Report on
First survey of Immunisation Programs in Europe.

VENICE Project

Work Package 1- 2
Work Package 3

April 2007

Abbreviations

ADR	adverse drug reaction
AEFI	adverse event following immunisation
AVR	adverse vaccine reaction
BCG	Bacillus Calmette-Guerin
D	diphtheria (regular dose)
d	diphtheria (booster strength dose)
DT	diphtheria-tetanus vaccine
DTaP	diphtheria-tetanus acellular cell pertussis vaccine
dtap	low dose diphtheria-tetanus acellular pertussis
DTP	diphtheria-tetanus-pertussis
DTwP	diphtheria-tetanus-whole cell pertussis vaccine
ECDC`	European Centre for Disease Control
EU	European Union
HBsAg	hepatitis B surface antigen
HBV	hepatitis B vaccine
Hib	Haemophilus influenzae type b (vaccine)
IPV	inactivated polio vaccine (injectable)
ISS	Istituto Superiore di Sanita
NIP	national immunisation programme
OPV	oral polio vaccine
PnV7	conjugate 7 valent pneumococcal vaccine
Pn23	polysaccharide pneumococcal vaccine
T	tetanus toxoid
TB	tuberculosis
TBE	tick borne encephalitis
Td	tetanus-diphtheria vaccine (diphtheria booster dose)
WHO	World Health Organization
WHO-EURO	World Health Organization, Regional Office for Europe
WP	Work Packages

ISO 3166-1 Country Codes

AT	Austria
BE	Belgium
BG	Bulgaria
CY	Cyprus
CZ	Czech Republic
DK	Denmark
EE	Estonia
FI	Finland
FR	France
DE	Germany
GR	Greece
HU	Hungary
IS	Iceland
IE	Ireland
IT	Italy
LV	Latvia
LT	Lithuania
LU	Luxembourg
NL	The Netherlands
NO	Norway
PL	Poland
PT	Portugal
RO	Romania
SK	Slovakia
SI	Slovenia
ES	Spain
SE	Sweden
UK	United Kingdom

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Summary

This report aims at giving an overview of the status of the immunization programs by April 2007 for the countries participating to the VENICE project.
The report summarizes the results of a survey which was implemented during the first year of activity of the project, and was undertaken with a joint work by Work Package 1/2 and Work Package 3. More specifically, national gatekeepers from each of the participating country were sent a questionnaire by email and were asked to write a short narrative description of the immunization program on the basis of a common outline. Since this was the first survey of the project, it aimed at collecting background information relevant for the three Work Packages: immunisation programs indicators, vaccine policy and decision making process, and surveillance and management of Adverse events following immunisation (AEFIs). In fact, specific surveys were already planned as part of the activities of Work Packages 3, 4 and 5 in the future steps of the VENICE project. When designing the survey, special attention was given to pre-existing networks on vaccines and vaccination (eg. EUVAC.NET), in order to avoid overlapping contents.
From the survey, we described that the "well established" childhood vaccinations have a quite homogenous schedule across different countries, while new vaccinations show a more heterogeneous picture in terms of schedules, doses, purchase and population targeted.
Vaccine coverage varies in accordance with the immunization schedules with all countries aiming for the ideal levels as suggested by WHO to either eradicate disease or to control infection rates. Adverse events following immunization are recorded in all countries.

Background

Immunisations are the single most cost- effective public health intervention. The introduction of small-pox vaccine has eradicated this disease and the impetus now is to eradicate measles, rubella and polio through sustained vaccination campaigns in Europe and Worldwide.

Vaccines for measles, polio, diphtheria, pertussis and tetanus have been recommended by the WHO since 1974. The inclusion of hepatitis B vaccine in 1992 followed by Hib vaccine in1998, as part of routine infant immunisations as appropriate to national priorities, aim to reduce infant mortality rates further.

In 2002 the World Health Organisation (WHO) estimated that 1.4 million deaths among children less than 5 years of age were due to diseases that could have been prevented by routine vaccination.

The Global Immunisation Vision and Strategy 2006-2015 seeks to "protect more people against more diseases by expanding the reach of immunization to every eligible person."

Vaccination coverage as assessed at the third dose of diphtheria-tetanus-pertussis vaccine among children aged 12-23 months allows for comparisons of success of immunisation programmes. (World Health Statistics: 2005 Geneva, World Health Organization , 2005 http://www.who.int/healthinf/statistics/en/.)

Aim of the VENICE project

The VENICE project's aim is to encourage collection and dissemination of knowledge and best practice relating to vaccination and to further develop collaboration and partnership between participating countries.

The project is organized in five Work Packages (WP), which refer to different areas of activity and to the specific objectives of the program:

WP 1 Coordination

WP 2 Dissemination of results

WP 3 Indicators of immunization programs

WP 4 Priority setting and decision making

WP 5 Capacity building in monitoring, prevention and management of post-vaccination Adverse Events.

Each Work Package is guided by a *WP leader*. In each country participating in the project several people in public health institutions have been identified and are involved: a *gatekeeper* responsible for the project at the national level, and three *contact points*, one for each "technical Work Package" (WP3, WP4, WP5). An executive board of the *Work Package leaders* ensures the aims and the objectives of the project are met.

Objectives of the survey

The objective of this study was to define common indicators for monitoring in a comparable way the immunisation programs across participating countries as well as their constituent regions. The feasibility of collecting immunisation uptake data using computerised immunisation registries in each participating countries was also examined.

The survey of Immunization Program was the first survey conducted through the VENICE network. When designing the survey, special attention was given to pre-existing networks on vaccines and vaccination (eg. EUVAC.NET), in order to avoid overlapping contents.

The objectives of the survey were:

1) To have a structured description of national immunisation programs according to basic variables to allow comparison across different countries.

2) To identify similarities and differences of immunisation programs across European countries

3) To identify heterogeneities of the immunisation program at sub-national level in each Country

4) To Collect background information on immunisation programs indicators, vaccine policy and decision making process, surveillance and management of Adverse events following immunisation (AEFIs) that could be used for the development of the specific surveys planned as part of the Work Packages 3, 4 and 5 (WP3, WP4, WP5) of the VENICE project.

Methods

The survey was conducted among national gatekeepers previously identified in the European Countries so far enrolled to participate to the VENICE project.

The 28 National gatekeepers were identified on the basis of their participation in other ongoing European vaccination networks (e.g. EUVACNET) as well as through the sponsor (DG SANCO) and the ECDC advisory forum EU members.

The survey was divided in two parts.

In the first part, gatekeepers were asked to write *a two page summary* on the characteristics of the immunization program in their country. To ensure consistency, an outline with 14 open questions was provided. The issues addressed were the following:

- vaccination programs as part of National Health Services
- dedicated infrastructures for vaccine administration
- vaccination schedules for childhood and adults
- heterogeneity of the system at sub-national level in terms of schedules and diseases targeted
- vaccine purchase
- vaccine coverage
- availability of national website on vaccination data

The second part of the survey consisted in a *questionnaire* with multiple choice questions and open answer questions. The questionnaire was divided in three parts: National Immunization program, Vaccine Coverage, and Adverse Events Following Immunization. More specifically, the issues addressed in this part were:

- sub-national levels and their population figures
- heterogeneity of the immunisation program at sub-national level
- National Immunisation Committee
- channels to disseminate recommendations on vaccination programs in the country
- vaccine coverage measurement
- surveillance of Adverse Reactions following vaccination (AEFIs)

The survey was first piloted in the three countries which act as Working Package Leaders in the VENICE project (Italy, France and Ireland). The questionnaires were then sent by email to all national gatekeepers, who provided the answers and the data by e-mail.
The data was analysed with the use of Microsoft Excel and Microsoft Access by Work Package 3.

Responders

The two-page summary of immunisation programs was returned by 27/28 participating countries (IS absent). Information on Iceland's immunisation schedule was obtained from EUVAC.NET. The questionnaire, First survey on immunisation programs was returned by 28 countries.

Vaccination schedules

National Vaccination Committees

Results from the first survey on immunisation programs, indicated that National Vaccination Committees exist in 24 /28 participating countries. (Returned completed questionnaires n=28). In Norway, the Ministry of Health and Care Services decide the national recommendations with advice provided by The Norwegian Institute of Public Health. In Poland, the Ministry of Health and the General Sanitary Inspectorate are responsible for setting the immunisation program as national policy. The Romanian Immunisation program is under the responsibility of the Ministry of Public Health. The committees/ advisory groups are made up of a diverse group of paediatricians, neonatologists, epidemiologists and other experts.

Vaccination schedules (mandatory and recommended) set at national level are followed by 25/28 participating countries at sub national level. In Austria, Germany and Spain decisions on vaccination schedules are made at local level.
Sub national administrative areas are present in 17/28 of the countries(BE,BG,CZ,DE,EE,ES,FR,IE,IT, LT,NL,PT,RO,SE,SI,SK,UK). The divisions are listed as regions or counties. Within countries variations exist in 7 participating countries at sub national level.

Table 1. Differences in immunisation program at sub-national level

Country	Types of disease Addressed	Age group	Extent of Public program	Purchase	Administration
Belgium	No	Yes	Yes	Yes	Yes
Germany	Yes	Yes	No	Yes	No
Ireland	No	Yes	No	No	No
Italy	Yes	Yes	Yes	Yes	No
United Kingdom	No	Yes	No	Yes	Yes
Spain	No	Yes	No	Yes	No
Sweden	No	No	No	Yes	No

Recommendations on vaccination schedules are published by booklet, technical documents, website, newsletters and Ministry of Health decrees in various combinations in all 28 participating countries.

Mandatory vaccinations and recommended schedules
Immunisation programs can be divided into different groups such as

- Mandatory vaccinations for all
- Mandatory vaccinations for those at risk
- Recommended routine vaccinations for all
- Recommended vaccinations for those at risk.

Table 2 Participating Countries with Mandatory Vaccines

Country	Mandatory Vaccines

Belgium	Polio
Bulgaria	Childhood vaccines
Czech Republic	Childhood vaccines
France	BCG/D/T/IPV
Hungary	BCG/Hib/DTaP/IPV/MMR/HepB
Italy	D/T/IPV/Hep B
Latvia	BCG/D/T/P/IPV/MMR/Hib/HepB/TBE/ Adults- Td
Poland	BCG/HepB/D/T/P/IPVorOPV/MMR
Slovakia	DTwP/IPV/Hib/HepB/MMR/BCG/Td
Slovenia	DTaP/IPV/Hib/HepB/MMR/BCG

Mandatory vaccines are governed by legislation, recommended vaccinations are voluntary. In Sweden it is mandatory for health care providers to offer vaccines since 2007.

Those that are routine generally are paid for by the government whereas those that are recommended for at risk groups need to be paid for by the patient in certain countries. In some cases there are charges both for the vaccine and the administration of the vaccine.

Table 3. Vaccines Charged

Country	Vaccines Free	Vaccines Charged
Austria	Most Childhood vaccines up to 15 years of age	
Belgium	Childhood vaccines free Adults occupational vaccine free	Administration fee if vaccine given by GP or paediatrician
Bulgaria	Routine mandatory vaccines free (children and adults). Targeted immunisations and re-immunisations free e.g. Rabies	Administration fee and vaccine charged if vaccine is a recommended vaccine
Cyprus	Public sector treats 37% Childhood vaccines free	Private sector 63%
Czech Republic	Childhood mandatory vaccines free	
Denmark	Childhood vaccines free	At risk groups
Estonia	Childhood vaccines free Adult at risk groups free	
Finland	Childhood vaccines free Adult at risk groups free	Travel vaccines
France	Childhood vaccines free	65% of cost of vaccine

	Flu for at risk groups and elderly free	re-imbursed
Germany	Recommended vaccines covered by statutory insurance policy	
Greece	Childhood vaccines free on insurance scheme	
Hungary	Childhood mandatory vaccines free	Recommended vaccines cost 50% covered
Ireland	Childhood vaccines free Flu vaccines free	Administration fee for flu vaccine applies to 60% of population i.e. non medical card holders
Italy	Childhood vaccines free Flu vaccines free for those at risk and elderly	
Latvia	Mandatory vaccines free	Other vaccines pay vaccine and administration .risk groups pay 50% cost of flu vaccine
Lithuania	Childhood vaccines free Rabies vaccine free	Flu vaccine
Luxembourg	Vaccines free	
The Netherlands	Vaccines free	
Norway	Childhood vaccines free	For flu and Pn23 fee for administration and vaccine. Risk groups also charged.
Poland	Mandatory vaccines free	Recommended vaccines
Portugal	Recommended vaccines free	Flu and Pn23 patient pays for 60% of the vaccine price
Romania	Childhood vaccines free	
Slovenia	Mandatory vaccines for children and at risk groups free	Recommended vaccines
Spain	Vaccines free	
Sweden	Childhood vaccines free	Flu, Pn23, TBE fee may be charged
UK	Vaccines free	

Childhood vaccination schedules

The ten commonest diseases that vaccinations are provided against are diphtheria, tetanus, pertussis, polio, measles, mumps rubella, *Haemophilus influenzae* b, hepatitis B and BCG. Other childhood vaccines include meningococcal C, pneumococcal, varicella and influenza. These vaccines are less commonly administered according to national vaccination schedules.

Diphtheria, Tetanus, Pertussis

All twenty eight participating countries give three doses of diphtheria, tetanus and pertussis (acellular or whole, DTa/wP) vaccines by twelve months of age.

Within the twelve months there is some variation with third dose being achieved at 4 months in BE,BG,DE,FR,HU,LU,NL,UK at 5 months in PL,SI, at 6 months in CZ,EE,ES,GR,IE,LT,LV,PT,RO, at 7 months in AT, at 6-8 months in Cyprus and at twelve months in DK,FI,IS,IT,NO,SK,SE.

Currently, Bulgaria, Estonia, Poland, Romania and Slovakia use whole cell pertussis. The Czech Republic introduced nation wide vaccination with acellular pertussis vaccine in January 2007. In Cyprus, whole cell pertussis is used in the public sector, which accounts for 37% of childhood vaccinations and acellular pertussis is administered in the remaining 63 % in the private sector. Poland uses acellular pertussis at age of 6 years.

Table 4. Third dose of Diphtheria, Tetanus and Pertussis (acellular or whole) administered at 4,5,6, and 12 months of age.

4 months	5 months	6 months	12 months
Belgium	Poland	Austria[1]	Denmark
Bulgaria	Slovenia	Cyprus[2]	Finland
France		Czech Republic	Iceland
Germany		Estonia	Italy

Hungary		Greece	Norway
Luxembourg		Ireland	Slovakia
Netherlands		Latvia	Sweden
United Kingdom		Lithuania	
		Portugal	
		Romania	
		Spain	

[1]Austria achieves third dose at 7 months of age

[2]Cyprus achieves third dose at 6-8 months of age

Table 5 Total number of doses of Diphtheria and Tetanus given on or by age of 18 years

Country	DTaP	DTwP	dTaP	dT-IPV	DT	Td	Total
Austria	4		1	1			6
Belgium	5					1	6
Bulgaria		4			1	2	7
Cyprus[§]		5			1		6
Czech Republic	5					1*	6
Denmark	3		1				4
Estonia		4				3	7
Finland	4		1[†]				5
France	5				1	1	7
Germany	4		2				6
Greece	5					1	6
Hungary	5					1	6
Iceland	4					1	5
Ireland	4					1	5
Italy	4		1				5
Latvia	4				1	1	6
Lithuania	4				1	1	6
Luxembourg	6						6
Netherlands	4				2		6
Norway	4					1	5
Poland	1	4				1	6
Portugal	5					1	6
Romania		5			2		7
Slovakia		5				1	6
Slovenia	4				1	1*	6
Spain	5					1	6
Sweden	4						4
United Kingdom	4			1			5

*Tetanus toxoid alone

[§]Cyprus Both DTaP and DTwP are administered.

†Finland Fifth dose given to adolescents is dtap. Where **all** antigens are reduced

Polio

Inactivated polio is administered for all doses in the childhood schedule in 24 countries. Only Estonia and Romania use oral polio vaccine for all doses on the schedule (Table 7).Third dose of polio is achieved at 4 months of age in BE,BG,DE,FR,HU,LU,NL,UK at 5 months in SI, at 6 months in

CZ,EE,ES,GR,IE,LT,LV,PT,RO, at 7 months in AT , at 6-8 months in CY and at twelve months in DK,FI,IS,IT,NO,SE,SK. Poland administers the third dose of IPV at 16-18 months of age. The Czech Republic administers five doses of inactivated polio (3 doses during the first year of life, 4th dose at 18 months and 5th dose at 10 years of age. Cyprus administers inactivated polio for the first two doses but thereafter oral polio is used to complete the course. At the age of 6 years in Poland remaining doses are of oral polio.

Table 6. Third dose of Polio (oral and inactivated polio) administered at 4,5,6,and 12 months of age.

4 months	**5 months**	**6 months**	**12 months**
Belgium	Slovenia	Austria[1]	Denmark
Bulgaria		Cyprus[2]	Finland
France		Czech Republic	Iceland
Germany		Estonia	Italy
Hungary		Greece	Norway
Luxembourg		Ireland	Slovakia
Netherlands		Latvia	Sweden
United Kingdom		Lithuania	
		Portugal	
		Romania	
		Spain	

[1] Austria achieves third dose at 7 months of age

[2] Cyprus achieves third dose at 6-8 months of age

Table 7 Total number of doses of Polio administered in the Childhood Vaccination Schedule in participating countries

Country	IPV	OPV	Age range of final dose
Austria	5		7-9 years
Belgium	5		5-7 years
Bulgaria	5		7 years
Cyprus	2	3	4-6 years
Czech Republic	5		10 years
Denmark	4		5 years
Estonia		5	7 years
Finland	4		4 years
France	7		18 years
Germany	5		9-17 years
Greece	4		4-6 years
Hungary	5		6 years
Iceland	4		14 years
Ireland	4		4-5 years
Italy	4		5-6 years
Latvia	6		14 years
Lithuania	5		6-7 years
Luxembourg	6		15-16 years
Netherlands	6		9 years
Norway	5		15-16 years
Poland	3	1	6 years
Portugal	4		5-6 years
Romania		5	9 years
Slovakia	5		12 years
Slovenia	4		12-24 months
Spain	4		15-18months
Sweden	4		6 years
United Kingdom	5		13-18 years

Measles Mumps Rubella

Measles mumps rubella (MMR) vaccine is included in the routine childhood immunisation schedule of all twenty eight participating countries.

All first doses have been given by 18 months of age. By 15 months of age 22 countries (AT,BE,BG,CY,CZ,DE,DK,EE,ES,FR,GB,GR,HU,IE,IT,LV, NL,NO,PL,PT,RO,SK) administer the first dose. In Lithuania, the first dose is given by 16 months of age. Luxembourg, Iceland and Sweden deliver the vaccine by 18 months of age. Slovenia's first dose age range is 12-24 months. In France, first dose MMR is administered at 9 months of age to those who attend playschool but otherwise12-15 months is the age range.

Age of second dose of MMR has a wide range of variation from 12 months to 15 years of age. In Austria there must be a minimum interval of at least one month between the first and second dose. Catch up programs are in place in Austria, Belgium, Cyprus, France, Italy and Poland.

Table 8. Measles Mumps and Rubella childhood vaccination schedules of participating countries.

Country	First dose MMR	Second dose MMR	Catch up doses
Austria	12-24 months	<24 months	7-9 years, 9-17 years
Belgium	12-13 months	10-13 years	5-7 years,14-16 years
Bulgaria	13 months	12 years	
Cyprus	12-15 months	4-6 years	11-12 years
Czech Republic	15 months	21-25 months	
Denmark	15 months	12 years	
Estonia	12 months	13 years	
Finland	14-18 months	6 years	
France	12-15 months	25 months	<6 years
Germany	11-14 months	15-23 months	
Greece	12-15 months	4-6 years	
Hungary	15 months	11 years	
Iceland	18 months	12 years	
Ireland	12-15 months	4-5 years	11-12 years
Italy	12-15 months	11-15 years	
Latvia	15 months	7 years	12 years
Lithuania	15-16 months	6-7 years	12 years
Luxembourg	15-18 months	5-6 years	
Netherlands	14 months	9 years	
Norway	15 months	12-13 years	
Poland	6-7 months	10 years	11-12 years
Portugal	15 months	5-6 years	
Romania	12-15 months	6-7 years	
Slovakia	14 months	10 years	
Slovenia	12-24 months	5-6 years	
Spain	12-15 months	3-6 years	
Sweden	18 months	12 years	
United Kingdom	13 months	40 months-5 years	

Haemophilus Influenzae b

Haemophilus influenzae B vaccine is routinely given in 25/28 participating countries.

Third dose of *Haemophilus influenzae* B (Hib) is given in the following countries at 4

months BE,DE,FR,HU,LU,NL,UK at 5 months in SI, at 6 months in CZ,EE,ES,GR,IE,LT,LV,PT, at 7 months in AT, at 6-8 months in Cyprus and at 12 months DK,FI,IS,IT,NO,SE,SK.

In Poland, Hib is a mandatory vaccine for those considered to be an epidemiological risk group such as large families and occupants of children's homes. It is also recommended for children over 2 months of age however, patients are required to pay for the vaccine in these circumstances. In Bulgaria, Hib vaccine is a recommended vaccine and as such the patient pays for both the vaccine and its administration. Romania does not administer Hib.

Table 9. Third dose of *Haemophilus Influenzae* b administered at 4,5,6 and 12 months of age:

4 months	**5 months**	**6 months**	**12 months**
Belgium	Slovenia	Austria[1]	Denmark
France		Cyprus[2]	Finland
Germany		Czech Republic	Iceland
Hungary		Estonia	Italy
Luxembourg		Greece	Norway
Netherlands		Ireland	Slovakia
United Kingdom		Latvia	Sweden
		Lithuania	
		Portugal	
		Spain	

[1]Austria achieves third dose at 7 months of age

[2]Cyprus achieves third dose at 6-8 months of age

Table 10. Total number of doses of *Haemophilus Influenza*e b vaccine administered in Childhood vaccination schedule in participating countries

Country	Total number of doses	Age range of final dose
Austria	4	12-24 months of age
Belgium	4	13-18 months of age
Cyprus	4	12-18 months of age
The Czech Republic	4	18 months of age
Denmark	3	12 months of age
Estonia	4	2 years
Finland	3	12 months of age
France	4	16-18 months of age
Germany	4	11-14 months of age
Greece	4	12-15 months of age
Hungary	4	18 months of age
Iceland	3	12 months of age
Ireland	3	12-15 months of age*
Italy	3	11-13 months of age
Latvia	3	6 months of age
Lithuania	4	18 months of age
Luxembourg	4	12 months of age
The Netherlands	4	11 months of age
Norway	3	12 months of age
Portugal	4	18 months of age
Slovakia	3	10 months of age
Slovenia	4	12-24 months of age
Spain	4	15-18 months of age
Sweden	3	12 months of age
United Kingdom	4	12 months of age

*A single dose of Hib is recommended if the child presents after the age of 13 months (13-48 months) and has had no previous Hib vaccine

Hepatitis B

Hepatitis B vaccine is currently routinely given in 20 participating countries (AT,BE,BG,CY,CZ,DE,EE,ES,FR,GR,HU,IT,LT,LU,LV,PL,PT,RO,SI,SK).First dose is given at birth in eight countries (BG,EE,ES,LT,LV,PL,PT,RO) while the remaining countries commence vaccination at 2-3 months of age. If a mother is HBsAg positive, the first dose is given within 12 hours of birth. In Latvia and Italy,

where the mother is known to be HBsAg positive, four doses of Hep B vaccine are recommended for the child.

In addition, Belgium, Czech Republic, Denmark, Finland, Ireland, Netherlands, Norway, Portugal, Sweden and the United Kingdom administer Hep B vaccine to at risk groups.

Table 11 Age of hepatitis B Vaccine Administration

Country	**1st Dose**	**2nd Dose**	**3rd Dose**	**4th Dose**	**Catch up dose[1]**
Austria*	3 months	5 months	7 months	12-24 months	13 years
Belgium*	2 months	3 months	4 months	13-18 months	10-13 years
Bulgaria	At birth	1 month	6 months		

Cyprus	2-3 months	4-5 months	8-12 months		11-12years
Czech	13 weeks	17-29 weeks	5-7 months		12 years
Estonia	At birth	1 month	6 months		13 years
France *	2 months	4 months	16-18 months		2-13 years
Germany *	2 months	4 months	11-14 months		9-17 years
Greece*	2 months	4 months	6-18 months		
Hungary*	14 years				
Italy*	3 months	5 months	11-13 months		
Latvia	At birth	1 month	6-8 months		14 years
Lithuania	At birth	1 month	6 months		12 years
Luxembourg*	2 months	3 months	12 months		12 years
Poland	At birth	2 months	6-7 months		14 years
Portugal	At birth	2 months	6 months		10-13 years[2]
Romania	At birth	2 months	6 months		
Slovakia*	2 months	4 months	10 months		10 years
Slovenia*	6 years				
Spain	At birth	1-2 months	6 months		10-14 years

* Hep B vaccine schedule given within 12 hours of birth where mother is known to be HBsAg positive or at high risk.
[1] Hep B given if recommended doses missed before
[2] Three doses given to those born before 1999 in 0-1-6 month schedule

BCG

In all, nineteen countries administer BCG

(BG,CY,CZ,EE,FI,FR,GR,HU,IE,LT,LV,NO,PL,PT,RO,SE,SI,SK,UK)

BCG is given at different ages ranging from within 24 hours of birth to 13-15 years of age. In France if BCG is not given at birth, it must be given before age of 6 years, prior to commencing school. BCG is only given to those who are categorised as high

risk group either due to family member with Tuberculosis or else if native of a country with high endemicity in FI,LU,SE,SI. In Cyprus BCG is given only to children when there is continuous contact with a case of contagious form of TB. Norway normally administers BCG at 13-15 years of age, however, children of immigrants from countries outside low endemic countries receive BCG at birth. In the UK BCG is recommended for high risk group infants, previously unvaccinated new immigrants from high prevalence countries for TB and children who after screening for TB risk factors and tested mantoux negative. In Bulgaria, the Czech Republic and Slovakia BCG is recommended only if tuberculin negative at 7, 11 and 10 years respectively.

Meningococcus

The Men C vaccine is given routinely in eleven countries (BE,CY,DE,ES,GR,IE,IS,LU, NL,PT,UK) of which Ireland administers three doses by 6 months of age and United Kingdom by 12 months of age. Of the remaining countries four (ES,GR,IS,PT) give two doses by twelve months of age and Germany administers one dose at this age. Luxembourg and the Netherlands administer only one dose at ages 13 and 14 months respectively. Belgium administers a single dose of Men C simultaneously with the hexavalent vaccine (DTaP/Hib/IPV/HepB) in children aged 13-18 months. In Cyprus, MenC is universally administered in the private sector while in the public sector it is administered only to high risk groups. Meningococcus C is available with payment in France. In Germany and Italy the vaccine is free for groups at risk; regions can also decide for additional vaccination policies at local level.

Table 12. Total number of doses of Meningococcal C Vaccine administered in Childhood vaccination schedule in participating countries

Country	Total number of doses	Age range of last dose
Belgium	1	13-18 months of age

Cyprus	1	12-13 months of age
Germany	1	12-23 months of age
Greece	3	15-18 months of age
Iceland	2	8 months of age
Ireland	3	6* months of age
Luxembourg	1	13 months of age
The Netherlands	1	14 months of age
Portugal	3	15 months of age
Spain	3	15-18 months of age
United Kingdom	3	12 months of age

*Three doses administered if infant <12 months of age. A single dose is given if aged 12 months to 22 years to those who have not received the routine 3 doses in infancy

Pneumococcus

The vaccine used in childhood vaccinations is the pneumococcal conjugate PnV7, which is given routinely in nine of the participating countries (BE,CY,DE,FR,GR,LU,NL,NO,UK). Three doses are given in DE,FR,LU,NL by 4 months of age and in GR by 6 months of age. Norway delivers the third dose of PnV7 by 12 months of age while the United Kingdom administers the third dose by 13 months of age. In Belgium PnV7 is recommended at 12-13 months of age preferentially at 12 months. The Czech Republic administers PnV7 to at risk groups (1-4 doses according to the age). Austria and Bulgaria also offer pneumococcal vaccine to at risk groups only. In Cyprus pneumococcal vaccine is universally available in the private sector but is offered in the public sector only to those at risk. Slovenia and Estonia also offer PnV7 to at risk groups and Italy may offer it in different regions as recommendations differ at regional level.

Table 13 Total number of doses of Pneumococcal vaccine administered in childhood vaccination schedule in participating countries

Country	Total number of doses	Age range of final dose
Belgium	3	12-13 months of age
Cyprus	4	12-15 months of age
France	4	12 months of age
Germany	4	11-14 months of age
Greece	4	12-18 months of age
Luxembourg	3	4 months of age
The Netherlands	4	11 months of age
Norway	3	12 months of age
United Kingdom	3	13 months of age

Varicella

Varicella is listed as a routine childhood vaccination in four countries AT,DE,ES,GR.

In Germany and Greece it is part of the childhood immunisations with doses given at 15-23 months and 12-18 months of age respectively.

Spain offers the vaccine at 10-14 years and in Austria varicella vaccination is recommended only for those with no previous history of varicella or have negative serology results for varicella.

In Italy, local recommendations differ and varicella is offered is some areas routinely. Cyprus, France and Slovenia recommend varicella to at risk groups.

Influenza vaccine

Influenza vaccination is recommended for children in at risk groups i.e. children with underlying medical conditions which places them at increased risk of developing potentially fatal complications in 27 of the participating countries.
Information from Iceland with regard to influenza vaccine was not available.

Adult Vaccination schedules

Influenza vaccine

Influenza is the commonest adult vaccination with annual campaigns in all participating countries. Recommendations as to the composition are produced annually by WHO. Influenza vaccine is administered in Austria, Germany, Greece,

and Hungary to those over 60 years of age and in Slovakia in those over 59 years of age routinely. In the remaining participating countries the vaccine is offered at 65 years or over. If there are predisposing medical conditions in persons below these age brackets, influenza vaccine is offered earlier. Influenza vaccination is also considered for those individuals who are at increased risk of transmitting influenza to persons at high risk such as Heath Care Workers.

Pneumococcal vaccine

Pneumococcal vaccination with the covalent pneumococcal vaccine pn23 is recommended to at risk groups in 16 participating countries (AT, BE,BG,CY,CZ,DE,DK,FR,GR, IE,LV,NO,PL,SI,SE,UK). At risk groups include patients with asplenia, functional asplenia, sickle-cell disease or other underlying conditions that would predispose them to severe infection with *Streptococcus pneumoniae*.

In Belgium, Czech Republic, Greece, Hungary,Ireland, Norway, Slovenia and Sweden pneumococcal vaccine is routinely recommended to the elderly along with influenza. Bulgaria recommends vaccination to those ≥ 65 years of age.

In Italy, local recommendations differ and pneumococcal vaccine is offered in some areas routinely together with influenza vaccine.

Tetanus

Tetanus toxoid plus adult diphtheria toxoid (Td) is recommended every 10 years in BE,BG,CY,DE,DK,EE,FI,GR,LV,PT,RO in adults and tetanus toxoid (T) is recommended in The Czech Republic every 10-15 years.

Table 14. Adult Tetanus vaccination schedules in participating countries

Country	Age recommended at	Schedule for Td
Belgium	>16 years of age	Every 10 years
Bulgaria	>25 years of age	Every 10 years

Cyprus	14-16 years of age	Every 10years
Czech Republic	>14 years of age	Every 10 –15 years*
Denmark	> 18 years of age	Every 10 years
Estonia	>18 years of age	Every 10 years
Finland	>18 years of age	Every 10 years
Germany	>18 years of age	Every 10 years
Greece	>18 years of age	Every 10 years
Latvia	>18 years of age	Every 10 years, (at risk groups every 5 years)
Portugal	>13 years of age	Every 10 years
Romania	>14 years of age	Every 10 years

*Tetanus toxoid only

Additional vaccines

Occupational risk groups

Occupational risk groups exist in all participating countries and vaccines are administered according to epidemiological risk, such as Hepatitis B to health care workers, prison staff and police and influenza to health care workers. In Latvia, rabies and tick-borne encephalitis vaccines are administered to occupational risk groups, for instance, forest workers.

Travel vaccines

Recommendations exist in some participating countries for specific vaccines to protect travellers against prevalent disease in certain countries. Persons are urged to contact their doctors and /or relevant tropical medicine bureau for advice on specific requirements.

Tick Borne Encephalitis

This vaccine is offered to people living in areas where TBE is endemic such as parts of Finland, Germany, Hungary, Latvia, Poland, Slovenia and Sweden.

Vaccination coverage

General aspects

There are a number of methods by which vaccination coverage can be assessed such as administrative methods, surveys and/or computerised registries. Administrative

methods include measuring the number of doses of vaccines administered to target population. Surveys can be conducted via face-to-face interview, telephone, mail and / or school surveys. The principal types of surveys are the Expanded Program on Immunisation (EPI) 30-cluster survey, the UNICEF Multiple Indicator Cluster Survey and the Demographic Health Survey. Further details on the methods of vaccination assessment will be addressed in the forthcoming questionnaire on Immunisation Coverage Assessment.

The immunisation registries of Denmark, Ireland, Norway, Slovenia and United Kingdom are capable of determining vaccination coverage.
Belgium, Estonia and Cyprus conduct vaccination coverage surveys as per WHO guidelines.
Germany performs coverage studies at age of 5-6 years i.e. school entry.
Hungary uses a different approach in calculating vaccination coverage that is not based on age. Hungary examines how many months last after the due dates of administration until vaccination coverage levels of 98% are achieved. Five levels of vaccine coverage are specified according to the number of months after due dates. Two months is considered " very good", three months is "good", four months is "average", five months is "late" and ≥ six months is "very late".

In the Netherlands up to now yearly reports were made describing coverage rates for all vaccines used for three birth cohorts each year: infants(vaccines given until 14 months of age), toddlers (vaccines given at age 4 years) and school children (vaccines given at age 9 years).Vaccinations are registered individually so that data is present for all children up to the age of 13 years.

Bulgaria routinely assesses vaccination coverage far those particular vaccines administered at each age group in the immunisation schedule from birth through to adulthood.

Childhood vaccine coverage

At 12 months of age

The commonest vaccines measured by 12 months of age are D/T/P/IPV/Hib.
Fourteen countries test for D/T/P/IPV or OPV
(AT,CY,DK,EE,ES,FI,IE,IS,LT,LV,PL,PT,SI,UK)
Hib is measured in all of these countries apart from Poland.

Hep B coverage is assessed in AT,EE,ES,LT,LV,PT, BCG coverage in EE,IE,LT,LV,PT,SK and Men C in four countries ES,IE,PT,UK.
Cyprus assesses coverage of MMR between 13 and 18 months of age.
In the Netherlands at 14 months of age the following antigens are measured DTP/IPV/Hib/HepB/MMR/MenC. At 15 months in Denmark and 18 months in Slovenia, vaccination coverage of the first dose of MMR is calculated. Iceland records MMR coverage at 16 – 18 months.

At 24 months of age

The following vaccines are measured at 24 months of age
D/T/P/IPV/Hib/HepB/MMR/BCG/MenC/Var/Pn7v.
At 24 months of age 19/25 countries record measurement for D/T/P/IPV
(AT,BE,CY,EE,ES,FI,FR,GR,IE,IT,LT,LU,LV,NO,PL,RO,SE,SK,UK.)
Of the nineteen countries listed above only LV, PL, and RO do not assess Hib coverage.
MMR coverage is assessed in eighteen participating countries at 24 months of age (AT,BE,CY,EE,ES,FI FR,GR,IE,LT,LU,LV,NO,PL,PT,RO,SE,SK,UK).
Hepatitis B is assessed at 24 months of age in Austria and Belgium.
Belgium also assesses Men C coverage at 24 months o f age.

School age

Nine countries assess coverage of D/T/P/IPV at age of six years (AT,BE,DE,FR,GR,IT,NO,PL SK). There are other age levels such as in the United Kingdom at five years old D/T/P/IPV/Hib/MMR/MenC are measured by the COVER program.
Coverage of both MMR and Hep B has been recorded regionally at 7 and 14 years of age in Belgium.

Table 15. Vaccination Coverage assessment in School Aged Children in participating countries

Country	Age in years	Antigens Assessed
AT	6	D/T/P/IPV/Hib
BE	6	D/T/P/IPV/Hib
BG	7 11 12 17	D/T/IPV/BCG BCG MMR BCG/Td
CY	6 11-12	MMR MMR
DK	12	MMR
EE	13-14	HepB
FR	6 10 14	D/T/P/IPV/Hib/HepB/BCG/MMR D/T/P/IPV/Hib/HepB/BCG/MMR D/T/P/IPV/Hib/HepB/BCG/MMR
DE	5-6	D/T/P/IPV/Hib/HepB/MMR
GR	6	D/T/P/IPV/Hib/HepB/BCG/MMR/MenC/PnV7/Var
IS	<6 11-13	D/T/P D/T/P/IPV/MMR
IT	6	D/T/P/IPV/Hib
LV	8 15	D/T/P/IPV/MMR D/T/IPV
LT	6	D/T
NL	4 9	D/T/P/IPV D/T/IPV/MMR
NO	6 16	D/T/P/IPV/MMR D/T/IPV/BCG/MMR
PL	6	D/T/P/OPV
SK	4 6 12 14	D/T/P D/T/P/IPV HepB/MMR D/T/IPV
ES	3-6 4-6 14-16	MMR D/T/P D/T/HepB
UK	5	D/T/P/IPV/Hib/MMR/MenC

Adult vaccine coverage

Flu coverage

Influenza coverage appears to be the only antigen where coverage is assessed.
Flu coverage is calculated in 19/28 (AT,BE,CZ,DE,DK,ES,FI,FR,GR,HU, IE,IS,IT,LT,LU,PT,SI,SK,UK)In Hungary flu coverage is assessed in those in at risk groups as well as people aged 60 years or older.

Immunisation Registries

Computerised immunisation registries are operational at either local or national level in 16 /28 countries.
Differences exist between countries with regard to the populations on their respective registries. Some registries are only for childhood vaccinations where other registries record all age groups including the elderly.
Immunisation registries are nationally implemented in Denmark, Hungary, Latvia, Luxembourg, Portugal, The Netherlands and Slovenia.

Table 16. Computerised Immunisation Registries

Region	Childhood	Adolescents	Adults	Elderly>65
Local	BE,DE[1],DK,FR,HU,IE,IT,PT[2],SI,ES,SE,UK,NO	IT,PT,ES,SE,NO	IT,PT,ES,SE	IT,PT,ES,SE
National	DK,HU,LV[3]NL, SI,NO	HU,LV,NO	LV	LU, LV

[1] Pilot project at present in one state

[2] Computerised registry system was implemented and coordinated at national level, but the data entry is only at local level and is not yet available at regional and/or national level.

[3]Registry used in Latvia covers only the patients registered with a family doctor under state financed medical services. This registry is not used to calculate vaccination coverage. As other doctors can provide vaccinations, both groups are requested to return data.

Immunisation registries are planned to be introduced or expanded further in the following countries:

	Introduce	Expand/develop (local to national)
Childhood	BG,CZ,EE,IS,PL,SK,RO	**SE,PT , IE**
Adolescents	BG,CZ,IS,PL,SK,NL	**SE,PT , IE**
Adults	**HU,IS,SI**	**SE,PT , IE**
Elderly	**HU,IS,SI**	**SE,PT, IE**

Table 17. Immunisation Registries Further Plans

Vaccination Coverage Results

WHO and UNICEF base estimates of routine coverage for antigens on review of administrative coverage data, surveys, national reports and consultation with local and regional experts. Vaccination coverage levels for the year 2005 of participating countries were available from WHO vaccine preventable disease monitoring system, 2006 global summary at http://www.who.int/vaccines-documents/globalsummary/globalsummary.pdf .

Table 18. Percentage of target population vaccinated as reported to WHO-UNICEF, estimates for 2005.

Country	DTP1	DTP3	MCV1
Austria	91	86	75
Belgium	98	97	88
Bulgaria	97	96	96
Cyprus	99	98	86
Czech	98	97	97
Denmark	93	93	95
Estonia	99	96	96
Finland	99	97	97
France	98	98	87
Germany	96	90	93
Greece	96	88	88
Hungary	99	99	99
Iceland	95	95	90
Ireland	96	90	84
Italy	97	96	87
Latvia	99	99	95
Lithuania	98	94	97
Luxembourg	99	99	95
Netherlands	ND*	98	96
Norway	97	91	90
Poland	99	99	98
Portugal	94	93	93
Romania	98	97	97
Slovakia	99	99	98
Slovenia	92	96	94
Spain	98	96	97

Sweden	99	99	94
United Kingdom	97	91	82

*ND not done

Adverse events following Immunisation

Adverse events are reported to the institutions/bodies with responsibility for AEFIs in all participating countries. Additional systems are in place in eight countries DE,FR, HU,IT,NL,RO,SE,UK.

Feedback of adverse events between vaccinators and the public occurs in 19/28 countries. (AT,CY,CZ,DE,EE,ES,FI,HU,IE,IS,IT,LT,LV,NL,NO,RO,SE,SI,SK).

Compensation schemes for vaccine damage exists in 14/28 countries AT,DE,DK,FI,FR,HU,IS,IT,LU,NL,NO,SE,SI,UK. In France, Hungary the scheme only concerns mandatory vaccines. In Denmark, Finland and Sweden, compensation is not automatic in that the person must apply for it.

Conclusions

Despite much agreement on the diseases that need to be addressed, it is clear from this report that immunisation schedules vary across the participating countries in the vaccines used, number of doses administered and the age at which vaccines are administered. Indeed not only do variations exist between countries but also within some countries. Differing disease epidemiology and health defining structures may account for some of the differences observed between European immunisation schedules.

Vaccination coverage varies in accordance with the immunisation schedules with all countries aiming for the ideal levels as suggested by WHO to either eradicate disease or to control infection rates.

Adverse events following immunisations are recorded in all countries and further work by the VENICE project will detail this aspect of immunisations.

Further research into the effectiveness of these different programmes may allow a more stream-lined approach in the delivery of vaccination within Europe. The development of agreed standards and performance measures of European vaccination programmes will be explored in the next phase of the VENICE project.

Even though this was a preliminary survey, it provided important information for the VENICE project and it was able to give an accurate picture of the European situation in the field of vaccine. For the first time the sub-national organization was described. It is possible that the use of a common European schedule could be facilitate reaching common public health objectives, rather than different immunization schedules. However in order to reach such objectives, the rational behind different immunization schedules needs to be explicitated.