



European Joint Action on Vaccination (EU-JAV)

Strengthening European cooperation
to fight vaccine-preventable diseases



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» The EU-JAV Project

Presentation of the project

The European Joint Action on Vaccination (EU-JAV), coordinated by France (National Institute of Health and Medical Research, Inserm, with the support of the Ministry of Health and Solidarities), was launched in August 2018.

The Joint Action was funded for 3.5 years with a total budget of EUR 5,800,000, including 3,500,000 from the Health Programme 2014-2020 of the European Union. 17 EU Member States are participating as partners, as well as Norway, Serbia, and Bosnia and Herzegovina. Collaborating stakeholders include many national and international organisations (such as ECDC, Vaccines Europe and EMA), universities, associations (e.g. EFPIA, EHMA, EPHA) and federations, who have shared their expertise with the project and ensure coherence with ongoing initiatives.

The project brings together the European Commission, health ministries, international policymakers and organisations, institutes, universities from 20 countries, and a wide range of stakeholders (including civil society and manufacturers' representatives) working on vaccination policy and health services. Through its core mission of elaborating and sharing tools for stronger national responses to vaccination challenges, the EU-JAV aims at spurring long-lasting European cooperation against vaccine-preventable diseases in the era of the Sustainable Development Goals promoted by the United Nations. Vaccination is one of the greatest biomedical and public health success stories of the 20th century and is estimated

by the World Health Organisation (WHO) to save 1 to 3 million lives every year. Yet, suboptimal uptake of recommended immunisations has increased over the past two decades and has resulted in the re-emergence of infectious diseases such as measles on the European continent.

Building on existing initiatives, the EU-JAV developed multilateral and durable systemic cooperation to build concrete tools useful for EU and non-EU Member States' health authorities. These tools include efficient mechanisms for interoperability of digital vaccine-related database, robust methods of monitoring immunisation programmes, accurate forecasting of vaccine needs through a concept of repository of vaccine supply and demand data, priority-setting of vaccine research and development, an instrument to monitor vaccine confidence in social media, as well as a platform collecting and disseminating best practices and interventions to improve confidence.

Furthermore, the surge of the Covid-19 pandemic, followed by the discovery of new vaccines and the launch of an unprecedented immunisation campaign, brought an illustration of the relevancy of the work undertaken within the EU-JAV project. Indeed, the issues that Europe had to face in the past two years strongly resonate with the EU-JAV objectives; whether it is joint vaccine procurement, joint research funding, cross-border vaccination, open access to vaccine coverage data, or the best ways to improve vaccine uptake.

EU-JAV structure and objectives

The EU-JAV project is structured via different working teams. Among them, some were in charge of horizontal goals of the project (e.g., sustainability or dissemination), whereas others were focused on more particular domains (e.g., study of past vaccine shortages, or elaboration of a platform assessing and visualising vaccine coverage). All aimed at strengthening cooperation throughout Europe in the field of vaccination and more broadly to improve health in this territory.

Building on their own experiences, one or two institution(s) from the 20 participating countries were selected to carry out the work, helped by all EU-JAV partners.

- 1) **Coordination:** set up an effective management framework and ensure the smooth management and coordination of the project towards the planned objectives through effective internal management tools, including communication.
- 2) **Dissemination:** dissemination of the tools, and information on project events and final results of EU-JAV
- 3) **Evaluation:** evaluate internally if the overall aim of the EU-JAV project was accomplished
- 4) **Education, Communication, Cooperation and Sustainability:** incorporate the outcomes of all WPs to implement best practices on vaccine policy in national policies and to build options for a sustainable mechanism of cooperation and communication between EU Members states and non-EU EU-JAV consortium member countries.
- 5) **Vaccine Coverage and Reminder Systems:** strengthen the interaction of immunisation

Information Systems (IIS) in Europe in order to increase vaccine surveillance capabilities at the national and regional levels.

- 6) **Vaccine Supply and Preparedness:** define common basic principles for vaccine demand level of risks and develop a concept for how a data-warehouse for an EU-wide central repository for all consortium members (EU and non-EU) on vaccine supply and demand data can be designed.
- 7) **Research Priority Identification and Funding Cooperation:** define tools and methods for priority-setting and identify mechanisms to increase collaboration and cooperation in vaccine and vaccination research and research funding programmes among MS.
- 8) **Vaccine Hesitancy and Uptake:** develop a systematic overview and analysis of the current situation of activities related to vaccine hesitancy and uptake, including best practices and lessons learned in Member States and their regions.

Finally, the EU-JAV has been governed by different entities throughout the entire project that ensured its proper implementation, monitored its progress, and provided strategic advice:

- **General Assembly:** Decision-making body of the EU-JAV chaired by the Coordinator and composed of one representative from each partner. The General Assembly monitors the work progress of the EU-JAV and provides awareness on related projects, actions or changes within the EU Health Program.

- **Executive Board:** Main executive body of the EU-JAV composed of the Work Package leaders and the Joint Action Secretariat, and chaired by the Coordinator. The Executive Board ensures the proper implementation and execution of the strategic orientations of the EU-JAV and of any decision committing the participating organisations.
- **Member States Committee:** Composed of representatives of competent authorities (Ministry of Health) of each Member State willing to be part of the EU-JAV. Members provide strategic directions to the General Assembly on behalf of their respective government and contribute to the successful implementation of the Joint Action results.
- **Stakeholders Forum:** Composed of representatives of the major stakeholders having a

legitimate interest in the Joint Action, such as international organisations, manufacturers' representatives, healthcare professionals, representatives of European programs, patient associations. It provides strategic advice, reflects on and contributes to the overall conceptual development during the Joint Action. The Stakeholders Forum ensures that the consortium decisions are strategically connected to the global challenges and developments in the field.

- **Vaccine Network:** Composed of the Member States Committee and the Stakeholders Forum. The Vaccine Network will review the integration and sustainability of best practices and key recommendations in national policies.

Main results and recommendations

To monitor and address the pre-service and in-service needs of healthcare students and professionals, two tools were elaborated and tested: a **“vaccine barometer”**, which allows measuring the skills and the needs of participants regarding vaccination knowledge and practice; and a complete **curriculum on vaccination**, which addresses all the different relevant topics in the field. Each country and each healthcare student/professional association can make its own these tools and improve the impact of these crucial agents on vaccine uptake.

Two **communication actions toward Youth** were implemented; they consisted of two competitions for the elaboration of posters and videos promoting HBV and HPV vaccination. These actions were successful, and were opportunities to determine how some wider, future actions should be designed and launched.

A **platform to monitor and compare at national and subnational levels harmonised vaccine coverage** was built upon a specific extension of the software R; with the example of measles-containing vaccines, it allows to identify immunisation gaps in spite of the complexity resulting from the difference of vaccines schedules between different countries.

A **study of the existing reminder systems** was performed in 17 countries. Such systems are designed to ensure that as many individuals as possible will receive the recommended vaccines. All countries have reminder systems in place but the study highlighted the heterogeneity of these systems between European countries both the nature and the extension of the systems.

A survey of the prerequisites, the operational implementation, and the perceived barriers and enablers for **conducting cross-borders vaccination campaigns** was performed through questionnaires and workshops with 28 European countries; it paves

the way to implement such international actions focused on a cross-border area.

A **study of past vaccine shortages experiences** was conducted; it allows identifying the vaccines involved and the causes (often multiple) of such shortages, and to emit recommendations to prevent these episodes.

A **study of financing mechanisms** and of the **feasibility of joint vaccine procurement** (gathering EU member states) instead of national procurement was conducted, and led to a better understanding of how the ecosystem of vaccine procurement may evolve in the near future. In addition, a survey on the **stockpiling of vaccines** and the **exchanges of vaccine stockpiles between EU member states** has been conducted.

A method to consensually **identify research priorities in vaccination** has been elaborated, and was applied in 2020 and 2021 to set annual lists of the most relevant research topics that should receive attention and funding in the near future.

A survey regarding the mechanisms that may lead entities that provide research funds to collaborate and adopt **joint funding** to increase the efficiency of the research has been conducted.

A **platform** to gather as much as possible **documents accounting for past experiences of EU member states in their efforts to address vaccine hesitancy** has been launched; the many features on this platform allow to identify the best practices and the most efficient action in this field.

A platform that displays the **monitoring of the vaccine confidence as expressed in the social media** and the **content of the online conversation regarding vaccine and vaccination** has been elaborated.

» Deliverables

Education, Communication, Cooperation, and Sustainability

D4.3

Pre- and in-service educational activities in medical and paramedical curricula on vaccines and vaccination programs in Europe.

The Council recommendation on strengthened cooperation against vaccine-preventable diseases emphasises that “Healthcare workers play a key role in working towards the goal of improved vaccination coverage rates. To support their efforts, they should be offered opportunities for continuous education and training on vaccination”. In light of these recommendations, in a EU-JAV task aiming at piloting selected actions toward an integration into national policies, a barometer to assess the perception of healthcare professionals (HCP) regarding their need regarding vaccination training, and a curriculum on vaccine and vaccination education were developed.

Barometer

The **Vaccine Training Barometer** was developed for in-service HCPs as an online survey. It questions the need for training on vaccination, to collect information about their education on vaccination and to assess their attitudes towards vaccination. Furthermore, the survey allowed us to collect some circulating misinformation/myths as well as questions that HCPs received but could not answer. The Vaccine Training Barometer was pilot tested twice in Flanders (Belgium) and once in Spain. From the responses, it was concluded that in both countries there is a need for training; indeed, only a third of HCPs felt confident to answer questions on vaccines they get, and the vast majority of the surveyed HCPs indicated that they were willing to follow extra courses.

In addition, since health students (medical as well as para-medical) are the future vaccinators, it was important to evaluate the attention given to vaccinology in their education, their attitudes towards

vaccination and their confidence to answer questions about vaccination. Thanks to the collaboration with the student organisations represented in the Coalition for Vaccination, more than 3500 students participated in a dedicated survey survey. The analysis of their answers supported the notion that improved education on vaccination in the different (para)medical courses is needed to better support the role of future HCPs in vaccination programs.

Curriculum

On the input of these different surveys, it became clear that an optimal pre-service and in-service training in immunisation is needed and would be appreciated by HCPs. Therefore, an **all-inclusive curriculum on vaccines and vaccination** has been created that is suitable for all types of HCPs that are involved in the vaccination process, as well as future HCPs (health students following their standard education).

In this curriculum, all different topics are divided in 8 different modules with their specific learning outcomes: 1. Rationale, context and history of immunisation, 2. Immunology/ immunopathology, 3. Key aspects vaccine safety, development, quality, 4. Vaccine preventable diseases, 5. immunisation policies and schedule, 6. Future perspectives, 7. Understanding, active listening and communication about vaccines and 8. Practical skills.

This curriculum was extensively tested as a pilot, in the Summer School on Vaccinology organised at the University of Antwerp, Belgium. It was evaluated by the participants and the comments were used to update and improve content. Overall, this training was considered by the participants as very useful and in line with their expectations.

Due to the pandemic situation it was not possible to test the curriculum in an 'in-service' setting; instead, an extra review round among all members of the Coalition of Vaccination was performed to optimise the curriculum.

In the near future, the Vaccine Training Barometer, the Students' survey and, above all, the Curriculum

on Vaccine and Vaccination can be easily translated in other European languages. They represent valuable tools for monitoring and addressing the need for training of HCPs' involved in vaccine delivery, and as such can be sustained and integrated into national vaccine policies.

D4.5

Communication towards European young people on vaccines

To develop an effective strategy of communication towards European young people on vaccines, the Association of European Cancer Leagues (ECL) was subcontracted by the French Ministry of Solidarity and Health. Two communication pilot actions aimed at raising awareness about vaccination among European youths were designed and implemented with the input of the ECL Youth Ambassadors (YAs) for the European Code Against Cancer (ECAC) - a network of ambitious students and young professionals interested in cancer prevention and health promotion and living in over 40 countries.

Two Europe-wide youth competitions centred on vaccination were launched, one in 2019 aimed at school-aged children between 7-18 years old, and one in 2021 aimed at young people up to 25 years old. The competitions sought compelling visual designs and short videos that portray the importance of vaccination with a focus on vaccination against Hepatitis B and Human papillomavirus (HPV).

1. In 2019, the 'Be Wise, Immunise' European Schools' Competition 2019 reached out to schools' principals and involved primary and secondary schools across Europe using networks such as the European Network of Health Promoting Schools. Schools active in the previous Joint Actions and those that collaborated with cancer leagues and YAs on previous projects were also contacted. Winners were selected based on a combination of judges' scoring and online votes. Shortlisted posters and videos were widely disseminated on social media just ahead of European immunisation Week for the public to view and vote on. ECL received a total of 40 submissions from 10 countries, of which 16 were shortlisted and 5 won

a prize. The 52 social media posts shared to promote and disseminate the competition and shortlisted entries between February and April 2019, reached over 111,400 people (of which 87,700 on Facebook and 23,600 on Twitter).

2. In 2021, given the Covid-19 health crisis and taking stock of the lessons learnt from the 2019 competition, the ECL Secretariat and the YAs adapted the format of the competition. The 2021 ECL Youth Competition targeted teenagers and young people aged 25 years old or younger, who were able to participate individually in the competition. ECL received a total of 85 submissions from 21 countries, of which 65 complied with the rules and fit the theme and 8 won a prize. The shortlisted and winning graphics were shared with cancer leagues, health charities and advocates working on HPV and cervical cancer from around Europe to support their efforts to protect youth from HPV. To further promote the competition and its themes, YAs organised (i) a special a live session on Instagram with the WHO Ambassador for Cancer to discuss the importance of vaccination, (ii) a webinar with experts from Croatia and Bosnia Herzegovina to discuss the importance of HPV vaccination, and (iii) a video campaign to raise awareness of HPV vaccination with VIPs and experts from Eastern Europe.

Raising awareness about the importance of vaccination and its uptake and overcoming vaccine hesitancy among young people are no easy tasks. However, the experience from these pilot actions indicates that free, online competitions with prizes provide a unique way (i) to spread pro-vaccine messages and (ii) to engage and motivate young individuals, enabling them

to gain knowledge and understand the importance of vaccination while fighting myths and disinformation. Overall, we received a satisfactory response to the competitions:

- More than 5,000 people visited the official web pages of the competitions.
- The 101 social media posts shared to promote the competitions, their messages and the shortlisted submissions reached an estimated 574,824 people on ECL's social media pages.
- 10,167 people reacted, commented and shared the posts on Facebook, Instagram and Twitter.
- Through the competitions, we (i) gathered 125 original visuals, graphics, case studies, videos and designs, (ii) widely promoted messages in support of the Hepatitis Band HPV vaccines on social media, (iii) significantly increased our follower base on Facebook, Twitter and Instagram, (iv) increased traffic to ECL and EU-JAV's websites, and (v) maximised ECL and EU-JAV's visibility during EIW. A sizable number of young people got to know the EU-JAV indirectly.

These actions also showed that free online competitions with prizes are beneficial:

- It is a great way to build a community and a strong following;
- It encourages new audiences to follow a specific account;
- It creates project awareness;
- It is a great idea to convince people to learn more about vaccination;
- It represents a good way of counteracting messages from anti-vaccine groups;
- It leads to more input from one's audience and stronger relationships in the long term.

Nevertheless, organising Europe-wide competitions required more resources and time than we planned for. Small civil society organisations like ECL are probably not best placed to lead on the implementation and evaluation of big competitions. Bigger NGOs supported by the Ministry of Health of specific countries or national health institutes would have the resources and reach needed to carry out this type of competitions. In addition, getting primary and secondary schools involved in the competition was difficult. Some schools' principals and teachers also

reported that they were not willing to (i) introduce the competition and carry out activities and projects on the topic of vaccination and to (ii) request parents' agreement for such activities. Even the schools and teachers who ended up involved and supporting students with their submissions did not organise follow-up activities on vaccination and/or meeting with our ECL YAs.

Thanks to these pilot actions, a benchmark / point of reference to assess future competitions was established. Moreover, some considerations on the value of Europe-wide competitions focusing on vaccination can be made and some lessons learnt:

- Define appropriate goals and indicators;
- Timeframe - There will likely be a drop-off in engagement if a competition runs for too long. By setting a short time frame, a sense of urgency is created, and the target audience can be reminded that they have a limited time to enter;
- Peer-to-peer communication works;
- Build community; people might not know about a project until they have heard about it after their family, friends and social cliques share them. It is essential to maintain engagement by interacting with prospective contestants, and to urge them to tell their friends about the competition;
- Landing page design is critical;
- Keep it simple, and have material translated in every appropriate language;
- Have appropriate prizes (we chose gift cards and electronics, for their very broad appeal); it is better to offer a prize that will bring continued interaction with the topic of the competition;
- Follow-up and a post-competition strategy are crucial - it is essential to have a post-contest strategy prepared (including what to do with the submissions collected, and what the winners and runners-up are supposed to do next);
- Implementation research is required at the local and community level to assess the impact of the competition;
- Social media ads are worth it - The 2021 competition used social media posts promoted using the help of Facebook ads so that young people could be targeted directly and share the competition with their friends. This contributed to doubling of the submissions received in 2021 in comparison to 2019.

Vaccine Coverage and Reminder Systems

D5.1

Functional specifications for pilot platform

A pilot platform where harmonised vaccine coverage is shared publicly is helpful to identify immunisation gaps nationally and cross borders. The basic set of functional specifications needed for such a platform with a standardised approach were therefore explored, with the example of measles-mumps-rubella (MMR) vaccination coverage.

This platform is envisioned as a web application consisting of two parts: a publicly accessible part, and a functional part accessible on authorisation. Platform language is in the English language (UK).

- The publicly accessible part is holding a navigation bar that contains elements like Home, Countries, Coverage in Europe, Coverage on age and Coverage methods. Home page provides background information and supports the ability to add new features and content (text, pictures, static links, etc.). Element Countries consists of twenty EU and non-EU countries. Coverage in Europe and Coverage on age function as a drop-down menu with

MCV1 and MCV2 coverage across birth cohorts 2005-2020. Selecting any country from a drop-down menu opens a bar with specific information. MCV coverages are depicted in different patterns – as levels of NUTS regions available, colour coding, mouseover hovering functions, etc.

- The functional part of the web application can only be accessed via authentication and authorisation. System recognises two types of authorisation – users and administrators. It supports upload and file validation. Data files on coverage estimates produce reports that will be retrieved and processed. User administrators are able to add, edit and delete users. Data administrators have the ability to manipulate datasets regarding their quality.

The platform is currently accessible at <https://eu-jav.rinels.hr/> (after the 31st of March, it will have a new address: <http://eujav-platform.com/>).

D5.3

Report on standardised estimations of vaccination coverage

National measles-containing vaccine (MCV) coverage is reported to WHO yearly. However, countries are using different methods to obtain data on vaccine coverage (e.g., national or subnational surveys, administrative methods, or vaccination registries) and the data is published annually with several months delay. We aimed to establish common methodological guidelines, data structure and criteria for standardised assessment of vaccination coverage.

To fulfill this aim, an R-package¹ was developed as a tool to do timely and standardised estimations of MCV coverage within and between countries, and to

identify immunity gaps at national and regional level. Three national partners (Finland, The Netherlands and Denmark) who had an immunisation information system (IIS) in place extracted population and vaccination data and estimated standardised MCV coverage using the R-package. The outputs from the R-package were MCV dose 1 and 2 coverage estimates by birth cohort and the age of vaccination. The coverage was also estimated per birth cohort at regional level and displayed on maps allowing each country to identify differences in coverage between regions.

The age of administration of MCV dose 1 differs in the 3 countries: 12 months of age in Finland, 14 months of age in The Netherlands, and 15 months of age in Denmark. For MCV dose 2, the difference in recommended age at vaccination is even larger and varies from 4 years of age in Denmark to 9 years of age in the Netherlands, which inevitably will result in immunisation gaps. With the age at vaccination shown as part of the R-package output, it was possible to identify if the observed differences in coverage between regions or countries was due to any delay in vaccination with regard to the national recommended age at vaccination. All three countries were able to prepare new population and vaccination data files within a short timeframe. This is very important, as this will allow preparing coverage maps fast if a measles outbreak is

discovered and a vaccination campaign should be planned in relevant areas with short notice.

It was not possible to identify cross-border immunity gaps as none of the partners enrolled in this study had shared borders. However, when comparing MCV coverage that was extracted at the same point in time between the three countries. It was very clear that immunity gaps were created due to differences in recommended age at vaccination.

Several European countries are setting up IIS systems; with real-time access to population and vaccination data, the R-package and the pilot platform are powerful tools to identify immunisation gaps.

D5.4

Report on reminder systems

Reminder/recall systems have been identified in several studies to improve immunisation rates. During the EU-JAV period, we wanted to

- Obtain information regarding the possibility to send out automatic vaccination reminders/recall by the regional or national immunisation Information system (IIS) in place. In case the IIS was not used for this task, we asked what methods the countries used to remind us about vaccinations;
- Determine whether the countries had identified any barriers (languages, social, cultural) towards the implementations of vaccine reminder systems;
- Identify the most optimal reminder systems.

A questionnaire was developed and distributed to 20 European countries to explore if and how parents/recipients were reminded about upcoming or missed vaccinations. A total of 17 countries/regions filled out the questionnaire (Austria, Croatia, Denmark, Finland, Flanders [Belgium], France, Greece, Italy, Latvia, Malta, The Netherlands, Norway, Romania, Slovakia, Slovenia, Spain, and Sweden). All 17 countries reported that to some extent, some patients/recipients are reminded about vaccinations; however, the nature of the systems in place and the population concerned vary between countries. Phone and SMS are the most widely used reminders in this survey, probably

because they are very efficient ways to reach people even in remote/isolated areas. Reminders are used in countries with and without an IIS in place. In addition, some countries use e-mail, letters, webpage, regional newspapers etc.

In some European countries, vaccination policy is a national issue; however this is not the case in all countries. In some large European countries, e.g. Italy and Spain, each region has their own IIS, that often differ between regions. In some other countries, reminder systems (and more broadly immunisation programmes) are even more decentralised, and managed by, e.g., the municipalities, baby clinics, school healthcare etc.

Fourteen out of 17 countries answered that reminder systems are well-accepted by the population; in three out of 17 countries, reminders are translated to foreign languages in order to reach individuals with foreign background.

Based on the answers in this questionnaire, it is not possible to identify if one method is more efficient compared to another. Translation of reminders to other languages could be considered to further improve coverage.

D5.5

Report on reminder systems

A feasibility study for a future coordinated cross-border measles catch-up vaccination campaign in the EU is included in the EU Joint Action on Vaccination (EU-JAV), in connection with the work on cross-border immunisation information systems (IIS). Such a coordinated EU-wide measles catch-up vaccination campaign was envisaged to tackle common immunity gaps in older children and adults that have not been vaccinated against measles as part of the regular national childhood immunisation programmes (NIP).

Given i) limitations in identifying through the cross-border IIS the unvaccinated and undervaccinated target populations for an EU-wide vaccination campaign, ii) a lack of comparable cross-border data on the reasons behind low vaccine coverage (such as from vaccine acceptance studies), and iii) the well-documented heterogeneous nature of vaccination programmes across the EU, the objectives of the feasibility study were revised. Instead of launching a campaign, the aim of this report is to provide a review of experience and best practice on what has already been done across borders and what can be gained by teaming up, as well as the facilitators and barriers, to inform future coordinated cross-border vaccination campaigns. In addition, the scope of the feasibility study has been extended (following a request by the European Commission) to include all vaccines recommended by the NIPs, as well as covid vaccination.

Data was collected through a survey of EU and associated countries, as well as 4 workshops with relevant public health officials in EU-JAV participating countries and the EU-JAV stakeholders who are representatives of the EU Coalition for Vaccination. Of the 32 countries that were sent the survey, 28 countries responded.

Responses to survey questions revealed that only 9 out of 28 countries reported having worked previously across borders, and that countries in Central and Eastern Europe were more likely to report collaborative practices, whereas countries in Northern Europe were more likely to report a lack of cross-border actions. The examples given of collaboration efforts that respondents had participated in included research groups, a method for tailoring immunisation campaigns to specific low coverage populations or individuals, platforms for technical exchange, a neighbourhood collaboration on vaccine coverage and acceptance, and a Europe-wide annual vaccination campaign. However, the barriers of working cross-border reported through the survey were rather extensive. Platforms for exchange were raised as a possible facilitator of enhanced cross border collaboration.

Through analysis of relevant statements from a workshop with regional breakout groups in October 2019, we identified 7 themes that participants raised as relevant for EU-wide and cross-border campaigns: adult vaccination, working with pharmacists, political advocacy, training of healthcare workers, technology tools, communication strategies, and low vaccination populations. Six more themes were added following 3 further digital workshops in November and December 2021, taking account of experience working with covid vaccination and input from the EU-JAV stakeholders. These are: comparable data on vaccine acceptance, training risk communicators, neighbourhood/twinning initiatives, coordinated literature reviews, “one voice” key messages, and stakeholder engagement.

Overall, these 13 themes appear to be relevant for EU and cross-border vaccination campaigns.

Vaccine Supply and Preparedness

D6.1

Report on previous experiences with vaccine shortages in EU countries (and non-EU consortium member countries), and responses at national and European levels

National immunisation programmes depend on an adequate supply of vaccines and many countries, globally and in the EU, are facing important challenges in this respect. Vaccine shortages are a serious public health issue, as they can lead to missed opportunities for vaccination, and to a greater risk of occurrence of deadly vaccine-preventable disease.

Vaccine shortages have become more frequent, globally and in Europe, in recent years. Their causes are complex, multifaceted, may vary by vaccine and country, and include supply, demand and information factors. Their prevention is a top priority in the EU and globally, as highlighted during the 68th World Health Assembly (2015), and in the the EU Commission 2018 Council Recommendation on strengthened cooperation and coordination between EU countries, industry and other relevant stakeholders, against vaccine preventable diseases, included a reference to strengthening vaccine supply, procurement and stock management.

One of the EU-JAV aims is to define common basic principles for vaccine demand level of risks and develop a concept for how a data-warehouse for an EU-wide central repository for all consortium members (EU and non-EU) on vaccine supply and demand data can be designed. In this context, a survey of previous and ongoing vaccine shortages and stock outs in Europe was conducted among persons in charge of the national or subnational immunisation programme(s) or of vaccine supply/procurement in EU/EEA and consortium (EU-JAV) Member States (MS), to collect information on vaccine shortages and stockouts in the years 2016-2018 and responses at the national and European level. The survey was conducted from February to May 2019.

Twenty-one countries participated in the survey (response rate 75%). Overall, 115 shortage and

stockout episodes were reported in the three-year study period, 23 of which caused a disruption in immunisation services.

- The most frequently involved vaccines were diphtheria-tetanus (DT and dT) -containing combination vaccines, and hepatitis B, hepatitis A, and BCG vaccines.
- The median duration of shortages/stockouts was five months (range <1 month - 39 months).
- The most frequently indicated cause of shortage was interruption in supply (due to quality issues or for other reasons), particularly for BCG and DT-containing vaccines, but also for hepatitis B (adult), hepatitis A (adult), and combined hepatitis A+B. Global shortage also played a major role in various vaccine shortage events, especially for BCG, DT-containing vaccines, hepatitis A, hepatitis B and rabies vaccines.
- Regarding procurement procedures, most countries reported to procure vaccines at national level by the public sector. The preferred purchase mechanism is based on competitive bidding: 13 countries purchase all or at least some vaccines from more than one manufacturer. Fourteen countries report using multi-year contracts for all vaccines.
- Sixteen countries stated that they keep stock-piles of vaccines.
- Only little more than half of countries surveyed reported having an immunisation supply chain improvement plan and a vaccine supply manager at national level. Similarly, only about half of countries have recommendations or procedures in place to address shortage and stockout events. Most countries stated that they regularly inform manufacturers about planned changes to immunisation programmes and about VPD outbreaks.

Besides vaccines, the survey also identified the occurrence of shortages of biological products such as antitoxins and immunoglobulins. Overall, 25 shortages/stock outs were reported by 17 countries. The most frequently reported event was shortage/stockout of diphtheria antitoxin, reported by 12 countries.

In addition to the survey, the perspectives of two main stakeholders' (Vaccines Europe and the European Medicines Agency) were also collected.

In conclusion, results of the survey enable us to better describe vaccine shortages and stockouts in Europe, their impact and main causes. In addition, the survey results provide some insights into the procurement and tendering mechanisms used in EU/EEA countries. This information, together with information collected from the literature, and stakeholders' views, bring us to make the following general considerations and recommendations:

- More research is needed on the causes of vaccine shortages and their interplay;
- There is a need for all countries to have an immunisation supply chain improvement plan, and a vaccine supply manager at national level;
- Improved communication between public health

authorities, manufacturers and regulatory agencies is needed to better anticipate the evolution of vaccine recommendations and more accurately forecast vaccine demand. In case of vaccine shortages, communication by competent authorities to the public should not trigger undue concerns regarding the quality of vaccines;

- Procurement and tender mechanisms should be improved and take into consideration, among others, multisource suppliers, other factors besides price, and the length of contract;
- An EU platform for exchanging information on vaccine shortages and actions taken across countries would be helpful;
- In case of vaccine shortages, all countries should have procedures or recommendations in place regarding the use of alternative vaccines or vaccination schedules during the shortages;
- Coordinated actions are needed from all stakeholders to prevent and mitigate vaccine shortages;
- Shortages of biological products (the most concerning of which is diphtheria antitoxin, currently reported to be unavailable in several countries) deserve the same consideration as vaccine shortages.

D6.3

Report on financial mechanisms underlying vaccine procurement, and the possibility of joint vaccine procurement

In parallel with the study on past episodes of vaccine shortages, and to further characterise the ecosystem that maintains the supply of vaccines, we aimed to analyse and evaluate local financing mechanisms for purchase and stock of vaccines, and the room for joint vaccine procurement.

The methodology consisted in:

- Workshop with participating EU-JAV consortium member states and main stakeholders.
- Consultation of the literature on vaccine procurement and advantages and disadvantages of self-procurement versus centralised/joint procurement.

- Survey among EU/EEA and EU-JAV consortium Member States (MS), to collect information on the local financial mechanisms for vaccine procurement used in their respective countries, and to explore MS opinions on key barriers and enablers of success of joint/centralised procurement initiatives.
- In addition, although the activities related to this deliverable were carried out prior to the availability of Covid-19 vaccines (which are therefore not included in our results), some considerations on procurement of Covid-19 vaccines are discussed.

Workshop

The workshop was held in October 2019, in Rome (Italy), at the first General Assembly Meeting of the EU-JAV. The discussion was focused mainly around the feasibility of centralised procurement of vaccines and whether it is a possible solution for mitigating vaccines shortages. A decision was made to evaluate advantages and disadvantages of centralised versus self-procurement of vaccines and to conduct a survey among MS to explore local financial mechanisms for vaccine procurement, experiences with and opinions on joint procurement.

Literature analysis

The available literature comparing self-procurement (which can occur at the national or subnational levels) and joint procurement methods is scarce and often limited to low- and middle-income countries, and this reduces the generalisability to the EU/EEA context. In addition, it contains only limited data on the impact of current vaccine procurement methods on the performance and sustainability of vaccination programmes.

Survey

The survey was conducted from August to October 2020 among persons in charge of the national or subnational immunisation programme(s) or of vaccine supply/procurement in EU/EEA and EU-JAV consortium Member States. Twenty-eight countries were invited to participate, including all 20 EU-JAV partners (which consist of 18 EU/EEA countries, Bosnia-Herzegovina and Serbia), and eight EU/EEA countries not participating in the EU-JAV. Fourteen of 28 invited countries responded to the survey, all EU/EEA.

Regarding the financial mechanisms that underlie vaccine procurement, survey results highlight that vaccines included in the national vaccination schedules are entirely funded by the national or subnational government in the majority of countries. Other reported sources of funding include health insurance contributions either directly funded by the central government or with reimbursement of costs. The survey also highlights that not all vaccines included in national vaccination programmes are

completely state funded. Most countries allocate specific funds to vaccines and use annual budget planning, while midterm or long-term planning is seldom used by countries. Budget planning is centralised in most countries. Decision-making to finance introduction of a vaccine is based, among other things (epidemiology of the disease and cost-effectiveness evaluations), on NITAG recommendations. However, lack of information on the size of the population to be vaccinated (e.g., size of high-risk populations) and estimating the exact coverage levels to be achieved, were reported by some countries as main difficulties in forecasting and budget planning (these issues are addressed in another EU-JAV deliverable, which aim is to develop guidelines for procedures to estimate vaccine needs and procurement in EU-MS in the short and long-term). Regarding the current framework for vaccine tenders, most countries reported using price criteria, with only three countries using quality criteria. There is some evidence that while price-based tenders can bring a reduction in prices, at least in the short term, they may contribute to vaccine supply issues, discourage the provision of value-added services and be a disincentive for future R&D. They also have not been shown to increase vaccination coverage. Survey results suggest that overall, the current financial mechanisms for vaccine procurement used in the surveyed countries seem to function well and that in general, these countries are satisfied with their procurement process. Survey respondents identified as main strengths of current procurement systems, transparency, homogeneous and adequate prices and equal access to vaccines. The main reported weaknesses are the high level of bureaucracy and long and complex tendering procedures. One country highlighted the need to conduct more long-term agreements, another the difficulties with sub-national budgeting. In three countries, there is no national centralised process for vaccine purchasing; one of these countries highlighted that this means no discount for high volumes of doses purchased.

In the same survey, joint procurement (JP) was also discussed. Prior to the EU Joint Procurement for Covid-19 vaccines (in which all EU countries participated), several countries had participated or were

participating with other European countries in more limited joint procurement initiatives. The general perception of these countries is that JP has several advantages but also disadvantages. However, most participants agreed about the usefulness of JP of vaccines in improving MS preparedness in the event of serious cross-border health threats caused by vaccine preventable diseases. Some countries seem to be unfavourable to JP because of its potential to seriously disturb a healthy market. Indeed, short-term versus long-term impact of joint procurement, for example on the sustainability of the suppliers, should be analysed and considered. Besides joint procurement, half of responding countries reported participating in other forms of cross-border collaboration to support decision making during national procurement, such as sharing vaccine price information, conducting joint market research, sharing information and discussing tender processes and supplier insight. According to respondents, possible advantages of these collaboration models include increased transparency on prices, increased negotiating power, decreased prices and administrative costs (a concept analysis for a regional EU data warehouse for sharing data/information of supply and demand is another EU-JAV deliverable).

The example of the Covid-19 vaccine procurement

The common procurement of Covid-19 vaccines, led by the European Commission, with the participation of all EU Member States, is a very recent and important example of a common approach taken to procuring vaccines in the EU during a cross-border health threat, as well as the financing mechanism used. Advanced purchase agreements were used and these have been a crucial element contributing to the European response to fight the Covid-19 pandemic. Thanks to the common EU Vaccines Strategy, the Commission was able to build a diversified portfolio of several vaccines, based on

different technologies, from several suppliers, at a fair price, and has ensured access to Covid-19 vaccines for all Member States. The strategy also enabled the support and speeding up of development and manufacturing at scale of Covid-19 vaccines and allowed the exportation of doses to over 100 countries worldwide. In order to strengthen the EU preparedness and response in future health emergencies, in November 2020, the Commission, among other initiatives, set out the main elements of the future Health Emergency Response Authority (HERA), to be proposed by the end of 2021. HERA is part of the European Health Union and will provide a dedicated structure to support the development, manufacturing and deployment of medical countermeasures (including vaccines) during a health crisis of natural or deliberate origin.

We can draw several conclusions from this work:

- Longer term planning regarding vaccine procurement is recommended because it allows a more comprehensive view of future vaccine demand;
- Price should not be the only criterion considered in vaccine tenders, as it may be a disincentive for manufacturers to participate in tenders and invest in R&D. This would allow a range of suppliers to be available, which is one of the requirements of a healthy market;
- The majority of participants reported being favourable to joint procurement of vaccines during serious cross-border health threats caused by vaccine preventable diseases. Other forms of cross-border collaboration (such as sharing vaccine price and other market information), and lending of vaccines in case of vaccine shortages have been used in the EU, and should be encouraged;
- Availability of a regional EU data warehouse of supply and demand could be a step in this direction.

D6.4

Report on the anticipation of needs to ensure sufficient size of supply and stockpiles

To reinforce mechanisms of management of vaccine supply, we aimed to understand how to ensure **sufficient size of vaccine supply and stockpiles**, including their sustainability. A specific survey was developed to understand the stakeholders' and EU Members States' opinion on key mechanisms on this issue. Additionally, we aimed to understand their opinion on the need, relevance, and specifications for a European-wide data repository on vaccine demand and supply.

The survey revealed a high need for sufficient and timely planning of vaccine supply and stock at national level. There are a limited number of manufacturers and production capacity worldwide, affecting the supply and demand situation for vaccines. The countries responding to the survey listed the following key mechanisms to ensure

sufficient supply:

- Early warning systems from suppliers and manufacturers of potential stockouts;
- Sufficient stockpiles of vaccines at national level including an emergency stockpile;
- A comprehensive national overview of vaccine demand and stocks.

Additionally, the countries identified the following key mechanisms for improving forecast of vaccine demand and manufacturing:

- Long-term vaccine forecast from government agencies and procurers;
- Timely input from government agencies and procurers on future demand related to potential changes in the national immunisation programs.

Harmonising labelling of vaccines was also mentioned by many as an important mechanism to improve exchange of vaccine supply.

D6.5

Report on possibilities, gaps and options for building a “concept type” for regional/European virtual stockpiles on vaccine management needs and stocks

We aimed to explore the feasibility of an EU data warehouse for sharing of vaccine supply and demand data among dedicated stakeholders; and to determine whether a virtual stockpile monitoring tool or other type of rapid exchange mechanism could be useful, and if such a tool should be restricted to specific vaccines only to secure public health and national security.

Very few of the participating countries believed establishing a virtual data repository would in general prevent shortages in the EU. On the other hand, several of them gave feedback on specific priority vaccines should be under focus for potential sharing or exchange mechanisms in case of shortages or need for shared vaccine supply.

The member states listed the following focus areas as most important for a virtual stockpile monitoring tool or other type of rapid exchange mechanism:

- Rarely used vaccines and immunoglobulins;
- Vaccines to be used during epidemic outbreaks;
- Vaccines for emerging infectious diseases.

The feedback received from the countries on these questions reflects the fact that most failures in vaccine supply is the unpredictable nature of outbreaks and rare events. Some member states have national stockpiles to protect against potential disease outbreaks. However, a global overview of the size of these stockpiles and how they are forecasted in each member state is still lacking. Due to these uncertainties, it is likely that this may

impact the supply of vaccines needed to contain emerging threats and unpredicted outbreaks of e.g., measles, rather than all the vaccines included in the national standard immunisation programme.

The countries responding to the survey pointed the following key mechanisms to enable exchange of vaccines between EU countries:

- Rapid exchange mechanism on available vaccines between EU member states;
- Harmonised labelling of vaccines in the EU;
- Set liability protection for parties involved in making the vaccines available. Indeed, concerning current legal or regulatory hurdles related to the exchange of available vaccines between member states in case of shortages, many of the respondents pointed out liability issues and regulations concerning authorisation of the vaccines as the main hurdles.

In conclusion, this reflects the need for further discussion and for developing a standard operating procedure regarding the ad hoc urgent exchange of medical countermeasures through the Early Warning and Response System (EWRS) raised by the European Health Security Committee (HSC). Further work on the concept analysis for a regional European data warehouse for sharing data/information of vaccine supply and demand among dedicated stakeholders should include several options, such as not having a data warehouse (status quo), as well as having different models of voluntary sharing of specific vaccines with the use of a rapid exchange mechanism on available vaccines between EU member states.

In addition, we consider that the list of priority vaccines may reflect the respondents' preferences for the content of a potential future virtual data repository, rather than the actual challenges the countries face today to ensure supply for their national immunisation schedule and outbreak vaccines.

It is important to note that this survey and the results reported were performed prior to the Covid-19 pandemic, which presumably has strongly changed the preparedness response and EU vaccine strategy during an emergency.

The common procurement of Covid-19 vaccines has additionally provided the EU member states with experience in sharing mechanisms for surplus vaccines during an emergency, for 2 main reasons:

- Through the advanced purchase agreements with individual vaccine producers, the Commission secured the right to buy a specified number of vaccine doses in a given timeframe;
- Moreover, through the EU vaccine strategy, the surplus vaccines have been donated, and the donor-funded vaccines have been shared with the global collaboration COVAX, which enables low and middle -income countries to access Covid-19 vaccines.
- In addition, the member states have gained experience with mechanisms and procedures for bilateral donations, i.e., import and export of covid-19 vaccines.

These new experiences will probably affect the member states view on these questions and our results need to be considered in this context.

Research Priority Identification; Research Funding Cooperation

The research funding system in Europe is very complex, involves many actors and is highly fragmented. With the great diversity of possible topics, in a context of limited resources, prioritising research questions becomes a necessity. This selection process must be transparent, evidence-based and carried out rigorously, in accordance with best practices.

With respect to this questions, 2 work axes were set, with a final objective to propose a shared funding on

common priorities among member states in the European Union:

- One regarding the priorities for vaccine research and development, to develop and implement a prioritisation framework to identify research priorities in Europe and the area of vaccine and vaccination research;
- One regarding the potential mechanisms to increase collaboration of funding and research cooperation.

D7.1

Report on guidelines / best practices to establish priorities for vaccine and vaccination research to increase vaccination coverage

Based on literature review and experts' interviews, we propose a prioritisation framework which we piloted twice. The framework is based on a multi-criteria decision analysis inspired from the Child Health and Nutrition Research Initiative (CHNRI) by Rudan et al¹. Based on our experience and advice

from participating experts, it was refined and improved throughout the project.

The general principle of the framework is that each research proposition is assessed through a series of steps, as detailed in figure 1.

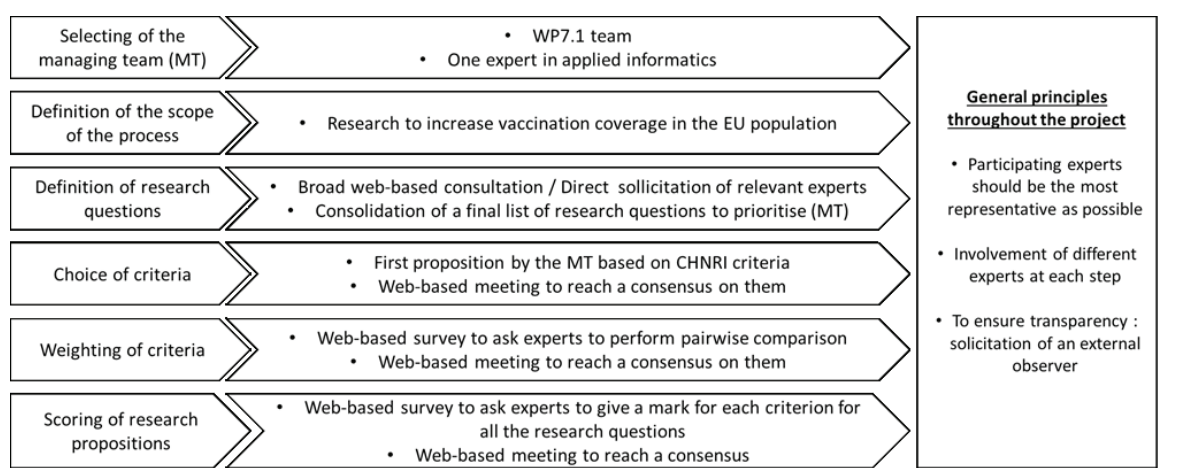


Figure 1: step of the prioritisation framework

2. Rudan I, El Arifeen S, Black RE. A systematic methodology for setting priorities in child health research investments. In: A new approach for systematic priority setting. Dhaka: Child Health and Nutrition Research Initiative; 2006.

The first step consists in identifying key research questions through a broad consultation. In parallel, a first group of experts is tasked to select criteria for prioritisation of research questions, taking into consideration the ultimate goal of the exercise. Another group of experts is then requested to assess a weight to each of the criteria, using pair-wise comparisons. The final step consists in gathering

experts who will assess each research question against the weighted criteria. This evaluation leads to assigning a score to each individual research question, which can then be ranked in order of priority.

Following this framework, we were able to identify research priorities on vaccination, with a list updated annually.

D7.2

Annual list of research priorities on vaccination, covering most vaccines used in the EU, and for which research might provide insights on how to maximise coverage

During the time of the EU-JAV projects, two annual research priorities lists for vaccine and vaccination research were established applying the framework initially developed:

- a first one focusing on four pilot vaccines (Influenza, Measles containing vaccine, HPV and pertussis);
- a second list extended to all vaccines, but with a focus - given the context - on Covid 19 vaccines.

Top-research priorities from the first exercise performed in 2020

- Assess and compare strategies for systematic measles vaccination catch-up in adolescence/adulthood for people who missed vaccination during childhood, in view of increasing immunity against measles in the population;
- Perform a review of evidence and impact of various social media interventions on the perception of HPV vaccination in adolescents and their close adult parents/guardians Explore the acceptability of the systematic use of tetravalent (D-T-Polio + Pertussis) vs trivalent (D-T-Polio) for revaccination during adulthood;
- Investigate the effectiveness of various influenza vaccine formulations and products (live attenuated, high-dose, adjuvanted, quadri- vs tri-valent, cell-based, recombinant) in key target groups, i.e. (very) young children >65, frail and institutionalised older persons;
- Evaluate the effectiveness of vaccinating children of various ages on protecting vulnerable persons (in particular elderly family members) against influenza;

- Investigate across Europe whether and to what extent authorising pharmacists to administer seasonal influenza vaccine to the general population increases influenza vaccination coverage.

Top-research priorities from the second exercise performed in 2021

- Study whether - as compared with other new vaccines - the centralised purchasing and distribution method used in the EU has helped to reduce inequalities or access difficulties among and within countries and should therefore be generalised in case of a new pandemic;
- Generate evidence to optimise vaccine strategies for people with underlying conditions including immunodeficiency (additional dose, double dose, cocooning) - Covid-19;
- Study which are the appropriate diagnostic tests to track persistence/decline of immunity, and guide re-immunisation policy in subsequent years? - Covid-19;
- analyse the different vaccination strategies implemented in European countries and model these strategies in terms of impact (on mortality, hospitalisation, economic indicators);
- analyse the different vaccination strategies implemented in European countries and model these strategies in terms of impact (on mortality, hospitalisation, economic indicators) - Covid-19;
- analyse and detail the determinants of Covid-19 vaccine hesitancy and to assess whether they are different from those identified for other vaccines

D7.3

Potential mechanisms to increase collaboration in vaccine and vaccination research and cooperation for funding these programmes among MS

The funding of vaccine research and development is not evenly distributed along the value chain from basic research through pre-clinical and clinical development, epidemiological studies, and implementation of vaccines in public health programmes. In addition, the European research landscape is complex: both the EU and the individual countries fund vaccine research; for vaccines with a clear market potential, the development costs are most frequently funded by large businesses such as the pharmaceutical industry; more early-stage research, basic science and late-stage implementation research often utilise other sources of funding, mostly provided by the public sector.

In these areas research councils, charities, philanthropic organisations, and private funders participate and contribute to the funding ecosystem. Such funding may appear very fragmented, and collaboration between entities who provide these funds may bring more efficiency and more readability to the research.

A literature review of existing and possible funding mechanisms for vaccine research and development was carried out in 2019 to gain an overview of organisations providing funding of vaccine R&D and vaccination research. Then, a survey towards organisations funding research was carried out during spring 2019. The aim was to use the combined findings from the survey and the literature review of existing funding mechanisms to propose a potential mechanism to increase collaboration in vaccine and vaccination research and cooperation for funding of identified priorities.

We determined that the most frequent mechanisms for collaborative funding are joint calls with other funders, as well as bilateral and multilateral cooperation with research funding organisations from other countries.

In addition, we identified several avenues to increase cooperation between European member states:

- Cofunders must reach agreement on clear guidance and options for collaborations as part of governance system;
- A process regarding joint evaluation and joint selection should be elaborated by the cofunders prior to the announcement of the call;
- Sufficient lead time should be given to approve and agree on topics for calls for proposals;
- Cofunders should define common financial rules.

One area mentioned as a particular need for collaborative funding within the vaccine field was late-stage clinical trials and phase III/phase IV trials.

In addition, concerning some of the areas on which the EU-JAV has been working, more research on implementation of new vaccines in national public health programmes and follow-up on long-term safety and safety signals should be prioritised. Moreover, it is increasingly important to prioritise and finance research to better understand mechanisms of vaccine hesitancy in a coordinated approach among the member states of the European Union.

Vaccine Hesitancy and Uptake

D8.1

Barriers and enablers behind suboptimal vaccination coverage

In order to map the current situation of activities related to vaccine hesitancy and uptake, including best practices and lessons learned in the Member States and their regions, and among stakeholders, a data gathering was conducted. The survey used for gathering data was sent to 32 countries and 32 EU-JAV stakeholders. In total, 28 countries and 8 stakeholders responded to the survey. The survey sent to the countries included 73 questions, while the stakeholder version contained 48 questions. The data from the countries was collected between November 2019 and June 2020, and the stakeholder data between November 2020 and January 2021. The survey included both multiple choice and open-ended questions. The data was analysed using both quantitative and qualitative methods by the EU-JAV team at the Finnish Institute for Health and Welfare (THL) leading this work in the EU-JAV.

The analysis of the answers brought important facts:

- The definition of vaccine hesitancy has many interpretations. Vaccine confidence, or lack thereof, is perceived to be the dominating feature of vaccine hesitancy. However, it is important not to leave any of the components of vaccine hesitancy (such as complacency and convenience) behind;
- Determinants of vaccine hesitancy are also understood primarily from the perspective of a lack of confidence. This lack of confidence is rooted within vaccines' safety and effectiveness profiles, or may be more broadly due to ideological or religious reasons;
- From a public health and policy perspective, inconsistent terminology – and focusing only on vaccine confidence, or the lack of it, and overlooking other factors of vaccine hesitancy, such as convenience and complacency – means that programs designed to reduce vaccine hesitancy and strengthen uptake may be too narrow or improperly focused;
- The most emphasised practices among the countries were communication activities and work related to healthcare workers (HCWs), followed by cooperation with government bodies;
- The vaccines or subgroups perceived to be responsible for suboptimal vaccine uptake do not completely match with the target of work conducted by health departments. In this work, there are underserved groups, such as HCWs, or under emphasised vaccine, such as pneumococcal, in vaccine uptake work;
- The work to improve vaccine uptake has focused heavily on the human papilloma virus (HPV) and influenza vaccinations. However, none of the work primarily targeted the vaccine mentioned with the reportedly lowest/most decreasing coverage: the pentavalent (diphtheria, tetanus, pertussis, polio, Haemophilus influenzae type B) vaccine; and the pneumococcal vaccines were rarely mentioned as targets at all. Further on the HPV vaccine, as it is one of the latest additions to national immunisation programs, it is the top focus of communication, population-specific, and education-related activities. The measles, mumps and rubella (MMR) vaccine was reported frequently as a target, and alongside childhood vaccines such as MMR, makes it a prominent target across communication strategies;
- Official websites, HCWs, and informational literature are all the most highly emphasised for communicating both information on vaccines and information on vaccine safety. HCWs are trusted intermediaries in delivering vaccine information to their patients;
- The benefits of working across borders can include sharing experiences and data, as well as

the possibility to collaborate on reviews of the international scientific literature. Barriers are identified as socio-cultural, institutional and resources. The report includes a number of examples of international initiatives which have facilitated cross border collaborations linked to vaccine hesitancy and uptake;

- What is left unanswered from these results is a deeper look into the public's mind of what is driving the lack of confidence;
- Organisational barriers, personnel shortages, and lack of funding are listed as the most common barriers to working on vaccine uptake and vaccine hesitancy issues.

D8.2

Support for effective programme implementation

In May 2020, the Vaccine Hesitancy and Uptake Network was launched on the EU Health Policy Platform. The aim of the network is to provide support for developing practices and policies for maintaining good vaccine uptake and for strengthening public health responses to vaccine hesitancy and uptake issues in the European countries. The contents on the Vaccine Hesitancy and Uptake Network is based on the work done in the EU-JAV.

In practice, the network provides:

- Descriptions and presentations of good practices related to vaccine hesitancy and

uptake (studies, campaigns, publications, activities);

- Results from the data gathering on Barriers and enablers behind suboptimal vaccination coverage;
- More than 60 publications in total (February 2022);
- Possibility to organise webinars
- Possibility to search information using key-words

The work done in this task will be described in a report that will be included in an updated version of this booklet at the end of March 2022.

Dissemination

D2.2

Stakeholder Analysis

To implement relevant communication and activities with vaccine stakeholders in Europe, an analysis cross-referencing the known data of the said stakeholders and the project topics has been conducted early on.

Several issues from the project were highlighted that allowed an identification and selection of the relevant stakeholders:

- Children & adult vaccination,
- Seasonal Vaccinations,
- Vaccine hesitancy,
- Vaccine demand forecasting and supply information,
- Vaccine research and development

All of these stakeholders were then assessed to provide a list of potential interest for the project thanks to a set of their characteristics, such as power, interest, and their legitimacy to engage in the EU-JAV.

From the analysis of the data collected appeared 7 main categories: Dominant, Forceful, Influential, Dormant, Concerned, Vulnerable, Marginal. Each one corresponds to certain levels and methods of engagement with the project. In that respect, partners in the EU-JAV identified 526 national and 53 international stakeholders, and provided data on the characteristics of 444 of them.

Among those, almost half of the identified stakeholders have the power and resources to engage meaningfully with EU-JAV and influence the progress and outcomes of the project. Most national Authorities belong to this category, as do Research

and Academia and most representatives of healthcare. This represents an opportunity to strengthen the influence of the EU-JAV and to broaden the pool of knowledge and valuable research contribution of the project. Thus, involving these stakeholders in outreach activities (workshops, web-conference, etc.) or via direct collaboration on appropriate tasks and activities (advisory groups, etc.) would be beneficial.

The second most important group includes stakeholders who do not have the resources to influence the project and its outcomes. They are nevertheless legitimate to engage with the project regardless of their benefits or losses.

It should be noted that the healthcare field either falls into the first or second category, depending on the partner country. Indeed, in some of the EU-JAV Member States, associations of doctors and other health professionals have few resources, influence or authority whereas in others it's the other way around. These stakeholders therefore need to be supported by improving their capacity and access to participation and meaningful engagement in the issues of the EU-JAV.

Two issues were highlighted by all the identified stakeholders: vaccine hesitancy and seasonal vaccination. They will have to be taken into account throughout the project so that it remains as inclusive as possible.

Finally, to enrich the lists of stakeholders throughout the duration of the project, all partners were asked to do a continuous/regular update.

Evaluation

D3.2

Interim Evaluation Report (August 2018 - January 2020)

A midterm evaluation of the European Joint Action on Vaccination (EU-JAV) program was conducted. The specific objectives were to evaluate the process of the work packages (WP), as well as program meetings. The goal was to understand whether the overall aims of the EU-JAV program were achievable, if WP specific targets had been met in a timely fashion, and if there were any unintended outcomes.

The objectives and targets were adhered to and the work package teams work towards accomplishing the milestones and deliverables in a timely manner. Nonetheless, delays and constraints have been voiced. The positioning of EU-JAV activities in relation to ECDC's and the Commission's activities has been an important question and it has influenced several of the WP activities. To achieve the intended goals for EU-JAV, there is a need to work in close cooperation with ECDC, WHO and other

stakeholders. The signing of the cooperation agreement between ECDC and EU-JAV will facilitate the interaction between EC-JAV-ECDC. The First General Assembly was well attended, with 17 (24%) of 71 attendees being stakeholders. In planning the next General Assembly, the organisers (THL) should consider the feedback from the previous General Assembly meeting, i.e. refrain from having parallel sessions and provide group meeting facilities to enable more productive WP-specific workshops. Each work package should also consider how best to use the workshop/round table for their needs.

In conclusion, the EU-JAV program was well on track to achieve the intended objectives after 18 months, and the main hurdle identified at M12 of the program, the lack of a cooperation agreement between EC-JAV-ECDC, has been overcome.

» The EU-JAV Team

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Olivier Epaulard is a professor in clinical infectious diseases in Grenoble-Alpes University Hospital, Grenoble, France.

He graduated in infectious and tropical diseases and in internal medicine at the Faculty of Medicine of Grenoble, and obtained a PhD in Microbiology and Immunology in the Université Grenoble Alpes. His PhD, and his post-doctoral fellowship (in Paris, France), focused on vaccine vectors and vaccine adjuvants.

Apart from his current clinical and teaching activities, he coordinates the Vaccination and prevention study group of the French-speaking infectious disease society (SPILF), he participates in the board of the vaccine study group (EVASG) of the European Society of Clinical Microbiology and Infectious Diseases (ESCMID), and he is a permanent member of the French national immunization technical advisory group (at the Haute Autorité de Santé). His current research areas include vaccine hesitancy, and vaccination of the immunocompromised host



Stelios Lefkovits

Stelios Lefkovits is a professional journalist, Head of Press Office and Communication department of National Public Health Organization; certified member of Journalists Union of Athens Daily Newspapers; certified member of International Federation of Journalists.

He holds a Master`s Degree in Business Administration (MBA), University of Athens, specialising in Health Economics & Health Care Management and a Bachelor's degree focused on Elementary Education and Teaching from the National and Kapodistrian University of Athens.

He was the Vice President of the National Emergency Centre (2007-2010). Also, he has been honored with the Medal of the City of Athens, by the Mayor of Athens for his work promoting the capital city of Greece.





Charlotta Nilsson

Charlotta Nilsson has long-standing experience in vaccinology with over 15 years of experience of EU- and European and Developing Countries Clinical Trials Partnership (EDCTP)-funded clinical vaccine trials. She is a biomedical laboratory scientist with a PhD in infectious disease control and an associate professorship in virology. Charlotta Nilsson works as a microbiologist and analyst at the Public Health Agency of Sweden.

Christine Berling

Christine Berling is head of European and International affairs. She has actively contributed to various European projects, of which Joint Actions. M.Sc. in Physics, PhD in Biophysics, C. Berling has over 15 years' experience of working in public-private partnership and technology licensing, initially with the INSERM, and subsequently at the European Commission, DG RTD Health Directorate, during the setting up of the Innovative Medicine Initiative Joint Undertaking.





Magid Herida

MD and PhD in Public Health, Dr Herida is currently Project manager - Vaccines at the General Directorate for Health. Before joining the Ministry M. Herida held various positions as general practitioner in the public & private practice, including emergency operation abroad with Médecins du Monde. He has 15 years of experience as an epidemiologist, initially with Institute for Public Health Surveillance and subsequently with ECDC where he was National Focal Point Threat Detection (ECDC), & Member of the board of GOARN (WHO).

Hanne-Dorthe Emborg

Hanne-Dorthe Emborg is a veterinarian with a PhD in veterinary epidemiology and currently working at SSI as senior scientist. She has several years experience performing register-based epidemiological analyses. Since she joined Statens Serum Institut she has been involved in surveillance of influenza and other respiratory infections and in the estimation of influenza and covid-19 vaccine effectiveness in Denmark. She has been responsible for SSI's contribution to various European projects related to vaccine coverage and vaccine effectiveness including, I-MOVE, I-MOVE+, ADVANCE, VITAL and JAV.





Tamara Buble

Tamara is a sociologist and social anthropologist working as an analyst at the Division of health informatics and biostatistics at the Croatian Institute of Public Health (CIPH). Since her employment at CIPH, she has acquired the knowledge and skills necessary to work with managing and linking health databases and registries, as well as the experience in data, business and statistical analysis. She is currently responsible for maintenance and improvements of national Communicable Diseases Registry, and involved in implementation of national Covid-19 vaccination database (eVac). Her previous experience is related to vocational education policy implementation, research, and project management of various EU projects in the field of education and training, youth and culture.

Sarah Earnshaw Blomquist

Sarah is a political scientist and strategic communication expert with a demonstrated history of working on behavioural insights, advocacy and communication in public health, vaccines and antibiotic resistance. Since 2018, she has been working as an analyst at the Public Health Agency of Sweden supporting a 3-year government initiative to secure a resilient vaccination programme. Since the start of the Covid vaccination programmes in Sweden at the end of 2020, she has been working on various studies and implementation projects relating to Covid vaccine acceptance. During 11 years at the European Centre for Disease Prevention and Control (ECDC), she led a team which built up from scratch an award winning EU-wide initiative to support national campaigns on prudent antibiotic use - European Antibiotic Awareness Day. She was also group leader for press, media and information for 6 years, including during the 2009 pandemic. Previously, Sarah worked as government relations manager for



GlaxoSmithKline supporting the European launch of HPV vaccines, as an account director in an international public affairs consultancy and as a research assistant in the European Parliament.

A portrait of Antonietta Filia, a woman with dark hair, smiling, wearing a dark blue top. The background is a light blue sky. The portrait is framed by a decorative graphic consisting of overlapping light blue and purple shapes.

Antonietta Filia

Antonietta Filia M.D. Ph.D. is a public health and preventive medicine physician and researcher working at the Infectious Diseases Department of the Italian National Health Institute (Istituto Superiore di Sanità -ISS), with over 15 years of experience in surveillance, epidemiology, control of infectious diseases, including immunizations. She received her M.D. degree from McGill University in Montreal, Canada, and holds a specialty degree in Hygiene and Preventive Medicine and a PhD in Research Methods in Preventive Medicine and Therapy.

Dr Filia played a major role in drafting the Italian national measles and rubella elimination plan, in close collaboration with the Ministry of Health, and in establishing the integrated measles and rubella surveillance system in Italy; she is also an active member of the national strategic advisory group for measles, rubella and congenital rubella elimination. More recently she has been involved in COVID-19 surveillance and public health response activities in Italy.

Since joining the ISS, she has participated in a number of European and national projects, expert working groups, risk assessments, communication and training activities in the areas of vaccine-preventable diseases, and provides technical and scientific advice and recommendations to the Italian Ministry of Health, regional and local health authorities and other stakeholders on vaccines and immunization. She is an active member of the WHO Vaccine Safety Net and of the WHO- European Technical Advisory Group of Experts on Immunization (ETAGE).

Karianne Johansen

Karianne Johansen, MSc Pharm, PhD, MM, is Department Director for Infectious Disease Registries at the Norwegian Institute of Public Health, reporting to the Executive Director for the Division of Infection Control. She is overseeing five key national health registries important for infection control, surveillance, and preparedness in Norway. The last two years she has been heavily involved in the Norwegian response to the covid-19 pandemic, the national surveillance systems for infection control and preparedness, and the Norwegian Covid-19 Vaccination Programme. She has previous experience with different vaccine projects, such as the institute's contribution to the EU-JAV and their new system for evaluation of new vaccines for the National immunisation Program. She has been seconded to CEPI in their early establishment phase, working with regulatory affairs and stockpiling of vaccines

to be used during an emergency. She has broad experience of the complete value chain from preclinical development to market access and reimbursement working in major pharmaceutical companies, as well as wide experience from governmental affairs and policy work, both in public institutions and the pharmaceutical industry.



Marie-Paule Kieny

Dr Marie-Paule Kieny is Director of Research at Inserm (Paris, France). Since June 2020 she chairs the French Scientific Committee on Covid-19 vaccine.

In addition to her responsibilities in France, Marie-Paule Kieny chairs the Board of the Drugs for Neglected Diseases Initiative (DNDi, Geneva, Switzerland) and of the Medicines Patent Pool Foundation (MPPF, Geneva, Switzerland). She is also vice-chair of the Board of the Global Antibiotic Research and Development Partnership (GARDP, Geneva, Switzerland), member of the Board of Fondation Mérieux

(France) and a Non-Executive Independent Director of bioMérieux (Lyon, France). She is a member of the scientific advisory group of several organisations working in the area of health.

Until June 2017, Dr Kieny served as the Assistant Director-General for Health Systems and Innovation at the World Health organisation . Key successes under her leadership roles at WHO include coordinating the WHO R&D efforts during the 2014-2016 West-African Ebola epidemic and conceptualising the WHO R&D Blueprint, a global preparedness plan against emerging diseases' epidemics.

Before joining WHO, Dr. Kieny held top research positions in the public and private sectors in France.

Jean-Daniel Lelièvre

Professor Jean-Daniel Lelièvre received his MD in Internal Medicine in 2002 and his PhD in Immunology in 2002. He is a Professor of Immunology and Head of the Department of Clinical Immunology and Infectious Diseases at Henri Mondor Hospital (Créteil, France).

His basic research activities focused on T cell apoptosis during HIV infection (PhD), then on the biology of Tregs during HIV infection and on the fundamental aspects of T cell development and their disruption during HIV infection.

In recent years, his research activity and expertise have been refocused on the field of vaccinology. In this context, he participated in the research of an HIV vaccine. He is responsible for clinical development within the Vaccine Research Institute (VRI) and the European HIV Vaccine Alliance (EHVA) and has conducted several clinical trials in

the field of immunotherapy or HIV vaccinology. His activities in the field of vaccines also include the responsibility of a WP within the EU-JAV (European Joint Action on Vaccination) and Vaccelerate Project (dedicated to the research on the Covid-19 vaccine). Finally, he is an expert in this field at the national (NITAG) and international (IVIR-AC WHO, SAG EMA) levels and regularly gives interviews to the media on this subject.

Jonas Sivelä

Jonas Sivelä, Chief Specialist, PhD, is the Head of the Cultural, Behavioural and Media Insights Centre (CUBE) at the Finnish Institute for Health and Welfare (THL). Before joining CUBE, Sivelä has been leading a number of research activities and projects relating vaccine acceptance, communications and health security at the Unit for Infectious Disease Control and Vaccinations, Department of Health Security at THL. Before joining THL, Jonas Sivelä has, among other things, conducted ethnographic research about AIDS-related myths and misconceptions in South Africa. He also has a long work experience from the fields of communications, media intelligence and journalism.

» The EU-JAV Final Conference

Purpose

The EU-JAV final conference brings together key speakers from a wide range of stakeholders working on vaccination, vaccination policy and health services.

With the participation of the European Commission, the DG Santé, the public health institutions and authorities of the 20 countries of the consortium, including civil society and manufacturers' representatives, the Joint Action will be delivering and sharing concrete tools for stronger national responses to vaccination challenges, aiming at spurring long-lasting European cooperation against vaccine-preventable diseases and therefore improve population health.

The European Joint Action on Vaccination Conference is formally closing the Joint Action on Vaccination (EU-JAV), and also officially opening the “post-Joint Action on Vaccination” period: a time for any Member State and Stakeholder to use the tools and recommendations resulting from Joint Action on Vaccination work, for the benefits of European populations.

The hybrid closing conference of the European Joint Action (EU-JAV), is the culmination of this joint

Action, as it will be giving the stage to the distinguished scientists in their distinct fields, of the different EU-JAV teams, to officially detail all results and conclusions of their hard, complex and of three and a half years effort.

The European Joint Action on Vaccination (EU-JAV) conference, organised under the auspices of the French Presidency of the Council of European Union, takes place in Paris (09.03.2022), at the Laroque Auditorium of the French Ministry of Health and also online.

The Final Conference is meant to:

- Disseminate the results of the European Joint Action on Vaccination (EU-JAV);
- Ensure the sustainability of the European Joint Action on Vaccination (EU-JAV);
- Increase awareness of the EU population on the vaccine-centred topics;
- Show how the relevancy of the Joint Action on Vaccination topics, as well as how the potential realisation of the EU-JAV recommendations were brought at the forefront of the Covid-19 vaccine campaign.

Agenda

CONFERENCE

European Joint Action on Vaccination (EU-JAV)

March 09, 2022
09:00 CET



Auditorium Laroque, French Ministry for Solidarity and Health

Paris, France

Under the auspices of the French Presidency of the European Union



Conference Agenda

- 09:00** **Welcome of the participants**
- 09:05** **Introduction Speeches**
Jérôme SALOMON, Director for Health, Ministry for Solidarity and Health
Gilles BLOCH, Inserm President
- 09:35** **An overview of the European Joint Action on Vaccination (EU-JAV):
The context, the aims, and the main results**
Olivier EPAULARD, EU-JAV Coordinator, UGA, Inserm, France
- 09:55** **Impact of harmonised vaccine coverage estimation in Europe**
Tamara BUBLE, Croatian Institute of Public Health (CIPH), Croatia
Hanne-Dorthe EMBORG, Statens Serum Institut (SSI), Denmark
Possible future surveillance of European vaccination coverage
Reminder systems in place in Europe
- 10:15** **Discussion**
Panelists
Tamara BUBLE (CIPH), Hanne-Dorthe EMBORG (SSI),
Palle VALENTINER-BRANTH (SSI)
- 10:35** **Feasibility study on EU wide and cross border campaigns on vaccination**
Sören ANDERSSON, Folkhalsomyndigheten (FoHM), Sweden
Sarah EARNSHAW BLOMQUIST, Folkhalsomyndigheten (FoHM), Sweden
Experience and best practice from previous cross-border interventions
What can be gained by teaming up? What are the barriers and facilitators?
Possible EU-wide and cross-border vaccination campaigns
- 10:55** **Discussion**
Panelists
Karam ADEL ALI (ECDC), Sören ANDERSSON (FoHM),
Sarah EARNSHAW BLOMQUIST (FoHM)
- 11:15** **Break**
- 11:35** **Vaccine supply: EU-wide anticipation and preparedness**
Karianne JOHANSEN, Norwegian Institute of Public Health (FHI), Norway
Maria Cristina ROTA, Istituto Superiore di Sanità (ISS), Italy
Vaccine needs and demands
Strengthen vaccine supply management mechanisms
- 11:55** **Discussion**
Panelists
Truus DE GRAAF (RIVM), Karianne JOHANSEN (FHI), Maria Cristina ROTA (ISS),
Michel STOFFEL (VE)
- 12:15** **Keynote speech**
Karam ADEL ALI, Policy Expert Communicable Diseases Prevention and Control,
VPD and Immunization, DPR, ECDC

- 12:35** **Vaccine research and development: prioritisation and funding at a Europe scale**
 Karianne JOHANSEN, Norwegian Institute of Public Health (FHI), Norway
 Jean-Daniel LELIÈVRE, Inserm, France
 Vaccine research priorities
 Research funding mechanisms and cooperation
- 12:55** **Discussion**
Panelists
 Marco CAVALERI (EMA), Abdul GHAFAR (WHO.int), Karianne JOHANSEN (FHI),
 Melanie SAVILLE (CEPI), Jean-Daniel LELIÈVRE (Inserm)
- 13:15** **Lunch Break**
- 14:30** **Keynote speech**
 John-F Ryan, Director, Public Health, Directorate-General for Health and Food Safety,
 European Commission
- 14:50** **Vaccine hesitancy and uptake: best actions to address vaccine hesitancy and tools to monitor it in real time**
 Francesco GESUALDO, Ospedale Pediatrico Bambino Gesù (OPBG), Italy
 Jonas SIVELÄ, Finnish Institute for Health and Welfare (THL), Finland
 From research and practices to implementation
 Monitoring public vaccine confidence through social media and the web
- 15:10** **Discussion**
Panelists
 Francesco GESUALDO (OPBG), Siff Malue NIELSEN (WHO Europe),
 John KINSMAN (ECDC), Sanjin MUSA (Bosnia and Herzegovina),
 George PANAGIOTAKOPOULOS (EODY/NPHO), Jonas SIVELÄ (THL)
- 15:30** **Break**
- 15:50** **Communication and Training**
 Greet HENDRICKX, University of Antwerp, Belgium
 Magid HERIDA, Ministry for Solidarity and Health, France
 Ginevra PAPI, Association of European Cancer Leagues
 Training and communication for health care students and workers
 Communication towards the Youth
- 16:10** **Discussion**
Panelists
 Greet HENDRICKX (University of Antwerp), Magid HERIDA (MoH.FR), Markus KUJAWA (CPME),
 Georgia ORPHANOU (PASYKAF), Ginevra PAPI (ECL), Bolette SØBORG (SST)
- 16:30** **Questions from the public**
 Tamara BUBLE, Hanne-Dorthe EMBORG, Antonietta FILIA, Magid HERIDA,
 Karianne JOHANSEN, Jean-Daniel LELIÈVRE, Jonas SIVELÄ
- 16:50** **Sustainability of the EU-JAV**
 Magid HERIDA, Ministry for Solidarity and Health, France
- 17:05** **Closing remarks**
 Olivier EPAULARD, EU-JAV Coordinator, UGA, Inserm, France
- 17:20** **End of Public Conference**

Conclusion

When EU-JAV was launched in 2018, it was designed to address some crucial issues in the vaccination field, in particular in the strengthening of vaccine uptake, in a spirit of European collaboration. During these 3 years and half, it has completed the different works that were planned, from online platforms of data analysis and visualisation to surveys and feasibility studies.

The first months of the SARS-CoV-2 pandemic, as in many other domains, has weighed heavily on the work of the EU-JAV scientists, most of them being deeply involved in the national response to this crisis, and a 6 months extension was decided to allow the consortium to achieve its tasks; but most of all, the Covid-19 evidenced how much relevant were the different topics included in the EU-JAV plans, and how much the European level was the most appropriate in such case.

The closing conference of the 9th of March is the opportunity for the EU-JAV to share what has been done; moreover, in the coming weeks, policy briefs will be emitted and disseminated to help all those involved in immunisation to carry out efficient actions, whether they are governments, stakeholders, or active citizens.

In conclusion, we have 3 important messages.

To the governments and all those at political key positions: invest in vaccination, promote it at all ages among the general population, have your healthcare workers educated about it; make it one of the cornerstones of policies for a long, healthy life; and favour international cooperation to harmonise and synergise policies and actions.

To the stakeholders: in a world prone to hesitancy, keep on reassuring people on the merits of vaccines; keep taking advantages of your expert position to inspire governments, and challenge them to make vaccination more accessible and simple; keep on being these actors well-connected with the population and well-informed who speak with all the parties involved, and that make sure vaccination is never out of view.

To the citizens: in a complex world, keep informed on what will make your life safer, and that of your children, parents, friends, colleague; advocate around you about the long-lasting benefits of vaccination; take interest in the way health policies are elaborated, and do not let something be done for you without you.



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From science to health

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