the vaccine for adult influenza vaccination free of charge at the point of delivery. The financing of this vaccine nevertheless falls into two categories: in 11 EU Member States (ES, FR, IT, LT, HU, MT, AT, SI, SK, FI,SE) it is free of charge for the entire population while in 14 (BG, CZ, DK, DE, EE, IE, EL, HR, CY, LV, LU,PL, PT, RO) it is free at the point of delivery for targeted groups.

[4] Over the years practices may have changed in some Member States.

4. Physical, practical and administrative barriers to vaccination across Member States

Key messages

This section provides an overview of the physical, practical and administrative barriers to vaccination across Member States.

The main barriers identified are:

Administrative and practical barriers: 25 Member States. These barriers refer to the steps an individual takes to make an appointment and receive a vaccination, as well as the steps taken by HCPs to source and provide the vaccine. They also concern issues related to the national health system and the vaccination monitoring system.

Outreach of vaccination services: 24 Member States. This type of barrier relates to the lack of available information and low levels of awareness among the public and HCPs, larger-scale outreach activities, low frequency or absence of reminders and insufficient staff training in terms of soft skills and communication.

Availability of HCPs: 24 Member States. These barriers refer to the number of healthcare professionals who are available, trained and authorised to administer a vaccination.

Convenience of vaccination services: 23 Member States. These barriers relate to opening hours, vaccination venues and the user-friendliness of the booking system.

Financial obstacles: 21 Member States. These barriers relate to the implications of the financial costs of providing vaccines for health authorities, and financial implications for the public in receiving the vaccine. Other costs relate to factors such as transport costs, or loss of earnings if there is a need to take time off work.

Geographical proximity to vaccination services: 21 Member States. This concenrs the proximity and convenience of vaccination services.

Availability and supply of vaccines: 15 Member States. Physical availability and a sufficient supply of vaccines can be an issue in some Member States. These barriers relate to a number of system challenges such as production capacity, administrative procedures, logistics and regulatory issues.

This chapter analyses the physical, practical, and administrative barriers identified through the mapping of vaccination journeys across EU Member States. These types of barriers reflect systemic gaps and obstacles that citizens may encounter during their vaccination journey. In conjunction with behavioural attitudes towards vaccination at an individual level, practical, physical and administrative obstacles may reduce the likelihood of individuals being inclined and willing to get vaccinated.

4.1. Barriers to vaccination across Member States

In the aftermath of the COVID-19 pandemic, the identification and analysis of structural barriers is particularly relevant. During the pandemic, health systems around the world endured unprecedented levels of strain. It is therefore paramount for health authorities to identify limitations in the system as well as potential solutions, not only to improve efficiency and effectiveness but also to futureproof health systems.

The diverse types of barriers identified in each of the EU27 Member States can be grouped into seven high-level categories, each containing specific barriers, as shown in the table below. The high level barriers are: outreach of vaccination services; administrative or practical steps required in order to be vaccinated; geographical proximity to vaccination services; convenience of vaccination services; availability of healthcare professionals (HCPs); supply of vaccines; financial requirements of vaccination services.

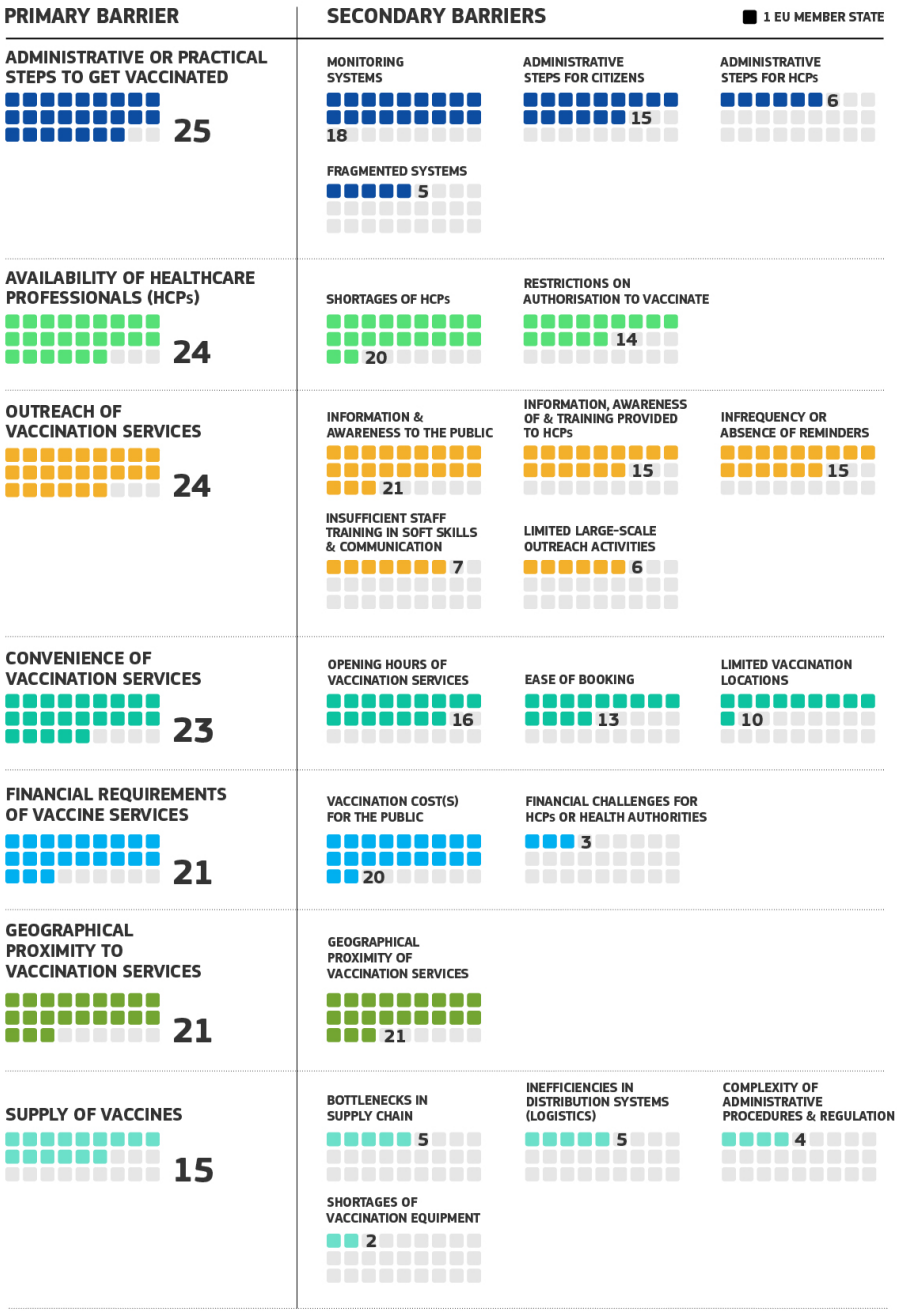
Table 2 Barriers and sub-barriers

Areas of barriers	Examples of specific barriers
Outreach of vaccination services: this type of barrier relates to the lack of information available and low levels of awareness among the public and HCPs, larger-scale outreach activities, low frequency or absence of reminders and insufficient staff training in terms of soft skills and communication.	- Information and awareness of the public. - Information, awareness of and training provided to HCPs. - Limited large-scale outreach activities. - Low frequency or absence of reminders. - Insufficient staff training in soft skills and communication.
Administrative or practical steps required in order to be vaccinated: these barriers refer to the steps an individual takes to make an appointment and receive a vaccination, as well as the steps taken by HCPs to source and deliver the vaccine. They also concern issues related to the national health system and the vaccination monitoring system.	- Administrative steps for citizens (booking system, lengthy times, parental consent, extra steps). - Administrative steps for HCPs (ordering vaccines, issuing prescriptions, delivery). - Fragmented system (existence of different systems in place for vaccines). - Monitoring systems (lack of register, data collection provision).
Geographical proximity to vaccination services: the proximity and convenience of vaccination services.	- Geographical proximity of vaccination services (rural, urban).
Convenience of vaccination services: these barriers relate to opening hours, vaccination venues and the user-friendliness of the booking system.	- Opening hours of vaccination services. - Limited vaccination locations (schools, healthcare centres, GPs, paediatricians, community health clinics, private practices, pharmacies, workplace). - Ease of booking.
Availability of Healthcare Professionals (HCPs): these barriers refer to the number of healthcare professionals who are available, trained and authorised to administer a vaccination.	- Shortages of HCPs. - Restrictions on authorisation to vaccinate (limited number of physicians authorised to vaccinate).

Areas of barriers	Examples of specific barriers
Supply of vaccines: physical availability and sufficient supply of vaccines can be an issue in some Member States. These barriers relate to a number of system challenges such as production capacity, administrative procedures, logistics and regulatory issues.	- Bottlenecks in supply chain. - Shortages of vaccination equipment. - Inefficiencies in distribution systems (logistics). - Complexity of administrative procedures and regulation.
Financial requirements of vaccine services: these barriers relate to the implications of the financial costs of providing vaccines for health authorities, and the financial implications for the public when being vaccinated. Other costs relate to factors such as transport costs, or loss of earnings if there is a need to take time off work.	- Vaccination cost(s) for the public (e.g., where vaccines are not free of charge, incidental costs such as transport costs, time off from work, etc.). - Financial challenges for HCPs or health authorities (risk of business loss when HCPs are in charge of buying and storing vaccines, forecasting number of vaccines).

The figure below summarises the barriers of a physical, practical and administrative nature identified across Member States. The most common barriers concerned the administrative and practical steps needed to be vaccinated, followed by availability of HCPs, outreach of vaccination services and convenience of vaccination services. Financial requirements, geographical proximity of vaccination services and vaccine supply also emerged as possible barriers to vaccination. The sections below provide details of the specific barriers identified in the Member States.

Figure 12 Overview of barriers identified across Member States



4.1.1. Outreach of vaccination services

Barriers related to the outreach of vaccination services were identified in 24 Member States (BE, BG, CZ, DE, EE, IE, EL, ES, FR, HR, CY, LV, LT, LU, HU, MT, NL, AT, PL, RO, SI, SK, FI, SE). These are obstacles to vaccination such as lack of available information and awareness among the general public, low HCP awareness of vaccination, lack of updated HPC and public knowledge of vaccine-

related information, low frequency or absence of reminders, insufficient staff training in terms of soft skills and communication vis-à-vis the interaction with patients, and insufficient large-scale communication activities.

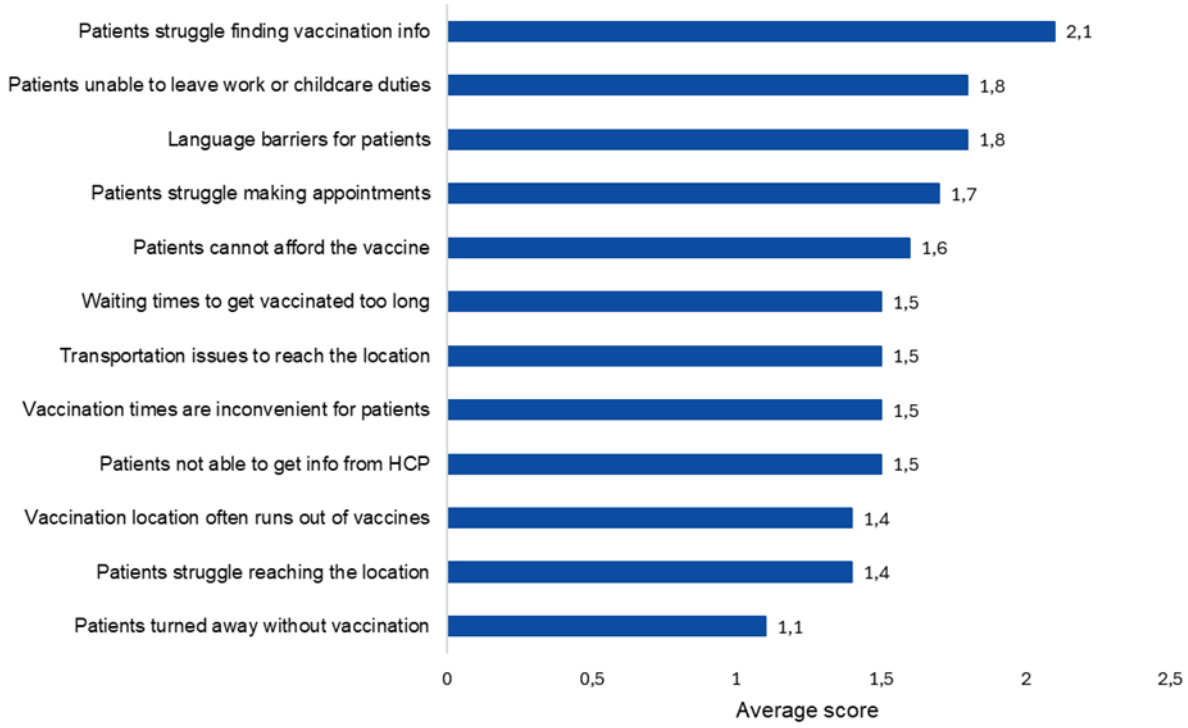
A lack of information and awareness represent an obstacle to vaccination in 21 countries (BE, BG, CZ, DE, EE, ES, FR, HR, CY, LV, LT, LU, HU, MT, NL, PL, RO, SK, SI, FI, SE). Most frequently this barrier refers to the lack of information and awareness about the importance of vaccines (BE, CZ[5], DE, ES, FR, HR, CY, LV, LT, NL[6], PL, RO, SI, SK). This barrier was mentioned specifically in relation to hard-to-reach populations, such as migrants, homeless people and Roma people.

As shown in Figure 13, healthcare professionals identify patients' difficulty in finding adequate vaccination information as the most significant barrier to vaccination. Survey data from the public show that this difficulty varies depending on the vaccine. People report significantly more difficulties with DTP and HPV vaccines than with COVID-19 and influenza vaccines.

[5] Dáňová, J., Šálek, J., Kocourková, A., and Čelko, A. M. (2015). Factors associated with parental refusal of routine vaccination in the Czech Republic. Central European Journal of Public Health, 23(4), 321-323.

[6] Kroneman, K., M., & Verheij, V., R. (2007, April 7). De griepprik in Nederland: motivatie voor deelname en distributiekanalen. NIVEL. https://www.nivel.nl/sites/default/files/bestanden/griepprik-in-Nederland-maart-2003.pdf

Figure 13 HCPs' views on the presence of barriers to vaccination[7]



The population survey found that, while most patients are familiar with where to vaccinate children and where to get influenza and COVID-19 vaccines, knowledge drops significantly for adult DTP vaccines and is lowest for adult HPV vaccines. Knowledge of where to vaccinate children is generally high for all vaccines, with slightly lower rates for HPV, but still over 50%. In all Member States, approximately three-quarters of adults know where to go to be vaccinated against COVID-19 and influenza. Rates are comparatively lower for the DTP vaccine but still above 50% in most countries. Nearly half of adults do not know where to go to be vaccinated against HPV disease in 13 MS (BE, BG, CY, EE, EL, HR, IE, LV, MT, NL).

Lack of information and awareness about vaccination is prevalent not only among the general public, but also among healthcare professionals. This issue was

[7] HCP survey: When it comes to your own personal experience with the vaccination process, to what extent you agree with the following statements? (answer on a 8-point scale where 0 = Strongly disagree, 7 = Strongly agree).

identified in 15 countries (BE, BG, CZ[8], DE[9], ES, FR, HR, LT[10], LU, HU, AT[11], PL, RO, SK, FI), where insufficient knowledge and awareness among HCPs was reported. This barrier contributes to an information gap that hinders outreach to the target population in different ways:

11 Member States (BE, DE, ES, FR, HR, HU, LT, AT, PL, RO, SK) reported hesitancy among healthcare professionals to promote vaccination or inform patients about specific vaccines;

4 countries (BE, ES, HR, LU) reported that HCPs lack up-to-date knowledge about vaccines;

5 countries (BG, CZ, PL, FI) reported that HCPs have limited time available to provide in-depth information about vaccines.

The HCP survey showed that HCPs, across Member States, generally lack awareness of the type of vaccination reminders sent by the national call centre or indeed whether such a centre exists. HCPs also have a generally limited awareness of whether a centralised online booking system is available in the country.

The HCPs survey found that while most HCPs acknowledge their responsibility to inform patients about vaccination, nurses and pharmacists are generally less likely to see this as part of their role. This difference is consistent across Member States and probably reflects their more peripheral role in vaccine administration, compared with GPs and paediatricians.

Figure 14 HCPs' views on their responsibility to inform patients[12]

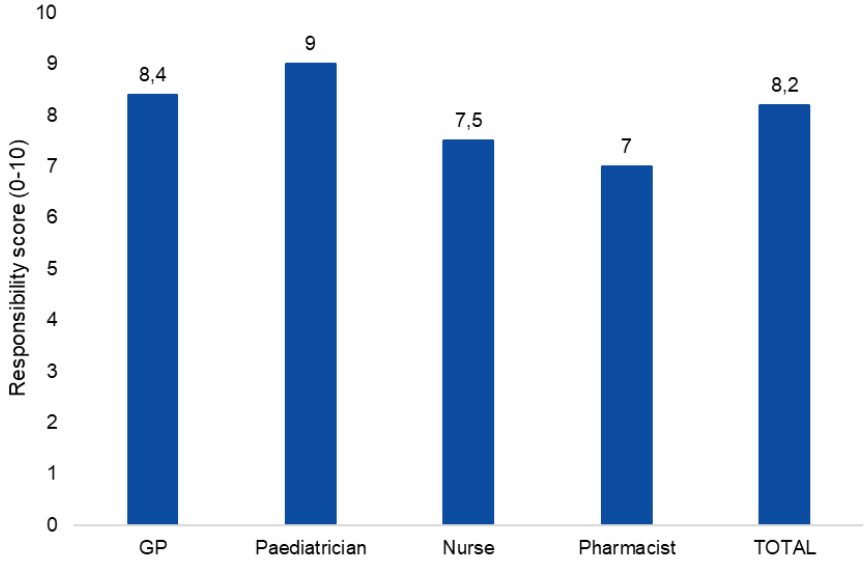
[8] Moravec. V. & Volek. J. (2021). Praktičtí lékaři ve stínu pandemie. Vybrané otázky z dotazníkového šetření pro Institu komunikačních studií a žurnalistiky FSV UK. Agentura Focus. Retrieved on 20 April 2023 from: https://www.infomore.cz/res/file/analyzy/20210305-ockovani-pl/20210305-ockovani-pl.pdf

[9] Bundeszentrale für gesundheitliche Aufklärung, Einstellungen, Wissen und Verhalten von Erwachsenen und Eltern gegenüber Impfungen – Ergebnisse der Repräsentativbefragung 2021 zum Infektionsschutz, 2021.

[10] Valstybine ligoniu kasa prie Sveikatos apsaugos ministerijos (n.d.), www.ligoniukasa.lrv.lt

[11] Sandhofer, M. J., Robak, O., Frank, H., & Kulnig, J. (2017). Vaccine hesitancy in Austria: a cross-sectional survey. Wiener klinische Wochenschrift, 129(1-2), 59-64. doi: 10.1007/s00508-016-1062-1. Vaccine hesitancy in Austria: A cross-sectional survey - PubMed (nih.gov)

[12] Population survey. On a scale of 1 to 10, to what extent do you feel that it is your responsibility to recommend vaccines to your patients? (0 = Not at all responsible, 10 = Very responsible).



Another outreach barrier is the infrequent use or absence of reminder systems that support the target population in adhering to the nationally recommended vaccination schedule in a timely and effective manner. This barrier was identified in 15 countries (DE[13], EE, IE, EL, FR, HR, CY, LV, LT, LU, HU, AT, RO[14], SK, FI). Specifically, the most frequently mentioned barrier was the infrequent nature or absence of automated reminders to inform citizens about upcoming follow-up doses to complete the vaccination cycle. As suggested by the survey data, reminders for childhood vaccinations are even less effective than those for adult vaccines, especially COVID-19.

Insufficient training in specific transversal and interaction skills among healthcare professionals was reported in seven Member States (BE, DE, ES, FR, HU, NL, AT). This barrier affects outreach by weakening the patient-provider relationship and making it harder for patients - especially those from diverse cultural backgrounds or with disabilities - to access vaccination services. In some countries (BE, DE, ES, FR), the inadequate communication skills of HCPs were perceived as adversely impacting perceptions and awareness of the benefits of vaccination among the general public.

The need for larger-scale outreach activities (e.g. awareness-raising campaigns) was also reported in six Member States (CY[15], LT, HU, PL, AT, RO) due to the

[13] Bundeszentrale für gesundheitliche Aufklärung, Einstellungen, Wissen und Verhalten von Erwachsenen und Eltern gegenüber Impfungen – Ergebnisse der Repräsentativbefragung 2021 zum Infektionsschutz, 2021.

[14] Mindcraft stories (2019), Registrul vaccinărilor, între inovație și „Big Brother” [Vaccination registry, between innovation and “Big Brother”] https://mindcraftstories.ro/sanatate/registrul-vaccinarilor-intre-inovatie-si-big-brother

[15] Republic of Cyprus (2017), National Strategy for the Rights of Children in Health 2017-2025, Republic of Cyprus (in Greek)

insufficiency of general information and communication on the benefits of vaccination.

4.1.2. Administrative and practical barriers

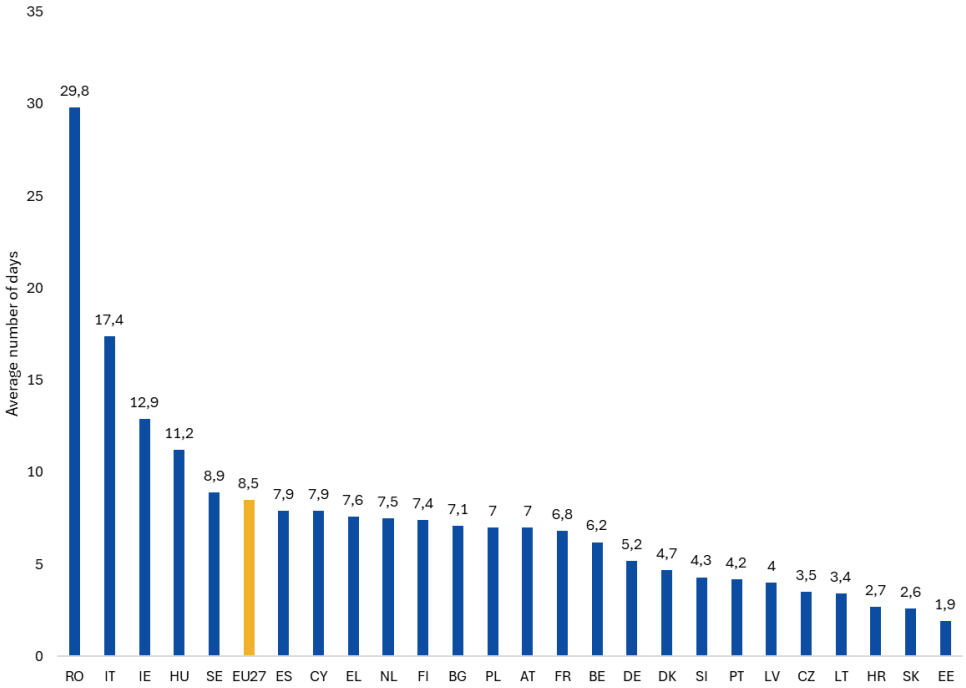
Administrative and practical barriers to vaccination were identified in 25 Member States (BE, BG, CZ, DE, EE, IE, EL, ES, FR, HR, IT, CY, LV, LT, LU, HU, MT, NL, AT, PL, PT, RO, SK, FI, SE). These barriers fall into two types: one is the existence of fragmented vaccination systems (e.g. different local or regionalised systems) and monitoring systems (e.g. lack of registers or data collection provisions). The other type concerns the administrative and practical steps that individuals must take to be vaccinated and that HCPs must follow in order to administer a vaccination - for example, booking an appointment, obtaining a prescription, receiving the vaccine; or, in the case of HCPs, obtaining supplies and issuing prescriptions.

Barriers to vaccination related to the fragmentation of the immunisation monitoring and information system were identified in 18 countries (BE, BG, CZ, DE, IE, EL, ES, FR, HR, CY, LT, LU, HU, MT, AT, PL, PT, SE). This barrier includes the challenges to accurate monitoring that arise in countries where digital systems are lacking and paper booklets are still used, often resulting in lost vaccination information. It also includes the absence of a centralised vaccination register, which makes it difficult to record vaccinations and collect vaccination coverage data - this barrier was reported in 13 countries (CZ, DE, IE, EL, ES, HR, CY, LT, LU, HU, AT, PL, SE).

Complicated procedures and/or the multuple administrative and practical steps the public need to complete in order to access vaccination (i.e. the booking system, lengthy times, the need for parental consent or extra steps) were identified as a barrier in 15 countries (BE, CZ, DE, IE, EL, FR, IT, LT, LU, HU, NL, PL, PT, RO, SK). This barrier manifested in various ways, including multi-step vaccination journeys requiring prescriptions and visits to multiple locations; long delays due to limited appointment availability or staff shortages; and legal or procedural requirements such as obtaining parental consent, which can lengthen and complicate access to vaccination.

The HCPs survey revealed that the average waiting time for adults and adolescents in the EU – from booking a vaccine appointment to receiving the vaccination - is 8.5 days.

Figure 15 Average waiting time (number of days) for adult and adolescent vaccinations[16]

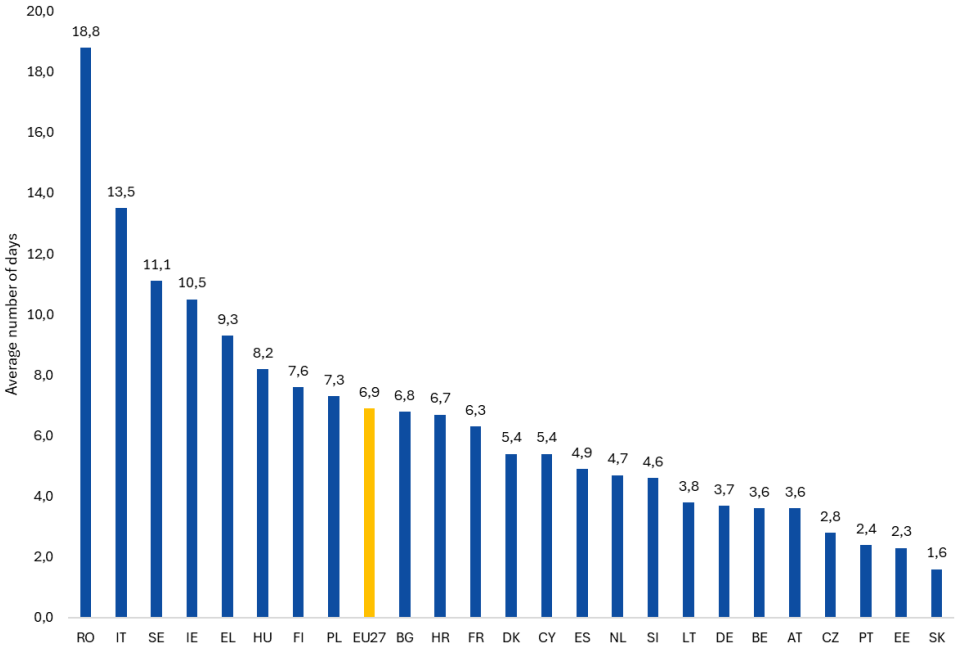


The HCPs survey showed that the average waiting time for childhood vaccination in the EU, from booking a vaccine appointment to receiving the vaccination, is 6.9 days.

Figure 16 Average waiting times (number of days) for childhood vaccinations[17]

[16]HCP survey: When it comes to the vaccination process, what is the average waiting time (in days) for the following vaccines for teenagers and adults? (the figure shows the combined averages across HPV, Influenza, DTP and Covid-19).

[17] HCP survey: When it comes to the vaccination process specifically for children, what is the average waiting time for the following vaccines? (the figure shows the combined averages across Polio, MMR, Menungococcus-C).



4.1.3. Geographical barriers

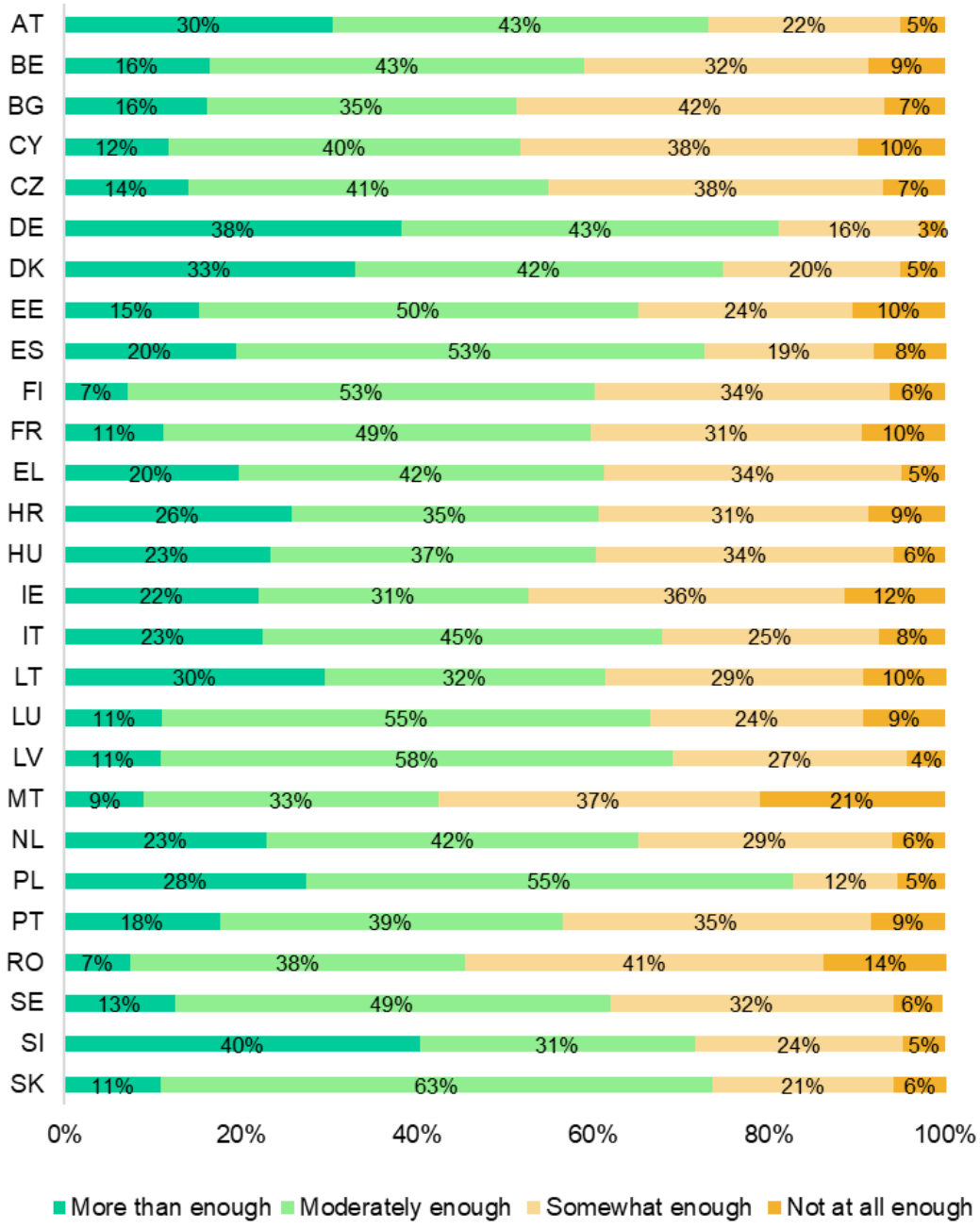
Geographical barriers relate mostly to the proximity and convenience of vaccination services. In 21 Member States (BE, BG, CZ, DK, IE, EL, ES, FR, HR, CY, LV, LT, HU, NL, AT, PL, PT, SI, SK, FI, SE) the lack of geographical proximity represents a barrier to vaccination. Patients need to travel long distances to reach vaccination sites in 15 countries (DK, IE, EL, ES, LV, LT, HU, NL, AT, PL, PT, SI, SK, FI, SE), perhaps with high transport costs.

The population survey also identified transport costs as one of the main barriers across Member States. For adult vaccines, more than a third of respondents, in all Member States, reported transport costs as a barrier. In Austria, Czechia, Germany, Estonia, Finland, Latvia, Slovenia and Hungary over 60% of respondents cited this factor. For childhood vaccines, the majority of parents (62% on average) in 19 Member States, reported that transport costs represent a barrier to vaccination. In Austria, Lithuania, Latvia, Estonia and Slovenia, transport was reported as a barrier to all vaccines by around 70% of respondents.

Patients living in rural areas, which are typically underserved by healthcare practitioners, face greater challenges due to the geographical distance from vaccination sites. This was also confirmed by focus groups in Bulgaria, Estonia and Spain.

The population survey investigated geographical barriers, asking participants about the presence of vaccination services in their area and how accessible these were. In 24 Member States, more than 50% of respondents reported that there were ‘more than enough’ or ‘enough’ vaccination places within easy reach in their area.

Figure 17 Citizens' perception on whether enough places that provide vaccination can be reached without too much difficulty[18]

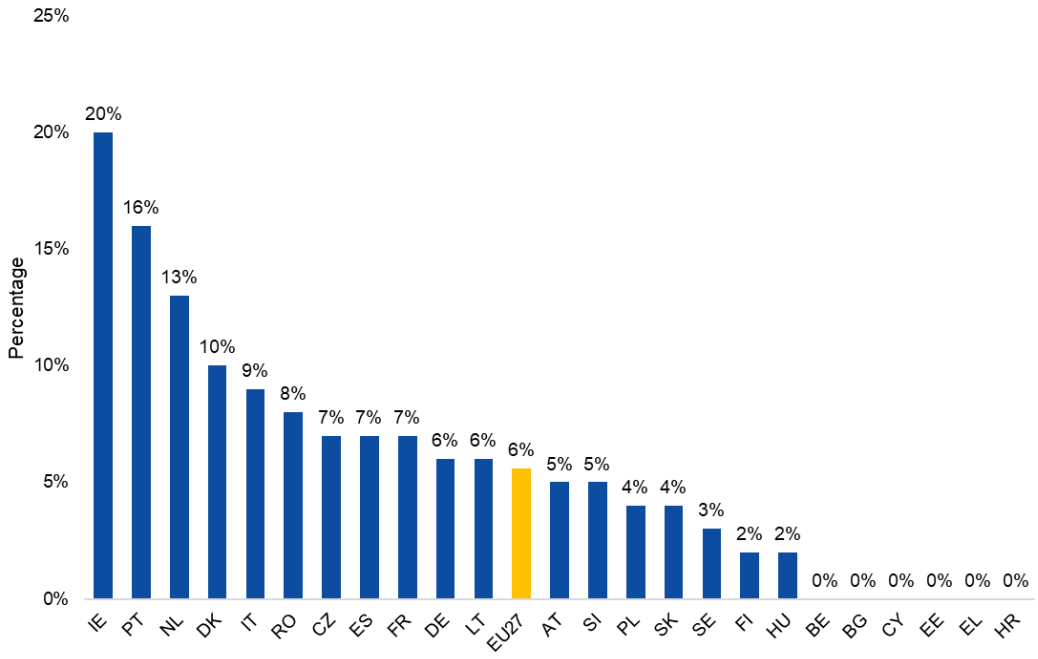


The HCPs survey shows that, in most EU27 Member States, practitioners identified transport improvements as the main measure to improve vaccination uptake. HCPs in Ireland (20%), Portugal (16%) and the Netherlands (13%) were

[18] Population survey: Thinking about the area you live in, to what extent do you think there are enough places that provide vaccinations that you can reach without too much difficulty?

most likely to believe that improving transport routes and location accessibility was key. In six Member States (BE, BG, CY, EE, EL and HR) this option ('better transport routes and access to location') was not selected by any respondents.

Figure 18 Share of HCPs who think that better transport routes and access to location could make the national system more effective[19]



4.1.4. Convenience of vaccination services

Barriers related to the convenience of vaccination services include aspects such as opening hours, convenient and user-friendly booking systems and the availability of vaccination locations. These types of barriers are common in the EU and were identified in 23 Member States (BG, CZ, DK, DE, EE, EL, ES, FR, HR, IT, CY, LV, LT, HU, NL, AT, PL, PT, RO, SI, SK, FI, SE).

In 16 Member States (CZ, DK, EE, EL, IT, CY, LV, LT, HU, NL, AT, PT, RO, SI, SK, FI) healthcare centers have limited opening hours, which often clash with working hours and school hours. This represents a convenience barrier for patients.

The limited accessibility/convenience and user-friendliness of the booking system was reported as challenge in 13 Member States (DE, EL, ES, FR, HR, CY, HU,

[19] HCP survey: If it was in your power, and you had to choose only one of the following measures to improve vaccination uptake, which one would you choose? Answer options: better transport routes and access to location; better training for vaccine administrators; free vaccination services; leave days dedicated to getting vaccinated; frequent distribution of information material; other measures.

AT, PL, PT, RO, FI, SE). This may limit patients' ability to effectively monitor and manage their own vaccination needs through the system. For example, in eight Member States (EL, DE, HR, CY, LT, HU, AT, PL) the lack of digital booking system was said to make the vaccination journey less accessible. However, it is worth noting that the use of digital tools might also be a barrier for less digitalised people or people living in areas with limited internet coverage (e.g. in remote areas) or people with no internet at home. This was noted in Spain, Portugal, Finland and Sweden.

The limited number of vaccination locations could also limit the accessibility and convenience of vaccination. This barrier was reported in 10 countries (BG, CZ, EE, EL, CY, HU, PL, RO, SI, SE). In some countries, vaccines cannot be administered in pharmacies, at school or at work (unless the workplace has a dedicated vaccination room and doctor), thus reducing accessibility. In other cases, the vaccination premises could be difficult to access by elderly people or persons with disabilities.

4.1.5. Financial obstacles

Financial obstacles concern difficulties resulting from the various potential costs, both for citizens and HCPs. These may include out-of-pocket payments when buying the vaccines, transport costs, loss of earnings for citizens, or costs for HCPs linked to the purchase and storage of vaccines.

Financial implications for citizens were identified as a possible barrier in 20 Member States (BE, BG, CZ, DK, DE, EE, EL, ES, IT, CY, LV, LU, HU, NL, AT, PL, RO, SI, SK, SE). These include situations where vaccines are not free of charge, transport costs or loss of earnings. The main financial barrier for the public seems to be out-of-pocket payments for people who are not included in a target group for recommended vaccines; this was identified as a possible barrier in 17 countries (BE, BG, CZ, DK, DE, EE, ES, IT, CY, LU, HU, NL, AT, PL, RO, SI, SE). In Hungary, Austria, Poland, Romania and Slovenia the purchase cost of non-mandatory vaccines was reported as a possible barrier (e.g. the Meningococcus C vaccine).

Financial implications for the public can take various forms. According to the population survey, the need to pay for the vaccination itself is not a major financial concern for most patients. However, the financial burden may also arise from transport costs to attend the vaccination facility. This was identified as a significant barrier in 13 countries (BG, CZ, DK, EL, ES, LV, HU, AT, PL, RO, SI, SK, SE), mainly due to geographical accessibility issues in rural areas.

In the population survey, over 60% of respondents reported that transport costs were a barrier in eight Member States (AT, CZ, DE, EE, FI, LT, SL, HU), and at least 50% did so in six MS (ES, IE, LT, PL, PT, SE).

4.1.6. Avaialbility of HCPs

In most EU Member States (24: BE, BG, CZ, DK, DE, EE, IE, EL, ES, FR, HR, IT, LT, LU, HU, NL, AT, PL, PT, RO, SI, SK, FI, SE), the availability of healthcare professionals (HCPs) presents challenges to the vaccination journey. This barrier primarily stems from a shortage of general practitioners (GPs) in many countries and restrictions on the number of professionals authorised to administer vaccinations. These two issues result in limited personnel available for vaccination services, leading to longer waiting times for patients and increased workloads for HCPs.

A general shortage of HCPs was reported in 20 Member States (BE, BG[2021], CZ, DK, DE, IE, ES, FR, HR[22], LT, LU, HU, NL, PL, PT[23], RO, SI, SK, FI, SE). In Germany[24], Ireland[25], Spain, France[26], Romania and Slovakia there was an emphasis on the shortage of HCPs in rural areas.

Restrictions on the number of professionals allowed to administer vaccines was identified as a barrier in 13 countries (BG, CZ, DE, EE, EL, HR, IT, HU, LU, NL, AT, SI, SK). In these 13 countries, only medical doctors are authorised to vaccinate patients, while in other countries (CZ, DE, LU, HR, NL, SK, SI) other

[20] Наръчник за оценка на здравословното състояние на бежанците и мигрантите в ЕС/ЕИП. (2015). European Commission. https://health.ec.europa.eu/system/files/2016-11/handbook_healthprofessionals_bg_0.pdf

[21] https://www.nsi.bg/bg/content/

[22] Hrvatski zavod za zdravstveno osiguranje (2021). Ugovoreni sadržaji zdravstvene zaštite u RH, https://hzzo.hr/zdravstvena-zastita/zdravstvena-zastita-pokrivena-obveznim-zdravstvenim-osiguranjem/ugovoreni

[23] CFP (Conselho de Finanças Públicas) (2022). Evolução do Desempenho do Serviço Nacional de Saúde em 2021. Relatório nº7/2022. https://www.cfp.pt/uploads/publicacoes_ficheiros/cfp-rel-07-2022.pdf.

[24] Kassenärztliche Bundesvereinigung, Regionale Verteilung der Ärztinnen und Ärzte in der vertragsärztlichen Versorgung, 2021.

[25] McNally, T. (2022) Over 1,600 GPs need to be hired before 2028 as concern grows over shortage, The Journal. https://www.thejournal.ie/more-gps-needed-5664914-Jan2022/#:~:text=There%20are%20currently%20an%20average,be%20between%201.02%20and%201.1.&text=THE%20OIREACHTAS%20HEALTH%20Committee%20has,meet%20population%20needs%20by%202028.

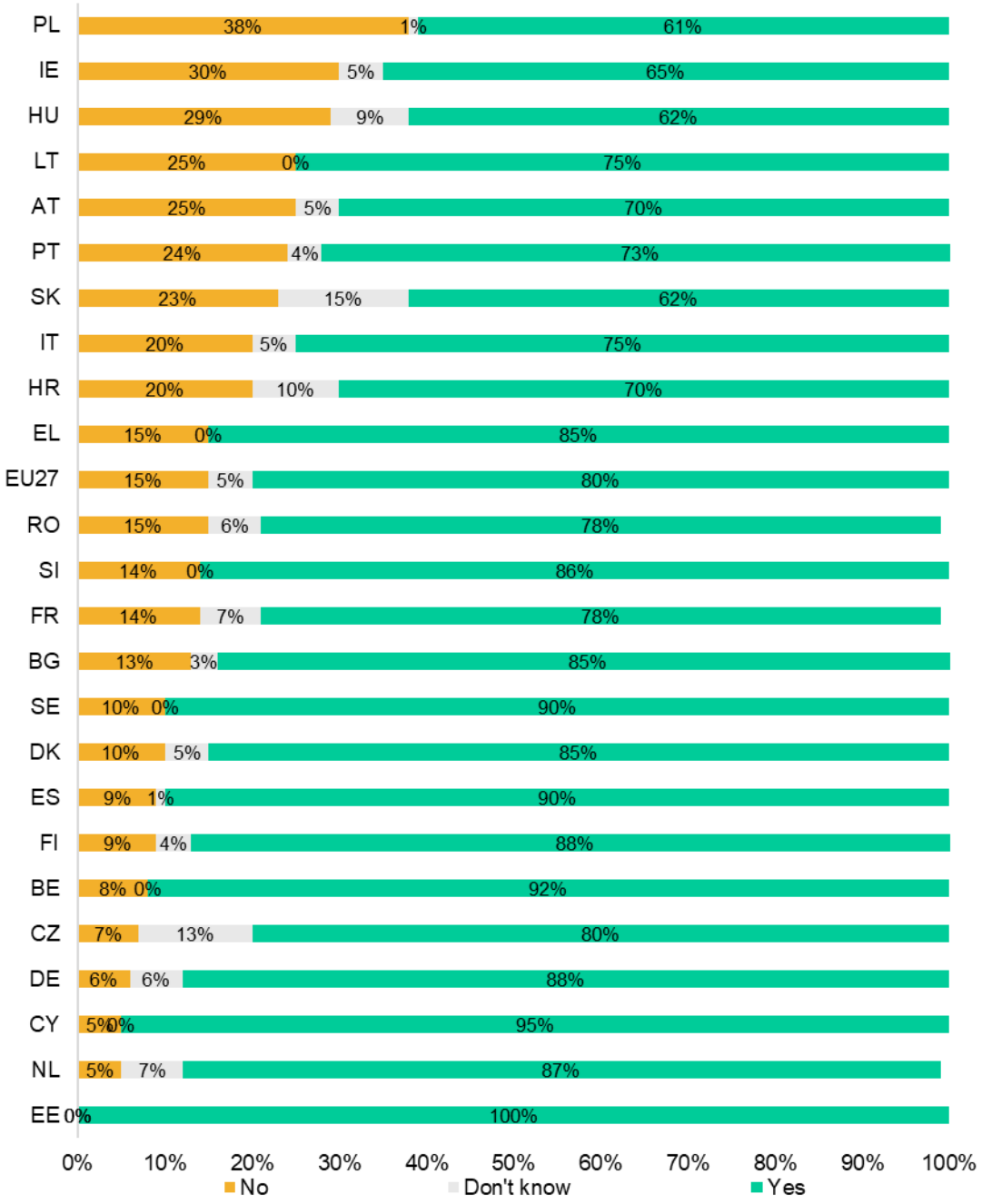
[26] Zarifi, F. & Casteele, A. V. (2022, October 23). Pourquoi y a-t-il une pénurie de médecins en France ? Le Monde. https://www.lemonde.fr/societe/video/2022/10/23/pourquoi-y-a-t-il-une-penurie-de-medecins-en-france_6147002_3224.html

health professionals such as midwives or nurses are allowed to vaccinate patients under supervision and/or following specific training.

The HCPs survey showed that in Europe, 15% of respondents believe that there are not enough vaccinators in their country.

Figure 19 Share of HCPs reporting the presence of enough vaccinators[27]

[27] HCP survey: When it comes to people that can administer vaccines, do you feel that there are enough in the area or community in which you work?



4.2. Barriers faced by hard-to-reach groups

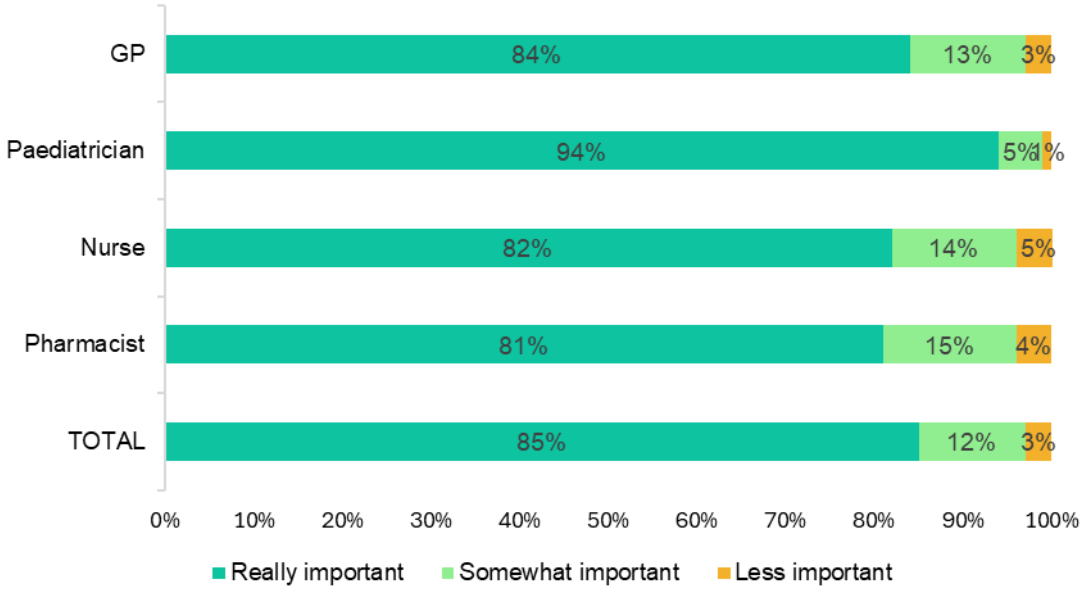
Depending on the patient's needs, the impact of the barriers to vaccination may differ across population groups. Among Member States five main subgroups have been identified, and the impact of the barriers on these groups is likely to be exacerbated by the specific vulnerabilities faced by these groups and intersectionality. Under-represented groups analysed in this section include i)

refugees, migrants, and undocumented people, ii) homeless people, iii) people from the Roma community or Travellers, iv) people living in rural areas, and v) people with disabilitites.

The most prominent barrier for hard-to-reach populations concerns outreach services and, in particular, the lack of information and awareness about the importance of vaccines. This challenge was mentioned specifically in relation to migrants (including undocumented migrants) in eight Member States (BG, CZ, EE, IE, LU, MT, RO, SE), and to Roma people in three (BG, CZ, RO). For these groups, access to vaccination services is made more complex owing to an information gap, a lack of awareness or reduced language skills (e.g. difficulty in understanding the system, difficulty in making an appointment without being registered with a GP). The language barrier and the unavailability of information in different languages were mentioned in Spain, Austria, Cyprus, Latvia, Hungary, Finland and Sweden. In Sweden the language barrier was identified as one of the most common barriers to vaccination for specific groups (e.g. minority language groups and/or migrants).

The practitioners survey revealed that in Europe, more than 80% of practitioners believe they have a central role in communicating about vaccines and making vaccination understandable, especially for vulnerable groups.

Figure 20 Share of HCPs agreeing or disagreeing on the important of the health professional roles in making vaccination understandable, especially for vulnerable groups[28]



[28] HCP survey: In your view, how important is health professionals' role in making vaccination understandable to their patients, and especially to vulnerable groups (language and health literacy)

Hard-to-reach groups also face administrative and practical challenges. For instance, migrants and undocumented people face other 'entry-point' barriers in the lack of registration in national health systems and registers. In Belgium, the Netherlands, and Portugal it is necessary to have an identification card or to have been registered in the health system prior to vaccination, which is rarely the case for undocumented migrants. Respondents in many countries highlighted the fact that undocumented migrants tend to avoid medical facilities for fear of being reported to the authorities. In Greece, the fact that in most cases refugees, migrants and undocumented people do not have proof of their medical history was reported as a specific issue.

Similarly, homeless people face barriers due to the fact that they have no identification documents or regular address. This was identified as a common barrier in Belgium, Portugal, Romania and Slovenia, where such people are hard to reach. In addition, this category is rarely registered with a GP. In Czechia and Spain, the outreach barrier and the difficulty of passing on information to homeless people was identified as an issue.

The fact that a majority of people in the Roma community and Travellers do not have a permanent address or are not registered in national systems creates outreach difficulties for the health authorities in Belgium, Czechia, Ireland[29] and Romania. For example, in Romania, Roma people are often not registered with a GP and therefore are neither informed nor reminded of the vaccination schedule.

[29] K C Dixon, Mullis, R., Blumenfeld, T (2017) Vaccine uptake in the Irish Travelling community: an audit of general practice records, J Public Health, 1 (39). 235-241. doi: 10.1093/pubmed/fdw088

5. Determinants of vaccine uptake

Key messages

This section examines the main system-level factors that influence vaccine uptake, focusing on practical, physical, and administrative determinants rather than individual attitudes alone. The analysis focuses on three broad categories of barriers: (1) outreach and information barriers, (2) geographical and convenience barriers, and (3) administrative and systemic barriers. These categories are shown to have a measurable impact on vaccination rates across EU Member States.

Outreach and information barriers include insufficient public awareness, lack of reminders, and weak involvement of local healthcare providers. When people are not proactively informed or reminded, even those willing to vaccinate may miss opportunities. The presence of large-scale outreach programmes and reminder systems is associated with significantly higher vaccine coverage.

Geographical and convenience barriers relate to the physical accessibility of vaccination services, such as the number and location of sites, opening hours, and travel requirements. Limited access points, inconvenient scheduling, and transport costs can all deter individuals from being vaccinated. Evidence shows that expanding the number of convenient locations and offering flexible hours can increase uptake by several percentage points.

Administrative and systemic barriers refer to how vaccination programmes are organised and integrated into routine services. Fragmented delivery systems, complex booking or consent procedures, lack of integration with schools or workplaces, and inadequate record-keeping all create additional hurdles. Countries with streamlined, integrated systems, such as school-based vaccination or national immunisation registries, achieve higher coverage.

This chapter also highlights the critical role of healthcare providers: active engagement and recommendations from general practitioners and paediatricians are strong determinants of vaccine uptake. Socio-demographic factors (age, education, health status, parenthood, and trust in vaccines) also play a role, but the focus is on system-level determinants that can be addressed through policy and programme design.

Finally, this chapter links these determinants to the project's pilot interventions, reminder schemes, mobile units, and school-based vaccination, which were each designed to address specific barriers. The pilots demonstrated that targeted interventions can lead to measurable improvements in vaccination coverage, providing practical blueprints for scaling up effective strategies across Europe.

This chapter first discusses the broad categories of key barriers, outlines the determinants of uptake in general that emerge from these barriers and finally describes how the three clusters of pilot interventions addressed the barriers.

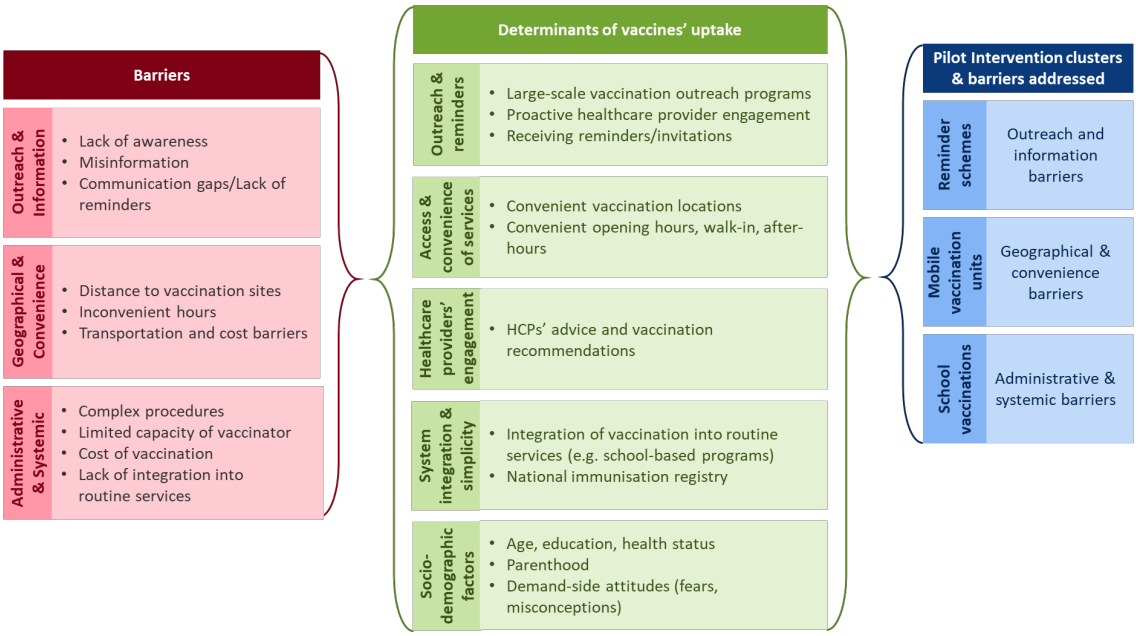
5.1. From mapping of barriers to determinants of vaccination

Vaccination uptake is influenced by a blend of individual factors (like age, health beliefs, trust) and system-level factors (like how easy and accessible vaccination services are). This analysis focuses on the latter – the practical, physical, and administrative determinants that can either facilitate or hinder vaccinations. These determinants largely align with barriers that can be removed through policy interventions.

As part of the activities carried out as part of Task 1, three high-level categories of barriers have been identified: (1) Outreach and information barriers, (2)

Geographical and convenience barriers, (3) Administrative and systemic barriers. These categories roughly correspond to the main 'physical, practical, administrative' obstacles detailed and highlighted in the previous sections. In turn, as explained in the chapter, these categories of barriers are linked to the clusters of interventions piloted in EU Member States.

Figure 21 Interlinks between barriers, determinants of vaccines and pilot interventions



5.1.1. Outreach and information barriers

This category covers insufficient public awareness and reminder mechanisms. It encompasses cases where people are willing to vaccinate but simply lack knowledge or forget due to the absence of effective outreach. Key manifestations of this barrier include: lack of large-scale campaigns about the importance of vaccines, no reminder notices for upcoming or overdue shots, and low involvement of local healthcare providers in actively calling patients. When such conditions prevail, many individuals not actively opposed to vaccination still end up unvaccinated because “nobody told them” or the information lacked salience. Our data showed that in countries without broad outreach, adults were less likely to realise they needed a booster or an additional vaccine dose. For example, before introducing their reminder system, authorities in Catalonia noted that uptake of the second MMR dose was lagging – not due to deep anti-vaccine sentiment, but because “people did not think of the MMR booster as important; they missed it because they missed the opportunity”: this illustrates a classic outreach gap.

This barrier category directly maps to the “Outreach of vaccination services” factor included in the country-level analysis, and, as discussed, the presence of outreach programmes was one of the strongest drivers of increased uptake. Therefore, lack of outreach/reminders is a crucial barrier to be removed – its effect is quantified as roughly a ~5-10% difference in coverage.

5.1.2. Geographical and convenience barriers

This category of barriers includes physical access issues and time/location convenience. It arises when vaccination opportunities are present, but not easily reachable or usable by all intended populations. Telltale signs of this barrier are: few vaccination sites (e.g., only central hospitals offer the vaccine), sites that are distant from certain communities (underserved rural areas or marginalised urban districts), inconvenient operating hours (e.g. only weekday mornings), or requirements that create extra steps (needing separate doctor visits to get a prescription, etc.). When faced with even moderate hassle, many people procrastinate or skip vaccines – as evidenced by the strong uptick when convenience is improved. In our analysis, this barrier corresponds to factors like “limited vaccination locations” and “geographical proximity”.

The model results for both adults and children showed a potential gain of about 4-7 percentage points when moving from a scenario of limited access to one of ample access. A relevant example is the contrast within countries: in Sweden, an extremely high-performing region had 99% MMR coverage, yet a lower-performing region in terms of vaccine uptake was ~93%. The analysis of the results revealed that the latter region had fewer child health clinics per capita, meaning some parents had to travel farther, leading to more missed vaccinations. Another example: in the Netherlands, it was observed that working parents sometimes delayed children’s shots because clinics were open only during working hours; when a pilot offered after-hours sessions and school-based delivery, those missing vaccinations dropped significantly.

Thus, ease of access – having many points of delivery and flexible hours – is critical. If this ease is lacking, we have an access barrier. Notably, this category also includes transport and cost barriers as they relate to convenience: if people have to pay for travel or vaccines (financial barrier) or cannot take time off (convenience barrier), uptake suffers. We consider those as part of the broader “practical barriers” umbrella.

5.1.3. Administrative and systemic barriers

This category refers to shortcomings in how vaccination programmes are organised and integrated into healthcare, which can pose hurdles even for motivated individuals. It includes fragmented delivery systems (no “one-stop” vaccination, requirement for multiple appointments or complex paperwork), lack

of integration into routine services (e.g. no school vaccination means an extra task for parents; no workplace flu clinics means employees must go in their own time), inadequate record-keeping and reminder infrastructure (no central registry to track who needs what), and insufficient workforce or training (e.g., only doctors can give vaccines and nurses/pharmacists are not authorised, leading to capacity limits).

It also covers financial costs when those are due to system design (for example, a country might require upfront payment for certain vaccines or not fully cover adult vaccines – effectively an administrative decision that creates a monetary barrier for some people). When these systemic factors are suboptimal, the effort or cost on the user's part is higher and uptake drops. For instance, in our study many countries cited the lack of a unified immunisation registry as an administrative barrier – without it, identifying and contacting unvaccinated individuals is difficult, leaving coverage gaps.

Another example is the lack of school-based adolescent vaccination: countries that rely solely on parents to schedule teen vaccinations have lower teen coverage on average than those that vaccinate during school hours. The data also show that where nurses or pharmacists are allowed to vaccinate, coverage tends to be higher (because it expands capacity and convenience), whereas strict rules requiring physician-only vaccination can bottleneck the system – one of our "what-if" model-based simulations showed nurse authorisation could raise flu vaccination for elderly people by a couple of percentage points in some countries.

Therefore, these issues can be grouped as systemic barriers – if the system fails to make vaccination a default easy process, people slip through. In practice, this barrier category is why some countries with otherwise high awareness still underperform – the desire may be there, but the execution is not user-friendly. Financial barriers fit here as well: if a vaccine is not free in the national programme, cost can deter a portion of the public. Indeed, the Task 1 findings showed out-of-pocket costs were reported as a barrier in over 20 EU countries for certain vaccines, and our models indicated that eliminating direct costs could potentially boost uptake by a few percentage points in those scenarios.

Each of these barrier categories ties back to specific country-level variables ("limited outreach," "limited locations," "fragmentation," "cost to public," etc.) that we used in our statistical models. All were found to significantly affect vaccine uptake. For example, to quantify the administrative barrier of fragmented services: the analysis noted that in countries where vaccination in schools was not available, the predicted adult uptake of some vaccines was lower – supporting the idea that absence of routine integration (school programmes) acts as a barrier. Another quantifiable example: countries reporting "written consent required" (an extra admin step for vaccines) had lower COVID-19 vaccine uptake; our model estimated that removing such a requirement could correlate with ~4-5% higher uptake in some cases.

It is also important to note that these barriers can intersect. For instance, a lack of outreach often goes hand-in-hand with system fragmentation – if no single entity is responsible for send-outs, people might not get reminded. Similarly, communities facing geographic barriers might also experience less outreach (rural communities often have both fewer services and less targeted communication). Therefore, to truly raise coverage, multiple barriers should be tackled together.

5.2. Key determinants of vaccine uptake

Building upon the identified barriers, it is essential to understand the key determinants that influence vaccine uptake. These determinants are closely linked to the barriers and provide a framework for addressing the challenges faced in increasing vaccination rates.

The modelling of the survey data enriched with country-level information showed that several quantifiable factors are significant determinants of whether people are vaccinated (based on an EU-wide survey and statistical modelling). The present section details those factors that emerged as the most significant – substantively and statistically – from our models.

5.2.1. Outreach and reminders

One of the strongest country-level determinants is the presence of large-scale vaccination outreach programmes. If a country implements extensive outreach (public awareness campaigns, reminder calls/texts, proactive healthcare provider engagement), uptake increases markedly. For example, the estimated model showed that in countries with large-scale outreach activities, adult diphtheria-tetanus-pertussis (DTP) vaccination likelihood was just above 70%, compared with slightly below 65% in countries without such outreach. In other words, not having proactive outreach corresponds to about a 5 percentage-point lower coverage on average – a substantial vaccine uptake gap. Another related factor is whether individuals receive reminders or invitations for vaccination. People who reported getting a reminder (by mail, SMS, etc.) were significantly more likely to be vaccinated. For instance, among older adults due for flu shots, those who received a mailed invitation had a nearly 3% higher uptake on average (with larger effects in some countries).

These findings underline that forgetfulness or lack of awareness is a major reason for missing vaccines – a gap that reminders and outreach can close.

5.2.2. Access and convenience of services

Physical and logistical access is another crucial determinant. If vaccination services are offered in many convenient locations (e.g. not only at clinics, but also in pharmacies, workplaces, schools, mobile units), more people attend. Our analysis shows that when the types of vaccination location are limited, uptake suffers. For adult DTP vaccination, we predicted an average probability of ~65% in countries with few or limited vaccination settings, rising to ~70% in countries with wider availability of vaccination sites

Similarly, for childhood vaccines like MMR, having “limited vaccination locations” was associated with lower coverage (~70% vs ~75% if that barrier is removed). In practical terms, bringing vaccination “closer” to people – through local clinics, mobile vans, or school-based programmes – could raise coverage by ~4–7 percentage points depending on the context. Convenient timing also matters: if vaccine clinics only operate in narrow hours, working parents or busy adults may miss out. Conversely, offering after-hours or walk-in opportunities increases uptake. These determinants all relate to the effort required from individuals – the easier we make it, the more people will be vaccinated.

5.2.3. Healthcare providers’ engagement

People are much more likely to vaccinate when encouraged by trusted healthcare professionals. A strong determinant identified is whether general practitioners (GPs), paediatricians, or other health officials actively recommend the vaccine. Where doctors regularly counsel patients to vaccinate, uptake is significantly higher. For example, in the models (described in Chapter 2. Methodology), if a GP or health organisation recommended an adult vaccine like MMR, the probability of the person being vaccinated went up by an estimated 10–15 percentage points. For childhood vaccines, having paediatricians deeply involved in vaccine outreach (e.g. discussing HPV shots with teens and parents) was associated with about a 9 percentage-point higher coverage on average (74% rising to 83% with strong paediatrician engagement). This underscores that while public campaigns are important, a personal “doctor’s advice” is often the final push that converts intent into action. In settings where such personalised guidance is lacking, that absence becomes a barrier.

5.2.4. System integration and simplicity

Another set of determinants relates to how well vaccination is integrated into routine services. If getting a vaccine requires navigating complex booking systems, separate doctor’s prescriptions, or multiple trips, some people drop out. For instance, countries where school-based vaccination programmes are in place tend to achieve higher adolescent vaccine uptake (because vaccination is built

into the school routine). Where parents must initiate everything via clinics, more teens miss vaccines. The results indicate that if a country adds a convenient school vaccination mechanism for, say, HPV, it could raise coverage by a few points (because it catches those who would otherwise not get around to it). Similarly, having a robust national immunisation registry that sends reminders or a default appointment is a determinant – countries with these systems (like Denmark) have higher completion rates, suggesting the system "automation" of vaccination helps. In contrast, if record-keeping is poor and no reminders are sent, many willing individuals might simply forget or not realise they are due.

5.2.5. Socio-demographic factors

Of course, uptake is also influenced by individual-level characteristics. In line with the survey data, factors like age, education, and health status played a role in the uptake of vaccines: for example, older age groups generally had higher COVID-19 vaccine uptake due to prioritisation, and those with more education tend to have slightly higher uptake, possibly due to greater health literacy. One demographic factor that stood out is parenthood – having children made adults in our sample slightly more likely to keep up with their own vaccines, perhaps reflecting a general health-seeking behaviour (or requirement for certain vaccines when around young kids). Another factor is trust and hesitancy, which vary by population: confidence in vaccine safety and importance is critical – where trust is low, no amount of reminders could help. Our scope here focuses on the practical barriers, but it is important to note that a target population's attitudes (fears, misconceptions) are also key determinants that can further enhance the effect of administrative and physical barriers, or, in turn, could be addressed through interventions such as outreach or improving access and the convenience of services. Moreover, these individual-level factors must be tackled through education and community engagement, complementing the removal of practical barriers.

In summary, the major determinants of vaccine uptake that emerge are those that can be influenced directly through policy interventions, as opposed to individual-level behavioural factors, which might require more complex, indirect measures to achieve a significant positive change: availability of information and reminders, ease of access (locations and scheduling), and system/policy-maker support through providers and integrated programmes. When these determinants are favourable (e.g. strong outreach, convenient clinics, proactive doctors), uptake improves significantly. When they are lacking, each missing measure manifests as a barrier that leads to lower coverage.

6. Interesting practices across Europe and mutual learning activities

Key messages

Health authorities across the EU submitted 24 interesting practices used to overcome practical, physical and administrative barriers to vaccination. Of these, five were selected as good practices to pilot in different EU MS:

- School vaccination programme in Murcia region (Spain)
- Mobile vaccination units to increase COVID-19 vaccination uptake (Netherlands)
- Offering the flu vaccine to children in three primary schools (Ireland)
- Su.Pr.Eme (Italy)
- Communication initiatives including reminder schemes to support childhood immunisation (Denmark)

On-site visits fostered mutual learning among HAs, through the exchange of in-depth knowledge about successful practices, assessment of the practices' transferability, the identification of context-specific barriers and enablers and building networks for further collaboration.

Strengths of practices visited included:

- Collaboration between health and education sectors to increase vaccine accessibility and health promotion
- The active involvement of nurses in vaccine administration
- Use of targeted communication strategies
- Importance of reliable, unified vaccination databases enabling tracking of vaccination rates and sending of reminders
- Tailored awareness-raising campaigns via mobile units to reach underserved communities
- Leveraging community figures as 'vaccination ambassadors'.

Nine Health Authorities - Austria, Croatia, Catalonia (Spain), Murcia (Spain), Estonia, Lithuania, Netherlands, Slovenia, and Sweden - committed to pilot a good practice in their own context to test transferability and effectiveness in overcoming similar vaccination barriers.

Piloting HA developed 'piloting protocols' following the Chrodis+ methodology & established a Local Implementation Working Group (LIWG)

In-depth study visits and dedicated peer-exchange meetings provided practical guidance to better understand the operational and strategic dimensions of the chosen good practices, combining theoretical input, peer exchange, and practical work sessions to support the design and implementation of pilot projects.

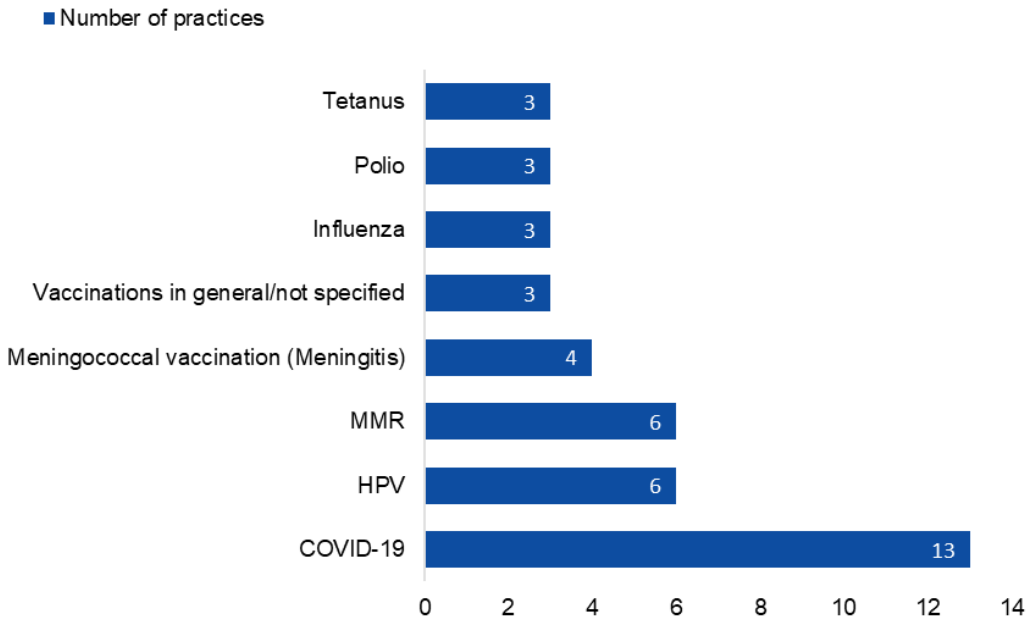
This section presents an overview of the collection of interesting practices across Member States, the selection of five good practices and the mutual learning activities carried out as part of the five on-site visits in host countries.

6.1. Interesting practices in Member States and selection of five good practices

The study team collected practices used by health authorities across the EU to overcome administrative, physical and practical obstacles to vaccination. The aim was to collect 10 national, regional and local vaccination practices from Member States' health authorities and select five to pilot in different European contexts to address similar barriers.

A total of 24 practices were received from 16 health authorities via the European Commission Best Practice Portal. Submissions came from health authorities across different countries across Europe, ensuring a diverse representation of successful vaccination strategies from various regions. The practices addressed various obstacles to vaccination, including physical, practical, and administrative barriers. They covered a range of vaccines such as COVID-19, HPV, MMR, influenza, and meningococcal vaccines, as shown in Figure 22.

Figure 22 Vaccinations covered by the submitted practices



6.1.1. Selection of five good practices

The evaluation process led to the selection of 11 good and promising practices which were then presented in a validation workshop organised with all the health authorities who had submitted practices. During this workshop 33 health authorities from 19 Member States voted on the practices they would like to learn

more about during an on-site visit[30]. Member States' interest was determined through a poll in the validation workshop, and finally five practices were selected for the following stage of the project. The tables below (table 3 – 7) provide an overview of the selected five practices.

Practice 1: School vaccination programme in Murcia region (Spain)

Table 3 Practice 1: School vaccination programme in Murcia region (Spain)

School vaccination programme in Murcia region	Spain
	**Governance level**: regional
	**Funding source**: regional funding
	**Vaccine(s) covered:** HPV, meningitis
	**Barriers that can be remove by the practice**: lack of information/awareness; digital skills gap among public; digital skills gap among health professionals; lack of (accessible) information for public; shortages of health care professionals; limited opening hours of vaccination points; contacting hard-to-reach groups
	**Target group:** children, 11 years of age
	Approach of the practice: this is a school programme for HPV and meningococcal vaccines intended to increase vaccination rates. It transfers the adolescent vaccination against HPV and meningococcus (given at age 11) from health centres to schools, thereby promoting accessibility and equity. A letter is sent to the parents telling them about the vaccines and their importance, and requesting their consent to vaccinate their children (minors) in the school environment in their absence. School staff collect the consent letters and forward them to the health centre professionals to schedule the day when the vaccination will be carried out. To increase outreach, information about the vaccination has been translated into several languages including Arabic for the Arabic-speaking population in the region. The practice shows that the administration is no different from any other vaccine performed outside a health centre, but the process before and after requires organisational support. This is set out in a protocol detailing the responsibilities of each participant in the vaccination process, from circulating information to parents, through obtaining consent to administering the vaccine. The protocol also defines the necessary resources, the activities that need to be carried out, and an approximate schedule for the deployment of the campaign.
	**Vaccination journey(s) covered**: - A parent/legal guardian getting their child vaccinated for MMR, meningitis, or polio. - A parent/legal guardian getting their child/teenager vaccinated for HPV.

[30] In line with the call for submission, which was open to all health authorities in the EU, the workshop was also open to all health authorities.

School vaccination programme in Murcia region	Spain
	**Justification for selection:** - Removes barriers for parents struggling with booking systems or the opening hours of vaccination centres. - Vaccines offered at school are easily accessible, and parents are informed directly by school staff thus removing barriers to accessing vaccination information. - Well implemented, clear assessment of key problems and solutions (i.e., hesitancy of parents, lack of (accessible) information about vaccination). - The practice considers the local context – the Arabic-speaking population was identified as a hard-to-reach group in the region and was targeted with information in Arabic to enhance accessibility. - Continuity of care between the health, social, and education sectors in the public domain with a multidisciplinary approach - Collaboration and participation are promoted among all stakeholders including teachers and healthcare professionals, with the appropriate preparation and skills; and parents and children, with easily understood health information, encouraging their empowerment and self-care.

Practice 2: Mobile vaccination units to increase COVID-19 vaccination uptake (Netherlands)

Table 4 Practice 2: Mobile vaccination units to increase COVID-19 vaccination uptake

Mobile vaccination units to increase COVID-19 vaccination uptake	**Netherlands**
	**Governance level:** national and regional
	**Funding source:** national funding
	**Vaccine(s) covered:** COVID-19
	**Barriers that can be removed by the practice**: restricted opening hours at vaccination points; difficulties in contacting hard-to-reach groups, and under-served areas, both rural and urban; digital skills gap among the public; digital skills gap among health professionals; and the lack of (accessible) public information.
	**Target group**: general population (neighbourhoods with low vaccination uptake)

Mobile vaccination units to increase COVID-19 vaccination uptake	Netherlands
	Approach of the practice: vaccines were offered in vaccination buses on a drop-in basis with no appointment needed. This practice was developed through cooperation between national and regional stakeholders. The buses were centrally procured and coordinated by a national organisation and made available to regions with identified needs. The practice also relied on leaflets, flyers, and posters which were disseminated in the neighbourhood, and personal conversations between local people and health care workers and trusted neighbourhood role models (often in multiple languages and in culturally appropriate ways) to increase knowledge of and trust in vaccination.
	Vaccination journey(s) covered: Adult getting vaccinated against COVID-19
	Justification for selection: - Well developed, documented and evidence-driven. Practice has been evaluated and showed its effectiveness. - Useful example for pandemic preparedness.

Practice 3: Offering the flu vaccine to children in three primary schools (Ireland)

Table 5 Practice 3: Offering the flu vaccine to children

Offering the flu vaccine to children in three primary schools	Ireland
	Governance level: national
	Funding source: national funding
	Vaccine(s) covered: influenza (for children)
	Barriers that can be removed by the practice: shortages of health care professionals; limited opening hours at vaccination points; lack of information accessible to the public
	Target group: children and young people, 2-17 years of age
	Approach of the practice: all children and young people aged 2-17 are eligible for the free HSE nasal flu vaccine in Ireland. It is usually given by GPs or pharmacists; however, vaccination uptake has been very low. To increase uptake, a pilot was launched in three primary schools to administer the vaccine in a school setting. For this pilot, comprehensive information packs (leaflet, consent form, template letters) were circulated among parents by operational community health teams. The teams reviewed the returned documents and the health condition of the children, and then recommended personalised vaccination routes via GP, pharmacy, or the school.

Offering the flu vaccine to children in three primary schools	Ireland
	**Vaccination journey(s) covered:** An elderly or vulnerable person getting vaccinated for seasonal influenza – *Note: the practice does not directly cover this journey since it focuses on influenza vaccination for children rather than elderly and vulnerable people. However, due to the great interest of health authorities in this practice and flu vaccinations for children, it is included in the final selection.*
	**Justification for selection:** - Well-designed and effective – the results of the pilot show that vaccination uptake in schools increased significantly compared with uptake outside the school setting. - Includes a description of resources needed to guide future pilots. - Relatively easy to transfer to other settings because the approach is straightforward and could be replicated by many other Member States.

Practice 4: Su.Pr.Eme (Italy)

Table 6 Practice 4: Su.Pr.Eme

Su.Pr.Eme	Italy
	**Governance level:** regional
	**Funding source**: national and regional funding
	**Vaccine(s) covered**: COVID-19
	**Barriers that can be removed by the practice**: lack of (accessible) information for public; reaching hard-to-reach groups; out-of-pocket payments; digital skills gap among public; digital skills gap among health professionals
	**Target group**: undeclared migrants, seasonal workers
	**Approach of the practice**: The Su.Pr.Eme project targets undeclared and seasonal workers from third countries to overcome stigma and address the vulnerability of these migrant workers. Su.Pr.Eme is an integrated action plan to overcome all forms of labour exploitation, marginalisation, and vulnerability among migrant workers. It offered the Apulian Regional Agency for Health and Social Care (AReSS) the opportunity to define and develop a model of health and social care in informal settlements ('ghettos'). In this practice, mobile outpatient units were organised at which health care and vaccinations are provided to workers. It focuses on prevention and health care, as well as health and social status monitoring. The practice is implemented in close collaboration with NGOs which act as the front office, offer guidance, remain in contact with the migrants, and also support GPs.
	**Vaccination journey(s) covered:** An adult getting vaccinated against COVID-19

Su.Pr.Eme	Italy
	**Reason for selection:** - Effectively targets a hard-to-reach, vulnerable population group. - Innovative, unique approach in collaboration with NGOs on the ground.

Practice 5: Communication initiatives including reminder schemes to support childhood immunisation (Denmark)

Table 7 Practice 5: Childhood immunisation/vaccination programme

Childhood immunisation/vaccination programme	Denmark
	**Governance level**: national
	**Funding source:** national funding
	**Vaccine(s) covered:** 3 months: diphtheria, tetanus, whooping cough, polio and Hib and pneumococcal disease 5 months: diphtheria, tetanus, whooping cough, polio and Hib and pneumococcal disease 12 months: diphtheria, tetanus, whooping cough, polio and Hib and pneumococcal disease 15 months: MMR: measles, mumps and rubella 4 years: MMR: measles, mumps and rubella 5 years: diphtheria, tetanus, whooping cough, polio booster 12 years: HPV (2 doses)
	**Barriers that can be removed by the practice**: inefficient or ineffective data collection; inefficient/lack of unified immunisation monitoring and information system; lack of (accessible) information for public.
	**Target group**: parents of children aged 3 months to 12 years.

Childhood immunisation/vaccination programme	Denmark
	**Approach of the practice:** this vaccination programme includes a reminder scheme, vaccination ambassadors, communication campaigns, and a research study to demonstrate the effectiveness and outcomes of the practice. In Denmark, all recommended childhood vaccinations are administered free of charge by general practitioners. However, vaccination rates for MMR and diphtheria-tetanus-pertussis-polio have been below 90%, mainly due to parents forgetting the vaccination. Therefore, reminder schemes based on data from civil registries and public health databases have been introduced for all childhood vaccinations. Through digital reminders, parents are notified when it is time for their child to be vaccinated and again if the vaccination time has passed but their child has not received the vaccination as planned. This practice is based on civil registries and public health databases data, allowing Danish health authorities to monitor vaccination uptake, including the number of vaccinations administered by general practitioners, and the type and number of side effects recorded. Vaccination ambassadors play a key role in reaching out to local communities through dialogue-based approaches to address concerns about vaccination. Health visitors regularly meet the families and children in their district and build up a strong level of trust. They work with pregnant women and visit new-borns multiple times at home during the first year of life. They meet the children again at kindergarden and school. Health visitors are able to address concerns in a trusting atmosphere and are in a perfect position to bring up the topic of vaccination. In 2017 the information awareness campaign *Stop HPV: get vaccinated* was launched jointly by the Danish Health Authority, the Danish Cancer Society, and the Danish Medical Association. The initiative was to provide nuanced and evidence-based information about the HPV vaccine and increase immunisation coverage following a decline in uptake. The campaign was extended to include boys in 2019, meaning that boys, like girls, now receive the HPV vaccination free of charge if they were born in the latter half of 2007 or later. The campaign ended in late 2021 following the successful restoration of HPV immunisation coverage.
	**Vaccination journey(s) covered**: - A parent or legal guardian getting their child vaccinated for MMR, meningitis, or polio. - An adult getting a booster vaccine for tetanus – *Note: this journey is not directly covered by the practice, which targets tetanus vaccinations among young children instead of adults. However, it is included because it is the only one of the five selected journeys covering tetanus.*
	**Justification for selection by evaluators:** - Well documented with approach and results shared in academic paper. - Effectiveness and vaccination increase demonstrated in academic paper. - Incudes tetanus and polio which have not been well covered by practices received from other Member States. - Use of database and public health data to systematically organise and implement a vaccination intervention.

6.2. On-site visits

One of the purposes of this project was to implement capacity-building activities to enable mutual learning and sharing of good practices. Accordingly, representatives of health authorities, health ministries, health institutes or national immunisation offices were invited to participate in on-site visits to discover in more detail how good practices were designed and implemented on the ground. On-site visits were carried out for each of the five selected good practices promoted by the respective health authorities in Murcia, Denmark, Netherlands, Italy, and Ireland. Table 8 provides an overview of the five on-site visits.

Table 8 Number of participants in on-site visits

Country/region	Date	Hosting health authority	Number of participants
Murcia (Spain)	30/05/2023 - 02/06/2025	Directorate General for Public Health and Addictions (Dirección General de Salud Pública y Adicciones, DGSPyA), Region of Murcia	27
Netherlands	20/09/2023 – 22/09/2023	National Institute for Public Health and the Environment (Rijksinstituut voor Volksgezondheid en Milieu, RIVM) and GGD Amsterdam (Municipal Public Health Service)	25
Ireland	04/10/2023 – 06/10/2023	Health Service Executive (HSE), National Immunisation Office	21
Italy	28/06/2023 – 30/06/2023	Apulian Regional Agency for Health and Social Affairs (A.Re.S.S. Puglia), with the support of the Regional Council of Puglia	20
Denmark	21/06/2023 – 23/06/2023	Danish Health Authority (Sundhedsstyrelsen)	28

The on-site visits were a core component of the project, designed to foster mutual learning among health authorities across EU Member States. Their primary purpose was to identify and showcase exemplary practices that have successfully addressed physical, practical, or administrative barriers to vaccination. By bringing together public health professionals from diverse backgrounds, the visits

aimed to facilitate in-depth exchange of knowledge, and promote the transfer of effective strategies at both national and regional levels.

Each visit followed a structured programme which included:

Presentations on the local health system, vaccination governance, and specific exemplary practices.

Site visits to vaccination centres, schools, or community settings to observe practices in action.

Interactive workshops (reflection sessions, SWOT analyses, and “Impact Canvas” exercises) to encourage critical discussion and peer learning.

Stakeholder engagement with local health authorities, NGOs, community leaders, and, where relevant, target populations (e.g. migrants, schoolchildren).

Evaluation and feedback sessions to capture participant experiences and suggestions for improvement.

The rationale for this design was to ensure that participants learned about successful practices and critically assessed their transferability, identified context-specific barriers and enablers, and built networks for ongoing collaboration. Activities were tailored to the local context and the specific challenges addressed by each exemplary practice, ensuring relevance and practical value.

6.2.1. Interesting findings from the on-site visit activities

Across the five on-site visits, the mutual learning activities provided a unique platform for health authorities and public health professionals from diverse European contexts to engage in deep, practical exchanges. These activities, ranging from site visits and workshops to structured reflection and SWOT analyses, uncovered a wealth of insights into both the challenges and the enablers of vaccination programmes.

A recurring theme was the power of context-specific good practices to inspire adaptation and innovation elsewhere. For example, the school-based vaccination programme in Murcia, Spain, provided an example of how integrating vaccination delivery into the educational setting can significantly boost vaccination accessibility. Strengths identified by participants included the close collaboration between the health and education sectors, the active involvement of nurses in vaccine administration, and the use of targeted communication strategies to engage parents and students[31]. From the reflection and group discussion,

[31] D11 On-site visit report Murcia

participants recognised that while the Spanish system benefited from decentralised governance, this also created administrative fragmentation and challenges in data sharing - issues that resonated with participants from other countries and which fed the mutual learning discussions[32].

In Denmark, the on-site visit focused on the national reminder scheme, and the role of health visitors as vaccination ambassadors. Strengths identified by participants included the use of digital reminders and the unified vaccination registry[33], which enabled real-time tracking of citizens' vaccination status and targeted outreach[34]. The Danish approach to building trust - through empathetic communication by health visitors acting as 'peer' vaccination ambassadors - was widely recognised as a key aspect of the practice. The health visitor model, in particular, was seen as a powerful way to reach families and hard-to-reach groups, fostering trust and addressing hesitancy at the community level. Outcomes from the on-site visit activities highlighted the importance of continuous investment in IT systems and staff training to implement these effectively[35].

The visit to Bari (Puglia Region), Italy, focused on reaching migrant and seasonal worker populations through mobile health units and close collaboration with NGOs. The mutual learning activities featured the importance of multidisciplinary teams - including legal, social, and healthcare professionals - and the need for cultural mediators to bridge language and trust gaps. Participants learned that while mobile units and community outreach can dramatically improve access for vulnerable groups, challenges remain in ensuring sustainability, data collection, and coordination among multiple stakeholders. The Italian experience highlighted the value of holistic, person-centred approaches that address not only health needs but also social determinants such as housing and employment[36].

In Amsterdam, the Netherlands, the on-site visit focused on the deployment of mobile vaccination units ("vaccination buses") to increase COVID-19 uptake. The evaluation of the mobile vaccination practice was presented to participants, showing how these mobile units were particularly effective in reaching underserved neighbourhoods and populations with lower vaccination rates. The Dutch practice featured strong local partnerships, flexible logistics, and tailored communication - often involving trusted community figures[37]. During the SWOT analysis exercise, participants identified strengths such as the great accessibility

[32] Ibid

[33] The Danish Civil Registration System (CPR)

[34] D11 On-site visit report Copenhagen

[35] D11 On-site visit report Copenhagen

[36] D11 On-site visit report Bari

[37] D11 On-site visit report Amsterdam

of the mobile units as well as the awareness-raising impact deriving from this. At the same time, they acknowledged concerns about the resource-intensive nature of mobile outreach, the need for robust data integration, and the importance of maintaining flexibility to adapt to changing needs. Overall, the key take-away was the value of data-driven decision-making and the potential for mobile units to be repurposed for other vaccination campaigns[38].

The final visit in Dublin, Ireland, centred on a pilot programme offering flu vaccination to children in primary schools. During collaborative exercises, participants noted the operational efficiency, inclusivity, and positive social dynamics of the school-based model, where peer influence and group participation encouraged higher consent rates. At the same time, the reliance on paper-based consent forms and fragmented data systems were identified as weaknesses, prompting discussions on the need for digitalisation and streamlined processes. The Irish experience also highlighted the importance of engaging teachers and school staff as advocates for vaccination and the potential for school-based programmes to serve as platforms for broader health promotion[39].

Across all visits, the mutual learning activities fostered a spirit of openness, critical reflection, and practical problem-solving. Participants consistently valued the opportunity to see practices in action, engage in candid discussions about barriers and enablers, and explore the transferability of solutions to their own contexts[40]. The workshops and group exercises, such as SWOT analyses and Impact Canvas sessions, enabled participants to systematically assess the strengths, weaknesses, opportunities, and threats of each practice, and to co-create actionable recommendations.

A key result of these activities was the recognition that while no single model fits all contexts, certain principles are universally important: stakeholder engagement (including NGOs, community leaders, and target populations), digital innovation (such as reminder systems and registries), tailored communication strategies, and a commitment to equity and inclusivity. The mutual learning process also highlighted the importance of building networks for ongoing collaboration, supporting the transfer and adaptation of successful practices, and empowering participants to drive change within their own organisations.

[38] D11 On-site visit report Amsterdam

[39] D11 On-site visit report Dublin

[40] From the results of the online evaluation by participants in the D11 On-site reports

6.2.2. Feedback from participants

Following each of the on-site visits participants completed an online feedback survey on the personal learning and networking value of the on-site visits, transferability and organisational impact, quality of organisation and communication, as well as key learning and interest in piloting.

High personal learning and networking value

Participants overwhelmingly agreed that the on-site visits provided valuable insights and learning opportunities. Many respondents noted that the chance to observe exemplary practices first-hand, engage in in-depth discussions, and network with peers from other EU Member States was particularly beneficial. The interactive workshops, site visits, and group exercises were frequently cited as highlights, fostering a spirit of openness and practical problem-solving. For example, in Murcia respondents strongly agreed that they enjoyed the overall experience, and a majority felt confident that the knowledge gained could help drive positive changes in vaccination coverage rates at home. Similar sentiments were echoed in Copenhagen.

Transferability and organisational impact

While personal learning was rated very highly, participants were sometimes more cautious about the transferability of practices to their own organisations. In several visits, such as Bari and Amsterdam, participants noted that while the practices observed were inspiring, their direct applicability could be limited by local context, resources, or legal frameworks. Nevertheless, a significant proportion of respondents expressed interest in piloting or adapting elements of the showcased practices, and many planned to share what they had learned through meetings, presentations, or written reports within their organisations.

Quality of organisation and communication

The organisation and communication of the visits were consistently rated positively. Participants appreciated the clarity of information provided before and during the visits, the ease of registration, and the overall structure of the programmes. In Dublin, for example, 86% of respondents stated that the organisation met their expectations, and all agreed that the visit was an enjoyable experience. Some participants suggested that more advance information or a slightly less packed schedule would further enhance the experience.

Key lessons and suggestions

A recurring theme in the feedback was the value of seeing practical solutions in action and learning from the challenges faced by others. Participants highlighted the importance of multidisciplinary collaboration, digital innovation (such as reminder systems and registries), and tailored communication strategies. The

opportunity to discuss barriers and enablers openly, and to participate in structured exercises like SWOT analyses and Impact Canvas sessions, was seen as particularly useful for translating insights into action.

At the same time, participants identified areas for improvement. These included the need for more detailed information on technical aspects (such as IT systems), greater inclusion of target populations in discussions, and more focus on the cost-effectiveness and sustainability of practices. Some respondents also noted that institutional learning, translating individual insights into organisational change, remained a challenge and suggested more support for follow-up and implementation.

Interest in piloting and continued involvement

Interest in piloting practices varied across visits. In some cases, a majority of respondents expressed willingness to participate in pilot projects or further collaboration. In others, participants indicated that further discussion with superiors or assessment of local feasibility would be needed before committing to implementation. Across all visits, the networking opportunities and the establishment of cross-country contacts were seen as valuable foundations for ongoing collaboration.

The on-site visits directly supported the next phases of the project by:

Informing the design of pilot interventions: insights from the visits guide the adaptation of exemplary practices to local contexts, using structured methodologies (e.g., SWOT, Impact Canvas) to identify barriers, enablers, and necessary adaptations.

Building networks for implementation: the visits fostered relationships among health authorities, NGOs, and experts, facilitating ongoing support and knowledge exchange during pilot implementation.

Providing methodological templates: the workshops and evaluation tools used during the visits serve as models for monitoring and evaluating pilot projects.

Enhancing self-efficacy and motivation: participants reported increased confidence in their ability to drive change within their organisations, a key factor for successful implementation and sustainability.

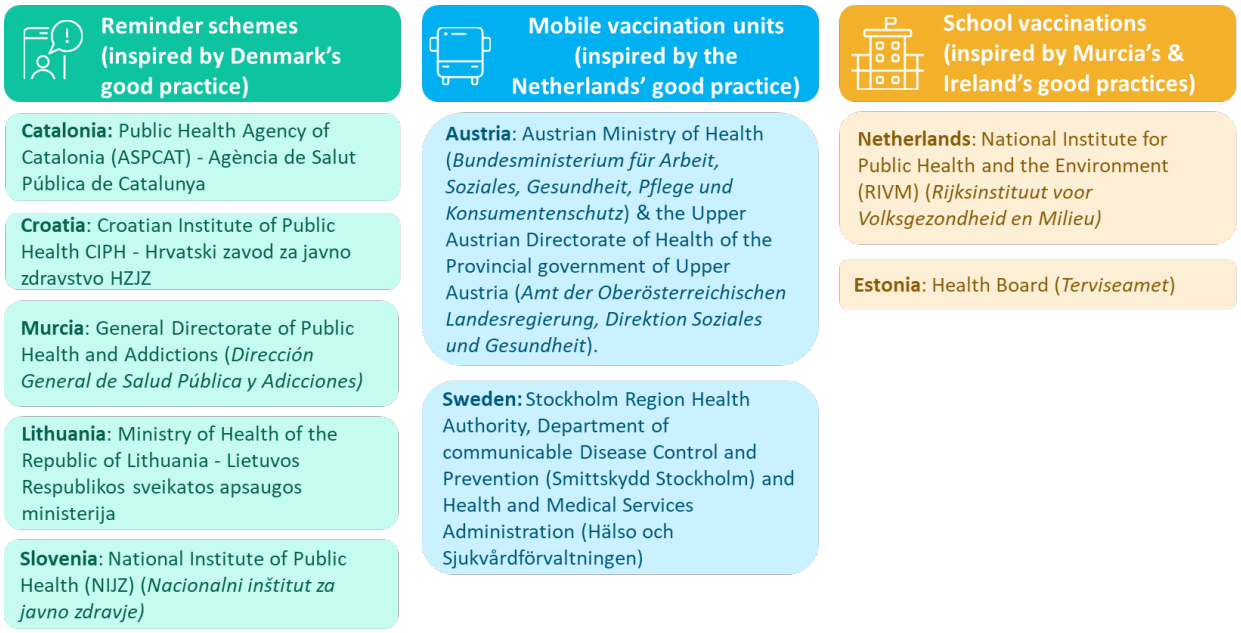
6.3. Selection, design, and support to pilot activities

During and after the on-site visits, health authorities expressed their interest in piloting the good practices. In particular, dedicated one-to-one discussions were organised during the on-site visits and online one-to-one meetings with the project team after the visits. These informal arrangements helped build trust and allowed tailored exploration of the feasibility of implementing a pilot. The project

team, together with the interested health authorities, assessed ideas for piloting, taking into account the country's context, existing infrastructure and alignment with the barriers to the practice. Criteria under consideration included legal frameworks, technical capacity, and strategies for continuity and scale-up in the event of successful results.

The outcome of this process led to the selection of nine pilots and three clusters inspired by the exemplary practices as indicated in Figure 23.

Figure 23 Selected piloting health authorities per practice cluster



6.3.1. Design of the nine pilots

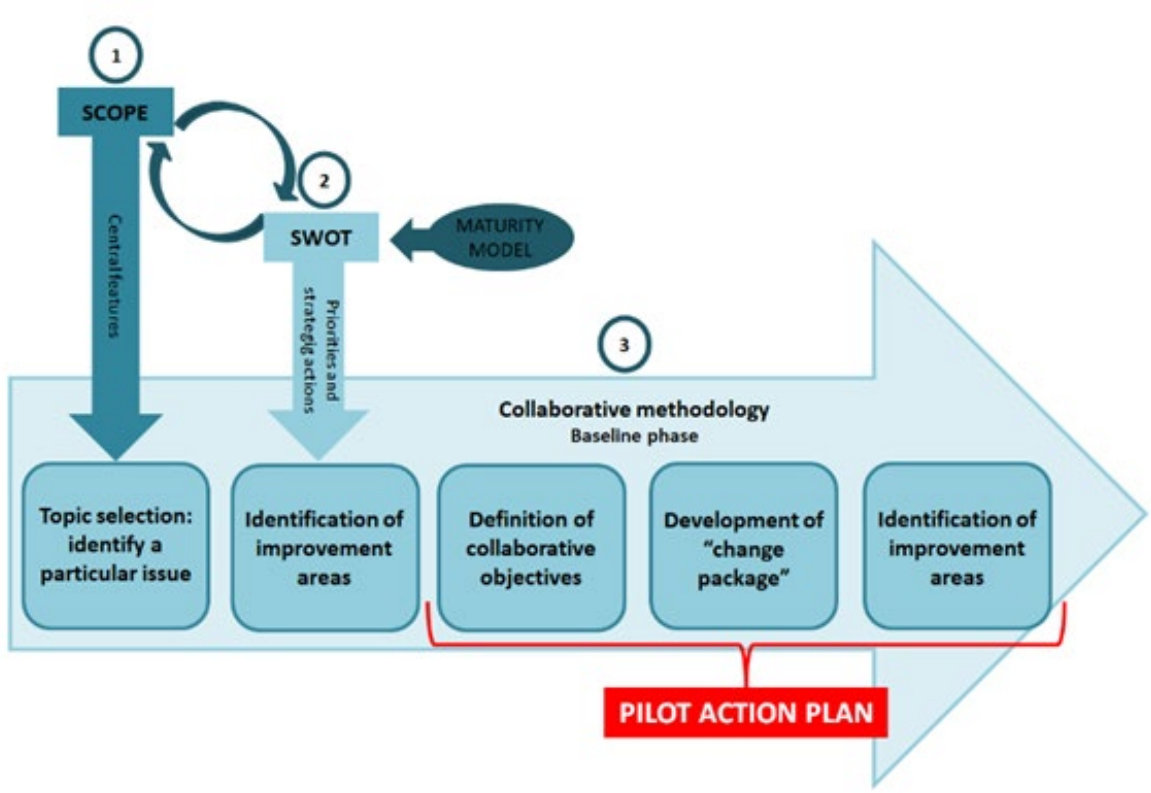
To guide the methodological development of the pilot, the project team developed piloting protocols, including a range of tools and templates to help design the pilot. These were conceived to ensure consistency, adaptability, and effectiveness across diverse regional contexts. Each pilot followed a structured three-phase methodology: pre-implementation, implementation, and post-implementation.

Pre-implementation phase

In the pre-implementation phase, each participating health authority established a Local Implementation Working Group (LIWG), composed of relevant stakeholders such as healthcare professionals, IT specialists, educators, and community representatives, depending on the nature of the pilot. The LIWG was responsible for conducting a situation analysis using tools like the SWOTframework and, optionally, the Scirocco Maturity Model, which helped

assess system readiness and identify strengths, weaknesses, opportunities, and threats related to the pilot (see Figure 24). To deepen understanding and refine their approach, the pilot teams from the nine health authorities participated in in-depth study visits to the countries that hosted the exemplary practices, where they engaged in peer learning and collaborative planning. These visits served as a foundation for drafting the Pilot Action Plan, which outlined the pilot's objectives, activities, timeline, key performance indicators (KPIs), the Intervention Logic (IL) and Theory of Change of the pilot, as well as establishing a detailed evaluation framework.

Figure 24 Pre-implementation activities



Source: Joint Action Chrodis-Plus methodology[41]

Implementation phase

During the implementation phase, the LIWGs executed the pilot activities according to the Pilot Action Plan, using the Plan-Do-Study-Act (PDSA) cycle to

[41] Palmer, K., Carfì, A., Angioletti, C., Di Paola, A., Navickas, R., Dambrauskas, L., Jureviciene, E., João Forjaz, M., Rodriguez-Blazquez, C., Prados-Torres, A., Gimeno-Miguel, A., Cano-del Pozo, M., Bestué-Cardiel, M., Leiva-Fernández, F., Poses Ferrer, E., Carriazo, A. M., Lama, C., Rodríguez-Acuña, R., Cosano, I., ... Onder, G. (2019). A Methodological Approach for Implementing an Integrated Multimorbidity Care Model: Results from the Pre-Implementation Stage of Joint Action CHRODIS-PLUS. *International Journal of*

allow for iterative refinement and responsiveness to emerging challenges. Regular meetings and peer support sessions facilitated ongoing monitoring and adaptation, while data collection focused on both process indicators and outcomes such as vaccination coverage and barrier reduction. The project team provided continuous support, including technical assistance and coordination of peer exchanges.

Post-implementation phase

In the post-implementation phase, the pilots were evaluated following the Theory of Change approach and evaluation framework designed during the pre-implementation phase. The measurement of the impact of the pilots included both quantitative and qualitative research methods, such as statistical analysis of administrative data, surveys of citizens and GPs (depending on the pilots) and in-depth interviews with personnel implementing the pilots. The evaluation results informed recommendations for future scale-up and policy developments. Throughout all phases, the project team played a central role in guiding the process, ensuring methodological rigour, and fostering collaboration among pilot sites. This comprehensive approach enabled each health authority to tailor the pilot to its specific context while maintaining alignment with the overarching goals of the project.

6.3.2. Peer learning activities: in-depth study visits and online peer support meetings

To start the support activities for the pilots, three in-depth study visits were organised in spring 2024, with the aim of facilitating peer learning between piloting health authorities and the hosting Member States that had successfully implemented the good practices. Each visit was tailored to the specific cluster of good practices being piloted: school vaccination, mobile vaccination units, and reminder schemes.

The in-depth study visits were designed to foster mutual learning, exchange of experiences, and practical guidance for piloting health authorities. They provided a structured environment for participants to engage directly with the hosting health authorities, understand the operational and strategic dimensions of the practices, collaboratively develop their own pilot action plans and discuss the composition of the LIWGs, the IL of each pilot and the KPIs. These visits also served to build confidence and strengthen networks among health authorities. Table 9 provides an overview of the in-depth visits.

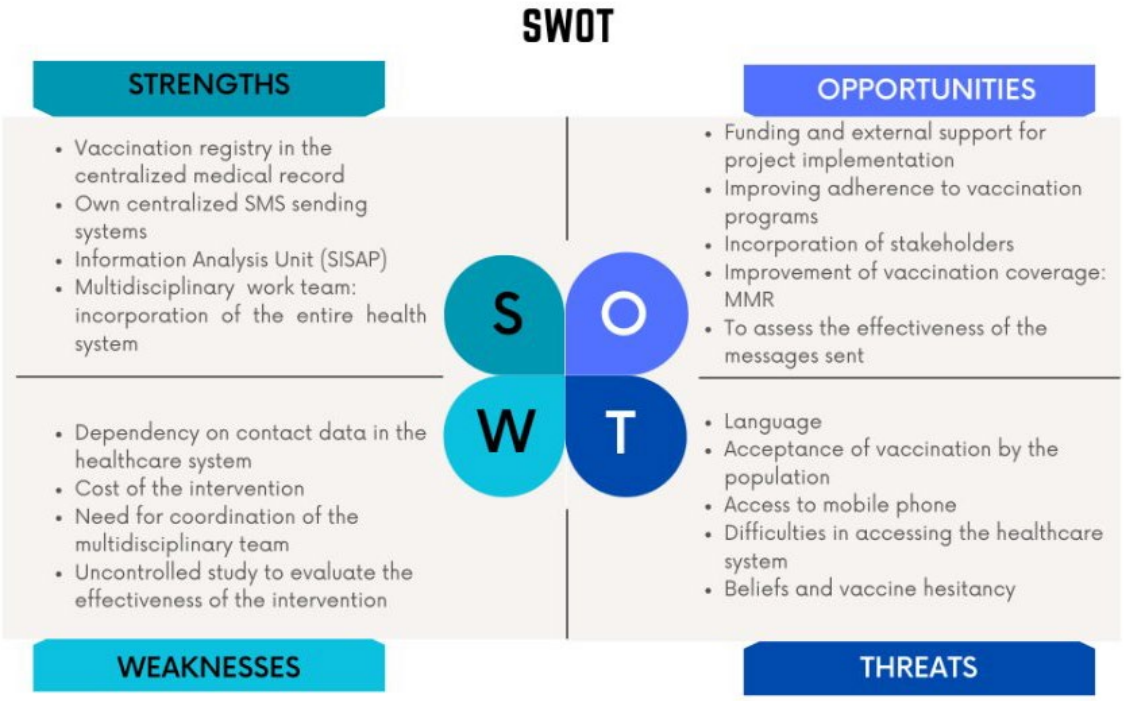
Environmental Research and Public Health, *16*(24), 5044. https://doi.org/10.3390/ijerph16245044

Table 9 Overview of in-depth study visits

Pilot cluster	'Good practice owner' hosting in-depth study visit	Dates of in-depth study visits	Participants
School vaccination programme	Directorate General of Public Health, Murcia	13/05/2024 - 14/05/2024	5 participants from Estonia and the Netherlands, 1 expert representative from Ireland's school vaccination programme, representatives from EHMA, Verian and ifok .
Mobile vaccination units	RIVM and Erasmus University, Rotterdam	22/05/2024 – 23/05/2024	4 participants from Austria and Sweden, reprsentatives from EHMA, Veriana and ifok.
Reminder schemes	Statens Serum Institut, Copenhagen	22/04/2024-23/04/2024	11 participants from Catalonia, Croatia, Lithuania, Murcia and Slovenia, representatives from EHMA, Verian and ifok.

Each in-depth study visit was carefully structured to provide piloting health authorities with a comprehensive and hands-on learning experience. The visits combined theoretical input, peer exchange, and practical work sessions to support the design and implementation of pilot projects. The agenda typically began with a welcome session and introductions, followed by presentations from piloting countries using their pre-filled SWOT analyses and findings from the Scirocco Maturity Model. These presentations allowed participants to contextualise their pilot designs and share insights into local barriers and enablers.

Figure 25 Example of Catalonia's SWOT analysis



Central to the visits were the Q&A sessions with the hosting health authorities, during which participants engaged directly with the personnel who had implemented the practices in the host country. These sessions provided valuable insights into operational strategies, stakeholder engagement, communication methods, and evaluation approaches. For example, in Copenhagen, Danish experts explained the timing and content of digital reminders, GDPR compliance, and the integration of IT systems into public health messaging. In Rotterdam, Dutch hosts discussed the logistics of mobile vaccination units, community engagement strategies, and safety considerations. In Murcia, Spanish and Irish experts highlighted the effectiveness of school-based vaccination in reducing access barriers and increasing uptake.

Table 10 Example of questions from the Q&A session with the 'hosting' health authority

Questions
Does your approach include the use of incentives?
What is the duration of the intervention period?
How do you communicate/inform about the buses?
What is considered cost-efficient?
How do you identify suitable locations? (Consider the vaccination journey.)
How do you use health communication?
How did you collaborate with the different areas?
How were the buses scheduled?
How did you train the health communicator?

Questions
How many communicators were active on one day?
How was the administration process managed?
What is important when analysing the data during the preparation phase?
What would be a reasonable target population?
How did you address issues of distrust?
How did you engage with the target group?
Until what age do young people typically seek advice from their parents?

Following the expert sessions, participants took part in focused work sessions to draft or refine their Pilot Action Plans and intervention logic. These sessions were designed to help participants articulate the rationale, objectives, activities, and expected outcomes of their pilots, and to begin shaping their evaluation frameworks. The group work was complemented by plenary discussions, where countries presented their plans and received feedback from peers and hosts.

Figure 26 Example of an early draft of intervention logic developed during the in-depth study visit in Copenhagen

General objectives: Address barriers: Information and awareness of the public; Infrequency or absence of reminders.
Specific objectives: Raise the 2nd dose of MMR vaccine coverage in the Region of Murcia, have Public Health own reminder system, have autonomy from the SMS in sending the reminders.

Needs: 2nd dose of MMR vaccine uptake under 95%, to have Public Health own reminder system.
Target population: 4-years old children (MMR vaccines).

Inputs	Activities/Actions	Outputs	Results (Outcomes)	Impact (Long-term)
The time required for the various meetings of the LIWG and for the meetings between the coordinating group with VERIAN, the development of information about the MMR vaccine on the web and the evaluation will be necessary within the piloting process. From a human resources point of view, IT personnel will also be needed to develop the new reminder system within the regional immunization registry computer system (the number of hours and the number of people working will be detailed later on). The total budget will be 25,000 euros.	An specific 2nd dose MMR vaccine coverages will be calculated in each intervention arm before the intervention. Consultation with target groups was already made in a previous study with a sample of 960 parents. Pilot activities: • Design the online MMR vaccine information. • Consult to specific population groups representatives, as the Arabic community. • Design of the reminders. • Meetings with LIWG. • Follow-up meetings with VERIAN. • Development of the IT reminders system. • Follow-up meeting with our IT system department. • Transfer information on the implementation of the pilot to the health centers • Sending the reminders. Monitoring activities: • 2nd dose MMR vaccine coverages will be calculated again in each intervention arm 6 weeks after sending the reminders.	Needs assessment outputs: Identification in our database those children born between September-October 2019 and 2020 without a 2nd MMR vaccine dose registered. Assignment of children born in the months of January, April, July and October to intervention group 1, those born in February, May, August and November to intervention group 2 and the rest of the children to the control group. Outreach activities outputs (the amount will be detailed later on): • A development of online information about the MMR vaccine. • Communication activities. • Reminders sent. • Citizens who received the reminder notification. • Our own reminder system.	**Improvement of contextual issues** Improved understanding of barriers/ target population for MMR vaccine/LIWG. **Improvement in process outcomes** Improved design of reminder system, improved IT system, personnel outputs (e.g. increased capacity building activities and increased technical skills). **Improvement in health outcomes** Increase 5% in vaccination rate during pilot vs baseline, net impact (increase 5% in vaccination rate pilot groups versus comparator group. **Improvement in target groups' knowledge** Increased awareness and improved decision-making of target group (target group will be more up-to-date about vaccination schedule and increased likelihood to follow vaccination guidelines).	Impact on vaccination rates/population health: increased vaccination coverage rates, reduced risks of measles, mumps and rubella outbreaks). Overcome impact of barrier: improved awareness and accessibility of information to the public through reminders). Monitoring and information systems: increased efficiency of IT system by having our reminder system to increase vaccination coverages. Replicability/continuation: the use of reminder will be continued, design of the pilot is applied to develop an e-mail reminder system in the future.

The visits also included dedicated sessions on evaluation design, where hosting experts provided guidance on developing KPIs, data collection strategies, and methods for measuring impact. These sessions helped piloting teams align their evaluation plans with the goals of their pilots and the broader objectives of the project.

The visits incorporated networking opportunities and informal exchanges through social activities such as group dinners, cultural visits, and walks. These events fostered trust and collaboration among participants, contributing to a supportive peer-learning environment.

A few months after the start of the pilots, three online peer support meetings were organised for each cluster of pilots. The aim of these peer support meetings was:

to enable piloting health authorities to share their progress on the pilot development and any challenges encountered, as well as any preliminary findings,

to enable good practice owners to give feedback and share lessons from their experience that could help their peers,

to monitor progress on the pilot design and implementation stages and to enable the project team to understand where and how they could provide tailored support.

Subsequent ad hoc one-to-one meetings with piloting health authorities were organised on a regular basis to ensure continued support.

In addition to the peer support activities, during the implementation phase the study team provided ongoing support to the health authorities, one dedicated ‘account manager’ followed each of the nine pilots overseeing the activities and the ad-hoc support needed. For example, at different stages of the pilots support was provided by evaluation and statistical experts to refine the design of the pilots and adapt to contextual changes and challenges encountered.

The feedback received from participants in the in-depth visits demonstrated the positive effects of peer learning activities. Participants across the three in-depth study visits reported increased confidence in their ability to implement and evaluate their pilots, and affirmed that their organisations would benefit from the experience going forward[42].

[42] To the statement ‘The visit provided valuable insights and learnings for my organisation overall, supporting organisational development’, 71% participants responded that they strongly agreed, 24% agreed, and 6% responded ‘neutral’.

For example, in Murcia, participants appreciated the networking opportunities and practical insights. They highlighted the value of discussions with hosts and peers, and the usefulness of evaluation guidance. Some suggested earlier communication and more time for in-depth pilot planning. In Rotterdam, attendees valued the intervention logic sessions and discussions with Dutch experts. While content and organisation were rated highly, some participants desired more background on the hosting country and statistical evaluation methods. In Copenhagen, participants appreciated the clarity, relevance, and depth of the content. Suggestions included more detail on IT algorithms and message design.

To the statement 'The visit helped to better design the implementation of the pilot in my country', 69% participnats responsed 'strongly agree', 25% 'agree' and 6% 'neutral'.

To the statement 'The visit helped to better design the evaluation of the pilot in my country', 59% participants responded 'strongly agree', 24% 'agree' and 18% 'neutral'.

7. Piloted practices and activities implemented

Key messages

Under the reminder schemes cluster, pilots addressed outreach and communication barriers, notably the absence of vaccination reminders and insufficient public knowledge about vaccination schedules.

Pilots in Murcia and Catalonia addressd low coverage of the second dose of MMR, by sending SMS reminders and testing which message was more likely to prompt action.

Lithuania's pilot addressed low HPV coverage among teenagers by sending SMS to parents containing an information package.

Slovenia' pilot also aimed at increased HPV coverage among teenagers through printed reminder letters disseiminated via the digital school platform.

Croatia's pilot sought to increase tetanus and diphteria vaccination rates among elderly patients, by sending data-driven reminders to GPs, prompting them to engage with their patients.

Mobile unit pilots were mobilised to address barriers faced by hard-to-reach groups, such as geographical distance to vaccination sites, limited opening hours, inability to book a GP appointment, or lack of accessible information about vaccines.

In Upper Austria, mobile vaccination teams implemented 'vaccination info days' in vocational schools, which included awareness raising activities and on-site opportunities for young people ro receive vaccination against MMR and the DTP-pertussis combination vaccine.

In Sweden, mobile units were stationed in the central public square of a diverse neighbourghood, while 'health informers' raised awareness in different languages of the opportunity for elderly to be vaccinated against the flu and COVID-19.

Pilots implementing school vaccination programmes leveraged schools as a trusted and accessible venue and simplified parents' vaccination journeys, while promoting equity in access to health services.

Estonia's pilot sought to increase vaccination uptake by strengthening awareness of the HPV vaccine offered in schools to 14 year-olds through dedicated information materials.

The Dutch pilot sought to increase MMR, DTP and HPV vaccines by bringing vaccination close to schools, thereby increasing the convenience of childhood/adolescent vaccination services.

This section outlines the activities implemented as part of the nine pilots in three clusters adapting the good practices.

7.1. Barriers per cluster and pilots

Table 11 details the administrative, physical and practical barriers addressed by the different pilots under each cluster.

Table 11 Typology of barriers addressed by each pilot

Barriers		School vaccination pilots		Mobile vaccination pitos		Reminder scheme pilots				
Area of barrier	Specific barriers	Estonia	Netherlands	Austria	Sweden	Catalonia	Murcia	Lithuania	Slovenia	Croatia
Outreach of vaccination services	Information and awareness of the public	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Information, awareness of and training provided to HCPs			✓						✓
	Limited large-scale outreach activities					✓		✓	✓	✓
	Low frequency or absence of reminders			✓		✓		✓		✓
	Insufficient staff training in soft skills and communication			✓	✓					
Administrative or practical steps for vaccination	Administrative steps for citizens (booking system, lengthy times, parental consent, extra steps)		✓	✓	✓					
	Administrative steps for HCPs (ordering vaccines, issuing prescriptions, delivery)									
	Fragmented system (existence of different systems in place for vaccines)					✓				
	Monitoring systems (lack of register, data collection provision)					✓				
Geographical proximity to vaccination services	Geographical proximity of vaccination services (rural, urban)		✓		✓					
Convenience of vaccination services	Opening hours of vaccination services		✓	✓	✓					
	Limited vaccination locations (schools, healthcare centres, GPs, paediatricians, community health clinics, private practices, pharmacies, workplace)				✓				✓	
	Ease of booking				✓					
Availability of Healthcare Professionals (HCPs)	Shortages of HCPs									
	Restrictions on authorisation to vaccinate (limited number of physicians authorised to vaccinate)									
Supply of vaccines	Bottlenecks in supply chain									
	Shortages of vaccination equipment									
	Inefficiencies in distribution systems (logistics)									

Barriers		School vaccination pilots		Mobile vaccination pitos		Reminder scheme pilots				
	Complexity of administrative procedures and regulation									
Financial requirements of vaccine services	Vaccination cost(s) for the public (e.g., vaccines that are not free of charge, additional costs such as transport costs, time off from work, etc.)		✓	✓						
	Financial challenges for HCPs or health authorities (risk of business loss when HCPs are in charge of buying and storing vaccines, forecasting number of vaccines)									

7.2. Overview of clusters and pilot implementation

As described in the previous sections, the selection of good practices and the pilot was a multi-phased process grounded in tested assessment frameworks and criteria, extensive stakeholder engagement, mapping of vaccination barriers and the feasibility of pilots. This process led to the identification of nine pilots in three clusters of exemplary practices, as shown in Table 12. The sub-sections below present details of the three clusters and corresponding pilots.

Table 12 Characteristics of pilot design and target group

Cluster	Good practice	Piloting country/region	Pilot description	
Reminder schemes	*Reminder schemes to support childhood immunisation (DK)*	Catalonia	Target group	Children aged 4 years who missed the 1st or 2nd dose of the MMR vaccine, as well as their parents and caregivers, while involving healthcare professionals in vaccination outreach.
			Topic	Addresses the growing number of missed doses, improving public knowledge about vaccines and illnesses, overcoming barriers like language and literacy issues, and enhancing access to vaccination services.
			Design	A multi-disciplinary team of 20 experts, implementing reminder schemes through SMS and collaborating with paediatricians, schools, and general practitioners to promote vaccines.
		Murcia	Target group	Parents of 4-year-old children who missed the 2nd MMR dose.

Cluster	Good practice	Piloting country/region	Pilot description	
			Topic	Increasing MMR vaccination rates by testing different reminder messages and their impact.
			Design	Two types of SMS reminders are sent to parents, and vaccination uptake is monitored over 6 weeks to compare effectiveness. A control group (no reminder) is included for evaluation.
		Lithuania 	Target group	Parents of 11-year-old children.
			Topic	Increasing HPV vaccination rates by introducing a reminder system, improving public awareness, and enhancing IT support.
			Design	A data-driven reminder system is developed and tested, with focus groups, surveys, IT system improvements, and targeted communication to increase parental awareness and trust.
		Slovenia 	Target group	Parents of children entering 9th grade (approximately 14 years old).
			Topic	Increasing HPV vaccination rates by reaching children who missed or opted out of initial vaccination through parental reminders.
			Design	Reminder letters and information packages are distributed during parent-teacher conferences, with coordinated efforts between teachers, healthcare professionals, and paediatricians to facilitate vaccination.
		Croatia 	Target group	60-year-old patients in Croatia.
			Topic	Increasing TD vaccination rates through better general practitioner – patient communication.
			Design	A data-driven reminder system is tested to inform general practitioners of their patients' vaccination status, enhance their engagement, and ensure timely TD vaccination for 60-year-old individuals.
School vaccinations 	*School Vaccination Programme in the Region of Murcia (ES)* *Offering the Flu Vaccine to*	Netherlands 	Target group	Parents of 9-year-olds (eligible for DTP and MMR) and 10-year-olds (eligible for HPV) in underserved areas of New West Amsterdam.
			Topic	Increasing vaccination uptake by reducing logistical barriers and understanding parental drop-out points in the vaccination journey.

Cluster	Good practice	Piloting country/region	Pilot description	
	Children in Three Primary Schools (IE)		Design	Vaccination sites are relocated to school buildings, with focus groups for healthcare providers, on-site parent interviews, and personalised outreach via letters and SMS reminders.
		Estonia	Target group	Boys and girls aged 14 in eight schools across four regions.
			Topic	Increasing HPV vaccination rates by improving vaccine literacy through a targeted information campaign.
			Design	Schools receive HPV vaccine information packages for students, parents, and teachers before the vaccination campaign, alongside video lectures to educate and encourage participation.
Mobile units	*Mobile Vaccination Units (NL)*	Austria	Target group	The pilot seeks to increase MMR uptake among young people (15+) and fill vaccination gaps by focusing on those still in vocational schools.
			Topic	Addresses logistical and financial barriers by bringing vaccination services directly to schools, eliminating the need for appointments, travel, or out-of-pocket expenses.
			Design	The Upper Austria health department, federal health ministry, and school leaders collaborate to promote vaccine awareness through family and peer networks, using the "Boost-to-go" campaign, pre-announced vaccination days, and age-appropriate communication.
		Sweden	Target group	This initiative is designed to increase flu and COVID-19 vaccination rates among residents, particularly those with a migration background.
			Topic	This pilot seeks to remove administrative and logistical hurdles by eliminating the need for appointments, travel, and costs while ensuring clear and accessible health communication.

Cluster	Good practice	Piloting country/region	Pilot description	
			Design	Introducing a welcoming and accessible approach to vaccination with the 'Cozy House' initiative driven by regional and local health authorities, community leaders, nurses, and community health service workers, all working together to build trust and improve access to health information.

7.2.1. Cluster 1: Reminder schemes

The reminder scheme pilots were inspired by the Danish best practice of using systematic reminders, such as SMS, letters, or digital notifications, to prompt timely vaccination. This approach was designed to address several persistent barriers: lack of outreach and follow-up, lack of vaccination reminders, insufficient public knowledge about vaccination schedules, and the absence of automated, large-scale communication systems. By leveraging digital health records, public health registries, and existing communication channels, the reminder schemes aimed to increase vaccination coverage, particularly for childhood and adolescent vaccines, and to reduce missed or delayed doses due to practical or information gaps.

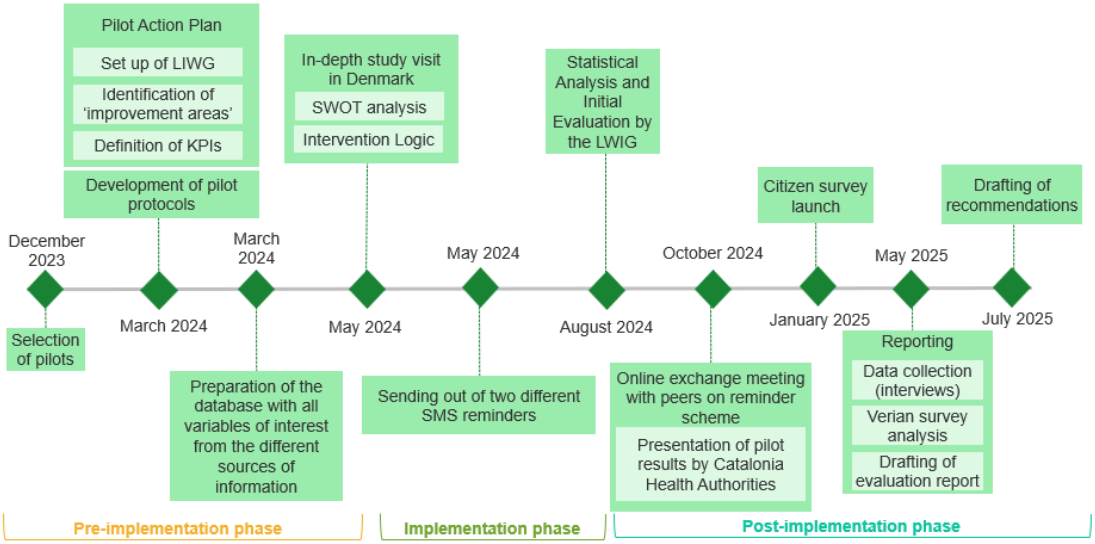
Catalonia pilot

Aim	Objectives
Increase MMR vaccination coverage among 4-year-old children in Catalonia.	- Increase the awareness and knowledge of parents and guardians of children around vaccination to address the lack of accessible information for the public and insufficient public knowledge of vaccination and illness. - Gain knowledge as to the most effective type of message to encourage people to vaccinate their children; - Increase the predictability of vaccination demand through sending SMS reminders.

The Catalan pilot focused on increasing the uptake of the second dose of the MMR vaccine among four-year-old children, a group where coverage had stagnated below the 95% WHO target. The pilot was implemented in response to a resurgence of measles cases and was designed to reach parents and guardians of children who had not received a second dose of MMR vaccine (recommended at 3 years of age) according to the ECAP database. The intervention involved sending two types of SMS reminders to over 14,000 families, each message crafted with slightly different wording to test which would be more effective in prompting action. The messages encouraged parents to

book an appointment for vaccination and provided clear instructions on how to do so. As in the case of Denmark, the reminder scheme in Catalonia had a secondary objective, namely overcoming information mismatches due to double (public/private) vaccination recording systems. In fact, vaccinations administered through the private systems are not reported in a consistent and timely way in the public registry.

Figure 27 Catalonia's pilot development and implementation



The pilot was built on a robust, pre-existing stakeholder cooperation framework, involving public health officials, primary care teams, and IT specialists. The SMS campaign was automated and integrated into the region's health information system, allowing for efficient outreach and follow-up.

Murcia pilot

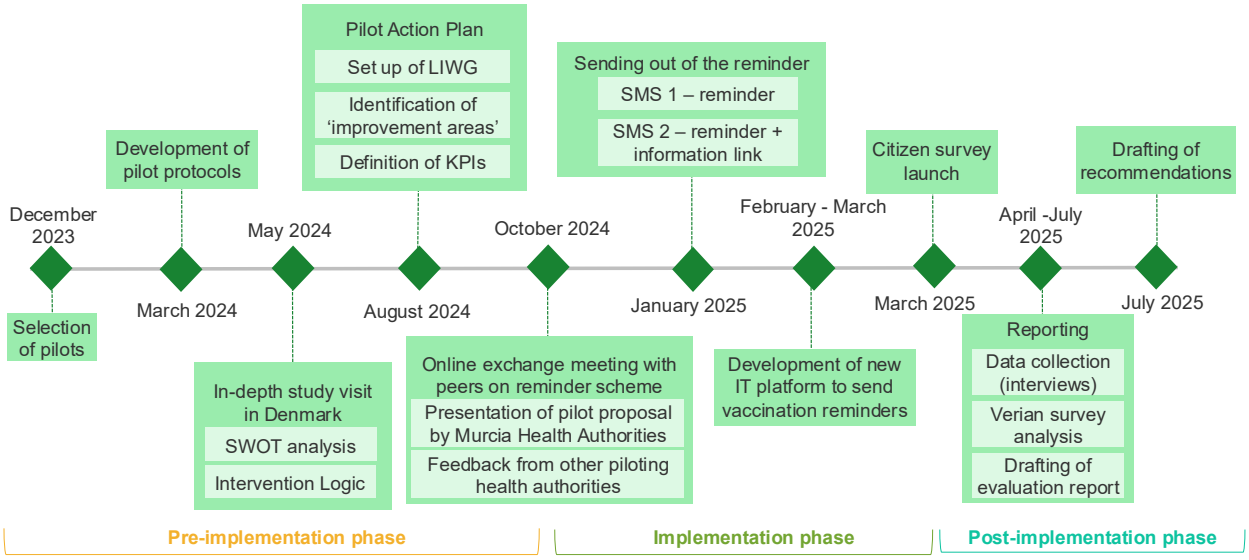
Aim	Objectives
Increase uptake of the second dose of the MMR vaccine in children aged 4 years.	- Establish a dedicated reminder platform managed by Public Health of Murcia to overcome limitations of the shared SMS platform, which currently restricts message volume and consistency due to cross-departmental usage. - Reduce missed vaccinations caused by forgetfulness by sending timely reminders to parents, especially for the second MMR dose, which requires advance booking and is not available through online scheduling. - Increase parental awareness and knowledge by including informative links in reminder messages, helping parents understand the importance of the second MMR dose and encouraging timely action through accessible web-based resources.

In Murcia, the reminder scheme pilot targeted parents of four-year-old children who had not completed the two-dose MMR schedule. The intervention was

motivated by the observation that missed vaccinations were often due to forgetfulness or logistical challenges, rather than vaccine hesitancy. The pilot involved sending two types of SMS reminders – one with a simple prompt to vaccinate, and another with additional educational information about the MMR vaccine. A control group received no reminder, allowing for a comparative evaluation of the messages' effectiveness.

The pilot was implemented by a multidisciplinary Local Implementation Working Group, including public health officials, IT specialists, nurses, and representatives of the local Arab community. The SMS system was integrated into the region's new vaccination information platform, which allowed for rapid and secure communication.

Figure 28 Murcia's pilot development and implementation



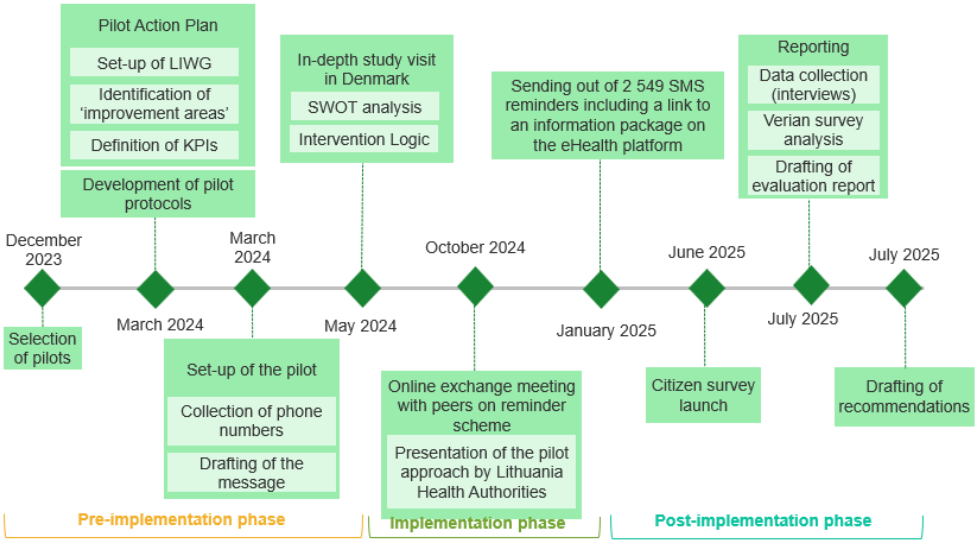
Lithuania pilot

Aim	Objectives
Increase the HPV vaccination coverage among 11 and 12-year-old children in the county of Klaipeda by 4%.	- Mobilise parents and guardians to have their children vaccinated against HPV, notably by increasing their awareness around the vaccination schedules to address the identified forgetfulness of parents and guardians around the vaccination schedule. - Increase awareness and knowledge of parents and guardians of 11 and 12-year-old children in the county of Klaipeda around HPV vaccination, to address the identified fears of side effects, lack of reliable information and lack of trust in the effectiveness of vaccines.

The Lithuanian pilot addressed declining HPV vaccination rates among 11- and 12-year-old children, particularly in Klaipeda county, where coverage had dropped below national targets. The pilot aimed to mobilise parents and guardians by increasing their awareness of the vaccination schedule and the importance of HPV vaccination. The intervention involved sending SMS reminders to parents, each containing a link to an information package hosted on the national eHealth platform.

The pilot was coordinated by the Ministry of Health, the Registry Centre, the National Public Health Centre, and the Klaipeda City Municipality.

Figure 29 Lithuania's pilot development and implementation



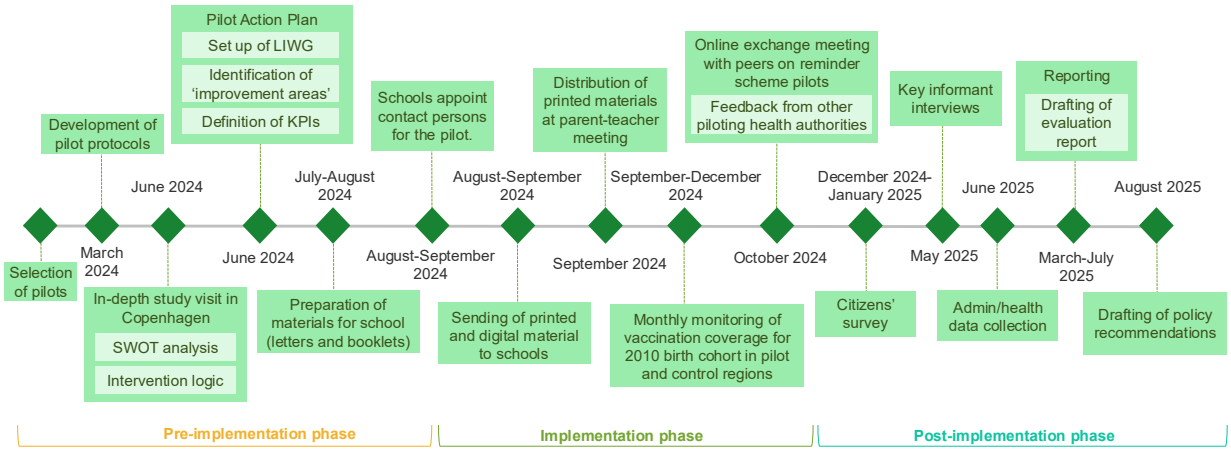
Slovenia pilot

Aim	Objectives
Increase HPV vaccination uptake among adolescents in Slovenia	- Raise awareness among parents of 9th grade students about the eligibility for, importance and effectiveness of HPV vaccination before age 15 - Assess the effectiveness, feasibility and acceptability of school-based reminder strategies (using school paediatricians, non-digital communication methods) in increasing HPV vaccination uptake - Strengthen collaboration between key actors (healthcare authorities/providers, and schools) in the implementation of vaccination outreach

The Slovenian pilot sought to address persistently low HPV vaccination coverage among adolescents, particularly after the initial offer in the 6th grade. The reminder scheme was implemented through the direct involvement of schools. The pilot covered three regions and targeted 9th grade students who had not received their second vaccine dose, which is normally offererd to 8th grade students during annual school medical checkups. The pilot was implemented in the period September-December 2024. The intervention targeted parents of 9th-grade students, who were often unaware that their children were still eligible for free vaccination. The pilot involved distributing printed reminder letters and illustrated information booklets during parent–teacher meetings in three pilot regions, with digital versions made available via the eAssistant school platform. The reminder letters distributed to parents provided information on how to access vaccination free of charge, either through the school's designated paediatrician or via the family paediatrician.

The Local Implementation Working Group included epidemiologists, paediatricians, communication experts, and representatives from the Ministries of Health and Education.

Figure 30 Slovenia's pilot development and implementation



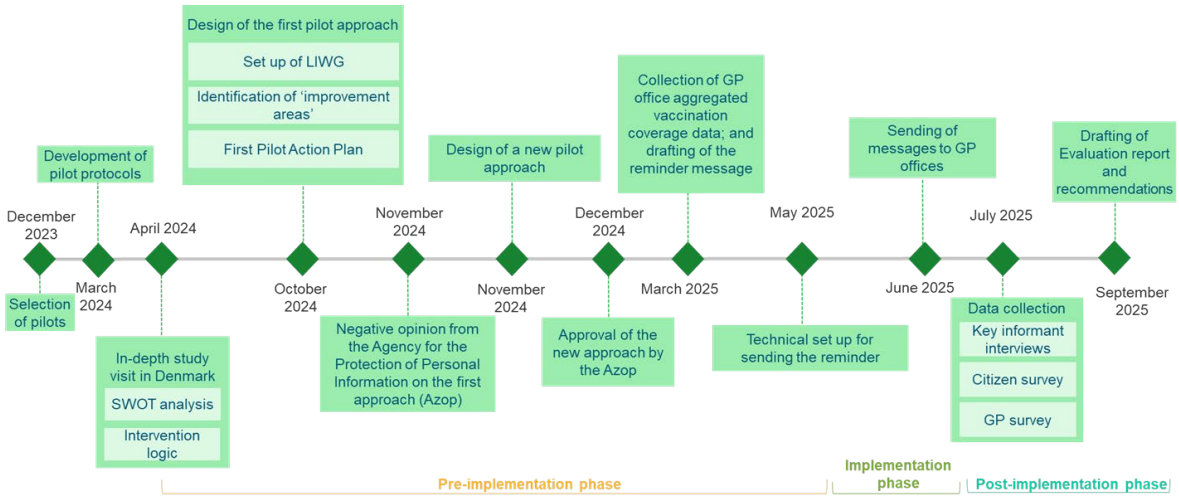
Croatia pilot

Aim	Objectives
Increase TD vaccination coverage rate among 60-year-old-people.	- Establish direct communication with GPs about the TD vaccination. - Increase GP awareness around TD vaccination.

The Croatian pilot focused on increasing tetanus and diphteria (TD) vaccination rates among 60-year-old patients by improving communication between general practitioners (GPs) and their patients. The intervention involved sending data-driven reminders to GPs, informing them of their patients' vaccination status and prompting them to engage with patients about timely vaccination.

The pilot was coordinated by the Croatian Institute of Public Health and involved the use of aggregated administrative data to cluster GP offices.

Figure 31 Croatia's pilot development and implementation



7.2.2. Cluster 2: Mobile vaccination units

The mobile vaccination units cluster builds on the Dutch COVID-19 mobile unit model, adapted in Austria and Sweden to address persistent barriers to vaccination among hard-to-reach populations. These pilots aimed to overcome barriers related to geographical distance of vaccination sites, limited opening hours of GPs and difficulties in getting appointments, financial costs (transport, time off work, vaccine access), lack of accessible information, low health literacy, and absence of reminders. These pilots also sought to address barriers to outreach and awareness-raising, given the high levels of mistrust in health authorities and the politicisation of vaccination post-COVID-19.

By bringing vaccination services closer to the target groups, both pilots reduced the complexity of the vaccination journey and improved equity of access.

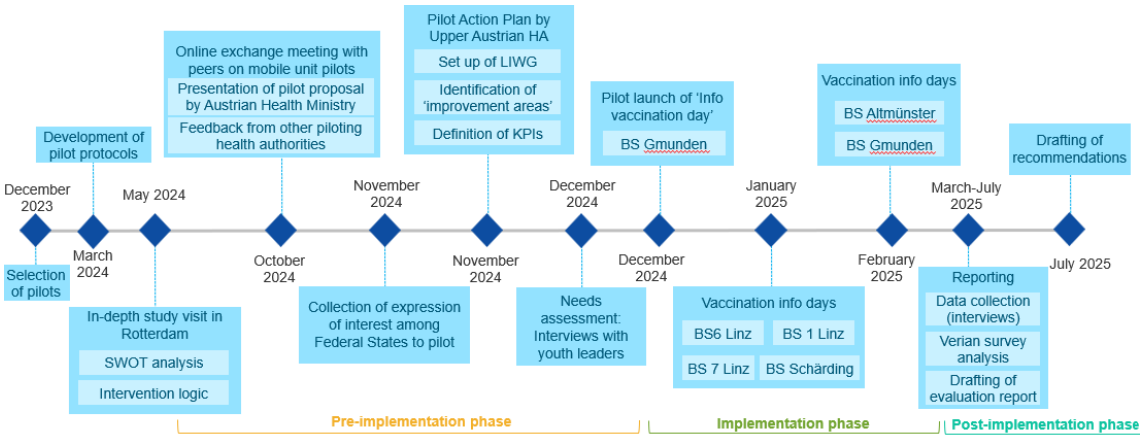
Upper Austria pilot

Aim	Objectives
Address low vaccination coverage against MMR and pertussis among young people (aged 15+ years)	- Provide accessible information on recommended vaccinations - Facilitate more equitable access to vaccination via targeted outreach effort - Increase vaccination coverage (MMR & DTaP/IPV)

The Austrian pilot was implemented in the federal state of Upper Austria and focused on increasing vaccination uptake among young people aged 15 and above, particularly those attending vocational schools. The initiative was developed in response to declining vaccination rates for MMR and DTaP/IPV, especially among adolescents and young adults, and aimed to address both logistical and information barriers to vaccination.

The pilot was designed to bring vaccination services directly into schools through a series of “vaccination info days.” These events combined awareness-raising activities with on-site vaccination opportunities. A key component of the initiative was the “Boost to go – Schutz di” campaign, which used a variety of communication materials - including flyers, pocket cards styled like WhatsApp messages, and videos - to engage students in a relatable and accessible way. The campaign was tailored to the needs of vocational school students, many of whom come from lower socio-economic backgrounds and may have limited access to reliable health information.

Figure 32 Austria’s pilot development and implementation



During the info days, mobile vaccination teams visited six vocational schools across rural and urban areas. The teams delivered classroom-based talks using a mix of standard German and local dialect to make the content more relatable. These sessions included visual aids, such as images of vaccine-preventable diseases, to help students understand the risks and benefits of vaccination. Following the talks, students were invited to one-on-one consultations where their

vaccination booklets were reviewed, and they were informed about any missing or due vaccinations. Those who wished to proceed could receive their vaccinations on-site, without needing parental consent.

Sweden pilot

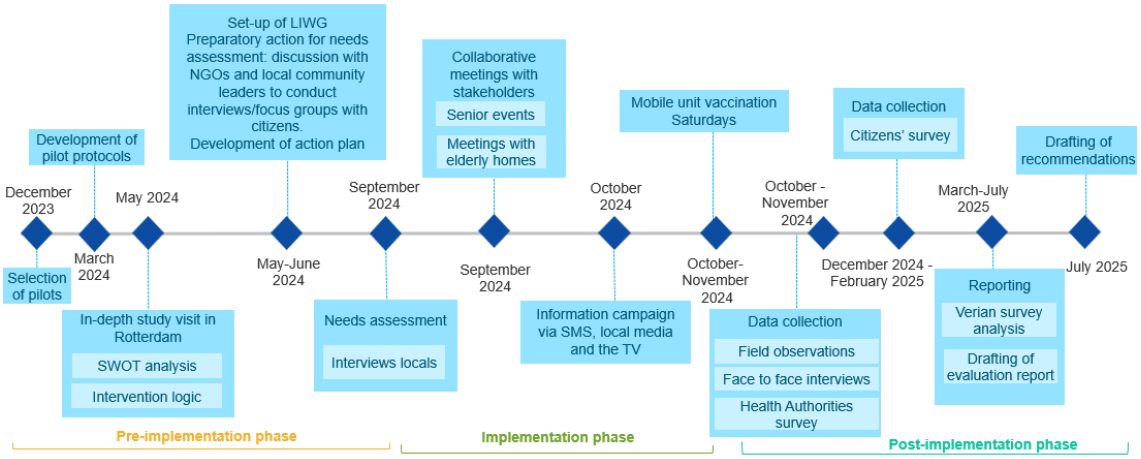
Aim	Objectives
Increase the vaccination coverage rate for influenza and COVID-19 among 65+ years old in Skärholmen district of Stockholm	- Reduce accessibility barriers by improving the geographical proximity of vaccination services - Address the language barrier by offering multilingual support to non-Swedish speaking residents

The Swedish pilot took place in the Skärholmen district of Stockholm, a very diverse district with a large migrant population, and targeted residents aged 65 and older. The initiative aimed to increase uptake of influenza and COVID-19 vaccines by addressing barriers related to proximity, language, and trust in health services.

To achieve this, the pilot repurposed an ambulance as a mobile vaccination unit, which was stationed in a central public square over seven consecutive Saturdays. The unit operated without requiring appointments or electronic identification, making it accessible to individuals who might otherwise struggle with digital booking systems. The mobile unit was staffed by nurses, doctors, and multilingual health communicators and informers who engaged passers-by in different languages, including Arabic, Turkish, Dari, Tigrinya, Amharic, English, and Swedish.

The outreach strategy included a media campaign, SMS notifications, and the distribution of flyers and postcards. Health informers played a crucial role in encouraging residents to visit the unit and the visibility of the ambulance in a busy public space also contributed to the pilot's success in attracting attention and participation.

Figure 33 Sweden's pilot development and implementation



7.2.3. Cluster 3: School vaccination programmes

The school vaccination cluster draws on exemplary practices from Murcia (Spain) and Ireland, where vaccinations were delivered in or near school settings to improve access and uptake. This approach aims to streamline access to immunisation for children and adolescents by leveraging the school environment as a trusted and accessible venue. The practice addresses several key barriers to vaccination, such as the restricted opening hours of vaccination centres, limited outreach, lack of accessible information, shortages of healthcare professionals, and challenges in reaching underserved or hard-to-reach populations.

By embedding vaccination services within schools, these programmes reduce logistical burdens on families, improve uptake rates, and promote equity in access to preventive healthcare.

In Estonia and the Netherlands, these practices were adapted to local contexts. Estonia focused on enhancing vaccine literacy through targeted information campaigns in schools, while the Netherlands aimed to improve physical accessibility by relocating vaccination services to school-adjacent sites.

Estonia pilot

Aim	Objectives
Increase HPV vaccination coverage among 14-year-old girls and boys in Estonia.	- Increase the knowledge and awareness of students, parents and teachers by developing additional and tailored information material on HPV vaccination to effectively engage and inform the target population. - Foster collaboration between all actors involved in school vaccination: stakeholders at the institutional level – such as the Ministry of Social Affairs, the Ministry of Education and Research, and the national health authority – as well as those directly engaged in implementation – including school personnel and school nurses. - Enhance support to school nurses. The pilot aimed at providing an innovative and useful information tool – the video lecture included in the information package – to streamline the vaccination journey and reduce the workload of school nurses.

Estonia's pilot initiative aimed to increase HPV vaccination rates among 14-year-olds by enhancing awareness and understanding through tailored information materials - including a video lecture - delivered to students, parents, and teachers prior to school vaccinations. The pilot also sought to strengthen collaboration between health and education sectors and support school nurses in their outreach efforts. The Estonian pilot was implemented in eight schools across four regions, targeting 14-year-old boys and girls eligible for HPV vaccination. Following a preparatory phase during which a video lecture on HPV vaccination was developed, the pilot activities were implemented between September and October 2024. The intervention included:

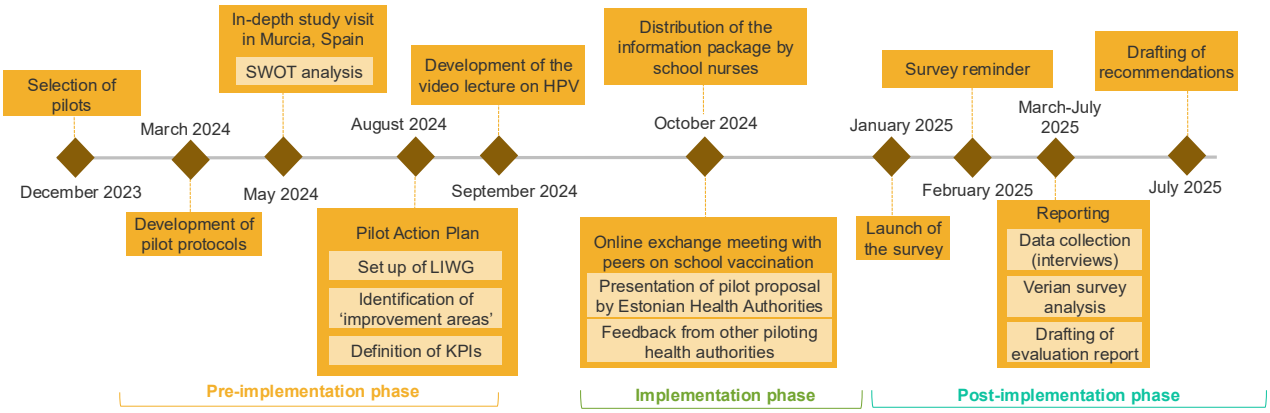
Distribution of an information package comprising a leaflet and a newly developed video lecture tailored to students, parents, and teachers.

Information sessions for school nurses about the project, both one-to-one and in groups, to collect information about potential challenges and equip the nurses with the needed technical and methodological knowledge to carry the project forward

Information sessions delivered by the nurses to students, parents and teachers. These sessions included showing the video lecture, followed by a Q&A session where nurses would respond to questions raised by students and their families. The video lecture was also disseminated via email.

Engagement of school personnel and institutional stakeholders through a Local Implementation Working Group (LIWG).

Figure 34 Estonia's pilot development and implementation



Netherlands pilot

Aim	Objectives
Increase vaccination uptake (DTP, MMR, HPV) among the underserved population of primary school children in New West Amsterdam	- Improve physical accessibility to vaccination services - Preserve parental autonomy and minimise political sensitivity - Promote uptake through familiar and frequented settings

The Dutch pilot project aimed at increasing vaccination coverage against MMR, DTP, and HPV among children aged 9-10 residing in New West Amsterdam, a district characterised by low vaccination rates and high proportions of residents with a migration background and/or low socio-economic status. The initiative aimed at encouraging vaccine take-up by bringing vaccination services closer to the target group and by priviledging a more intimate, family-friendly location to the usual hall-type buildings, such as sports centres, where child vaccinations are usually delivered. The initiative consisted of piloting new vaccination sites in New West Amsterdam, strategically situated in the same multifunctional buildings where the school is located. These locations were chosen to increase the convenience of vaccination services by cutting travel time for families and leveraging home-school travel routines, while avoiding delivering vaccinations on school premises, to avoid triggering adverse public reactions (school vaccination is a highly divisive topic in the country).

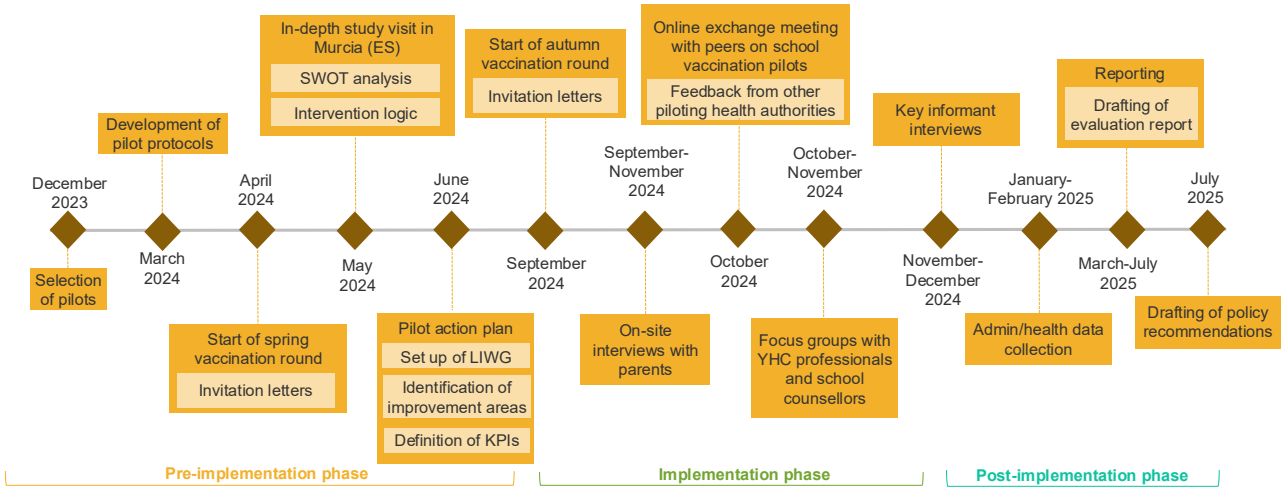
The intervention included:

Sending standard invitation letters to parents.

Maintaining routine procedures for consent, vaccination, and data registration.

Conducting on-site interviews with parents and focus groups with Youth Health Care professionals to assess perceptions and experiences.

Figure 35 The Netherland's pilot development and implementation



8. Effectiveness of pilots

Key messages

Reminder schemes, mobile units and school vaccination programmes have the potential to contribute to higher vaccine uptake, by increasing population awareness, improving user experience, engaging effectively with underserved groups, and making vaccination journeys easier and accessible for all.

Pilot reminder schemes proved effective in contributing to increasing vaccination coverage. In Catalonia and Croatia, statistical analyses conducted as a part of the pilot evaluations indicate a positive effect of reminders on vaccination uptake. Also in Murcia, where the non-random sampling of the treatment and control groups makes results more difficult to interpret, data seem to indicate a positive, though limited, effect of reminders on increased vaccination coverage. The five pilots were also an effective tool for fine-tuning the IT infrastructure, improving and updating administrative databases, and collecting lessons about the legal and practical obstacles to the implementation of effective vaccination reminder campaigns. This will allow for the design of impactful reminder schemes in the future.

Pilot mobile units provided an effective alternative to standard vaccination booking systems that is suitable to engaging with hard-to-reach groups. The results obtained by pilot mobile units show that integrated interventions addressing logistical and information barriers can increase uptake among population segments that are inadequately reached via conventional vaccination services. Moreover, investing in tailored, dialogue-based communication with the target group, addressing linguistic barriers at all steps of the design, and engaging constructively with community leaders and other potential multipliers (such as teachers) are key to maximising outreach among underserved communities.

The results of pilot school vaccination programmes indicate that school vaccination has the potential to improve the convenience of vaccination services for families and encourage uptake. The Estonian pilot, which required the direct involvement of schools in the implementation, resulted in the development of an innovative information tool (a video) and experimentation with effective ways to improve communication between families and school nurses. In the Netherlands, the relocation of vaccination premises near schools and the investment in improving the user experience was accompanied by increased family satisfaction. The outcome of both pilots highlights the need for systematic outreach and effective information dissemination strategies to maximise the impact of school vaccination programmes.

This chapter provides an overview on the achievements of the pilot projects and their effectiveness in contributing to their stated objectives. The chapter starts by illustrating the outputs and results of the pilots, before discussing the impact of each of the three clusters in more depth.

8.1. Overall view of pilot outputs and results

Based on the qualitative and quantitative data collected during pilot evaluations, this section discusses the relative performance of pilots within the same cluster to identify potential drivers of the observed results, promising practices, and areas for improvement.

By definition, pilots are a first attempt to introduce a practice in a given context on a limited scale, in order to better understand its potential and assess whether and how the practice could be scaled up.

The assessment of the pilot effectiveness focuses therefore not only on the number of vaccines delivered or the increase in coverage rates, but also, importantly, on the quality of lessons learned and the extent to which the pilots provide a solid knowledge basis for further, larger-scale projects.

A further important caveat to be considered when interpreting the results of the pilots is the type of evidence collected and shared by health authorities as a part of the pilot evaluations. This evidence is highly heterogenous. In some cases, statistical analysis was conducted to assess whether results obtained are statistically significant. When an analysis of this kind was not possible (due to the lack of data for the purpose), the evaluation consists of a qualitative assessment based on available sources (e.g. interviews, and non-representative survey results). The source used and the robustness of findings are clarified in the text.

Table 13 Overview of pilot project outputs and results

Country	Type of vaccine and target population	Outputs and results
Reminder schemes		
Catalonia	MMR vaccine for children aged 4	- 14,358 parents and guardians of unvaccinated 4-year-old children reached via SMS, including 7,184 messages with a more assertive formulation of the reminder and 7,174 with a less assertive formulation - 20% of the targeted population (N = 2871) vaccinated following the intervention
Croatia	TD vaccine for individuals aged 60	- 585 GPs received a reminder (1750 GP offices included in the control group) - 803 vaccines administered overall in the target group - 16.4% of GP offices increased the vaccination rate of their 60-year-old-patients, after sending the messages. Statistically significant increase in the number of vaccines administered by GPs both in the treatment (+0.91 vaccines on average) and control groups (+0.17 on average). - Statistically significant difference observed in the number of GP offices that increased vaccine administration in the treatment group as compared with the control group over the intervention period.
Lithuania	HPV vaccine for children aged 11-12	- 2,549 SMS delivered to parents and guardians of children in the target group - 137 vaccines administered following the intervention

Country	Type of vaccine and target population	Outputs and results
Murcia	MMR and MMRV vaccine for children born in 2020	- 13,804 children included in the pilot and assigned to the control and treatment groups based on their birth month - 9,274 parents and guardians of 4-year-old children reached via text messages (of which 4,396 included a link to an information page) - 4,530 children included in the control group - 672 vaccines administered after the intervention - When considering children born in the first six months of the year (with similar initial coverage): 6,784 were born between January and June 2020; 4,472 parents and guardians of 4-year-old children born in the first half of the year were reached via text messages (of which 2,140 included a link to an information page); 2,312 children were included in the control group. - For this group of children born in the first six months, 93 were newly vaccinated within the first 6 weeks following the intervention. In terms of absolute increase in coverage, there were 1.73% and 1.33% increases respectively in vaccination coverage rates for recipients of the reminder with information link and SMS only, against a 1.08% increase in the control group.[43]

[43] The evaluation methodology adopted by the health authorities in the Region of Murcia divided the target population, 4-year-old children born in 2020, into three groups based on the month of birth. Group 1 included children born in January, April, July, and October. Group 2 included children born in February, May, August, and November, while Group 3 included children born in March, June, September and December. Group 1 received a reminder, Group 2 received a reminder accompanied by a link to additional information about the MMR vaccine, and the control group received no intervention. Administrative data assessed six weeks after the reminders showed vaccination coverage increased by 3.69% in Group 1, 4.89% in Group 2, and 6.11% in the control group. The sampling method used (with children assigned to groups based on the birth month) complicates the interpretation of the results. The table reports the figures for children born in the first six months of the year, which presented comparable pre-intervention coverage rates. This second analysis accounted for the influence of birth month on the timing of the 4-year check-up appointment, during which the second dose of the MMR vaccine is administered. Children born in the last months of the year were less likely to have attended the check-up at the time of the intervention, which resulted in significant differences in vaccination coverage prior to the intervention. Specifically, children born in the early months of the year had substantially higher initial coverage compared with those born later. To address these pre-existing differences, a second analysis was conducted for children born in the first half of 2020, who had similar vaccination coverage before the intervention. Among children born between January and June 2020, the increase in vaccination uptake following the pilot was highest among those whose parents received a reminder accompanied by a link to additional information (+1.73%), followed by those whose parents received only a reminder (+1.33%), and the control group (+1.08%).

Country	Type of vaccine and target population	Outputs and results
Slovenia	HPV vaccine for 9th grade students (+/-14 years old)	- 169 schools involved across 3 regions - 5.6% increase in first-dose vaccination coverage was registered in the student cohort concerned
Mobile units		
Austria	MMR, DTP vaccines for pupils aged 15+ in 6 vocational schools in Upper Austria (3 rural and 3 urban schools)	- 1,481 invitations for pupils distributed through awareness raising campaign - 473 one-to-one individual consultations on recommended vaccinations delivered - 1,400 pupils reached through information sessions on vaccination benefits - 174 vaccinations delivered (10 MMR and 164 DTP
Sweden	Influenza and COVID-19 vaccines for individuals aged 65+	- 196 people vaccinated for influenza (59), COVID-19 (10), or both (127) by the mobile unit during seven consecutive Saturdays.
School vaccination		
Estonia	HPV vaccine for pupils aged 14 in 8 schools	- 1,022 pupils, 2,044 parents and 24 teachers attended the video lecture sessions - 89 vaccines delivered across the 8 schools
Netherlands	MMR, DTP, and HPV vaccines for children aged 9-10 in low socio-economic status neighbourhoods in New West Amsterdam	- 4,579 children reached across two low socio-economic status neighbourhoods in New West Amsterdam - 1,673 vaccines delivered (446 for MMR, 431 for DTP, 796 for HPV)

8.2. Reminder schemes

Reminder schemes were inspired by the good practice of vaccination reminders implemented in Denmark as a part of the Danish Childhood Immunisation Programme.

Reminder schemes to support childhood immunisation in Denmark

While child vaccines are not mandatory in Denmark, to ensure high vaccination coverage rates the country has adopted an approach characterised by a strong focus on lifting knowledge and awareness barriers to vaccination through continuous communication with families, both via one-to-one follow-up and general awareness-raising campaigns. The success of the approach is visible in the high coverage rates for most vaccines (94% for MMR, and 87% for HPV, with boys' vaccination coverage levels being close to girls', despite HPV vaccination being recommended for boys only since 2019). The positive impact of the reminder scheme on vaccination coverage rates is confirmed by a broad cohort study published in 2025, which assesses the effects of the reminder scheme for MMR1 (recommended for children aged 15 months) and DTaP-IPV/Hib, recommended for children aged three, five and twelve months), implemented since 2019. The study compared vaccination coverage rates for the cohort of children born in January 2018 (control group) and those of children born in January 2022 (treatment group), six weeks after the scheduled vaccination. The results show higher coverage rates for the treatment group for all vaccines except the second DTaP-IPV/Hib vaccine (1.3% of children in the treatment group were unvaccinated, against 3.4% in the control group). The difference was found to be statistically significant with a p-value < 0.001. At the end of the study period, children in the treatment group were significantly more likely to have received the three DTaP-IPV/Hib vaccines (88.3% against 79% in the control group, p-value < 0.001).

The five reminder scheme pilots implemented in Catalonia, Croatia, Lithuania, Murcia, and Slovenia built on the experience of the Danish Programme to develop practices addressing challenges specific to each country. The main elements of the pilot design were similar across all projects, and consisted of reaching out to the target group with a vaccination reminder. However, as pilots were designed to adapt to the country's vaccination system, they had their own specificities, including unique objectives:

In **Catalonia**, where vaccinations are administered in parallel by the public health system and private health clinics, the reminder scheme served the important purpose of **updating public databases** of individuals vaccinated through private health providers. The Catalan pilot was also an opportunity to test a system to make **vaccine demand** more predictable.

In **Catalonia** and **Murcia**, the pilots aimed to test the relative effectiveness of different types of reminder communication style and reminder content. As in Catalonia and Murcia, the reminder scheme implemented in **Lithuania** targeted families of children in the relevant age group and reached them via SMS. A particularity of the Lithuanian pilot was the regional dimension of the intervention, which aimed to decrease large regional disparities in vaccination coverage rates.

In **Slovenia**, the pilot leveraged the existing tradition of collaboration between health and education institutions and aimed, inter alia, to strengthen the role of schools as vaccination promoters beyond the 8th grade, when this role traditionally stops. Importantly, by leveraging collaboration with the education sector, the Slovenian pilot explored effective, non-intrusive ways of communicating with families on the topic of child vaccination via a trusted intermediary (the school). Also in Slovenia, the pilot had a regional scope.

In **Croatia**, where the pilot focused on TD vaccination for 60 year olds, the reminder scheme targeted general practitioners (GPs) and aimed to address a gap in direct communication between the Croatian Institute of Public Health (CIPH) and GPs and the limited awareness among the latter around TD vaccination.

Importantly, of the five health authorities that piloted a vaccination reminder scheme, some (such as Catalonia) could rely on previous experience with similar practices implemented in the past (although on a limited scale) and a well developed IT infrastructure adapted to the purpose. For others, like Lithuania and Slovenia, the pilot introduced a new practice and constituted an opportunity for experimentation. This diverse experience is reflected in the different scale and ambition attached to the pilots, and can contribute to explain variations in performance.

The pilots had different target groups. Four of them focused on child vaccination. The Catalan and Murcia pilots covered MMR vaccination and targeted 4-year-old children who, according to health authority recommendations, are supposed to have received their second dose of vaccine. The main goal of MMR vaccination reminder in Catalonia was to counter a resurgence in measles cases correlated with gaps in vaccination coverage, which remains below the 95% rate recommended by the WHO (in 2023, it was 88.4% for children born in 2019). Also in Murcia, where the MMR vaccination rate is above the national average, coverage remains below the WHO recommended level (93.8% in 2022). The Lithuanian and Slovenian pilots focused on HPV vaccines for young adolescents. It should be noted that the introduction of HPV vaccines in the list of recommended vaccines is relatively recent, especially for boys (in Lithuania, HPV vaccination has been recommended for girls since 2016 and for boys only since 2023). In Slovenia, the pilot aimed at countering a decline in HPV vaccination coverage registered in recent years. Slovenian parents are informed about the recommended HPV vaccination during the regular school checkups children undergo during the 6th grade of elementary school (when pupils are 11-12 years old)[44], a phase when most families consider it is “too early” to have their child vaccinated. The last health checkup offered by schools during the 8th grade includes minimal communication with families on the topic of HPV vaccination, with the result that many miss the opportunity to be vaccinated in the time window when the vaccine is most effective. The Lithuanian pilot also aimed to counter a decline in vaccination rates for girls. In both countries, coverage rates are well below the WHO target of 90% by 2030, with significant regional disparities.

The Croatian pilot was the only one to focus on the vaccination of older adults. The action covered TD vaccination, for which Croatia registers a low coverage

[44] In Slovenia, primary education consists of nine years, from approximately age 6 (1st grade) to age 15 (9th grade). It is organised as a single structure combining primary and lower secondary education, divided into three three-year cycles (grades 1-3, 4-6, and 7-9).

rate among older adult residents (in 2023, it was 32.4% for persons above 60 years). Although cases of tetanus infection are low in the country, due to the severity of the disease the ECDC recommends maintaining high vaccination coverage as a preventive measure, especially among the older population.

8.2.1. Contribution to vaccination uptake

The pilots provide strong evidence that reminder schemes can contribute to increasing vaccination coverage rates. The results of the statistical studies conducted in Catalonia, Murcia and Croatia show an impact of reminders on vaccination uptake, in line with the positive impact already recorded in the evaluation of the reminder practice in Denmark.

In Catalonia, health authorities opted to assess the impact of the pilot reminder scheme by relying on the analysis of time series data. The interrupted time series analysis covering the period between January 2023 onwards reveals a statistically significant increase in vaccination coverage during the period May-June 2024, when the reminder scheme was implemented. The choice not to opt for splitting the target population into a treatment and control group was justified by the need to reach as many individuals as possible, in a context characterised by the resurgence of measles across Europe.

In Murcia, the target population was divided into three groups, two of which each received a different type of message (one consisting of a text message only, the other including a link to online information materials) while the third served as control group. Children were assigned to one of the three groups based on their birth month. Evaluation results, adjusted for 4-year-old children born in the first half of 2020 to control for differences due to birth dates of children assigned to different groups[45], confirm a larger increase in post-intervention coverage for children that had received the reminder than for those in the control group. An analysis focusing on children born during the first half of 2020 shows that the group that received a message with link experienced the highest increase in

[45] In the Region of Murcia, the second dose of the MMR vaccine is administered during the 4-year-old check-up. These check-ups must be booked in advance by parents, who receive a letter reminder approximately one month before their child's birth month. The pilot intervention was implemented between December 2024 and January 2025 and evaluated in March 2025. At the time of the intervention, children born in the last months of the year might not yet have attended their 4-year check-up due to delays in booking and scheduling appointments. This resulted in important pre-intervention differences in vaccination uptake by month of birth. When initial vaccination coverage was calculated, children born in the last months of the year showed significantly lower initial coverage compared to those born in the first months of the year. To adjust for these differences, which influenced the evaluation of the results, a second analysis was conducted that considered only children born in the first half of 2020, who had similar pre-intervention coverage.

coverage (1.73%, against 1.33% for those who had received the text message only and 1.08% for children in the control group).

In Croatia, the TD vaccination coverage rate among 60 year-olds increased significantly by 1.97% in the intervention group (against 0.80% in the control group). The analysis conducted as a part of the pilot evaluation shows a statistically significant increase in the number of GP offices that boosted the number of vaccines administered following the intervention. A difference-in-difference analysis conducted by the health authority revealed that GPs in the treatment group administered approximately twice as many vaccines as expected, based on the baseline and prevailing trends. The positive outcome of the reminder schemes implemented in the three countries was facilitated by the existence of a pre-existing IT infrastructure and the availability of good quality administrative data.

In Slovenia, the effectiveness of the reminder scheme is harder to assess. Vaccination rates increased within the 9th grade students cohort in both intervention and control groups (the effect may be partially due to seasonality). Importantly, the increase in vaccination coverage among children whose families had received the reminder was higher than in the control group, although the methological framework of the pilot does not allow us to assess whether the difference is statistically significant. Other elements point to a positive effect of the reminder scheme on vaccination rates. The conversion rate registered was relatively high (about 35% of those that received the reminder had their children vaccinated afterwards), while unvaccinated students were found mostly among those who had not received the reminder (70% of those who did not have their child vaccinated had not received the communication from school). These data suggest that receiving the reminder had a positive effect on the subsequent decision to have a child vaccinated. The effectiveness of the pilot was adversely affected by uneven degrees of engagement across schools (in some areas, less than 40% of schools appointed a contact person, making it difficult to track the dissemination of reminders). The project was also less effective in engaging with families of children that had not received the first dose of vaccine (as compared with those who had received the first dose and needed a booster), although this was a prominent objective of the pilot. Overall, the coverage rate remained quite low (lower than 50% in regions covered by the pilot).

In Lithuania, the observed effects of the pilot on vaccination uptake were limited. The month following the intervention registered a slight increase in the vaccinations delivered to 11 and 12 year-olds, although results were far from the project target. Data collected suggest that design issues were the main reason for the limited effectiveness of the reminder scheme, the reach of which was adversely affected by the relative low share of individuals for whom the health authorities could find a mobile phone number. Moreover, only a small number of individuals targeted via the SMS campaign opened the message on their eHealth system afterwards.

The pilots provided valuable lessons on how to improve conversion rates for reminder messages, meaning the share of individuals who take the hoped-for action upon receiving the reminder. These lessons included observations on the advantages and limitations of different communication channels and dissemination strategies.

The convenience of the channel used to deliver the reminder and the overall quality of the user experience can increase the effectiveness of these schemes.

In Lithuania, the high attrition rate (message receipients who failed to engage with the following step, in this case opening the message received on the eHealth website) provided useful lessons for the implementation of future vaccination reminder schemes. These include a better understanding of the risks of using SMS: as these messages become more and more associated with scams and phishing attemps, people are increasingly reluctant to open them, especially when they contain hyperlinks. Another limitation concerned the fact that, at the time of the pilot, Lithuania did not have an eHealth mobile application: convenient access the information package through a mobile app would have improved the user experience and might well have increased conversion rates. Similar conclusions on the limitations of the use of SMS were reached by Catalan authorities.

In Catalonia, stakeholders consulted judged that the connection with a health application could help improve the user experience and increase engagement. Another observation regarding the Catalonian pilot concerned the language used for the reminders: messages were distributed in Catalan only, a choice that probably limited reach among non-Catalan speakers.

Finally, an observation made in the Murcia pilot impact assessment report, but which is also valid for the Catalonian and Lithuanian pilots, is that the interventions via SMS only reached residents covered by the (national or regional) health system (in the case of Murcia, this corresponds to about 95% of regional population).

In Slovenia, the channels used were probably suboptimal for the purposes of the campaign. While the dissemination of printed materials relied heavily on the initiative of schools and parental attendance at parent-teacher meetings, the alternative dissemination via the eAssistant tool, the platform used for school-family communications, also came with its challenges. To access the information package, parents or guardians had to visit the platform and deliberately check the list of messages received, something that not all families do on a regular basis.

In general, the results of the pilots seem to confirm that working on the user experience and using reminders to facilitate access to vaccination services could increase conversion rates, eventually leading to a stronger impact on vaccination uptake. Interventions aimed at increasing user convenience could also include

linking reminder messages to an online vaccination booking system where one exists, as suggested in the Murcia statistical assessment report. In the case of Murcia, no such system is available to the public. The absence of an online booking system to which reminders could directly link was identified as an obstacle to making reminder schemes even more effective. **Targeted messages, although more difficult to implement, could contribute to the effectiveness of reminder schemes.**

The experiences collected through the implementation of the pilots highlight a trade-off between universal reminder schemes (which are sent to the whole population in the target age group, regardless of vaccination status), which are easier to implement, and reminders that target unvaccinated individuals. The latter can be harder to implement effectively, especially when the information available on the population's vaccination status is incomplete, or unreliable (in the case of Catalonia, updating the public database was one of the goals of the project). Another complication is that targeted reminders may be perceived as more intrusive into citizens' privacy and hence trigger adverse reactions. In the case of Slovenia, where reminders were disseminated through schools, this aspect led to the decision to opt for universal/general reminders distributed to the parents or guardians of all children in the target age group, rather than to parents of unvaccinated children only. However, while more challenging to set up, targeted or personalised reminders could bring better results. In Slovenia, targeting the whole population added confusion to the communication and may have diluted the effectiveness of the message. The use of targeted reminders may also pay in the longer term, as limiting the number of messages that citizens receive reduces the risk that important messages go unnoticed, or the risk of fatigue due to overexposure to irrelevant communication.

Data collected among the target group showed that reminders are valued as an effective way to increase vaccination awareness, reduce forgetfulness, and encourage timely vaccination.

The results of the citizens' survey across pilots suggest that, if measures to ensure wide reach are implemented, reminder schemes can contribute to timely vaccination. In Slovenia, over half the respondents to the citizens' survey (54%, or 94 of 173) described the reminder as helpful or very helpful in encouraging vaccination. In Lithuania, a significant share of respondents who had not received a reminder (over 75%, or 147 of 191) said that it was likely or very likely that they would have taken steps to have their child vaccinated had they done so. Conversely, 27% (or 49 of 181) of those who said they had received the reminder thought it was unlikely or very unlikely that they would have had their child vaccinated had they not received the message. The results of the citizens' survey are less striking in Catalonia, where just 19% (or 16 in 85) of those who received a reminder thought it unlikely or very unlikely that they would have had their child vaccinated had they not done so. It should be noted that the size of the Catalonian

sample was particularly small (85 respondents), so the figures are hardly representative of the target population.

8.2.2. Other effects of the reminder scheme pilots

In all countries, pilots helped to build or finetune the infrastructure needed to make reminder schemes an integral part of vaccination campaigns. In all cases, the pilot reminder schemes represented an opportunity to refine or build a suitable infrastructure to support awareness-raising communication around vaccinations in the future.

In the case of Catalonia, completing and updating the public vaccination status database was an objective set from the design phase. Improvements in the quality of public data as a result of the pilot will make it possible to conduct better targeted communication campaigns in the future. In Catalonia, recording the number of vaccinations delivered per day during the pilot implementation period also provided useful lessons on the response of vaccine demand to reminders: understanding how demand fluctuates (with a spike right after the reminder delivery, followed by a gradual return to normal levels after few weeks) will allow for effective vaccine supply planning during future iterations.

In some cases, the pilot was useful to identify critical data gaps (in the case of Lithuania, the limited availability of mobile numbers) to be taken into account when designing future reminder scheme strategies.

In Croatia, the pilot stimulated discussions on adapting the law to allow the health authority to use the eCitizen platform for vaccination awareness campaigns. The Croatian pilot was initially intended to focus on HPV vaccination for 14 year-olds. The initial design included the dissemination of reminders to the families of adolescents in the target group via the eCitizen platform “e-gradani”. Following the negative advice of the Agency for the Protection of Personal Data, the initial project was suspended and the health authority opted to pilot a reminder scheme focused on TD vaccination targeting GPs via the Medicus.net platform. Discussions were subsequently opened with the Ministry of Health with a view to amending the legislative framework to allow the use of the e-citizen application to conduct vaccination campaigns that would contact citizens directly. The Croatian health authority is planning to continue to work to establish a legal basis for outreach campaigns in the context of the legislative change for the application of the European Health Data Space (EHDS). While the timeframe for the reform was incompatible with the timescale of the pilot, the reform will provide the health authority with a powerful tool to deliver effective reminder schemes in the future.

In Slovenia, the pilot provided an opportunity to foster collaboration between the health and school systems, setting an example of successful cross-sectoral cooperation. In fact, the benefits of cooperation among relevant stakeholders, both at central and regional levels, was one of the key achievements of the

initiative. Building on an existing tradition of education system involvement in public health efforts, the pilot paved the way for a more effective, innovative approach by schools in supporting vaccination awareness efforts and communication with families regarding health matters.

In some cases, reminder schemes made it possible to test the effectiveness of different communication styles and content. In Catalonia, testing the communication style was an objective included in the pilot design. Two versions of the reminder message were tested, which led to different levels of response. In particular, a temporal analysis conducted by the health authority showed that the more assertive message was more effective at triggering a reaction (vaccination registration and administration) within the first 30-45 days after distribution, although the figures tended to converge as the time interval increased.

Where reminder schemes relied on a chain of information transmission involving multiple actors, they highlighted the role of intermediary figures (teachers, GPs) and the need to raise their awareness in order to engage with them constructively. This was the case in Slovenia, where the reach of the initiative was jeopardised by inconsistent engagement levels among schools. Although the pilot represented a remarkable step forward in revitalising the collaboration between health and education institutions, the project reach and impact were limited by the uneven degrees of engagement, preparation, and tracking of the initiative by the schools, which were not always able to make the best use of resources provided to them. While reaching families with the mediation of school system proved to have potential, the pilot also highlighted the importance of investing in awareness-raising among schools and better school onboarding. In Croatia, the dissemination of reminders to GPs provided useful lessons on potential challenges when relying on GPs as intermediary figures. The survey of GPs conducted as a part of the pilot evaluation showed that the choice of the Medicus.net platform for the dissemination of reminders was seen as convenient, and probably facilitated engagement. Nevertheless, some GPs said they had not disseminated the information further to their patients, reportedly due to lack of time. Also, patient response to the information provided by GPs varied. According to GPs who responded to the survey, “only a small share of patients” (up to 25%) scheduled an appointment to receive the vaccine following the communication. These responses are consistent with the relatively low share of GP offices that registered an increase in the number of vaccines administered. While healthcare professionals have an irreplaceable role in ensuring continuous communication with the general population about health matters, exclusive reliance on GPs for communication may limit outreach. In parallel with working to increase engagement among GPs, further initiatives of this kind may consider integrated approaches using multiple communication channels to reach the target group.

8.3. Mobile units

The Austrian and Swedish pilots involving mobile units leveraged proximity and proactive communication to increase vaccination rates among groups traditionally characterised by relative low vaccine uptake. Both were inspired by the good practice of using mobile vaccination units implemented across the Netherlands to boost COVID-19 vaccination coverage.

Mobile vaccination units in the Netherlands

Vaccination mobile units were activated in the Netherlands in the period September – December 2021 to encourage vaccination uptake in districts with a low vaccination coverage rate. The results of the evaluation study conducted following the initiative show that the approach had a positive effect on vaccination uptake. The increase in uptake varied greatly across districts, with rural areas registering a 14-fold increase in daily vaccination uptake on the days where the mobile unit was present, against a 1.1 higher uptake registered in highly urbanised districts. The larger effect observed in areas with lower population density, such as rural areas, is consistent with the hypothesis that mobile units can encourage vaccination by addressing logistical barriers and indirect vaccination costs associated with the remoteness of vaccination services. In Amsterdam, the days where the mobile unit was present registered 26% higher vaccination rates than other days.

The pilots implemented in Austria and Sweden propose adaptations of the Dutch practice to the specific national contexts and priorities. In the case of Sweden, the pilot could also build on the experience of mobile units activated during the COVID-19 pandemic to support vaccination uptake across the Stockholm region.

While focusing on two different population segments, the pilots share some key characteristics that allow us to compare them:

Emphasis on vaccination equity. Both pilots aimed to increase vaccination equity by targeting population subgroups that are disproportionately affected by logistical barriers to vaccination, as well as administrative, linguistic and/or information barriers. Both schemes were designed as a faster and easier track to vaccination than the usual booking system.

Focus on tailored outreach. Beyond the innovation of positioning a mobile vaccination unit in a strategic area (or moving to different locations to reach the target group), the pilots also included outreach efforts as a critical part of the design. Both projects explored new ways to reach out to the target groups: in Austria, this included efforts to develop and adapt communication materials that would resonate with the target audience, and the involvement of young communicators belonging to the target age group. The operationalisation of the Swedish mobile unit was preceeded by an extensive awareness-raising campaign. In an effort to facilitate culturally sensitive communication and dialogue with residents belonging to minority groups, the Swedish pilot also

introduced the role of health informers, social workers with ties within the local community and capable of speaking multiple languages, who were responsible for establishing the first contact with potential beneficiaries of the vaccination campaign.

Flexibility in the design. Both pilots were designed in a way that left scope for adjustments in the course of implementation to integrate lessons learned as fieldwork progressed. The extended implementation timeframe, which included several vaccination days over a period of several weeks, allowed for adjustments to the plan and assessment of the impact of such changes on the effectiveness of the initiative in the course of implementation.

8.3.1. Contribution to vaccination uptake

Results of the pilots show that mobile units can contribute to sustaining and increasing vaccination coverage. Both pilots showed that mobile units could effectively complement existing vaccination campaigns and help boost vaccination coverage rates.

Notably, the Skärholmen district in Stockholm, where the Swedish pilot was implemented, registered a statistically significant 3% increase in the vaccination rate for influenza compared with the previous season. The district was the only one of four Stockholm districts with similar socio-demographic characteristics to register such an increase[46].

The mobile unit delivered fewer COVID-19 vaccinations (137, against 186 for influenza). Overall, the COVID-19 vaccination rate in Skärholmen remained stable compared with the previous year. The district was one of the two districts that registered no statistically significant variations in the vaccination coverage for COVID-19, while the other two saw a statistically significant decrease over the same period[47].

A noteworthy aspect of the Swedish pilot is the **stability in the number of vaccines delivered** over the seven Saturdays when the mobile unit was operational[48]. This regular influx of people approaching the mobile unit to receive the vaccine across the whole implementation period suggests that the potential

[46] The districts of Järva and Botkyrka did not record a statistically significant change in vaccination coverage rates for influenza compared with the previous year, while Södertälje district saw a statistically significant decrease in coverage.

[47] Botkyrka and Södertälje registered a statistically significant decrease in coverage compared with the previous year, while no significant change was rdcorded in Järva.

[48] The mobile vaccination unit administered a median of 26 vaccines per day of operations. On the last day of operations, the unit administered 32 vaccines, a number still above the period median.

of the unit to deliver was not exhausted after seven weeks. As noted by the health authorities involved in the project, making the mobile unit available for a longer period could potentially increase the overall impact on vaccination coverage.

Data available for the Austrian pilot do not include figures on vaccination coverage among students in beneficiary schools as compared with the previous year or a comparison group. Nevertheless, the information available is relatively positive, taking into account the initial resistance that the mobile unit encountered among the target group. Of 1481 students involved in the project, 32% (or 473) decided to attend a private consultation. Of these, 37% (or 174, 12% of the total number of students involved in the project) opted to receive the vaccination on the spot. It should also be noted that, as interviews suggest, more may have decided to be vaccinated at a later time by a GP. Among the respondents to the citizens' survey, about 11% of those not vaccinated in the mobile unit had plans to be vaccinated elsewhere, although what proportion ultimately opted for vaccination as a result of the mobile unit activities is not known.

By improving accessibility and convenience of vaccination services, mobile units contributed to encouraging timely vaccination. One important lesson of the pilot evaluations is the potential of mobile units to encourage vaccination among those with a history of missed or late vaccinations. In Austria, over half of those vaccinated in the mobile unit who responded to the citizens survey (52%, or 70 of 135) said that, without the presence of the mobile unit, they would have been unlikely or very unlikely to be vaccinated.

In Sweden, according to the data collected by the mobile unit itself, 27% of those vaccinated against influenza and 46% of those vaccinated against COVID-19 in the mobile unit had not been vaccinated for these diseases in the previous season, suggesting a certain capacity of the mobile unit to attract individuals with a history of missed vaccinations. According to the regional health authority survey[49], at the time when the mobile unit was activated 80% of respondents had not yet booked a vaccination. In such circumstances, it is reasonable to conclude that the mobile unit probably helped to overcome motivational barriers and contributed to timely vaccination among the target group.

Efforts to ensure the visibility of mobile units, essential to promote participation, were effective, contributing overall to vaccine uptake. Visibility and communication were an important part of the pilot design. Tailored awareness-raising activities conducted before and during vaccination days laid the ground

[49] The Regional Health Authority distributed a paper survey to those individuals who approached the mobile vaccination unit. The objective was to gather relevant data on individuals' socio-demographics, how they had heard about the vaccination opportunity, whether they had already booked an appointment, which vaccines they received, and their first-time vaccination status for COVID-19 and influenza. The survey also explored reasons for getting vaccinated, future vaccination intentions, and preferred vaccination locations. This survey had 187 responses (out of 197 individuals vaccinated).

for an effective vaccination campaign via the mobile units. In Austria, the dissemination of information materials and the organisation of vaccination info talks were all part of a consistent effort to build awareness and interest around the initiative. In Sweden, activities aimed at raising awareness around the mobile unit included media collaboration and a wide postal and SMS awareness-raising campaign addressed to residents in the target age group.

As the implementation of the projects spanned several weeks, the organisers had opportunities to apply the lessons of the early stages to improve their visibility strategy. In Austria, this included moving from a whole-school type of format for the vaccination info talks to discussions within smaller, classroom-size groups to keep attention high and build rapport with the students. Moreover, the mobile unit stand was strategically re-positioned next to the vending machines to make it more visible to students. In Sweden, the mobile unit was moved to a more visible location in Skärholmen central square, based on feedback collected during early implementation days, to improve its visibility.

Efforts to maximise visibility made an important contribution to the success of the mobile units. In Austria, they were fundamental in enabling the project staff to engage with the students and be able to convey scientific information. In Sweden, most respondents to the health authority survey mentioned that they got to know about the initiative either because they noticed the ambulance on the main square or received information on the initiative through the media. Among respondents to the citizens' survey, 68% reported being aware of the initiative.

8.3.2. Other effects of the mobile unit pilots

The mobile unit pilots represented an initial attempt to engage with hard-to-reach groups, leading to the identification of promising practices to be developed in the context of larger scale projects. Mobile units were piloted, following the Dutch example, to support vaccination among some hard-to-reach groups and to contribute to reducing the vaccination coverage gap with better-served demographics. Qualitative evidence collected as a part of the pilots shows strengths and weaknesses of the pilot design with regard to this aspect and highlights that:

Targeted communication is key to ensure that hard-to-reach demographics engage with the mobile unit

In both cases, tailored, dialogue-based communication proved important to improve outreach among groups that are not easily reached through general or non-targeted communication. In the Swedish pilot, health informers were able to engage with potential beneficiaries who had not been reached through other channels. 22 of the 187 respondents to the survey conducted by the health

authorities mentioned that they had learned about the mobile unit when approached by a health informer. The Austrian pilot included robust efforts aimed at finding the most effective way of communicating with students in vocational schools.The choice of language that would resonate with the target (including the use of local dialect in the video materials), the extensive use of impactful images, and the priority given to face-to-face interaction contributed to building rapport and ensuring the engagement of an initially inattentive and even dismissive audience. Importantly, the Austrian pilot offered an even more personalised communication channel in the form of one-to-one consultations, the role of which was duly explained in advance to the families so that they could make the best use of the opportunity offered.

To maximise the engagement of minority language groups, multilingual and culturally sensitive communication should be mainstreamed across all aspects of the design

While showcasing successful practices, the implementation of the pilots also provides some indication about areas for improvement. As it targeted an area with a strong presence of individuals with a migration background, the Swedish pilot faced the specific challenge of addressing the language barrier experienced by some minority groups. As mentioned earlier, administrative data showed that an important share of individuals vaccinated in the mobile unit had not received the vaccine in the previous year, suggesting that the pilot was able to reach people with a history of missed vaccinations. These data, however, provide no information on other important aspects that the unit aimed to address, such as the extent to which the mobile unit was able to engage with non-Swedish speaking residents. The results of the citizens' survey and information collected via the survey administered by the health authority are missing a substantial proportion of the data on the country of birth of respondents. It is, therefore, hard to establish the extent to which non-Swedish speaking and/or individuals with a migration background (the latter representing 55% of the population in the target age group in Skarholmen) benefited from the initiative. Interviews with health informers added some elements to the picture. For instance, some health informers highlighted the difficulty in establishing dialogue with potential beneficiaries due to the language barrier. In some cases, cultural reasons were mentioned as a source of vaccination hesitancy that health informers did not have the tools to address. Improvements implemented while the mobile unit was already operational included the translation of flyers and other information materials in multiple languages to address the needs of non-Swedish speakers. However, the awareness-raising campaign via postcards, SMS, or the media only targeted Swedish speakers, something that may have limited its outreach among non-Swedish speaking individuals. One lesson of the pilot is that multilingual communication should be integrated into the project design from the start, including awareness-raising communication. Similarly, further efforts are needed to understand cultural specificities and to adapt communication to ensure engagement among linguistic and cultural minority groups.

Combining the mobile vaccination units with actions to address information gaps can strengthen the effectiveness of the mobile units in reaching hard-to-reach population segments

The Austrian pilot combined the offer of a convenient and easily accessible vaccination option with robust measures aimed at addressing the information barrier encountered by the target demograhic. Info days, one-to-one consultations and awareness-raising met a real need, as is shown in the data collected from the target group in both interviews and the citizens' survey. The latter shows that the project had potential both to remove logistical and economic barriers and to improve knowledge around vaccination, including by providing reassurance on vaccination safety. These encouraging results show how an integrated intervention like the Austrian pilot, combining logistical facilitation with information, could greatly contribute to encouraging vaccination uptake among underserved demographics.

By design, the Swedish pilot did not include measures specifically addressing the information barrier. Data collected for the pilot evaluation suggests that this absence may have limited the capacity of the pilot to engage with some hard-to-reach groups, particularly vaccine sceptics, or those worried about side effects. In fact, the results of the citizens' survey conducted among residents in the target group show that respondents were unclear as to the effectiveness and safety of vaccines, and had misconceptions about disease severity. Interviews with residents in the target age group suggest that, particularly in the case of COVID-19, the decision not to be vaccinated may be linked to concerns about vaccine safety and side effects. These interviews also highlight a need for information on the safety and effectiveness of vaccines in multiple languages and accessible formats. Should the initiative be reproduced at a wider scale, the inclusion of measures to address the knowledge gap, coupled with robust community outreach, could help the mobile unit to reach those groups that are more susceptible to misinformation, or simply lack access to accurate information to make informed decisions.

Engaging with trusted interlocutors close to the target group can increase the success of the mobile units among hard-to-reach groups

Lessons collected through the implementation of the pilots point to the importance of engaging with intermediaries or trusted figures of the final beneficiaries in order to maximise receptiveness and participation within the target group. The success of the Austrian pilot was probably driven by measures taken to encourage the participation of parents by extending information about the project to them. This is because, while students aged 14+ are legally capable of taking decisions about about vaccinations on their own and do not need parental consent, many still rely on parental advice and recommendations. The same pilot revealed the importance of teachers as a stakeholder group that could influence the success of vaccination initiatives such as the mobile units: teachers who engaged positively with the initiative helped overcome initial resistance and encouraged a

more positive, receptive attitude among students. In fact, the experience of the Austrian pilot suggests that teachers themselves can be seen as a very relevant target for vaccination awareness-raising efforts, given the authoritative position they hold[50]. In Sweden, the need to step up efforts to engage with communities and community leaders was one of the lessons emerging from the pilot experience. While the pilot design included a limited number of activities to engage with relevant local interlocutors (e.g. homes for the elderly), the project showed how these efforts could be expanded (e.g. engagement with sports club and centres of worship).

8.1. School vaccination

Like the mobile unit pilots, school vaccination pilots leveraged proximity to increase vaccination uptake. These pilots were inspired by successful school vaccination practices implemented in Murcia (for HPV and meningitis) and Ireland (for influenza).

School vaccination programme in the Region of Murcia Offering the flu vaccine to children in three primary schools in Ireland
In Murcia, vaccination coverage for cohorts that were offered the vaccine in school is significantly higher than for those that were offered the vaccination in the standard health centres, indicating a comparative advantage of school vaccination in encouraging uptake. The potential of school vaccination is confirmed by the results achieved in Ireland. A pilot conducted in 2022 in three schools showed large differences in coverage between children attending pilot schools and the rest of the population, a result that led to the scaling up of the practice to cover all schools across Ireland during the subsequent season. In 2023, the vaccine was offered to specific cohorts (senior infants in mainstream primary schools and all children in primary-aged special education schools), reaching an average uptake of 51.7%, above the initial target of 50%.

The Estonian and Dutch pilots took inspiration from the experiences of Murcia and Ireland to apply them to two contexts that are profoundly different from each other. These differences are reflected in the design and primary focus of the two pilots.

In **Estonia**, school vaccination is an established practice. Children enrolled in school can already benefit from an easily accessible option to receive the recommended vaccinations cost-free (including the indirect costs connected with distance). Against this background, the pilot focused on **improving collaboration** between health and education services and addressing the

[50] Skepticism towards vaccination among teachers was highlighted in interviews with the health authority: while some teachers were supportive and interested in the initiative, most of them were open to the initiative but refrained from demonstrating any particular interest and kept their involvement neutral. Only very few teachers were critical of the initiative.

information barrier to encourage families' uptake and therefore improve the peformance of existing school vaccination programmes.

In the **Netherlands**, school vaccination is a divisive topic. For a part of public opinion, administering vaccinations in schools is seen as too intrusive, limiting parental autonomy and voluntary participation[51]. In the absence of school vaccination programmes, families have to adjust to the availability of vaccination services offered in their area, typically during dedicated child vaccination days. While families have the flexibility to change their assigned vaccination appointment, attending vaccination services may come at a cost (including the cost of travel time and/or absence form the workplace). The Dutch pilot therefore focused on addressing the **logistical barrier** by offering an alternative child vaccination location in the same multifunctional building where the school is located. Contextually, the relocation of vaccination services focused on making the new location more welcoming, focusing on shorter waiting times and more attention to individual needs.

The results of the two pilots enable us to explore how different types of measures (addressing logistical, information, and coordination barriers) can contribute to improving the success of vaccination services and increase overall vaccination uptake.

8.1.1. Contribution to vaccination uptake

Data collected show that the innovations incentivised families to have their children vaccinated, although they do not conclusively demonstrate a direct impact of the school vaccination pilots on vaccination uptake. It is possible that practices introduced with the pilots could show stronger effects in the longer term, should the initiatives be replicated.

In Estonia, information disseminated by school nurses encouraged hesitant families to have their children vaccinated.

The Estonian pilot was implemented in a context of an ongoing country-wide effort to promote HPV vaccination for young adolescents. Schools that participated in the project saw an increase in vaccination rates among 14 year-olds. However, this is in line with the positive trend registered among comparison schools and at national level more broadly. It is hard to disentangle the effect of the pilot from the joint effect of broader and longer-term measures aimed at increasing vaccination rates. Nonetheless, the evidence shows that the innovations of the pilot were well received by the target group and suggests that they may have contributed to the factors that encouraged vaccination uptake. Interviews with school nurses reveal that the information provided in the video

[51] This aspect was highlighted in interviews with the health authorities.

lecture had positive effects on sceptical parents or parents concerned by the safety of vaccines. Some parents who had refused the offer of vaccination changed their minds after watching the video, as reported by some school nurses interviewed. The results of the citizens' survey also suggest that the initiative, when well publicised, was effective in helping parents to decide to have their children vaccinated. Among those who mentioned having received the information package (55% of those who responded to the citizens' survey, or 60 of 110), 45% (or 27 of 60) said that it was unlikely or very unlikely that they would have had their children vaccinated had they not received this additional information.

In the Netherlands, the simple relocation of vaccination services near schools did not result in an increase in vaccination uptake. Nevertheless, it showed interesting results in terms of appreciation, improved accessibility, and attractiveness compared with better publicised locations.

In the Netherlands, a difference-in-difference analysis was conducted to compare the performance of two pilot vaccination sites (placed in small youth health centres next to schools) with that of the standard centralised vaccination location (control site), all located in New West Amsterdam. The aim of the study was to isolate the effects of relocating vaccination sites to a more accessible, familiar location on vaccination uptake. The statistical analysis conducted by the health authority as a part of the pilot performance evaluation shows no comparative advantage of pilot locations over centralised locations in ensuring vaccination uptake. On the contrary, it shows that ordinary vaccination sites outperformed the pilot sites in terms of year-on-year improvements in vaccination uptake. These results suggest that, in the specific context of New West Amsterdam, the simple relocation of vaccination services (i.e. a measure unaccompanied by any communication and targeted awareness-raising activities) is probably insufficient to achieve the desired vaccination coverage rates. Nevertheless, a closer look at the vaccination figures for the pilot and control sites also reveals the potential of the pilot locations: importantly, vaccination centres located near schools presented similar levels of attendance to the usual vaccination location even though the usual site was better known to residents thanks to years of communication efforts. Community-based outreach activities organised by the Amsterdam municipal health service (GGD) had included targeted social media communication and multilingual information campaigns, all managed through existing consultation offices, including the control location. Moreover, the survey conducted by GDD Amsterdam among families that had used the vaccination services offered at the pilot location, and the focus groups with youth healthcare professionals working at the pilot location consistently show that smaller vaccination centres, closer to schools and public transport, offering shorter waiting times and more individual attention were much appreciated. Of the 114 respondents to the survey conducted by GGD Amsterdam, over four in five (84%) said they prefered the new vaccination location to the usual sports hall, and over

three-quarters (76%) said they would have been unlikely come to have their child vaccinated on that day had the vaccination been administered elsewhere.

Outreach activities implemented over a longer period of time could further strengthen the effectiveness of school vaccination initiatives such as those introduced by the pilots. The results of both projects suggest that more systematic and longer-term outreach could contribute to families' positive engagement and result in higher vaccination uptake. In the case of the Netherlands, the new vaccination locations were deliberately kept "low profile". This decision was consistent with the objective of isolating the effects of vaccination site relocation alone. The results achieved suggest that integrating communication and outreach within the project could strengthen the effects of relocation. In fact, families who used vaccination services at the new location were generally satisfied with the advantages it brought, suggesting that publicising these advantages more openly could have positive effects. In the case of Estonia too, better outreach could contribute to strengthening the effectiveness of the measure introduced by the pilot. The results of the citizens' survey show that families who said they had received the information materials reacted positively, and there are suggestions that the video may have facilitated the decision to opt for vaccination. However, the same survey also shows that a relatively low share of respondents had received, or could remember receiving, the information materials. This points to a gap in outreach, either due to non-systematic dissemination, or to insufficient or ineffective framing of these materials so that in some cases they went unnoticed. This all suggests that more robust and tailored outreach measures could have a stronger impact. It is also possible that both initiatives could have stronger longer-term effects if they were fully integrated within the school health awareness practice (in Estonia) or within family routines (in the Netherlands).

8.1.2. Other effects of the school vaccination pilots

The school vaccination pilots were effective as laboratories to test a fresh approach to delivering vaccination services and communicating around them. The Dutch pilot allowed the testing of a new format for vaccination delivery and the collection of lessons, including in terms of collaboration among actors involved, that could facilitate the replication of the experience on a larger scale. While the results suggest that the relocation of services alone is not sufficient to achieve Amsterdam's vaccination coverage targets, they shed light on the priority areas to work on (including communication) and the potential of the various improvements proposed (such as reduced waiting times, enhanced privacy, and individual attention) in terms of user satisfaction and potential for building a rapport with the target group.

In Estonia, contributing to bringing coverage rates up to WHO recommended levels was just a part of the rationale behind the implementation of the pilot. Against a backgrpound of existing larger national efforts around vaccination

awareness, the project aimed to test effective methods of collaboration between the health and school sectors, leveraging a solid tradition of school involvement in public health initiatives. In this sense, the pilot was effective, as it allowed new ways of working together to be tested. Importantly, the pilot enabled the development of a new tool (the video lecture) to facilitate the work of school nurses, and provided training to these nurses on how to establish dialogue with students and families and how to address vaccine hesitancy, in a context where school medical staff have limited capacity to dedicate to vaccination awareness activities. Finally, the pilot allowed health authorities to test a new communication approach not previously experimented in Estonia, and which proved to have more potential than the usual health information campaigns delivered using printed materials, which were less likely to capture students' attention.

9. Added value, sustainability and transferability of piloted activities

Key messages

EU support was decisive. Across all pilots, stakeholders consistently emphasised that the initiatives would not have been designed or implemented in their current form without the resources and inspiration provided by this project.

Pilots fostered cross-country learning and closer collaboration between regional and national actors (e.g. health, education, and community actors).

Pilots also delivered concrete outputs – such as automated reminder systems (Catalonia, Lithuania, Murcia), reusable communication materials (Estonia, Slovenia), new digital channels (Croatia), school-adjacent vaccination sites (Netherlands), and tailored outreach to vocational schools and migrant communities (Austria, Sweden).

Pilots stimulated institutional change. Several countries reported that participation reinforced the need for stronger data systems, created new cross-sector working structures, or even initiated legal reforms that would not have occurred otherwise.

Sustainability requires embedding pilots into existing structures. Feasible pathways include: digital infrastructure already in use or under expansion; integration into school health routines and education partnerships; maintaining mobile units as flexible tools in public health systems.

Transferability depends on national and local contexts, but the pilots showed that certain approaches can be adapted beyond their original settings. The key lesson is that it is the underlying principles (e.g. bringing vaccination closer to people, working through trusted intermediaries, using systematic reminders) that can be replicated, not necessarily the exact venues or delivery models.

This chapter examines the added value, sustainability and transferability of the pilots. Added value refers to the extent to which the pilot, or related activities, would have taken place without the intervention of the EU. Sustainability and transferability refer to the likelihood that the pilot can be maintained or scaled within the region or country, and the extent to which it can be adapted and applied in other settings or Member States.

The analysis draws on the evaluation evidence, in particular in-depth interviews with health authorities, members of the local implementation working groups (LIWGs), and other stakeholders directly involved in the pilots (e.g. healthcare personnel).

9.1. Reminder schemes

9.1.1. Added value

Across Catalonia, Lithuania, and Slovenia, Murcia, and Croatia, the reminder pilots demonstrated the important role of **mutual learning and capacity building** supported by the EU project. In all five cases, stakeholders interviewed as part of the pilot evaluation emphasised that the initiatives would not have been designed or implemented without the opportunities provided by the project to reflect on

barriers, learn from other countries, and adapt best practices. Participation in in-depth visits and exchanges with other countries were cited as an important added value of the project, offering inspiration and creating a structured process for the development of pilots.

In Catalonia, the added value was particularly visible in how the project inspired a shift from ad hoc reminders to a **systematised** and **automated approach**. Learning from Denmark's good practice gave the health authority both the inspiration and the motivation to implement a more structured reminder system.

Similarly, in Lithuania, the project enabled the **first-ever use of automated SMS reminders** for vaccination. Health authorities saw the EU project as the decisive factor that made this possible, stressing that the pilot built directly on insights from the in-depth visits. The experience empowered national stakeholders to drive changes by mobilising local partners and, in this sense, the added value also lay in **coordinating stakeholders** more closely around a shared plan.

In Slovenia, the pilot was successful in creating a **new working group** that brought together health and education actors who had previously worked in silos. This cross-sectoral collaboration was recognised as a breakthrough, with stakeholders noting that the EU project gave them both a mandate and a common goal that **improved institutional relationships**. The pilot also produced tangible resources, including a youth-friendly HPV booklet and invitation letters, which can be reused in future campaigns. Finally, the pilot generated operational learning by testing a school reminder approach and identifying its limitations, and clarifying the conditions under which more targeted systems may be required.

In Murcia, added value came from both directions: showcasing its own school-based vaccination model to other countries, and at the same time adopting and adapting Denmark's reminder practice to its local context. The project also exposed Murcia's health authority to the importance of a **structured pre-implementation phase**, including a needs assessment, SWOT analysis, and intervention logic, which strengthened the design of the pilot.

In Croatia, the pilot added value by uncovering the **legal obstacles to sending reminders** directly to citizens and helping to tackle them. The health authority gained clarity on the legislative framework and initiated steps towards a national reform that will allow such campaigns in the future. Exchange with peers, particularly Denmark, provided concrete examples of how other countries had structured their legal basis for reminders. As a result the Croatian pilot contributed directly to forthcoming legislative amendments. The creation of a direct communication channel via the national e-citizen platform was another achievement, laying the ground for future public health campaigns.

9.1.2. Sustinability and transferability

In all EU MS piloting reminder schemes, stakeholders agreed that the reminder pilots generated practices with potential for continuation and broader application. Each pilot showed that reminder systems are feasible and adaptable to different contexts, though the conditions for sustainability and transferability vary by setting.

In **Catalonia**, sustainability is facilitated by the fact that the **infrastructure for automated reminders is already in place**. However, the health authority expressed a clear intention to expand the practice to other vaccines and target groups. According to stakeholders, the future success of an expanded pilot will depend on tailoring reminders to **avoid information overload** and on using trusted communication channels. Stakeholders also suggested that regional health applications could provide a promising platform for the integration of the system tested in Catalonia, although their effectiveness compared with SMS reminders still needs to be tested.

In **Lithuania**, the pilot was explicitly seen as **a first step toward national scale-up**. Building on this experience, Lithuania has already launched an online application that centralises notifications and provides direct access to vaccination information. Moreover, work is under way within a new EU-funded project to expand the reminder system at national level.

In **Slovenia**, sustainability lies in the integration of the pilot into existing institutional routines. The initiative relied on school paediatricians, parent-teacher meetings, and the eAssistant platform, which minimised the need for new investments. This low-cost design, combined with broad parental support, makes long-term maintenance of the model both feasible and acceptable. The communication materials created for the pilot can be reused in future campaigns, further reducing resource requirements. There is also strong potential for transferability; in particular, the pilot is believed to be well suited to contexts where vaccination is voluntary or where registry-based outreach is legally sensitive. The use of trusted intermediaries and school-based communication channels was identified as a strength that could be adapted in other EU countries or health systems with similar structures.

In **Murcia**, stakeholders were confident that the reminder system developed during the pilot will remain in use beyond the project period. The system represents a strategic investment in digital infrastructure that can support future vaccination campaigns. Sustainability will depend on maintaining technical capacity and ensuring integration with broader health communication strategies. Transferability potential is also strong, as the reminder platform can be adapted to other vaccines and outreach campaigns. However, successful replication requires robust and interoperable information systems. At present, communication between Spanish regions on individuals' vaccination status

remains limited, which could constrain wider adoption until the national database under development becomes fully operational.

In **Croatia**, sustainability stems from the new communication channel established through the e-citizen platform and the engagement of general practitioners. This digital channel can be reused for vaccination or other public health needs. Transferability depends on further reform of the legislative framework to permit broader citizen outreach; work on this reform has already begun, supported by exchanges with peers such as Denmark. While the pilot showed that the channel is effective for reaching GPs, it also revealed limitations linked to their low time availability, which needs to be considered in future use.

9.2. Mobile units

9.2.1. Added value

In Upper Austria, the creation of added value primarily concerned **institutional capacity-building** and **targeted communication** with vocational schools, while in Sweden the pilot's main contribution was in **mobilising diverse stakeholders** and **elevating vaccination equity** on the policy agenda.

In Upper Austria, participation in **capacity-building** and **mutual learning activities** introduced the health authorities to evaluation practices and evidence-based approaches that are not commonly applied in national public health campaigns. Designing the pilot with an evaluation component helped strengthen **institutional learning** and highlighted the added value of having comprehensive and comparable sociodemographic data in health databases to better identify vaccination gaps. At present, data collection practices vary across federal states, which limits comparability. The pilot therefore reinforced the importance of harmonised approaches to data collection as a foundation for future evidence-based vaccination strategies.

The Austrian pilot also introduced an innovative approach to developing and testing **communication materials** tailored to a specific hard-to-reach group, namely vocational school students. The outcome was a set of messages and visuals adapted to the students' needs, which also provided the Upper Austrian health authority with a better understanding of this group's concerns. This personalised approach, described by stakeholders as one of the pilot's key strengths, was valued as an alternative to general campaigns and is considered transferable to other hard-to-reach groups.

In Sweden, the pilot primarily added value through its practical demonstration of how to **integrate different actors** into a vaccination outreach model. The Local Implementation Working Group (LIWG) gained experience in involving municipal

social workers, primary health care units, and community health informers in the planning and delivery of vaccination services. This broadened the health authority's awareness of existing networks that could be mobilised in future initiatives for vaccination and health programmes in general.

This holds true also for Austria, where another important achievement was the **strengthened collaboration** between the healthcare system and the education sector. While cooperation with academic secondary schools was already well established, the pilot created new partnerships with vocational schools where vaccination outreach had been limited, opening up opportunities for further health promotion activities in this setting.

The Swedish pilot enabled Stockholm's regional health authority to pilot a new approach that would not otherwise have been prioritised, and in doing so it generated **greater public and political visibility for vaccination equity**. The initiative attracted significant media coverage, including national outlets, and was repeatedly discussed in the regional health authority's management meetings. This visibility, achieved because the EU project created the mandate and resources for experimentation, helped place the issue of unequal vaccination coverage on the political agenda and stimulated interest from other primary care units in Stockholm. In this way, the pilot not only produced local awareness but also demonstrated to decision-makers the added value of investing in targeted approaches to reduce vaccination gaps.

9.2.2. Sustainability and transferability

The Austrian and Swedish pilots also offered important lessons on the sustainability and transferability of mobile vaccination services.

In Austria, stakeholders expressed interest in maintaining the initiative beyond the pilot phase, particularly by expanding the range of vaccines offered to vocational school students, such as HPV. The pilot demonstrated that **vaccination checks could be reintegrated into annual school health visits**, a practice that had previously been discontinued and which stakeholders considered the most promising way to long-term sustainability.

In Sweden, sustainability was understood as **keeping mobile vaccination available as a flexible tool within regional public health efforts**. Stakeholders saw the model as adaptable to recurring health campaigns, such as influenza or COVID-19, as well as a flexible response mechanism during outbreaks. However, continuation depends on ensuring political and financial support, especially as the pilot required active outreach staff and logistical coordination.

Furthermore, both pilots showed which factors are key for adapting the mobile units to other settings. A shared lesson is that **proximity/familiarity of vaccination sites are crucial**. In Austria, vocational schools provided a practical

and trusted channel to reach students, whereas in Sweden, community centres and local networks served this function for residents with a migration background. Thus, what makes the approach transferable is not the exact venue, but the idea of offering vaccines in places that people already know and trust.

At the same time, both pilots highlighted challenges. Scaling the model requires sufficient human resources, particularly trained nurses and outreach workers. Identifying appropriate venues can also be a limiting factor, especially in areas without multifunctional facilities or strong community infrastructures. Finally, sustainability depends on political will and stable funding: while pilots demonstrated feasibility and acceptability, long-term integration into health systems requires institutional commitment.

9.3. School vaccination

9.3.1. Added value

A central added value of both the Estonian and Dutch pilots was the opportunity for **mutual learning** and structured **capacity building** created by the EU project. Stakeholders in both countries stressed that, without this initiative, they would not have analysed vaccination barriers in a systematic way, compared their practices with other Member States, or developed a concrete pilot action plan.

In Estonia, **participation in on-site visits and exchanges** provided health authorities with knowledge of how school vaccination is organised in other countries, as well as insights into different vaccination systems and their results. Drawing directly on these good practices, the health authority developed a pilot that stood out from previous national initiatives. The resulting video lecture, adapted to the national context and target audience, was inspired by examples shared through the EU project and represented a more targeted alternative to earlier broad campaigns.

Similarly, in the Netherlands, the added value stemmed from using the EU project as a chance to reflect on current practices and test new ideas. National and local stakeholders agreed that the pilot would not have been conceived or implemented without the project's structure and resources. The process encouraged RIVM and GGD Amsterdam to move beyond mobile units and communication campaigns and to pilot a new proximity-based initiative inspired by practices in Ireland and Murcia. Dutch authorities particularly valued the **mutual learning aspect**, emphasising how seeing other models and adapting them to the Amsterdam context expanded their range of feasible interventions.

9.3.2. Sustainability and transferability

In both the Netherlands and Estonia, key stakeholders agreed that the pilots have potential for longer-term continuation. Each pilot created tools or practices that could be sustained beyond the project period.

In Estonia, sustainability is closely linked to the communication resources developed. The information package and HPV **video lecture were designed for re-use**, enabling schools to apply them to each new cohort of eligible students and with catch-up groups. The digital format of the video lecture makes it durable and versatile, allowing it to be shared with other schools, embedded in health education projects, or adapted to other vaccines such as MMR or DTP.

In the Netherlands, stakeholders also saw potential for continuation, particularly **in urban neighbourhoods where underserved populations may benefit from more accessible vaccination sites**. Relocating vaccination sessions to smaller facilities (adjacent to school buildings) was recognised as a valuable addition to existing strategies. However, sustaining the pilot would require more bottom-up engagement, including **conversations with parents** (about their preferences in terms of timing and accessibility), a solid **understanding of community needs**, and **close cooperation with schools**.

In the Netherlands, transferability was mostly linked to the **availability of facilities nearby schools** (not always the case in suburban and rural areas), as well as the **social and political sensitivity of school-linked vaccination** (i.e. some schools may be reluctant to participate). Stakeholders emphasised the importance of evaluating each school individually and engaging boards and teachers early to secure buy-in.

10. Communication activities

Key messages

Three main channels - the website, social media, and a newsletter - were used in a coordinated way to reach diverse audiences across the EU.

Website content include factsheets, news articles, infographics, and publications, timed to coincide with project milestones and stakeholder engagement events.

Social media, especially LinkedIn, played a central role in amplifying project milestones, promoting on-site visits and exemplary practices, with engagement peaking during periods of active posting.

Social media analytics showed that engagement was highest among professionals in healthcare, government, research, and public health, particularly in Belgium, Ireland, the Netherlands, and Spain.

Newsletter editions highlighted project achievements, pilot implementation, peer learning, and the publication of infographics, supporting transparency and knowledge-sharing.

Analytics reporting demonstrated that website and social media engagement peaked during major content releases, such as infographics and pilot results.

This section outlines the communication activities carried out during the project.

10.1. Website activities

The project website, overcomingobstaclestovaccination.eu, launched on 20 September 2023 during the on-site visit in Amsterdam, served as the central platform for all public-facing content. In its initial phase, the website introduced the project's objectives, covered the seven vaccines under study, and provided information on the consortium and stakeholders involved.

From its launch, the website reflected the rhythm of project activities and milestones. The initial publication was the visual identity manual, which set the standard for branding and communication. Over the following months, the site expanded to include factsheets and news articles documenting exemplary practices in Member States. These included the Murcia school vaccination programme in Spain, the Danish childhood immunisation initiative, the Su.Pr.Eme programme in Italy, and the mobile vaccination units in the Netherlands. Each publication was carefully timed to coincide with on-site visits and stakeholder engagement events, ensuring that the website remained a living record of the project's progress.

As the project moved into 2024, the website continued to grow in both scope and depth. In January, a factsheet was published detailing the pilot programme offering the flu vaccine to children in Irish primary schools. March saw the release of a comprehensive summary of five selected practices, which highlighted the most promising approaches piloted across the EU. In April, a news article provided an overview of the piloting of exemplary practices in Member States,

marking a transition from planning to implementation. The summer months brought a series of infographics that distilled complex findings into accessible visual formats. These included insights into vaccination booking systems, locations, administrators, and barriers identified across Member States.

In 2025, the website remained a dynamic repository of new content, reflecting the ongoing evaluation and dissemination of pilot results. Pilot implementation, evaluation, and recommendations were added as the project advanced, ensuring that stakeholders and the public had access to the latest findings and guidance.

The thematic coverage of the website was broad and nuanced. It addressed vaccination delivery models, barriers to vaccination, stakeholder engagement, country-specific practices, vaccine types, and policy and research outputs. The media library enriched the narrative with photographs from on-site visits in Spain, Italy, Denmark, the Netherlands, and Ireland, capturing key moments and interactions among stakeholders.

Accessibility and multilingualism were core principles in the website's design. All publications and news articles were made available in English, as well as the rest of the EU languages to reach a wider audience. The site's structure allowed users to filter content by country, vaccine, year, and content type, supporting targeted information retrieval and facilitating engagement with diverse user groups.

Table 14 Website analytics from October 2023 to June 2025

	2023 (01/10/2023 - 31/12/2024	2024	2025 (01/01/2025 – 30/06/2025)
Visits	149	378	13,747
Page views	431	1003	No data
Unique page views	347	830	No data
Bounce rate	52%	56%	No data
Referrals	Of the 149 visits, 116 came from direct entry[52] and 26 came from referrals from social media	Of 378 visits, 204 came from direct entry and 30 came from referrals from social media	Of the 13 747 visits, 3,884 came from direct entry and 29 came from referrals from social media
Downloads	16 downloads, 14 of which classified as unique downloads	44 downloads, 40 of which classified as unique downloads	No data
Visits by country	Ireland (27)	Belgium (45)	No data
	Belgium (24)	Spain (33)	
	United States (23)	Norway (27)	
	Luxembourg (16)	France (26)	
	Slovakia (16)	Sweden (19)	
	Spain (11)	United States (14)	
	Netherlands (10)	Ireland (14)	
	Estonia (4)	United Kingdom (14)	
	United Kingdom (4)	Netherlands (13)	
	Denmark (3)	Germany (11)	

[52] Direct entry doesn't mean that a visitor typed in the URL, it rather means that there was no way to find out where the visitor came from.

10.2. Social media engagement

Social media played a central role in the HaDEA project's communication strategy, serving as a dynamic channel for disseminating updates, engaging stakeholders, and amplifying visibility across Member States. The project maintained active profiles on LinkedIn and X (formerly Twitter), with LinkedIn serving as the primary platform for professional outreach and stakeholder engagement.

The LinkedIn account was launched in February 2023 and quickly became the cornerstone of the project's digital presence. It was used to announce milestones, promote on-site visits, share infographics, and encourage newsletter subscriptions. X was also used during the early stages of the project, particularly in 2023, to support real-time coverage of on-site visits and amplify visibility. The use of X was discontinued after 2023.

The project's social media presence began with the launch of the LinkedIn page in February 2023. Early posts focused on introducing the project, sharing EU funding opportunities, and promoting HPV awareness. The best-performing post during this period was the launch announcement, which achieved an 18% engagement rate.

The X presence (formerly Twitter) was launched in July 2023 as part of coverage of the on-site visits. Over the last quarter of 2023, the best performing post was about the fifth on-site visit in Ireland, posted on 04/10/2023. It had 62 impressions, and gathered a 17.7% engagement rate. Overall, engagement was modest, with impressions peaking during the launch of the website and on-site visits. Posts in the first quarter of 2024 had low visibility, averaging 1–2 impressions per day.

LinkedIn activity intensified in 2024, with over 30 posts published across the year. These covered study visits in Denmark, Spain, and the Netherlands, pilot announcements, and the release of mapping infographics. The best-performing posts included the announcement of the first study visit in Denmark (1,512 impressions, 15% engagement rate) and the second study visit in Murcia (923 impressions, 11% engagement rate). In the first half of 2025, LinkedIn posts focused on pilot implementation, including updates from Catalonia, Austria, and Sweden. The post about the Catalonia reminder scheme achieved a 13% engagement rate and 375 impressions.

Demographics showed that most followers and visitors came from Belgium, Ireland, the Netherlands, and Spain, with professional backgrounds in healthcare services, government administration, research, and public health. Engagement rates ranged from 2% to 73%, with spikes during months of active posting and tagging of local authorities and partners.

10.3. Newsletter development

The newsletter was developed and distributed via the European Commission's Newsroom platform. It served as a structured and accessible medium with which to disseminate updates, showcase achievements, and foster engagement with stakeholders across the EU.

Subscribers to the newsletter were gathered through two main channels: a call for expression of interest published on the project's LinkedIn profile, and direct outreach to the project's internal network of stakeholders, including health authorities and partner organisations. Initial promotion began in September 2023, with the first edition sent on 30 September 2024 to 44 valid subscribers. The second edition was sent on 30 May 2025, increasing the subscriber base to 53, with 8 new additions.

The first edition introduced the project's scope and accomplishments to date. It highlighted the mapping of vaccination barriers across Member States, the results of two large-scale surveys of citizens and healthcare professionals, and the identification of 24 promising practices. Five of these practices were selected for on-site visits, which were featured in detail. These included school-based vaccination programmes in Murcia and Ireland, reminder schemes in Denmark, and mobile units in Italy and the Netherlands. The newsletter also included feedback from 27 participating health authorities, with an interview with Mia Kontio of the Finnish National Institute for Health and Welfare emphasising the value of informal exchanges and peer learning.

The second edition focused on the implementation phase of nine pilot projects across eight Member States. It detailed the design and objectives of three types of practices: reminder schemes (e.g., SMS and letters in Catalonia, Murcia, Lithuania, Slovenia, and Croatia), school vaccination programmes (in Estonia and the Netherlands), and mobile units (in Austria and Sweden). The newsletter also reported on peer learning sessions that facilitated mutual exchange among pilot countries, helping refine strategies and adapt successful models from Denmark, Ireland, and Spain. Additionally, it introduced four infographics summarising findings from the mapping exercise, covering vaccination barriers, administrators, locations, and booking systems.

Together, the newsletters provided a comprehensive narrative of the project's evolution, from foundational research and stakeholder engagement to pilot implementation and evaluation planning.

10.4. Analytics reporting

Social media engagement was primarily conducted through LinkedIn and X (formerly Twitter), with LinkedIn serving as the main channel for professional outreach. The LinkedIn account was launched on 14 February 2023 and grew steadily, reaching 248 followers by January 2024. In September 2025, the account reached 333 followers.

Website analytics revealed that engagement peaked during major content releases, such as the launch of infographics, publication of pilot results, and coverage of on-site visits. The most visited pages included the Home, Contact, and Publications sections, indicating sustained interest in both project updates and practical resources. The website's evolution mirrored the project's commitment to transparency, collaboration, and evidence-based communication, making it an indispensable tool for sharing knowledge and fostering dialogue across the European health community.

In early 2025, the team faced a challenge with the Matomo platform. A technical issue arose following an automatic update to the Drupal content management system and the Matomo analytics tool. This update occurred without developer involvement and resulted in the loss of some key performance indicators for the months of February to June. As a consequence, not all the usual metrics, such as page views, bounce rates, and referral sources, were captured during this period, which temporarily limited the ability to monitor user engagement and website performance with the usual level of detail. The issue was identified and resolved, and additional configuration steps were put in place to prevent similar disruptions in the future.

11. Recommendations

All the activities implemented throughout the project resulted in a set of recommendations that provide a framework for developing and refining vaccination strategies and to enhance their potential for success and sustainability.

11.1. Potential for increasing vaccination coverage rates

The experiences from pilot clusters provide blueprints for success. Introducing reminders, expanding vaccination sites, bringing vaccines into communities via mobile offerings, and integrating vaccines into routine services like schools address multiple barriers such as lack of information on vaccination schedules, physical and logistical barriers, or the inconvenience of locations and hours.

Engagement by healthcare providers, such as general practitioners and paediatricians, is also a strong determinant of vaccine uptake. Eliminating or reducing administrative, physical and financial barriers has a remarkable impact on boosting the potential of programmes to increase vaccination rates.

Reminder schemes are crucial in improving awareness of recommended vaccination schedules, reducing forgetfulness, and addressing the information barriers that hinder vaccination uptake. Effective reminder systems can significantly increase vaccination coverage rates by ensuring that individuals are aware of their vaccination schedules and of the importance of timely vaccination. Automated reminder systems using SMS, emails, and digital notifications to inform individuals about upcoming vaccinations and follow-up doses, can be integrated with public health databases to ensure timely communication. Tailored communication through reminders (e.g. with messages incorporating user-friendly links to information websites or mobile applications to address parents' concerns), with multilingual and accessible information can notably strengthen the effectiveness of the scheme. Similarly, engaging healthcare providers in the reminder process by providing them with tools to track their patients' vaccination status and send personalised information can enhance the credibility and effectiveness of the reminders. The use of vaccination reminders can also help make vaccine demand more predictable (by anticipating peaks in vaccination bookings in the weeks after reminders are sent out) and ensuring an adequate supply.

Mobile vaccination units address geographical and convenience barriers by bringing vaccination services closer to underserved populations. These units have the potential to improve vaccination coverage in underserved areas, deploying to reach those with limited access to healthcare facilities. This includes rural areas, underserved urban neighborhoods, and

locations with a high concentration of vulnerable populations. Mobile vaccination health units can also be used in schools to reach young students. A critical factor in designing these schemes is flexible scheduling, enabling units to operate during convenient hours, including evenings and weekends, to accommodate individuals with varying schedules. Community engagement, through collaboration with local community leaders, organisations, and influencers to promote the mobile units and build trust within the community can help bridge the distance between the community and health institutions and address initial hesitancy and misinformation. The availability of multilingual healthcare professionals and the provision of information in multiple languages contribute to effective communication with diverse populations. A comprehensive approach, with the offer of a range of vaccines alongside other healthcare services to address multiple health needs in one visit, can increase the perceived value of the mobile units and encourage higher uptake.

School vaccination programmes leverage the school environment to streamline access to vaccinations for children and adolescents. These programmes can notably reduce logistical and proximity barriers and improve vaccination rates. The integration of vaccination sessions within regular school activities and school hours can minimise disruption of everyday routines for busy parents and ensure high rates of participation. Parental engagement is a critical factor to ensure high uptake. Providing parents with clear and comprehensive information about the vaccination programme, including the benefits and safety of vaccines, and streamlining processes, e.g. through the use of digital consent forms, facilitate engagement. Collaboration with school staff by engaging school nurses, teachers, and administrators in the vaccination process helps build trust and ensure smooth implementation of the programme. Targeted communication, with age-appropriate and culturally sensitive communication materials (information and Q&A sessions, flyers, and videos) to educate students and parents about the importance of vaccination increases the effectiveness of these schemes.

11.2. Designing tailored and sustainable programmes

Ensuring the success of vaccination programmes requires a comprehensive approach that addresses the unique needs and concerns of diverse populations. By conducting thorough needs assessments, engaging communities through culturally sensitive strategies, and fostering strong cooperation among stakeholders, health authorities can build trust at early stages. Collaborative efforts, such as organising community-based events, partnering with local organisations, and establishing Local Implementation Working Groups (LIWGs), are essential for tailoring strategies, overcoming barriers, and achieving high vaccination coverage.

Sustainability and transferability allow for building on pilot successes and the expansion of effective vaccination programmes to broader populations or other contexts. Critical enabling factors in ensuring the sustainability and transferability of vaccination programmes include leveraging existing networks and infrastructure, securing political and financial support, and engaging with local communities to guarantee buy-in.

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