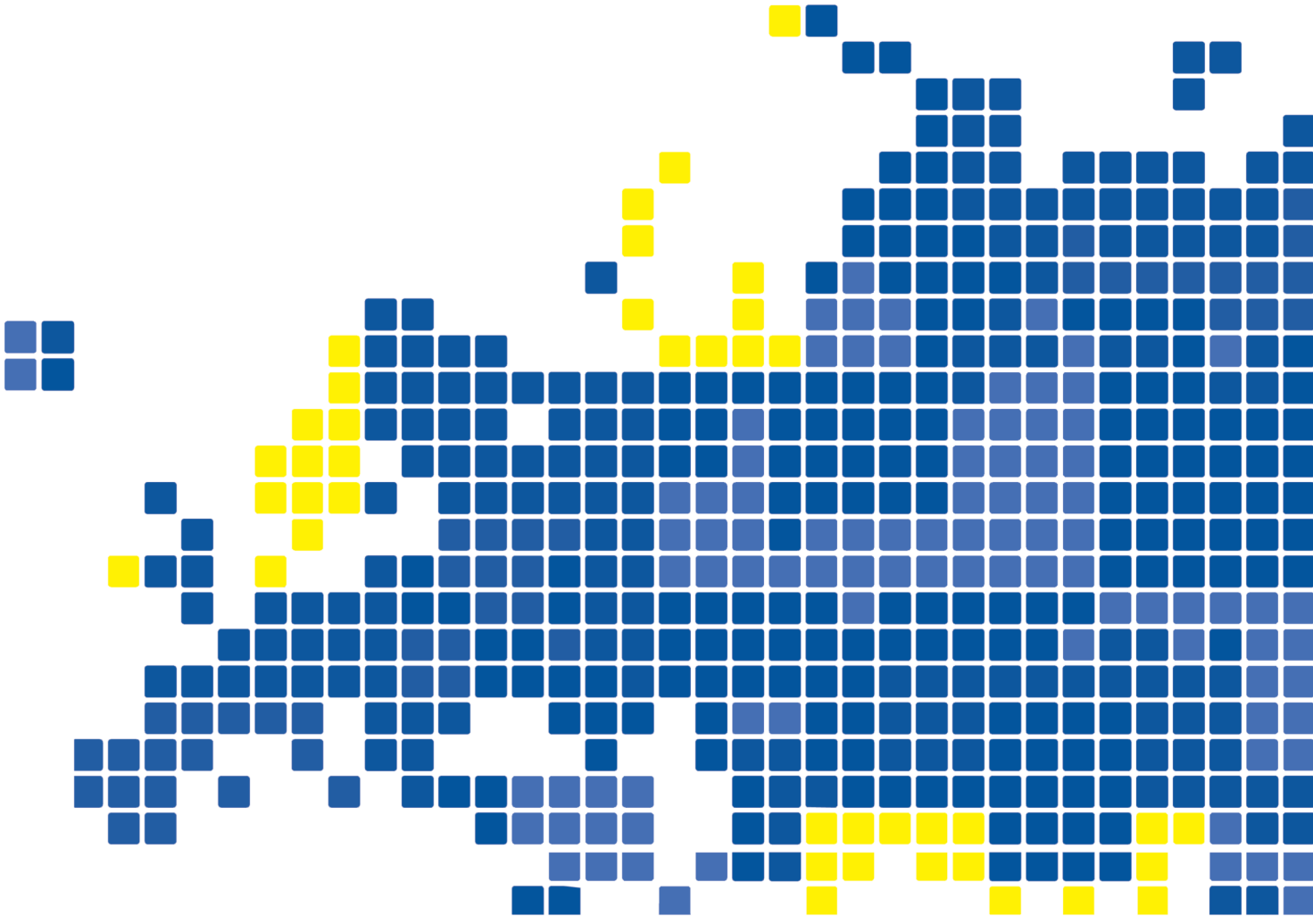
The organization and delivery of vaccination services in the European Union

Prepared for the European Commission



European Commission

European Observatory on Health Systems and Policies

a partnership hosted by WHO

The organization and delivery of vaccination services in the European Union

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The organization and delivery of vaccination services in the European Union

Prepared for the European Commission

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Keywords:
Vaccination
Immunization
Immunization Programs – organization and administration
Measles – prevention and control
Influenza, Human – prevention and control
Europe

ISBN 978 92 890 5173 6

Printed in the United Kingdom

Typeset by Peter Powell and Tetragon

Cover design by M2M

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Executive summary

Approach

This report was prepared by the European Observatory on Health Systems and Policies, on the request of the European Commission. It begins with the recognition that the design and operation of health systems can influence vaccine uptake, while noting that there are also many factors relating to individuals who chose to, or not to, be vaccinated. The report has three components. The first is a review of the current situation within the EU on vaccine uptake and vaccine-preventable disease. The second is an umbrella review of systematic reviews on health system related factors influencing vaccine uptake. The third is a summary of country fiches that describe the organization and delivery of vaccination programmes in EU Member States. These were commissioned by the European Observatory in May 2018 and drafted in May-September 2018. The country fiches are included in the Appendix of this report.

The number of vaccines available has increased rapidly in recent years and while some form part of a common package used to immunize children, others are given only to particular groups, such as travellers (e.g. yellow fever or cholera) or those at occupational risk (e.g. rabies). Moreover, the situation is constantly changing, with new vaccines being added to schedules and, in a few cases, such as smallpox or Paratyphoid A and B, being removed, either because the threat no longer exists or the vaccine has limited effectiveness. Consequently, a comprehensive overview of vaccination in Europe would be extremely detailed and, more importantly, soon out of date. Therefore, we focused this review on two exemplar

vaccines, both well established in routine use everywhere, which illustrate many of the issues that affect most or all vaccines. The two exemplars are, firstly, one common childhood vaccination (**against measles**) and, secondly, one common adult vaccination (**against influenza**).

The current situation

In recent years, the European Union (EU) has been facing several serious outbreaks of vaccine-preventable diseases including measles outbreaks in EU Member States. Vaccination coverage rates for the first dose of the vaccine against measles vary from 85% in Italy to 99% in Luxembourg and Hungary, with the average for the EU (93.6%) falling below what is required to ensure herd immunity. Similar variations can be seen for other vaccinations, including influenza immunization programmes targeting older adults who are at greater risk of severe complications.

The overview of systematic reviews

The overview of systematic reviews, supplemented by European reports and reviews, sought to identify the necessary health system factors for the successful operation of a vaccination programme. Our starting point was that the best results are to be expected within a system that includes a set of key components, linked together effectively.

After searching the literature, we identified 45 systematic reviews relating to health system factors and childhood or influenza vaccination programmes in Europe. While wide-ranging, they did not cover the entire health system and the focus of the evidence was on public attitudes, vaccine hesitancy, inequalities or interventions aimed at increasing coverage. Funding, enacting legislation, supply of materials and systems for monitoring outcomes were not covered by any of the included systematic reviews. Only a minority of individual studies related to childhood or influenza vaccination programmes in Europe, with much of the cited evidence generated in the United States. Reports from European organizations (WHO Europe, ECDC, VENICE etc.) went some way to filling the gap, but these reports tend to be based on surveys or the collated opinions of experts rather than reviews of interventional or observational studies.

Comparative analysis of country fiches

Governance

In terms of the governance of vaccination programmes, there is a dedicated agency in charge of developing and overseeing implementation of national vaccination plans and programmes in each of the EU Member States. This is usually the Ministry of Health or a subordinated agency, often supported by technical advisory groups or committees.

In all EU Member States, vaccination programmes are organized at the national level, whereas the regional level tends to be charged with overseeing implementation of vaccinations and monitoring vaccination coverage. However, there are some countries where the regional level has latitude to modify national vaccination programmes and recommendations to local needs. This includes Denmark, Germany, Spain and Sweden.

In 9 EU Member States (Bulgaria, Croatia, Czech Republic, France, Hungary, Italy, Poland, Slovakia and Slovenia), vaccinations against measles are mandatory for children, while in the remaining 19 countries they are voluntary, but recommended by the relevant authorities. However, the distinction between voluntary and mandatory immunization is not always clear-cut. In several countries (Cyprus, Germany and Greece) vaccinations are formally voluntary, but vaccination certificates are required for the enrolment of children in schools or kindergartens.

In contrast, vaccinations for adults against influenza are voluntary in almost all EU Member States. The sole exception is Slovakia, where vaccination against influenza is mandatory for any person living in social care facilities, as well as for any person at increased risk of infection due to living or working in an area with the presence of avian influenza.

The countries have embraced a mix of incentives and sanctions to improve vaccination coverage. These include awareness campaigns, financial rewards for parents or health care providers, and financial sanctions or denying school or kindergarten entry for those who refuse (mandatory or even voluntary) vaccinations.

Specific targeted measures for vulnerable groups of the population are adopted in a number of countries (including Croatia, Finland, Germany, Greece, Ireland, Luxembourg, Malta, the Netherlands, Portugal,

Romania, the United Kingdom). These include, in particular, actions for refugees and asylum-seekers, often as part of routine medical screening upon entry to the country. Other countries (including Croatia, the United Kingdom, Ireland and Romania) also offer targeted measures for minority ethnic groups, such as the Roma and Traveller communities.

Only 12 EU Member States reported using a population register as the basis for their vaccination programmes. In some of the other countries (e.g. Bulgaria, Estonia, Poland, Spain, and the Netherlands in the case of influenza), the registries of health care providers (usually GPs) or health insurance funds are used to monitor vaccination uptake and invite patients for vaccinations.

The methods used to estimate vaccination coverage rates also differ between countries. There are differences for both the numerator (the number of people being vaccinated) and the denominator (the number of people who could be vaccinated). Only some countries use population registries as the denominator for calculating rates. Others use records of health care providers (patient lists) and lists of people covered by health insurance funds. Calculation of the numerator is based on varied sources, including data on reimbursements for providers, sales data and reports by health care providers. Some countries also use surveys to establish vaccination rates.

Provision

Measles vaccinations for children are provided in most EU Member States through primary care physicians or nurses. Depending on the organization of primary care in the country, this can include paediatricians, general practitioners (GPs), school physicians, and nurses in various settings, such as GP practices or school health services. Given that measles vaccinations for children are provided at different ages, with the first shot typically given at 12 months and a second shot often several years later (the timing of the second shot differs widely between countries), different types of providers and professionals can be involved. School health services play an important role for the second shot in a number of countries, whereas pharmacies and pharmacists do not tend to play a role.

For adult vaccinations against influenza, the principal health care providers are physicians and nurses in primary health care, although with differences between countries as to whether this task is performed by physicians, nurses, or both. In some countries, vaccinations are also offered by public health institutions. Occupational health services play an important role in a number of countries for those who receive influenza vaccinations to protect them against occupational health risks, such as health workers. Only six countries (Ireland, Latvia, Malta, Portugal, Sweden, and the United Kingdom) report the availability of influenza vaccinations in (some) pharmacies, although these are now also being introduced on a pilot basis in Estonia and France.

Financing

In all EU Member States, childhood vaccinations against measles are free of charge at the point of delivery. The only exception is the private sector in Cyprus, where patients have to pay the cost of the vaccine and of the vaccination.

For adult vaccinations against influenza, most (21) EU Member States provide vaccinations free of charge at the point of delivery for those groups of the population targeted by the respective national vaccination programme, e.g. people aged 65 years and above. In seven countries (Austria, Belgium, Bulgaria, Estonia, Latvia, Poland and Slovenia) targeted patients need to pay at least part of the costs for adult vaccinations against influenza.

Key barriers and facilitators

For measles, the country reports identified a number of barriers to effective vaccination coverage, with only five countries (Cyprus, Denmark, Luxembourg, Portugal and Sweden) not reporting any major barriers. The factor mentioned in most country fiches (20 countries) was vaccine hesitancy. Seven countries acknowledged a failure to reach vulnerable groups of the population. Six of the reports mentioned a lack of awareness in the population as one of the barriers to effective vaccination coverage. Five countries reported insufficient training or vaccine hesitancy among health professionals. Factors related to the organization, provision and financing of vaccination services were only reported by very few countries, with two (Latvia and Romania) reporting short-term shortages of vaccines, two (Hungary and Lithuania) reporting a shortage of resources, and three (Greece, Ireland and Lithuania) reporting the lack of a vaccination register as barriers.

Of the 28 EU Member States, 25 identified key facilitators for effective vaccination coverage against measles. The factor mentioned by most (14 countries) was the inclusion of measles vaccination in the health services

that are publicly funded. This was followed by awareness-raising campaigns (mentioned in 8 country fiches) and a good health service delivery network (7 country fiches). Six countries each mentioned public attitudes that were conducive to measles vaccination, the important role of health professionals, and the existence of a monitoring system overseeing vaccinations, while five mentioned the mandatory character of measles vaccination, and the existence of special incentive schemes.

For adult vaccinations against influenza, 20 of the 28 countries identified barriers to effective vaccination coverage. The most commonly mentioned barrier (described in 15 of the country fiches) was lack of awareness among the general population, with people being unaware of the potentially serious consequences of infection. The related issue of vaccine hesitancy was pointed out by 11 of the countries, linking low vaccination coverage to anti-vaccination movements. The existence of out-of-pocket payments as a barrier to higher coverage rates was pointed out by 9 countries.

Only 12 of the 28 countries identified facilitators for effective vaccination coverage against influenza. These include media campaigns to raise awareness in the general population and among health workers, the involvement of employers and professional societies, outreach services, financial incentives for providers of immunizations, and the provision of influenza vaccinations in pharmacies.

Conclusion

This report and the underlying country fiches document the sustained efforts undertaken by EU Member States in addressing vaccine-preventable diseases. They provide an insight into what has been achieved, but also where further improvements could be made. The main perceived barrier for improved vaccination coverage is vaccine hesitancy and lack of awareness in the general population, but also among health workers. However, the country profiles also identify many other actions that health systems can take to improve coverage. These include a mix of incentives and sanctions, targeted measures and outreach services for vulnerable population groups, and an expansion of public financing for vaccinations against influenza, as well as the removal of administrative barriers.

Acknowledgements

This report was prepared by the European Observatory on Health Systems and Policies on the request of the European Commission. It is based on country fiches prepared by national experts (**Table 1**) which are provided in the Appendix.

We would like to express our gratitude to Karam Adel Ali, Programme Manager for Vaccine-preventable Diseases at the ECDC, for coordinating the review of the draft country fiches, and to the ECDC national focal points for vaccine-preventable diseases for reviewing the draft country fiches and providing valuable feedback.

Thanks are also extended to Isabel de la Mata, Principal Advisor for Health and Crisis Management at the European Commission, for constructive feedback on the comparative analysis, to Dheepa Rajan for helping with the analysis of the country fiches, and to Willy Palm for providing comments on the data collection template used for the country fiches. We are also grateful for comments received on an earlier draft of this document by Siddhartha Sankar Datta, World Health Organization (WHO) Regional Office for Europe.

Table 1 *Authors of country fiches*

Country	National experts
Austria	Katharina Habimana
Belgium	Chloé Wyndham-Thomas, Nele Boon, Pierre Van Damme
Bulgaria	Maria Rohova
Croatia	Aleksandar Džakula
Cyprus	Chrystala Charalambous, Mamas Theodorou
Czech Republic	Lucie Bryndová
Denmark	Peter Henrik Andersen
Estonia	Kaija Kasekamp
Finland	Ilmo Keskimäki
France	Karine Chevreul
Germany	Miriam Blümel
Greece	Styliani Tziaferi, Panayota Kalatzi
Hungary	Györgyi Tokodi, Péter Gaál
Ireland	Maebh Ní Fhallúin
Italy	Walter Ricciardi, Giovanni Rezza, Fortunato Paolo D'Ancona, Stefania Iannazzo, Maria Cristina Rota
Latvia	Daiga Behmane, Oksana Martinuka
Lithuania	Liubove Murauskiene
Luxembourg	Guillaume Campagné, Françoise Berthet, Nathalie de Rekeneire, Diane Pivot
Malta	Natasha Azzopardi Muscat
Netherlands	Madelon Kroneman
Poland	Iwona Kowalska-Bobko, Katarzyna Badora-Musiał
Portugal	Jorge Simões, Inês Fronteira and Gonçalo Augusto
Romania	Silvia Gabriela Scîntee
Slovakia	Elena Marušáková, Darina Sedláková, Helena Hudecová, Adriana Mečochová
Slovenia	Maja Sočan
Spain	Andreu Segura Benedicto
Sweden	Ann Lindstrand
United Kingdom	Sandra Mounier-Jack

1 Introduction

Martin McKee, Jennifer Priaulx, Bernd Rechel

The development of vaccines has been one of the greatest triumphs of scientific medicine. Diseases that once killed in the millions have been eradicated, as with smallpox, or their impact has been reduced greatly. Even a few decades ago, measles, a disease that is entirely vaccine-preventable, was still killing vast numbers of children in Sub-Saharan Africa and, even in rich countries, it was a common cause of death in survivors of childhood cancer who were, mistakenly, not immunized. While these numbers declined in recent years and measles became uncommon in Europe, in mid-2018, the European media was reporting outbreaks, and some fatalities (1).

There are many reasons why people are not immunized. They fall into three broad categories. The first two relate to the individual concerned or, more often, their parents; the third relates to the health system. First, they may be unaware of the importance of vaccination, especially as it is increasingly likely that they have never seen a case of the disease in question and do not realise how serious its effects can be. Or they may be unaware of how to get vaccinated, for example because the necessary information is in a language they do not understand. Second, they may reject vaccination because they believe, wrongly, that it is ineffective or harmful. This belief may be specific to vaccines or part of a more general distrust, in government or in the corporations that manufacture vaccines. Although much attention in the media, the public health community, and in published research has focused on factors related to the individual and how to address them (19–23), as the decision to accept a vaccine is at least in part a function of the wider system that delivers immunization programmes, it is important that questions of uptake are not considered in isolation, and

especially not at the expense of understanding how the wider system functions and how this affects the overall effectiveness of the programmes. Consequently, this report focuses on the third of these categories, the impact of the health system.

The seemingly simple act of injecting a vaccine into a child is only possible because of the existence of a number of well-functioning processes. These include a population register to identify those who will benefit and, as importantly, to monitor uptake in different groups and respond when it falls short of what is expected. Then there is a system to procure and distribute the vaccines, especially challenging when supplies are limited. There is also a need for a system to ensure that there are trained health workers available to administer the vaccines, with a detailed knowledge of the indications and, in a few rare cases, contra-indications. Finally, there should be a system of governance, providing oversight of the entire system to ensure that it is working in an effective, equitable, and sustainable way. Some countries perform these functions very well, but others are less successful and in many European countries there are persisting, and in some cases widening, gaps in coverage, leading to outbreaks of what should be preventable disease (17, 18).

The report has three elements. First, it reviews the current situation with regard to vaccine uptake and vaccine-preventable disease in the European Union (EU). Second, it reports on a systematic review which sought to identify those factors related to the health system that influence the successful operation of a programme. Finally, it reviews in detail the systems that are in place in the different EU Member States to deliver vaccination services, drawing on information provided in country fiches on the organization, provision and financing of vaccination programmes in EU Member States (see the Appendix). The country fiches were commissioned by the European Observatory in May 2018 and, following a common data collection tool, covered:

- the governance of all elements necessary to deliver vaccination programmes (including agencies involved, national vaccination plans, population registries, whether vaccinations are recommended or mandatory, the existence of sanctions or incentives);
- the organization and provision of vaccination services, including organizations and professionals involved (primary health care providers, pharmacies, public health facilities, schools, etc.);
- the financing of vaccination services, including the existence of patient co-payments;
- barriers to and facilitators of effective vaccination coverage.

The number of vaccines available has increased rapidly in recent years and while some form part of a common package used to immunize children, others are given only to particular groups, such as travellers (e.g. yellow fever or cholera) or those at occupational risk (e.g. rabies). Moreover, the situation is constantly changing, with new vaccines being added to schedules and, in a few cases, such as smallpox or Paratyphoid A and B, being removed, either because the threat has been removed or the vaccine has limited effectiveness. Consequently, a comprehensive overview of vaccination in Europe would be extremely detailed and, more importantly, soon out of date. Thus, for the purposes of the country fiches and the comparative analysis, we focus on two exemplar vaccines, both well established in routine use everywhere, which illustrate many of the issues that affect most or all vaccines. The two exemplars are, firstly, one common childhood vaccination (**against measles**) and, secondly, one common adult vaccination (**against influenza**).

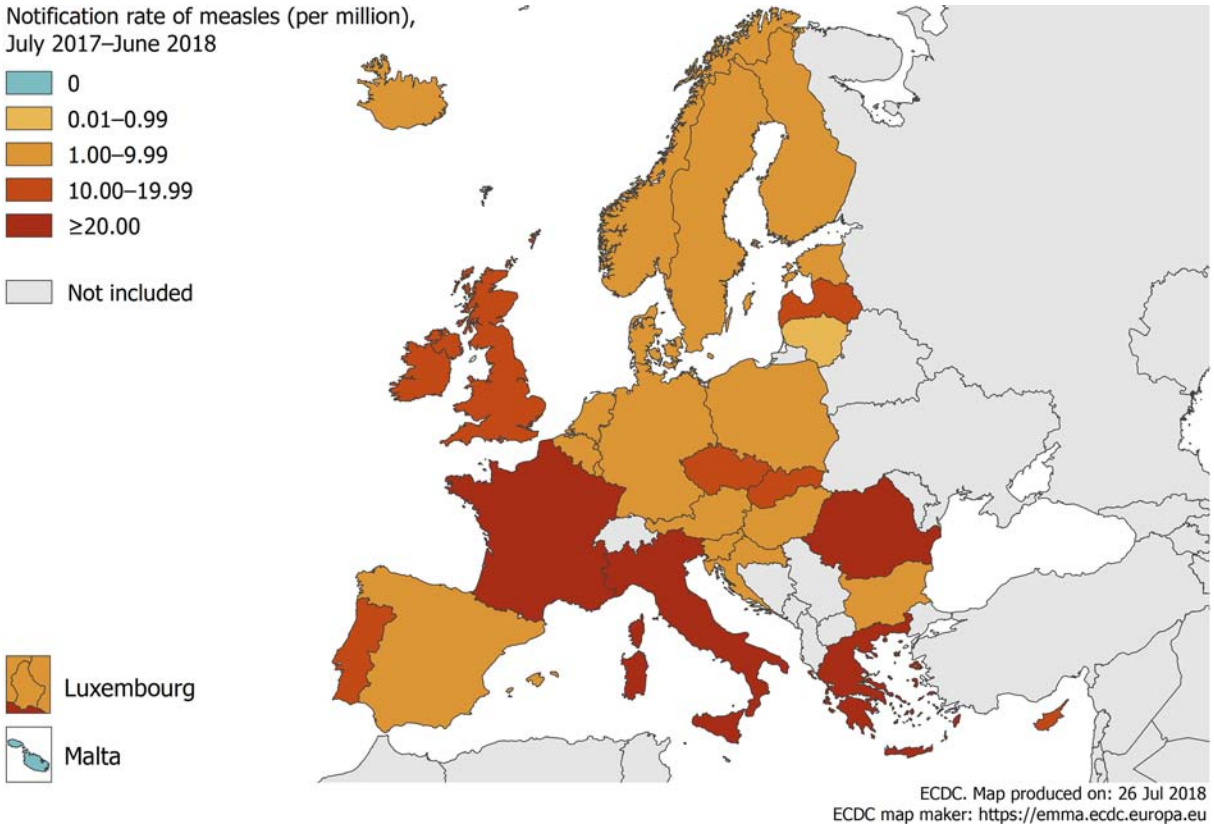
2

Vaccine uptake and vaccine-preventable disease in the EU

Bernd Rechel

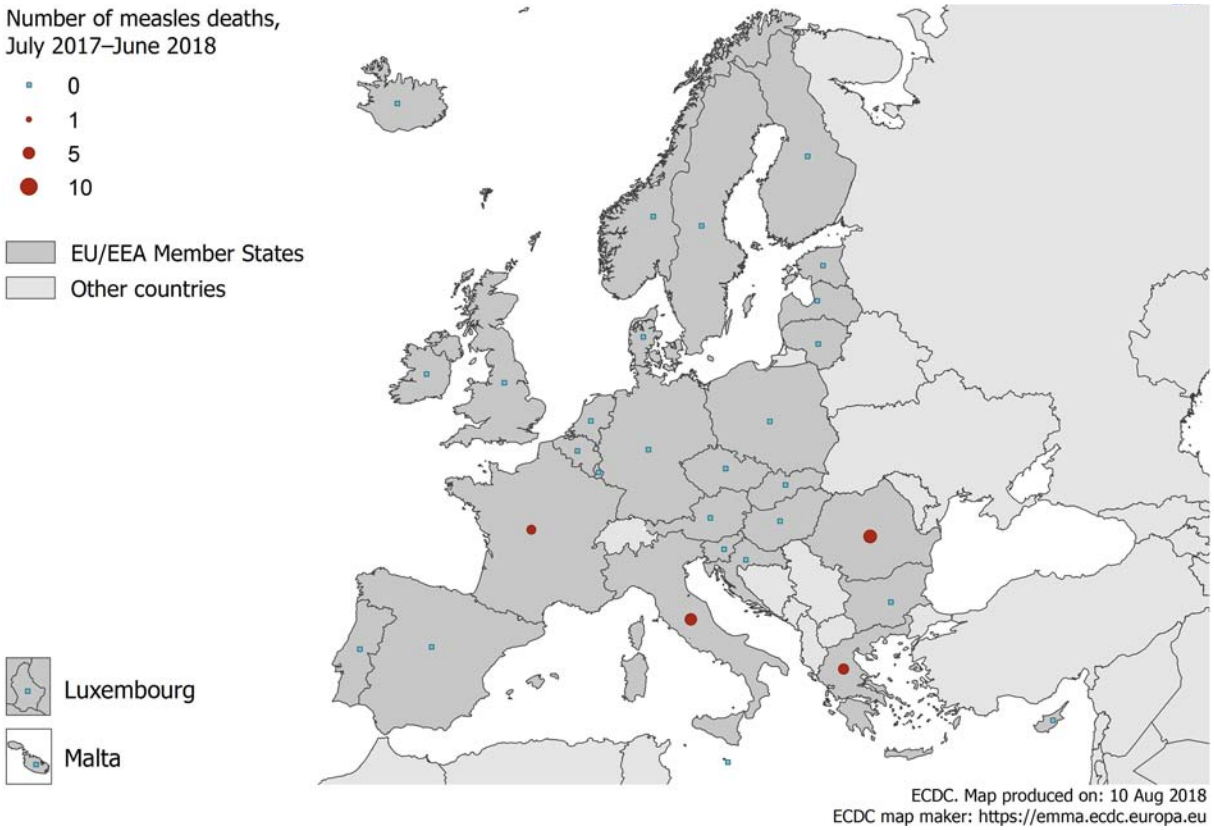
In recent years, the EU has been facing several serious outbreaks of vaccine-preventable diseases. This included measles outbreaks in EU Member States, with an increasing numbers of cases (**Figure 1**) and deaths (**Figure 2**). Even these numbers however may be an underestimate, in particular for Romania, where the sustained outbreak has led to delays in reporting to international databases (2).

Figure 1 *Measles notification rate per million population in EU/EEA countries, 1 July 2017– 30 June 2018*



Source: (2)

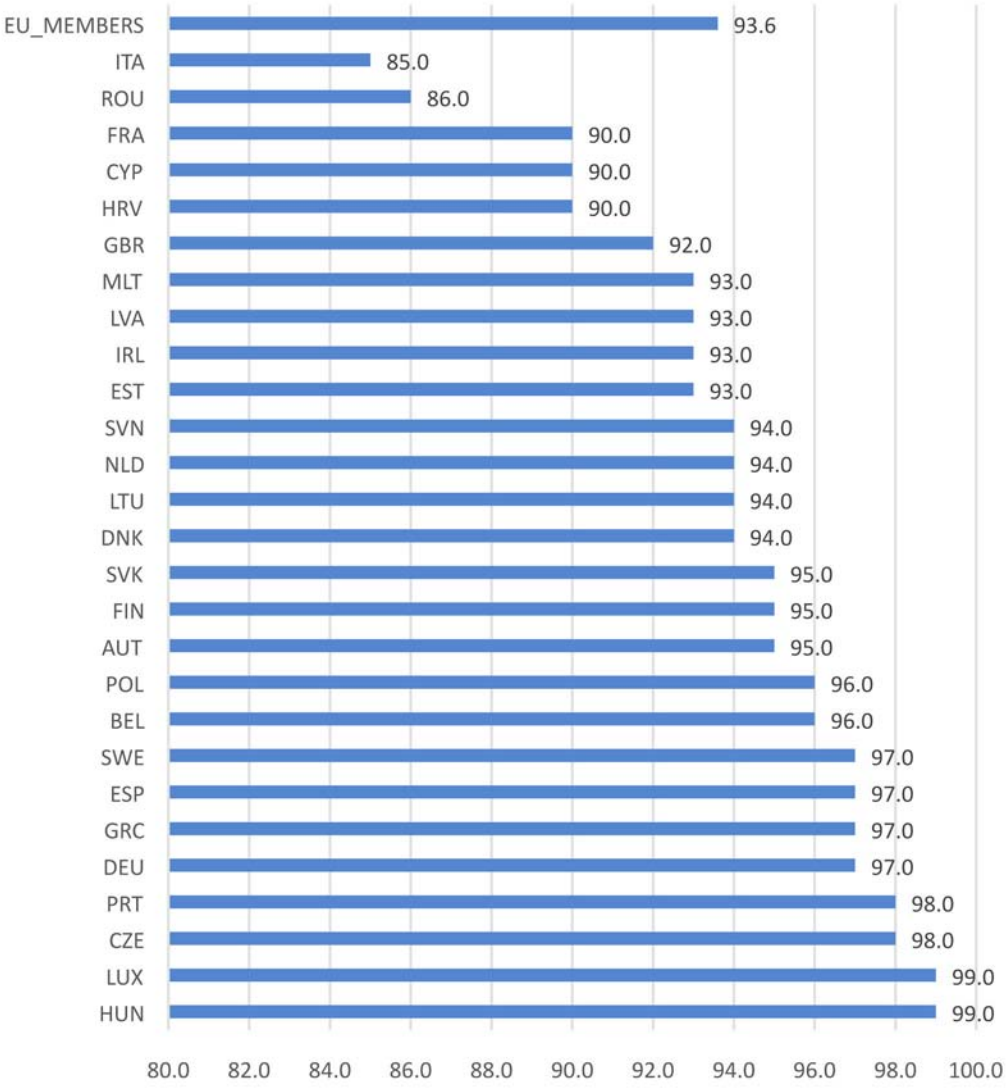
Figure 2 *Number of measles deaths by country, EU/EEA, 1 July 2017– 30 June 2018*



Source: (3)

The measles outbreaks can be linked to insufficiently high vaccination coverage in some countries (2), or to gaps in vaccination coverage among vulnerable groups of the population. Overall vaccination coverage differs markedly across EU Member States, with many falling below the target of 95% coverage which is needed to ensure herd immunity (**Figure 3**).

Figure 3 *Immunization coverage for measles, first dose, 2016*

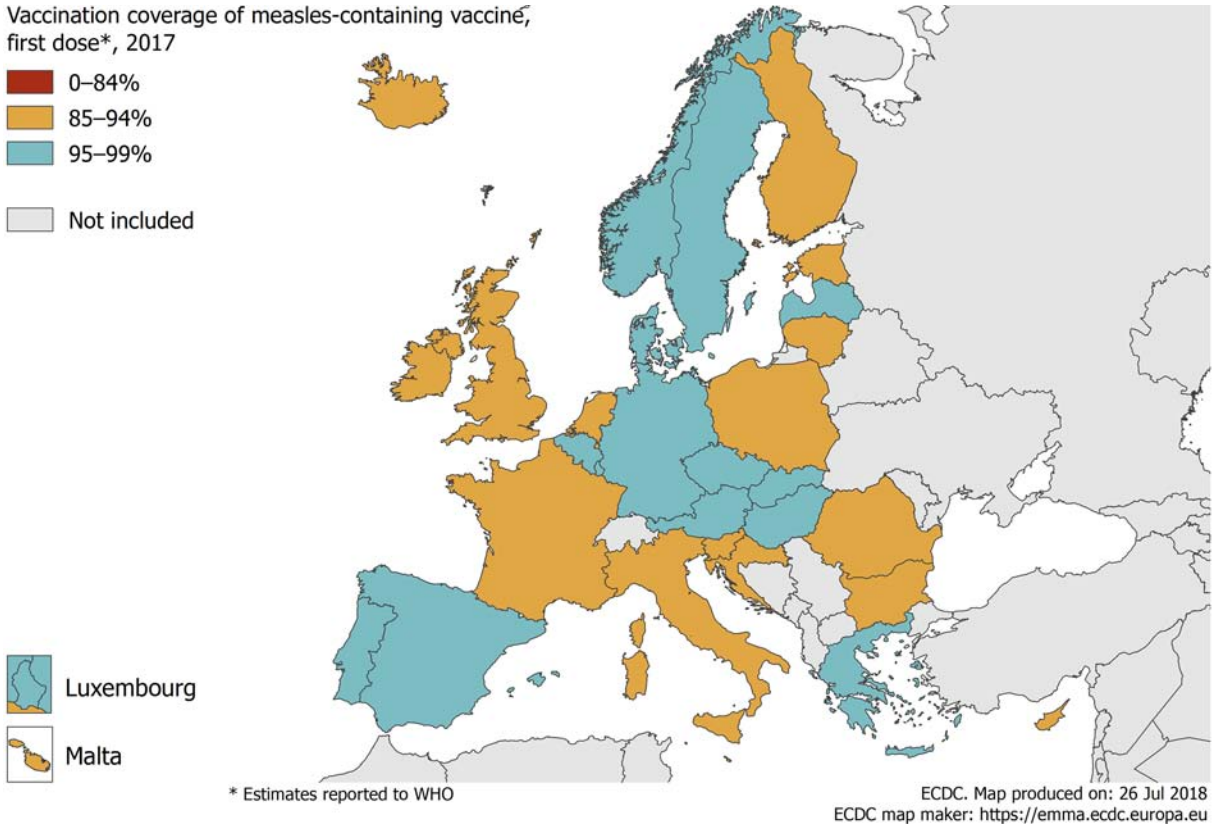


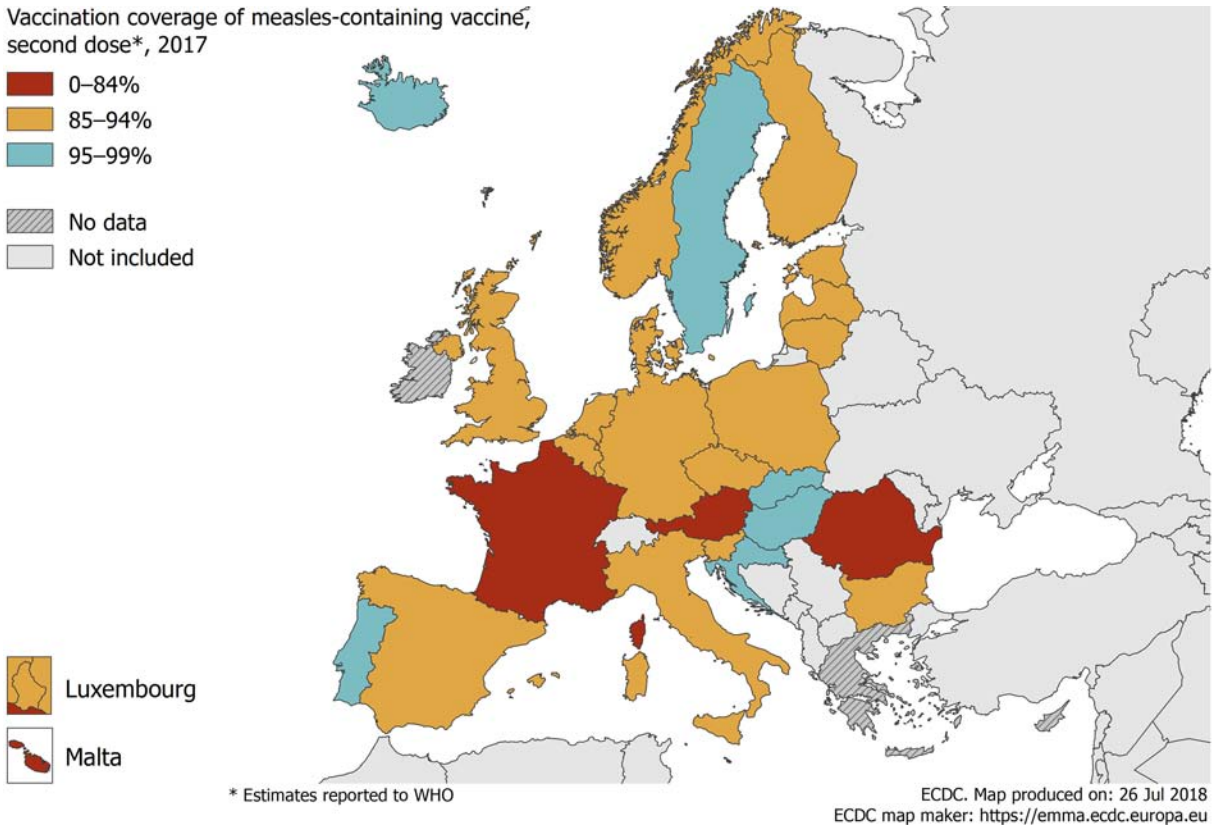
Source: (4)

Note: Immunization coverage defined as % of children reaching their second birthday who have been fully vaccinated against measles (1 dose). Data are reported annually to, and available from, the Communicable Disease unit at WHO/EURO; data for France refer to 2014; data for Germany, Ireland, Italy, Poland, Portugal, Slovenia and the EU average refer to 2015

In 2017, only four EU/EEA countries achieved at least 95% vaccination coverage for both doses of measles-containing vaccine (**Figure 4**).

Figure 4 *Vaccination coverage for the first (upper panel) and second (lower panel) doses of measles-containing vaccine, by country, EU/EEA, 2017*

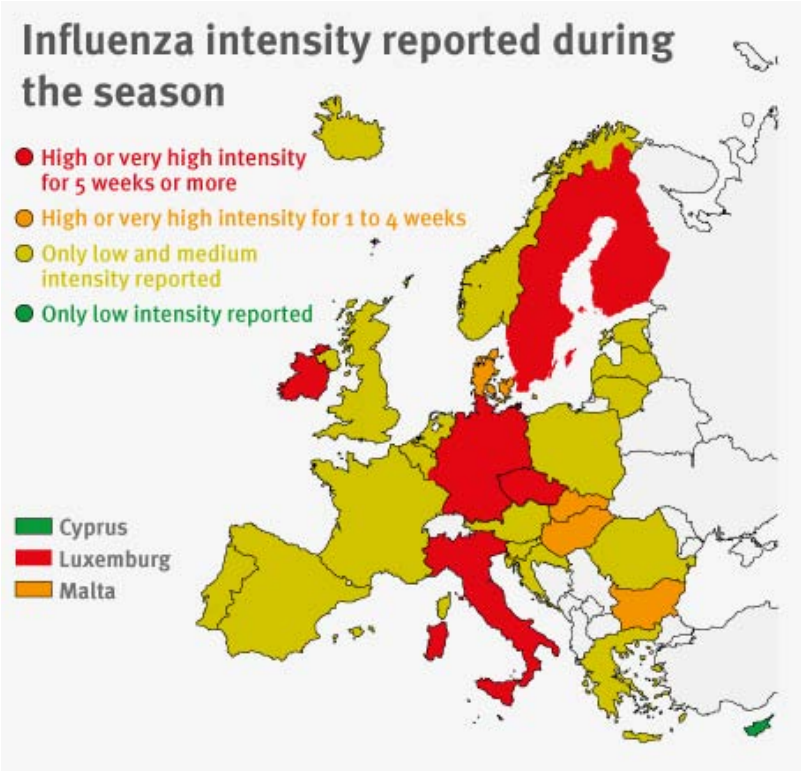




Source: (2)

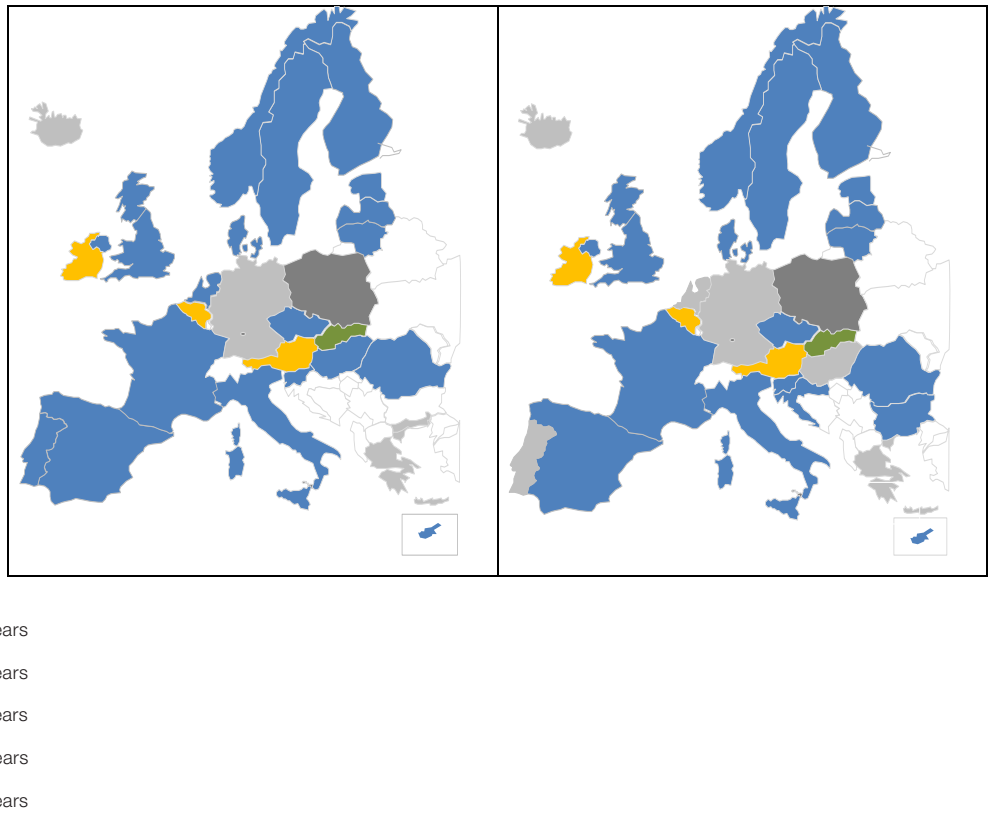
EU Member States also differ in the intensity of seasonal influenza (**Figure 5**), whether they recommend seasonal influenza vaccination (**Figure 6**) and in their vaccination coverage (**Figure 7**).

Figure 5 *Influenza intensity in Europe 2016–2017*



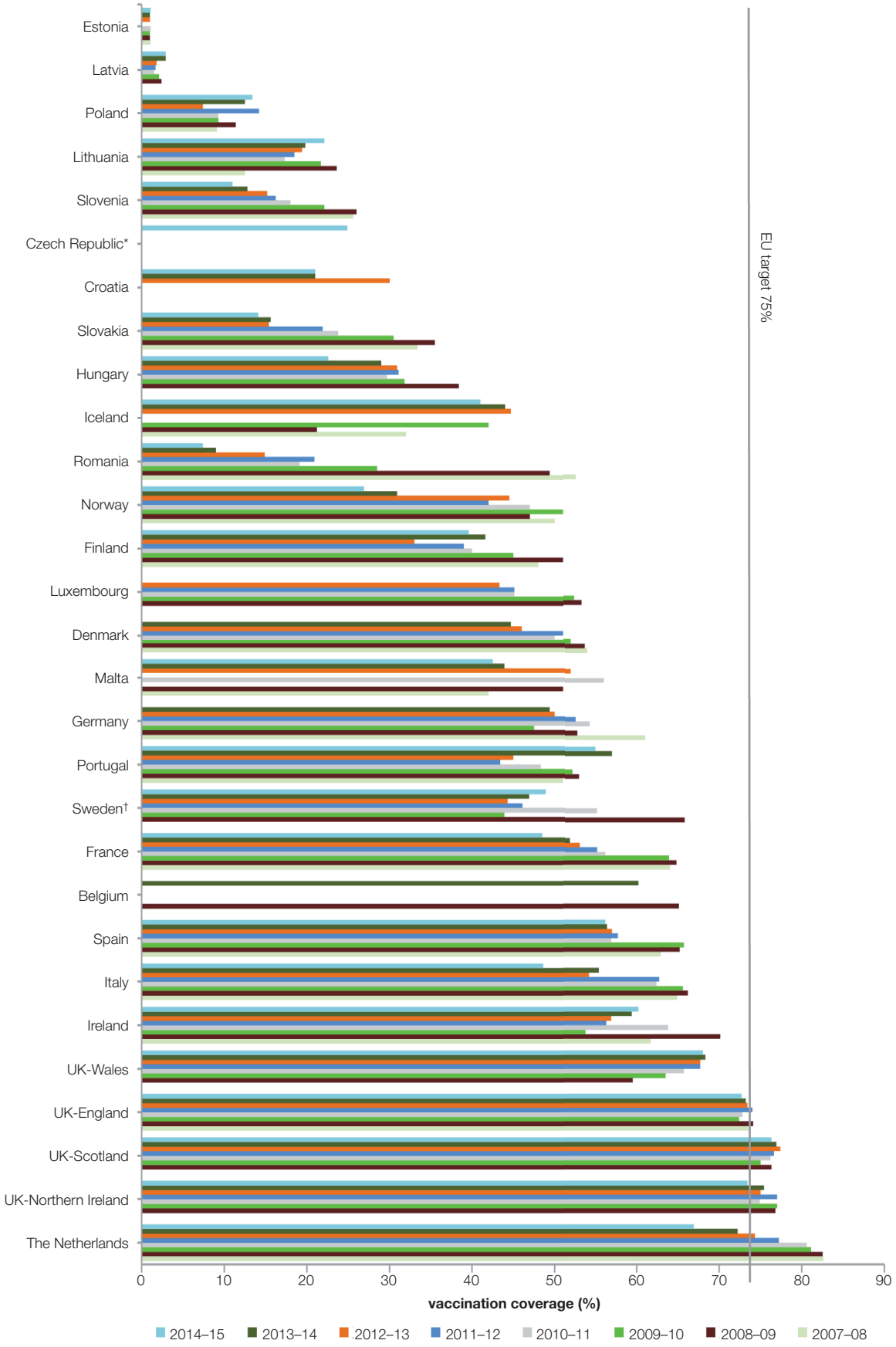
Source: (5)

Figure 6 *EU/EEA Member States recommending seasonal influenza vaccine for older age groups, 2014–15 and 2007–08 influenza seasons*



Source: (6)

Figure 7 *Seasonal influenza vaccination coverage rates in older age groups, 29 EU/EEA Member States, 2007–08 to 2014–15 influenza seasons*



Source: (3)

* Age groups of over 65 years of age and clincal risk groups combined

† Sweden: For the 2009–10 influenza season, reports were received for around 60% of the population

While a large body of work has been undertaken to explore vaccine hesitancy (the refusal or delay in acceptance of vaccines) among the general population and health workers (7, 8) and how to address it (9), the organization, financing and provision of vaccination programmes in Europe have so far received less attention. This study aims to shed light on these health system related aspects of vaccination programmes, in order to identify aspects that could be strengthened to improve effective vaccination coverage.

Previous studies have explored the role of national advisory groups in immunization policy-making processes (10), with an ECDC study on practices of immunization policy-making finding that 26 of 28 participating EU/EEA countries had technical advisory groups in place, although with wide variety in structures (11). Other work was conducted on the organization and quality of HPV vaccination programmes (12), and drivers and barriers of rotavirus vaccination in Europe (13). A study on adult vaccination policies in Europe found major variation in terms of recommendations, funding and coverage (14).

There is also evidence on coverage gaps in vulnerable groups of the population, such as migrants and refugees (15). A Guide to tailoring immunization programmes (TIP) for vulnerable groups was developed by the WHO Regional Office for Europe in 2013. By 2016, the tool had been used in Bulgaria, Lithuania, Sweden and the United Kingdom, aiming to improve vaccination services for Roma, pregnant women, migrants and religious objectors (16).

3 Health system barriers

Jennifer Priaulx, Martin McKee

A conceptual framework

This chapter seeks to identify the factors that relate to the design and operation of health systems that are necessary for the successful operation of a vaccination programme. Our starting point is that the best results are to be expected within a system that includes a set of key components, linked together effectively, with each or, ideally, all, actively managed. We identified the following components of a comprehensive programme:

- **Generating and applying evidence** – decisions on what vaccines to include, target groups and schedules
- **Funding** – payment for vaccines and those administering vaccines
- **Enacting legislation** – legal basis for immunization, including whether it is mandatory, what sanctions exist for non-compliance and exemptions
- **Setting professional roles** – restrictions on who can administer vaccines
- **Supplying materials** – procurement and distribution of vaccines
- **Registering the population** – creation and maintenance of a register of those eligible for immunization
- **Monitoring public attitudes** – who monitors public attitudes, concerns and who responds to them

- **Governing the system** – overall responsibility for achieving uptake, other actors involved and mechanisms to hold them accountable
- **Evaluating progress** – monitoring of uptake including identification of problems, including for disadvantaged groups
- **Monitoring outcomes** – monitoring adverse effects

We are not examining individual motivations or the role of social, cultural, and political factors, such as arguments about individual autonomy versus collective action, as these have been addressed in detail elsewhere. We have confined our review to Europe, reflecting both the salience of concerns about low uptake in some European countries and the challenge of contextualising with confidence research from other settings.

Objectives

To conduct an overview of systematic reviews, supplemented by European reports and reviews, that evaluate health system components, barriers and facilitators to establishing effective childhood immunization and influenza vaccination programmes at health system and health service level. To identify gaps in the evidence and make recommendations for future research.

Methodology

Search and selection

Our priority was to search for systematic reviews of health system factors affecting the implementation of immunization programmes, including barriers and facilitators. However, given the anticipated paucity of evidence for the system as a whole, we incorporated European reports and reviews (including non-Cochrane systematic reviews) to supplement the results of our search. A protocol was registered beforehand on PROSPERO, an international database of prospectively registered systematic reviews in health and social care (*https://www.crd.york.ac.uk/prospero*).

We searched electronic databases, including the Cochrane Database of Systematic Reviews (CDSR), Ovid Medline, Ovid Embase, Web of Science, PsychInfo and Google Scholar), using a pre-defined search strategy. European health organization websites were also searched and any relevant publications retrieved (for example: WHO Regional Office for Europe, ECDC (European Centre for Disease Prevention and Control), VENICE (Vaccine European New Integrated Collaboration Effort) Project, European Council, European Commission, VaccinesEurope.eu). We also searched the London School of Hygiene and Tropical Medicine database of all systematic reviews for vaccines, created for the WHO (www.nitag-resource.org) (reported in Fernandes et al 2018 (24)). Reference lists of included reports and reviews were manually searched to identify any additional reviews from the grey literature. Papers with abstracts published in English, French and German between January 2000 up to and including May 2018 were considered for inclusion in order to provide the most up to date evidence. One reviewer selected the studies to include according to the selection criteria in **Box 1**. Reasons for exclusion included studies not being about Europe, being about a single European country, not being a review or report, not related to immunization/vaccination, population not children or influenza (or about pandemic flu), no programme or policy specified, no health system factors, focus on personal or cultural behaviour, language other than English, French or German, no abstract available or duplicates.

Data extraction and synthesis

One author extracted data from each included review using a data extraction sheet. The original data extraction form summarized key information from each review, including authors, year of publication; objectives; population; information about the interventions assessed; outcome indicators and conclusions, focused on the information needed for the health systems framework. A formal assessment of the quality of the reviews was not conducted given the range of types of review and report to be included and because our goal was primarily to map potential factors. In view of the wide variety of evaluations and interventions likely to be included within the eligible reviews and reports, no subgroup analyses were planned.

A narrative synthesis of collected data was conducted. An overall description of included reviews (e.g. an 'Overview of reviews' table) and synthesis by health system domain related to according to the health systems framework, considering physical resources, human resources, intellectual resources, social resources, health system financing, governance and delivery. We allocated each systematic review to the most relevant sub-system although there is obviously some overlap with other sub-systems within some of the reviews.

Box 1 Inclusion criteria

Types of study
Cochrane systematic reviews and non-Cochrane systematic reviews supplemented by European reports and reviews including non-systematic reviews or reports from the grey literature covering countries in the EU that have a primary focus on childhood immunization or influenza vaccination.

Condition or domain
This review focuses on the health system factors that influence performance of population-level vaccination programmes in the relevant target population.

Participants/ population
Children under school age – standard scheduled vaccinations including TB (BCG), Rotavirus, Diphtheria, Tetanus, Pertussis, Poliomyelitis, Haemophilis influenza type B infection, Hepatitis B, Pneumoccocal disease, Meningoccocal disease, Measles, Mumps, Rubella, Varicella and human papillomavirus (HPV) (although the latter is later we included it to maximize the evidence), older people (influenza only), at risk groups (influenza only) (seasonal not pandemic, bird, swine flu etc).

Intervention(s), exposure(s)
All types of national or regional immunization interventions including organized and non-organized programmes. These may include legislation, policies, guidelines, recommendations, mandatory vaccinations schedules, strategies, governance, surveillance and services. We also considered barriers and interventions to improve the effectiveness and efficiency of immunization programmes.

Comparator(s)/control
If relevant, no immunization intervention or alternative immunization interventions from the above.

Outcome(s)
The primary outcomes of interest relate to provider-level and system-level factors: legislation, policies, guidelines, recommendations, mandatory vaccinations schedules, strategies, governance, surveillance and services. We also considered barriers and interventions to improve the coverage, effectiveness and efficiency of immunization programmes. Contextual factors associated with the coverage, effectiveness and efficiency of immunization programmes: physical resources, human resources, intellectual resources, social resources, health system financing, governance and delivery

Results of the literature search

The results of the search and selection process are presented in Figure 8.

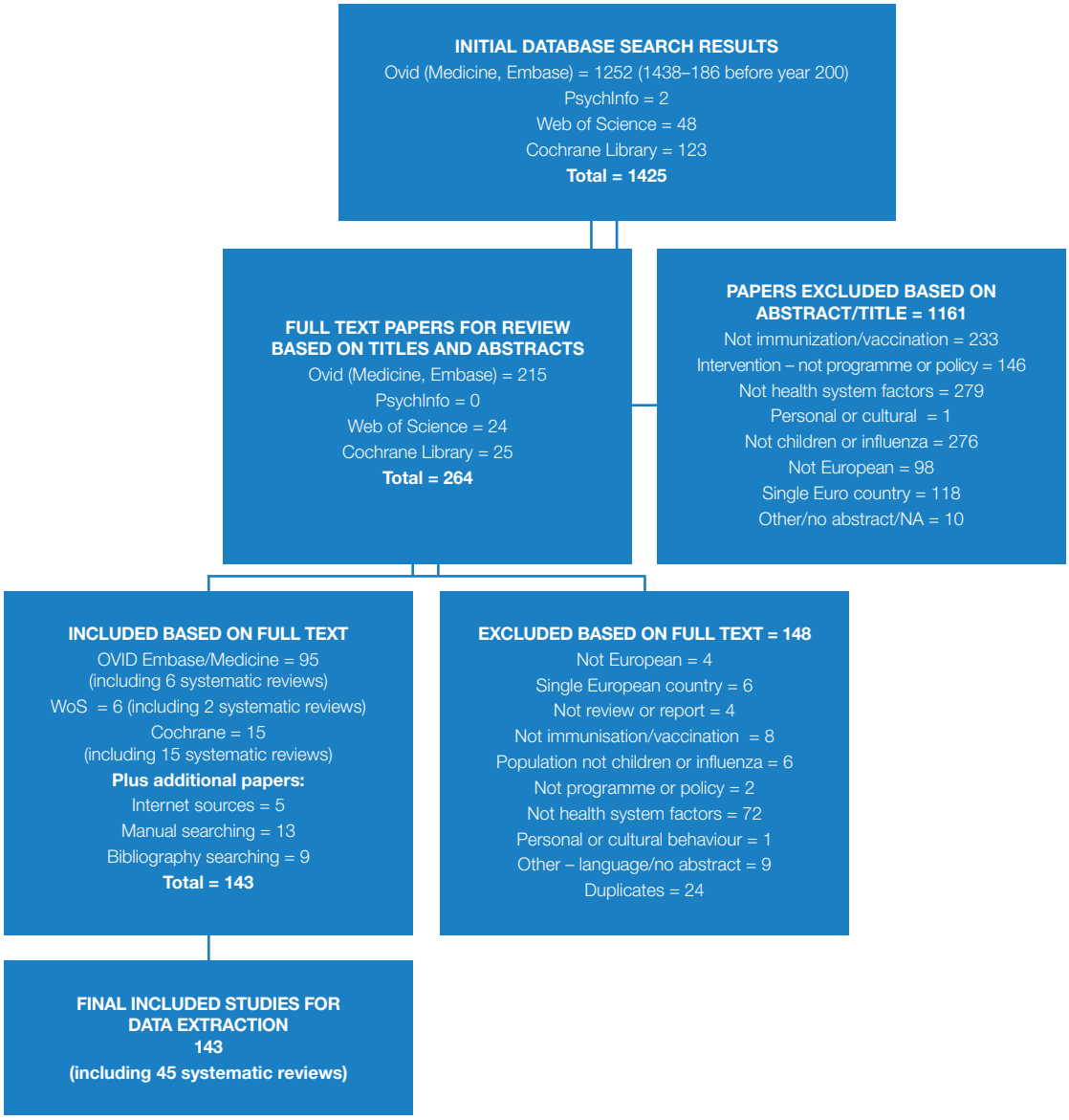
Characteristics of included studies

The review identified 1425 publications of which 264 were included for full text review, based on an initial assessment of titles and abstracts. After full text review, 143 publications were included for data extraction, which included an additional 27 papers from manual searching. 45 were systematic reviews, 6 were non-systematic literature reviews (reviews including a search strategy), 32 were European reports and 51 were reviews (reviews with no reference to a search strategy). Given the more robust nature of systematic reviews, these were prioritized for data extraction.

Summary of evidence from systematic reviews within the health systems framework

Most of the 45 systematic reviews covered various immunization topics (n=19), childhood immunization (n=17), influenza (n=5), HPV (n=3) or measles (n=1). An analysis of the included systematic reviews using the health systems framework showed that most of the available evidence is allocated within the monitoring public attitudes sub-system (n=23). A smaller number of reviews covered other sub-systems including generating the evidence (n=3), professional roles (n=3), registering the population (n=2), governing the system (n=6) and evaluating progress (n=7). There was some overlap between sub-systems for several of the reviews but one review in particular covered multiple sub-systems (24). Fernandes et al. (24) reviewed all systematic reviews relating to vaccination and so could not be categorized. Ryan et al (25) also covered several sub-systems but the focus was on public attitudes, also including the systematic reviews in this review (26–34).

Figure 8 *Flow diagram of search and selection process*



Although the included systematic reviews, in their entirety, fitted the inclusion criteria for this review, many of the individual studies identified by those reviews were not relevant (based on information provided in the systematic review). For the most part, this was because the studies were not European studies, did not address health system factors, or did not relate to children's immunization programmes or adult influenza vaccination.

In 11 systematic reviews, none of the identified individual studies were relevant to the objective of this review (i.e. relating to health system factors, from Europe, relating to childhood or influenza vaccination programmes). In 4 systematic reviews, there was insufficient information to establish the number of relevant studies and in 2 systematic reviews, the number of relevant studies could be identified but not specifically referenced. There were 231 relevant individual studies (where sufficient information was available), of which 32 individual studies were duplicated in 46 cases, leaving 185 unique and relevant individual studies, of which 174 could be fully cited.

Reflecting the focus of systematic reviews on public attitudes, the topics included in these studies primarily relate to understanding determinants of uptake and evaluating interventions to improve uptake. Interventions

ranged from increasing understanding of the factors affecting coverage, interventions to support, promote and inform both parents and health professionals, and more complex system-level, multi-factorial strategies to address level of uptake and inequalities. Other studies from other sub-systems evaluated decision-making processes and recommendations at national level, access to vaccination, financial incentives, information systems and the health system impact of vaccination programmes.

Summary of other evidence from non-systematic reviews and reports

Given the paucity of relevant European evidence on some sub-system factors from systematic reviews, we supplemented it with evidence from 6 non-systematic literature reviews and 32 European reports. The majority of reports are associated with European organizations relating to public health and vaccination (ECDC, WHO Regional Office for Europe, the ADVICE project and the VENICE project). Evidence for all health system factors is more wide-ranging when considering non-systematic reviews and reports (8 compared to 6 sub-systems covered) and these reports go some way to filling the gaps in the evidence from systematic reviews. There was no evidence of this type for the sub-systems relating to setting professional roles or supplying materials.

While covering more sub-systems, the level of evidence for reports and non-systematic reviews was inherently lower, with most references to health system factors being based on expert opinion, either the opinion of the authors themselves or surveys of individual experts on vaccination, rather than observational or interventional studies. Moreover, the limited information about study or article references provided in the non-systematic reviews made it more difficult to assess their particular relevance to this review.

We also considered whether evidence from more general review articles could fill the gaps where evidence from literature reviews and reports was not available. We found that the information provided in reviews was generally the opinion of the author(s), with occasional reference to the literature, and did not add much to the information found in the systematic reviews, non-systematic reviews and reports. Given the general nature of this data and the availability of evidence from systematic reviews and reports we did not extract any data about the characteristics of the articles.

Key health system factors highlighted by the evidence

Generating and applying evidence

The evidence shows the diversity of national-level recommendations for childhood and influenza vaccination within Europe. This may be due to differences in health systems, disease burden, and decision-making processes, but differences can also be seen where all of these are similar. Burchett et al. (35) highlight common categories of criteria that influence decisions about vaccine adoption across countries, albeit to varying degrees. The categories are: the importance of the health problem; vaccine characteristics; immunization programme considerations; acceptability; accessibility, equity and ethics; financial/economic issues; impact; alternative interventions; and the decision-making process. Yet, recommendations can vary by their definition of risk groups (69) or recommended ages of vaccination, if recommended at all (70). A comparison of four similar Scandinavian health systems showed different interpretations of disease burden and approaches to data analysis when establishing vaccination policy (71). For example, burden can be considered in terms of number of cases, level of threat to health, mortality or number of healthcare visits. Inputs and assumptions used in economic evaluations can also vary widely.

There is scope for harmonization between European countries in terms of the process and methods for developing recommendations, including sharing of resources such as systematic reviews (to avoid duplicated effort) and agreeing common definitions. This would have many direct benefits, especially for families moving between countries, as well as indirect ones, such as reducing the scope for those opposed to immunization to portray differences negatively. Common European guidelines can be established (72) and, unlike across European countries where recommendations vary widely, more standardized strategies across US states have been shown to result in better coverage (73). Broader outcomes, such as economic analysis in immunization decision-making, are now widespread in Europe. While these analyses can assist modelling future effects of vaccines, comparing different strategies, identifying critical input parameter, estimating budget impact and cost-effectiveness, appraisals are generally informal and without the use of cost effectiveness thresholds or multiple-criteria decision making (36, 37). Systematic and harmonized development of recommendations within a formal framework may facilitate the successful

implementation and funding of vaccination programmes (74). However, some differences in process and recommendations are likely to remain due to varying national or regional priorities, systems and finance across Europe.

Funding

Funding mechanisms for vaccination vary across Europe and across vaccination types, including out-of-pocket, publicly funded, official health insurance and employer funding, either in full or in part. Recommendations that are not accompanied by the necessary funding may not achieve adequate uptake but different countries in Europe will have different public health priorities (14). The ability to fund vaccination programmes (including capacity, identification of and response to inequalities in uptake, monitoring and investment, as well as unit vaccination costs) can be frustrated by financial crises, although at such times concerted efforts to maintain vaccination coverage are most important (75). Some countries, such as those in Southern Europe with fewer resources available, may also be more sensitive to changes in funding than other high-income countries where parental hesitancy is more of an issue in vaccine refusal than resources available for funding (76).

Enacting legislation

Vaccination programmes can be mandatory, based on recommendations alone, or a mix of both (77). This is essentially a political decision, reflecting views about the relationship between the individual and the state. However, the available evidence does not provide an answer to the question of which is best, perhaps because this will depend on context, while comparisons are hindered by different definitions of 'recommended' and whether mandatory approaches are consistently enforced, such as being accompanied by penalties or other measures to ensure compliance (77).

Professional roles

While the role of professionals is often cited as an issue in monitoring and responding to public attitudes as part of their wider role in primary care (e.g. their attitudes and knowledge of the risks and benefits of vaccination and subsequent recommendation of vaccination during routine visits) (38), they may also play a more specific part in the implementation and administration of programmes. Employing lay workers for the purposes of improving coverage (28) or implementing programmes within the school system are examples of this, although the level of success varies by study (78).

Registering the population

Ideally immunization registers should collect data on vaccines, generate reminders/recall notices, provide official vaccination forms on request, allow coverage assessments, be established from birth, linked to health outcomes (to monitor long term impact and performance), protect data, allow data sharing and be standardized, such as using bar coding on vaccines (79). However, not only do some countries lag behind in terms of establishing such comprehensive information systems, there are also certain under-vaccinated population groups (e.g. Roma, migrants and refugees) that have restricted access to healthcare and these groups also tend to be those who may be excluded from medical and population registers due to high mobility/migration, lack of appropriate information, fear of legal consequences, economic environment and insufficient coordination among public health authorities (39, 40). While improving information systems may increase overall coverage, more tailored approaches may be required to address the particular needs of vulnerable, under-vaccinated groups.

Monitoring public attitudes

There are challenges in terms of vaccination coverage for certain diseases, in certain countries and particularly among certain vulnerable population groups across Europe. This includes both disease outbreaks and general issues with achieving target coverage rates. In terms of health system factors, hard to reach groups can have limited access to healthcare but there are also geographical, cultural and socioeconomic factors influencing uptake (80). While there is considerable evidence on the determinants of vaccination uptake (41, 42, 44), there is still a need to better understand the barriers to achieving target rates, particularly for adults (81) and those from marginalized groups (82) so that health systems can better address the needs of those groups.

There are many studies, and systematic reviews of these studies, investigating interventions to improve uptake, primarily addressing the knowledge, attitudes and

decision-making process of parents or adults eligible for vaccination, be it directly or indirectly through health professionals or by increasing ease of access (25, 29, 45–52, 57). This review did not aim to investigate how particular interventions might change behaviour or address differences due to personal beliefs, culture or socioeconomic factors, as this is covered elsewhere in the literature. However, facilitators focused on changes to the health system can include evidence-informed routine immunization schedules, political commitment (including resources), targeted, second-chance/supplementary immunization strategies, and multi-sectorial communication initiatives (80). Facilitators include raising awareness and better understanding the dynamics of practice (particularly for adults), but this needs to be accompanied by evidence-based up-to-date guidelines, national/international recommendations, surveillance of vaccination rates, opportunities to provide vaccines more readily, leadership at a European level and a firm research and action. Reasons for lack of uptake by adults of influenza vaccination can depend on perceptions and lack of information but recommendation by physicians can assist uptake (83). In particular, flexible vaccine delivery systems are increasingly required due to the movement of populations across borders, the existence of specific under-vaccinated populations and the influence of the anti-vaccination movement (84).

Governing the system

There is a need for political commitment and leadership, both nationally and internationally for implementation to be effective (80). There are multiple barriers to implementation that need to be overcome through a cohesive approach (85–88). Barriers range from inadequate funding (not just for the vaccination product itself but also resources for the implementation of programmes such as lab supplies, staff and training) to perceptions to insufficient monitoring (such as variable and under-reporting of coverage and cases and the quality or reliability of data). Subsequently, potential solutions include a combination of education, communication, funding and improved surveillance.

The types of challenges and solutions may differ by vaccination programme. For example, there are particular challenges in terms of improving uptake of adult vaccination (89). The health system barriers and facilitators to the effectiveness of vaccination programmes may also differ according to the level of centralization and government control (90). The policies and practices underpinning vaccination programmes vary widely across Europe (91, 92). Thus, tailored, goal-driven programmes, addressing the particular needs of the public and professionals, including local champions and experts with influence, and supplementary activities to address identified local barriers are required (93, 94). Other health system facilitators to optimal immunization programmes include surveillance, quality assessment, lab networks (95), indicators of lab performance (96), strengthening programmes (registry, reminder and recall systems, expert advocates) (94) and financial incentives (26, 59, 61, 97).

Evaluating progress

There is variability of coverage data and information systems (98) and coverage can be considered an indicator of success (99). Immunization information systems are key to the success of a programme (63) including monitoring and evaluating programmes (100), and reminder/recall interventions (30, 64, 65). There are multiple ways to evaluate the impact of new vaccines on health systems including experiences from a programme, effectiveness, incidence of disease, herd immunity, hospitalization and economic evaluation (68).

Monitoring outcomes

Systems to monitor vaccine safety, effectiveness and performance are key (101–103). The success depends on the comprehensiveness of the organization of surveillance schemes including population specific denominators (104), appropriate surveillance methodologies (105), serological/molecular surveillance (106) and laboratory capacity (107). Monitoring migrants is a challenge for some surveillance systems (108).

Overview of main findings

We identified 45 systematic reviews relating to health system factors and childhood or influenza vaccination programmes in Europe. While wide-ranging, they did not cover the entire health system and the focus of the evidence was on public attitudes, either understanding vaccine hesitancy, inequalities or interventions aimed at increasing coverage. This focus of evidence on uptake is even more dominant considering that we excluded 14 articles which focused solely on personal or other reasons. Most of the overlap of the included systematic reviews occurred within this sub-system. Funding, enacting legislation, supply of materials and monitoring outcomes were not covered by any of the included

systematic reviews. Regarding the evidence included in these systematic reviews, only a minority of individual studies related to childhood or influenza vaccination programmes in Europe, with much of the cited evidence generated in the United States. Reports from European organizations (WHO Regional Office for Europe, ECDC, VENICE etc.) have gone some way to filling the gap, but these reports tend to be based on surveys or the collated opinions of experts rather than reviews of interventional or observational studies.

Conclusion

While there is much evidence about the health system factors influencing the success of childhood and influenza vaccination programmes in Europe, there are still gaps that require further research. Much of the existing research is focused on the United States and addressing public attitudes. While this is important, public and professional attitudes are one part of a complex health system that must be investigated as a whole, given the interaction of so many of the influencing factors. Further systematic evidence on the specific roles of health professionals, supply and systems for monitoring outcomes of vaccination programmes in Europe is required.

4 Comparative analysis of country fiches

Bernd Rechel

The comparative analysis is based on the information provided in the country fiches, where more detailed information can be found, including references and details for studies and data cited in the country fiches (see the Appendix).

The comparative analysis aims to set out:

- differences and commonalities in the governance approach, the financing of vaccination services and provider organizations involved;
- differences and commonalities in success factors and barriers to effective vaccination coverage.

Governance

In all EU Member States, there is a dedicated agency in charge of developing and overseeing implementation of national vaccination plans and programmes. This is usually the Ministry of Health or a subordinated agency, often supported by technical advisory groups or committees.

In all EU Member States, vaccination programmes are organized at the national level, whereas the regional level tends to be charged with overseeing implementation of vaccinations and monitoring vaccination coverage. Consequently, vaccination programmes or plans tend to apply to the whole country. In Italy, for example, a National Immunization Plan 2017–2019 was issued in

January 2017. Until then, Italy's vaccination schedules had been a patchwork of 21 different regional vaccination schedules; the new plan helped to harmonize these diverse programmes. The plan sets targets for vaccine coverage, but also sets out actions to reduce disparities between Italian regions.

However, there are some countries where the regional level has latitude to modify national vaccination programmes and recommendations to local needs. This includes Denmark, Germany, Spain and Sweden. Yet, this potential for regional modifications typically concerns additional vaccinations that go beyond the set of vaccinations recommended for the whole country.

In 9 EU Member States (Bulgaria, Croatia, Czech Republic, France, Hungary, Italy, Poland, Slovakia and Slovenia), vaccinations against measles are mandatory for children, while in the remaining 19 countries they are voluntary, but recommended by the relevant authorities. Italy only added measles to the list of mandatory vaccinations for children in July 2017, while Romania is currently discussing whether vaccination should become mandatory.

However, the distinction between voluntary and mandatory immunization is not always clear-cut. In Greece, children require proof of immunization against measles when enrolling in kindergarten or primary school, so that the formally voluntary immunization is de facto mandatory. Similarly, in Germany, vaccinations are voluntary, but children will only be admitted to day-care facilities or school if they have received the standard vaccinations. If the children are not vaccinated, the parents must prove that they have taken medical advice on vaccination. In case of a measles outbreak in a day-care facility or school, the institution is allowed to exclude unvaccinated children from attendance. In Cyprus too vaccinations are voluntary, but a vaccination certificate is needed for enrolment in schools. An attempt to establish similar procedures in Lithuania failed in 2016.

In contrast, vaccinations for adults against influenza are voluntary in almost all EU Member States. The sole exception is Slovakia, where vaccination against influenza is mandatory for any person living in social care facilities, as well as for any person at increased risk of infection due to living or working in an area with the presence of avian influenza. In the remaining countries, adult vaccinations against influenza are recommended for specified groups of the population, such as people aged 65 years and older, pregnant women, people with chronic conditions or people with serious immunodeficiencies.

The countries have embraced a mix of incentives and sanctions to improve vaccination coverage. These include awareness campaigns, financial rewards for parents or health care providers, and financial sanctions or refusal of school or kindergarten entry for those who refuse (mandatory or even voluntary) vaccinations.

Specific targeted measures for vulnerable groups of the population are adopted in a number of countries (including Croatia, Finland, Germany, Greece, Ireland, Luxembourg, Malta, the Netherlands, Portugal, Romania, the United Kingdom). In particular, these include actions for refuges and asylum-seekers, often as part of medical screening upon entry to the country. Other countries also offer targeted measures for ethnic minority groups, such as the Roma and Travellers. Examples include Croatia, Ireland, Romania, and the United Kingdom.

Only 12 EU Member States reported using a population register as the basis for their vaccination programmes: Croatia, Czech Republic, Denmark, Hungary, Ireland (for measles), Italy (in 90% of regions or local health services, with a national system being set up), Lithuania, Malta, the Netherlands (for measles), Portugal, Slovakia, Slovenia.

In some of the other countries (e.g. Bulgaria, Estonia, the Netherlands in the case of influenza, Poland, Spain), the registries of health care providers (usually GPs) or health insurance funds are used to monitor vaccination uptake and invite patients for vaccinations. In Estonia, there is concern over the population registry including many who have moved abroad and a decision was made to use GP registries instead.

The methods used to estimate vaccination coverage rates also differ between countries. There are differences for both the numerator (the number of people being vaccinated) and the denominator (the number of people who should be vaccinated). Only some countries use population registries as the denominator for calculating rates. Others use the records of health care providers (patient lists) and lists of people covered by health insurance funds. Calculation of the numerator is based on a variety of sources, including data on reimbursements for providers, sales data and reports by health care providers. Some countries also use surveys to establish vaccination rates.

Sometimes, methods differ even within countries. In Italy, calculation of the denominator differs across regions, with some using statistical population data, whereas others use the number of resident people in their

territory, and still others the number of people registered in the local health system register. In Spain, sources to determine the denominator (i.e. the populations of the corresponding sex and age groups) differ across the different Autonomous Communities and include official statistical bodies, population health registers and registers of the vaccination services. In Sweden too different methods are used to estimate the vaccination coverage rate at county council level, including data from regional vaccination registries (for about a third of the counties), financial systems, surveys of older people (65+), patient record systems, and doses distributed.

Provision

Measles vaccinations for children are provided in most EU Member States through primary care physicians or nurses. Depending on the organization of primary care in the country, this can include paediatricians, general practitioners (GPs), school physicians, and nurses in various settings, such as GP practices or school health services. Given that measles vaccinations for children are provided at different ages, with the first shot typically given at 12 months and a second shot often several years later (the timing of the second shot differs widely between countries), different types of providers and professionals can be involved. School health services play an important role for the second shot in a number of countries, whereas pharmacies and pharmacists do not tend to play a major role.

For adult vaccinations against influenza, the principal health care providers are physicians and nurses in primary health care, although with differences between countries as to whether this task is performed by physicians, nurses or both. In some countries, vaccinations are also offered by public health institutions. Occupational health services play an important role in several countries for those who receive influenza vaccinations to protect them against occupational health risks, such as health workers. Only six countries (Ireland, Latvia, Malta, Portugal, Sweden, and the United Kingdom) report the availability of influenza vaccinations in (some) pharmacies, although these are now also being introduced on a pilot basis in Estonia and France.

Financing

In all EU Member States, childhood vaccinations against measles are free of charge at the point of delivery. The only exception is the private sector in Cyprus, where patients pay the cost of the vaccine and of the vaccination when being vaccinated, unless they have private health insurance. It has been estimated that 42% of children in Cyprus are vaccinated in the public sector and 58% in the private sector, although with a higher share in the public sector in recent years. Systems in place for financing vaccinations against measles differ across countries, in line with the predominant systems for health financing and paying health care providers.

For adult vaccinations against influenza, most (21) EU Member States provide vaccinations free of charge at the point of delivery for those groups of the population targeted by the respective national vaccination programme, e.g. people aged 65 years and above. In only seven countries (Austria, Belgium, Bulgaria, Estonia, Latvia, Poland and Slovenia) targeted patients need to pay at least part of the costs for adult vaccinations against influenza (**Table 2**).

Table 2 *Is adult vaccination against influenza free of charge at the point of delivery for targeted groups of the population?*

Country	Yes	No
Austria		X
Belgium		X
Bulgaria		X
Croatia	X	
Cyprus	X	
Czech Republic	X	
Denmark	X	
Estonia		X
Finland	X	
France	X	
Germany	X	
Greece	X	
Hungary	X	
Ireland	X	
Italy	X	
Latvia		X
Lithuania	X	
Luxembourg	X	
Malta	X	
Netherlands	X	
Poland		X
Portugal	X	
Romania	X	
Slovakia	X	
Slovenia		X
Spain	X	
Sweden (a)	X	
United Kingdom	X	

Note: (a) patient co-payment required in 4 of 21 regions

Table 3 *Overview of key barriers to effective vaccination coverage of childhood vaccinations against measles*

Country	Vaccine hesitancy	Voluntary character of vaccinations	Lack of awareness	Failure to reach vulnerable groups	Lack of vaccination register
Austria	X	X	X		
Belgium	X			X	
Bulgaria	X			X	
Croatia	X		X		
Cyprus					
Czech Republic	X		X		
Denmark					
Estonia	X				
Finland	X				
France	X		X		
Germany	X				
Greece	X	X			X
Hungary	X			X	
Ireland	X				X
Italy	X				
Latvia			X		
Lithuania					X
Luxembourg					
Malta	X				
Netherlands					
Poland	X				
Portugal					
Romania	X		X	X	
Slovakia	X			X	
Slovenia	X				
Spain	X			X	
Sweden					
United Kingdom	X			X	
Total	20	2	6	7	3

Key barriers and facilitators

Barriers to effective vaccination coverage against measles

The country fiches identified a number of barriers to an effective vaccination coverage against measles, with only five countries (Cyprus, Denmark, Luxembourg, Portugal and Sweden) not reporting any major barriers. The factor mentioned in most fiches (20 countries) was vaccine hesitancy. Seven countries noted a failure to reach vulnerable groups of the population. Six of the reports mentioned a lack of awareness in the population as one of the barriers to effective vaccination coverage. Five countries reported insufficient training or vaccine hesitancy among health professionals. Factors related to the organization, provision and financing of vaccination services were only reported by very few countries, with two (Latvia and Romania) reporting short-term shortages of vaccines, two (Hungary and Lithuania) reporting a shortage of resources, and three (Greece, Ireland and Lithuania) reporting the lack of a vaccination register as barriers. Two countries also reported the voluntary character of vaccinations as a barrier to vaccination coverage (**Table 3**).

Lack of resources	Lack of training for health workers	Vaccine shortages	Migration	Unclear	No major barriers
					X
					X
X					
			X		
		X			
X	X				
					X
				X	
					X
	X	X	X		
	X		X		
	X				
	X				
					X
			X		
2	5	2	4	1	5

Facilitators of effective vaccination coverage against measles

Of the 28 EU Member States, 25 identified key facilitators for effective vaccination coverage against measles. The factor mentioned by most (14 countries) was the inclusion of measles vaccination in the health services that are publicly funded. This was followed by awareness-raising campaigns (mentioned in 8 country fiches) and a good health service delivery network (7 country reports). Six mentioned public attitudes that were conducive to measles vaccinations, the role of health professionals and the existence of a monitoring system overseeing vaccinations, and five each mentioned the mandatory character of measles vaccinations and the existence of special incentive schemes (**Table 4**).

Barriers to effective vaccination coverage against influenza

22 of the 28 EU Member States identified barriers to effective vaccination coverage of adults against influenza. The most commonly mentioned barrier (described in 15 of the country fiches) was lack of awareness among

Table 4 *Overview of key facilitators of effective vaccination coverage of adult vaccinations against measles*

Country	Inclusion in vaccination plan	Health professionals	Mandatory character of vaccinations	Covered by public funds	Awareness-raising campaigns
Austria	X	X			
Belgium		X		X	
Bulgaria			X	X	
Croatia					X
Cyprus	X			X	X
Czech Republic			X		
Denmark				X	
Estonia	X		X	X	
Finland					
France				X	X
Germany					
Greece				X	
Hungary					
Ireland		X		X	
Italy	X	X			X
Latvia					
Lithuania		X			X
Luxembourg				X	
Malta				X	
Netherlands					
Poland			X	X	
Portugal				X	X
Romania					
Slovakia		X			X
Slovenia			X	X	
Spain				X	X
Sweden					
United Kingdom					
Total	4	6	5	14	8

the general population, with people being unaware of the potentially serious consequences of the disease. The related issue of vaccine hesitancy was pointed out by 11 of the countries, linking low vaccination coverage to anti-vaccination movements. Out-of-pocket payments as a barrier to higher coverage rates were also pointed out by 9 countries. Lack of training for health workers was noted in 7 of the countries, with the related issue of low vaccination coverage among health workers or difficulties in accessing vaccination services for them mentioned by 6 countries (**Table 5**).

Monitoring system	Incentive schemes	Public attitudes	Recall system	Health care delivery network	Tailored interventions
X				X	X
X	X			X	
				X	
	X				
X		X			
			X		
		X			
X	X				
	X				
X	X				
		X		X	
		X			
		X			
				X	
		X		X	
X				X	X
6	5	6	1	7	2

Facilitators of effective vaccination coverage against influenza

Only 14 EU Member States identified facilitators of effective vaccination coverage against influenza. These include media campaigns to raise awareness in the general population and among health workers, the involvement of employers and professional societies, outreach services, financial incentives for providers of immunizations, and the provision of influenza vaccinations in pharmacies.

Table 5 *Overview of key barriers to effective vaccination coverage of adult vaccinations against influenza*

Country	Vaccine hesitancy	Voluntary character of vaccinations	Lack of awareness	Failure to reach vulnerable groups	Not part of national vaccination schedule
Austria	X		X		
Belgium			X		
Bulgaria			X	X	
Croatia					
Cyprus	X		X		
Czech Republic		X			
Denmark			X		
Estonia					X
Finland	X		X		
France	X		X		
Germany	X				
Greece					
Hungary					
Ireland	X				
Italy	X		X		
Latvia	X		X		
Lithuania					
Luxembourg				X	
Malta					
Netherlands	X		X		
Poland	X				
Portugal					
Romania			X		
Slovakia					
Slovenia			X		
Spain			X		
Sweden			X	X	
United Kingdom	X		X	X	
Total	11	1	15	4	1

Out-of-pocket payments	Lack of training for health workers	Complicated system	Migration	Difficulties in access for or low coverage among health workers	Procurement; supply shortages	Low vaccine effectiveness
X	X					
	X			X		X
X						
X						
X						
X		X				
	X					
			X			
X				X		
				X		
		X		X		
X		X				
					X	
X	X				X	
X	X					
	X			X		
					X	X
	X	X		X		
9	7	4	1	6	3	2

5 Discussion

Bernd Rechel, Jennifer Priaulx, Martin McKee

This report brings together key information from the umbrella review and country fiches (see Appendix) on the governance, organization, provision and financing of vaccination programmes in EU Member States, including perceived barriers and facilitators. The aim was to identify factors that could be considered in efforts to strengthen vaccination systems and increase vaccination coverage.

Limitations

Before delving into the findings of the report, it is important to highlight some of its limitations. The umbrella review was limited to what had been researched and included in previous systematic reviews. As noted, a considerable part of the evidence, particularly in terms of systematic reviews, focuses on vaccine hesitancy and reasons for under-vaccination, such as health literacy, lack of trust and socioeconomic or ethnic inequalities (21–23, 109–112). In turn, there is also considerable evidence on interventions to address non-compliance and inequalities (51, 113, 114), including other reviews of reviews (115).

In the comparative analysis of country fiches, questions in the template used for data collection were open-ended, which means that the issues identified by the country respondents should not be regarded as exclusive. This applies in particular to the barriers to and facilitators of effective vaccination coverage against measles and influenza, where many factors may have been identified in earlier parts of the country fiches and not repeated in the final section on barriers and facilitators, or without distinguishing clearly between those that apply to measles and those that apply to influenza.

The literature on health system related barriers

The literature review aimed to fill a gap in previous reviews, focusing on the importance of health system factors in implementing effective vaccination programmes. Although we had identified other umbrella reviews of systematic reviews in the field of vaccination, these reviews had different objectives to our review that focused on health system factors. Ryan et al. (25), aimed to synthesize evidence of consumers' use of medicines, including interventions targeting consumers and promoting evidence-based prescribing and use. Fernandes et al. (24) aimed to collate a bibliographical resource of all vaccination-related systematic reviews.

The health system approach to understanding the effectiveness of immunization programmes has been used elsewhere but the focus seems to have been mainly on middle- or low-income countries. For example, Burchett et al. evaluated case studies of the impact of introducing new vaccines into the health system in low- and middle-income countries (116). GAVI, the international Vaccine Alliance (www.gavi.org), proposes support for health system and immunization strengthening, including immunization supply chain, data, leadership/management/coordination, and demand promotion. There are multiple examples of health system strengthening efforts in low and middle income countries (117, 118) and it is by no means a new topic (119).

Where health systems have been discussed in relation to immunization in Europe, much of the published literature is not based on systematic methods, but rather in the form of expert opinions or non-systematic reviews of the literature, which are less robust approaches to evidence review. Our review identified 98 non-systematic reviews and reports covering health system factors. For example, McGuire et al. (120, 121) provide a comprehensive list of health system and vaccine policy making features which includes many of the factors that we identified. However, our systematic approach adds weight to the conclusions of their more iterative approach to evidence review.

Comparative analysis of country fiches

Governance

All EU Member States have a dedicated agency in charge of developing and overseeing implementation of national vaccination plans and programmes. Vaccination programmes are organized at the national level, whereas the regional level tends to be charged with overseeing implementation of vaccinations and monitoring vaccination coverage.

Where there are major differences between countries is in whether childhood vaccinations against measles are mandatory or not. In 9 countries (Bulgaria, Croatia, Czech Republic, France, Hungary, Italy, Poland, Slovakia and Slovenia), vaccinations against measles are mandatory for children, while in the remaining 19 countries they are voluntary, but recommended by the relevant authorities. However, the distinction between voluntary and mandatory immunization is not always clear-cut. In several countries (Bulgaria, Cyprus, Czech Republic, Germany, Greece and Spain) vaccinations are voluntary, but vaccination certificates are required for enrolment of children in schools or kindergartens. In contrast, vaccinations for adults against influenza are voluntary in almost all EU Member States. The sole exception is Slovakia, where vaccination against influenza is mandatory for any person living in social care facilities, as well as for any person having an increased risk to be infected due to living or working in an area with the presence of avian influenza. It is noteworthy that almost all of the countries that have opted for mandatory vaccinations (except Italy) are in Central and Eastern Europe. This points to the wider societal and cultural context that may be more or less accepting of the introduction of mandatory vaccinations. Even in countries with mandatory vaccinations, those who refuse vaccinations may prefer to pay fines rather than getting vaccinated. Yet, it is one of the policy options available.

Other options are additional incentives and sanctions; illustrations for many are given in the country fiches. They include awareness campaigns, financial rewards for parents or health care providers, and financial sanctions or refusal of school or kindergarten entry for those who refuse (mandatory or even voluntary) vaccinations.

Specific targeted measures for vulnerable groups of the population are adopted in several countries (including Croatia, Finland, Germany, Greece, Ireland, Luxembourg, Malta, the Netherlands, Portugal, Romania, the United Kingdom). These include in particular actions for refugees and asylum-seekers, often as part of the medical screening upon entry to the country. Other countries, such as Croatia, Ireland, Romania and the UK, also offer targeted measures for ethnic minorities, such as the Roma and Travellers. It would be important to know how successful these measures are and what more would need to be done to close gaps in vaccination coverage.

The organization of vaccination programmes is another area where improvements seem possible. Only 12 countries reported using a population register as the basis for their vaccination programmes. In some of the other countries (e.g. Bulgaria, Estonia, the Netherlands in the case of influenza, Poland, Spain), the registries of health care providers (usually GPs) or health insurance funds are used to monitor vaccination uptake and invite patients for vaccinations, but these may not always be complete.

The methods used to estimate vaccination coverage rates also differ between countries, with much scope for improvements. There are differences for both the numerator (the number of people being vaccinated) and the denominator (the number of people who should be vaccinated). Only some countries use population registries as the denominator for calculating rates. Others use records of health care providers (patient lists) and lists of people covered by health insurance funds. Calculation of the numerator is based on varied sources, including data on reimbursements for providers, sales data and reports by health care providers. Some countries also use surveys to establish vaccination rates.

Provision

Measles vaccinations for children are provided in most EU Member States through primary care physicians or nurses. Depending on the organization of primary care in the country, this can include paediatricians, general practitioners (GPs), school physicians, and nurses in various settings, such as GP practices or school health services. Given that measles vaccinations for children are provided at different ages, with the first shot typically given at 12 months and a second shot often several years later (the timing of the second shot differs widely between countries), different types of providers and professionals can be involved. School health services play an important role for the second shot in several countries, whereas pharmacies and pharmacists do not tend to play a role.

For adult vaccinations against influenza, the principal health care providers are physicians and nurses in primary health care, although with differences between countries as to whether this task is performed by physicians, nurses or both. In some countries, vaccinations are also offered by public health institutions. Occupational health services play an important role in a number of countries for those who receive influenza vaccinations to protect them against occupational health risks, such as health workers. Only six countries (Ireland, Latvia, Malta, Portugal, Sweden, and the United Kingdom) report the availability of influenza vaccinations in pharmacies, although these are now also being introduced on a pilot basis in Estonia and France.

While little can be changed about the organization and delivery of primary health care services in the countries covered with the sole purpose of improving vaccination services, there might be scope for involvement of a wider range of actors in some countries. Depending on the country and its organizational and regulatory context, this can include school health services for vaccinations against measles and pharmacies for adult vaccinations against influenza.

Financing

In all EU Member States, childhood vaccinations against measles are free of charge at the point of delivery. The only exception is the private sector in Cyprus, where patients have to pay the cost of the vaccine and of the vaccination, if they do not have private health insurance. It has been estimated that 42% of children in Cyprus are vaccinated in the public sector and 58% in the private sector, although more recent estimates indicate a shift towards the public sector in the wake of the financial crisis.

For adult vaccinations against influenza, most (21) EU Member States provide vaccinations free of charge at the point of delivery for those groups of the population targeted by the respective national vaccination programme, e.g. people aged 65 years and above. In only seven countries (Austria, Belgium, Bulgaria, Estonia, Latvia, Poland and Slovenia) targeted patients need to pay at least part of the costs for adult vaccinations against influenza. Improving public coverage of vaccinations against influenza and removing administrative barriers for getting reimbursed seem to be potential avenues for improving vaccination coverage.

Key barriers and facilitators

The country reports suggest that there are currently few factors related to the organization, provision and financing of vaccination services that are in the way of improved vaccination coverage. Two countries (Latvia and Romania) reporting short-term shortages of vaccines, two (Hungary and Lithuania) reported a shortage of resources, and three (Greece, Ireland and Lithuania) the lack of a vaccination register as barriers. The overwhelming majority of countries (20 countries) point to vaccine

hesitancy as of the main barriers for improved vaccination coverage against measles. Five countries also reported insufficient training or vaccine hesitancy among health professionals. It is clear that major efforts are required in many countries to address these concerns or lack of knowledge.

The key facilitator mentioned by most (14 countries) for effective vaccination coverage against measles was the inclusion of measles vaccination in the health services that are publicly funded. This was followed by awareness-raising campaigns (mentioned in 8 country fiches) and a good health service delivery network (7 country fiches).

For influenza, 15 countries pointed out that there is a lack of awareness among the general population, with people being unaware of the potentially serious consequences of the disease. The related issue of vaccine hesitancy was pointed out by 11 of the countries, linking low vaccination coverage to anti-vaccination movements. The existence of out-of-pocket payments as a barrier to higher coverage rates was pointed out by 9 countries.

Only 14 EU Member States identified facilitators for effective vaccination coverage against influenza. These include media campaigns to raise awareness in the general population and among health workers, the involvement of employers and professional societies, outreach services, financial incentives for providers of immunizations, and the provision of influenza vaccinations in community pharmacies.

6
Conclusion

Bernd Rechel, Martin McKee

This report and the underlying country fiches provide a detailed overview of the measures taken by EU Member States to address vaccine-preventable diseases. They reveal a situation that is far from satisfactory. While some countries have achieved high levels of coverage with measles vaccine, others lag far behind, exposing their populations to avoidable disease and, in some cases, premature death. The situation is even worse for influenza vaccine coverage. This is an area where the scope for learning from the experience of others is obvious.

The material presented here should be read in conjunction with a new report published by the European Commission's Expert Panel on Investing in Health, which has looked in detail at vaccine hesitancy in the EU (122), and which drew on some of the material assembled for this report. It complements the findings presented here but looks in more detail at the main factors (enablers and obstacles) influencing vaccination uptake, assessing measures that can be considered as means to improve vaccination coverage.

Like this report, it highlights the importance of developing a systems approach to national vaccination programmes. Thus, it is important that the administration of vaccines to individuals should not be viewed in isolation but rather should be looked at within a wider perspective that includes legislative frameworks, governance arrangements, accuracy and completeness of registers of target populations, funding mechanisms, and monitoring systems. This makes it easier to identify the diverse range of obstacles and enablers of high rates of vaccination coverage. While this report has provided much detail

on the organization of vaccination programmes, there is considerable scope for more detailed evaluations of how these programmes work in practice. Thus, as the country fiches show, the scale and nature of monitoring the effectiveness of vaccination programmes varies greatly and information on how uptake varies among different groups in the population, and the reasons why, is often fragmentary.

Both reports highlight the importance of vaccine hesitancy. The Expert Panel report looks at this in considerable detail, seeking to understand individuals' and parents' concerns or fears about vaccine safety and side effects, which are often based on lack of trust and exposure to myths that undermine confidence in vaccines. Yet, it reveals how healthcare providers do not always counter these myths with evidence-informed advice. Moreover, when they do, their messages may backfire. Thus, it is important to draw on the now extensive evidence from psychological research on how best to frame messages, recognising that this will be different for those who are merely uninformed, in that they lack information, and for those who are misinformed, believing information that is false to be correct. It is also necessary to address disinformation, when people are subject to information spread with the intention to deceive.

Both reports note the continued existence of barriers to access, which can be financial or organizational. The continued existence of co-payments for influenza vaccine in some countries is an obvious barrier but, even though measles vaccination is free everywhere, there may be costs involved in accessing facilities. The insistence, in some countries, that only physicians can administer vaccines is a further barrier. There is no evidence to support such a restrictive policy and, in many countries, they are given entirely safely by nurses and pharmacists. However, all those involved in vaccination programmes should be supported with specific training to address concerns from hesitant individuals.

The fiches note how vaccination is mandatory in some countries but not in others. On the evidence available it is not possible to make a universal recommendation and much will depend on context as well as political preferences. If it is mandatory, there is a need for a well-designed communication strategy, addressing in particular the scope for such a decision to be exploited for political purposes unrelated to vaccination. Where mandatory vaccination is not considered acceptable, an alternative can be to require individuals to opt out but only subject to certain conditions, such as following a mandatory consultation with a healthcare worker who explore the risks involved.

The continued toll of vaccine preventable disease in the EU is unacceptable. Those countries that have achieved high levels of coverage show what can be done. While the precise arrangements must be adapted to the precise circumstances prevailing in each country, this report, and the accompanying one by the Expert Panel, offer a basis to engage in discussion of how this continuing threat to the health of Europe's citizens can be addressed.

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Appendix

Country fiches

Austria

Katharina Habimana

Governance

In Austria the Federal Ministry of Labour, Social Affairs, Health and Consumer Protection (*Bundesministerium für Arbeit, Soziales, Gesundheit und Konsumentenschutz*, BMASGK) is responsible for procurement of vaccines in the national vaccination programme. In close collaboration with the National Vaccination Board (*Nationales Impfgremium*)[1] and based on its scientific advice, the Federal Ministry of Labour, Social Affairs, Health and Consumer Protection annually issues national recommendations for vaccinations (BMASGK, 2018a), which include information on available and recommended vaccinations and are designed mainly for doctors, pharmacists and health professionals. The Austrian recommendations are developed and published at the national level. At the regional level, counselling and vaccination centres[2] are in place, which carry out vaccinations, provide information on vaccinations and also advise other providers. Vaccinations in Austria are voluntary, and population registries do not serve as a basis for vaccination programmes. However, selected infectious diseases such as measles have to be reported to a national registry (*Epidemiologisches Meldesystem*) to ensure containment of the disease (BMASGK, 2018b).

1 The NIG consists of national experts, For more information please refer to: https://www.bmgf.gv.at/home/Gesundheit/Gesundheitsfoerderung_Praevention/Impfen/Expertinnen_und_Experten_des_Nationalen_Impfgremiums.

2 For more information on the regional counselling and vaccination centres please refer to: https://www.gesundheit.gv.at/service/beratungsstellen/impfen.

Several of the vaccinations included in the national vaccination plan are provided free of charge for children under the age of 15 years, in line with the free national immunization programme. This programme covers diseases occurring very frequently, as well as more rare but severe diseases (BMGF, 2017a). The following vaccines are included in the national immunization programme for children at defined age groups: vaccines against measles, mumps and rubella (MMR), diphtheria, Haemophilus influenza type B, hepatitis B, human papillomavirus (HPV), meningococci of groups A, C, W135 and Y (MEC-4), pertussis, pneumococcal, poliomyelitis, rotavirus and tetanus (BMASGK, 2018a).

In the context of the global measles and rubella elimination programme of the World Health Organization (WHO), **vaccinations against measles** (as part of the combined vaccination against MMR) are free of charge for all persons above the age of 9 months (BMASGK, 2018a). However, between 2012 and 2014 the vaccine was available free of charge until the age of 45 years only. Since 2014 there have been no upper age limits for the free measles vaccine any more. In 2014 the then Ministry of Health initiated a public awareness campaign (*keinemasern.at*), which was described by outside observers as creative and innovative, seeking to encourage vaccination among both infants and unimmunized adults (WHO, 2016). However, in 2015 Austria still had the second highest rate of measles cases per one million inhabitants (35.3) in the EU (ECDC, 2016).

In 2016 measles vaccination rates were analysed in depth using a population-based mathematical model at the national level (BMGF, 2016). According to the results of these calculations, in 2015, in children aged between 2 and 5 years, measles vaccination coverage rates for the first dose reached 92% and were about 10% lower for the second dose. In particular, children born between 2008 and 2010 and young adults born in the 1990s had lower immunization rates. It was estimated that about half a million persons aged between 15 and 30 years were not protected against measles. Measles incidence stood at 10.4 cases per one million population in 2017.

In addition to the awareness campaign, the Federal Ministry of Labour, Social Affairs, Health and Consumer Protection provides a national action plan on MMR-elimination, information leaflets in German, English, Arabic, Turkish, Croatian and Slovak, and recommendations for refugees (high priority to immunize against measles in refugee homes) and persons working in refugee care (BMASGK, 2018c).

About 5–15% of the population in Austria are infected with influenza each year and many of them suffer from the disease. **Vaccinations against influenza** are not covered by the free national immunization programme but are recommended in Austria for all children (starting from the age of six months) and all adults. A special recommendation is in place for several groups at high risk, e.g. health workers, persons above the age of 50 years or persons affected by chronic disease. Vaccinations are not documented in a central register in Austria. Therefore, there are no detailed data available on the number of administered vaccines or vaccination coverage rates. Data from the pharmaceutical industry (the Austrian Association of Vaccine Manufacturers, ÖVIH) indicate that the vaccination coverage rate against seasonal influenza is below 10%. The influenza situation in Austria is monitored by an Influenza Surveillance System. These data are reported to the European Surveillance System operated by the European Centre for Disease Prevention and Control (ECDC) (AGES, 2018).

Provision

Provider organizations and professionals involved in administering **childhood vaccinations against measles** in Austria include:

- Physicians. Only physicians can prescribe vaccinations.
- The national immunization programme is implemented by the nine federal states and organized differently at the federal state level, involving mainly paediatricians, general practitioners and public health officers.
- The national immunization programme is also implemented in schools, involving public health officers, school physicians, paediatricians and general practitioners.
- There are also ambulances and vaccination centres that administer MMR vaccines.

According to the national recommendations, the first dose of the MMR-vaccine should be administered at the age of 9 months, followed by a second dose three months later.

When the first vaccination is carried out at the age of one year or later, the second dose should be administered in an interval of at least four weeks, but as soon as possible (BMASGK, 2018a).

Provider organizations and professionals involved in administering **vaccinations against influenza** in Austria include:

- Primary health care providers, such as general practitioners, paediatricians, occupational health physicians, public health officers, and internists, as well as regional and local counselling and vaccination centres. In some provinces, outpatient clinics may also provide vaccinations against influenza or provide vaccinations bought by patients at pharmacies.

Relevant professional standards and guidelines are detailed in the national recommendations, as different types of vaccines against influenza should be chosen according to different age or risk groups.

Financing

Childhood vaccinations against measles are free of charge in Austria. Patients do not need to cover any costs at the point of delivery. Vaccinations provided in the national immunization programme are covered by the federal government (two thirds) and by provinces and social health insurance funds (one sixth each). Vaccines in the national immunization programme, including vaccines against MMR, are procured by tenders covering several years.

Vaccinations against influenza are not publicly covered and have to be paid by patients out of pocket. Influenza vaccines are only available on prescription, and doctors carrying out the vaccination charge a fee. Social health insurance funds may promote influenza vaccinations by covering part of the costs, such as in annual promotion periods when vaccines are available in pharmacies at a reduced price. Some employers and health insurance funds also cover the costs for the vaccinations, such as employers of health care workers (BMASGK, 2018a).

Key barriers and facilitators

The current epidemiological situation in Austria points to the need for a higher immunization coverage for both measles and influenza. All vaccinations in Austria are voluntary and authorities are often limited to making recommendations. Scepticism about vaccinations in Austria has some sort of "tradition" and is often based on *"personal philosophy or groundless fears about side effects […] and, there are even quite a number of health workers who are anti-vaccine"* (WHO, 2016). There are also vaccination critics strongly opposing vaccinations.

Regarding **childhood vaccinations against measles,** sometimes parents of young children are not aware of the importance of having their children vaccinated. However, vaccine hesitancy also seems to play a role. In young adults it can be assumed that many of them are simply not aware of the fact that they are not protected against measles. This is why authorities initiated a broad awareness-raising campaign on measles in 2014, promoting free-of-charge vaccinations for all age groups. To further reduce vaccine hesitancy, the annual European Immunization Week campaign is used to raise awareness (Kreidl & de Kat, 2017). Having the MMR-vaccine free of charge in Austria and strongly recommending it in the national recommendations are two key facilitators of its uptake. Paediatricians who are close to the patients and participate in the programme are another crucial element for achieving effective vaccination coverage rates among children in Austria.

Coverage of **adult vaccinations against influenza** in Austria is low, mainly due to lack of awareness and vaccine hesitancy. Kunze & Kunze (2015) further suggest the *"most extensive recommendations for influenza vaccination worldwide"* are not adequately implemented due to *"ignorance, lack of social marketing and the predominance of a distinct discordance within the health system in general, and the Austrian medical fraternity in particular"*. Kunze, Böhm & Groman (2013) even describe Austria as a country that is *"resistant to influenza vaccination"*, as the impact of influenza on public health seems to be misjudged by the population and even the opinion of health care workers is divided. Furthermore, there is no vaccination reminder system for adults in place.

Even where contributions by employers or social health insurance funds reduce the costs of vaccinations against influenza, the remaining financial barriers, with patients generally having to pay for the vaccination out of pocket, can reduce access (Hoffmann et al., 2016). Hoffmann et al. (2016) also suggest involving and incentivizing general practitioners to support vaccinations against influenza, as they are often more trusted by the patients than the media or the internet.

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Belgium

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Governance

Vaccine governance and agencies involved

Belgium's vaccination programmes are organized at the subnational level. Indeed, disease prevention in health care, and hence immunization policy, is a duty and responsibility of the Communities and the Regions. These authorities are responsible for vaccine strategy including vaccine schedule, public tenders for choice of vaccine, vaccine promotion (including awareness campaigns), cost evaluations, vaccine coverage assessment, etc. As a result, the vaccination programmes differ slightly between Belgium's Communities (see Figures 1 and 2).

For the Flemish-speaking community (in Flanders and Brussels) the Agency for Care and Health (*Agentschap Zorg en Gezondheid*[1]) is responsible for vaccine policy and a subnational vaccination plan is available online.[2] The plan covers various topics including communication to the population, training of health care workers, vaccine

1 https://www.zorg-en-gezondheid.be/

2 https://www.zorg-en-gezondheid.be/vlaams-actieplan-vaccinaties-2012-2020

schedules for children and adults, registry for vaccine administration, etc. In the French-speaking community (in Wallonia and Brussels) the responsibilities regarding vaccine policy are shared between several agencies (ONE[3]; COCOF[4]; AviQ[5]) based on location and/or population age-group. The German-speaking community (*Deutschsprachige Gemeinschaft*) is responsible for its own vaccine programme, but uses the French-speaking community platform (e.g. for public tenders).

In addition, Belgium's federal authorities remain the competent authority for specific components of vaccine governance. Polio vaccination, for example, falls within the federal jurisdiction, as the mandatory vaccination of infants against polio (see next section) is based upon federal legislation.[6] Being responsible for foreign affairs and national health, the federal authorities are also the competent authority for Belgium's international commitments such as the 'Measles & Rubella WHO elimination global strategic plan', in cooperation with the subnational level.

Recommendations, mandatory vaccination, incentives, sanctions

In Belgium only vaccination against polio is mandatory by law. Vaccination against poliomyelitis was first recommended in Belgium in 1958 and became implemented as mandatory in 1967 under the Royal decree of 26 October 1966. In case of non-immunization against polio, the parents or guardian of the child concerned can be prosecuted by the Federal health inspector.

In the French community vaccination against poliomyelitis, diphtheria, whooping cough, *Haemophilus influenzae* type b, measles, rubella and mumps are mandatory in order for children to attend a public childcare centre, whilst vaccination against pneumococcal disease, meningococcal disease type C and hepatitis B are strongly recommended.[7] By contrast, in the Flemish community there is no legal obligation for vaccination in order for children to attend a childcare centre, although vaccination following the Flemish Community Vaccine Calendar is strongly advised based on the individual responsibility for community health.

At the national level the Superior Health Council (SHC) permanent vaccine working-group (Belgium's National Immunization Technical Advisory Group, NITAG)[8] of the Federal Public Service (FPS) of Health, Food Chain Safety and Environment[9] provides independent scientific advice on vaccinations and formulates recommendations. These recommendations serve as a basis for the vaccination programmes set up by the three Belgian regions.

In addition to the basic vaccination schedule for children, which includes vaccination against measles, Superior Health Council recommendations are available for pregnant woman (e.g. pertussis), adolescents and adults (e.g. booster vaccines), older people (e.g. yearly flu vaccinations) and other specific risk groups (e.g. immunocompromised), as found on their website.[10] These recommendations and further documentation on vaccination are also available on the community websites[11] and several others like SSMG/Domus Medica.

The vaccine schedule for measles vaccination and the target populations for influenza vaccination are the same across the country. Considering influenza, the groups at risk for whom vaccination is strongly recommended are pregnant women, people aged 65 years and more, health care workers, and those with an underlying risk or morbidity aged 6 months and older. There is an additional recommendation for those aged 50–65 years because of a higher risk of hospitalization after contracting influenza.[12]

Targeted measures

For children of refugees and asylum-seekers under the age of 5 months, vaccination must be carried out according to the basic vaccination calendar recommended in Belgium. From the age of 5 months, vaccination follows the principles of catch-up vaccinations for which specific recommendations are available.[13] Asylum-seekers are offered a first vaccina-

3 http://www.one.be/
4 http://be.brussels/a-propos-de-la-region/les-institutions-communautaires-a-bruxelles/cocof
5 https://www.aviq.be/
6 Royal decree of 26 October 1966: http://www.ejustice.just.fgov.be/doc/rech_f.htm
7 Article 31 of the French Government's Decree of 27 February 2003: http://www.ejustice.just.fgov.be/doc/rech_f.htm
8 https://www.health.belgium.be/en/superior-health-council
9 https://www.health.belgium.be/en/health
10 https://www.health.belgium.be/fr/vaccination
11 http://www.vaccination-info.be/; https://www.zorg-en-gezondheid.be/infectieziekten-en-vaccinatie; http://www.ostbelgienlive.be/desktopdefault.aspx/tabid-420
12 https://www.health.belgium.be/nl/advies-9488-vaccinatie-griep#article
13 https://www.health.belgium.be/fr/avis-9111-vaccination-de-rattrapage-fiche

tion when applying for asylum, and further vaccinations are given at reception facilities (coordinated by Fedasil) or at well-baby clinics (for children under 6 years of age). Vaccinations offered include polio (depending of country of origin), tetanus, diphtheria, whooping cough, measles, mumps, rubella and influenza (depending on season and a person's risk factors). In the Flemish Community a mobile vaccination team started a few years ago with catch-up immunization plans in schools without school health services, and in populations with lower vaccination coverage (e.g. Roma communities).

Vaccination coverage

Two main population registries on vaccine status exist: Vaccinnet[14] (Flemish Community based) and E-Vax[15] (French Community and German Community based). These are automatic ordering systems used by doctors that also collect information on vaccine administration. In Flanders, for example, all vaccinations with free-of-charge vaccines should be registered in the database. Although the aim is the exhaustive recording of vaccinations, these population registries are currently incomplete, particularly for adults and for the French-speaking community, for which recordings are essentially completed by school health services. Hence, for estimating vaccination coverage, regular vaccination coverage studies are set up, using the cluster sampling method. These studies are conducted for the three regions by the Communities almost every three to four years, from which national weighted averages are estimated. According to the most recent surveys, vaccination coverage for the first dose of MMR (measles, mumps, rubella) is 95.6% in Wallonia, 94.1% in Brussels and 96.2% in Flanders (Vermeulen et al., 2017; Robert E, Swennen B & Provac-ULB - École de Santé Publique, 2015). Coverage of the MMR second dose is 93.4% in Flanders and 78.0% for Wallonia and Brussels. Vaccination coverage for two documented doses of MMR is 87.4% in Flanders and 75.0% in Wallonia and Brussels (Vermeulen et al., 2017; Grammens et al., 2016). For influenza, vaccination coverage is based on surveys in specific risk groups (40–50% in health care workers (Vermeulen et al., 2017) and pregnant women (Maertens et al., 2016), or in the over 15 years old category by the Health Interview Survey (e.g. 60–70% in people aged 65 years and over (Gezondheidsenquete, 2013).

14 www.vaccinnet.be

15 https://www.e-vax.be

The organization and provision of vaccination services

Childhood vaccination against measles

Provision of infant immunization services (including first dose of MMR at 12 months) is mainly undertaken by Well-Baby Clinics (Coordinators: *Kind en Gezin* for the Flemish-speaking community, ONE for the French-speaking community, *Kaleido-Ostbelgien* for the German-speaking community). There is a large number of such consultation rooms all over Belgium which facilitates access. General practitioners, paediatricians and hospital-based physicians cover the remaining part of infant immunization.

Vaccines for school children (including the second dose of MMR at 11–12 years) are offered through school health services, general practitioners and paediatricians.

Adult vaccination against influenza

For adult immunizations, the general practitioner is usually the key vaccinator. This is particularly the case for adult influenza vaccination. In homes for older people, often the responsible medical doctor will take care of the influenza vaccination programme. Chronic disease patients (lung, renal or cardiac insufficiency, haematological patients, people living with HIV, etc.) may also be vaccinated by their treating specialist. Occupational medicine services are vaccinators for exposed professionals, including influenza vaccination of health care workers. In addition, since April 2016 nurses have been allowed to administer physician-prescribed vaccines without the presence of a doctor.

Financing

Childhood vaccination against measles

All vaccines, including MMR, that are included in the basic vaccination schedule for children, with the exception of rotavirus vaccine[16], are provided free of charge, being fully covered by the respective Communities. Manufacturers have to follow a public tender procedure set up by the respective Communities on average every three to four years.

16 Partial reimbursement by the national health insurance

For vaccinations of infants against measles, the services provided by Well-Baby Clinics and school health services are also free of charge. Vaccinations provided to infants or children by general practitioners and paediatricians operate through a fee-for-service system (vaccines are free of charge, but a consultation fee has to be paid).

Adult vaccination against influenza

For healthy adults over 65 years of age, pregnant women and at-risk population groups, influenza vaccines are partially reimbursed by the National Health Insurance (INAMI/RIZIV), as are the medical consultations. In Flanders all residents at elderly nursing homes and institutions for disabled people and chronic psychiatric patients are offered influenza vaccination free of charge.

Certain vaccines indicated for professional risks and offered by occupational medicine services are reimbursed by the Federal Agency for Occupational Risks (Fedris). These include hepatitis A, hepatitis B, and yellow fever vaccines, but not influenza vaccines.

The vaccines used for the vaccination of asylum seekers in Belgium (including measles and influenza vaccines as aforementioned) at entry are provided by the Flemish Community, and reimbursed by the federal authorities.[17] Once asylum-seekers are appointed to an asylum centre, vaccination is supported by the regional vaccination services, as for the general population.

Key barriers and facilitators

As mentioned above, the coverage rate for the first dose of MMR is close to or above 95% according to the most recent vaccination coverage studies. One main reason for this high coverage rate is the organization of MMR vaccination through public health services and primary health care providers, as well as paediatricians. These services are easily accessible, geographically well distributed across the country and mostly free of charge. In addition, the teams in Well-Baby Clinics and school health services are well trained and receive regular scientific and practical training.

The vaccination uptake for the second MMR dose is, however, still below 95% in the three regions, and lower than 80% in Wallonia and Brussels. The lower vaccination coverage in Wallonia and Brussels is related to various factors, such as vaccine hesitancy and commodity issues (e.g. parental authorization not available), lower catch-up modalities (e.g. no mobile team available), higher rate of vaccinations in private practices, and lower use of vaccination in public health services. Moreover, the vaccination coverage for the second MMR dose is probably underestimated in these two regions, being estimated from school-based surveys that do not take into account all the vaccinations performed by paediatricians or general practitioners. In Flanders population groups that are difficult to access, such as the Roma population and Jewish children in private Jewish schools (Asnong et al., 2011), are approached through a mobile vaccination team, so that these groups of the population are offered vaccines (e.g. measles catch-up vaccination) in a tailored way. With the increased number of measles cases in Europe, since September 2018 in Flanders the vaccines from the public tender (free or charged) may be used for catch-up vaccination in adults.

It remains very difficult to improve vaccination coverage against influenza, in particular among health care workers. Barriers include misinformation and misperceptions on influenza and influenza vaccination among this group, and a lack of awareness about the role health professionals may play in disease transmission. The weak vaccine effectiveness is probably also playing a role. General vaccine campaigns to inform and increase awareness (brochures, press-releases, etc) are organized by all three Communities. In Flanders a campaign is running to improve influenza vaccination in health care workers, especially in hospitals and nursing homes.[18]

Although population registries of administered vaccines exist, recording vaccine administration is not obligatory for all vaccines and is particularly incomplete for adults and the French-speaking community as mentioned above. These registries could, however, become an excellent tool to collect data on vaccines administered and real-time vaccination coverage. At the same time, pockets of under-vaccination can be identified by the Communities and physicians, so that more specific actions can be taken.

Finally, most physicians are exposed during their medical education to a teaching module on vaccinology, although more efforts are needed to extend this training to all universities and nursing schools.

17 https://www.zorg-en-gezondheid.be/vaccinatie-vluchtelingen-vanaf-nu-bij-aankomst-in-belgi%C3%AB

18 http://www.laatjevaccineren.be/campagnes

Figure 1 Immunization schedule in the Flemish community

Vaccinatie tegen	8 wkn	12 wkn	16 wkn	12 mnd	13-15 mnd [8]	5-7 jr [1]	10-13 jr	14-16 jr [3]
Poliomyelitis								
Difterie (kroep)								
Tetanus (klem)								
Pertussis (kinkhoest)								
Haemophilus influenzae B (hersenvliesontsteking)								
Hepatitis B (geelzucht)								
Pneumokokken		[7]						
Rotavirus [4]		[5]	[5]					
Mazelen							[2]	
Bof (dikoor)								
Rodehond (rubella)								
Meningokokken type C (hersenvliesontsteking)								
Humaan Papillomavirus[6] (baarmoederhalskanker)								

Source: https://www.kindengezin.be/img/201803VaccinatieschemaNederlands.pdf

Figure 2 Immunization schedule in the French community

Recommandé par la Fédération Wallonie-Bruxelles		Nourrissons					Enfants et adolescents				Adultes		
		8 sem. 2 mois	12 sem. 3 mois	16 sem. 4 mois	12 mois	15 mois	5-6 ans	11-12 ans	13-14 ans	15-16 ans	♀	tous les 10 ans	65 ans
Poliomyélite	Hexavalent	○	○	○		○	○						
Diphtérie	Hexavalent	○	○	○		○	○			○	○	△	
Tétanos	Hexavalent	○	○	○		○	○			○	○	△	
Coqueluche	Hexavalent	○	○	○		○	○			○	○		
Haemophilus influenzae de type b	Hexavalent	○	○	○		○							
Hépatite B	Hexavalent	○	○	○		○							
Rougeole	RRO				○			○					
Rubéole	RRO				○			○					
Oreillons	RRO				○			○					
Méningocoque C						○							
Pneumocoque		○		○	○								△
Rotavirus (Vaccin oral)		△	△	(△)									
Papillomavirus (HPV)									◇◇				
Grippe (Influenza)													△

○ Recommandé à tous et gratuit

△ Recommandé à tous, remboursé mais pas gratiut

Vaccin combiné (une seule injection)

◇◇ Recommandé aux jeunes filles et gratuit (2 doses)

♀ Femmes enceintes entre 24 et 32 semaines de grossesse

Source: http://vaccination-info.be/vaccinations-recommandees/calendrier-vaccinal

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Bulgaria

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Governance

The Health Act (2004) regulates general principles for the control of communicable diseases and epidemic outbreaks, including immunizations. The Minister of Health determines by ordinance who is subject to immunizations (mainly in terms of age or risk groups), as well as the methods and the terms for carrying out vaccinations.

The Ministry of Health is responsible for developing vaccination plans and programmes and overseeing implementation at the national level. An Expert Advisory Council on Surveillance of Immunoprophylaxis is established under the Minister of Health, and functions as a consultative body on the planning and implementation of vaccination programmes. The immunization policy is a part of the state health policy and is carried out by the Ministry of Health. The Ministry also coordinates the activities of other institutions involved.

The 28 Regional Health Inspectorates, which represent the Ministry of Health in every district of the country, are responsible for the organization of vaccination plans and programmes at the regional level. Their functions include supervising vaccination activities in their respective districts, planning mandatory and targeted immunization for the next year (number of persons to be vaccinated), and providing information on vaccination coverage, etc. The National Centre of Public Health and Analysis summarizes the Regional Health Inspectorates' reports on the number of performed vaccinations and provides information for the whole country to the Ministry of Health and the National Centre of Infectious and Parasitic Diseases.

The latter prepares annual analyses of immunoprophylaxis in Bulgaria for the Ministry of Health.

According to the Health Act, there are three types of immunization in Bulgaria: mandatory, targeted and recommended. All kinds of vaccination (whether mandatory, targeted or recommended) are specified in the ordinance mentioned above. Mandatory planned immunizations and re-immunizations are scheduled by age group in the Bulgarian Immunization Calendar, as regulated by the Ministry of Health. Some of the non-mandatory vaccinations recommended by the Ministry of Health for specific high-risk populations are included in national programmes for prophylaxis and prevention (such as vaccines against rotavirus and human papillomavirus).

Vaccination against measles is mandatory for children, in accordance with the Bulgarian Immunization Calendar. Vaccinations are performed as a combined vaccine against measles, mumps and rubella (MMR), with two doses, the first for infants over 13 months and the second for children aged 12. **Vaccination against influenza** is recommended for several target groups (older people, people with certain chronic conditions, and certain employees such as medical personnel, etc.). Participation in this vaccination is voluntary.

General practitioners maintain registers of children (enrolled on their lists) who are subject to mandatory planned vaccinations against measles. They are obliged to record all the immunizations performed. The general practitioners notify the parents about upcoming immunizations in the Calendar. Regional Health Inspectorates summarize the information from general practitioners' registers at the regional level and monitor the uptake of vaccines in their respective districts. Planning mandatory immunizations for the next year, based on general practitioners' annual plans and population registers maintained by the National Statistical Institute, is also the responsibility of the Regional Health Inspectorates. However, this is not the case for recommended vaccinations against influenza – all health care establishments should only report the number of immunizations performed to the Regional Health Inspectorates.

Participation in vaccinations against measles is mandatory for all children. There are sanctions for parents who refuse to have their children vaccinated, as regulated by the Health Act. Unvaccinated children cannot go to kindergarten, and the parents must pay fines. However, the fines are not very high and some parents prefer to be sanctioned in this way rather than having their children vaccinated. Information about immunizations is available on the Ministry of Health website, and many other agencies and nongovernmental organizations provide such information as well. In 2017 several nongovernmental organizations together with the Ministry of Health started an awareness campaign in response to growing anti-vaccination movements. Every year the media provide information about influenza, risk groups and recommended vaccinations.

In emergency epidemic situations, or where there are significant declines in immunization coverage, the Minister of Health can order additional mandatory vaccination and revaccination against measles (outside those planned in the Immunization Calendar) for specific groups, as well as organizing immunization campaigns, on-site immunizations, and temporary immunization points, etc. For recommended vaccinations (such as influenza) there are only information campaigns. In addition, general practitioners should inform risk groups about vaccination against influenza.

For mandatory immunizations, vaccination coverage is measured by administrative reports (e.g. reports of performed vaccinations by general practitioners and other providers). The registers of infants and children subject to mandatory vaccination against measles (at the required age) are used as the denominator in calculating the vaccination coverage rate. The Regional Health Inspectorates maintain these registers at the regional level. At the national level the vaccination coverage rate is analysed annually by the National Centre of Infectious and Parasitic Diseases. However, not all the performed vaccinations against influenza are fully recorded by health facilities. Moreover, there are no specific requirements on reporting vaccinations against influenza by age or risk groups. Thus, vaccination coverage estimates are often inaccurate, or data are insufficient for calculating coverage rates (National Centre of Infectious and Parasitic Diseases, 2017).

Provision

General practitioners provide vaccination against measles for all children enrolled on their lists. For children not registered with a general practitioner, mandatory vaccinations can be provided by health professionals in so-called immunization offices established by the 28 Regional Health Inspectorates. Exceptionally, vaccination can also

be delivered through other health care establishments or medical offices in schools, kindergartens and social institutions for children, but only under the supervision of the relevant Regional Health Inspectorate. Generally, professional standards and guidelines for mandatory vaccinations (medical contraindications, for instance) are regulated by the ordinance on immunizations; furthermore, the Regional Health Inspectorates provide consultations and expertise in the field of immunoprophylaxis in specific cases.

Adult vaccinations against influenza can be provided by health care establishments (primary or specialist health care providers) and by immunization offices under the Regional Health Inspectorates. Such vaccinations can be requested by patients and the patients choose the provider.

All health care providers involved in vaccination are accountable to the relevant Regional Health Inspectorate.

Financing

All children in Bulgaria are entitled to free access to mandatory immunization programmes (including vaccination against measles). Vaccines are paid for by the Ministry of Health and vaccination services provided by general practitioners are covered by social health insurance. Services provided in immunization offices under the Regional Health Inspectorates are also free of charge for children. All children in Bulgaria are insured and contributions for them are paid from the state budget.

Adult vaccinations against influenza are paid for by the patients. Although vaccines and vaccination services are not expensive, out-of-pocket payments create barriers to access for some risk groups, such as older people with low incomes.

Key barriers and facilitators

Bulgaria has a long tradition of childhood vaccination against measles and a well-established system for mandatory immunization regulated by several legislative acts. Moreover, vaccination is covered entirely from public sources without financial barriers to access for patients. Despite these positive factors, which could be considered facilitators for effective coverage, there are groups of vulnerable individuals who are still susceptible to infection. In 2009 an outbreak of measles was detected, following an eight-year period without any indigenous measles transmission. In 2017 several cases of measles were identified among the Roma community living in the second largest city in Bulgaria. In recent years vaccination rates have been falling because of both growing anti-vaccination movements among parents and negative perceptions among vulnerable groups of individuals. According to the National Centre of Infectious and Parasitic Diseases (2017), there is currently a real risk of an outbreak of measles and rubella, especially among the Roma community and migrants.

The low uptake of influenza immunization is a result of popular underestimation of the severity of the disease and its complications in Bulgaria. Out-of-pocket payments and the low health literacy of some patients (especially risk groups) are key barriers to effective coverage.

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Croatia

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Governance

In Croatia childhood vaccination is mandatory. For years vaccination coverage for all the vaccines in the immunization programme was very high, over 95%, but in the last few years there has been a decrease of coverage in the whole country, and in some counties coverage is very low. This situation is of major concern, particularly in regard to measles outbreaks in Europe. The Ministry of Health, together with the public health institutes, is continuously working to increase vaccination coverage.

Information about the type of mandatory vaccinations for different age groups is set out in the immunization programme (Figure 1).

The vaccination of pre-school and school-aged children, travellers, sailors, health workers and others is regulated under the Law on the Protection of the Population against Communicable Diseases and the Ordinance on the Method of Implementation of Immunization, Seroprophylaxis and Chemoprophylaxis against Infectious Diseases. In an emergency, the Law states that the Ministry of Health, upon a proposal from the Croatian Institute of Public Health, declares an infectious disease epidemic, or a danger of an infectious disease epidemic, and determines an infected or endangered area.

There are three categories of vaccine: mandatory (for example, vaccination against measles), recommended (for example, influenza vaccination for older people) and additional (for example, vaccination against hepatitis A for travellers).

Figure 1 Immunization programme for 2018

AGE / VACCINE	MONTHS					YEARS		GRADES OF PRIMARY SCHOOL			YEARS		
	0	2	3	4	6	1	5	I	VI	VIII	19	24	60
BCG (Tuberculosis)	BCG												
HIB (H. influenzae b)			Hib	Hib	Hib	Hib							
DI-TE-PER[3]			DTPa	DTPa	DTPa	DTPa	DTPa[2]						
POLIO (poliomyelitis)			IPV	IPV	IPV	IPV		IPV		IPV	*		
DI-TE										DT	*	*	
MO-PA-RU[4]						MPR		MPR					
HEPATITIS B[1]			HBV	HBV	HBV			*	HBV (x3)				
ANA-TE (tetanus)													TE

1 Infants born from HBsAg-positive mothers are vaccinated right after birth, using immunoglobulin according to the post-exposure scheme
2 only for children who have missed re-vaccination according to previous programmes
3 diphtheria, tetanus, pertussis
4 measles, mumps, rubella

* Check the number of vaccinations and provide missed vaccinations, if necessary

The **national level** mandatory vaccination programme is the most important and most successful preventive health programme in the country. The local County Public Health Institutes are responsible for its implementation and monitoring. The Croatian state plays a significant role in the protection of its citizens, and the Croatian Institute of Public Health, using the population register, is responsible for monitoring and controlling the vaccination rate among children and adults. Vaccination coverage shows the percentage of the population or of a specific age or risk group who have received a particular vaccination (www.hzjz.hr).

Each year the Ministry of Health announces the immunization programme, based on the recommendations of the Croatian Institute of Public Health. The main body responsible for implementation of the mandatory vaccination programme and its monitoring, as defined by laws and regulations at the national level, is the Croatian Institute of Public Health. The Institute receives mandatory vaccination reports from family doctors, primary care paediatricians and the school medical service that are collected by the County Public Health Institutes (Croatian Institute of Public Health, 2018). The annual review report is regularly published in the Croatian Health Statistical Yearbook of the Croatian Institute of Public Health.

The Agency for Medicinal Products and Medical Devices (HALMED) is a stakeholder which actively

contributes to the protection and promotion of public health through the regulation of medicines and vaccines by monitoring their quality, effectiveness and safety on the Croatian market. In coordination with the Croatian Institute of Public Health, HALMED also monitors the side-effects of medicines/vaccines and the side-effects reported in clinical trials. After the United Kingdom and the Netherlands, Croatia was the third country in the European Union to start using a mobile application for reporting suspected adverse drug reactions (HALMED, 2016). Once approved by HALMED, the Croatian Institute of Public Health assesses the quantity of vaccines required and distributes them to the County Public Health Institutes, which then distribute them further to the primary care doctors (family doctors, primary care paediatricians and school and adolescent medicine doctors).

Vaccination coverage

The 2017 report on the vaccination programme suggests that vaccination coverage has declined since 2012, with large variations in vaccination coverage across counties. Table 1 shows the vaccine coverage for measles, mumps and rubella (MMR) according to primary vaccination and revaccination by county.

Provision

Primary care doctors (family doctors and primary care paediatricians) and the school medical service (a service within County Public Health Institutes) carry out the mandatory vaccination programme for school-aged children. Family doctors or County Public Health Institutes

Table 1 MMR vaccination by county, Croatia, 2017

	Primary vaccination			Revaccination		
County	**Scheduled**	**Vaccinated**	**%**	**Scheduled**	**Vaccinated**	**%**
Bjelovarsko-bilogorska	1 010	974	96.44	1 076	1 038	96.47
Koprivničko-križevačka	1 011	993	98.22	1 074	1 051	97.86
Karlovačka	996	956	95.98	1 034	1 027	99.32
Ličko-senjska	308	257	83.44	391	380	97.19
Osječko-baranjska	2 520	2 191	86.94	2 364	2 221	93.95
Virovitičko-podravska	700	674	96.29	861	842	97.79
Brodsko-posavska	619	593	95.8	629	621	98.73
Požeško-slavonska	1 216	1 171	96.3	1 298	1 270	97.84
Vukovarsko-srijemska	1 442	1 366	94.73	1 513	1 463	96.7
Istarska	1 642	1 445	88	1 920	1 756	91.46
Primorsko-goranska	2 636	2 110	80.05	2 604	2 499	95.97
Sisačko-moslavačka	1 317	1 268	96.28	1 324	1 290	97.43
Zadarska	1 695	1 485	87.61	1 642	1 566	95.37
Splitsko-dalmatinska	5 237	4 110	78.48	4 739	4 414	93.14
Dubrovačko-neretvanska	1 268	708	55.84	1 283	1 060	82.62
Šibensko-kninska	882	826	93.65	1 045	980	93.78
Međimurska	1 173	1 136	96.85	1 110	1 091	98.29
Varaždinska	1 337	1 286	96.19	1 474	1 405	95.32
Krapinsko-zagorska	949	914	96.31	1 239	1 223	98.71
Grad/City of Zagreb	7 859	7 319	93.13	8 015	7 620	95.07
Zagrebačka	2 883	2 648	91.85	2 995	2 886	96.36
CROATIA	**38 700**	**34 430**	**88.97**	**39 630**	**37 703**	**95.14**

are in charge of the recommended vaccination programmes. County Public Health Institutes also provide additional vaccination, on request.

Based on the Health Care Act, the Croatian Public Health Institute also monitors the health status and implementation of health care for vulnerable populations. There are specific programmes for refugees and the Roma population.

There are no incentives for patients or vaccinators under the mandatory vaccination programme, but some "pro-vaccination" programmes are financed at county level.

Financing

All mandatory vaccines and vaccines recommended for specific vulnerable groups are covered by compulsory health insurance, provided by the Croatian Health Insurance Fund. Additional vaccines are paid for out-of-pocket.

Barriers and facilitators

In recent years Croatia has faced a strong anti-vaccination movement, leading to hesitancy towards vaccination among both parents and health professionals. A study published in 2016 explored attitudes regarding vaccination in a nationally representative sample of 1000 people. Over two thirds of participants reported vaccine acceptance (69.9%; 95% CI = 66.2–73.3), about one fifth (19.5%; 95% CI = 16.9–22.5) reported vaccine hesitancy (i.e. they would accept some but not all vaccines), while 10.6% (95% CI = 8.4–13.3) would refuse all vaccinations (Repalust et al., 2016).

So far, there is no clear national strategy for dealing with the anti-vaccination movement. Croatia is trying to raise public awareness of the importance and benefits of vaccination through various public health actions, such as holding professional meetings, creating posters and flyers, and organizing workshops and lectures. Individuals within some local communities are also seeking to introduce changes. There is particular concern in the area of Dubrovnik and its surroundings, where the County Public Health Institute conducts various interventions, such as educational brochures, infographics and short videos, trying to educate the population. The shortage of health workers in primary health care, the lack of an active pro-vaccination programme, ignorance about the benefits of vaccination and the release of false information about vaccination through the mass media are some of the factors which affect citizens' attitudes. They contribute to falling vaccination rates, with potential serious consequences for health.

In Croatia risk groups recommended to be vaccinated against influenza include people whose health status or medical condition increases the risk of influenza complications. Preference is given to people suffering from chronic conditions, people over the age of 65 and other vulnerable groups.

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Cyprus

Chrystala Charalambous, Mamas Theodorou

Governance

The Child and Adult Immunization Programme in Cyprus is set out at the national level by the Ministry of Health of the Republic of Cyprus, following recommendations from the National Advisory Committee on Immunizations. The aim of the immunization programme is to maintain and increase the already high levels of immunization of all children at the appropriate age and recommended doses. To achieve this, the Ministry of Health and, more specifically, the Directorate of Medical and Public Health Services, which is the responsible body, has adopted the Expanded Programme on Immunization and closely adheres to WHO recommendations. The immunization programme is an ongoing process, modified and updated according to changes in epidemiological data and international scientific knowledge and recommendations. Based on these recommendations, and in an effort to ensure a unified approach to the administering of vaccines, the Ministry of Health has published a vaccination booklet with the recommended programme, as well as background information on the vaccines, their side-effects and contraindications, which is disseminated to all health workers involved in the administering of vaccines (both in the public and private sectors) (Figure 1).

In addition to the vaccines shown in Figure 1, for the last three years the HPV vaccine has also been introduced and is given free to all girls in the first class of secondary school (11–12 year olds).

Although vaccinations are not mandatory in Cyprus, immunization coverage is very high. According to 2017 data, 97% of children were covered with DTP3 (Figure 2)

Figure 1 Immunization scheme

VACCINE \ AGE	Birth	2 Mths	4 Mths	6 Mths	8 Mths	12 Mths	13 Mths	15 Mths	18 Mths	20 Mths	24 Mths	4-6 Yrs	14-15 Yrs
Diphtheria Tetanus Pertussis		DTaP	DTaP	DTaP				DTaP				DTaP	
Polio		IPV	IPV	IPV				IPV				IPV	
Haemophilus Influenza – type b		Hib	Hib	Hib		Hib							
Pneumococcal conjugated		PCV	PCV			PCV			> PCV				
Hepatitis B		Hep B	Hep B		Hep B								
Meningococcal C conjugated						Men C							
Measles Mumps Rubella							MMR					MMR	
Varicella							Var					Var	

Vaccines that are given special findings

Pneumococcal conjucated										> PCV			
Pneumococcal Polysacharide										PPV23			
Meningococcal Polysacharide										Men Polyscharide			
Hepatitis A										Hep A			
Tuberculosis	BCG												
Influenza				Influenza									

Adult Vaccination

1. Td Adults – given if recommended doses were missed and as a booster dose every 10 years
2. Hepatitis B (HepB) – given to adults who belong to high risk groups
3. Measles- Mumps- Rubella (MMR) – given if recommended doses were missed
4. Influenza – given to high risk groups and for other specific indications

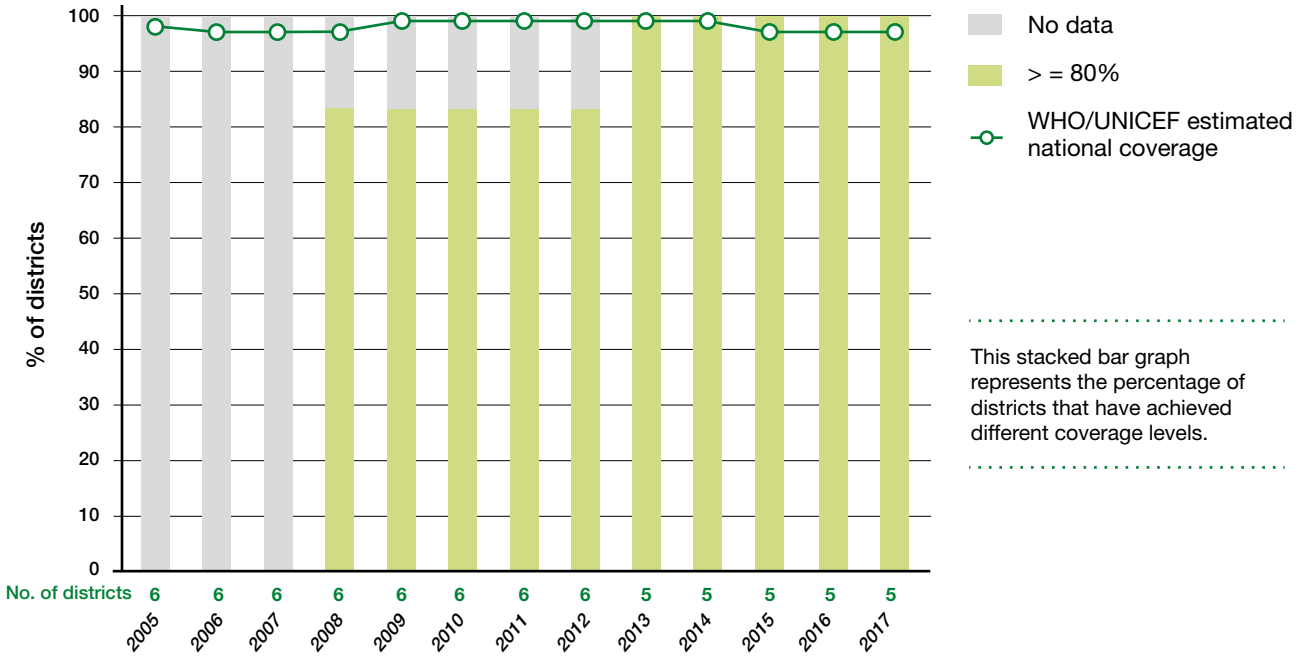
Shape

Indicate the range of recommended ages for immunization

> Indicate vaccines to be given if previously recommended doses were missed or given earlier

Source: Ministry of Health, 2016

Figure 2 DTP3 coverage in Cyprus, 2005–2017



Source: WHO, 2018

and 90% were covered against MMR (WHO, 2018). These data are derived from national surveys conducted by the Ministry of Health, covering children of 17–24 months of age. These surveys are repeated every three years and are carried out according to WHO recommendations and guidelines.

As a result of the high immunization coverage, no measles cases were reported during 2015 and 2016 in Cyprus and only eight cases during the period from February 2017 to January 2018.

The high immunization coverage is mainly due to several incentive schemes, including:

- Provision of vaccines free of charge to all children in the public sector, regardless of their nationality or socioeconomic status. Children who are asylum-seekers or refugees living in government-organized accommodation are also vaccinated free of charge by the Ministry's medical and public health services. Newly arriving refugees are immunized with some basic vaccines such as DTaP and IPV within 48 hours of their arrival.

- A significant percentage of children are also immunized by their private paediatrician. In this case the cost is paid out-of-pocket or covered by the parents' private health insurance.

- Cooperation between the public and private sectors to promote vaccination. Every year a campaign is organized to inform not only health professionals but also children and their parents about the benefits of vaccination. The campaign includes newsletters and messages in radio and TV programmes and the distribution of leaflets.

- The Vaccination Coverage Intervention Action is undertaken annually to ensure that all children at primary schools (public and private) are vaccinated according to the recommended programme. More specifically, at the beginning of each school year health visitors check all pupils' vaccination cards to ensure that they are vaccinated according to the recommended programme; in cases of incomplete vaccinations, they inform the parents or guardians of the importance of, and the necessity to proceed with, the vaccination of their children. In April of the same school year the vaccination cards are rechecked in order to assess the result of this intervention. Results are usually quite good. Children can also be vaccinated at schools.

Regarding **adult vaccination against influenza**, the Ministry of Health, following recommendations from

WHO and the European Centre for Disease Prevention and Control, recommends vaccination of those belonging to the following high-risk groups, in order to reduce the number of patients, the severity of infection, and the number of deaths:

- citizens over 65 years;
- residents in nursing homes and patients in long-term care institutions;
- children and adults with chronic lung disease or cardiovascular disease;
- people with chronic kidney disease;
- people with chronic metabolic disease, including diabetes mellitus;
- people with HIV infection;
- people with neurological disease;
- immunosuppressed individuals;
- people with sickle cell anaemia or other haemoglobinopathies;
- children and adolescents who require long-term aspirin therapy;
- pregnant women after the first trimester of pregnancy;
- people working or living in places where the aforementioned high-risk groups live; and
- health workers.

There are no complete data for adult vaccination against influenza, except for those who have been vaccinated in the public sector. According to Health and Hospital Statistics (Cyprus Statistical Service, 2015), around 13 000 adults (belonging to the above-mentioned high-risk groups) are vaccinated every year in the public sector. Influenza activity in Cyprus is monitored through three systems: syndromic surveillance in primary care, virological surveillance, and surveillance of severe illness and deaths. Recent data show that influenza intensity is low in Cyprus compared to most other EU/EEA countries (European Centre for Disease Prevention and Control, 2018b).

Provision

Children can go to either the public or the private sector for vaccination. Immunization in the public sector is carried out at hospitals and health centres by health visitors or nurses, as well as at schools by the school health services, under the guidance of public health doctors and after receiving written consent from the parents. In the private sector vaccinations are carried out by paediatricians or, for adults, by general practitioners. In the public sector the responsibility for calling and follow-up lies with local health visitors, while in the private sector it lies with primary care paediatricians.

Financing

The vaccines used in the public sector are centrally purchased through a tender by the pharmaceutical services of the Ministry of Health and are provided free of charge to all children regardless of income, socioeconomic status and nationality. The seasonal influenza vaccine is also provided free of charge to all persons over 65 who apply to public hospitals. These people, regardless of whether they are entitled to free medical care or not, can apply for vaccination directly at hospitals or health centres, using their identity card to confirm their age. For other age groups, vaccination against influenza is provided free of charge only to those people who are eligible for free health care in the public sector. The total cost of vaccines and vaccination services provided by the public sector is borne exclusively by the Ministry of Health.

For vaccinations carried out in the private sector, doctors purchase vaccines from pharmacies and are then reimbursed directly by the patients or by private health insurance. According to the price list issued by the Cyprus Pharmaceutical Services in March 2018, the maximum retail price (i.e. the maximum price pharmacies can charge when selling medications) was set at €14.23 for the MMR vaccine and at €25.93 for the vaccine against seasonal influenza (Pharmaceutical Services Cyprus, 2018). However, patients pay paediatricians or general practitioners much more for vaccination in the private sector.

It is estimated that 42% of children are vaccinated in the public sector and 58% in the private sector. However, more recent estimates indicate that during the financial crisis more children were vaccinated in the public sector than in the private sector.

Key barriers and facilitators

The financial incentives mentioned above, and because all children and certain categories of adults can be vaccinated free of charge in the public sector, as well as the monitoring of the vaccination coverage of children, have contributed to the high vaccination coverage in Cyprus.

There are no serious barriers that make it difficult for children to have access to vaccinations. According to a survey conducted in 2015 (Ministry of Health, 2016), the main reasons reported by parents for not vaccinating their children were "child's sickness" (67%), followed by "lack of vaccine" (9.8%), "lack of time" (7.6%), "lack of interest" (6.5%), "limited information" (3.3%), and "other reasons" (8.7%). Despite the high rates of vaccination, there is still room for improvement. According to the 2015 national vaccination survey, approximately 2% of the population rejects vaccination.

For influenza vaccination, there is no evidence on barriers or facilitators. However, barriers might include possible ignorance of the existence of the vaccine and the importance of vaccination against influenza, particularly for older people, as well as misinformation and the anti-vaccination movement. Facilitators are likely to include the free-of-charge provision of the vaccine and the information provided for the population by the services of the Ministry of Health and private doctors.

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Czech Republic

Lucie Bryndová

Governance

Legislation on vaccination

The act on public health protection (Act No. 258/2000 Coll.) defines the obligation to undergo specified mandatory vaccinations for all people with permanent residence in the Czech Republic as well as for those with a residence permit for 90 days and above. Types of mandatory vaccination (whether regular, specific or exceptional) and vaccination schedules are defined in implementing regulations (Ministry of Health's Decree No. 537/2006 Coll., on vaccination against infectious diseases, last amended by Ministry of Health's Decree No. 355/2017 Coll.). These include vaccination against diphtheria, tetanus, pertussis, poliomyelitis, hepatitis B, *Haemophilus influenzae* type B, **measles**, mumps and rubella (MMR) for all, and vaccination against tuberculosis, pneumococcal diseases and rabies only in defined cases.

In addition to mandatory vaccination, there are vaccinations that are not mandatory but are still covered by social health insurance (Act No. 48/1997 Coll., on social health insurance). These include vaccines against human papillomavirus (for girls and boys aged 13 to 14 years), **influenza** and pneumococcal diseases **for defined groups** (i.e. seniors aged 65 years and older), pneumococcal and meningococcal diseases and **influenza for patients with immunity disorders**.

Additionally, health insurance funds operate individual prevention programmes that provide full or partial reimbursement to their insured members for vaccinations

against other diseases such as tick-borne encephalitis or meningococcal disease or **influenza**.

Measles

Vaccination against measles is part of the mandatory regular vaccination scheme. All people with permanent residence in the Czech Republic or having a residence permit for 90 days and above are obliged to be vaccinated against measles.

The vaccination programme is organized at national level, with the Ministry of Health publishing the vaccination schedule in its decree. Currently, vaccination against measles is given together with vaccination against mumps and rubella, and should be provided as follows: the first dose to children aged 13 to 18 months and the second dose to children aged 5 to 6 years. If there are medical reasons, a child can be exempted from vaccination or the vaccination can be postponed, but this fact must be recorded in the child's medical record, as otherwise not undergoing a vaccination is viewed as a violation of the law.

The main state authorities in charge of controlling observance of the law are the Regional Public Health Authorities. There are 14 of them, one in each region. These authorities control vaccination coverage by birth year of the respective cohorts.

In practice, the authorities check, on a continuous basis, children by the first letter of their family name, based on the population registry. In administrative procedures parents are responsible for their children up to the age of 15. They can be fined up to CZK 10 000 (€400) if their child has not followed the vaccination schedule. The Regional Public Health Authorities impose a fine, and, if it is not paid, the customs office enforces it. The fines are state budget income.

If a person does not undergo a mandatory vaccination and is not registered with any general practitioner (*see* below), the Regional Public Health Authority decides in an administrative procedure which general practitioner will provide the vaccination and the person must receive it.

There are no specific targeted measures in the national vaccination plan regarding specific groups of the population (e.g. refugees, religious objectors), since measles vaccination is mandatory for all residents, including these groups (although financing differs – *see* below).

Apart from fines, there is another factor that encourages parents to follow the vaccination schedule with their children. Children without proper vaccination, if not exempted for medical reasons or due to lifelong immunity, cannot be, according to the law, accepted into preschool facilities. This does not apply to mandatory school education. Providers of preschool services can be fined up to CZK 500 000 (€20 000) if they accept an unvaccinated child. There has been a wide public debate on this topic in recent years. However, the findings of the Czech Constitutional Court supported this legal provision, based on the argument that it would be "an act of social injustice if nonvaccinated children without serious medical reasons were accepted into a preschool facility, thus benefiting from the willingness of others to take the minor risk of being vaccinated" (JUD282605CZ).

Estimation of vaccination coverage

By law the health insurance funds are required to report to the Ministry of Health the number of vaccinated children by age cohorts according to the mandatory vaccination schedule. The denominator is the total number of children in the given age cohort based on the population registry. Reporting is due at the end of April for the preceding calendar year.

Since January 2018 vaccination against measles is also listed in the mandatory specific vaccinations, applying to people taking up new jobs at infection or dermatovenereology departments.

Influenza

Vaccination against influenza is not mandatory in the Czech Republic. Nevertheless, for defined groups it is covered by the social health insurance system. According to the Act No. 48/1997 Coll., on social health insurance, these groups are as follows:

1. people aged 65 and over,

2. people with pharmacology treatment due to chronic cardiovascular, pulmonary, renal or diabetes conditions,

3. people after splenectomy or after blood formation cells transplantation,

4. people living in long-term care facilities, or in homes for older people, facilities for people with physical disabilities, or social care facilities with special regimes (i.e. facilities for people with dementia or Alzheimer's disease),

5. people with limited spleen functionality, or with serious immunodeficiencies requiring long-term follow-up treatment at specialized departments, or after invasive meningococcal or pneumococcal disease.

Until 2010 vaccination against influenza was part of the mandatory vaccination schedule. As a mandatory specific vaccination, it applied to people working at places with higher risk of infectious disease, namely long-term care facilities, homes for older people, facilities for people with physical disabilities, and social care facilities with special regimes.

The 2010 legislative changes moved the influenza vaccination from the mandatory (which was free for eligible people) to the voluntary schedule, but at the same time explicitly, by law, covered it under social health insurance, dropping the group of employees but broadening the categories of eligible patients.

Estimation of vaccination coverage

Health insurance funds are, by law, required to report to the Ministry of Health the number of people vaccinated against seasonal influenza. The denominator is the total number of people based on the population registry. Reporting is due at the end of April for the preceding calendar year.

Provision

Measles

Providers responsible for vaccination against measles are primary health care providers, namely general practitioners for children and adolescents. They are legally obliged to ensure and provide mandatory vaccination to their registered children. In practice, general practitioners fulfil their duty by inviting children for regular vaccination according to the vaccination schedule. No case has been reported where a health care provider has been fined for "not ensuring" the vaccination of a child. General practitioners may ask the Ministry of Health to provide them with contact details for their registered children from the population registry. If a child is not registered with any general practitioner, the Regional Public Health Authority decides which general practitioner will provide the vaccination and the person must receive it.

State monitoring and control is based on children's medical records in general practice offices, and is intended to ensure high vaccination coverage. General practitioners are obliged to provide the authorities with the necessary information and medical records or face a fine.

Influenza

Adult vaccination against influenza is provided by primary health care providers, namely general practitioners for adults, or by physicians in long-term health or social care facilities. If a vaccination is offered by employers, it is provided by an occupational medicine provider. It can be also provided by the Regional Institutes of Public Health (but not by the National Institute of Public Health).

Financing

Measles

Vaccination against measles is covered by social health insurance and is free of charge at the point of delivery. Primary care doctors receive the vaccines directly from distributors, who are reimbursed directly by the health insurance funds. Reimbursement for vaccine provision is included in general practitioners' capitation payments or paid fee-for-service in the case of an unregistered patient.

For people not covered by the social health insurance system, such as refugees, the state pays for vaccines and their provision directly, because vaccination is also mandatory for these people. Payment to providers is channelled through regional budgets.

Influenza

Vaccination against influenza is covered by social health insurance for defined groups of people (*see* the Governance section above). For these people, vaccination (i.e. the vaccine and its provision) is free of charge at the

point of delivery for the cheapest vaccine. Otherwise the patient has to co-pay.

If a vaccination is offered by employers, and is provided by an occupational medicine provider, it is usually also free of charge for the patient.

For all the others, it is a paid service, both for the vaccine and its provision. However, all health insurance funds have special prevention programmes for their insured, above the statutory insurance coverage. They contribute to (i.e. reimburse) their insured members for any kinds of vaccines that are not covered by statutory health insurance, up to a certain financial limit. Usually, only vaccines are covered, not their provision, and a claim for reimbursement must be made to the health insurance fund (i.e. the patient pays first and is then reimbursed).

Key barriers and facilitators

Measles

Key barriers: false stories among new parents regarding the side-effects of mandatory vaccination. The National Institute of Public Health and the Ministry of Health are responsible for health literacy and the dissemination of public health-related information. Their outreach is, however, limited.

Facilitators: fines and the vaccination requirement for preschool facility admission, as described above.

Influenza

Since vaccination against influenza is voluntary and free of charge only for some people, it is not too widely used. Promoting free-of-charge vaccination by more employers would help to increase coverage rates. However, simply including it as part of employment benefit packages does not increase coverage, because people compromise over different benefits and often choose other ones (such as contributions towards a vacation).

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Denmark

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Governance

For vaccination against both measles and rubella, the Danish Health Authority (*Sundhedsstyrelsen*) is in charge of developing and overseeing the implementation of national vaccination plans and programmes. It recommends to the Ministry of Health a vaccine for use in a publicly financed programme. Ultimately, financing is secured via legislation passed in the Danish Parliament. When considering vaccine candidates, the Danish Health Authority prioritizes according to the seriousness of the disease to be prevented. The agency has a vaccination committee with members drawn from the relevant medical specialties (paediatrics, infectious diseases, general medicine and public health) and from the Statens Serum Institut, the Danish Medicines Agency and the Danish Patient Safety Authority.

The Danish Medicines Agency is responsible for approval if no central European Medicines Agency (EMA) approval exists (which is the case for almost all new vaccines). It is also responsible for pharmacovigilance, passively receiving reports on suspected adverse events from both health care personnel and private persons (patients/family members, etc.).

The Statens Serum Institut provides vaccines for use in public tenders. They also advise health care personnel on the use of vaccines and monitor the uptake of vaccine programmes, as well as monitoring the diseases prevented by the vaccine. For influenza, they also monitor day-by-day all-cause mortality as a proxy for influenza-related mortality during the influenza season.

The Danish Patient Safety Authority monitors safe practices among health care personnel and is responsible for contact tracing.

Vaccination programmes are almost always organized nationally. An exception would be the Capital Region, which offers free hepatitis B vaccination to men who have sex with men (MSM).

There is no national vaccination plan. All vaccines are recommended, but no vaccine is mandatory.

In Denmark all residents are assigned a unique personal identification number which is used for registration of the vaccine. Since November 2015 all vaccinations are required to be reported to the Danish Vaccination Registry. It is also possible to register previously administered vaccines in this registry. The vaccination registry is run by the Danish Health Data Authority. Since May 2014 reminders are sent (from the Statens Serum Institut) to parents whose children are recorded as missing at least one childhood vaccine (including MMR). Electronic letters are sent out when the child is 2, 6½ and 14 years of age.

There are no targeted measures for specific groups in the population. Asylum seekers (children) are offered vaccinations in the asylum centres run by the Danish Red Cross and some municipalities.

The main incentive for general practitioners to vaccinate is driven by their reimbursement for the activity by the National Health Service. The cost per vaccination has been agreed between the Medical Practitioners Organization and the National Health Service.

Vaccination coverage is calculated by birth cohort. The numerator is the number of individuals registered with an administered vaccine and the denominator is the number of individuals of that age residing in Denmark at the time of calculation. Real-time data on coverage is shown on the website of the Statens Serum Institut. For influenza, the coverage is calculated for all risk groups (number of doses given per season) and by age groups, e.g. for persons aged 65 years and above (proportion vaccinated per season).

Provision

In principle, any medical doctor can administer vaccines. Doctors with type B authorization can delegate to assisting personnel, i.e. nurses.

Measles

In practice, the majority of measles vaccines are given by primary health care providers (general practitioners/nurses in general practitioner clinics). School vaccination is normally not done in Denmark but is currently being considered for certain vaccines.

Influenza

Most influenza vaccines for adults are given by primary health care providers (general practitioners/nurses in general practitioner clinics), but dedicated vaccination clinics (including mobile units/in homes for older people/in pharmacies) also perform vaccinations (provided they report their activity to the vaccination registry).

Financing

Measles

Childhood MMR vaccination is free of charge for all residents (two doses recommended at 15 months and 4 years of age; the offer ends when the child turns 18 years of age).

The cost (vaccine and vaccination fee) is covered by the National Health Service. The five regions tax their citizens and are responsible for regional health costs, including costs for vaccination. There is no patient payment. In asylum centres children are offered MMR vaccination free of charge, covered by the Danish Red Cross, which is responsible for the centres.

Influenza

Vaccination is free of charge for defined risk groups (those with a number of medical conditions, those aged 65 and over, and pregnant women in the 2nd and 3rd trimesters).

The doctors (general practitioners and vaccination clinics) buy the influenza vaccines from the Statens Serum Institut and are reimbursed by the National Health Service at a fixed price. For defined risk groups there is no patient payment. Employers may choose to pay for vaccination of employees not in the risk groups.

Despite free vaccination, the uptake of influenza vaccines for people aged 65 years and above is only around 50%. No precise data on coverage exists for the other medical risk groups.

Key barriers and facilitators

Current MMR coverage in the childhood vaccination programme is around 95% for MMR1 and around 90% for MMR2, giving only minor room for improvement (Denmark obtained WHO measles elimination status in 2017). However, coverage was lower in previous cohorts, which is why the government decided to offer free MMR vaccination for all non-immune residents as of 1 April 2018 (one dose, unlimited offer).

For adult influenza vaccination, fewer than half of the defined risk groups are currently vaccinated. There is a great variety in the ways people can get vaccinated, and organizational aspects, financing and delivery of services do not appear to be important barriers to vaccination. However, it seems the public perception of influenza as a potentially serious disease is missing.

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Danish Medicines Agency: https://laegemiddelstyrelsen.dk/en/

Danish Patient Safety Authority: https://stps.dk/en/

Danish Vaccination Registry: https://sundhedsdatastyrelsen.dk/vaccinationsregister

Staten Serum Institut: https://www.ssi.dk/English.aspx

Estonia

Kaija Kasekamp

Governance

The Ministry of Social Affairs is responsible for developing and overseeing implementation of the national immunization schedule and programmes. It is also responsible for developing and implementing the national immunization policy, and organizes the procurement of vaccines and immunoglobulins to fulfil the immunization schedule. Furthermore, it coordinates the implementation of the immunization schedule, immunization pursuant to emergency care, and immunization necessary for the prevention of an epidemic of a communicable disease.

The Ministry of Social Affairs also coordinates the activities of the Health Board and the Medicines Agency. The Health Board organizes the distribution of vaccines and immunoglobulins, carries out immunization surveillance and monitors immunization coverage. The Medicines Agency issues marketing authorizations for medicines (including vaccines and immunoglobulins) and carries out their safety and quality monitoring.

The national health insurance fund (Estonian Health Insurance Fund) is involved in immunization mainly through the financing of primary health care and school nursing. From 2019 it is planned that the Estonian Health Insurance Fund will take over the Ministry of Social Affairs' responsibility for organizing vaccine procurement.

The Communicable Diseases Prevention and Control Act regulates immunization in Estonia. Vaccines that are included in the national immunization schedule and emergency vaccinations are nationally organized and

publicly funded. Vaccinations that are not included in the immunization schedule are governed by the same legislation, but the state does not organize or finance these vaccines.

The national immunization schedule includes vaccines for children against 12 diseases: tuberculosis, hepatitis B, rotavirus, diphtheria, tetanus, whooping cough, **measles**, mumps, rubella, polio and *Haemophilus influenza* type B (Hib); the HPV vaccine has also been added to the state vaccine schedule for girls starting from 2018. For adults, a diphtheria and tetanus vaccine is included in the immunization schedule every ten years.

Adult vaccination against **influenza** has not been added to the immunization schedule; nevertheless, a health technology assessment (HTA) was conducted in 2014 by the Tartu University Department of Public Health to evaluate the impact of seasonal influenza vaccination by analysing the costs and cost-effectiveness of a nationwide vaccination of population-based target groups in Estonia. The analysis concluded that a national influenza vaccination programme for population-based risk groups would reduce both the number of influenza cases, including severe cases requiring hospitalization, and illness-related costs in both young children and older adults. Nevertheless, as of 2018, political commitments have not been made to add adult influenza vaccines to the national immunization schedule.

A National Immunization Technical Advisory Group advises the Ministry of Social Affairs on issues and decisions concerning state immunoprophylaxis. The expert group consists of representatives of the Ministry of Social Affairs, the Health Board, the State Agency of Medicines, the Estonian Health Insurance Fund, the Estonian Society of Family Physicians, the Estonian Society for Infectious Diseases, the Estonian Society of Paediatricians, the Union for Child Protection, the Estonian Nursing Association and the Immunologists and Allergists Society.

Vaccination is voluntary in Estonia. The parent or legal guardian of a child or a person with restricted legal capacity decides about the vaccination of that person. Before performing the vaccination, the health care professional checks the health of the patient and finds out whether or not they have permanent or temporary contraindications for vaccinations. In case of contraindications, vaccination is not performed or is temporarily postponed.

Vaccinations can only be carried out by a medical professional (doctor, nurse or midwife) who has completed special training. National guidelines for medical professionals have been developed to ensure safe vaccinations.

Newborns are vaccinated at the hospital after delivery according to the national immunization schedule. The family doctor or nurse is responsible for vaccinating persons on their patient list according to the immunization schedule. School-aged children and adolescents receive vaccinations at school and the school nurse carries out these vaccinations according to the national immunization schedule. Post-traumatic anti-tetanus immunizations are carried out in the emergency medical departments in hospitals. Other immunizations are provided by outpatient clinics for infectious and travel medicine, women's clinics and/or private practices.

Before each vaccination in the school, the school nurse must ask for written consent from the parent of the child even if it has already been granted for the child's admission to the school. Parental consent helps to avoid any contraindications. If the family does not want to vaccinate their children, this must be confirmed in writing. This is also mandatory when vaccinations conducted by the primary care provider are rejected.

There are no sanctions for parents or people who have decided to reject vaccination according to the immunization schedule. Nevertheless, there is a continuous media monitoring and communication strategy on increasing vaccination coverage among the population.

The Health Board supervises health care providers. The purpose of supervision is to ensure:

(a) the quality, effectiveness and safety of immunological products at all stages of their handling;

(b) compliance with the immunization procedure (safety) requirements; and

(c) completion of the immunization programme.

The Health Board monitors vaccination coverage and is responsible for overseeing the level of coverage in the country. The vaccination programmes are not based on population registries. All health care providers need to report vaccinations to the Health Board (including measles and influenza). For vaccines that are included in the national immunization schedule (measles), the health care

provider needs to report to the Health Board the number of persons in the target group and the number of persons vaccinated. This means that health care providers, such as primary care providers and school nurses, use their own patient lists as the basis to define the target groups. The coverage of the national health schedule vaccines is not calculated based on the national population registry, because of the quality of the data in the national population registry; it is assumed that it includes people who are not actually resident in Estonia. Nevertheless, for calculating influenza vaccine coverage, the Health Board uses the population registry. There are no specific target measures for population groups other than the threshold of covering 95% of children with vaccinations included in the immunization schedule. By the end of 2017, 95% of children aged 1–14 years were vaccinated against measles. Around 50 000 persons were reported to have received an influenza vaccine during 2017, out of a total population of approximately 1.3 million.

The Health Board provides a statistical overview of all immunizations and reports on the vaccination schedule four times a year. An overview of vaccination coverage is published annually on the Health Board's website and on the official national website for vaccinations: vaktsineeri.ee. On the basis of the reports, the Health Board draws up and reports data on immunization to the World Health Organization and to the European Commission. Based on these reports, the Health Board monitors immunization trends and assesses their impact on the epidemiological situation in the country. If necessary, the Health Board submits proposals for changes to the immunoprophylaxis programmes or for new activities.

The Health Board monitors the storage, distribution and transportation of immunological products in accordance with the requirements of the cold chain. Supervision of health care professionals includes, for example, a check on whether the medical professionals who are providing the vaccinations have received appropriate training and whether all vaccinations have been provided, recorded and documented in an accurate and timely manner. The Health Board also checks whether the immunizations are conducted according to the national immunization schedule, especially whether they are provided in a timely manner.

The State Agency of Medicines carries out safety and quality monitoring of medicines, including immunological products, to ensure that they meet quality and safety requirements. Post-marketing safety and quality monitoring of medicinal products is subject to adverse reaction reports from health care professionals. Health care professionals carrying out vaccinations are required to submit a notification to the State Agency of Medicines regarding all serious adverse reactions. In addition, every person can report an adverse reaction to the State Agency of Medicines. All non-serious adverse reactions are reported to the Marketing Authorization holder of the vaccine. All alert notifications received by the State Agency of Medicines are registered, identified and entered into the database. Information on adverse reactions is analysed, forwarded to the Marketing Authorization holder, the World Health Organization and the European Medicines Agency. The State Agency of Medicines publishes an overview of adverse drug reactions, including vaccines, on its website annually.

Provision

Childhood vaccinations against measles are provided at the ages of 1 and 13 years. It is a combined vaccine for measles, mumps and rubella. The first vaccine is most commonly provided by the primary care provider during a child's regular health check-ups. Family doctors are motivated to actively invite parents for child check-ups, including vaccinations, because they are a part of the quality bonus system. Health check-ups for children are mandatory for certain age groups (at 1 month, 3 months, 12 months, 2 years and pre-school) and these mostly align with the immunization schedule. School nurses mostly provide the second vaccination at the age of 13.

Since influenza vaccinations are not included in the national immunization schedule, these vaccinations are not organized at a national level. Any health care provider that has medical professionals with appropriate training can perform the vaccinations. Primary care providers or ambulatory clinics specializing in infectious and travel medicine mostly perform the influenza vaccinations.

It is mandatory for the health care provider to register all immunizations in writing or in the electronically stored immunization booklet and enter them on the health record, which, according to the most recent developments, automatically adds the data to the digital immunization booklet. An immunization certificate is issued to newborn babies on the maternity ward; for other persons the family physician or other health care provider issues the certificate. The written consent or refusal of the parent or legal representative is kept on the patient's health

records. Since Estonia has National Health Records, this information is then accessible for all health care providers in the country.

Pharmacies have not participated in vaccination programmes in the past. They are allowed to sell vaccines but, generally, pharmacies have not been allowed to vaccinate. However, in the autumn of 2018, a pilot programme was launched, allowing to provide influenza vaccinations in pharmacies during a one-month period.

Financing

All vaccinations included in the national immunization schedule, including measles, are free of charge at the point of delivery. Vaccinations not included in the immunization schedule and performed at the person's request (or on the recommendation of a doctor) are paid for out-of-pocket.

Vaccines are procured at the national level and distributed to the service providers. Until 2018, the Ministry of Social Affairs has financed vaccines from the state budget. From 2019 the Estonian Health Insurance Fund will be responsible for covering the costs of vaccines. The Estonian Health Insurance Fund is funded through social health insurance contributions in the form of an earmarked social payroll tax. Since all children are entitled to health insurance, there are no gaps in vaccination coverage as a result of having no health insurance.

Primary care and school health care are also free of charge for insured people in Estonia, which means that there is also no co-payment at the point of service delivery when receiving vaccinations. Vaccination costs are included in the capitation payment for primary care and school nursing. In primary care the providers are also incentivized with a quality bonus system to increase vaccination coverage.

Vaccines that are not included in the national immunization schedule, such as influenza, need to be paid fully out-of-pocket. The person would need to purchase the vaccine and, if the vaccination is not done by the primary care provider, might need to pay for the immunization as well. Vaccination in the outpatient centres providing immunization services are carried out on the basis of a price list set by the provider.

Employers are responsible for financing their employees' immunization and prophylactic treatment necessary for the protection of their health in those occupations where they are at risk of infection (including placement, foreign missions of military and civil structures, etc.).

The municipalities can finance the prevention and control of communicable diseases (including vaccinations), but this is rather rare. The Communicable Diseases Prevention and Control Act makes it possible for the Estonian Health Insurance Fund to finance vaccines, but so far this option has not been used.

Key barriers and facilitators

The main facilitator of vaccination coverage against measles is its inclusion in the national immunization schedule, which enables access to vaccination for all children free of charge. Vaccination is part of primary health care and health care provided at schools, which means that it is easily accessible. Primary care providers are interested in high coverage rates, because it is part of their quality bonus system. Furthermore, since there is a surveillance system in place for monitoring coverage, it is possible to take immediate action if coverage starts to decrease.

A barrier in the current system is the increase in the number of patients or their representatives who decline vaccination because of unfounded concerns. Although there is continuous communication on a national level explaining the need for vaccinations, the number of children under 2 years receiving measles vaccination is decreasing. Greater stakeholder involvement including primary care providers and other medical personnel might increase trust in vaccinations.

Adult influenza vaccination coverage is extremely low in Estonia. Although population-based vaccination of risk groups has been assessed as cost-efficient, no political commitments have been made to add adult influenza vaccines to the national immunization schedule. The high vaccination service charge might be an additional barrier for increasing coverage.

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Finland

Ilmo Keskimäki

Governance

The following agencies are in charge of developing and overseeing the implementation of the national vaccination plans and programmes:

- The Ministry of Social Affairs and Health[1] is responsible for legislation on vaccines and the national vaccination programme. In addition, the Ministry makes proposals to the government and the Parliament on including new vaccines in the national vaccination programme and decides on the purchase of vaccines used in the national vaccination programme.

- The vaccines in the national vaccination programme are purchased by the state for use in municipal health services. The municipalities/ municipal health authorities are responsible for the practical organization of vaccinations included in the national vaccination programme. For children, vaccinations are provided according to the national vaccination programme by maternity and child health clinics and school health care.

- The National Institute for Health and Welfare[2] is the expert agency on infectious disease protection and vaccinations. It monitors, evaluates and develops the national vaccination programme in order to maintain high vaccination coverage. The National Institute for Health and Welfare

1 Ministry of Social Affairs and Health: www.stm.fi
2 National Institute for Health and Welfare: www.thl.fi

also hosts expert groups supporting decision-making on the national vaccination programme. These are the National Immunization Technical Advisory Group and expert groups nominated by the National Institute for Health and Welfare for evaluating individual vaccines and vaccination strategies.

- The National Institute for Health and Welfare makes its proposals on national vaccination programme vaccines and vaccination strategies to the Ministry of Social Affairs and Health. The Ministry's Advisory Board on Communicable Diseases acts as an expert body for infectious disease protection and supervises the general trends regarding communicable diseases, and supports protection activities.

- The Ministry of Social Affairs and Health Working Group on Vaccination Purchasing prepares the financial aspects of purchases of national vaccination programme vaccines. The National Institute for Health and Welfare takes care of implementing Ministry of Social Affairs and Health decisions on purchasing vaccines, the distribution of vaccines to the municipal health authorities, and guidance on the implementation of the national vaccination programme.

Organization of vaccination programmes

- In Finland the vaccination programme is financed by the government; it is uniform and national. The local primary care authorities organize national vaccination programme vaccinations. The National Institute for Health and Welfare has issued detailed guidance on the implementation of the national vaccination programme and the practical organization of vaccinations.

- Due to a high risk of tick-borne encephalitis (TBE) in some parts of the country, the government has recently supplemented the national vaccination programme with TBE vaccination for residents in certain municipalities or areas, or for those who stay at least four weeks in summer time in the municipalities at risk. The decision was implemented in 2018.

Vaccination programme for children and adolescents

- In Finland vaccinations against eleven diseases, their sequelae and their long-term complications are available to all children and adolescents. Girls are additionally offered HPV vaccine against cervical cancer. Vaccinations under the national vaccination programme are free of charge. According to current legislation, data on vaccinations given are entered into the patient information system and transferred to the National Patient Data Repository. Citizens can access their own vaccination details in the online service.[3] Vaccination details are also entered into the Well-Baby Clinic health card given to parents/guardians of each child vaccinated.

- If a child has not received a particular vaccination at a child care clinic, this can be remedied in school health care, student health care, the army or adult health care (for example, checking the measles vaccine status of having received two doses or being ill with the disease is instructed to be done in the army and in occupational health care). In addition, there are specific instructions for children and adolescents in at-risk groups for BCG, pneumococcal conjugate, TBE and hepatitis vaccines, seasonal influenza vaccinations and vaccinations for patients receiving stem cell transplants.

Vaccination programme for adults

- Vaccines that are part of the national vaccination programme are free of charge for adults and administered at the local health centre. Vaccinations are entered into the patient information system and transferred into the National Patient Data Repository. Citizens can access their own vaccination details online (Omakanta).

- Vaccination details should also be entered on a health card given to the person vaccinated. This card will remind the person when he or she has received vaccinations and when boosters are required. As normally no reminder system exists, it is important for adults to be updated on the need of boosters for vaccinations administered in childhood and adolescence.

3 Omakanta: http://www.kanta.fi/en/omakanta

Table 1 National Vaccination Programme in Finland for children and adolescents

Age	Disease	Vaccine
2 months	Rotavirus diarrhoea	Rotavirus
3 months	Meningitis, pneumonia, sepsis and ear infection	Pneumococcal conjugate (PCV)
3 months	Rotavirus diarrhoea	Rotavirus
3 months	Diphtheria, tetanus, pertussis, polio and Hib diseases, such as meningitis, epiglottitis and sepsis	5-in-1 vaccine (DTaP-IPV-Hib)
5 months	Meningitis, pneumonia, sepsis and ear infection	Pneumococcal conjugate (PCV)
5 months	Rotavirus diarrhoea	Rotavirus
5 months	Diphtheria, tetanus, pertussis, polio and Hib diseases, such as meningitis, epiglottitis and sepsis	5-in-1 vaccine (DTaP-IPV-Hib)
12 months	Meningitis, pneumonia, sepsis and ear infection	Pneumococcal conjugate (PCV)
12 months	Diphtheria, tetanus, pertussis, polio and Hib diseases, such as meningitis, epiglottitis and sepsis	5-in-1 vaccine (DTaP-IPV-Hib)
12–18 months*	Measles, mumps, rubella	MMR
6 months to 6 years	Seasonal influenza (annually) and its complications	Influenza
1.5 to 11 years	Chickenpox	Chickenpox**
4 years	Diphtheria, tetanus, pertussis, polio	4-in-1 vaccine DTaP-IPV
6 years	Measles, mumps, rubella	MMR
6 or 12 years	Chickenpox	Chickenpox***
girls aged 11 to 12 years	Cervical cancer	HPV
14 to 15 years	Diphtheria, tetanus, pertussis (whooping cough)	DTaP

* The National Institute for Health and Welfare recommends that the first MMR vaccine dose be given at the age of 12 months.

** For children who have not had chickenpox.

*** According to the instructions issued by the National Institute for Health and Welfare

Table 2 National Vaccination Programme in Finland for adults

Vaccine	For whom and when?
Diphtheria and tetanus vaccine, DT	Persons who have received the basic series are given a booster at 25 years (DTaP), thereafter every 20 years up to the age of 65 years (dT), and then every 10 years (dT)
Polio vaccine, IPV	The basic series generally requires no boosters in adulthood. A booster is recommended for persons arriving from or departing for longer than four weeks in areas classified as at-risk by the World Health Organization.
Measles, mumps and rubella vaccine, MMR	Every adult must be protected against measles, mumps and rubella, either by having had the diseases or by having had two doses of MMR vaccine. If this is not the case, missing vaccine doses are given.
Influenza vaccine	For persons aged 65 years and over, those belonging to medical risk groups, pregnant women, and those taking care of adults for whom influenza might be severe and life-threatening.

- In addition, certain adults in risk groups are entitled to free tick-borne encephalitis and hepatitis vaccines, seasonal influenza vaccinations and vaccinations for patients receiving stem cell transplants.

Vaccinations are not mandatory in Finland but in 2017 the Law on Communicable Diseases (1227/2016) was amended and since 1 March 2018 health and social care employers have to ensure employees, including trainees and students, caring for patients and clients with a risk of negative consequences of communicable diseases have received adequate vaccinations (i.e. pertussis vaccination if taking care of children under 1 year of age, influenza vaccination if taking care of vulnerable individuals, hepatitis B vaccination for all, measles and varicella protection by disease or two vaccination doses). The regulation applies to both public and private health and social care providers. The National Institute for Health and Welfare has provided detailed instructions on the implementation of this legal provision for employers and health and social care providers. However, this regulation has met some resistance and led to unwanted litigation cases and the termination of some work contracts.

The vaccination programme for children is provided by child health clinics and school health care and administered during the children's regular health visits to these

services. These public providers monitor the uptake of the vaccinations according to the national vaccination programme. Vaccinations are not mandatory, but families very rarely refuse childhood vaccinations. The vaccination coverage in Finland under the vaccination programme is excellent for many vaccines such as DTaP-IPV-Hib (over 97% coverage), good for some such as HPV (70% coverage), but not nearly as good for influenza (34% coverage). For adults there is no similar follow-up and call system. In principle, occupational health care should have this responsibility, but usually adults themselves need to ensure that they have received at least a basic series of three vaccination doses each for tetanus, diphtheria and polio, and two doses of MMR.

It is advised that the vaccinations in the national vaccination programme are offered to migrants, including (1) children and pregnant women applying for asylum, (2) quota refugees, (3) persons who have been granted asylum, (4) adopted children, (5) foreign students using student health care, and (6) persons immigrating permanently to Finland. The National Institute for Health and Welfare has also issued detailed instructions for health care providers and professionals regarding the assessment of each migrant's existing vaccination protection and the cases where there is a need to complete the national vaccination programme vaccinations. The latter applies to vaccinations against polio, hepatitis A and B, influenza and tuberculosis. As detailed above, another targeted group for vaccinations is health and social care workers.

There are no monetary incentives or sanctions for vaccinations. The National Institute for Health and Welfare has run several campaigns on vaccinations directed at the general public. There is an ongoing seasonal campaign for seasonal influenza vaccination called "Stop influenza – take the vaccination". When the HPV vaccination was introduced into the national vaccination programme, the National Institute for Health and Welfare ran a campaign directed at adolescent girls about HPV infection, cervical cancer and HPV vaccination. The websites of these campaigns are continuously maintained by the National Institute for Health and Welfare.

The health care authorities also inform residents about vaccinations. Employers are obliged to offer vaccines to their employees if their work puts them at risk of communicable disease. Some other employers (i.e. beyond health and social care work) also offer vaccinations against seasonal influenza to their employees.

The following methods are used to estimate vaccination coverage rates at the national and subnational level:

- The National Institute for Health and Welfare maintains the National Vaccination Register (NVR) which is used to monitor and evaluate the coverage of the national vaccination programme.[4] The data are collected continuously and coverage can be estimated on a real-time basis. The results on vaccination coverage are made available on the National Institute for Health and Welfare website for national, regional and primary care authority levels.

- Vaccination details are obtained electronically directly from patient information systems. At the moment, the National Vaccination Register includes vaccinations given in public primary health care. Details of vaccinations administered in specialist medical care and private health care are planned to be added in the near future, once data transfer problems have been resolved.

- The National Vaccination Register also allows the evaluation of the benefits and safety of the national vaccination programme. By combining data from the National Vaccination Register and other health registers, information such as the effectiveness of influenza vaccines can be obtained almost in real time. The denominator figures are obtained from the national population registries which are considered accurate enough for this purpose.

Provision

According to the national vaccination programme, vaccinations against measles are administered at the age of 12–18 months and at the age of 6 years. Measles vaccination is combined with vaccinations against mumps and rubella. The vaccinations are provided by child health clinics organized by the municipal primary care authorities.

Seasonal influenza vaccine is included in the national vaccination programme only for those over 65 years of age and for those to whom influenza poses a substantial threat to health. Since 2012 seasonal influenza vaccines have also been offered to family members of persons vulnerable to

4 www.thl.fi/en/web/vaccination/vaccination-coverage

a serious case of influenza. This includes family members of older persons, newborn infants, pregnant women and persons with immunodeficiencies. Informal carers are also given the shot free of charge. These vaccines are regularly provided by the municipal primary care authorities at local health centres. In cases where the employer provides seasonal influenza vaccines to their employees, vaccination takes place at occupational health services.

Persons not belonging to the groups listed above can request a prescription for the vaccine from a medical doctor, buy the vaccine at the pharmacy and visit the local health centre, occupational health service or a private clinic to be vaccinated. Guidelines on vaccinations are issued by the National Institute for Health and Welfare.

Financing

All vaccinations in the national vaccination programme, including against **measles**, are free of charge for the patient.

The purchasing of the national vaccination programme vaccines is funded from the state budget. The vaccination services are organized by the municipal primary care authorities and funded by the municipalities. The municipalities have the right to levy taxes and they also receive state subsidies.

The main gaps in financing vaccination services apply to undocumented migrants and EU and ETA citizens who are not covered by health insurance in their home country. Some large municipalities, such as Helsinki, Espoo and Turku, have decided to provide health services not granted by national legislation to these groups. These services include childhood vaccinations.

As a general rule, vaccinations included in the national vaccination programme are free of charge for the patient. The national vaccination programme covers vaccination against **influenza** for those over 65 years of age and for those to whom influenza poses a substantial threat to health as well as their family members. Other specific groups for whom influenza vaccination is provided free of charge are personnel in health and social care and pharmacy services, pregnant women, children aged 6–35 months, and men and women starting their conscript or voluntary service in the army.

The financing of adult influenza vaccinations comes from multiple sources. The vaccinations under the national vaccination programme are purchased by the state and vaccination services are organized and funded by the municipal primary care authorities. The vaccinations provided by employers are funded primarily by them, but the costs are partly reimbursed by the Social Insurance Institution. Those who are not in the above groups have to cover at least the cost of the vaccine but if the vaccination is given at a public health care, it is usually free of charge.

Key barriers and facilitators

In Finland the coverage of MMR vaccination is quite high, reaching 94% among children born in 2015, and has somewhat improved during recent years. However, the coverage is slightly lower than 95% which is considered to be the level necessary to prevent outbreaks of measles. In addition, there are areas with coverage below 90%. The inadequate coverage is probably not so much related to the vaccination system which in general is considered to operate well but to the health beliefs of the parents. According to some anecdotal evidence, this is also an explanation for low local vaccination coverage in some areas of the country with higher support for vaccine-sceptic opinions.

The coverage of seasonal influenza vaccine has improved but is still relatively poor in Finland even in the large groups eligible for free-of-charge vaccines; in the 2017/18 season coverage among those aged over 65 years was 47.6% and for children aged 6-35 months it was 34.5%. Among the working-age population, coverage is even lower: 30.1–34.6% in women and 23.2–25.9% in men aged 30–59. The out-of-pocket pharmacy cost of influenza vaccines (€10–14) is probably not the main reason for low coverage but the complicated system for getting vaccinations when the person is not eligible for free-of-charge vaccination might be a factor. These complications include time costs related to requesting the vaccine prescription from a physician, purchasing the vaccine at a pharmacy, and visiting a health centre for vaccination. In addition, influenza is not generally understood to be a serious illness. However, the public campaigns for increasing coverage have improved the situation to some extent.

An additional factor influencing public attitudes to influenza vaccination is the fact that Finland was one of the countries affected by several cases of narcolepsy as a consequence of the mass vaccinations for Influenza A (H1N1)

in 2009/10. These adverse effects resulted in public debate and raised concern regarding the safety and effectiveness of influenza vaccines.

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France

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Governance

The Ministry of Health is responsible for developing and overseeing the implementation of national vaccination plans and programmes. Each year the national immunization programme is set out by the Minister of Health on the basis of proposals made by the Technical Commission on Immunization of the French National Authority for Health (*Haute Autorité de Santé*). Implementation is the responsibility of regional health agencies (*Agences regionales de santé*) that are charged with ensuring that the provision of health services meets the needs of the population and with implementing regional health policies in relation to mother and child health (*protection maternelle et infantile*). Health care providers are obliged to report cases of measles to the relevant regional health agency.

The French National Public Health Agency (*Santé publique France*), created through the merger of two key public health bodies, the French Institute for Public Health Surveillance (*Institut de Veille Sanitaire*) and the National Institute for Prevention and Health Education (*Institut national de prévention et d'éducation pour la santé*), monitors the implementation of the immunization plan. It provides statistics on the share of the targeted population that has been immunized and on the number of cases of vaccine-preventable diseases. Infant vaccination coverage is mainly calculated through the returns of mandatory health certificates when a child reaches their second birthday. More recently, and for older children, vaccine coverage is also measured through the databases of the statutory health insurance about health care utilization. All health services that are reimbursed through the statutory health insurance are registered in these databases (*see* for instance:

http://invs.santepubliquefrance.fr/Dossiers-thematiques/Maladies-infectieuses/Maladies-a-prevention-vaccinale/Couverture-vaccinale/Donnees/Grippe). Statutory health insurance is the single public payer for health services in France, and through various schemes it covers more than 99% of the resident population.

The National Public Health Agency is also in charge of raising the awareness of the population about the importance of immunizations against vaccine-preventable diseases such as measles and influenza. It produces information materials for patients, parents and health professionals, including leaflets, flyers and posters, as well as vaccination campaigns through the media and the Internet. Many of these documents are also available online. A website managed by the National Public Health Agency provides comprehensive information on immunization programmes and vaccines.[1] It aims to increase the trust of the population in publicly organized vaccination programmes and to provide all the information needed about vaccination. A version for health professionals has also been launched in 2018.

Since January 2018 there have been 11 mandatory immunizations for children before the age of two. These are against tetanus, diphtheria, poliomyelitis, *Haemophilus influenzae* type b, pertussis, *Streptococcus pneumoniae* (pneumococcal vaccine), group C *Neisseria meningitidis* (meningococcal C vaccine), hepatitis B, rubella, measles and mumps.

Vaccination against measles is thus compulsory for children who must receive two injections between the ages of 1 and 2 years for all children born since January 2018. In order to extend immunization coverage, children born after 1980 should also have received two doses. Unvaccinated children are not admitted to any kind of social life (day nurseries, crèches, schools, leisure activities, holidays camps, etc.). There is no further sanction or fine for parents who do not have their children vaccinated, but they could be legally pursued for compromising their child's health.

Immunization against measles is recommended for health professionals and professionals working with young children.

Immunization against seasonal influenza is recommended for all people aged 65 years and over, as well as for individuals with certain chronic conditions (such as lung diseases, cardiovascular diseases, neurological diseases, kidney and liver diseases, diabetes, cancers and immunity disorders), pregnant women, obese people, relatives of particularly vulnerable newborns (such as premature newborns, newborns with congenital heart disease, immune deficits, lung disease, or neurological disease). Immunization against influenza is also recommended for residents of nursing homes irrespective of their age, as well as for health professionals, including pharmacists, and people working in the travel sector (e.g. on ships and planes).

Provision

Childhood vaccinations against measles

Most childhood vaccinations against measles are administered by self-employed general practitioners. However, they can also be administered by hospital doctors, nurses (if prescribed by a doctor), in public vaccination centres, in mother and child health services, and by midwives for pregnant women, cohabitating relatives, and relatives of newborns under the age of eight weeks.

When the vaccination is to be administered by a self-employed health professional, it is first prescribed by a physician; the parents then have to obtain the vaccine from a pharmacy and return with it to the health professional who administers the vaccination. When administered in a public vaccination centre, or a mother and child health service, the prescription, delivery and administration of the vaccine are usually done by the health care provider.

Adult vaccinations against influenza

Most adult vaccinations against influenza are also performed by self-employed general practitioners. However, they can also be administered by hospital doctors, nurses (for at-risk adults for whom vaccination is indicated), in a public vaccination centre, in a medical centre managed by the statutory health insurance, by a midwife (for women and relatives of a newborn at high risk), and by mother and child health services for children below 7 years and pregnant women.

For individuals who are not at increased risk, when the vaccination is to be administered by a self-employed health professional, it is first prescribed by a physician,

1 https://vaccination-info-service.fr

then the patient has to obtain the vaccine from a pharmacy and return with it to the health professional who administers the vaccination.

Every year in the autumn the statutory health insurance sends a personal invitation to be vaccinated against influenza to all insured people covered by the recommendations (with the exception of pregnant women and obese people, who are difficult to identify as such in the database). The person will be given the vaccine for free from a pharmacist when showing the invitation letter, and will then visit a health professional (doctor, nurse or midwife) to receive the vaccination.

If a person of the targeted population does not receive an invitation (e.g. pregnant women and obese people), a physician can prescribe the vaccine on a specific form and the patient will receive the vaccine for free from the pharmacist.

Since October 2017 pharmacists have been allowed to vaccinate against influenza, on a voluntary basis. A pilot was conducted in two regions (Auvergne-Rhône-Alpes and Nouvelle Aquitaine) for the influenza season 2017/18. For the next season (2018/19) the pilot will be extended to two additional regions (Occitanie and Hauts-de-France). It is foreseen that all pharmacists in all the regions of France, including overseas departments, will be allowed (if they want to) to vaccinate against influenza from October 2019 onwards.

Financing

Childhood vaccinations against measles

In France vaccines used in both mandatory and recommended immunizations are covered by statutory health insurance.

When immunization against measles is administered by a self-employed health professional, patients can receive the vaccine for free from a pharmacy (on production of their statutory health insurance card) when they are between 1 and 17 years of age. If they are 18 years or older, the costs are covered by statutory health insurance at a rate of 65%, with the remaining costs covered for about 95% of the population by complementary voluntary health insurance. In practice, the vast majority of the population receives the vaccine for free and the pharmacist is reimbursed by the statutory and complementary health insurance. Patients have to pay 70% of the service fee for the visit to the health professional who administers the vaccine. The remaining 30% of the service fee is covered for about 95% of the population by complementary voluntary health insurance.

When the vaccines are administered in public vaccination centres, or mother and child health services, they are usually free at the point of delivery and no payment has to be made out of pocket for the vaccines or their administration. The costs of the vaccines are covered by statutory health insurance. Vaccination centres are financed by the state, and mother and child health protection services by local government at department level.

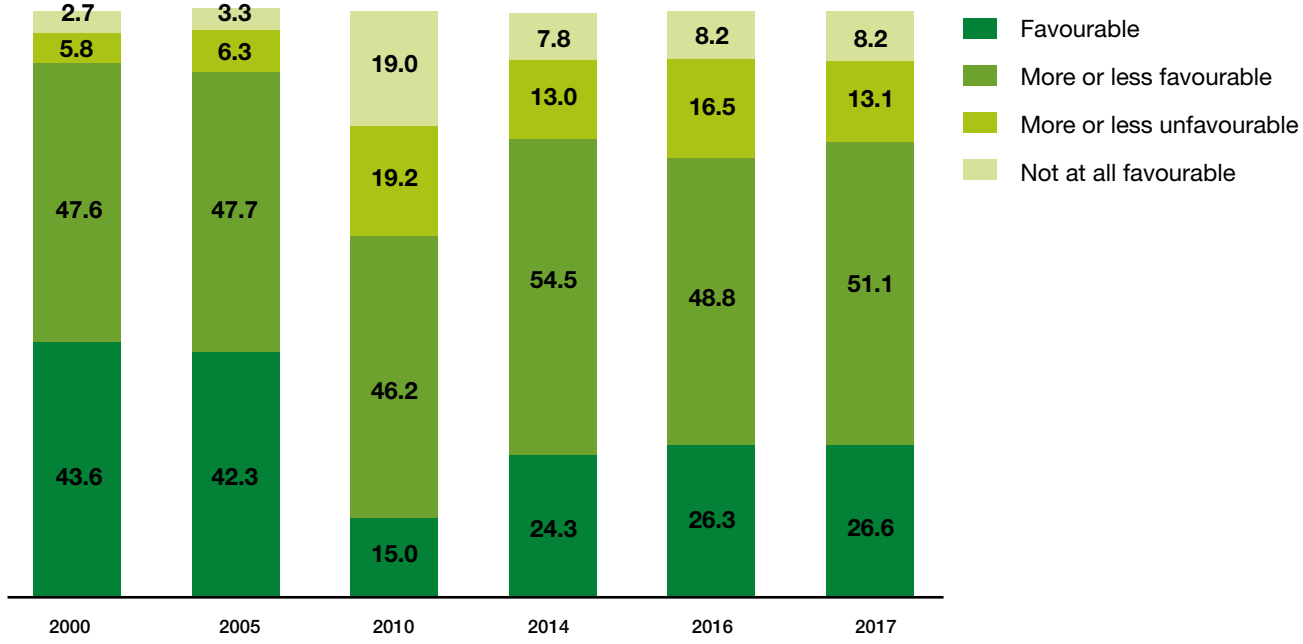
Adult vaccinations against influenza

Vaccines for immunizations against influenza are also fully covered by statutory health insurance for the targeted population and there are no out-of-pocket payments. When immunizations against influenza are administered by a self-employed health professional, people can obtain the vaccine for free from the pharmacy if they belong to the targeted population groups and provide their invitation letter from the statutory health insurance or the specific form for prescription. Patients then have to pay 70% of the service fee for the visit to the health professional who administers the vaccine. The remaining 30% of the service fee is covered for about 95% of the population by complementary voluntary health insurance cover. When the vaccines are administered in a public vaccination centre, or by a mother and child health service, they are free at the point of delivery and no payment has to be made.

Key barriers and facilitators

The main barriers for effective immunization coverage in France are public (mis)perceptions on immunization and the safety of vaccines, oversight and negligence. According to the regular Health Barometer survey, favourable attitudes towards vaccination declined markedly between 2000 and 2017 (Figure 1). In 2010 almost 40% of respondents had negative attitudes towards immunization. This was mainly due to the failure of the H1N1 campaign, with negative media reports, lack of involvement of private physicians, concerns over the safety of vaccines, and sometimes beliefs that immunization is recommended under the pressure of pharmaceutical companies for vested financial interests.

Figure 1 Attitudes towards vaccination (in %) among 18–75 year-olds in France, 2000–2017



Sources: Baromètres santé, 2000, 2005, 2010, 2014, 2016, 2017, Santé publique France

Although attitudes towards vaccination have again improved (with only 2.2% of the population against all types of immunizations), distrust towards some vaccines persists. Immunization against influenza shows the highest rate of distrust (nearly 15% of people aged 18 to 75 years in 2017), with people aged between 25 and 49 years having the most negative attitudes.

In the 2016 Health Barometer survey (Gautier et al., 2017), parents of children aged between 1 and 15 years were more in favour of immunization than any other groups of the population (i.e. people without children or with children below 1 or above 15 years; OR adjusted by age, gender, level of education, income and region = 1.2; $p<0.01$). However, one quarter of parents surveyed in 2016 reported that they had refused a recommended vaccination because they thought the vaccines were not safe or useful; 17% reported that they had postponed an immunization recommended by their doctor because they were unsure; and over a quarter reported that they had accepted an immunization despite having had doubts about its efficacy.

The main facilitators of effective vaccination coverage in France are excellent access to immunization services, public coverage of the costs of vaccinations, and information and education campaigns.

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Germany

Miriam Blümel

Governance

In 2001 the "German Protection against Infectious Diseases Act" (the law on prevention and control of infectious diseases in humans) came into force and defined the basics for vaccinations with the aim of protecting the population from communicable diseases. The Federal Institute for Infectious and Non-Communicable Diseases (Robert Koch Institute) is a subordinated agency of the Federal Ministry of Health. It is the government's central scientific institution in the field of biomedicine and an important body for the safeguarding of public health in Germany. Among other tasks, the Robert Koch Institute is charged with identification, surveillance and prevention of infectious diseases. The tasks of the Robert Koch Institute are specified in § 4 of the German Protection against Infectious Diseases Act (2001).

The Robert Koch Institute is advised in its technical and regulatory tasks by several committees, including the Standing Committee on Vaccinations. The Standing Committee on Vaccinations is an independent advisory group that develops national recommendations for the use of licensed vaccines. It consists of 12 to 18 unpaid members representing different expert fields who are appointed by the Federal Ministry of Health for a period of three years.

Vaccination recommendations by the Standing Committee on Vaccinations apply nationally and are based on the criteria of evidence-based medicine. While the Federal Institute for Vaccines and Biomedicines (Paul Ehrlich Institute) is responsible for licensing vaccines with regard to product-specific efficacy, safety and quality, the

Standing Committee on Vaccinations analyses the individual benefit-risk ratio, but also studies epidemiology at the population level and the effects of a nationwide vaccination strategy for Germany. In addition, the Standing Committee on Vaccinations develops criteria to delineate a common vaccine response from a health impairment beyond the usual extent of a vaccine response. The Committee's recommendations are considered medical standard. While the Committee's recommendations are not binding, they provide the basis for the vaccination guidelines of the Federal Joint Committee. After publication of a new Committee recommendation, the Federal Joint Committee has three months to decide if they will include this recommendation in the vaccination guidelines. If they decide against it, they must provide the arguments that led to the rejection. Once a vaccination is included in the guidelines, it is covered under statutory health insurance. As already mentioned, the recommendations of the Standing Committee on Vaccinations apply nationally. However, the German Protection against Infectious Diseases Act gives the federal states the opportunity to make special arrangements for their own federal state. The federal state recommendations are relevant for the vaccine injury compensation programme.

The Standing Committee on Vaccinations' recommendations are usually published once a year in the *Epidemiological Bulletin* and on the websites of the Robert Koch Institute. Since 2004 detailed explanations of the recommendations have also been published. The recommendations include a vaccination schedule of standard vaccinations for infants, toddlers, children, adolescents and adults, and a table of indication and booster doses with explanatory notes. According to the vaccination schedule, infants receive primary immunization for tetanus, diphtheria, pertussis, poliomyelitis, hepatitis B, *Haemophilus influenzae* type B, pneumococcal disease and rotaviruses. Toddlers should receive primary immunization for meningococcal disease (Serogroup C), **measles**, mumps, rubella and varicella. Human papillomavirus (HPV) is a standard vaccination for girls and boys aged between 9 and 14 years. The Standing Committee on Vaccinations also recommends an annual vaccination against **influenza** and pneumococcal vaccination from the age of 60 (*see* Table 1).

The Standing Committee on Vaccinations gives recommendations for the use of vaccinations for infants, toddlers, children, adolescents, adults, adults older than 60 years and for certain high-risk groups (e.g. patients with chronic conditions). However, there is no mandatory vaccination in Germany. Adults can therefore decide for themselves and parents can decide for their children which vaccinations they receive.

In 2015 the Act to Strengthen Health Promotion and Prevention came into force with the aim to improve disease prevention and health promotion by regulating vaccination policy through a range of legal measures. For instance, children will only be admitted to day-care facilities if the parents can prove that they have taken medical advice from a physician. If this proof is not provided, the responsible health authority will be informed. Parents who refuse the counselling can be fined up to €2500. In case of a measles outbreak in a day-care facility or school, the institution is allowed to exclude unvaccinated children from attendance. Furthermore, the recruitment of employees in medical facilities can be made dependent on their vaccination coverage and immunization status.

According to the "German Health Interview and Examination Survey for Children and Adolescents" (KiGGS) conducted by the Robert Koch Institute, adolescents with a migration background from both parents represent a population group with a relatively low vaccination rate. Various welfare services and non-governmental organizations have developed primary prevention projects in collaboration with the responsible health authorities, the Robert Koch Institute and the Federal Ministry of Health in order to better reach this group. For example, the university medical centre Charité Berlin has launched the *Impfbus* ("vaccination bus") project. This mobile vaccination centre drives to schools, informs pupils about necessary vaccinations, and conducts them (with parental consent). The vaccination bus also supports the medical care of refugees.

In Germany a national immunization register does not exist. However, nationwide and continuous surveillance of vaccination coverage is available from school entrance examinations since 2001. As a second pillar for the nationwide monitoring of vaccine uptake, the Robert Koch Institute coordinates *KV-Impfsurveillance* (KV-Vaccination Surveillance) in cooperation with the 17 Regional Associations of SHI-Accredited Physicians (KV) to monitor vaccination coverage in all age groups, in specific risk groups and at district level. All 17 Regional Physicians' Associations send anonymized payroll data on vaccination services, child and adolescent health check-ups and diagnoses of vaccine-preventable diseases from ambulatory care physicians to the Robert Koch

Table 1 Vaccination recommendations 2018/19

AGE / VACCINE	INFANTS (Weeks)			INFANTS (Months)	TODDLERS		CHILDREN (Years)			ADOLESCENTS			ADULTS	
	6	2	3	4	11-14	15-23	2-4	5-6	7-8	9-14	15-16	17	from 18	from 60
			U4		U6	U7	U7A/8	U9	U10	J1				
Tetanus		G1	G2	G3	G4	N		A1	N	A2		N	A [f]	
Diphtheria		G1	G2	G3	G4	N		A1	N	A2		N	A [f]	
Whooping cough Pertussis		G1	G2	G3	G4	N		A1	N	A2		N	A [f]	
Polio Poliomyelitis		G1	G2 [a]	G3	G4	N				A1		N	N (if required)	
Hepatitis B		G1	G2 [a]	G3	G4	N								
Hib Haemophilus influezae type b		G1	G2 [a]	G3	G4	N								
Pneumococcal disease [g]		G1		G2	G3	N								S [c]
Rotaviruses	G1 [b]	G2	G3											
Meningococcal disease Serogroup C					G1 From 12 months		N							
Measles					G1	G2	N						S [d]	
Mumps Rubella					G1	G2	N							
Chicken Pox Varicella					G1	G2	N							
Flu Influenza														S (annually)
HPV Human papillomaviruses										G1 [e] G2 [e]	N [e]			

G **PRIMARY IMMUNISATION**
(up to 4 doses of vaccine G1-G4)

S **STANDARD VACCINATION**

A **BOOSTER VACCINATION**

N **CATCH-UP VACCINATION**
(primary immunisation of persons not yet vaccinated or completion of an incomplete vaccination series)

U **Well-child visit**

J **Well-adolescent visit**
(J1 aged 12-14 years)

a This dose is not required if a monovalent vaccine is administered.

b The 1st vaccine dose should be administered from the age of 6 weeks. Depending on the type of vaccine, 2 or 3 doses are required at intervals of a minimum of 4 weeks.

c Vaccination with polysaccharide vaccine, booster vaccination only recommended for specific indications.

d Single dose vaccinations for all individuals ≥ 18 years with unclear vaccination status and who were born after 1970, who have not been vaccinated or only received one vaccination as a child. Preferably with an MMR vaccine.

e Standard vaccination for girls ages 9-14. For catch-up vaccinations and number of vaccine doses see the summary of product characteristics.

f Td booster vaccination every 10 years. The next Td vaccination that is due is to be administered as a single dose vaccination in the form of Tdap or, if indicated, in the form of a Tdap-IPV combination vaccination.

g Premature infants receive an additional dose of vaccine at the age of three months, i.e. a total of 4 doses.

Source: German Standing Committee on Vaccination recommendations, 2018/19

Institute, covering all age groups. Based on these data, vaccination coverage rates can be assessed in a representative manner for different age groups (at least for people who are insured through statutory health insurance, i.e. around 87% of the German population) and at district level. Some of the regionalized data (measles and rotavirus vaccination) are made publicly available online.[2]

Provision

Every physician in ambulatory care is allowed to provide vaccination services, irrespective of their specialization. Childhood vaccination against measles is usually undertaken by paediatricians as part of routine health check-ups for children. Adult vaccinations against influenza can also be provided by any physician, not only general practitioners. Company physicians are also allowed to conduct general vaccinations, such as against influenza. In addition, vaccinations are also organized and carried out by the health authorities.

Financing

Childhood vaccination against measles is free of charge at the point of delivery and there are no co-payments. Vaccination against measles is included in the vaccination guidelines of the Federal Joint Committee and is therefore a mandatory benefit under statutory health insurance. The statutory health insurance funds cover the costs of vaccinations against measles for children and all adults born after 1970, and for all other vaccinations listed in the guidelines. According to the Association of Private Health Insurance Companies, vaccination coverage is regulated individually by every health insurance company. As a rule, private health insurance companies cover the costs of vaccinations recommended by the Standing Committee on Vaccinations. Health authorities, which also provide vaccination against measles, are financed through the federal state government.

Refugees are also entitled to (childhood and young adult) vaccination against measles, but the regulations are complex and access to health care varies between the federal states. During the first fifteen months of stay (1) some states require prior authorization for any medical treatment beyond emergency treatment (i.e. also for vaccination); (2) some states offer vaccinations in designated facilities; and (3) other federal states have opted for coverage of medical services under the statutory health insurance scheme. Irrespective of the means of access, vaccinations for refugees, as well as other medical treatments, are all financed through the federal state governments. Also nongovernmental organizations play a pivotal role in providing measles vaccinations to migrants and to other children without health insurance coverage.

For **adult vaccinations against influenza**, the same rules apply as in the case of measles vaccination. Vaccination is a mandatory statutory health insurance benefit and free of charge at the point of delivery for those population groups listed in the vaccination guidelines of the Federal Joint Committee. Listed groups include adults aged 60 years and older, pregnant women and all people with an increased health risk due to an underlying disease. Numerous sickness funds offer a range of vaccinations beyond those listed in the guidelines as a voluntary benefit, e.g. vaccination against influenza for insured persons who are not included in the risk groups.

For the upcoming influenza season (2018/19), the Standing Committee on Vaccinations is changing its recommendation on influenza vaccination. According to its assessment published in January 2018, the Committee sees an added benefit of a quadrivalent vaccine compared to a trivalent one. For the 2018/19 season the Joint Federal Committee has included the recommendation in the vaccination guidelines and thus created the conditions for allowing those with statutory health insurance to be vaccinated against seasonal influenza with a quadrivalent vaccine.

People who are not eligible for vaccination against influenza have to pay the physician out-of-pocket. However, many companies provide free-of-charge vaccinations for their employees.

Key barriers and facilitators

Although vaccination is not mandatory in Germany, measles immunization coverage among 3-year-olds with one vaccine dose has been at about 97%, which is above the EU average. Immunization uptake and paediatric immunization rates have been steadily rising over the last decade. However, gaps still persist in the second dose of measles vaccine. About every third person among people older than 60 years is vaccinated against seasonal influenza, which is close to the EU average (OECD/European Observatory on Health Systems and Policies, 2017).

2 http://www.vacmap.de/

A facilitator for measles vaccination was the harmonization of the immunization schedule with routine health check-ups for children, and moving the second measles vaccine dose from age 6 into the second year of life. After this change in the immunization schedule, second dose coverage especially increased dramatically. A barrier to improved vaccination coverage against measles is the low coverage achieved 20 years ago and earlier, and the lack of a systematic catch-up for these age groups. The decentralized and privatized vaccination system in Germany has problems in actively reaching out to these age groups of adolescents and young adults and in systematically closing the remaining gaps. There is a routine adolescent check-up, but it is only taken up by approximately 50% of adolescent children.

For influenza, important barriers to improved vaccination coverage are the perceptions of the adult population in respect to the need for the vaccine and the severity of the disease, and mistrust in the vaccine and its perceived safety and effectiveness (Bödeker et al., 2015).

To give physicians in ambulatory care a financial incentive to provide vaccinations (or at least not to prevent vaccination for financial reasons), there is a separate remuneration mechanism for all listed vaccinations. Unlike many other primary care services, vaccinations are not tied to budget restrictions.

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Greece

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Governance

Key agencies

According to the decision of the Ministry of Health (Υ1/ΓΠ 161682/2008), the National Immunization Committee is the body of the Ministry of Health and Social Solidarity that is responsible for advising on recommended vaccines. The Ministry determines the national vaccination programme, after the issuance of a joint ministerial decision by the Minister of Finance, the Minister of Labour and Social Security and the Minister of Health and Welfare.

The National Immunization Committee is responsible for recommendations on the drafting and updating of the national vaccination programme and vaccination recommendations for the general public. It is also responsible for providing vaccination recommendations regarding specific population groups and health professionals; for providing vaccination recommendations in the event of epidemics, pandemics and public health emergencies, including the setting of vaccination priorities; for the drafting of proposals for the development of population vaccination programmes in the country or for subgroups, and for the monitoring of their implementation; for the monitoring of epidemiological data on diseases prevented by vaccination; for taking measures to ensure the adequacy of vaccines and sera; and finally for the identification or modification of the technical specifications for vaccines and sera according to the specifications of the World Health Organization (WHO).

Vaccination programmes

In Greece, on the basis of systematic scientific documentation, epidemiological data and economic weighting, and taking into account the guidelines of WHO and the European Centre for Disease Prevention and Control (ECDC), the child and adolescent vaccination programme and the adult vaccination programme are drawn up at the national level, and include and explain the timetable for all vaccines recommended to the general public and to groups at high risk. The national vaccination programme includes the vaccination plan for measles for children and for influenza for adults.

Vaccines included in the national vaccination programme are recommended but, in accordance with current legislation, sanctions are not imposed on those who do not want to be vaccinated or vaccinate their children. However, enrolment of pupils in kindergarten and primary school requires vaccination in accordance with the national vaccination programme, as shown on each pupil's health card (No. Φ.6/451/115136/Γ1/16-9-2010 circular of the Ministry of Education, Research and Religious Affairs). Therefore the vaccination of children is becoming in a sense mandatory, with adult vaccination remaining recommended.

For **measles**, due to the recent epidemic outbreak in Greece, the National Immunization Committee, under the auspices of the Ministry of Health, has drawn up a circular recommending the immediate vaccination of children, adolescents and adults who have not been vaccinated. According to the national vaccination programme, children, adolescents and adults born after 1970 who have no history of the disease should be vaccinated with two doses of measles vaccine in the form of a monovalent measles vaccine or a trivalent MMR vaccine. In addition, it is recommended that the first dose of the MMR vaccine is administered at the age of 12 months and the second dose three months after the first dose or as soon as possible thereafter. In high-risk cases the second dose may be administered a minimum of four weeks after the first dose. These recommendations apply for as long as the epidemic outbreak of measles is in progress and until a new Committee decision is issued. The Centre for Disease Control and Prevention carries out activities to inform the public, as well as vaccination interventions for vulnerable population groups. The evolution of the epidemic in Greece is systematically monitored by the Ministry of Health and the Centre for Disease Control and Prevention and, according to its progress, guidelines are issued based on the current data and the opinion of the competent scientific bodies.

A circular for **influenza** vaccination is issued by the above-mentioned agencies on an annual basis. Influenza vaccination includes only one vaccine dose and is recommended for all people aged over 6 months, if they wish to have it. Particular emphasis is placed on the importance of influenza vaccination for individuals belonging to the so-called high-risk groups. The Health District Governors, the General Directors for Public Health and Social Welfare of the Districts and the Public Health and Social Care Directors of the Regional Units, as well as the mayors of the Kallikratis Municipalities of the country, collaborate with the Centre for Disease Control and Prevention in organizing joint actions to inform the public and special populations (e.g. schools) about both influenza and the importance of influenza vaccination through the distribution of printed material, speeches, social messages in the media, etc. The National Organization for Medicines (EOF) is responsible for the adequacy of the vaccine in the Greek market throughout the transmission period of the influenza virus. The activity of influenza and the circulating virus strains are monitored through the Centre for Disease Control and Prevention's supervision networks, with laboratory supervision in the Greek Influenza Report Centres. The notification of each laboratory-confirmed influenza case is made at the Centre for Disease Control and Prevention, which sends the annual epidemiological surveillance report on influenza to the Public Health Directorate of the Ministry of Health. An epidemiological surveillance bulletin on influenza is issued on a weekly basis, including information on the vaccination status of severe laboratory-confirmed influenza cases hospitalized in intensive care units, as well as on the vaccination status of those who died. There is no dedicated official responsibility for call and follow-up for those who have not been vaccinated against measles or influenza. The vaccine and the vaccination performed are recorded in the personal Booklet of Child Health (in writing) and in the national electronic database that is linked to the National Register of Social Insurance for both children and adults.

Special programmes

To address the health needs of refugees, asylum-seekers and irregular immigrants in Greece, a relevant circular has

been issued, according to which they should be vaccinated as a matter of priority against measles, rubella, mumps, diphtheria, tetanus, pertussis and poliomyelitis, and newborns against tuberculosis. If epidemiological supervision reveals a series of cases, meningococcal and influenza vaccination is recommended during the virus circulation period, at the age of ≥ 6 months. In the second year, and if their stay in the country is prolonged, vaccinations are supplemented according to the national vaccination programme and a tuberculin-reaction check is performed. The above recommendations are updated depending on epidemiological data and the availability of vaccines.

Vaccination coverage

Vaccination coverage of the population is researched at the national level through studies conducted by the National School of Public Health, by the country's universities, by the Centre for Disease Control and Prevention, and by the Hellenic Statistical Authority, in collaboration with the Ministry of Health. Vaccination coverage of children in Greece against measles is maintained at a high level. However, vulnerable social groups such as the Roma have a low level of vaccination coverage. As far as adult influenza vaccination is concerned, there has been an increase, but it is still at low levels compared to the European goal.

Provision

Vaccines are provided to the Health Centres of the Health Districts of the country and to the Public Health Directorates of the Regional Units. The health professionals who administer the vaccines are mostly nurses and physicians in the public and private sectors. Special cases, such as mobile populations (e.g. refugees, asylum applicants) with no National Register of Social Insurance, are being vaccinated by organizations such as nongovernmental organizations or the National Red Cross following the Centre for Disease Control and Prevention's guidelines.

Financing

Vaccines included in the national vaccination programme, including those against measles for children and against influenza for adults, are provided free of charge to all legal residents in the country, whether insured or not, including asylum-seekers. Vaccines are covered through the Greek National Health Service Organization (EOPYY) and by extension from the state budget. There are no charges at the point of delivery for vaccinations included in the national vaccination programme.

Key barriers and facilitators

Obstacles and facilitators of effective vaccination coverage for measles and influenza are common. The development and extent of the anti-vaccination movement constitute a major obstacle to increasing the rate of vaccinations. At present, vaccinations are not mandatory and sanctions are not imposed. In addition, a large percentage of Greek citizens are unaware of the existence of adult vaccination and consider vaccinations to be an issue only for children. The absence of a national vaccination archive also inhibits the search for those who refuse vaccination or those who need to update their vaccination status. The free provision to everyone of the vaccines included in the national vaccination programme is, however, a major facilitator of vaccination coverage in Greece.

References

Law 2676/1/5-1-1999.

No.Υ1/ΓΠ 161682/22-12-2008 consult of Hellenic Ministry of Health.

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Hungary

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Governance

In Hungary vaccination programmes are regulated by Decree No. 18/1998 (VI. 3.) NM of the Minister of Welfare on the Prevention and Control of Infectious Diseases and Epidemics. The Decree specifies a so-called vaccination guideline,[1] which has, since 2017, been issued by the Ministry of Human Capacities, to update all the necessary knowledge on vaccination, including the practical tasks regarding the implementation of the vaccination programmes, general and specific indications and contraindications of vaccines, the storage and use of vaccines, registration and reporting requirements, as well as other provisions and recommendations on a yearly basis.

The Decree categorizes vaccinations into five main groups:

1. **Mandatory, free-of-charge routine childhood immunizations** (tuberculosis, diphtheria, pertussis, tetanus, poliomyelitis, **measles**, rubella, mumps, *Haemophilus influenzae* type B, hepatitis B, Streptococcus pneumoniae);

2. **Mandatory, free-of-charge immunization where there is risk of infection** (people living in the vicinity of typhoid, diphtheria, pertussis, **measles**, rubella, mumps; hepatitis A patients; people at risk of tetanus or rabies infection; newborns of hepatitis B carrier mothers; health workers and students);

1 Article 4, section (2). Before 2017 the vaccination guideline was issued by the National Centre of Epidemiology, which was integrated into the National Public Health Institute.

3. **Voluntary, free-of-charge immunization where there is risk of infection** (diphtheria; hepatitis B (e.g. family members of people with hepatitis B infection; patients on dialysis; oncology patients; IV drug users); **influenza**; HPV for girls aged 12+);

4. **Mandatory** (e.g. yellow fever) **and optional** (e.g. hepatitis A) **vaccination for travellers**; and

5. **Occupation-related mandatory vaccination** (e.g. tetanus, tick-borne encephalitis, hepatitis B).

The minister responsible for health (the Minister for Human Capacities) is assigned the power to control and supervise the prevention and elimination of communicable diseases, which is delegated to the national chief medical officer.[2] The national chief medical officer is authorized to act on their own where there is a risk of epidemics.[3] Local official activities are under the scope of authority of County and District Government Offices.[4] The deputy state secretary for the affairs of the chief medical officer is responsible for the development of national immunization programmes, and the coordination and supervision of implementation via the Communicable Diseases Prevention and Surveillance Unit under the Department of Hospital Hygiene and Communicable Disease Control, as well as the Clinical and Epidemiological Microbiology Directorate of the National Public Health Institute.[5]

In Hungary all vaccination programmes are nationwide, but their implementation is organized on a territorial basis through the public health departments and units of County and District Government Offices. However, the immunization calendar applies nationwide and the same vaccine schedule and vaccines are used in the whole country.

The electronic epidemiological surveillance database is maintained by the Department of Hospital Hygiene and Communicable Disease Control of the Ministry of Human Capacities, and updated with data from the field. For mandatory childhood vaccination, the most important actor, responsible for preparing the monthly reports, is the health visitor (mother and child health nurse). The Health Visitor Service is organized on a territorial basis. Each health visitor is responsible for a district and is charged with the preventive care of inhabitants, including pregnant women, post-partum women and children under the age of 6 in their homes, and school children aged 6+ years in schools. The health visitor keeps track of those who are obliged to be vaccinated and maintains a vaccination register for them. If there is a missed vaccination, the health visitor sends a written notification. After three failed attempts, the health visitor is obliged to report the case to the District Government Office.

The health visitor has to report completed vaccinations, failed vaccinations over two months, and the emigration and immigration of persons liable for vaccination.

The District Government Offices integrate and electronically transfer the data provided by health visitors to the electronic epidemiological surveillance register of the Ministry for Human Capacities, in particular to the Department of Hospital Hygiene and Communicable Disease Control. This means that vaccination coverage data are up-to-date and available at every level (national, county and district).

The same process applies to communicable disease surveillance, the only difference being that patients are reported by the medical doctors who detect the disease. The list of communicable diseases, the reporting of which is mandatory, is determined by the same decree.[6]

Given that the system is mandatory and based on the place of residence, there are no targeted measures for specific groups of the population and no special incentive schemes in place. Parents who fail to vaccinate their children can be fined. The fine or the implementation of the mandatory vaccination can be enforced by the Hungarian tax authority.

For mandatory childhood immunization, the vaccination coverage rates are calculated using administrative information, mainly the data reported by health visitors to the electronic epidemiological surveillance database. The denominator is the total number of children obliged to be vaccinated in the given year, because they reached the vaccination age.

2 Article 2, section (1).
3 Article 2, section (2).
4 Article 3, section (1).
5 Order No. 51/2017 (X. 25.) EMMI of the Minister of Human Capacities.
6 Decree No. 18/1998 (VI. 3.) NM of the Minister of Welfare, Article 16/A, Annex 1.

Table 1 Coverage of the second dose of the measles vaccine, 2010–2017

	2010	2011	2012	2013	2014	2015	2016	2017
Coverage (%)	99.5	99.5	99.4	99.3	99.4	99.6	99.7	99.7

Source: Department of Hospital Hygiene and Communicable Disease Control, Ministry of Human Capacities

Table 2 Measles cases, 2006–2017

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Cases	1	0	0	1	0	0	1	1	0	0	0	36

Source: http://www.who.int/immunization/monitoring_surveillance/burden/vpd/surveillance_type/Country_slides_measles.pdf?ua=1

Vaccination coverage

In Hungary mandatory, free-of-charge vaccination against **measles** (group 1 vaccination) was introduced in 1969, as a result of which most persons aged under 47 years have received at least one shot. Since 1989, to achieve long-term protection, children have received two shots, the first at the age of 15 months and the second at the age of 11 years. Thanks to the mandatory vaccination programmes, the territory-based Health Visitor Service, and the strict reporting system, immunization coverage is excellent in Hungary (*see* Table 1), and measles cases are extremely rare.

Table 2 shows the trend regarding the number of measles cases. Between 2006 and 2016 there were no indigenous cases in Hungary, and only imported cases occurred. In 2017 a small outbreak took place in a small hospital near the border, where a foreign measles patient was treated and a few health workers and patients contracted the disease. In 2018, 18 imported, or import-related, cases were reported.

Under the national **influenza** vaccination programme, vaccination is accessible free of charge for certain target groups on a voluntary basis (group 3 vaccination), including:

- *High-risk populations*, including people over the age of 60, pregnant women, chronic patients, such as patients with immune deficiency, chronic respiratory, cardiovascular and kidney diseases, and long-term care patients,
- *workers where influenza is an occupational hazard*, such as health and social care workers, people working in stock-raising, people working with immigrants, and people working in public education institutions.

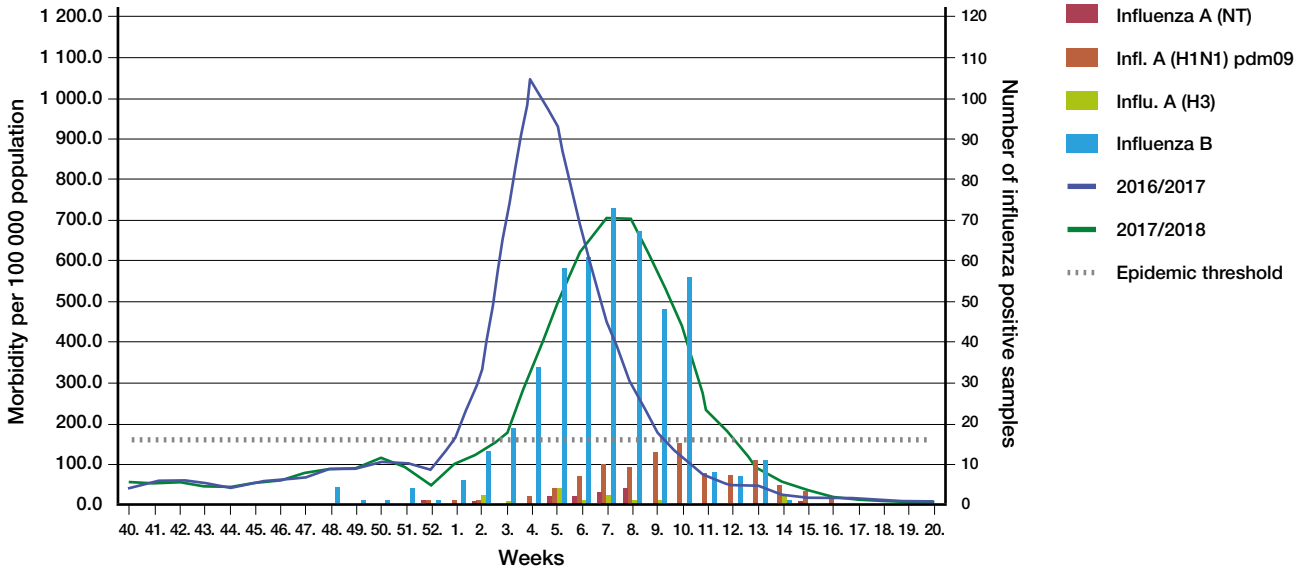
In addition to the national programmes, pharmacies offer several other vaccines that can be purchased by non-target groups.

In the 2017/18 influenza season the utilization of free-of-charge vaccines was 65.2%.[7] In 2017, 1.2 million vaccine doses were distributed among the target groups.

The Department of Hospital Hygiene and Communicable Disease Control of the Ministry of Human Capacities operates and maintains Influenza Sentinel Surveillance, which publishes the number of reported influenza-like illness consultations per 100 000 population and the number of virus detections. Influenza-like illness cases are reported by Sentinel general practitioners (roughly 20% of the total, and numbering 1351 in the 2017/18 season), on a weekly basis, by age groups. Of these family doctors, 100 regularly take samples from patients to identify the virus strain. Figure 1 shows an example of the weekly number of influenza-like illness cases and the number of specimens testing positive for influenza viruses for the 2017/18 influenza season.

7 Epinfo 20/19.

Figure 1 The number of patients with influenza-like illness who sought medical attention, per 100 000 population, and the number of influenza positive samples in Hungary, week 40 of 2017 – week 20, 2018



Source: Department of Hospital Hygiene and Communicable Disease Control

Provision

The provision of immunization is based on the vaccination guideline, which incorporates the professional guidelines according to which vaccination should be administered. The health service providers who administer the vaccines are supervised by and accountable to the District Government Offices.

Measles

Mandatory childhood vaccination for the entire child population between the ages of 0 and 6 years are administered by family paediatricians or family doctors, while childhood vaccinations for children over the age of 6 years are organized through the so-called school campaign vaccinations, which are administered by school health doctors. Contraindications are considered by the administering doctor.

Influenza

Influenza vaccines are administered by family doctors in primary care, or by occupational health doctors in the workplace, where influenza is an occupational hazard. They are obliged to report the utilization of free-of-charge influenza vaccines to the Government District Offices, which aggregate and transfer the data to the Department of Hospital Hygiene and Communicable Disease Control of the Ministry of Human Capacities.

Financing

With the exception of occupation-related mandatory vaccination, which has to be covered by employers, vaccines for mandatory vaccinations are free of charge. They are covered from the central government budget under the Ministry of Human Capacities.[8] With the exception of vaccination against influenza, HPV and pneumococcus,[9] voluntary vaccinations are excluded from the publicly funded benefit package, and the clients have to pay for them out-of-pocket, both for the vaccine and the vaccination service.[10] The service fee for administering the shot is set at HUF 2000, while it is free of charge for mandatory vaccinations. Publicly financed health service providers are paid for by the NHIFA depending on the type of service, e.g. primary care is capitated and outpatient specialist services are paid for by fee-for-service points.

Vaccines are procured centrally and distributed to the District Government Offices, which further distributes them among the relevant health service providers, such

8 Act CLIV of 1997, Article 142, section (2).
9 Government Decree No. 284/1997 (XII. 23.) Korm, Annex 2, item 16.
10 Act LXXXIII of 1997, Article 18, section (6), point (t).

as family paediatricians, family doctors or occupational health doctors. Family doctors usually pick up the vaccines in person from their local District Government Office.

Key barriers and facilitators

Hungary has a good immunization record, which is attributable to the well-organized system of addressing communicable diseases and the generally favourable attitude of the population towards vaccination and the prevention of infections. Nevertheless there are some threats to the existing system of public health, which can erode its firm organizational basis and might jeopardize current achievements:

- Since its establishment in 1991 the National Public Health and Medical Officer Service has undergone several reorganizations, the most recent of which was the organizational integration of its territorial units into the Government Office System and of the Office of the National Chief Medical Officer into the Ministry of Human Capacities. In contrast, the new Minister for Human Capacities has announced the re-establishment of the Office of the National Chief Medical Officer. Frequent major reorganizations are a risk for the disintegration of established processes and the loss of competent public health specialists.

- Despite recent improvements, Hungary is still facing a human resource crisis due to the emigration of qualified health workers. Shortages mostly affect the population in disadvantaged regions.

- In the case of mandatory childhood vaccination, coverage gaps are related to particular groups, such as children with anti-vaccination parents.[11] For this group, fines do not seem to be an effective corrective measure, and there are suspicions that certain anti-vaccination parents can obtain fake vaccination certificates from certain family paediatricians.[12]

- In terms of measles, imported cases (such as from Romania or Ukraine) seem to be the most important problem, and it is difficult for doctors to diagnose the disease because most of them have not encountered a single case for decades. On the other hand, outbreaks in neighbouring countries and in Hungary usually facilitate population awareness, because of the media coverage of such events.

11 www.ajbh.hu/documents/10180/2500969/Jelentés+az+óvodai+felvétel+védőoltások+elmaradása+miatti+elutasításáról+361_2016/c4de3125-7ec7-4fd8-8aba-2d0fe77421ae?version=1.0.

12 https://www.nlcafe.hu/csalad/20161105/gyermekorvos-kotelezo-vedooltas/.

Ireland

Maebh Ní Fhallúin

Governance

The **Health Service Executive**[1] is Ireland's publicly funded national health service, delivering health and social care services to the population of Ireland. It is responsible for the operational side of health and social care, implementing health and social care policy and legislation. The Department of Health has responsibility for developing policy and legislative frameworks for public health and for funding. The Health Service Executive is accountable to the Minister for Health.

The **National Immunisation Office**, established in 2005 under the Health Service Executive, serves as a coordinating unit for immunization to ensure high-quality, standardized implementation of all publicly funded immunization programmes (*The Role of the National Immunisation Office 2005–2011*). The Office's main responsibilities include:

- preparation of options papers for the implementation of changes, and the introduction of new vaccines, to the national immunization programmes. Health Service Executive management and the Department of Health determine the most appropriate implementation option and the National Immunisation Office then prepares a detailed implementation plan and project manages the implementation of the programme or campaign;

1 Health Service Executive: https://www.hse.ie/eng/health/immunisation/whoweare/.

- coordinating immunization programmes through collaboration with all stakeholders involved in their delivery and support;
- managing vaccine supply chains;
- developing educational, training and communication materials for health professionals and the public; and
- developing and implementing national standards in various aspects of immunization including training and education, consent forms, medication protocols and Health Service Executive staff immunization guidelines.

All information on immunization provided by the National Immunisation Office is based on the 'Immunisation Guidelines for Ireland', developed by the **National Immunisation Advisory Committee**[2] in the Royal College of Physicians of Ireland, which contain recommendations on the appropriate use of licensed vaccines. In addition to advising the Chief Medical Officer in the Department of Health on specific vaccine recommendations for use in Ireland, the National Immunisation Advisory Committee also helps develop national immunization strategies. Furthermore, it provides recommendations on which groups of the population should receive the seasonal influenza vaccine.

The **Health Protection Surveillance Centre**[3] is the specialist agency for the surveillance of communicable diseases and is part of the Health Service Executive. It provides policy advice and public information on the control and prevention of infectious diseases, and also carries out disease surveillance and epidemiological investigations and does research and training.

The **Health Products Regulatory Authority**[4] is an independent statutory body that provides an up-to-date list of licensed vaccines. It is the body responsible for pharmacovigilance and monitors adverse events following vaccination.

All vaccination programmes are organized nationally by the Health Service Executive.

2 National Immunisation Advisory Committee: https://www.rcpi.ie/policy-and-advocacy/national-immunisation-advisory-committee/.

3 Health Protection Surveillance Centre: https://www.hpsc.ie/abouthpsc/.

4 Health Products Regulatory Authority: www.hpra.ie.

	Measles (Children)	Flu (Adults)
Policy/ Decision-Making	Nationally (Health Service Executive, Department of Health, National Immunisation Advisory Committee)	Nationally (Health Service Executive, Department of Health, National Immunisation Advisory Committee)
Coordination/ Promotion	Nationally (Health Service Executive, National Immunisation Office)	Nationally (Health Service Executive, National Immunisation Office)
Implementation	Nationally (Health Service Executive, National Immunisation Office)	Nationally (Health Service Executive, National Immunisation Office)

Vaccinations are not mandatory in Ireland but are strongly recommended by the state, including for both measles and influenza.

Measles (Children)	Influenza (Adults)
There are two measles vaccination programmes for children, one delivered to children at 12 months through primary care and the other delivered at 4–5 years of age through Health Service Executive school immunization teams that go to primary schools (although in one Health Service Executive area children go to their primary care provider). The database for children in the primary immunization programme is populated predominantly by birth notification data. The school programme targets children attending school. For the primary childhood immunization programme there are eight separate immunization registries for eight of the Health Service Executive regions (based on former health boards/administrative areas). For the measles vaccine at 4–5 years of age, immunization information should be entered into the national Schools Immunisation Information System. (There is no single registry in Ireland that merges all immunization data.) The local Health Service Executive immunization office is responsible for calls and follow-up. Follow-up and recall of defaulters is performed at the local level by Health Service Executive immunization staff. Local immunization offices are responsible for the local immunization registry. The National Immunisation Office is responsible for setting standards that are implemented locally. It is also responsible for the governance of the Schools Immunisation Information System which is managed locally.	The influenza immunization programme for older people (≥65 years) is a voluntary programme. No population register is used to identify and target individuals. There is a an annual Health Service Executive -funded public campaign (on radio and sometimes TV, as well as through posters and leaflets) to encourage vaccine uptake among this age group and other risk groups. Individuals are recommended to attend their primary care provider or pharmacist for vaccination. There is no call or follow-up for individuals who do not attend for vaccination. There is no register of people younger than 65 years or for health care workers. However, individuals at risk in younger age groups and health care workers are also targeted in the annual public campaign.

Targeted measures for specific groups of the population.

Measles (Children)	Flu (Adults)
There are Health Service Executive promotional materials specifically for members of the Traveller and Roma communities.	None.

Incentive schemes for citizens/parents or vaccinators.

Measles (Children)	Flu (Adults)
The Health Service Executive runs awareness campaigns for the public and for vaccinators. There are no sanctions.	The Health Service Executive runs awareness campaigns for the public and for vaccinators. There are no sanctions.

The methods used to estimate vaccination coverage rates at national/subnational level.

Measles (Children)	Flu (Adults)
Administrative method based on the numbers vaccinated through the Health Service Executive' s two programmes (at 12 months and at 5 years) divided by the number of eligible children in the population. Health Service Executive birth registration data is used for the primary immunization register (plus any children who moved in, minus children who moved out or died). For the school immunization system each child vaccinated is entered into the system. The denominator used at school level is the school class population at the beginning of the school year. Uptake is reported by area, region and nationally.	• Administrative method for those aged ≥65 - - Primary Care Reimbursement Scheme data - On a monthly basis from September to August, Monthly/ Annual reports • Survey method for health care workers - Hospitals and long-term care facilities - Mid/end season • Telephone/omnibus surveys representative of the adult population - Approximately every three years - Comparison is made with Primary Care Reimbursement Scheme data for the >65 years age group - Collecting data for population groups not routinely monitored

(*Source*: https://www.hse.ie/eng/health/immunisation/hcpinfo/fluinfo/dr-j-mereckiene.pdf)

Provision

Childhood vaccinations against measles are administered by general practitioners or practice nurses in primary care (at 12 months) or in schools by public health/community nurses (at 4–5 years). For the primary immunization programme children are registered with one general practitioner practice for the delivery of the recommended vaccines.

Adult vaccinations against influenza are provided by general practitioners or practice nurses in primary care or by community pharmacists. Vaccinations are provided to health care workers primarily by Occupational Health departments. In recent years peer vaccinators (nurses) have been trained in many health care settings to provide vaccination. Health care workers can also obtain vaccinations from their own primary care provider or pharmacist.

General practitioners are private providers contracted by the Health Service Executive to deliver vaccinations. For administering vaccinations, they are accountable to both the Health Service Executive and the Irish Medical Council, which is the regulator of the medical profession in Ireland.

Practice nurses are privately employed by general practitioners and are responsible for adhering to the standards and guidance provided by the Nursing and Midwifery Board of Ireland.

Peer vaccinators in health care settings are nurses employed by the health care facility. They are responsible for adhering to the standards and guidance provided by the Nursing and Midwifery Board of Ireland.

Pharmacists are private providers contracted by the Health Service Executive to deliver vaccinations. For administering vaccinations, they are accountable to the Health Service Executive and the Pharmaceutical Society of Ireland, which regulates the professional practice of pharmacists.

Financing

Childhood vaccinations against measles are provided free at the point of delivery. The costs of vaccines and vaccination services are covered from the statutory financing system via taxation.

Adult vaccinations against influenza are provided free of charge by the Health Service Executive to all those in at-risk groups **with** a medical card (i.e. those from low-income households). The vaccine is free for everyone, but for those **without** a medical card, doctors and pharmacists may charge a consultation/administration fee (Ireland does not have universal primary care so a general practitioner consultation fee of €50–€60 is standard).

The statutory financing system (taxation) covers the cost of the vaccine for everyone. For medical card holders, the statutory financing system (taxation) also covers the cost

of the vaccine administration. People **without** a medical card pay out-of-pocket for vaccine administration, which may or may not be included in the general practitioner consultation fee. Payment is not a barrier to uptake of vaccination for measles but could be for influenza.

Key barriers and facilitators

Barriers for childhood vaccination against measles

- Vaccine hesitancy because of social media, mistrust in vaccines and belief in potential harmful effects. This impacts on the level of vaccine uptake.
- Absence of a national primary immunization information system negatively impacts on the ability to identify children who miss their first dose of measles vaccine if they move to another area. In addition, general practitioners do not have access to the immunization registry to review vaccines received if a child has moved to another practice.
- Children born outside Ireland who come to the country in their first or second year of life may not be entered onto the local immunization register, unless they are picked up by a general practitioner or the parents seek registration themselves.
- Migrant parents may have language or health literacy challenges. Even if their child is on the register they may not understand the invitation letters sent by the Health Service Executive to attend for vaccination. Some marginalized groups (e.g. migrants and homeless families) may move home frequently and Health Service Executive correspondence/invitations to vaccination may not be received.
- Children older than 12 years of age who have missed the measles vaccine doses at the recommended age have to pay for vaccination (but not for the vaccine).
- General practitioners and nurses have difficulty identifying older children who have missed measles vaccinations if they are new to the practice, as there is no web-based system to interrogate at the time of consultation and many parents are not sure of the vaccine status of their older children.

Facilitators for childhood vaccination against measles

- There is no cost for individuals if vaccination is obtained before 12 years of age
- Supportive approach by health care professionals
- The Health Service Executive's active recall system for the primary immunization programme. Mop-up clinics for the school immunization programme are held over the summer for those children who may have missed vaccination day

Barriers to adult vaccination against influenza

- Cost for members of the public without medical cards
- Some vaccine hesitancy due to the perception of harmful effects associated with the vaccine
- Availability/access issues for some health care professionals (e.g. those working in small rural communities)
- For health care workers, access to vaccination, if delivered in clinics, can be particularly difficult if they have to travel to a site off-work to obtain vaccination

Facilitators for adult vaccination against influenza

- Increasing informed media coverage and medical advice for the public
- Promotional/awareness campaigns
- Local champions
- Pharmacist delivery provides additional venues in the community
- Peer vaccinators

Reference

Interview with Dr Kevin Kelleher, Assistant National Director for Public and Child Health.

Italy

Walter Ricciardi, Giovanni Rezza, Fortunato Paolo D'Ancona, Stefania Iannazzo, Maria Cristina Rota

Governance

Key agencies

The Italian Ministry of Health is charged with defining the national immunization plan. This document is ratified with an agreement at the State-Regions conference. Since the Italian national health system is decentralized, the 21 regions (19 Regions and two Autonomous Provinces) have the task of establishing their own regional immunization plan and implementing it, based on the national recommendations.

The Italian Ministry of Health has established that all the vaccines included in the national immunization plan should be considered part of the so-called "minimum level of healthcare services" (LEA) that the regional authorities must provide to citizens free of charge. The national immunization plan outlines the objectives of the national immunization strategy for different age and risk groups, and it is ratified by an agreement with the regional authorities (the State-Regions Conference) who are responsible for the implementation of vaccination programmes in their respective regions. Childhood vaccines are usually administered by local vaccination centres, and in some cases by family paediatricians and/or general practitioners.

For influenza vaccination, the Ministry of Health's Directorate-General for Health Prevention provides an annual update of a document ("Circular letter for prevention and control of influenza"), signed by the Minister of Health, shared and agreed with the regions, indicating

the new vaccines' composition and reporting recommendations for the prevention of influenza through vaccination and other measures of hygiene and personal protection. As the influenza vaccine is included in the LEA, it is free of charge for selected target populations. It is administered mainly in vaccination centres and by general practitioners.

The main target of the influenza vaccination campaign is all individuals aged 65 years and over, with a vaccination coverage target of at least 75% and the aim of 95% coverage. Influenza vaccination is also recommended for high-risk individuals aged under 65, with the same target coverage rate.

National and regional level

The Regions are responsible for planning, financing, organizing and implementing health care services, including vaccination services following the national immunization plan recommendations.

Vaccination plan

The current National Immunization Plan 2017–2019 was issued in January 2017. In the past Italy's vaccination schedules had been a patchwork of 21 different regional vaccination schedules; the new plan helped to harmonize the diverse programmes. The plan recommends vaccination for people throughout the entire life-course and sets clear targets for vaccination coverage, but it also identifies the main priorities (e.g. measles and rubella elimination, polio eradication) and considers many actions to reduce disparities among Italian regions.

Mandatory and recommended vaccinations

Until June 2017 there were only four mandatory vaccinations: polio, diphtheria, tetanus and hepatitis B. At the end of July 2017 a new law was approved increasing to 10 the number of mandatory vaccinations for children aged 0–16 years: the previous four plus Hib, pertussis, measles, mumps, rubella and varicella. Regional authorities are required to promote and actively offer all vaccines indicated in the national immunization plan, including mandatory and non-mandatory vaccinations.

Organization of vaccination programmes

The Regions are in charge of implementing the national immunization plan, and the organization of vaccination programmes differs across regions. The national immunization plan requires regions to guarantee free and easy access to all vaccines included in the schedule, in order to achieve individual and population-level protection from vaccine-preventable diseases in line with national objectives. Furthermore, it requires the regions to organize training for health care workers, communication campaigns and the evaluation of their vaccination strategies.

A national electronic immunization register will start to be implemented in the second half of 2018. It will allow vaccination coverage to be evaluated with extreme precision, recalling individuals not yet immunized. So far, there are regional or local electronic immunization registers in more than 90% of Italian Regions and local health services, and they are used for the entire immunization process, from call-out to vaccination, to calculating the vaccination coverage. Regional aggregated coverage data are sent to the Ministry of Health to estimate the national vaccination coverage.

Targeted measures

Specific groups of people benefit from targeted vaccination measures, such as child-bearing women, individuals with specific health conditions at high risk of vaccine-preventable disease, individuals at high risk of professional exposure, individuals at high risk from specific behaviours (e.g. men who have sex with men), or individuals living in specific conditions (living with an immunosuppressed person in the same household).

The objectives of the national immunization plan include the reduction of inequalities through the promotion of vaccination interventions in marginalized or particularly vulnerable groups of the population, including irregular migrants, refugees and asylum-seekers, who may experience difficulties in accessing prevention services. The national immunization plan recommends close collaboration between vaccination services, health care workers, cultural mediators and nongovernmental organizations.

Incentive schemes

No monetary incentives exist for vaccinators, except for general practitioners in the case of influenza vaccination. Since September 2017 proof of vaccination has been required for children up to 6 years of age to attend kindergarten and nurseries. Lack of vaccination in older children does not impede their access to school, but financial sanctions are applied to parents refusing vaccination (with a maximum fine of €500 if all vaccinations are missing). The financial sanctions are also applied to parents of children up to 6 years of age if their parents refuse vaccinations.

Vaccination coverage

Vaccination coverage for all childhood vaccinations included in the national immunization schedule is measured annually for the following categories:

- at 24, 36 and 48 months old (for all vaccines);
- children in their 7th year of life and those in their 8th year of life (booster: DTP, polio; second dose: MMR, Var);
- adolescents aged 11–18 years (first dose and full course of HPV vaccine);
- adolescents aged 16 and 18 years (DTP, IPV, MMR, Men C, Men ACWT);
- individuals aged 65 years and over, pregnant women and general population (only for influenza)
- individuals aged 65 years (Zoster and pneumococcal vaccines).

Vaccination coverage for each vaccine is calculated by the Ministry of Health dividing the number of persons fully vaccinated by age in the target population by the total number of persons in the target population. The denominator is the critical point: some regions provide statistical population data, whereas others provide the number of people resident in their territory, and others the number of people registered in the local health system register.

In addition, epi-cluster surveys were conducted in 1998, 2003 and 2008 to validate administrative coverage data and to collect information regarding reasons for non-vaccination; however, further surveys are not planned.

Provision

All vaccinations, except against influenza, are mainly administered by the vaccination services in the local health units. Involvement of family paediatricians is being piloted in some regions.

Adult vaccinations against influenza are administered in almost all regions by general practitioners. Each region is free to decide on its own organization and is in charge of vaccine procurement, although in some cases vaccine procurement is further decentralized, to the level of local health services. Data are collected by public health services.

Financing

All compulsory and recommended vaccinations included in the National Immunization Plan 2017–19 are offered to the target population free of charge. The costs of vaccines and vaccination services are covered by the National Health Fund, which is a statutory financing system (via taxation) which covers the entire resident population.

Influenza vaccination is offered free of charge to all risk groups for which it is recommended, including:

- all individuals aged 65 years and above;
- clinical risk groups, such as individuals with treatment-induced and/or disease-induced immunosuppression, metabolic disorders, chronic pulmonary, cardiovascular or renal disease, hepatic disease, people living with HIV/AIDS, individuals with morbid obesity defined as body mass index >= 30kg/m2;
- all pregnant women in the second and third trimesters of pregnancy;
- all health care workers; for them vaccination is voluntary – it is an individual choice, and there is no penalty for not being vaccinated;
- selected occupational groups, such as military service personnel and poultry industry workers; staff

working in laboratories, e.g. in the non-medical academic or environmental sector; police and fire-fighters; veterinary service workers; and

- residents of long-term care facilities and household members of immunosuppressed individuals.

The system covers the entire resident population, including non-EU citizens with a regular residence permit and their dependent family members legally residing in Italy. Irregular immigrants are also entitled to receive vaccinations free of charge.

Key barriers and facilitators

Concerns about adverse events following immunization (e.g. autism or other chronic conditions) and underestimation of the potential severity of vaccine-preventable diseases are the main barriers to effective vaccination coverage against measles. Facilitators include targeted education and communication campaigns, training for health care workers, identification and vaccination of the most susceptible, and the update of the measles and rubella elimination plan.

The measles outbreak that started in Italy in 2017, with more than 7,000 cases and eight deaths in less than two years, has contributed to raising awareness among the population on the importance of vaccination.

With regard to influenza, concerns about perceived vaccine safety and effectiveness and the perceived low severity of influenza are the most commonly reported barriers to vaccination. Low influenza vaccination coverage among health care workers is also considered an obstacle.

Targeted education and communication campaigns and training for health care workers can facilitate influenza vaccination uptake.

Latvia

Daiga Behmane, Oksana Martinuka

Governance

Childhood vaccination against measles – agencies and roles

According to Cabinet Regulation No. 330 'Vaccination Regulations' (2000),[1] the following public agencies are responsible for organizing and providing the vaccination programme: the Centre for Disease Prevention and Control[2], the National Health Service[3] and the State Agency of Medicines[4]. The agencies are under the jurisdiction of the Ministry of Health.

The Centre for Disease Prevention and Control is responsible for planning, coordinating and monitoring the implementation of the state immunization programme, and also plans the total number of vaccines necessary for implementation of the vaccination calendar, and coordinates it with the Ministry of Health. In addition, the Centre for Disease Prevention and Control analyses the immunization indicators and morbidity of inhabitants and the use of vaccines. Each month the Centre compiles data on the vaccine orders by institutions and submits the total order for vaccines to the drug wholesaler. Drug wholesalers ensure storage and supply of vaccines to vaccination institutions according to the list of vaccination institutions submitted by the Centre for Disease Prevention and Control.

1 https://likumi.lv/ta/en/en/id/11215-vaccination-regulations.
2 https://www.spkc.gov.lv/lv/.
3 http://www.vmnvd.gov.lv/.
4 https://www.zva.gov.lv/.

The National Health Service is responsible for tendering and purchasing vaccines used in the state immunization programme in the country and for the reimbursement of drug wholesalers for vaccines. Together with the Centre for Disease Prevention and Control, the National Health Service evaluates the results of vaccinations and the use of vaccines, and works to maximize vaccination coverage rates.

The State Agency of Medicines ensures drug certification by issuing permits and licences to drug wholesalers. Only vaccines registered in the Medicinal Product Register of Latvia can be used.

The Ministry of Health has established the State Immunization Advisory Council to professionally evaluate issues related to vaccination and the state immunization programme, provide proposals for solutions, and evaluate the demand for vaccines.

According to Cabinet Regulation No. 330 'Vaccination Regulations' (2000), the implementation of immunization policy is organized nationally.

Vaccination is organized and implemented by vaccinating institutions (medical treatment institutions, mostly general practitioners) which conform to the mandatory requirements for performing vaccinations.

The National Public Health Strategy 2014–2010 defines key elements of the state immunization policy, and monitors performance indicators and actions to achieve these indicators.

Childhood vaccination against measles – vaccination plans

Childhood vaccination against measles is voluntary. A routine two-dose measles vaccination is included in the vaccination schedule.

Adult vaccinations against influenza – vaccination plans

There is a public health strategy to improve vaccination coverage for seasonal influenza vaccination, and respective seasonal influenza vaccination recommendations have been developed (e.g. recommendations for age groups, risk groups and target groups).

Character of vaccinations

According to Cabinet Regulation No. 330 'Vaccination Regulations' (2000), vaccination is mandatory for state institutions and vaccination providers but voluntary for the general public. There are no sanctions for vaccinators, parents or other citizens who refuse vaccinations.

Patients or parents can refuse vaccinations without any legal consequences. If a patient or their legal representative declines vaccination, a medical practitioner explains the health consequences and then draws up a refusal in writing which has to be signed by the person who has refused to be vaccinated.

Vaccination against influenza for those classified as belonging to the health risk groups, persons aged over 65 years of age and occupational target groups (e.g. health care professionals) is recommended, but vaccination is voluntary.

System for call and recall

Latvia does not have a computerized immunization registry or other computerized record systems with the capacity to issue reminders or recall notifications to patients. However, medical practitioners or vaccinating institutions are responsible for monitoring patients and they have to notify patients regarding the necessity for vaccination.

An electronic immunization register within e-health is under development.

Targeted measures

There are no asylum-seeker or refugee-specific vaccination policy documents. In accordance with the Asylum Law, asylum-seekers receive state-funded emergency medical assistance and primary health care (including vaccination), taking into account the special reception needs of asylum-seekers. Also, there are no special districts for refugees and no territorial vaccination strategy documents. In Latvia there are no data on vaccination coverage for special risk groups (migrants, refugees, ethnic minorities, or socially and economically disadvantaged people).

There is an annual information campaign to raise awareness among the general public and health professionals regarding vaccination against seasonal influenza.

Childhood vaccination against measles – coverage

In Latvia immunization coverage is analysed at two administrative levels, regional and national. It uses an administrative method based on monthly reports from all vaccination providers to the regional level and from there to the national level. Vaccinating institutions submit aggregated data on the number of vaccinated individuals in the reporting month, broken down by vaccine-preventable disease and whether it was the first or second vaccination. The number of vaccinated individuals is used as the numerator.

For children of 12–15 months of age receiving their first dose of measles vaccine, the number of children in that age group is used as the denominator.

For 7-year-old children receiving their second dose of measles vaccine, the total number of 7-year-old children reported by the Central Statistical Bureau of Latvia[5] is used as the denominator.

Latvia assesses vaccination coverage for measles quarterly and annually.

Adult vaccinations against influenza – coverage

National Health Service data on reimbursed vaccine doses (for children aged 6–23 months, persons aged 65 years or more, persons with chronic diseases and pregnant women) are used for influenza vaccination coverage estimates. Immunization of health care workers is not reimbursed and not reported separately, and the total number of pregnant women and persons with certain chronic diseases is unknown.

In addition, vaccination providers report monthly the number of patients vaccinated against influenza, covering both the total number and the number of children. Denominators to assess coverage are the size of the population and the number of children aged from 6 months to 18 years.

Latvia assesses vaccination coverage for influenza both monthly and by season.

5 https://www.csb.gov.lv/en/statistika/db.

Provision

In Latvia measles vaccination is routinely provided to all children. Routine vaccinations are organized and implemented by vaccinating institutions, mostly general practitioner practices, which conform to the mandatory requirements laid down in laws and regulations for medical treatment institutions and their units and with the basic requirements for hygiene and infection control in a medical treatment institution. General practice personnel also provide vaccinations in the event of an outbreak (e.g. measles). Each month vaccination institutions prepare the vaccine order, taking into account the number of persons to be vaccinated and the current amount of vaccines left in stock. Vaccine stock should be kept to a minimum by ordering monthly only the quantity of vaccine required until the next delivery.

Inhabitants have the right to choose a vaccinating institution or a medical practitioner to perform the vaccination.

In Latvia there has been no routine vaccination in school-based health services since 2008.

Drug wholesalers are responsible for the procurement and distribution of vaccines to vaccination services and also to pharmacies for some vaccines (for example against seasonal influenza).

Primary health care providers are responsible for identifying adults in high-risk groups and prescribing the influenza vaccine for them.

Healthy adults usually receive their seasonal influenza vaccine in the vaccination services room.

Financing

All expenditures related to routine vaccinations, their organization, supervision and monitoring, the acquisition of vaccines, drawing-up of medical documentation, vaccine injection, as well as the treatment of any side-effects caused by vaccination, which have been included in the minimum package of services provided for inhabitants specified in laws and regulations, are funded from the state budget.

If an outbreak or epidemic of measles is recorded in Latvia, the primary care physician has to collect information on the vaccination status of affected people and their

contacts (adults and children who have not had measles and who have not been vaccinated against measles; people who have not had measles and have been only partially vaccinated, people whose vaccination against measles is not recorded), and must vaccinate non-immunized individuals. Expenses for these vaccinations are covered from the state budget.

In case of an epidemic or threat, the Minister of Health is entitled to issue an order for the mandatory vaccination of specific groups of inhabitants in extraordinary cases and to purchase supplementary vaccines within the scope of budgetary resources allocated in the budget of the Ministry of Health.

For persons classified as belonging to one of the risk groups (persons suffering from chronic respiratory diseases, chronic cardiovascular diseases, chronic metabolic disorders, chronic kidney diseases, immunodeficiency, or undergoing immunosuppression therapy), persons aged 65 years and more, and pregnant women (at any stage of pregnancy), the National Health Service covers 50% of the cost of the influenza vaccine from the state budget. For the remaining cost of the vaccine (50%) and its administration, individuals need to pay out-of-pocket, unless costs are covered by their employer or health insurance.

For healthy adults, the vaccine cost and vaccine administration fees are not covered from the state budget.

Key barriers and facilitators

Immunization data show that vaccination coverage of the first measles, mumps and rubella (MMR) dose is above the target level (>95%). By the end of 2017, 96.4% of children aged 12–15 months had received the first dose of measles vaccine. However, the measles vaccination coverage among eligible schoolchildren is below the target level. By the end of 2017, 88.9% of 7-year-old children had received the second dose of measles vaccine.

Latvia saw a short-term (September–December 2017) shortage in MMR vaccine, probably due to manufacturer production problems.

In 2015 the Latvian Centre for Disease Prevention and Control conducted a survey on missed opportunities for childhood vaccination. The survey showed that lack of availability of vaccines and accessibility problems were not among the reasons given by respondents for missing vaccinations. Economic barriers for childhood vaccination were also rarely reported. Insufficient vaccination coverage is likely to be related to the attitudes or other commitments of parents. A possible reason for low measles vaccination coverage rates among 7-year-old children is parental forgetfulness. Some parents also did not consider vaccination necessary for older children.

Potential barriers for low seasonal influenza vaccination coverage among adults might be the financial burden of vaccine costs and vaccine administration fees. Furthermore, receiving the vaccine can be difficult for those adult groups for whom influenza vaccination is recommended but for whom vaccine costs are only partially reimbursed.

Potential barriers to influenza vaccination related to patients might include lack of awareness about the health threats posed by influenza and the benefits of vaccination, misperceptions about vaccine safety, fears of adverse effects, inconsistent advice or health care providers not recommending vaccination.

Potential barriers to influenza vaccination related to health care providers might include medical practitioners' negative attitudes towards influenza vaccination and influenza vaccine hesitancy among health care workers.

References

CDPC (2018) Vaccination schedule, Riga: Centre for Disease Prevention and Control [https://www.spkc.gov.lv/lv/tavai-veselibai/infekcijas-slimibas/vakcinacija, accessed 16 October 2018].

Cabinet of Ministers (2010) Cabinet Regulation No. 330 "Vaccination Regulations", Riga: Cabinet of Ministers [https://likumi.lv/doc.php?id=11215, accessed 16 October 2018].

Lithuania

Liubove Murauskiene

Governance

The Ministry of Health has overall responsibility for health policy in Lithuania. The main policy document in the vaccination field is the national immunization programme. Currently, the 2014–2018 programme is ongoing (Lietuvos Respublikos sveikatos apsaugos ministro, 2014). It comprises a situation analysis, objectives, tasks and targets, and outlines its implementation. The main objectives are: to control, eliminate or eradicate vaccine-preventable diseases (polio, measles, rubella); to decrease the risk of outbreaks; and to ensure the safety, effectiveness and accessibility of vaccination. The targets include immunization coverage for children of 90–95% in each municipality and the whole country, the eradication of measles in Lithuania, and the introduction of new vaccines.

The national organizational framework is set out by a Ministry of Health decree (amended in 2017) (Lietuvos Respublikos sveikatos apsaugos ministras, 2017), which describes the functions regarding immunizations and the coordination of all stakeholders (primary health care institutions, public health institutions, etc.). Two public health institutions under the Ministry of Health, namely the Centre for Communicable Disease and AIDS (at national level) and the National Public Health Centre[1] (at regional level, a network of 10 regional departments), are involved in the prevention of communicable diseases and are in charge of coordinating vaccination, monitoring vaccination coverage and surveillance of vaccine-preventable diseases.

1 https://nvsc.lrv.lt, accessed 1 June 2018.

The Centre for Communicable Disease and AIDS oversees the demand for vaccines and coordinates vaccination services; it provides expertise and consultations. The National Health Insurance Fund procures vaccines through centralized public purchasing. Vaccines are distributed to health care providers from the warehouse of the Centre for Communicable Disease and AIDS (the central vaccine store).

Licensed health care providers (mainly primary health care institutions) are in charge of the provision of vaccination services. They have to report to public health institutions all cases of vaccine-preventable diseases, the numbers of vaccinations and population coverage, as well as adverse events following immunization. The National Public Health Centre shares the reported information with the Lithuanian Centre for Communicable Disease and AIDS. Public health institutions collect and report aggregated immunization data.

The National Public Health Centre monitors health care providers at least once a year through a publicly available questionnaire which allows monitoring of their compliance with national legislation on vaccination. The monitoring mostly involves a review of medical documentation, including patient medical records.

A national immunization schedule for children has been drawn up, with the latest update in 2018. Pneumococcal vaccine (PCV), human papilloma virus vaccine (HPV), rotavirus vaccine (RV) and B type meningococcal vaccine (Men B) have been introduced in the national immunization schedule during the 2014–2018 programme (Lietuvos Respublikos sveikatos apsaugos ministro, 2018). For instance, the first MMR vaccination is given at the age of 15–16.5 months, the second within 6–7 years.

According to the Law on human communicable disease prevention and control, vaccinations in Lithuania are not mandatory, but they are recommended. The attempt by the Ministry of Health in 2014 to keep non-vaccinated children away from public nurseries and kindergartens was deemed to fail after the 2016 decision of the Supreme Administrative Court of Lithuania.[2] The Court ruled that the approach taken by the authorities, which included the recording of personal data about vaccinations, contravened the right to privacy.

2 https://www.lvat.lt, accessed 30 May 2018.

Seasonal influenza vaccinations are recommended for groups at risk, such as older people, pregnant women and health workers. Revaccinations for adults, as well as the pneumococcal vaccine for groups at risk, are free of charge for patients (Lietuvos Respublikos sveikatos apsaugos ministro, 2015). Responsibilities and procedures are similar to vaccination services for children, except that the timing is linked to the influenza season (Lietuvos Respublikos sveikatos apsaugos ministro, 2012).

Regular public awareness campaigns on the importance and availability of vaccines, as well as professional training, are components of the national vaccination programme.

Provision

In general, primary health care providers provide vaccination services for the registered population. They identify target groups from their records, plan the coverage, request and pick up vaccines, vaccinate and report on vaccinations, and perform other related functions.

Licensed physicians identify and vaccinate populations, and licensed nurses and midwives can also administer vaccines.

An official guide to procedures is used as the basis for the mandatory documentation of health care facilities.

Usually, vaccination services are available at primary health care clinics, as well as in a few other health care facilities, e.g. in specialized hospitals with the exception of privately funded vaccinations, including those paid for by employers and provided at the workplace if all requirements for safe vaccination are met.

The prescription of vaccines and their sale in pharmacies are legally forbidden.

Financing

All vaccinations included in the national immunization schedule are free of charge at the point of delivery. The same could be said about vaccination against seasonal influenza and pneumococcal infection for the groups at risk, for post-exposure prophylaxis, as well as revaccinations once per decade (diphtheria and tetanus) for adults over 25 years old. Other vaccinations are funded privately or by employers.

The National Health Insurance Fund, as the statutory financing scheme, centrally procures vaccines and syringes. This expenditure of around €17 million per year is covered by state budget subsidies. The subsidies are allocated in accordance with the national immunization programme. Currently, the programme also funds awareness campaigns and professional training, each costing around €30 000 per year. However, after the procurement of vaccines, the second largest explicit allocation under the programme is the annual €800 000 expenditure on additional fee-for-service payments for the influenza vaccination service under the incentive scheme for primary health care providers; this supplements the major capitation payment. Currently, there are four fee-for-service payments (of about €2 each) related to vaccination, namely, the vaccination of children performed by a physician or nurse, as well as vaccination against influenza performed by a physician or nurse for people from the risk group. However, the contract between the National Health Insurance Fund and each primary health care provider caps the total estimate of annual expenditure at no more than 70 fee-for-service payments altogether. As a result it is hard to assess the actual incentives created by the fee-for-service payments scheme.

The Centre for Communicable Disease and AIDS procures and distributes cold boxes for health care facilities.[3] More than half of about 500 health care providers have been equipped with modern cold boxes to ensure safe transportation of vaccines.

Key barriers and facilitators

A number of key barriers to and facilitators of effective vaccination coverage for measles and influenza can be identified (*see* Table 1).

3 https://www.ulac.lt, accessed 29 May 2018.

Table 1 Key barriers and facilitators

	Barriers	Facilitators
Organization	It is likely that the routine historic system does not meet new challenges like increasingly negative attitudes towards vaccination in society and the increasing mobility of the population.	There are advantages to the historic system with explicit roles and well known mechanisms. Prioritization of vaccination services is on the health policy agenda. Independent evaluation of approaches and tools. More analytical reviews of the actual situation regarding communicable diseases. Shift from monitoring by "checking papers" to a more advisory approach. Targeted efficient information campaigns.
Delivery	Opportunistic approach to delivery when activities are predominantly carried out inside a health care facility for its visitors during limited working hours. Misbalance in logistics while health care providers have to take care of proper transportation (return travel to the capital (Vilnius) at least four times per year). Some gaps in updated knowledge, communication skills and attitudes of health workers, e.g. general practitioners who replaced paediatricians are less well informed about child vaccination issues	Vaccination services delivered outside health care facilities. Tailored training for health professionals and professionals working in the community, e.g. social workers, personnel in nurseries and kindergartens, etc. Improved logistics.
Financing	Substantial additional costs of transportation and equipment on the side of providers.	Payment arrangements with proven efficient incentives.

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Luxembourg

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Governance

In Luxembourg the Ministry of Health is the main agency in charge of developing and overseeing the implementation of national vaccination policies. The Ministry follows the advice and recommendations of a national immunization technical advisory group, formally established in 2011, called the *Conseil supérieur des maladies infectieuses* (CSMI). Composed of civil servants and experts from several scientific societies, this committee enjoys a high level of independence in the choice and the conduct of its mission, despite being attached to the Ministry of Health, and is in charge of setting out and editing vaccine recommendations. The committee has published recommendations for measles and influenza vaccination, but these recommendations are not legally binding.

Relating to the organization and delivery of vaccination services, the Ministry delegates to the Directorate of Health three main functions:

1. Communication

2. Pharmacovigilance

3. Vaccine supply

The first two functions of communication and pharmacovigilance are similar for measles and influenza. The Directorate of Health communicates to health care professionals any amendment to vaccine recommendations published by the *Conseil supérieur des maladies infectieuses*. Professionals are also regularly informed through national

campaigns about vaccination. Furthermore, raising awareness of measles and influenza vaccines among the general public is part of the Ministry's mandate. The Ministry's website includes all information and updates pertaining to vaccine recommendations.

Pharmacovigilance is the second function devolved to the Directorate of Health. Any serious adverse event occurring with measles or influenza vaccines has to be notified to its pharmacy department. Collected data are then analysed and sent to international agencies when appropriate.

For the third function, vaccine supply, the Ministry's role differs for measles and influenza.

For the supply of measles vaccines, the Directorate of Health has several tasks. It is in charge of the public tender for the acquisition of measles vaccines and designates the pharmaceutical wholesaler for vaccine stock logistics. The Directorate then organizes and oversees the vaccine supply. It collects orders from health care providers (professionals and hospital pharmacies) for any vaccines they need, and transmits these orders to the pharmaceutical wholesaler that will dispatch the vaccines to providers. The procedure is completely free of charge for health care professionals and hospital pharmacies, as the Directorate pays the manufacturer for all supplied vaccines according to the contract. Consequently, the vaccine is available at the point of care free of charge.

The organization for the supply of influenza vaccines differs. Indeed, pharmacies contract directly with pharmaceutical wholesalers to buy influenza vaccines (from several manufacturers). Individuals belonging to risk groups entitled to free influenza vaccines need a medical prescription to obtain the flu vaccine from their local pharmacist, where the vaccine is subjected to full reimbursement according to the third-party payment system. A regular convention with the national health insurance system (*Caisse nationale de santé*) establishes the Ministry of Health's contribution to the costs of the influenza vaccines.

In Luxembourg policy design and the implementation of vaccination programmes take place at the national level. There is, however, no written national multi-year vaccination plan.

There are no mandatory vaccinations in Luxembourg but measles and influenza vaccines are recommended. For measles vaccination, the recommendation is universal and therefore applies to everyone. Official guidelines from the *Conseil supérieur des maladies infectieuses* mention that the first vaccine dose against measles should be administered at the age of 12 months, with a booster administered at the age of 15–23 months. Catch-up immunization applies to every individual born after 1970 who is not (or not fully) vaccinated against measles.

For influenza vaccines, recommendations take into account risk. Influenza vaccination is recommended for people aged 65 years and older, pregnant women, people with chronic cardiac and lung conditions, people with metabolic pathologies, people with immunodeficiency, and people with certain blood diseases, among others. Hence, not everyone should be given the influenza vaccine but only people in defined risk groups. In terms of cost coverage, people not included in the risk groups are not covered under the third-party payment system nor under reimbursement from the statutory health insurance.

Population registries are currently not used to support vaccination programmes against measles or influenza.

Targeted measures are in place for measles among refugees. Within three days of their registration, refugees are seen by a medical doctor and those for whom no proof can be found of previous vaccination against measles will receive a dose of the measles vaccine.

Several incentive schemes are in place in Luxembourg for vaccination against influenza and measles. Overall, the general public is informed about all vaccinations from birth (an information brochure about childhood vaccines is distributed to all parents) as well as yearly during the European Immunization Week. For this, the Directorate of Health organizes a yearly national campaign under the auspices of the Ministry and different methods and media are mobilized to inform the public. For measles, there are also financial incentive schemes. Notably, parents are incentivized (family allowance of €580) to visit medical doctors six times during the first two years following their child's birth. These consultations are scheduled around the time of the first measles vaccine dose (9–12 months) and of the booster dose (at 21–24 months). Paediatricians performing these consultations are also financially incentivized, as the tariff of these consultations is higher than a normal one. In the end, parents and professionals are encouraged to achieve optimal vaccination status.

For the influenza vaccine, the Ministry of Health organizes a national campaign every year incentivizing target groups to get vaccinated.

To estimate the measles vaccination coverage rate, a national survey is organized by the Directorate of Health every five years, based on a representative sample of 25–30-month-old children.

To estimate the influenza vaccination coverage rate, the Directorate of Health uses administrative data provided by the national health insurance system. Administrative reimbursement data from people over 65 years old, living and insured in Luxembourg, are collected and analysed for every season.

Provision

In Luxembourg public health services, school health services, community nurses and pharmacies are not involved in administering vaccinations against **measles**. Primary health care professionals such as paediatricians are the principal providers involved in administering childhood vaccinations against measles. These professionals have several roles:

1) informing and counselling patients;

2) administering the measles vaccine (supplied for free by the Directorate of Health);

3) documenting the given vaccine in the patient's vaccination record; and

4) reporting any serious adverse event occurring with the measles vaccine to the pharmacy department of the Directorate of Health – Pharmacovigilance.

Paediatricians are the principal private practice professionals involved in childhood vaccinations. They use and comply with recommendations and guidelines published by the *Conseil supérieur des maladies infectieuses*. The cost of the visit is fully reimbursed for all children up to 18 years old.

In Luxembourg public health services, school health services, community nurses and pharmacies are not involved in administering vaccinations against **influenza**. Primary health care professionals, mainly general practitioners, are the principal providers involved in administering adult vaccinations against influenza. These professionals have several similar roles to paediatricians involved in administering vaccine against measles:

1) informing and counselling patients;

2) prescribing the vaccine against influenza;

3) administering the influenza vaccine (fully covered for patients of certain risk groups through the third-party payment system);

4) documenting the given vaccine in the patient's vaccination record; and

5) reporting any serious adverse event occurring with the influenza vaccine to the pharmacy department of the Directorate of Health – Pharmacovigilance.

General practitioners are the mainly private practice professionals involved in influenza vaccination. Their compliance with the recommendations and guidelines published by the *Conseil supérieur des maladies infectieuses* is variable, and 80% of the cost of a visit to the general practitioner or specialist is reimbursed.

Financing

Childhood vaccinations against measles are free of charge at the point of delivery.

The state budget covers 100% of the cost of measles vaccines; the state budget and statutory health insurance together cover 100% of the cost of influenza vaccines; and vaccination services costs are covered by statutory health insurance at their usual rates: 100% for children and adolescents up to 18 years, 80% for adults.

The Ministry of Health has not identified any major gap in population coverage for the statutory financing system.

Vaccines against influenza are free of charge for some risk groups (notably people aged 65 years and older, pregnant women and people with chronic conditions, among others). Some employers also provide vaccines and vaccination services to their employees, all free of charge.

For high-risk groups covered by social health insurance, vaccine costs are partially covered by the state budget (from the Ministry of Health). For the general population

and for all risk groups, vaccination service costs are covered by the statutory financing system (social health insurance).

The situation is different for employees if their employers provide vaccines and vaccination services free of charge.

Barriers and facilitators

The Ministry of Health has not identified any major gap in population coverage for the statutory financing system.

In Luxembourg the key facilitators for achieving an effective vaccination coverage of **childhood vaccinations against measles** are as follows:

1) a family allowance of €580 for parents whose child attends the six planned medical consultations – each of these visits being an opportunity to inform, counsel and answer questions about immunization, and two of these visits being set according to the measles vaccination schedule;

2) medical doctors are financially incentivized to perform these six planned medical consultations thanks to a special tariff higher than the standard one; and

3) measles vaccines are available free of charge for patients and medical doctors at the point of delivery.

In Luxembourg no key facilitators have been identified for achieving effective vaccination coverage of **adult vaccinations against influenza**. Moreover, several key barriers are present:

1) unlike measles vaccines, influenza vaccines are not available at the point of service and must be collected from a pharmacy by patients with a prescription;

2) the amount to be paid by every covered adult patient after a medical consultation is roughly 20% of the consultation's normal tariff; and

3) some risk groups do not get free of charge influenza vaccines.

Malta

Natasha Azzopardi Muscat

Governance

The Primary Child Health and Immunization Unit is responsible for primary health care and prevention of illness in children within the community. Its services include Well-Baby Clinics, the National Immunization Service and the School Health Service. It forms part of the Primary Health Care Service within the Ministry for Health. The Minister for Health also appoints an Advisory Committee on Immunization whose remit it is to advise on immunization schedules and the inclusion of vaccines in the public health service. The Communicable Diseases Unit within the Directorate for Health Promotion and Disease Prevention is responsible for surveillance, including the surveillance of vaccine-preventable disease.

Vaccination programmes are organized at a national level. In the public health services, vaccines are centrally procured and distributed. Immunizations are delivered within primary care health centres distributed throughout the country. In specific immunization campaigns, local councils may also be involved as sites for immunization delivery.

It should be noted that in Malta there is a significant private health sector in primary care and community paediatrics. Several immunizations are delivered through these providers and are paid for out-of-pocket or via private health insurance. Vaccines which are not covered by the public health sector may be obtained privately. Under-reporting of immunization from the private sector remains an issue.

There is no national vaccination plan. Vaccination is guided by the public immunization schedule (http://deputyprimeminister.gov.mt/en/phc/pchyhi/Pages/National-Immunization-Schedule.aspx).

Vaccination is regulated through the **Prevention of Disease Ordinance**, Chapter 36 of the Laws of Malta, Articles 54–67 (http://www.justiceservices.gov.mt/DownloadDocument.aspx?app=lom&itemid=8595). Diphtheria, tetanus and polio vaccination are mandatory. There is a legal notice that still refers to mandatory immunization of girls against rubella by the time they are 13 years old. However, this refers to the period when girls were immunized against rubella between the ages of 10 and 13 and in practice this has been superseded by the MMR vaccine in line with the national immunization schedule. Under the Prevention of Disease Ordinance, the Minister has the power to prescribe mandatory vaccination as follows: "any disease as the Minister may prescribe until such time as full and continued protection of the child against these diseases is ensured".

Public vaccination programmes are based on the Common database (CdB) which is maintained by the Public Registry. The immunization service has access to the government common database and is responsible for call and follow-up.

Specific active immunization programmes are carried out with refugees and irregular immigrants. Usually this is part of the medical screening that takes place upon arrival in the country. There are no religious objectors but persons who object to vaccination are being encountered increasingly frequently.

There are no incentive schemes or sanctions currently in place. Parents are strongly encouraged to have their children vaccinated prior to school entry.

Vaccination coverage is calculated at the national level.

Provision

Measles

Childhood vaccinations against measles are delivered as part of the MMR in the vaccination schedule. In the public primary care sector these are delivered by nurses who run the immunization clinics. In the private primary care sector, MMR vaccines tend to be administered by general practitioners or private community paediatricians. Nurses are regulated by the Council for Midwives and Nurses under the Health Care Professions Act. The immunization service is accountable to the Primary Care Management team which includes the Chief Nursing Manager in primary care. Private general practitioners are regulated by the Medical Council under the Health Care Professions Act. They are not managerially accountable and are self-employed.

The public health service may be involved in the coordination of specific vaccination efforts with groups such as refugees and irregular immigrants. The public health service does not offer a parallel service to that offered by the public primary care facilities. The communicable disease surveillance unit is accountable to the Superintendent of Public Health.

The School Health Service consists of a team of doctors and nurses who provide monitoring of primary child health and well-being as well as preventive care services in all State and Church Schools in Malta and Gozo. The emphasis is on the early detection of developmental, growth, sensory and learning problems, as well as physical disorders. To this end, pre-school developmental assessments are carried out before school entry, i.e. at pre-kindergarten level. These assessments, which are carried out in the parents' presence, involve taking a medical and family history, conducting a language, physical and social development assessment, height and weight measurement, as well as checking vaccination records.

Throughout the school year, the school doctors and nurses carry out a number of procedures with the following being of relevance to vaccination:

- rechecking and updating vaccination records for all Year 1 pupils;
- checking of vaccination records and TB screening of all non-Maltese pupils; and
- the administration of diphtheria, tetanus and polio vaccine (booster) to Year 10 pupils, along with an MMR catch-up campaign running in parallel.

The team works in close collaboration with the National Immunization Service through regular updating and inputting of vaccines in the central national

immunization database, administration of some vaccinations in schools and catch-up campaigns for missed vaccinations. The School Health Service is accountable to the management of Primary Health Care but works closely with the Department of Paediatrics, which is based at the main hospital.

Community nurses based in the health centres and the School Health Service play an important role in the implementation of the immunization programme since they issue the call/recall, administer the immunizations and carry out the data entry. Community nurses work within the immunization service.

Pharmacies sell vaccines from community retail pharmacies. Vaccines may be administered in the pharmacy setting in the private sector by general practitioners or paediatricians normally carrying out a private clinic adjacent to (or embedded within) the pharmacy premises. Pharmacists do not administer immunizations routinely, but may do so under supervision.

Influenza

In the public primary care sector vaccinations against influenza are delivered by nurses who run the immunization clinics. In the private primary care sector influenza vaccines tend to be administered by general practitioners.

Public health services organize and coordinate the influenza vaccination campaign, including advising on specifications, procurement, etc., but the public health service is not directly involved in administering influenza vaccinations.

Adult influenza vaccination is primarily carried out through immunization clinics at health centres by community nurses working in the immunization service. Persons caring for housebound relatives can phone for a special arrangement to be made such that the housebound person is given the influenza vaccine by the community domiciliary nursing service.

Pharmacies sell influenza vaccines from community retail pharmacies. Vaccines may be administered in the pharmacy setting in the private sector by general practitioners normally carrying out a private clinic adjacent to (or embedded within) the pharmacy premises. Pharmacists do not administer immunizations.

Financing

Childhood vaccinations against measles are free of charge at the point of delivery. The cost is covered through the statutory financing system via the general government budget. Vaccines are procured through the Central Procurement Supplies Unit.

If patients choose to have the MMR vaccination privately, then they formally pay the full cost out-of-pocket unless they have a private insurance scheme which partly or fully covers childhood vaccinations.

The seasonal influenza vaccine for the year 2017/18 was available free of charge from all health centres. In the first week the campaign was launched, priority was given to:

- All persons aged 55 years and over
- Children between 6 months and 59 months of age
- Persons of any age suffering from chronic diseases of the lungs, heart, liver or kidneys, diabetes, and any immunodeficiency conditions, including HIV and AIDS - in these cases, the Schedule V Control Card or a recent medical certificate stating the person's medical condition should be presented.

After the first week the influenza vaccine was available free of charge for all persons over the age of 6 months while stocks lasted. It is likely that the same or highly similar criteria will continue to apply in future.

The costs of vaccines and vaccine services are covered under the statutory financing system via taxation from the general government budget, and through the Central Procurement and Supplies Unit.

Those persons who opt to take the influenza vaccine privately usually order it at the local pharmacy and pay for the full cost out-of-pocket. As government coverage has widened, the number of persons opting to pay for the vaccine privately appears to be coming down.

Over the past decade the government has widened the criteria for influenza vaccination with practically all those wishing to have the vaccine being able to access it free of charge after the first week while stocks are available. It is not reported that stocks have been totally depleted and that demand has not been met.

Key barriers and facilitators

Measles

Childhood vaccination against measles is widely available through the immunization clinics in the health centres. There are no financial barriers to access and vaccination is provided to all children in the country irrespective of nationality, etc. The main barriers being encountered are rising vaccine scepticism and 'fake news' on social media which requires constant rebuttal by health professionals.

Influenza

Adult vaccinations against influenza are widely available and promoted heavily. Over the years the criteria for vaccination have been extensively widened and one cannot really talk of unmet need in this area. For housebound and bedbound persons, domiciliary vaccination through the community nursing service is also available. Occasionally, difficulties have been encountered in the past in procuring stock at national level in a timely manner.

Netherlands

Madelon Kroneman

Governance

For **measles**, the vaccination programme is part of the national immunization programme (*Rijksvaccinatie-programma*), under the responsibility of the Ministry of Health, Welfare and Sport, to protect children against infectious diseases. To execute the programme, the Ministry of Health, Welfare and Sport delegated the task to the National Institute for Public Health and the Environment (*Rijksinstituut voor Volksgezondheid en Milieu*), which monitors and registers the vaccinations. The Minister of Health, Welfare and Sport decides which vaccinations will be part of the national immunization programme (Kroneman et al., 2016; National Institute for Public Health and the Environment, 2018a), based on the advice of the Health Council of the Netherlands, an independent advisory body for the government. Childhood vaccinations are recommended in the Netherlands. Measles vaccinations are provided to children at the age of 14 months and the age of 9 years. Childhood vaccinations are free of charge. Parents receive invitations for their child/ren from the National Institute for Public Health and the Environment, which uses the National Population Registry (*Basisregistratie Personen*) as the information source for these invitations. A reminder is sent if parents do not make use of the invitation.

Children who live in an asylum shelter receive an invitation for a meeting with Youth Health Care Services. A vaccination plan is tailor-made for them, based on the vaccinations they have already had. There is a small group of religious objectors and a growing group of people who do not believe in vaccinations. There are no special programmes or policies for them.

Vaccination uptake is calculated based on data from the National Population Registry and the number of administered vaccinations (Schurink-van 't Klooster & de Melker, 2017; van Lier et al., 2018).

Influenza vaccination is part of the National Influenza Prevention Programme coordinated by the National Influenza Prevention Programme Foundation (*Stichting Nationaal Programma Griepppreventie*). The National Institute for Public Health and the Environment oversees the quality and effectiveness of the programme and purchases the vaccines through European tenders. The Minister of Health decides which risk groups are eligible for influenza vaccination, based on advice of the Health Council of the Netherlands. Vaccination for risk groups is free of charge. Selection and invitation of persons at risk of complications associated with influenza are done by general practitioners, based on their electronic patient records. Influenza vaccination is recommended, not mandatory.

Some employers offer influenza vaccination through their occupational health services. The number of persons vaccinated in this way are not included in the uptake figures, but previous research revealed that this number is rather low (Kroneman & Verheij, 2003).

Vaccination uptake figures are based on the Nivel Primary Care Database (*Nivel Zorgregistraties eerste lijn*). This database uses routinely recorded data from health care providers to monitor health and utilization of health services in a representative sample of the Dutch population. The database contains data on approximately 800 000 patients from 211 general practitioner practices.

Side-effects of vaccinations (for both measles and influenza) are registered and monitored by the Netherlands Pharmacovigilance Centre Lareb.

Provision

Childhood vaccinations against measles at the age of 14 months are administered by physicians at Child Health Centres (*Consultatiebureaus*), where parents go with (healthy) babies for regular health check-ups. At the age of 9 years vaccination is provided by municipal public health services.

Soon after a baby's birth the parents receive an invitation. This invitation includes a letter, an information brochure, a vaccination certificate and a set of call-up cards for the different vaccinations up to the age of 4 years. Parental consent for vaccination is asked before the first vaccination and registered in the electronic registry of the Youth Health Care Services (*Jeugdgezondheidszorg*). For the vaccination at 9 years old, parents receive a new invitation.

Adult vaccinations against influenza are provided by general practitioners. They invite eligible persons based on the information in their information system. General practitioners mostly organize special vaccination hours, but they are free to organize the actual administration as they wish. The professional organization of general practitioners provides a guide on how the influenza vaccination campaign is organized and implemented (Vrieze et al., 2017).

Financing

Childhood vaccinations, including **measles** vaccination, are free of charge at the point of delivery. The national immunization programme is financed through general taxation.

Influenza vaccination is free of charge at the point of delivery for persons at high risk of complications from influenza infection. The groups for which vaccination is recommended are (as of 2018):

- persons aged 60 or over
- children and adults with certain conditions, namely:
  - patients with abnormalities and functional disorders of the airways and lungs
  - patients with a chronic heart disorder
  - patients with diabetes mellitus
  - patients with a chronic kidney disease
  - patients who recently underwent a bone marrow transplant
  - persons living with HIV
  - persons with a reduced resistance to infection (e.g. because of (functional) asplenia, autoimmune disease, liver cirrhosis, chemotherapy or immunosuppressive medication)
- children aged between 6 months and 18 years who are long-term salicylate users

- persons with an intellectual disability living in residential homes (National Institute for Public Health and the Environment, 2018b).

The influenza vaccination programme is financed through general taxation. General practitioners order vaccines from the National Influenza Prevention Programme Foundation. A spillage of 5% is allowed. Larger spillage will be at the expense of the general practitioner. General practitioners receive a fee for each vaccinated person from the target groups. People who do not belong to the target groups have to pay out-of-pocket. Sometimes employers pay for these vaccinations, which are then administered through their occupational health service.

Key barriers and facilitators

Childhood vaccinations against measles are provided during the regular health check-ups of babies at the age of 14 months. For those parents who visit the Child Health Centres, the vaccination does not require an extra visit. The invitation contains an information leaflet. Parents receive a baby book at their first visit to the Child Health Centre, in which they can register the developments of their children and in which the vaccination schedule is indicated. Vaccination uptake, although still high, has been slowly decreasing over the years. It is not yet clear why this is the case. Since January 2018 more time has been made available for professionals to discuss parents' worries concerning vaccinations. A number of other activities to increase vaccination uptake are currently being discussed or initiated, including a dialogue with anti-vaccination movements, and the establishment of a website with patient stories.

Vaccine uptake of **adults against influenza** is also decreasing. This trend started in 2008 and the latest figures available indicate uptake was still falling in 2016. Vaccine uptake decreased from over 75% at the beginning of the century to 53% in 2016 (Heins et al., 2016). Research revealed that among older people their willingness to accept vaccination is influenced by their judgement of the effectiveness of the vaccine, the risk of contracting the disease and the risk of dying as a result of influenza (Eilers et al., 2017). This information can be useful in designing information campaigns. Previous research revealed that a personal invitation from a general practitioner was a facilitator for influenza vaccination uptake (Kroneman, Paget & van Essen, 2003). As an incentive for general practitioners to organize and administer the vaccines, the National Influenza Prevention Programme Foundation pays about €10 per vaccinated person belonging to one of the target groups.

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Poland

Iwona Kowalska-Bobko, Katarzyna Badora-Musiał

Governance

Recommendations for the implementation of vaccinations in Poland are prepared by:

1. the Paediatric Team of Experts on the Protective Vaccination Programme at the Ministry of Health, and

2. the Sanitary-Epidemiology Group at the Chief Sanitary Inspectorate.

Recommendations result from the analysis of national data on the incidence of specific infectious diseases and infections. They also take into account the recommendations and reports of the Advisory Committee on Vaccination of the European Centre for Disease Prevention and Control (ECDC) and the recommendations of the World Health Organization (WHO).

Entities that carry out vaccinations keep medical records regarding mandatory vaccinations, including storing immunization cards and making entries confirming the vaccination, and prepare reports on mandatory vaccinations and reports on the vaccination status of persons covered by preventive health care, which they provide to the state county (*powiat* – the middle level of Polish territorial self-government) sanitary inspector.

The National Institute of Public Health–National Institute of Hygiene (*Narodowy Instytut Zdrowia Publicznego–Państwowy Zakład Higieny* (NIZP-PZH)), the health research and expert advisory institution in Poland prepares annual reports.

There are no acts addressed exclusively at migrants living in Poland. Legal regulations apply to the general population in Poland and, where appropriate, they also take into account the needs and/or obligations of migrants (Sakowski, 2012).

The obligation to vaccinate according to the immunization programme applies to everyone who stays in Poland for more than three months. The Act on preventing and combating infections and infectious diseases does not provide an exception for any specific population group (e.g. refugees, religious objectors, etc.).

If non-citizens are legally resident in Poland and registered with a general practitioner, regardless of health insurance cover, they can receive free vaccinations under the immunization programme up to the age of 19. Indeed, such immunizations might be mandatory. For persons who do not have health insurance entitlements, the costs of mandatory vaccinations, medical qualification tests or specialist consultations are financed from the state budget (from the part managed by the Minister of Health).

Primary care physicians are the primary source of information about vaccinations. The facilities of the State Sanitary Inspectorate are in constant contact with vaccination points, providing them with refunded vaccines, monitoring reporting and publishing information materials on websites. However, there are no standard procedures in this area and the quality of information available in individual facilities is very variable. The Chief Sanitary Inspector conducts the campaign "Vaccinating the willingness to vaccinate" (*Zaszczep w sobie chęć szczepienia*) and publishes legal acts regarding this issue.

A nationwide campaign, "Vaccinate yourself with knowledge!" (*Zaszczep się wiedzą*!), which promotes reliable information and sources of vaccination information, has been under way since 2015. The campaign emphasizes the need for a responsible approach to the idea of vaccinations. The main tool is the website *www.zaszczepsiewiedza.pl*, where people looking for answers to the question "why is it worth it to vaccinate?" will find the most important information.

Another important source of information is the portal *szczepienia.info*, created in 2007 and run by the National Institute of Public Health–National Institute of Hygiene, which is accredited by Vaccine Safety Net WHO.

According to the Law dated 5 December 2008 on the prevention and control of infections and communicable diseases in humans (OJ L 2008 No. 234 item 1570):

1. Persons issuing a live birth certificate are obliged to attach an immunization card and a vaccination booklet for the child;

2. Persons carrying out vaccinations, e.g. primary care physicians, must (a) maintain medical records concerning mandatory vaccination, including keeping immunization cards and making entries confirming the completion of vaccination; (b) prepare reports on the mandatory vaccinations carried out and reports on the vaccination status of persons covered by preventive health care, and provide the State County Sanitary Inspector with such reports.

3. The Chief Sanitary Inspector shall announce in a communiqué, in the official journal of the Minister of Health, the Protective Vaccination Programme for a given year, with detailed indications concerning the use of particular vaccines, resulting from the current epidemiological situation, not later than 31 October of the year preceding the implementation of the programme.

4. The health-epidemiological stations (at the state county level) shall determine the annual demand for vaccines, store the vaccines and supply the vaccinating service providers with them. The entities obliged to prepare the quantitative demand for vaccines used for the performance of the mandatory vaccination, together with the schedule of vaccine deliveries, and to prepare reports on the types, numbers, serial numbers and validity dates of vaccines, are the authorities of the State Sanitary Inspectorate. The entity responsible for reporting on the implementation of vaccine delivery schedules is the central distributor appointed by the Minister of Health.

5. The Minister of Health determines by way of an executive regulation the entities obliged to draw up a quantitative demand for vaccines used for mandatory vaccinations, together with a schedule of supplies of vaccines, their storage and distribution.

Key agencies

The immunization programme is established as a national policy by the Ministry of Health and the General Sanitary Inspectorate, in cooperation with the Sanitary-Epidemiology Board (*Rada Sanitarno-Epidemiologiczna*) and the Paediatric Group of Experts for Vaccination (*Pediatryczny Zespół Ekspertów ds Szczepień Ochronnych*). The Board is an advisory group and consists of: epidemiologists, paediatricians, infectious disease physicians, microbiologists and sanitary inspection members. The programme is published before 31 October in the year preceding the implementation of the programme as a Ministry of Health directive approved by the General Sanitary Inspectorate.

Immunization programmes

In Poland vaccinations included in the immunization schedule are mandatory for children and adolescents (0–19 years old). This means that every child residing in Poland can receive vaccines refunded by the state, but it also means that parents are obliged to show up to vaccination visits (Article 5 of the Act on preventing and combating infections and infectious diseases – *Journal of Laws*, Dz. U. 2008, No. 234, Item 1570). Refusal to vaccinate usually means triggering an administrative procedure, which typically involves a monetary fine.

Mandatory vaccinations are set by Polish law and pertain to all children residing in Poland for longer than three months. Each child at birth receives an immunization card which is stored at the general practitioner's office and is used to monitor progress through the immunization schedule. Based on this card, the general practitioner calls parents for Well-Baby visits and administers scheduled vaccines as part of developmental monitoring. The current immunization schedule (2018) includes 11 mandatory vaccines, against tuberculosis, hepatitis B, diphtheria, tetanus, pertussis, poliomyelitis, *Haemophilus influenzae* type b, pneumococci, **measles**, mumps and rubella (MMR). The immunization schedule also includes a separate section describing which additional vaccines are recommended, but their cost has to be met by parents[4] (e.g. rotavirus vaccines or meningococcal vaccines).

The Polish immunization programme includes:

1. The mandatory immunization programme,
2. The mandatory immunization programme for risk groups,
3. The recommended immunization programme.

Since 2013 the National Programme for Fighting Influenza has been educating the public and building awareness of the risks associated with **influenza** and its complications. This is a social initiative by independent medical experts. The assumptions of the programme were created in cooperation between experts of the Working Group on Influenza, the National Institute of Public Health–National Institute of Hygiene and the Polish Society of Health Education. In 2016, 205 territorial self-government units financed older people's vaccination against influenza.[5]

Vaccination coverage

The average coverage with the MMR vaccine in Poland in 2015 was 96.7% (for children having two doses of MMR). In 2017, 63 cases of measles were registered. The last death due to measles in Poland was recorded in the 1990s.[6]

Of all the infectious diseases covered by epidemiological surveillance in Poland, most cases are caused by influenza. Every year during the peak influenza season, which in Poland most often runs from January to March, influenza and influenza-like illness result in an overloading of the primary health care system and become a leading cause of sickness absence, generating significant economic and social costs (Wojtyniak & Goryński, 2016). In the 2016/17 season a record number of influenza and influenza-like cases were recorded. In total, 4 919 110 people fell ill, 20% more than for the same period of the previous influenza season. There have also been 25 deaths due to influenza and its complications. Most often they occurred in people over 65 who are the most vulnerable to influenza complications (Wojtyniak & Goryński, 2016).

4 *Mandatory vaccinations in Poland*, http://szczepienia.pzh.gov.pl/en/stories/mandatory-vaccinations-in-poland/.

5 *Szczepienia*, Ogólnopolski Program Zwalczania Grypy, http://opzg.pl/szczepienia.

6 http://szczepienia.pzh.gov.pl/szczepionki/odra/6/#szczepionki-przeciw-odrze-w-programie-szczepien-ochronnych.

According to data collected by sanitary-epidemiological stations, a total of 799 958 people in 2015 were vaccinated against influenza in the whole of Poland, i.e. 2.1% of the population. Compared to 2014, the number of vaccinated patients decreased by 7.6%. Most people who were vaccinated were aged over 65 (with a coverage in this age group of about 7%) (Wojtyniak & Goryński, 2016).

Financing

Vaccines listed as mandatory are paid for by the Ministry of Health, and the costs of the immunizations are paid by the National Health Fund (the third-party payer of health services in Poland). Mandatory vaccines are given in practices/hospitals/clinics that contract with the National Health Fund (patients do not need to pay for it directly). However, recommended vaccines and immunizations need to be paid for either by patients individually, by employers or from individual private insurance funds. Vaccines are also available on the private market (where costs are fully covered by patients)[7]. Sanitary-epidemiological stations determine the annual need for vaccines, store the vaccines and supply them to vaccination service providers.

The **measles** vaccine is given in a combined form as a measles, mumps and rubella (MMR) vaccine. Vaccination against measles belongs to the mandatory (free) set of vaccinations given to children in Poland aged 13–14 months and 10 years of age. They are financed from the budget of the Ministry of Health.

Children over 10 years of age who have not received two doses of MMR vaccine should be given the missing vaccine not later than by the age of 19 years. Vaccinations against measles, mumps and rubella are recommended (but not financed from the budget of the Ministry of Health) to persons:

- not vaccinated against measles, mumps and rubella as part of the mandatory vaccination, who receive two doses of vaccine at least four weeks apart, and

- young women, especially those working in children's environments (kindergartens, schools, hospitals, clinics), and young men to prevent congenital rubella, especially those not vaccinated as part of the mandatory vaccination.

It is not recommended to administer the vaccine during pregnancy, and women should not become pregnant in the first month after vaccination.

Vaccination against **influenza** belongs to the recommended set of vaccinations, which means that the vaccinated person covers the cost of the vaccine. More and more territorial self-government units are active in influenza prevention, so that in these territories older people have the opportunity to access influenza vaccination free at the point of delivery.

Provision

In Poland vaccinations are carried out in therapeutic entities by doctors in individual medical practices, individual specialist medical practices or group medical practices, or by nurses and midwives in individual medical practices, individual specialist practices or group practices of nurses and midwives.

Mandatory vaccination is performed exclusively by health care providers under agreements concluded with the National Health Fund for the provision of basic health care or other scope of services, if so provided by the agreement. Only vaccine preparations registered and available on the Polish market may be used in the implementation of the mandatory and recommended vaccination programmes.

Compliance with the scope of services and dates of vaccination are supervised by the State Sanitary Inspectorate in accordance with Article 5 (3) of the Act on the State Sanitary Inspection.

Box 1 Mandatory vaccinations in Poland

Mandatory vaccinations are carried out by doctors, nurses, midwives and school hygienists. In practice, the vaccination system is based on primary health care. General practitioners qualify for vaccination and constitute the main source of information. Nurses also perform vaccinations and record the administration of each vaccine on paper vaccination cards.

7 *Poland*, http://venice.cineca.org/documents/poland_ip.pdf.

Key barriers and facilitators

The state very clearly supports vaccination against measles by financing it from public funds and making it mandatory, but in 2017 almost 30 000 people in Poland evaded vaccination.

The very active anti-vaccination movement in Poland is a barrier to vaccination. Proponents of the anti-vaccination movement believe that the substances contained in vaccines are more harmful to health than the diseases against which they protect. It is argued that vaccines contain mercury, aluminium and formaldehyde, substances with toxic effects and many negative side-effects on health.

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Portugal

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Governance

According to Ordinance No. 248/2017 of 4 August 2017 the Directorate-General of Health (*Direção-Geral da Saúde*) is responsible at the national level for developing and overseeing implementation of the national immunization programme and other vaccination strategies to protect public health and groups at risk or in special circumstances, such as free vaccination against seasonal influenza. At the regional level, Public Health Departments in each Regional Health Administration (*Administração Regional de Saúde*) are in charge of coordinating the implementation of the national immunization programme and the free vaccination against influenza. At the local level those functions are carried out by Public Health Units, which are part of the Groups of Healthcare Centres (*Agrupamentos de Centros de Saúde*). Vaccines included in the national immunization programme and the vaccine against influenza are available free of charge in all primary health care units belonging to the National Health Service. Nurses are responsible for administering the vaccines.

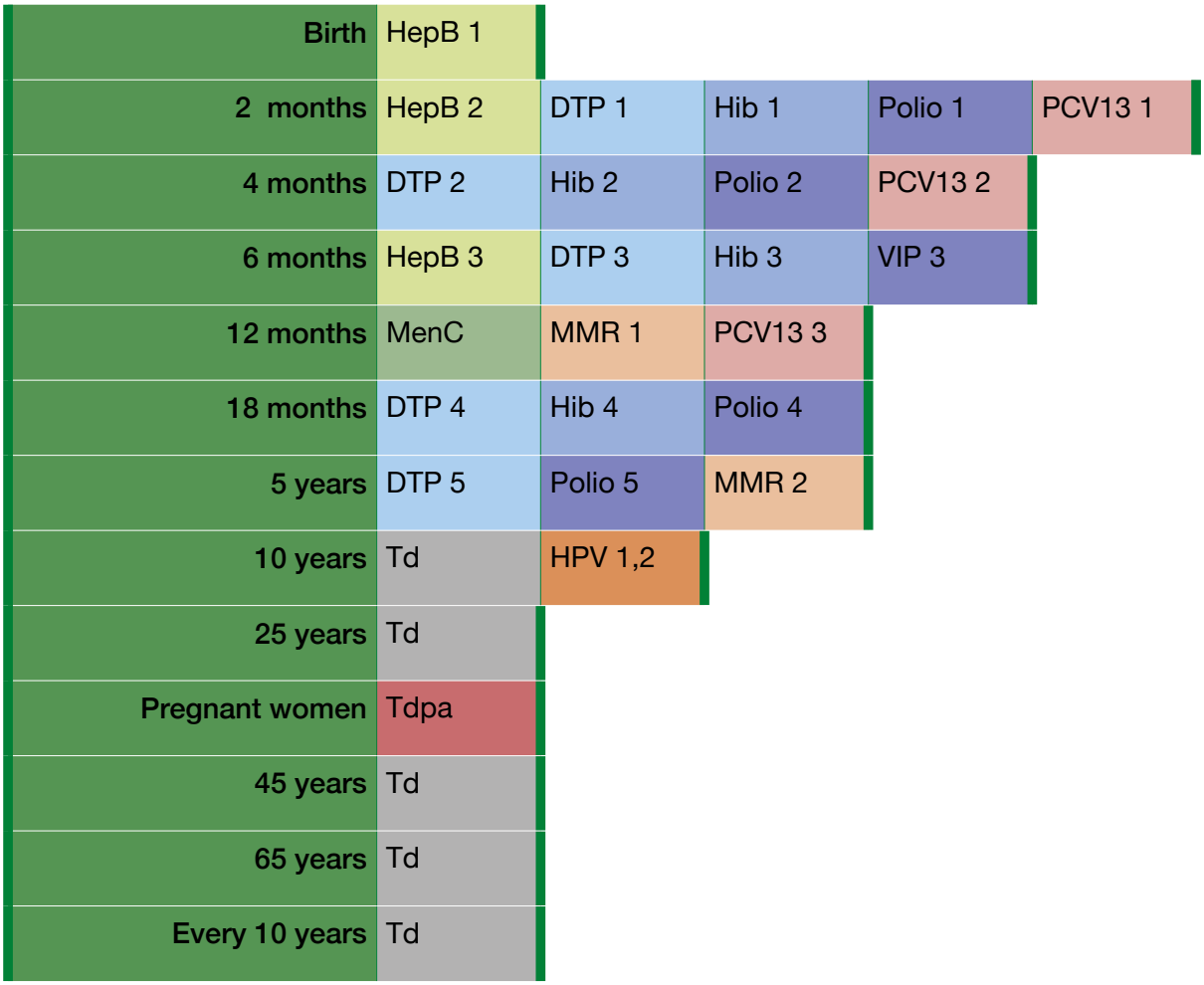
The seasonal influenza vaccine is also available at community pharmacies and can be administered by pharmacists. However, if bought in a pharmacy, with a medical prescription, patients have to partially pay for the vaccine (37% of the price is covered by the National Health Service) (Guideline No. 018/2017 from the Directorate-General of Health, published on 26 September 2017).

The governance of the Portuguese national immunization programme was strengthened in 2017 by a new regulation (Ordinance No. 248/2017, of 4 August 2017). The national

immunization programme is organized and coordinated nationally by the Directorate-General of Health, which is responsible for proposing new or revised vaccination strategies to the Ministry of Health, issuing normative documents and guidance where appropriate, conducting monitoring and evaluation of both the vaccination process and the impact of vaccination strategies, guaranteeing the implementation of the national immunization programme and other vaccines offered through coordination with the procurement body (Shared Services of the Ministry of Health, *Serviços Partilhados do Ministério da Saúde*), the financing body (Central Administration of the Health System, *Administração Central do Sistema de Saúde*), the national medicines agency (National Authority of Medicines and Health Products, *Autoridade Nacional do Medicamento e Produtos de Saúde*) and the public health laboratory (National Institute of Health Dr Ricardo Jorge, *Instituto Nacional de Saúde Dr Ricardo Jorge*). At the regional level Public Health Departments are responsible for overseeing the national immunization programme's implementation on a regular basis. At the local level Public Health Units coordinate the implementation of the national immunization programme.

The national immunization programme was established in Portugal in 1965. Several vaccines have been included under the national immunization programme since its inception. Currently, the Portuguese national immunization programme includes vaccines against hepatitis B, diphtheria, tetanus, pertussis, H. influenzae type b, poliomyelitis, pneumococcal disease, meningococcal disease, measles, mumps, rubella and human papilloma virus (Figure 1).

Figure 1 The national vaccination scheme in Portugal



DTP – tetanus, diphteria and pertussis vaccine; Hib – Haemophilus influenzae type b vaccine; HPV – Human Papillomavirus vaccine; MenC – serogroup C meningococcal vaccine; PCV13 – 13-valent pneumococcal conjugate vaccine; Td – tetanus and diphtheria toxoids; Tdpa – tetanus toxoid, reduced diphtheria toxoid, and pertussis vaccine (reduced doses); MMR – measles, mumps and rubella vaccine; HepB – Hepatitis B vaccine

Source: Directorate-General of Health

Vaccinations in Portugal are recommended. Portugal has achieved high immunization rates based on voluntary vaccination. However, according to Ordinance No. 19058/1962 of 3 March 1962 and Decree-Law No. 45198/62 of 20 February 1962, tetanus and diphtheria vaccines are mandatory for all people attending schools (up to the age of 7 years). Tetanus is also mandatory for certain professional groups, including civil servants. These laws are not enforced because these single vaccines do not exist and the Portuguese national immunization programme is not mandatory.

Individual information records based on population registries have existed since the inception of the national immunization programme in 1965, first on paper and, since 2003, in a computerized electronic system (in continental Portugal). This system was upgraded to an online system in 2017, which is still under development (in continental Portugal). Reminders and follow-up messages are generated automatically by the information system (since 2003) and managed by nurses in primary health care units. Catch-up with the schedules is done regularly.

Currently, in the national immunization programme specific groups of the population are targeted with specific measures and free vaccinations:

- Pertussis vaccine: All pregnant women should be vaccinated against pertussis (TDaP – tetanus, diphtheria and pertussis vaccine – reduced doses);
- BCG: Children at higher risk of TB (risk groups) should get BCG at birth or during childhood (<6 years old);
- Pneumococcal vaccines: Children and adults with certain chronic illnesses (risk groups) can get the 23-valent and 13-valent pneumococcal vaccines free of charge, according to their doctor's recommendation;
- Meningococcal B vaccine: Children and adults with certain chronic illnesses (risk groups) can get the MenB vaccine free of charge, according to their doctor's recommendation;
- Hepatitis B vaccine: Health professionals and other risk groups can get HepB vaccine free of charge;
- Polio and MMR vaccines: Travellers and health professionals can get polio and MMR vaccines for free;
- Refugees and migrants have access to the national immunization programme for free, under the same conditions as every Portuguese citizen;
- Other situations: during outbreaks (e.g. the hepatitis A outbreak in 2016/17), groups at higher risk are offered vaccination for free (even if the vaccine is not included in the national immunization programme).

Awareness-raising communication campaigns are organized regularly, and when new vaccines are included in the national immunization programme.

There are no specific incentives or sanctions for vaccinations.

Vaccination coverage is calculated in each National Health Service primary health care unit. The population (denominator) used is the total number of individuals who are registered in each National Health Service primary health care unit. As the National Health Service is universal, every citizen is a National Health Service user and is registered at a National Health Service primary health care unit.

National immunization programme vaccines: Vaccination coverage (of vaccine Y) in a given primary health care unit = Number of registered individuals born in year X vaccinated with vaccine Y / Total number of registered individuals born in the year X

Influenza vaccine: mixed method:

- administrative and survey (for ≥ 65 years old);
- records for institutional coverage;
- survey for clinical risk groups;
- Occupational Health for health care workers in the National Health Service.

Each National Health Service primary health care unit performs regular monitoring (at least yearly) and sends the information to the Public Health Unit of its jurisdiction. All Public Health Units communicate data to the respective Regional Public Health Department, and then each Regional Public Health Department sends the information to the Directorate-General of Health, which assembles national level information

on vaccination coverage, including the Autonomous Regions of Azores and Madeira. In the Autonomous Regions there are different records and information systems, but the same methodology for calculating coverage applies.

Table 1 Measles vaccination coverage

Cohort (of birth)	Measles vaccination coverage (latest data available)	Dose	Evaluation year
1997	96.6	MMR 2	2015
1998	96.6	MMR 2	2016
1999	97.6	MMR 2	2017
2000	97.9	MMR 2	2017
2001	98.0	MMR 2	2017
2002	98.0	MMR 2	2017
2003	98.0	MMR 2	2017
2004	97.7	MMR 2	2017
2005	97.7	MMR 2	2017
2006	97.6	MMR 2	2017
2007	97.2	MMR 2	2017
2008	96.7	MMR 2	2017
2009	96.7	MMR 2	2017
2010	96.5	MMR 2	2017
2011	95.0	MMR 2	2017
2012	97.8	MMR 1	2014
2013	98.0	MMR 1	2015
2014	97.8	MMR 1	2016
2015	98.4	MMR 1	2017

Note: According to the Portuguese national immunization programme, Cohorts 1997–2011: children and adolescents aged 7–20 years old: 2 MMR doses; Cohorts 2011–2015: children aged 1–5 years old: 1 MMR dose.

Table 2 Adult influenza vaccination coverage

Season	Adult influenza vaccination coverage (>=65 years old)	Source
2010/11	48%	Ecos, National Institute of Health Dr Ricardo Jorge
2011/12	43%	Ecos, National Institute of Health Dr Ricardo Jorge
2012/13	55%	Directorate-General of Health estimate
2013/14	57%	Directorate-General of Health estimate
2014/15	55%	Directorate-General of Health estimate
2015/16	60%	Directorate-General of Health estimate
2016/17	60%	Directorate-General of Health estimate

Provision

Vaccines included in the national immunization programme (such as the MMR vaccine) are mainly provided at National Health Service primary health care units. Alternatively, private health care units can also offer national immunization programme vaccines, according to specific agreements with the Regional Health Administrations, which are responsible for providing the vaccines for those private units. Nurses are the health care workers involved in the implementation of the national immunization programme, by administering vaccines and maintaining vaccination records.

Private market vaccines are bought in community pharmacies, with a medical prescription, and can be administered at a health care unit (National Health Service or private). Alternatively, some private market vaccines (mainly influenza vaccination) can also be administered in pharmacies.

Adult vaccination against influenza is given for free to all citizens aged 65 years or older, health care workers, and specific groups of patients with chronic conditions. All other groups must have a medical prescription and buy the vaccine at any community pharmacy (the National Health Service covers 37% of the cost of the vaccine). For citizens eligible for free vaccination, the influenza

vaccine is mainly given at primary health care units. Also, primary health care units are in close touch with homes and residential structures for older people and the vaccines are provided to those institutions to be offered to all eligible patients (and administered there). People not eligible for free vaccination can have the influenza vaccine administered at a community pharmacy by a pharmacist or at National Health Service health care units.

Financing

Measles vaccine, like all vaccines included in the national immunization programme, is free of charge at the point of delivery.

The National Health Service, including vaccines and the national immunization programme, is funded from the government budget and therefore general taxation is the main source of national immunization programme funding. The Central Administration of the Health System (*Administração Central do Sistema de Saúde*) is the body responsible for financing the vaccines. Costs associated with physical and human resources to implement the national immunization programme are mainly supported by the National Health Service. As national immunization programme vaccines can also be administered at some private health care units, there are some costs with physical and human resources that can be supported by private health care institutions, but all national immunization programme vaccines are entirely funded by the National Health Service.

According to the latest guidance from the Directorate General of Health (guidance for influenza vaccination is issued annually) (Guidance No. 18/2017, of 26 September 2017), influenza vaccination is free of charge at the point of delivery for the following groups:

- People aged 65 years or older
- All people with the following conditions, irrespective of their age:
    - Living in institutions, including homes and other structures to support older people
    - People who are recovering in the National Network for Integrated Care
    - People with home support
    - People hospitalized in the National Health Service, who have chronic conditions eligible for the influenza vaccine
- All people with the following chronic conditions, irrespective of their age:
    - Diabetes
    - Dialysis
    - Down syndrome (Trisomy 21)
    - Awaiting cell or organ transplant
    - Submitted to cell or organ transplant
    - On chemotherapy
    - Cystic fibrosis
    - With alfa-1 antitripsin deficit under therapy
    - With Pulmonary interstitial disease under therapy
    - Chronic disease with respiratory impairment
- National Health Service health care workers, who have contact with patients with chronic conditions
- Firemen who have contact with patients with chronic conditions

For those eligible for free influenza vaccination, the National Health Service covers the costs. For those who are not eligible for free influenza vaccination, but for whom vaccination is recommended, employers (if it is a professional group, e.g. those working in homes and institutions) or patients (e.g. pregnant women, older people aged 60–64 years) are responsible for buying the vaccines, with a medical prescription. The National Health Service covers 37% of the cost of the vaccine (the total cost at the pharmacy is around €6.00 and the citizen pays €3.80).

Key barriers and facilitators

Vaccination coverage in Portugal has been very high for several years. Primary health care services are well

distributed across the country. Since the national immunization programme is offered in primary health care units, this facilitates access to vaccines.

The good results obtained with vaccination since the 1960s have built trust among citizens. Recently, the provision of vaccination services by some private providers has contributed to facilitating access for those children who are followed-up in the private sector. In addition, as all children are exempt from service fees, there are no economic barriers to the national immunization programme.

Efforts have been made to increase awareness of the importance of vaccinating children with large media campaigns and public discussions on the matter.

Eligible population groups have access to free influenza vaccines in primary health care units, which are well spread across the country. In addition, outreach activities at primary health care units also contribute to increased coverage of influenza vaccine, allowing for those who are housebound or institutionalized and unable to access primary health care units to be vaccinated.

Every year there is a large campaign in the media and in health care units to inform citizens that the vaccine is available free of charge for those eligible, as well as how the vaccine should be administered, and how patients should proceed to obtain vaccination.

Vaccination in community pharmacies since 2007 has facilitated access to vaccine administration for those not eligible for free influenza vaccination. In this case, patients must have a medical prescription and pay part of the costs for the vaccine (37%) and its administration.

Romania

Silvia Gabriela Scîntee

Governance

The agency in charge of developing and overseeing implementation of national vaccination plans and programmes is the Ministry of Health. The Ministry of Health establishes the national vaccination schedule, approves the national immunization programme and organizes the centralized procurement of vaccines. The National Centre for Communicable Diseases Surveillance and Control of the National Institute of Public Health coordinates the programme implementation and is responsible for the epidemiological surveillance of vaccine-preventable diseases, and the evaluation of vaccine coverage and vaccine supply; it also coordinates the surveillance of post-vaccination adverse reactions. The District Public Health Authorities (the representatives of the Ministry of Health at district level, 41 districts plus the Bucharest Public Health Authority) are responsible for the local implementation of the national immunization programme, ensuring that the vaccines are distributed to the family medicine physicians and reimbursing doctors for providing the service. They are also in charge of promoting vaccination.

The national immunization programme is developed at the national level. Its implementation is supervised at district level by the District Public Health Authorities. Vaccination is performed by family doctors (except for those vaccines administered at birth in neonatal departments, in tuberculosis outpatient clinics, in health units hosting abandoned children, and in vaccination centres where vaccinations are performed on request or in case of epidemics).

A national immunization programme is usually developed and updated every two years. The programme includes two sections: vaccination of the population at specific ages, according to a national vaccination schedule (Table 1), and vaccination of risk groups (Table 2).

Table 1 Vaccination of the population at specific ages, according to the national vaccination schedule

Recommended age	Vaccine	Administered by
within first 24 hours	Hepatitis B vaccine	Maternity departments
2–7 days	BCG	
2 months	DTPa-VPI-Hib-Hep. B Pneumococcal conjugate vaccine	Family doctor
4 months	DTPa-VPI-Hib-Hep. B Pneumococcal conjugate vaccine	Family doctor
11 months	DTPa-VPI-Hib-Hep. B Pneumococcal conjugate vaccine	Family doctor
12 months	**Measles, Mumps and Rubella Vaccine**	**Family doctor**
5 years	**Measles, Mumps and Rubella Vaccine**	**Family doctor**
6 years	DTPa-VPI	Family doctor
14 years	Vaccine against diphtheria, tetanus, and acellular pertussis (Tdap) for adults	Family doctor

Table 2 Vaccination of risk groups

Vaccine	Groups at risk
Vaccine against diphtheria and tetanus for adults (Td) or adsorbed Tetanus toxoid if Td is not available	Pregnant women
Vaccines against influenza	**In accordance with WHO methodology**
Measles, Mumps and Rubella Vaccine	**People exposed by close contact**
Other vaccines approved by the Ministry of Health for specific outbreak situations	People with increased risk

Vaccinations are recommended but not mandatory for all types of vaccines. A draft Vaccination Law to make vaccination mandatory (by checking the vaccination history of children when they start school) was issued in 2017 and generated intense public debate. At the time of writing, the Law has been withdrawn from parliamentary debate with the intention of being included in the new Health Code that the current government wants to promote.

Childhood vaccinations are recorded in the National Electronic Vaccination Registry introduced in 2011. The Registry is administered by the National Centre for Communicable Diseases Surveillance and Control of the National Institute of Public Health. The database is updated monthly by maternity departments and family doctors. The reports generated by the system are submitted by the physicians to the District Public Health Authorities in order to obtain reimbursement for the services provided. The District Public Health Authorities have access to the National Electronic Vaccination Registry in order to verify the physicians' reports, as well as to generate analyses of immunization coverage in their districts.

Since 2001 a Migrant Health Department at the Romanian office of the International Organization for Migration has provided health assessments for transiting refugees upon their arrival, and pre-departure health assessments as required by the countries of resettlement, with the purpose of prevention and control of communicable diseases. Foreigners who have obtained a protection form in Romania and foreigners who have acquired a right of residence in Romania have the same rights to health care as Romanian citizens.

From 2002 so-called health mediators have been introduced within the national "Promotion of Mother and Child Health at Community Level" programme to enhance access to health care services among the Roma population. Health mediators are mainly women recruited from the Roma community, who receive specific training and are employed by the local authorities to facilitate communication between medical staff and the Roma community.

There are no other specific measures for objectors to vaccination, except the general information campaigns and the information and medical advice provided for each patient by family physicians or any other medical staff.

The draft of the Vaccination Law does not allow religious or other exemptions from vaccination, except for medical conditions that are certified by a special vaccination committee.

The current legislation does not include any explicit sanction for citizens or parents related to vaccination. Government Decision no. 857/2011 regarding sanctions for non-compliance with the public health regulations states that "non-compliance […] with measures for prevention and tackling of communicable diseases, laid down in the existing norms" is sanctioned with fines between 5000 and 10,000 lei (over €1000–2000). Considering immunization is a measure for "prevention of and fighting communicable diseases", this article might count as an existing sanction.

Different drafts of the Vaccination Law included either sanctions for parents refusing vaccination or sanctions for parents refusing to receive information on vaccination. Both versions were highly contested by adherents to the anti-vaccination movement.

Vaccination coverage is calculated as the percentage of children enrolled at all family doctors vaccinated in accordance with the vaccination schedule, of all the children enrolled at all family doctors. Data are collected at district level (by the District Public Health Authorities) twice a year: in February, for children aged 18 months, and for other children as foreseen by the national vaccination schedule, and in August, for children aged 12 months and 24 months, and for other children as foreseen by the national vaccination schedule. Data are collected actively by reviewing documents at the offices of at least 30% of family doctors, and passively for the rest, through the documents reported by family doctors to the District Public Health Authorities. Data are compared by random sampling with data in the National Electronic Vaccination Registry. Data from the District Public Health Authorities are sent in a specific reporting form to the National Centre for Communicable Diseases Surveillance and Control of the National Institute of Public Health. Vaccination coverage is calculated for BCG, Hep B, DTPa, Hib, VPI, MMR and Td for the total population of children, and per rural/urban residence, at district, regional and national level. The methodology was published by the National Centre for Communicable Diseases Surveillance and Control of the National Institute of Public Health on their site in 2016.

Provision

Measles

Family doctors provide all immunizations included in the national immunization programme (except for those vaccines administered at birth in neonatal departments), including measles, mumps and rubella (MMR) vaccines, following a general health status evaluation of the patient to ensure that the vaccine can be safely provided.

Public health services elaborate, implement and evaluate the national immunization programme and organize the centralized procurement of the vaccines and vaccine distribution. Community nurses provide information on vaccination. If the vaccines provided under the national immunization programme are missing or insufficient (e.g. due to delays in centralized procurement), pharmacies sell these vaccines, as well as other vaccines not included in the national immunization programme.

Influenza

Family doctors provide immunization to the people at risk on their list, or to anybody else at their request, following a general health status evaluation of the patient to ensure that the vaccine can be safely provided.

Public health services conduct vaccination awareness campaigns and organize the centralized procurement of vaccines and their distribution for some of the groups at risk. Pharmacies sell vaccines to defined groups at risk or anyone else who wants to get vaccinated against influenza.

Financing

Measles vaccines are free of charge at the point of delivery. Vaccines against measles are provided under the national immunization programme and covered by the state budget allocated to the Ministry of Health. Vaccines under the national immunization programme are procured by the Ministry of Health through a centralized procedure and distributed to the District Public Health Authorities. In addition, the Ministry of Health distributes the other funds for the national immunization programme to the District Public Health Authorities or other implementing entities (e.g. health units hosting abandoned children, vaccination centres).

The District Public Health Authorities distribute vaccines to family doctors and pay them for the provision of vaccines from the dedicated funds for Health Programmes received from the Ministry of Health. In case of documented vaccine shortages, parents might buy vaccines from pharmacies, but otherwise measles vaccination costs are covered. All children in Romania are entitled to free health services, including vaccination, regardless of the status (insured or uninsured) of their parents.

For influenza, vaccines are free of charge at the point of delivery for the population at risk. Vaccines against influenza are provided for the population at risk under the national immunization programme and covered by the state budget allocated to the Ministry of Health. Vaccines under the national immunization programme are procured by the Ministry of Health through a centralized procedure and distributed to the District Public Health Authorities. In addition, the Ministry of Health distributes the other funds for the national immunization programme to the District Public Health Authorities or other implementing entities (e.g. hospitals for the vaccination of medical and auxiliary staff, vaccination centres, etc.).

There is no mandatory financial obligation for employers. Some companies offer to their employees as a nonfinancial benefit so-called "health subscriptions" – a package of (mainly preventive) health services, including vaccination, to be provided by private health care providers (these contracts for health services between companies and private health care providers were initiated in the late 1990s).

The District Public Health Authorities distribute vaccines to family doctors and pay them for the provision of vaccines from the dedicated funds for Health Programmes received from the Ministry of Health. The population not included in the risk groups, or even the population at risk in case of vaccine shortages, may buy the vaccine from pharmacies. However, some persons at risk are covered by the national immunization programme, regardless of their status (insured or uninsured).

Key barriers and facilitators

Childhood vaccinations against measles

Gaps in child coverage with vaccinations against measles are due to the objections of parents influenced by the anti-vaccine movement, delays in vaccine procurement, insufficient information among the population, concern of family doctors about providing vaccinations, and the increase in the number of seasonal cross-border migrants – children of these migrants may not follow the same vaccination schedule as Romanian-born children because they come from countries that may have different epidemiological profiles and/or different vaccination schedules.

The last epidemiological report, for 2016, showed that the measles outbreak also affected many children under one year old (408 cases out of 2435) who were not eligible for MMR vaccination. The coverage rate of vaccination against measles was 87.1% for the first dose and 74.5% for the second dose.

A survey on the public perception of vaccination conducted by the Romanian Institute for Evaluation and Strategy in 2017 showed that only 67% of those interviewed did not agree with the statement "adverse reactions post vaccinations outweigh the benefit of vaccination"; these were mainly adults between 36 and 50 years of age and from rural areas. Of those interviewed, 92% were aware of the measles outbreak in Romania, but only 43% of them considered the lack of vaccination to be the main cause.

Adult vaccinations against influenza

Gaps in adult vaccinations against influenza might be due to the non-compliance of people with medical recommendations, insufficient information among the population or concerns of family doctors about providing vaccinations, and vaccine shortages. In 2016 the Ministry of Health distributed 500 000 doses of vaccine against influenza and 499 650 persons were vaccinated. As only the population at risk is included in the national immunization programme, while the rest of the population is supposed to pay for their own influenza vaccine, the coverage is very low – 2.5% in 2016. For the population at risk, the coverage was 2.9% for pregnant women, 8.2% for persons over 65 years old, 17.8% for patients with chronic diseases, 31% for medical personnel, and 47.5% for institutionalized persons.

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Slovakia

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Governance

There are several institutions that are involved in the process of developing, implementing and following up on the national immunization programme:

- the Ministry of Health
- the National Public Health Authority
- the Regional Public Health Authorities
- health insurance companies
- the State Institute for Drug Control
- health care providers (general practitioners for children and adolescents, general practitioners for adults) and pharmacies

The Ministry of Health is responsible for health policy, including drug policy, i.e. setting rules for the reimbursement of vaccines. For the purpose of vaccines reimbursement, the Ministry of Health Categorization Committee prepares recommendations for the Minister to make a decision. Recommendations are based on an evaluation and on statements of experts from the field of public health and pharmacoeconomy. In the case of a positive decision, the vaccine is included in the list of reimbursed drugs.

The implementation of the national vaccination policy is the responsibility of the National Public Health Authority.

Vaccination policy is governed by Act No. 355/2007 Coll on the Protection, Support and Development of Public Health and on the Amendment and Supplementation of Certain Acts (Act 355/2007) and specifically by Ministry of Health Regulation 585/2008 on the prevention and control of communicable diseases (Regulation 585/2008). The National Public Health Authority issues annually a vaccination calendar with details on population groups, vaccination age and conditions to be fulfilled (type of vaccine by general description; no specific vaccine is mentioned by name). The National Public Health Authority has prepared an action plan for measles and rubella that is regularly updated, most recently in June 2017. Influenza has a specific position in terms of surveillance. The National Public Health Authority provides weekly updates on the epidemiological situation of acute respiratory infections and influenza. During the influenza season attention is dedicated to the communication of the epidemiological situation. Information on the incidence of influenza is published weekly on the National Public Health Authority website and sent to the media.

Regional Public Health Authorities are the primary point of contact for general practitioners for children and adolescents and for general practitioners for adults. They conduct the yearly assessment of vaccination coverage in their respective districts, and monitor regional epidemiological data. They are particularly important during local epidemics, as they take protective anti-epidemic measures when searching for the primary source of infectious diseases, determine preventive steps and coordinate a regional approach. In case of a localized epidemic, for example of influenza or measles, they oversee implementation of specified procedures and monitor health care providers (including hospitals) in the area of infectious and preventable diseases. When it comes to vaccination during the epidemic, the Regional Public Health Authorities might order additional vaccinations. In this case they communicate with other responsible bodies and with the general practitioners who provide the vaccination. Regional Public Health Authorities also play an important role in the surveillance of influenza, as they coordinate regional sentinel surveillance systems. They also inspect health care facilities once a year.

The State Institute for Drug Control receives and analyses notices about adverse reactions to vaccines. It is responsible for the national registration of vaccines in the Slovak Republic. Health care providers are responsible for the delivery of vaccination programmes. Pharmacies supply health care providers with the vaccines.

Vaccination programmes

Vaccination programmes are organized nationally for entire cohorts of a certain age or for cohorts described in Regulation 585/2008 and the vaccination calendar. If an individual needs changes to the scheme defined for the entire cohort, there are special procedures according to which general practitioners might send patients to centres for persons with contraindications against vaccination. There is also guidance for health workers on how to proceed with the vaccination of people in different age groups.

The national immunization programme consists of two parts. The first part is a mandatory vaccination programme, setting out types of vaccinations within cohorts of the same age or groups of people at an increased risk of being infected. In Slovakia vaccination is mandatory against diphtheria, tetanus, pertussis, poliomyelitis, Haemophilus influenza type B, viral hepatitis type B, pneumococcal infections, **measles**, mumps and rubella. Mandatory vaccination programmes are based on registries of defined cohorts. The vaccination is defined by age, and general practitioners for children and adolescents are responsible for call and follow-up. When patients or parents of children refuse the mandatory vaccination, health care providers are obliged to inform the Regional Public Health Authorities who then issue a penalty. Vaccination based on professional risk is provided by general practitioners. Recommended vaccinations are not based on population registries.

Vaccination against measles was introduced in 1969. Today it is part of the MMR triple vaccine and consists of two shots. The first, basic, one is mandatory for every child aged between 15 months and 18 months. The second, booster, shot is mandatory for every child during their 11th year of age. There are expert discussions under way regarding moving the second dose to an earlier age, so that children would be completely vaccinated before entering school. Two vaccines against MMR are currently available in Slovakia (Priorix, M-M-RVAXPRO). Both are fully reimbursed by the health insurance companies without any co-payment by patients. The choice of vaccine is based on the recommendation of the general practitioner. The provision of vaccinations is also fully reimbursed by health insurance companies. Vaccination against measles is provided by general practitioners for children and adolescents who call children based on the registry of children in their outpatient facility. There is no unified system; every general practitioner for children

and adolescents makes their own system, some using the postal service and others using electronic mailing or text messages.

For **influenza**, vaccination is mandatory for:

- people living in social care facilities, and
- people with an increased risk of infection due to living or working in an area where avian influenza is present; this vaccination should be provided based on a decision of the Regional Public Health Authorities.

Vaccination against influenza is recommended, based on a recommendation of a health care provider, for:

- children aged between 6 months and 12 years,
- people older than 59 years, and
- people with chronic respiratory disease, or cardiovascular, metabolic, renal and immune disorders.

In addition, vaccination against influenza is recommended for people at increased risk of infection based on their profession:

- professional soldiers, or soldiers recalled for service, and
- health care professionals who are directly in contact with infected patients or with the source of influenza outbreaks.

There are two influenza vaccines available in Slovakia, both containing strains recommended by WHO. Both types of vaccine are fully reimbursed by health insurance companies for mandatory vaccinations, as well as for recommended vaccinations against influenza based on age or specific health conditions. The health insurance companies also fully reimburse the vaccines and vaccination against influenza for the entire population during the influenza season. No quadrivalent vaccine is available.

Vaccination coverage

The coverage rate for mandatory vaccinations of children (including against measles) is assessed at the subnational level by the Regional Public Health Authorities and at the national level by the National Public Health Authority. As mentioned above, the coverage rate is derived from yearly inspections of health care providers undertaken by the Regional Public Health Authorities. They also collect information about vaccination refusal (full – completely refused vaccination, and partial – refusal of some vaccinations) and this is sent to the National Public Health Authority, which summarizes all relevant information about vaccination coverage and vaccination refusal. This information is published annually as the report "Evaluation of administrative inspection of vaccination coverage".

The denominator for vaccination coverage against infectious diseases with mandatory vaccination comes from health care providers' data obtained during the annual inspection. Since the introduction of the national immunization programme and mandatory vaccinations, the vaccination rate for decades was almost 100%, until the last five or ten years when the anti-vaccination movement found its followers also in Slovakia; the vaccination coverage against measles is slightly decreasing (Figure 1). The highest rate of vaccination refusal is for the MMR vaccine and amounted to 3.1% in 2017. The decreasing vaccination coverage might lead to local epidemics of measles, which occurred for example in 2018 in the eastern part of Slovakia.

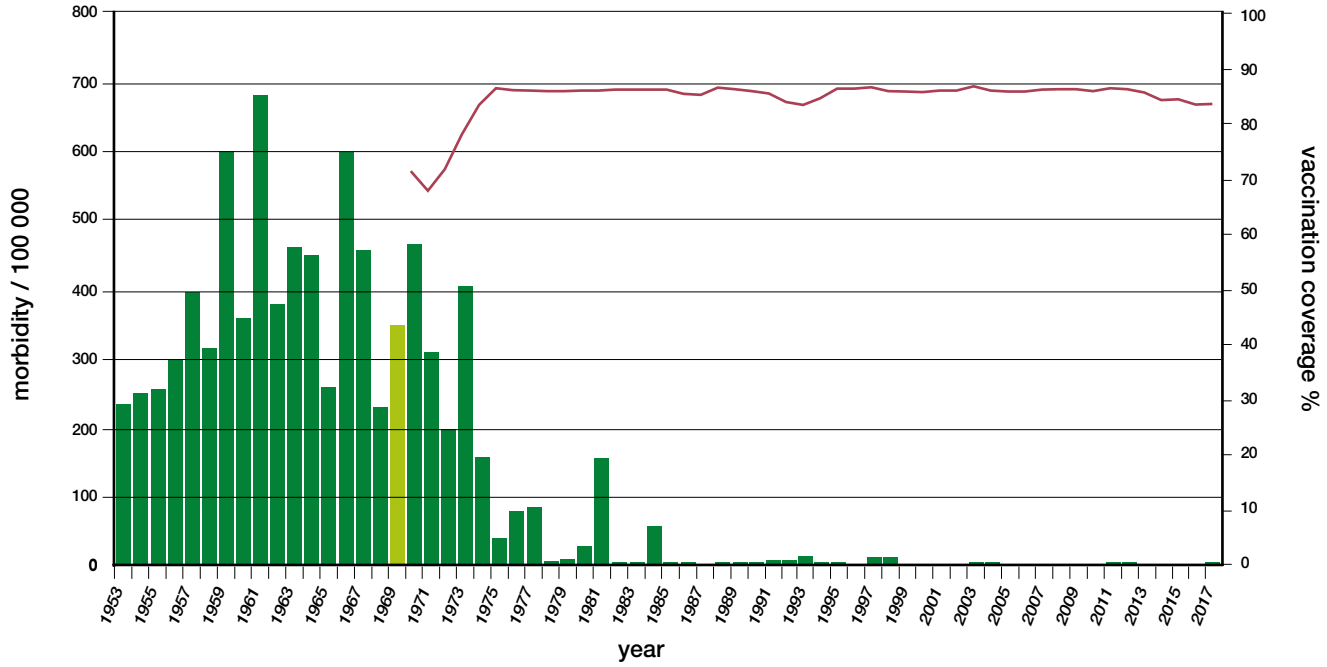
Calculation of the coverage rate for vaccination against influenza is based on the number of vaccines sold and the number of vaccines against influenza reimbursed by health insurance companies. This information is summarized by the National Public Health Authority. The denominator is based on data from the Statistical Office of the Slovak Republic on the size of the resident population in three age groups: 0–15 years, 16–58 years and 59 years and over.

Provision

As stipulated by the law and the national immunization programme, childhood vaccination against **measles** is provided by general practitioners for children and adolescents. There are about 1200 practices of general practitioners for children and adolescents; their network covers the entire country. Every newborn child should be registered with a general practitioner for children and adolescents, and there is free choice of provider.

Vaccination against measles for children with specific health conditions or children not in the national insurance

Figure 1 Measles vaccination coverage and cases per 100 000 population, 1953–2017



Source: Public Health Authority, personal communication

scheme (e.g. foreigners staying long term in Slovakia) is provided by regional specialized paediatricians.

Vaccination against **influenza** is provided for children by general practitioners for children and adolescents and for adults by general practitioners for adults. Every year the Ministry of Health decides about the level of reimbursement for seasonal influenza vaccines; in recent years this level has consistently been 100%, with the aim of increasing vaccination coverage.

Both general practitioners for children and adolescents and general practitioners for adults follow guidelines issued by the National Public Health Authority. They are monitored by the Regional Public Health Authorities at regular (annual) intervals.

Vaccines are provided by pharmacies following cold chain principles, or any principles defined by product characteristics.

Financing

At least one vaccine against every communicable disease included in the national immunization programme is fully reimbursed by the health insurance system. Parents or patients can also choose a categorized vaccine that is not fully reimbursed and pay the difference. The list of reimbursed drugs is updated every month.

Up to the age of 18 years, health insurance contributions are paid by the state and the basic benefit package covers practically all provided services. The mandatory vaccination against diseases included in the national immunization programme is fully reimbursed by health insurance funds. Health insurance companies reimburse a fee to physicians for performing vaccinations and the costs of vaccines to pharmacies. Representatives of health insurance companies participate in the categorization committee responsible for the recommendations with regard to which vaccines are reimbursed.

Vaccination against measles, including fees to the general practitioners for children and adolescents, is fully reimbursed by health insurance companies for cohorts defined in the mandatory vaccination programme. It is also fully reimbursed for cohorts defined in the recommended vaccination programme (i.e. for influenza), if the vaccination is recommended by a health care provider. The only exception are people recommended for vaccination against influenza due to professional risk. They are reimbursed by their employer for both vaccines and the vaccination.

Key barriers and facilitators

One of the main efforts of institutions involved in vaccination is effective communication with the public. There are no disease-specific vaccination campaigns established by the state (i.e. by the Ministry of Health).

Each year Slovakia participates in the WHO European Immunization Week. Activities are realized by the National Public Health Authority and by the Regional Public Health Authorities. They are focused on the lay public, health workers, and groups of the population at risk, such as the Roma minority living in remote settlements. For increasing awareness among the Roma, health mediators play an important role. They help Roma with following the vaccination schedule and facilitate communication between the Roma and health workers. Media coverage and dissemination of information are quite satisfactory, with input from experts from WHO, the National Public Health Authority, the Slovak epidemiologic and vaccination associations, and the field.

In the Regional Public Health Authorities there are Health Protection and Promotion Counselling Centres, which provide the public with advisory services including on vaccination. Parents with doubts or questions can come and take advice on vaccination. The National Public Health Authority prepares annually a vaccination calendar for the public (mostly parents) and the vaccination strategy is available on its website. Within the post-partum packet, mothers in hospitals are given an interactive tool of the vaccination calendar showing in a simple and clear way the dates when their newborn should be vaccinated. This interactive vaccination calendar is a reliable source of basic information on individual types of vaccination in the Slovak Republic. In addition, vaccination calendars are also distributed to paediatric outpatient departments. The aim is to build the public's trust in vaccination and to persuade parents that vaccination is the best, simplest and fastest way of protecting their children against serious infectious diseases.

Factors that can cause public concern about vaccination comprise fears of adverse events after immunizations, publication of research papers that contradict established opinion about vaccine safety, new recommendations or changes in policies, and the introduction of new vaccine products. Once a concern has been raised, it can be sustained by the spread of rumours, media reports, historical events that caused lingering doubts, marginalization of certain populations, and self-organized community groups that may become active in vaccine controversies. The Internet and social media provide a means of organization for anti-vaccine and pro-vaccine groups and make it easier to disseminate information and misinformation. Health workers might sometimes insufficiently inform the parents who have doubts about vaccination. Given the increasing source of alternative treatments, immunization services must now put more effort into addressing inaccuracies and misinformation that may circulate about vaccines. Information about outbreaks in neighbouring countries helps to persuade parents to vaccinate their children.

Problems might occur with marginalized groups of the population, such as homeless people, the Roma minority, or drug users. They require special attention and proactive outreach to provide vaccination. There are special projects aimed at these groups of the population by the state, the private sector and non-governmental organizations.

One new feature in Slovakia that has been observed recently is the in- and outmigration of people because of study, work, family reasons, etc. This can interrupt the vaccination schemes when the vaccination is initiated in Slovakia but not completed, due to travel abroad.

Slovenia

Maja Sočan

Governance

Slovenia runs a comprehensive and accessible system for administering and recording immunizations. The National Institute of Public Health provides centrally procured vaccines with effective distribution chains, an adequate cold chain and ongoing quality control. National funding is available for central vaccine procurement to ensure vaccines for all children.

The following vaccine-preventable diseases are covered by the programme:

- Mandatory vaccinations of children against diphtheria, tetanus, pertussis, Hib, polio, **measles**, mumps, rubella and hepatitis B
- Recommended vaccination against pneumococcal infection for children
- Recommended vaccination against HPV for girls
- Selective immunization against tuberculosis for newborns/children with the following epidemiological indications: newborns whose parents immigrated from countries with a high incidence of tuberculosis in the five years before the infant's birth; children whose mothers are being treated for tuberculosis; and children who, in the first years of life, lived permanently in, or frequently visited, countries with a higher incidence of tuberculosis

Agency in charge

According to current legislation, the Centre for Communicable Diseases, located at the National Institute of Public Health, is responsible for preparing the annual national Vaccination and Chemoprophylaxis Programme (*Program cepljenja in zaščite z zdravili*). Vaccination issues are covered by the **Law on Infectious Diseases** (https://www.uradni-list.si/glasilo-uradni-list-rs/vsebina/72546, in Slovene) and details are described in the **Regulations on certificates, record keeping and provision of vaccination data, vaccine adverse reactions and vaccination errors** (https://www.uradni-list.si/glasilo-uradni-list-rs/vsebina/2017-01-1269/pravilnik-o-potrdilih-vodenju-evidenc-in-zagotavljanju-podatkov-o-cepljenju-nezelenih-ucinkih-po-cepljenju-in-zdravstvenih-napakah-pri-cepljenju, in Slovene). The annual national vaccination programme covers vaccination target groups, vaccine types and mandatory or recommended vaccination schemes.

Before publication, the draft annual Vaccination and Chemoprophylaxis Programme is discussed with the regional vaccination coordinators and professional associations of doctors who are the most important actors in the implementation of the vaccination programme (i.e. pediatricians and doctors of school medicine, infectious diseases specialists and epidemiologists). The comments made by health professionals are discussed at the Centre for Communicable Diseases and, if relevant, changes are made.

The annual Vaccination and Chemoprophylaxis Programme is also discussed within the National Advisory Committee on Immunization, which acts as an advisory body of the National Institute of Public Health. The appointed members and minutes of the meetings are publicly available (in Slovene) on the internet (http://www.nijz.si/sl/posvetovalna-skupina-za-cepljenje). The National Advisory Committee on Immunization meets four times a year and discusses the challenges of the programme's progress, adherence to the programme, and information from the Adverse Event Monitoring Register. It also discusses initiatives from health care professionals and other stakeholders.

The Centre for Communicable Diseases prepares the final version of the annual Vaccination and Chemoprophylaxis Programme, taking into account suggestions and comments. The final version is sent to decision-makers at the Ministry of Health, Directorate of Public Health. The Vaccination and Chemoprophylaxis Programme is published in the *Official Gazette* and is available on the internet (http://www.nijz.si/sl/program-cepljenja-in-zascite-z-zdravili-za-leto-2018, in Slovene). Instructions for the implementation of the programme are available at: http://www.nijz.si/sites/www.nijz.si/files/uploaded/navodila_za_izvajanje_ip_2018.pdf, in Slovene.

More extensive changes to the Vaccination and Chemoprophylaxis Programme (including those with financial consequences, e.g. the introduction of a new vaccination) must be approved by the Health Council, a consultative body of the Ministry of Health.

Role of the national and regional level

Drafting the vaccination programme, planning, vaccine procurement, vaccine distribution, reporting of adverse events and reporting of errors in the vaccination procedure are all done at the national level. Data on vaccination coverage are collected regionally and forwarded to the national level.

Regional vaccination coordinators are in charge of implementing the vaccination programme at the regional level. They are located in nine Slovenian regions and belong organizationally to the National Institute of Public Health. The main functions of regional coordinators are to support the vaccination programme in their region, advise and inform the local medical and lay community, recognize the challenges in everyday vaccination practice, and provide vaccination coverage data.

Vaccination plan

Measles: There is no special national plan addressing measles vaccination in children or adults. Vaccination against measles is mandatory for some population groups and recommended for others (*see below* for more details).

Influenza: Vaccination coverage for influenza is very low in Slovenia (one of the lowest in the EU). A draft national strategic plan aiming to raise vaccination coverage has been prepared but has not yet been made public, as it has to be approved by the Ministry of Health with short- and long-term goals set in concert with all stakeholders.

Mandatory and voluntary programmes

According to the annual Vaccination and Chemoprophylaxis Programme, vaccination against measles is mandatory for children. Children are required to be vaccinated with a first dose of measles vaccine at the age of 12–18 months and with the second dose at the age of 6 years, before entering primary school.

The obligation for measles vaccination ends at the age of 18 years, except for students, for whom the requirement continues until 26 years of age (or earlier if they complete their studies before that age). Vaccination against measles for pre-school children, adolescents and students is free of charge.

Health care workers are required to receive two doses of measles vaccine, if not vaccinated according to the national programme before starting work. This obligation does not apply to those who have natural immunity having had measles earlier in life (it must be recorded in their medical records), or to those who have tested positive for measles-specific IgG antibodies.

Vaccination against influenza is not mandatory for anyone in Slovenia. The recommendations are in accordance with WHO recommendations and are available on the internet (http://www.nijz.si/sites/www.nijz.si/files/uploaded/cepljenje_proti_gripi_2018_19.pdf, in Slovene).

Population and vaccination registry

Measles: The vaccination programme for measles (and other vaccine-preventable diseases) is based on a population registry, the Central Registry of the Population, which is a responsibility of the Ministry for Internal Affairs. Every child at birth is given a citizenship number (or identity number) that is also used in the vaccination registry.

Soon after a baby's birth, parents choose a paediatrician who becomes responsible for the preventive and curative aspects of their child's health. The newborn child is invited for the first screening at the age of 2 months and then regularly thereafter (according to the Law on Preventive Programmes for Children), including on the dates when vaccines are scheduled.

The paediatrician follows up on adherence to the vaccination programme and sends additional invitations when children do not come to their scheduled appointments.

According to recently implemented regulations, all vaccinations are recorded in the vaccination registry, including mandatory and non-mandatory vaccinations. This new registry is not yet operational, but is expected to be so in 2019. The vaccination registry is located at (and maintained by) the National Institute of Public Health.

Influenza is a non-mandatory vaccination. Before the influenza season, the National Institute of Public Health provides information through the media about the availability of influenza vaccines, and distributes the vaccines to public and private health centres. An individual can choose to be vaccinated in their family doctor's outpatient clinic or can go to one of the nine regional units of the National Institute of Public Health which also offer influenza vaccinations. Data about influenza vaccinations are entered into the vaccination registry.

Targeted measures

Refugees under 18 years of age are vaccinated free of charge with the same vaccines and following the same vaccination scheme as Slovenian citizens. The number of refugees in Slovenia is still low and most are located in refugee centres. The health care workers (nurses) working in refugee centres identify those who need vaccinations and refer them usually to a nearby outpatient clinic which is responsible for providing health care for refugees.

There are no targeted measures to reach religious objectors in Slovenia. If parents object to mandatory vaccinations, according to the Law on Infectious Diseases and Regulations the child's paediatrician must send a notification to the Health Inspectorate of Slovenia. Health inspectors then contact the parents and, if they still object, a legal process starts that ends with a penalty being paid by the parents.

Incentive schemes

Measles: There is no formal continuous campaign for measles vaccination. Every parent receives information about vaccinations in the so-called "parents' school", along with other information, and more than half of parents-to-be attend these "schools" before the child is

born. At birth, in the maternity ward, every parent is given information material about the importance of vaccination. Before offering the measles vaccine, during the appointment parents are briefly informed (by a nurse or a paediatrician) why the child has to be given the vaccine. If parents refuse to have their child vaccinated, they face fines.

Influenza: Extensive information is given through the media before and during the influenza season. The National Institute of Public Health and the Ministry of Health use a variety of communication channels, including TV spots, the internet and social media (e.g. Twitter).

There are no incentive schemes for vaccinators or patients.

Methods to estimate vaccination coverage

Measles: Vaccinators (paediatricians) are required to report the number of vaccinated children and the number of children who should be vaccinated according to the schedule. The data from public and private outpatient clinics are sent to regional units of the National Institute of Public Health once per year. The data are then compiled at the national level and presented in a yearly report that is made available on the internet (http://www.nijz.si/sl/spremljanje-precepljenosti-deleza-cepljenih).

Influenza vaccine: Vaccinators (primary care physicians) and regional institutes of public health have to report the number of vaccinated individuals, stratified by age and risk groups. The data are collected at the national level and a report prepared by the National Institute of Public Health. The report is published on the internet (http://www.nijz.si/sites/www.nijz.si/files/uploaded/porocilo_cepljenje2016.pdf).

Measles vaccination coverage was 93% in 2017. Most children are vaccinated against measles for the first time aged 12–18 months and receive a second dose at the age of 5–6 years.

The Roma population is estimated to amount to 7000–12 000 people in Slovenia. Some (mostly living in the northern and eastern parts of Slovenia) are more integrated in society, while others (mostly living in the south-eastern part of Slovenia) are keen to keep their traditions. In the south-eastern group vaccination coverage is lower than for the rest of the population.

Provision

Measles: Primary care physicians (primary care paediatricians, doctors of school medicine and family physicians) are the main vaccinators of pre-school and school children. Primary care physicians work in the public or private sector, in the latter case with a concession to provide publicly funded services. For mandatory vaccinations private doctors with a concession are paid by the National Health Insurance Institute and have the same obligation as those working in the public sector.

Doctors of school medicine check pupils' vaccination records during regular preventive check-ups. If pupils have not yet been vaccinated, further action depends on the situation. If the doctor of school medicine is also the curative doctor of the pupil, and parents refuse the vaccination against measles, the doctor has to inform the Health Inspectorate. If the school medicine doctor is required only to carry out the preventive health check, they send a notice to the child's paediatrician.

Nurses are entitled to take care of the vaccines (procurement of vaccines, regular checks of the cold chain) and record-keeping, along with other administrative work. Pharmacies have no role in the measles vaccination process.

Influenza: Primary care physicians working in the public sector or private outpatient clinics with a concession are the main vaccinators for influenza. Nine regional institutes of public health also provide vaccinations with the influenza vaccine, but their vaccination clinics are mainly orientated towards travel medicine.

Nurses are entitled to take care of the vaccines (procurement of vaccines, regular checks of the cold chain) and record-keeping, along with other administrative work. In addition, nurses can vaccinate with the influenza vaccine, but not without a physician's permission. Pharmacies have no role in the influenza vaccination process.

Financing

The National Health Insurance Institute of Slovenia is the key payer of publicly funded health services, and, with the support of the Ministry of Health, provides the financial resources for the implementation of the vaccination programme. Local governments have no role in the financing process.

All mandatory vaccinations (including for measles vaccine and vaccination) and some non-mandatory childhood vaccinations (e.g. pneumococcal and HPV vaccine) are free of charge at the point of delivery. For families with no parent working, there are social compensations that enable families in need to obtain mandatory vaccinations free of charge along with other basic health services.

Vaccination of irregular migrants is not covered by the public financing scheme, but their numbers are likely to be small.

Vaccination against influenza is not completely free of charge for anyone in Slovenia. If a person is at least 65 years of age, has a chronic condition, is pregnant or falls into another specified category, they have to pay for the vaccination but not for the vaccine, which is covered by the National Health Insurance Institute. Vaccination costs in the season 2017/18 were €7. Individuals who are not considered to be at high risk pay the full price for both vaccine and vaccination, which amounted to €14 for the quadrivalent influenza vaccine in the season 2017/18. The trivalent vaccine was no longer available in 2017/18 in Slovenia, except for children under 3 years of age (paediatric form).

Some employers provide influenza vaccinations for their employees free of charge. Hospitals and primary care clinics also offer influenza vaccinations free of charge for their health care workers, but coverage among health care workers remains low.

Key barriers and facilitators

Key barriers to reaching 95% measles coverage are:

- Vaccine hesitancy and refusal because of a strong anti-vaccine movement, usually in combination with alternative medicine and "natural" health lifestyles
- Lack of knowledge even among health care professionals, as measles is a rare disease in Slovenia and most health care workers do not have any personal experience of caring for patients with measles
- Negative messages in the media (until recently)

Facilitators of a high coverage of measles vaccinations are:

- Mandatory vaccination
- Vaccination free of charge for children and students
- A more positive attitude in the media in 2017
- Changing perceptions of measles, due to measles outbreaks and deaths in neighbouring countries (e.g. Serbia and Italy)

A key barrier to improved influenza vaccination coverage is the general perception that influenza cannot lead to a life-threatening situation. This also applies to health care workers, for whom influenza is not an important topic in the professional curriculum. Paying for the influenza vaccine is an additional barrier, not only for patients in high-risk groups but also for health professionals, as they have to handle the payment, creating additional work, in particular in the public sector.

Spain

Andreu Segura Benedicto[1]

Governance

The vaccination policy in Spain is determined by the laws that regulate health interventions, although the decentralized model of public administrations (general or central, regional and local) modulates its application in practice.

The responsibility for establishing the basic lines of health and health care policies falls to the Ministry of Health, Consumption and Social Welfare of the General Administration. The General Directorate of Public Health, Quality and Innovation of this Ministry is the body directly in charge of vaccination policies.

The Spanish Agency for Medicines and Health Products, an autonomous body attached to the Ministry, is responsible for the authorization of medicines, including vaccines, and their distribution, as well as the coordination of the pharmacovigilance network in the country.

The responsibility for implementation of vaccination policies, and for reaching the established objectives, lies with the 17 regions, known as autonomous communities (CCAA), and, where appropriate, the autonomous cities of Ceuta and Melilla.

1 Thanks are expressed for suggestions and comments on the Spanish country fiche by Aurora Limia (Spanish Ministry of Health, Consumption and Social Welfare); Amós García (Spanish Vaccines Society); Montse Martinez; Carmen Cabezas and Luís Urbiztondo (Catalan Department of Health); and the data from Angel Plans (Catalan Society of Occupational Health). The responsibility for possible errors is exclusively that of the author.

The coordination between central and regional levels is done by the Inter-territorial Council of the National Health System (CISNS), which has various commissions. The Commission of Public Health is the one in charge of public health matters. The Immunization Programme and Registry Committee and the Surveillance Committee are technical advisory groups of the Commission of Public Health on immunization and vaccines, and surveillance of diseases respectively. All the regions and autonomous cities and the Ministry of Health, Consumption and Social Welfare are represented in the Inter-territorial Council of the National Health System. The Council, the commissions and the working groups are coordinated by the Ministry of Health, Consumption and Social Welfare. There is also an Influenza Surveillance Working Group coordinated by the National Centre for Epidemiology (Institute of Health Carlos III).

The Public Health Commission of the Inter-territorial Council of the National Health System, coordinated by the General Directorate of Public Health, Quality and Innovation, is the key body in the development of vaccination policies in Spain.

In summary, the role of the Inter-territorial Council of the National Health System includes:

a) Agreeing on the diseases that should be prevented by immunization, and the common schedule for systematic immunization.

Currently there are thirteen diseases subject to vaccination in addition to influenza vaccination. Vaccination against influenza is not part of the systematic childhood immunization schedule, but is formally recommended for those aged over 65 years and other groups of the population (risk groups, health care professionals, pregnant women, etc.). However, this is going to change as a new lifelong schedule has been recently approved.

b) Designing a common official vaccination schedule for Spain.

Although the regions are responsible for establishing the vaccination schedule and the management of the programme in their territory, the current trend is towards homogenization for the entire National Health System.

c) Establishing the risk indications for annual vaccines (influenza) or for vaccines not recommended systematically (e.g. meningitis B).

d) Determining, where appropriate, specific objectives for immunization programmes, such as the elimination of measles.

e) Evaluating the immunization programme, including the collection and analysis of data on vaccination coverage provided by the regions.

f) Other initiatives to promote vaccination (improvement of transparency in the operation of the presentation of vaccines, collaboration in vaccination campaigns, coordination of joint procurement of vaccines at a better price, etc.).

g) Coordination of travel health, including International Immunization Centres. Some of them depend on the Ministry of Health, Consumption and Social Welfare, and are distributed across the country, while others are the responsibility of the regions.

The **public health authorities of the regions** are responsible for:

a) Establishing the vaccination schedule for their territory.

In general, the schedule is the one recommended by the Inter-territorial Council of the National Health System. However, some differences persist in some regions (e.g. vaccination against Hepatitis A in Catalonia and Ceuta and Melilla cities).

b) Organizing the implementation of the vaccination schedule for the population of their territory.

In some regions advisory bodies have been created, involving scientific societies in vaccination strategies (in Catalonia, for instance: El Consell Assessor de Vacunes).

c) Buying the recommended vaccines.

In general, the vaccines are bought by the regional health services. The regions can benefit from a joint procurement framework to select the supplies of vaccines, signed by the Ministry of Health, Consumption and Social Welfare and the regions that want to participate.

d) Accrediting the vaccination centres from where the recommended vaccines are administered to the population.

In general, the accredited vaccination centres are the primary care centres of the public health care network,

including paediatric services, family health care, and family and community nursing, as well as hospitals in the public network, but private centres are also accredited.

e) Distributing the recommended vaccines to the accredited centres so they can be administered.

f) Designing the procedures for calculating the vaccination coverage of the recommended vaccines, including the indicators agreed by the Inter-territorial Council of the National Health System, collecting the data, analysing the information, using it where appropriate to modify strategies and programmes and sending it to the General Directorate of Public Health of the Ministry of Health, Consumption and Social Welfare.

g) Other activities include: collaboration with surveillance services for pharmacovigilance for the detection of possible adverse effects; vaccination campaigns for the population; awareness campaigns for health professionals; sero-epidemiological studies.

Local administrations collaborate with regional administrations and health services. Although some municipal school health programmes continue to exist in some Autonomous Communities, in most cases the general health services (basically the staff of the primary care centres and particularly the community nurses) carry out health promotion activities and disease prevention at schools. This includes the administration of some vaccines such as HPV and Hepatitis B and varicella. However, immunization programmes in schools do not exist in every region in Spain and there is also variability in the programmes and their coordination.

Other relevant agents could include the occupational risk prevention services (see the section on barriers and facilitators).

Scheduled vaccination is recommended and not mandatory. The current schedule is available at: http://www.msssi.gob.es/profesionales/saludPublica/prevPromocion/vacunaciones/docs/CalendarioVacunacion2018.pdf, and also at https://vaccine-schedule.ecdc.europa.eu. However, the competent health authorities can order the mandatory administration of vaccines if there is risk of epidemic spread. The judicial authority can also order it.

The official vaccination programmes usually use the population records of the public assistance services based on the individual health cards whose management and maintenance corresponds to the regional health services. However, this is variable across regions, with some having registries or immunization information systems in place. Most of them are linked to health care records. In general, people are not systematically called when they should be vaccinated.

There are some protocols from the Ministry of Labour, Migration and Social Security directed at specific groups of the population such as refugees. The regions are responsible for immunization programmes for these groups of the population.

Although the authorities are obliged to respect the decisions of parents who do not authorize the vaccination of their children, in some regions these parents are asked to sign an official document stating their refusal. There is an agreement at the Inter-territorial Council of the National Health System to register vaccine hesitancy and this is implemented in most registries at the regional level.

The parents of vaccinated children have documents that certify the immunization status of their children. These documents can be requested in day care centres, schools and other children's facilities, but schools cannot refuse to admit children who are not vaccinated.

The doses of vaccines administered in the official vaccination services are used to calculate vaccination coverage. The small proportion of vaccines acquired in pharmacies and administered through the private health sector is generally not included, although some regions do collect this information. The Autonomous Communities provide the information to the General Directorate of Public Health, Quality and Innovation of the Ministry of Health, Consumption and Social Welfare, as agreed by the Inter-territorial Council of the National Health System.

While the numerator used to calculate vaccination coverage is the number of administered doses of vaccines (i.e. the number of vaccinated persons), the sources used to determine the denominators (i.e. the populations of the corresponding population groups) vary between the different regions. In some cases they come from the official statistical bodies, in others from the population health registers or even from the registers of the vaccination services.

To diminish the possible differences in the procedures for calculating vaccination coverage between the regions,

a working group has been created that is preparing a proposal for new indicators of vaccine coverage.

Provision

The recommended vaccines are usually administered in primary care centres in the public network. These centres include paediatric and family medicine units and some other medical specialties. The nursing staff administer the vaccines to the people who request vaccination according to the official schedule.

The nursing or medical staff of provider entities that have authorized vaccination centres can also administer the influenza vaccine to the indicated population groups (risk groups, people aged over 65 years and public service personnel).

The nursing staff of the occupational risk prevention services of companies – including health care providers, such as hospitals – can administer influenza vaccines to the workers as and when recommended. In the case of health professionals working in hospitals, this is frequent.

Pharmacy offices can sell vaccines with prescription for sale in community pharmacies.

The official councils – of medicine, pharmacy and nursing – have an obligation to guarantee adequate conduct from their members.

The quality control bodies of the health service providers, as well as the inspection units of the autonomous health services and the public health authorities, are responsible for the proper functioning of the official vaccination centres.

Financing

The recommended vaccines – including measles and influenza vaccines – that are administered in officially accredited centres – mostly public primary care centres – by the nursing staff of the paediatric and family medicine services are fully funded by the regional health administrations (the majority of the public health budget is independent of the health care services but they both come from the same source: general taxes).

A small part of the Spanish population – the group of civil servants of the general administration, the armed forces and the administration of justice – is affiliated with public insurers other than the National Health System. There are some 2.2 million people who have the right to choose a publicly reimbursed private health care provider. These providers also have accredited vaccination centres that can administer free of charge the recommended vaccines, which are also provided free of charge by the public health services of the respective Autonomous Communities.

In any case, measles and influenza vaccines can be purchased at the community pharmacies at the publicly authorized price. There is no co-payment for these vaccines. Either they are received for free or they are paid for in full.

Key barriers and facilitators

Measles

There is no monovalent vaccine authorized in Spain, but the combined product with rubella and mumps (MMR) is used. Current vaccination coverage against measles is high, in particular for the first dose; coverage with the second dose is lower and varies more across regions (between 88.1% in Murcia and 99.6% in Madrid in 2016).

Although active vaccine hesitancy seems quite limited, the concentration of parents who oppose vaccination in some localities (such as the Albaicin in Granada) limits the protection of collective immunity locally and facilitates the spread of epidemic outbreaks. In other cases, however, insufficient vaccination coverage seems more attributable to ignorance, indifference or social exclusion than to hesitancy.

Some barriers to achieving effective vaccination coverage against measles have to do with a distrust of official information, the perceived interests of laboratories and eventual biases of health professionals involved. There are also difficulties with underestimating the severity of complications from measles, while the impact of possible adverse effects from vaccination is exaggerated.

The increase in social and economic inequalities after the recent financial crisis has led to an increase in extreme poverty. This does not support the demand for vaccination.

The free provision of vaccinations and their administration in NHS primary health care centres is probably the most important facilitating element. There are 13 000 primary health care centres in the country and vaccines can be administered at any time during working hours (from 8am to 9pm). Massive institutional initiatives support the widespread demand for vaccines, but they do not always convince people who are against vaccination.

Influenza

In contrast, the current coverage of influenza vaccination for the population group over 65 years of age is 55%, the lowest proportion in the last ten years. In the 2009/10 season of the AH1N1 pandemic, coverage was estimated at 65.7%.

Vaccination coverage among health professionals in the years 2010–2015 has been less than 30%. For the 2015/16 season, information is available from eight Autonomous Communities from which it has been estimated that approximately 31.5% of health professionals were vaccinated. The main reasons why workers reject vaccination are the perceived low risk of getting sick, the fear of adverse reactions and doubts about the vaccine's effectiveness.

The barriers to influenza vaccination have to do with the low adherence of health personnel that is due, in part at least, to the degree of uncertainty of protection, due to the characteristics of the causal virus in each season. The likely discomforts, even mild ones, associated with vaccination without a guarantee of personal benefit do not seem to motivate enough people.

Inadequate preparation of health professionals to promote vaccination in adults and risk groups is potentially another barrier. The heterogeneity of registries and information systems to quantify vaccine coverage in adults and risk groups complicates the issue.

The specific facilitating factors have to do with the development of vaccination programmes directed at adults and the relevant strategies that have been initiated in Spain.

The involvement of scientific societies, particularly those concerned with occupational health, and occupational risk prevention services could be a facilitating factor in promoting the vaccination of health workers. In the 2012/13 season the initiative to promote vaccination against influenza for health professionals of the Catalan Society of Occupational Health, through the involvement of occupational risk prevention services, administered some 7500 vaccinations to about 47 000 workers (15.8%, range 5%–33%) from 27 centres, while in the 2017/18 season it administered some 21 000 vaccines among 90 500 workers (23.2%, range 2.7%–51.7%) in 61 centres.

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Sweden

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Governance

National immunization programmes are developed by the Public Health Agency but decisions about which diseases will be included in the national immunization programme are made by the government. County Councils and municipalities are responsible for the implementation of the national immunization programme, including the procurement of vaccines. All the vaccinations included in the national immunization programme must be provided free of charge to the target population. The Public Health Agency may issue national recommendations on vaccinations against diseases that are not included in the national immunization programme, e.g. vaccination against influenza and hepatitis B. Such recommendations are not binding, but County Councils, regions and municipalities decide on the implementation of the recommendations and on possible costs for the patients. County Councils can even decide on regional vaccination programmes (e.g. rotavirus, hepatitis B) which are free of charge.

All vaccinations are voluntary in Sweden. There are no sanctions in place for non-vaccination. Vaccinations according to the national immunization programme should be offered to all children up to 18 years of age, including migrant children. An assessment of immunization status is included in a health examination offered to migrants. The vaccination of adult migrants is not funded and in general they have to pay for vaccinations themselves.

Measles

For vaccinations in the national immunization programme, annual vaccination coverage data are collected regarding children at the age of 2 years from all Child Health Care Units. Every unit reports data about the vaccination status (vaccinated, unvaccinated, unknown) among their enrolled children. Reports are first collected and compiled at the regional level and then sent to the Public Health Agency. The denominator used for estimating coverage is the number of children enrolled in Child Health Care Units. Reports on vaccination status cover about 99% of children registered in the national population register.

Since 2013 the vaccinations included in the national immunization programme should be reported to the national immunization register. In the future, vaccination coverage will be estimated using the data from the national immunization register; in that case the number of children registered in the national population register will be the denominator.

Influenza

Most activities regarding vaccination against influenza in Sweden are performed by the 21 County Councils. These are responsible for procurement of vaccines, communication campaigns, administration of vaccines, payment schemes, etc. As a result, there are 21 different levels of activity regarding influenza. Some counties do more to try to get adults in risk groups to get vaccinated, while others do less.

At the national level the Public Health Agency of Sweden publishes recommendations on influenza vaccination, including defining the recommended risk groups. These recommendations are not mandatory for counties to adopt, but they are widely adopted. For risk groups, see the English summary in the recommendations: https://www.folkhalsomyndigheten.se/publicerat-material/publikationsarkiv/r/rekommendationer-om-influensavaccination-till-riskgrupper/.

Varying methods are used to estimate the vaccination coverage rate at county council level, including data from the regional vaccination registry (for about a third of the counties), financial systems, surveys of older people (65+), patient record systems, and doses distributed. Most counties have no information on why a person has been vaccinated except age. This means it is impossible for nearly all counties to calculate a vaccination coverage rate in any risk group except among older people (65+). Likewise, at the national level only a combined weighted average (by population) can be calculated for people aged 65+ years. Data from a subset of counties is used to calculate a coverage rate for lower age groups, but this is as a percentage of the total population in each age group (as noted, no other denominator is available). One or two regions can estimate coverage among pregnant women but no such estimate is possible at the national level. The only denominator for adults that can be used for estimating vaccination coverage is the population registry. Risk group specific denominators are missing and thus it is impossible to calculate vaccination coverage by risk group or for "risk group adults" in general. For those aged 65 and over, there is a clear denominator (number of people aged 65 years and older).

Provision

Measles

Vaccination against measles is given to children at age 18 months and 7–8 years. The first dose of MMR-vaccine is provided by Child Health Care and the second dose by School Health Care. Vaccinations are in general administered by Child and School Health Care nurses.

Vaccinations within Child Health Care are provided during regular health visits according to the schedule for the National Child Health Care Programme. The same visits also include other items, such as the assessment of a child's health and development. The National Board of Health and Welfare has issued guidelines for Child Health Care, available at http://www.socialstyrelsen.se/publikationer2014/2014-4-5 (in Swedish only).

Influenza

Most influenza shots are given in primary care. Community nurses may administer influenza shots in long-term care facilities. Some pharmacies also began in 2018 to offer vaccinations. In these cases, nurses visit certain days a week to administer vaccines, including influenza. These are private initiatives but with some remuneration from the County Councils.

Financing

Measles

Vaccines within the national immunization programme are funded via taxation and are provided free of charge.

Influenza

In most counties, but not all, influenza vaccination is free of charge for risk groups, e.g. adults with medical risk factors and older people (65+). The regional county councils collect taxes locally to finance the provision of health care services in their regions. Patients pay a fee for influenza vaccination in four of the 21 regions. Employers pay for the vaccination of their staff, for example health care workers.

Key barriers and facilitators

Measles

Vaccination coverage for childhood vaccination against measles has been high in Sweden since the introduction of the MMR vaccine in 1982; 96% of children are vaccinated at the age of 2 years. The coverage for two doses of MMR-vaccine has been 95%.

Facilitators: a long tradition in Sweden of well organized child health care, school-based vaccination delivery and high levels of trust in Child Health Care nurses among parents.

Influenza

Barriers: decentralized procurement, different levels of funding for communication and vaccination efforts, varying by county council; difficulties in reaching target groups (e.g. it is not possible to do vaccinations within prenatal care); low vaccine effectiveness.

Facilitators: high levels of confidence in health care staff recommendations regarding vaccination, high internet connectivity of the population, high media interest in influenza, good compliance through the childhood vaccination programme.

United Kingdom

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Governance

The United Kingdom (UK) has a single, over-arching immunization schedule. However, governance of health care and public health is complex. In England these functions are the responsibility of the Department of Health, which also has some UK-wide responsibilities, for example those involving international relations. However, the organization of health care and public health services is devolved to the governments of the other three nations of the UK (Scotland, Wales, Northern Ireland), the three crown dependencies (Jersey, Guernsey, Isle of Man), and the 14 United Kingdom Dependent Territories (including Gibraltar, which is inside the EU). Given the complexity involved, this description is confined to the situation in the four nations of the United Kingdom. While each has, to varying degrees, autonomy in relation to immunization policy, all are advised by the Joint Committee of Vaccinations and Immunisations, with members from the UK and abroad.

The practical arrangements in England are the most complex, reflecting changes in the health system introduced in 2012. Until then, public health services (including immunization services) were part of the national health service (NHS), as is still the case in the other three jurisdictions. In that year, the Health and Social Care Act greatly expanded market-based mechanisms that were already in place in England. These necessitated separation of public health from health care. Local public health functions were transferred to local government but national ones, including oversight of immunization and screening, were transferred to a new organization, Public Health England, which also brought together a range of

existing bodies such as those responsible for radiological protection. Consequently, responsibility is now divided among a number of different organizations. In the other three nations these functions are, to varying degrees, integrated.

In England responsibility for immunization is based on a tripartite agreement between the Department of Health, Public Health England and National Health Service England (NHS England). NHS England's area teams, supported by specialist staff from Public Health England embedded within them, commission immunization services from community and primary care providers. The agreement assigns responsibility to the Department of Health for providing strategic oversight, to NHS England for commissioning services and to Public Health England for providing scientific support. Commissioning intentions and budget requirements for the delivery of the immunization programme are agreed annually by the Department of Health and NHS England, and published in a public health functions agreement. Public Health England supports the Department of Health and NHS England in system leadership and planning, and has specific responsibilities for the implementation of the immunization programme, the provision of service specifications for individual vaccines, the procurement of vaccines and immunoglobulins, and the provision of specialist advice and information at national and local levels.

At local level, arrangements involve NHS England, Public Health England and local government working together to commission and provide leadership for screening and immunization services. Public Health England employs screening and immunization teams embedded within NHS England local teams covering different geographic areas. This means that the screening and immunization teams are accountable to both Public Health England and NHS England. The screening and immunization teams are responsible for providing local leadership, encouraging multi-agency working, ensuring high-quality delivery of programmes based on national specifications, supporting commissioning, providing advice to the public and to health professionals, and monitoring the performance of community and primary care providers. Clinical Commissioning Groups, which are led by local general practitioners (GPs), are expected to support screening and immunization teams, particularly with quality improvement in primary care. Local government is responsible for providing independent scrutiny of the local immunization programme delivery, ensuring it is responsive to local population needs, and commissioning community health services, such as school nursing and sexual health, which can include immunization activities. Each local government body has a specialist public health team, headed by a Director of Public Health.

In Scotland immunization policy is set by the Scottish Government Health Directorates on the advice of the Joint Committee of Vaccinations and Immunisations and other appropriate bodies. NHS Health Protection Scotland works with NHS Health Board Immunisation Coordinators and other national organizations, such as Health Scotland, NHS Education Scotland, and NHS National Services Scotland, to monitor and coordinate the Scottish immunization programme, as part of the Scottish Health Protection Network. There is currently a programme of redesigning and modernizing how local vaccination services are delivered in Scotland. It will implement new models of delivery based on local decision-making and leadership.[1]

In Northern Ireland immunization policy is set by the Department of Health, on advice from the UK Joint Committee for Vaccines and Immunisation. Northern Ireland has implemented all the Joint Committee's recommendations, although occasionally with slight variations, e.g. with regard to ages of eligibility (Public Health Agency, 2017). The Department of Health tasks the immunization team in the Health Protection Directorate of the Public Health Agency to implement and monitor all national immunization programmes. All pre-school and most influenza immunizations, along with adult vaccines for pneumococcal disease, shingles and pertussis in pregnant women, are administered in general practice. The Public Health Agency works with colleagues in the Health and Social Care Board to support these programmes, and with the Child Health Information System to send invitations and monitor uptake. Teenage immunizations (HPV, Men ACWY, diphtheria, tetanus and polio, and MMR), along with flu immunization for all primary school children, are delivered by school nurses in each of the five Health and Social Care Trusts. The Public Health Agency works with these teams on the delivery and monitoring of these programmes, produces all materials to support the immunization programmes, and delivers communications campaigns to the public.

In Wales immunization policy is monitored and coordinated by Public Health Wales and NHS Wales.

1 http://www.healthscotland.scot/health-topics/immunisation/vaccination-transformation-programme

Guidelines and schedules on immunization against infectious disease, which are commonly referred to as the online Green Book, set out the principles, practices and procedures of immunization in the whole of the UK, with particular emphasis on those immunizations that comprise the routine immunization programme from birth through to adulthood. They apply equally to the devolved administrations of England, Wales, Scotland and Northern Ireland.

Although the Joint Committee of Vaccinations and Immunisations' guidance is generally applied throughout the UK, there is some flexibility to adapt to specific epidemiological circumstances. For example, newborn babies are vaccinated with the BCG vaccine only in 'risk' areas (e.g. parts of London) where the prevalence of tuberculosis is higher. In England, with its more decentralized system, decisions about eligibility also vary based on local settings, such as some areas delivering HPV vaccinations in schools with two doses in one year, or two doses over two years (depending for example on the level of student mobility in some areas compared to others). Some local areas will use catch-up vaccination following outbreaks in certain communities using various delivery strategies, and develop interventions to reach specific under-vaccinated groups (e.g. inequalities immunization nurses work in some local authorities). At local level, specific area teams develop strategic/operational plans for their regions to improve uptake. In England local plans are developed in close collaboration with local authorities.

Vaccinations in the UK are not mandatory but are recommended, including for health care workers. However, the Green Book recommends that all new employees should undergo a pre-employment health assessment, which should include a review of any immunization needs. The guidelines state that all health care staff should be up to date with their routine immunizations, e.g. tetanus, diphtheria, polio and MMR. Influenza vaccination is recommended for health care workers directly involved in patient care, who should be offered influenza immunization on an annual basis.

In theory, all people ordinarily resident in the UK should be registered with a general practitioner in the jurisdiction in which they live. These systems differ in each of the jurisdictions, in relation to content and linkage with other data, with linkage most advanced in Scotland. However, all these registers are known to be incomplete to some extent, and have some duplication. In theory, every time a person uses an NHS service, the record should be updated. This record is held in their GP practice and contains clinical information about the care the person has received. It should enable every health care professional involved at different stages of the person's care to have access to their medical history, including allergies, operations or tests, medicines and immunizations.

In addition, for children in England the Child Health Information System (a local population register of all children including those not registered with a general practitioner) acts as a source of data to estimate coverage for routine and selected childhood immunizations. The Child Health Information System is a patient administration system that provides a clinical record for individual children and supports a variety of activities related to child health, including universal services for population health (including immunization) and support for statutory functions. It identifies registered eligible children, sends out lists to GP practices and sends appointments directly to patients. More generally for both children and adults, GP practices call and recall patients who have not attended vaccination. Similar systems exist in the other jurisdictions, such as the Child Health Surveillance Programme in Scotland and the Northern Ireland Child Health System and the Child Health System in Wales.

Targeted measures and interventions are deployed for specific groups based on an assessment conducted by local public health and National Health Service teams. In the past these have included outreach programmes for specific minority ethnic groups (examples include Travellers, and Charedi (Orthodox Jewish) communities). Refugees and asylum-seekers are entitled to National Health Service care, with different arrangements in each jurisdiction, as are certain other groups, such as EEA citizens, NATO personnel, and victims of human trafficking. However, undocumented migrants face many barriers to obtaining health care and are deterred from doing so by fears of deportation. Information on immunization is available in a number of languages, and interpreters can be booked through GP practices for non-English speaking individuals. National Health Service/Public Health England commissioners also work with local public health departments located in local authorities to identify possible under-served populations.

There are no sanctions for citizens or parents who refuse vaccinations for themselves or for their children, but there have been many awareness campaigns to encourage people to come forward for immunization in the past (notably for MMR), and some are still on-going (HPV,

meningitis, shingles, influenza). Campaigns have included posters, leaflets, NHS websites and mass media.

There are incentives for GP practices to encourage vaccination, for example with payments for vaccine uptake at 2 and 6 years of age and separate specific incentives for achieving a target percentage for the cluster of three-dose vaccines: DTaP/Polio/Hib + MenC + MMR. In England GP practices need to achieve at least 70% coverage of their target population before the 2nd birthday to receive a standard payment and over 90% for a premium payment. English general practices receive an incentive payment if they achieve a set target for immunizing specific at-risk groups against influenza every year as part of the Quality Outcomes Framework; this is not currently the case in Northern Ireland.

Since the 1980s the Child Health Information System and its national equivalents have been used as sources of data to estimate coverage for routine and selective childhood immunizations as part of the Cover of Vaccination Evaluated Rapidly (COVER) Programme. Child Health Information System vaccination data mainly originate from general practitioners' data, as well as other settings where vaccination is delivered. The COVER Programme's vaccine coverage measurements are published quarterly as official statistics and annually as national statistics.

To estimate the coverage of some programmes delivered after the age of 5 in England and for most new vaccine programmes since 2013, data are extracted from GP practice systems. This approach started in 2004 with the influenza and pneumococcal polysaccharide vaccine programmes for people aged over 65 and has now been extended to an increasing number of vaccine uptake collections. Reporting was originally undertaken manually, but by 2008–2009 it had moved to automatic extraction from around 50% of practices and this has now increased to over 95%. In England this data collection is done through the system called ImmForm[2] which is a secure, web-based system used to collect data on vaccine coverage for selected immunization programmes and provide vaccine ordering facilities for the National Health Service. The denominator for childhood MMR is based on the Child Health Information System (*see* below). The denominator for influenza vaccination for adults is based on records of the population registered in GP practices. In Scotland data for children are extracted from the Child Health Surveillance Programme for immunizations, to school-leaving age. In Northern Ireland data for children up to the age of 18 years for both general practitioner and school-based programmes are extracted from the Child Health Information System. The uptake of influenza, shingles and pneumococcal vaccines is extracted electronically via the Apollo system and influenza uptake can also be calculated from general practitioners' fee claim data. Uptake for the pertussis and influenza vaccines in pregnant women is extracted from the maternity computer system NIMATS.

Provision

The majority of vaccines included in the routine schedule are given in primary care by practice nurses working in general practitioner-led surgeries, although Scotland is undergoing a Vaccine Transformation Programme, as already described. In Northern Ireland the system is similar to that in England, but some of the staff delivering vaccines in general practice are employed by the Health and Social Care Trust. The MMR vaccine is provided in two doses, with the first dose given at the age of 12 months and the second dose at around 3 years and 4 months, before children start school. The guidelines mention that there is an opportunity to offer unimmunized or partially immunized individuals the MMR vaccine with diphtheria, tetanus and polio boosters at around 13–14 years of age, and this should be considered as routine practice.

In the past, catch-up campaigns have been conducted for MMR vaccines, particularly following outbreaks. Catch-up vaccinations have been delivered through community services, schools and general practice.

In terms of adult vaccinations against influenza, most adults are vaccinated by their general practitioner. For adults a range of trivalent and quadrivalent inactivated vaccines against influenza are available from suppliers for GP practices to purchase. NHS eligible patients include people over 65 years old and risk groups as detailed in Table 1. As mentioned below, all pregnant women should be offered an inactivated influenza vaccine while pregnant, regardless of their stage of pregnancy. Scotland and Northern Ireland undertake central procurement of influenza vaccines each year, based on the Joint Committee of Vaccinations and Immunisations' recommendations.

Health care professionals are generally vaccinated by nurses in the occupational health services of employers (e.g. hospitals). The influenza vaccine is also available in

2 www.immform.dh.gov.uk

community pharmacies, administered by pharmacists, and since 2016 has been provided free to eligible patients under the National Health Service, and to others (i.e. those not in clinical risk groups) for a fee. Pregnant women are vaccinated either by midwives in antenatal clinics or in primary care services (by general practice nurses).

The list in Table 1 is not exhaustive, and the health practitioner should apply clinical judgement to take into account the risk of influenza exacerbating any underlying disease that a patient may have, as well as the risk of serious illness from influenza itself. Influenza vaccine should be offered in such cases even if the individual is not in the clinical risk groups specified in Table 1.

Table 1 Clinical risk groups who should receive influenza immunization.

Clinical risk category	Examples (this list is not exhaustive and decisions should be based on clinical judgement)
Chronic respiratory disease	Asthma that requires continuous or repeated use of inhaled or systemic steroids or with previous exacerbations requiring hospital admission. Chronic obstructive pulmonary disease (COPD) including chronic bronchitis and emphysema; bronchiectasis, cystic fibrosis, interstitial lung fibrosis, pneumoconiosis and bronchopulmonary dysplasia (BPD). Children who have previously been admitted to hospital for lower respiratory tract disease.
Chronic heart disease	Congenital heart disease, hypertension with cardiac complications, chronic heart failure, individuals requiring regular medication and/or follow-up for ischaemic heart disease.
Chronic kidney disease	Chronic kidney disease at stage 3, 4 or 5, chronic kidney failure, nephrotic syndrome, kidney transplantation.
Chronic liver disease	Cirrhosis, biliary atresia, chronic hepatitis
Chronic neurological disease (included in the DES directions for Wales)	Stroke, transient ischaemic attack (TIA). Conditions in which respiratory function may be compromised due to neurological disease (e.g. polio syndrome sufferers). Clinicians should offer immunisation, based on individual assessment, to clinically vulnerable individuals including those with cerebral palsy, learning disabilities, multiple sclerosis and related or similar conditions; or hereditary and degenerative disease of the nervous system or muscles; or severe neurological disability.
Diabetes	Type 1 diabetes, type 2 diabetes requiring insulin or oral hypoglycaemic drugs, diet controlled diabetes.
Immunosuppression	Immunosuppression due to disease or treatment, including patients undergoing chemotherapy leading to immunosuppression, bone marrow transplant, HIV infection at all stages, multiple myeloma or genetic disorders affecting the immune system (e.g. IRAK-4, NEMO, complement disorder) Individuals treated with or likely to be treated with systemic steroids for more than a month at a dose equivalent to prednisolone at 20mg or more per day (any age), or for children under 20kg, a dose of 1mg or more per kg per day. It is difficult to define at what level of immunosuppression a patient could be considered to be at a greater risk of the serious consequences of influenza and should be offered influenza vaccination. This decision is best made on an individual basis and left to the patient's clinician. Some immunocompromised patients may have a suboptimal immunological response to the vaccine.
Asplenia or dysfunction of the spleen	This also includes conditions such as homozygous sickle cell disease and coeliac syndrome that may lead to splenic dysfunction.
Pregnant women	Pregnant women at any stage of pregnancy (first, second or third trimesters).
Morbid obesity (class III obesity)*	Adults with a Body Mass Index ≥40 kg/m²

* Many of this patient group will already be eligible due to complications of obesity that place them in another risk category

Source: UK Government (2018)

Vaccination should also be offered to household contacts of immunocompromised individuals, i.e. individuals who expect to share accommodation on most days over the winter and for whom continuing close contact is unavoidable. This may include carers.

In addition to the above, immunization should be provided to health care and social care workers in direct contact with patients/clients to protect them and to reduce the transmission of influenza within health and social care premises, to contribute to the protection of individuals who may have a suboptimal response to their own immunizations, and to avoid disruption to services that provide their care. This would include:

- health and social care staff directly involved in the care of patients or clients;
- those living in long-stay residential care homes or other long-stay care facilities where rapid spread is likely to follow the introduction of infection and cause high morbidity and mortality (this does not include prisons, young offender institutions, university halls of residence, etc.);
- those who are in receipt of a carer's allowance, or those who are the main carer of an older or disabled person whose welfare may be at risk if the carer falls ill. Vaccination should be given on an individual basis at the general practitioner's discretion in the context of other clinical risk groups in their practice; and
- others involved directly in delivering health and social care so that they and vulnerable patients/clients are at increased risk of exposure to influenza.

Financing

All routine vaccines recommended in the national immunization programme are free at the point of delivery for both children and adults. This means that there is no direct financial barrier to childhood vaccination.

Vaccination against influenza in adults is also free of charge at the point of delivery for all recommended groups (described above). For non-recommended groups, influenza vaccination is accessible in a pharmacy for a fee (around £12, but each pharmacy is free to set its own prices). Most travel vaccines also have to be purchased.

The costs of routine vaccines and vaccination services are fully covered through the statutory financing system via general taxation with no contribution from employers, local government or patients.

Key barriers and facilitators

Measles

The UK achieved measles elimination status from the World Health Organization in 2017. The overall coverage rate for the MMR vaccine is high, with MMR coverage across the UK as a whole at 91.6% for the first-dose vaccine, and 88.0% for the second-dose vaccine. However, this level remains below the 95% target set by the World Health Organization.

MMR uptake rates have recovered from the 'Wakefield controversy', erroneously linking the measles vaccine and autism, which has hampered MMR vaccine uptake in the UK in the past 20 years. However, there may still be some in the original cohort who may not have been vaccinated with MMR in the 1990s or who may not have received two doses as recommended.

Under-immunized groups: A report published by the National Institute for Health and Care Excellence in 2016 highlighted a number of groups of the population who might not be fully immunized with childhood vaccines, including MMR. These include:

- those who have missed previous vaccinations (whether as a result of parental choice or otherwise);
- looked-after children;
- those with physical or learning disabilities;
- children of teenage or single parents;
- those not registered with a general practitioner;
- younger children from large families;
- children who are hospitalized or have a chronic illness;
- those from some ethnic minority groups;

- those from non-English speaking families; and
- vulnerable children, such as those whose families are travellers, asylum-seekers or homeless.

There was some evidence that uptake of MMR has declined at a greater rate among children of more highly educated parents and among those living in more affluent areas. Maternal education to degree level was a risk factor for not receiving the MMR triple vaccine. A study of over a million children born in Scotland between 1987 and 2004 found that children of more affluent parents were generally either vaccinated with MMR on time or not at all. In contrast, late MMR vaccination was associated with socioeconomic disadvantage.

An analysis of factors for under-immunization for MMR (2013 UK Millennium Cohort Study) showed that just over 40% of children who were unimmunized with MMR vaccine at age 3 had either partially or fully caught-up by age 5. The likelihood of catching up varied markedly with a number of social factors, and more so for full than partial catch-up. Some families, particularly those from ethnic minority groups, appear to have difficulty accessing vaccination in a timely fashion. Advantaged families and those citing non-practical reasons for non-vaccination at age 3 are more likely to persist in not immunizing their child against MMR.

Regional variation: There are regional variations in uptake. In England, for example, London, Manchester and Birmingham have lower uptake rates for most vaccines, including MMR. This has been attributed to higher mobility of the population in urban centres, and also to issues with the quality of data, particularly the denominator.

Some **ethnic groups** have been reported to be under-immunized for MMR and have experienced outbreaks in recent years. These include Roma and Traveller communities, the Somali population, and Orthodox Jewish communities. A recent study on Traveller and Roma communities in the UK identified language, literacy, discrimination, poor school attendance, poverty and housing as barriers across different communities. Trustful relationships with health professionals were important and continuity of care valued (Jackson et al., 2017).

Migration: the occurrence of measles outbreaks in 2017–2018 in Eastern European communities indicate that these populations are under-vaccinated, primarily because of a combination of factors such as a lack of understanding of the UK immunization schedule and health services, lack of trust, and issues around language barriers.

In terms of **facilitators**, steps are required to minimize time to uptake in those families who do eventually catch up, through the reduction of practical barriers. National Institute for Health and Care Excellence guidance outlines actions to reduce inequalities in immunization, including provision of information in multiple languages, offering immunization checks and administration in alternative settings, and sending out reminder invitations from general practitioners.

In terms of specific groups, such as Traveller or Orthodox Jewish communities, tailored strategies have proven to be effective, particularly when they involve close engagement with the communities. For example, outreach programmes such as the one carried out following an outbreak of measles on a Traveller site in Manchester involved containing its spread with daily visits by the same health visitor (Reynolds et al., 2008). A strategy to provide vaccinations during a child health clinic was also successful in increasing MMR uptake in Hackney (WHO, 2016).

Adult vaccinations against influenza

The National Institute for Health and Care Excellence has identified a number of groups that are underserved by seasonal flu vaccination (NICE, 2018), including:

- people who are homeless or sleep rough;
- people who misuse substances;
- asylum-seekers;
- Roma and Travellers;
- people with learning disabilities; and
- young people leaving long-term care.

Factors at general practice level, where the vast majority of vaccinations are conducted, include the lack of a lead member of staff, the lack of uptake targets, no systematic use of additional prompts within IT systems to identify eligible patients, and little or no opportunistic vaccinating and using phone calls as a first-line strategy to invite

patients for vaccination (Newby et al., 2016). Barriers include reluctance to be vaccinated by some NHS staff, beliefs that the vaccine will make recipients unwell, and issues around access and the convenience of vaccination for staff (Shrikrishna et al., 2015).

Barriers to maternal immunization against influenza involve a general reluctance to vaccinate among pregnant women, and issues around the complexity of vaccination pathways where several providers such as general practitioners and antenatal services vaccinate (and associated data quality issues of maintaining registry and sharing data), as well as lack of understanding of the timing of vaccination.

No recent research could be identified on factors associated with non-immunization of people over 65 years of age in the UK. A qualitative study published in 2007 concluded that many older people did not feel vulnerable to influenza, regardless of their age, and this influenced their views on the need for immunization. Both refusers and defaulters overstated adverse effects from influenza vaccine, so this is a potential target for an intervention. Individual prompts, particularly from general practitioners, seemed to be the most significant motivators to attend for immunization (Evans et al., 2007). In a survey conducted in 2006, over 80% reported being influenced by a recommendation by a health care worker. The most common reason reported for non-uptake was good health (44%), or illness considered to be due to the vaccine (25%) (Mangtani et al., 2006).

Facilitators of influenza vaccination uptake among adults include:

- national targets to support commissioning arrangements and incentives for achieving coverage targets for GP practices (using the Quality Outcomes Framework for at-risk groups) and for hospital trusts (using the Commissioning for Quality and Innovation framework), improving the uptake of influenza vaccinations for front-line clinical staff;
- using existing resources to support targeting, tailoring and information provision for eligible groups;
- the UK has introduced the recommendation of offering influenza vaccination to all children aged 2 to 11 years who are not in a clinical risk group to reduce transmission in the community and reduce the number of cases of flu-related illnesses and deaths among older adults. As of 2018 the universal influenza vaccination programme is available for children aged 2 to 9 years (Hodgson et al., 2017). In Scotland and Northern Ireland the vaccine has been offered to all those aged 2 to 11 years.
- the Health and Safety at Work Act (1974) makes employers responsible for offering the influenza vaccination to health and social care staff who have direct care responsibilities;
- support from national bodies, professional groups and royal colleges (organizations such as the British Medical Association and the Royal College of Nursing) helps to encourage their members and others to accept the influenza vaccination;
- provision in general practice is driven by a nationally enhanced service specification. This requires all eligible patients to be called (invited); records to be kept up to date; vaccination status (or reason for declining a vaccine) to be recorded accurately; appropriate skills and training for those administering the influenza vaccine; consideration of accessibility so that service users' needs are met; and regular monitoring and reporting of vaccination activity;
- availability of influenza vaccination in some pharmacies in England, through NHS provision. The highest percentage of vaccinations outside GP practices was given to patients aged 65 years and over in pharmacies (5.6% of all vaccinations for those 65 years and over). Vaccinations in pharmacies have increased for adult and at-risk groups; and
- existing examples of best practice guidance for increasing influenza vaccination uptake in general practice as well as for health care workers.

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Useful websites

United Kingdom: https://www.gov.uk/government/publications/the-complete-routine-immunisation-schedule

Northern Ireland: http://www.publichealth.hscni.net/directorate-public-health/health-protection/immunisationvaccine-preventable-diseases

Scotland: https://www.nhsinform.scot/healthy-living/immunisation

Wales: http://www.wales.nhs.uk/sitesplus/888/page/43510

www.healthobservatory.eu