



**Report on
Vaccination Coverage Assessment
In Europe**

VENICE

December 2007

Work Package No. 3

TABLE OF CONTENTS

Acknowledgments.....	3
ISO 3166-1 Country Codes.....	5
Abbreviations.....	6
Executive summary.....	7
Introduction.....	9
Aim of the VENICE Project.....	9
Objectives of the project.....	10
Aim and objective of the survey.....	10
Methods.....	10
Results.....	11
Findings.....	11
Performance and frequency of vaccination coverage assessment.....	11
Age groups.....	14
Administrative level of immunisation coverage assessment.....	16
Methods used in assessing vaccination coverage.....	17
Assessment of DTP vaccination coverage.....	17
Assessment of Measles Containing Vaccine Coverage.....	20
Assessment of Influenza coverage.....	22
Handheld vaccination records.....	24
Validation of Vaccine Coverage Data.....	24
Performance Indicators.....	24
Standards for Immunisation Coverage Assessment.....	26
Immunisation Registries.....	26
Privacy and Legislation.....	27
Data Entry for CIR.....	27
Confidentiality of Data contained on Registry.....	28
Data set of CIR.....	28
Ages covered on the immunisation registry.....	29
Access to information on the CIR.....	30
Capabilities of Immunisation Register.....	30
Summary and conclusions.....	33

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VENICE National Gatekeepers and Contact Points who have filled the WP3 questionnaire

Austria - Robert Muchl

Belgium – Pierre Van Damme

Bulgaria - Mira Kojouharova

Czech Republic - Bohumir Kriz.

Cyprus - Chrystalla Hadjianatassiou, Chryso Gregoriadou

Denmark - Steffen Glismann

Estonia - Natalia Kerbo

Finland - Tuija Leino

France – Daniel Levy-Bruhl

Germany - Sabine Reiter

Greece - Panagiotis Panagiotopoulos

Hungary - Zsuzsanna Molnàr, Beatrix Oroszi

Iceland – Thorulfur Gudnason

Ireland – Suzanne Cotter, Niamh Mullins

Italy - Marta Luisa Ciofi degli Atti.

Latvia – Jurijs Perevoscikovs

Lithuania - Nerja Kupreviciene

The Netherlands - Hester de Melker

Norway - Berit Feiring, Hilde Bakke

Poland – Waleria Hryniewicz, Pawel Stefanoff

Portugal - Teresa Fernades, Paula Valente

Romania - Gratina Chichin, Odette Nicolae

Slovakia – Jarmila Lancova, Katarina Krajcirova

Slovenia – Alenka Kraigher, Marta Vitek Grgic

Spain - Maria Victoria Martinez de Argon, Isabel Pena Rey

Sweden – Annika Linde, Rosemary Carlsson

UK – Richard Pebody

VENICE Work Packages

Workpackage 1-2 “Coordination & Dissemination of results”

Stefania Salmaso (Italy)

Workpackage 3 “Indicators of immunisation programs”

Darina O’Flanagan, Niamh Mullins (Ireland)

Workpackage 4 “Priority Setting and decision making processes”

Daniel Levy-Bruhl (France)

Workpackage 5 “Capacity building in monitoring prevention and management of post-vaccination Adverse Events”

Antonio Ferro, Giuseppe Tridente, Giovanna Zanoni (Italy)

VENICE Project Office at ISS

Project Managers

Lucia Pastore Celentano, Sabrina Bacci (Italy)

Project Secretariat

Eva Appelgren (Italy)

Project Administration

Francesca Meduri (Italy)

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

Abbreviations

AEs	Adverse Events
BCG	Bacillus Calmette-Guerin
CIR	Computerised Immunisation Registry
DTP	Diphtheria, Tetanus, Pertussis
EU	European Union
Flu	Influenza
Hep B	Hepatitis B
Hib	Haemophilus Influenza type b
MCV	Measles containing vaccine
MenC	Meningococcus C
MMR	Measles Mumps and Rubella
MS	Member States
PnV7	Pneumococcal 7 covalent conjugate
Polio	Poliomyelitis
Var	Varicella zoster
VENICE	Vaccine European New Integrated Collaboration Effort

Executive summary

This report relates to the findings of the second survey of Work Package 3 (“Indicators of Immunisation Programmes”) and describes how Vaccination Coverage is assessed in the VENICE network countries. This 2nd survey is a follow on to the first survey which provided a general description of each national immunisation program in the VENICE countries (see report from the First Survey at <http://venice.cineca.it>). This survey was undertaken in 2007.

The aim of this particular survey was to describe the methods used to compute Vaccination Coverage in the VENICE network states. More specifically, information was requested about vaccine coverage assessment for specific vaccines, frequency of assessment, age groups targeted and whether computerised immunisation registries were used in these countries. The survey was designed to meet the main objective of WP3, that is to determine common indicators for monitoring the immunisation coverage across member states as well as their constituent regions (in a comparable way).

The survey was conducted using a web-based questionnaire. This questionnaire was completed by **27/28** countries. The summary findings from this survey are: all countries assess DTP and Polio vaccine coverage, 18 (67%) of which do so annually; 18 (67%) countries assess vaccination coverage in children at or by their second birthday (24 months of age); 16 (59%) countries assess vaccination coverage at all three levels of the country’s administration - local, regional and national.

Administrative methods, surveys, and computerised record systems are used in the different countries to calculate the vaccination coverage for DTP, MCV and influenza vaccine in various combinations.

Validation of vaccination coverage data is done in 15 countries (56%) using various methods: vaccine sales are used in 47% (n=7) of these countries. Performance indicators are used in 14 countries (52%), while only 15% (n=4) of countries reported having a set of minimum functional standards for assessing immunisation coverage

Fifteen countries (56%) have national or local computerized immunisation registries, with different age groups covered; eight of these countries (53%; 8/15) could use the registry as means of recording influenza vaccination during a pandemic. In five of these countries (62%; 5/8) the computerized registry is used to record adverse events following immunisation.

The data collected show a high degree of variability across the European countries in the methods they use to estimate vaccination coverage, thus making comparison between countries of vaccination coverage difficult. However, the data in this report provide a starting point for further evaluation of the current obstacles to compare vaccine coverage data across different areas in the Europe.

Introduction

Aim of the VENICE Project

There is a need to improve knowledge on how vaccinations are performed across EU, to agree on indicators for monitoring vaccination programs, to define models of decision taking process and to integrate the available information identifying gaps and added values.

The VENICE project aims at encouraging 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 immunisation 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, 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.

Twenty-eight national gatekeepers were identified, one for each participating country, at the beginning of the project on the basis of their participation in other ongoing European vaccination networks (e.g. EUVACNET) as well as through the project sponsor (DG SANCO) and the ECDC advisory forum EU members.

All the data collection is performed with the collaboration of the national gatekeepers and issue specific contact points in each country.

Objectives of the project

1. To create an EU vaccination network able to collect and collate information on vaccination programs in each MS
2. To create a resource able to provide advice and support to single member states by integrating available tools and knowledge on various vaccine related issues
3. To create a network able to provide support in the development of preparedness strategies
4. To define common indicators for monitoring, in a comparable way the immunisation programs across MS and their constituent regions
5. To provide MS with the necessary information regarding safe vaccination and support capacity building in areas dealing with contraindication and the management of Adverse Events following vaccination
6. To encourage a rational approach to vaccination policy decision-making processes by providing standardized tools

Aim and objective of the survey

In order to comply with the project's objective number 4, a survey was implemented. Following on from the first survey "Immunisation Programs in Europe" which looked at vaccination schedules, this survey expanded further on vaccination coverage assessment. The questionnaire also asked for details on computerised immunisation registries.

Methods

The Vaccination Coverage Questionnaire was developed and piloted in five countries. Thereafter the gatekeepers/contact points of the participating countries were asked to enter the secure section of the VENICE website and complete the questionnaire online by March 2007. Poland filled in the questionnaire in June 2007 and has been later included in the present report.

Data was then collated by VENICE and imported into Microsoft Access Database for subsequent analysis.

Results

Findings

Data was downloaded on April 18th and analysed. Data from Poland were later added, as they become available. In all **27** countries had returned the questionnaire. Data from Luxembourg are still awaited.

Performance and frequency of vaccination coverage assessment

Participating countries were asked to quantify how frequently they assessed the vaccination coverage for specific vaccines. Of the 27 countries that responded, all countries (100%) assess Diphtheria, Tetanus, Pertussis (DTP), poliomyelitis (Polio) and Measles, Mumps and Rubella (MMR) vaccines. Haemophilus Influenzae type B (Hib) vaccination coverage is assessed in all countries 25 countries except BG and RO, where the vaccine is not included in the routine immunisation schedule. Hepatitis B (HepB) vaccination coverage is assessed in all 21 countries where the vaccine is administered. Influenza (Flu) vaccination coverage is assessed in adults in 19 of 26 countries, but all 27 countries have annual campaigns to promote adult influenza vaccination. Bacillus Calmette-Guerin (BCG) vaccination coverage is assessed in 16/18 countries, however in a number of countries BCG is given only to sub-risk groups. Meningococcal C (MenC) vaccination coverage is assessed in 12 countries, Pneumococcal conjugate (PnV7) vaccination coverage is measured in 10 countries and 5 countries assess varicella zoster (Varicella) vaccination coverage. For these last three vaccinations, it is difficult to estimate the proportion of countries, as the offer is often heterogeneous within the countries themselves.

Table 1. Numbers and details of participant countries that assess the following vaccines' coverage

<i>Vaccine</i>	<i>Total*</i>	<i>Countries</i>
Hib	25/25	AT,BE,CY,CZ,DE,DK,EE,ES,FI,FR,GR,HU,IE,IS,IT,LT, LV,NL,NO,PL, PT,SE,SI,SK,UK
HepB	21/21	AT,BE,BG,CY,CZ,DE,EE,ES,FR,GR,IT,LT,LV,NL,PL, PT,RO,SE,SI,SK,UK
Influenza	19/26	BE,BG,DE,DK,ES,FI,FR,HU,IE,IS,IT,LT,LV,NL,RO,SE, SI,SK,UK
BCG	16/18	BG,CZ,EE,FR,HU,IE,LT,LV,NL,NO, PL, PT,RO,SE,SI, SK
MenC	12**	BE,CZ,DE,ES,IE,IS,LV,NL,PT,SI,SK,UK
PnV7	10**	AT,BE,DE,FR,LT,NL,NO,SI,SK,UK
Varicella	5**	CY,DE,ES,LV,SI

*Countries assessing the vaccination coverage over the countries which included the vaccine in the routine immunisation schedule

** Countries offering the vaccination by different means, total not available

Eighteen of the 27 countries (67 %) annually assess DTP and Polio. RO conducts assessments at half yearly intervals, quarterly assessment occurs in IE and UK, and monthly assessment in HU and LV. FI assesses every 2 years, CY every 3 years and Greece every 5 years. In Belgium, the different regions Wallonia, Brussels and Flanders, carry out assessments at different intervals. Latvia assesses vaccination coverage both monthly and annually for the following vaccines DTP, Polio, Hib, Hepatitis B, MMR, BCG, MenC, Varicella, Influenza.

Table 2. Details of the frequency vaccines are assessed by participant countries.

<i>Vaccine</i>	<i>Frequency</i>	<i>Countries</i>	<i>Totals</i>
DTP, Polio, MMR	Annually	AT,BG,CZ,DE,DK,EE,ES,FR,IS, IT,LT,NL,NO, PL, PT,SE,SI,SK	18
	Quarterly	IE,UK	2
	Monthly	HU,LV	2
	Half yearly	RO	1
	Every 2 years	FI	1
	Every 3 years	CY	1
	Every 5 years	GR	1
	Other	Belgium different intervals according to the region	1
			27
Hib	Annually	AT,CZ,DE,DK,EE,ES,FR,IS,IT, LT,NL,NO,PL, PT,SE,SI,SK,	17
	Quarterly	IE,UK	2
	Monthly	HU,LV	2
	Every 2 years	FI	1
	Every 3 years	CY	1
	Every 5 years	GR	1
	Other	Belgium different intervals according to the region	1
			25
Hepatitis B	Annually	AT,BG,CZ,DE,EE,ES,FR,IT,LT, NL,PT,PL,SE,SI,SK	15
	Quarterly	UK	1
	Monthly	LV	1
	Half yearly	RO	1
	Every 3 years	CY	1
	Every 5 years	GR	1
	Other	Belgium different intervals according to the region	1
			21

Table 2. Cont'd Details of the frequency vaccines are assessed by country

<i>Vaccines</i>	<i>Frequency</i>	<i>Countries</i>	<i>Totals</i>
BCG	Annually	BG,CZ,EE,FR,LT,NO,PL,PT,SE,SI,SK	11
	Quarterly	HU,IE	2
	Monthly	LV	1
	Half yearly	RO	1
	Other	NL	1
			16
MenC	Annually	DE,ES,IS,NL,PT,SI,SK	7
	Quarterly	IE,UK	2
	Monthly	LV	1
	Every 3 years	CY	1
	Other	BE	1
			12
Pneumococcal	Annually	AT,DE,FR,LT,NL,NO,SI,SK	8
	Quarterly	UK	1
	Other	BE	1
			10
Varicella	Annually	DE,ES,SI	3
	Every 3 years	CY	1
	Other	LV	1
			5
Influenza	Annually	BG,DE,DK,ES,FI,FR,HU,IE,IS,LV, NL,RO,SE,SI,SK,UK	16
	Every 3 years	IT	1
	Other	BE,LV	2
			19

Age groups

Countries were asked to select from a list which target population is used in the assessment of vaccination coverage. While fifteen countries assess vaccination coverage at 1st birthday, children are most commonly assessed at, or by, their second birthday (n=18, 66%). Assessment at school entry age is performed in 15 countries and assessment at other age groups is detailed in table 3. Finland assesses childhood

vaccination coverage in one cohort, at 24<35 months of age and Italy only at or by 2nd birthday.

Table 3. Cohorts used in the assessment of childhood vaccination coverage in participant countries

<i>Cohort</i>	<i>Countries</i>	<i>Total</i>
Children at or by 1 st birthday	AT,BG,CY,CZ,EE,ES,IE,IS,LT,LV,NL,PL, PT,SI,UK	15
Children 24<35 months of age	CZ,DE,EE,FI,GR,IS,PL,SE,SK	9
Children at or by 2 nd birthday	AT,BE,BG,CY,CZ,EE,ES,FR,IE,IT,LT,LV,NL,NO, PL,PT,SI,UK	18
Age at school entry	AT,BG,CZ,DE,EE,ES,FR,GR,IS,LT,NO,PL,PT,SI,UK	15
Other	BE,BG,CY,DK,FR,HU,LT,LV,NL,NO,RO,SE	12

Twelve countries selected the “other” option and listed details of various age groups that are used outside of the list provided. Bulgaria routinely assesses vaccination coverage for those vaccines administered at each age group in the immunisation schedule from birth through to adulthood.

Table 3.1 Details of “other” age groups assessed (n=12)

<i>Country</i>	<i>Details of other age groups</i>
Belgium	7 y and 14 y in Flanders, end of primary school in Wallonia
Bulgaria	All cohorts defined by the immunisation calendar
Cyprus	Cohort of children 17-24 months
Denmark	Case based data with respect to age groups to be investigated
France	Children at 10 and 14 years every 3 years
Hungary	School children 11 years and 14 years
Latvia	8 and 15 years of age
Lithuania	Cohorts of children 12 and 16 years of age
Netherlands	Three cohorts 14 months; 4 years; 9 years old
Norway	At end of secondary school 16 years of age
Romania	Children 18-24 months old
Sweden	School children 12 years

Administrative level of immunisation coverage assessment

Countries were asked at what administrative level in the health system is immunisation coverage assessed with choice of local, regional and/ or national levels. Sixteen countries assess vaccine coverage at all three levels (BG,CZ,DE,EE,ES,HU,IE,IT,LT,NL,NO, PL, PT,SE,SK,UK). France assesses at local level only and six countries assess at national level alone (AT,CY,DK,FI,GR,IS). The other combinations include local and regional (BE), local and national (RO) regional and national (LV, SI) administrative levels. Participant countries were asked, when measuring vaccination coverage, if calculations were based on the agents i.e. the vaccine product or the antigen or both.

Table 4. Use of agent or antigen in vaccination coverage assessment in participant countries

<i>Disease</i>		<i>Countries</i>	<i>Total*</i>
DTP	Antigen	BE,CY,DE,EE,ES,FR,IE,IT,LT,NO,SE,	11
	Agent	AT,BG,DK,HU,NL,PT,RO,SK	8
	Both	CZ,FI,IS,LV,SI,UK	6
	Agent DT Antigen P	PL	1
			26
Polio	Antigen	BE,BG,CY,DE,EE,ES,FR,IE,LT, PL,NO,SE	12
	Agent	AT,DK,HU,IT,NL,PT,RO,SK,	8
	Both	CZ,FI,IS,LV,SI,UK	6
			26
HepB	Antigen	BE,BG,CY,DE,EE,ES,FR,IT,LV,LT, PL, SE	12
	Agent	AT,HU,NL,PT,RO	5
	Both	CZ,SI,SK,UK	4
			20
Hib	Antigen	BE,CY,DE,EE,ES,FR,IE,IT,LT,NO,PL,SE,UK	13
	Agent	AT,DK,HU,NL,PT,SK	6
	Both	CZ,FI,IS,LV,SI	5
			24

*Greece, missing data

Methods used in assessing vaccination coverage

With regard to assessment of DTP, MCV and Flu countries were asked to indicate the type of method used to calculate immunisation coverage e.g. administrative method, survey method and/or computerised records. Administrative methods included:

- Aggregate number of vaccines administered
- Aggregate collection of number of vaccines distributed
- School or day care records
- The number of subjects vaccinated
- Other methods

Survey methods included the following choices:

- Household surveys
- Telephone interview
- Mail survey
- Face to face interview
- Focus groups
- School survey
- Other methods

Additional information on the frequency with which surveys were conducted was also required and whether the surveys were conducted at regular intervals or occasionally. Details for each of the vaccines (DTP, MCV, Flu) are set out in the following sections.

Assessment of DTP vaccination coverage

Overview of methods used by participating countries to assess DTP numerator

Administrative methods are used in sixteen countries, survey methods in eleven and computerised records in eleven. Ten countries used more than one administrative method (CZ,DE,DK,ES,FR,IS,IT,LT,LV,PT) with three countries using all three methods CZ,IS,IT.

Table 5. Overview of Methods used by Member States to Assess DTP numerator

<i>Method</i>	<i>Country</i>	<i>Total</i>
Administrative	AT,BG,CZ,DE,DK,EE,ES,FR,HU,IS,IT,LT,LV,PL, PT,SK	16
Survey	BE,CY,CZ,DE,FI,FR,GR,IS,IT,LV,RO	11
Computer	CZ,DK,ES,IE,IS,IT,NL,NO,PT,SI,UK	11

Administrative methods for calculating DTP coverage

Twelve countries calculate DTP coverage using the number of subjects vaccinated. Five countries used the number of aggregate doses of vaccines administered. The six countries adopting more than one administrative method for detecting DTP coverage include CZ,DE,IS,LT,LV,PT.

Table 6. Types of administrative methods used by participant countries in DTP assessment

<i>Administrative Methods</i>	<i>Countries</i>	<i>Total</i>
No. of subjects vaccinated	AT,BG,CZ,DE,EE,HU,IT,LT,LV,PL,PT,SK	12
No. of doses administered	CZ,ES,LT,LV,PT	5
No. of doses distributed	CZ,IS,LT	3
Other Admin Method	DK,FR,IS	3
School Records	DE,PT	2

Other administrative methods are adopted by France (based on child health certificates); Denmark (case based data on each child vaccinated) and Iceland (uses health charts).

Survey methods for calculating DTP coverage

Survey methods are adopted by eleven countries, with five countries using more than one survey type (BE,CY,DE,FI,GR).

Table 7. Types of survey methods used by participant countries in DTP assessment

<i>Survey Methods</i>	<i>Countries</i>	<i>Total</i>
Face to face interview	BE,CY,CZ,DE,GR,IT	6
School survey	BE,CY,DE,FR,GR	5
Household Survey	CY	1
Telephone survey	DE	1
Mail	FI	1
Focus Groups	DE	1
Other	FI,IS,LV,RO	4

Amongst the countries that listed “other methods” Finland takes a sample from the population register and conducts a survey by contacting the Child Health Baby Clinic. Iceland uses health charts for DTP survey methods. Latvia conducts a survey based on immunisation cards. Romania randomly selects 30% of children in the age bracket 18-24 months from the GP register.

DTP surveys are conducted annually in six countries (BE,CZ,DE,FI,FR,LV), Romania holds surveys 1-3 times a year and Italy once every five years. In Belgium, Greece and Iceland the surveys are conducted occasionally.

Computerised Record Systems for calculating DTP coverage

Eleven countries use computerised records systems to calculate DTP coverage. Computerised record systems are present at local and/or national level and include different age groups according to the specifications of the relevant countries.

Table 8. Use of computerised records in DTP assessment

<i>Country</i>	<i>Childhood</i>	<i>Adolescents</i>	<i>Adults</i>	<i>Elderly</i>
Czech Republic	National and Local	National and Local		
Denmark	National			
Iceland	Local	Local	Local	Local
Ireland	Local			
Italy	Local	Local	Local	Local
Netherlands	National and Local			
Norway	National and Local	National and Local		
Slovenia	National and Local			
Portugal	Local	Local	Local	Local
Spain	Local	Local		Local
United Kingdom	Local			
Total	11	6	3	4

Assessment of Measles Containing Vaccine Coverage

Overview of MCV coverage assessment methods

Administrative methods are employed by sixteen countries to assess MCV, eleven countries use survey methods and ten countries use computerised records.

Ten countries used more than one administrative method

(CZ,DE,DK,ES,FR,IS,IT,LT,LV,PT) with two countries using all three methods

CZ,IT. These results are the exact same as for DTP except that Iceland does not employ computerised records to assess MCV.

Table 9. Overview of MCV coverage assessment methods.

<i>Method</i>	<i>Countries</i>	<i>Total</i>
Administrative	AT,BG,CZ,DE,DK,EE,ES,FR,HU,IS,IT,LT,LV,PL,PT,SK	16
Survey	BE,CY,CZ,DE,FI,FR,GR,IS,IT,LV,RO	11
Computer	CZ,DK,ES,IE,IT,NL,NO,PT,SI,UK	10

Administrative methods for calculating MCV coverage

MCV assessment by administrative methods is identical to DTP assessment except in respect to Iceland which uses only the number of doses of vaccine distributed in assessing MCV coverage.

Table 10. Types of administrative methods used by participant countries in MCV assessment

<i>Administrative Methods</i>	<i>Countries</i>	<i>Total</i>
No. of subjects vaccinated	AT,BG,CZ,DE,EE,HU,IT,LT,LV,PL,PT,SK	12
No. of doses administered	CZ,ES,LT,LV,PT	5
No. of doses distributed	CZ,IS,LT	3
School Records	DE,PT	2
Other Method	DK,FR	2

Survey methods for calculating MCV coverage

Of the eleven countries that use surveys face-to-face interviews followed by school surveys are the most commonly employed.

Table 11. Types of survey methods used by participant countries in MCV assessment

<i>Survey type</i>	<i>Countries</i>	<i>Total</i>
Face to face interview	BE,CY,CZ,DE,GR,IT	6
School Survey	BE,CY,DE,FR,GR	5
Other method	FI,IS,LV,RO	4
Household	CY	1

Surveys are conducted on a regular basis i.e. once a year in five countries (CZ,FR,DE,LV), twice a year in Romania, and every five years in Italy. In Belgium, Iceland and Greece surveys are conducted occasionally.

Computerised Record System for calculating MCV coverage

Ten countries use computerised records systems to calculate MCV coverage. Computerised record systems are present at local and/or national level and include different age groups according to the specifications of the relevant countries.

Table 12. Countries that use computerised records systems in MCV coverage assessment

<i>Country</i>	<i>Childhood</i>	<i>Adolescents</i>	<i>Adults</i>	<i>Elderly</i>
Czech Republic	National and Local	National and Local		
Denmark	National			
Ireland	Local			
Italy	Local	Local	Local	Local
Netherlands	National and Local			
Norway	National and Local	National and Local		
Portugal	Local	Local	Local	Local
Slovenia	National and Local			
Spain	Local	Local		
United Kingdom	Local			
Total	10	5	2	2

Assessment of Influenza coverage

Overview of methods to calculate Flu coverage

Flu coverage is calculated in nineteen countries with IE,IS,IT,LV,NO and Portugal using more than one method to do so.

Table 13. Overview of methods used by participant countries to assess Flu coverage

<i>Method</i>	<i>Countries</i>	<i>Total</i>
Administrative	BG,DK,ES,FI,FR,HU,IE,IS,IT,LT,LV,NO,PT RO,SK,SI	16
Surveys	BE,DE,IE,IS,IT,NO,PT,UK	8
Computer Records	IT,LV,PT	3

Administrative Methods for calculating Flu coverage

In calculating flu coverage the number of subjects vaccinated and/or the number of doses distributed is the most commonly used methods. In six countries (DK,LT,LV PT,SI,SK) more than one administrative method is used .

Table 14. Types of administrative methods used to assess Flu coverage

<i>Administrative</i>	<i>Countries</i>	<i>Total</i>
No. of doses distributed	BG,DK,FR,IS,LT,NO,PT,SK	8
No. of subjects vaccinated	FI,HU,IT,LV,RO,SI,SK	7
No. of doses administered	DK,ES,LT,LV,PT,SI,	6
Other Admin Method	IE	1

Survey Methods to calculate Flu coverage.

Survey methods are employed by eight countries, with DE and BE using more than one type.

Table 15. Survey methods used by participant countries in Flu coverage assessment

<i>Type</i>	<i>Countries</i>	<i>Total</i>
Telephone	DE,IE,PT	3
Face to Face	BE,IT	2
Household	BE	1
Mail	NO	1
Focus groups	DE	1

Three countries conduct flu surveys routinely (DE,PT,UK), and five only occasionally (BE,IE,IS,IT,NO). In the UK, flu surveys are conducted more than 3 times a year and once yearly in DE and PT.

Computerised Record System for Flu coverage

Table 16. Computerised Record System for Flu coverage

<i>Country</i>	<i>Childhood</i>	<i>Adolescents</i>	<i>Adults</i>	<i>Elderly</i>
Italy	Local	Local	Local	Local
Latvia	National	National	National	National
Portugal	Local	Local	Local	Local

Handheld vaccination records

National handheld vaccination records exist in twenty countries (75%), seven do not have handheld records (BE,FI,DE,IE,IT,LV,SE).

Validation of Vaccine Coverage Data

Validation of vaccine coverage data occurs in fifteen countries (55%) using various methods with vaccine sales used in about 50% of countries (n=7:

DE,DK,FR,IS,LT,NO,SI) and recounts of vaccination records undertaken in five countries: (LV,NL,PL, PT, SK). Other methods are used by the following countries BE,DE,DK,IT,NO,PT,UK. The WHO designed DQS Tool (Data quality Self assessment tool) is not currently used by any of the participant countries.

Table 17. Other methods employed by member states to validate coverage data

<i>Country</i>	<i>Method</i>
Belgium	Evaluates possible selection bias and quality
Denmark	Data analysis for eg. Double entry, vaccine given
Germany	Plausibility check
Italy	Cluster sampling surveys
Norway	Validates information on computerised system
Portugal	Number of doses distributed
United Kingdom	Feedback to local immunisation co-ordinators

Performance Indicators

Countries were asked to select which of the following performance indicators are currently in use according to the definitions given:

- **Up to date** immunisation is defined as the receipt of the full number of doses by the assessed age according to recommendations of the National Advisory Committee on Immunisation (e.g. assessed at 12 months or 24 months)
- **On-time** immunisation is defined as age-specific receipt of immunisation during acceptable time periods according to recommendations of the National Advisory Committee on Immunisation. Measured in some areas as median age in months at receipt of each vaccine dose
- **Late start rates** are defined as the % infants who don't have first dose by certain age
- **Drop –off rates** are defined as the % children with DTP1 at 6 months - % with DTP3 at 12 months
- **Valid doses** are the % doses that were administered when the child had reached the minimum age for the vaccine, and were administered with the proper spacing between doses according the national schedule

Performance indicators are used in fourteen countries with more than one method employed in all but two countries (IE,PT).

Table18. Performance indicators used by participating countries

<i>Method</i>	<i>Countries</i>	<i>Total</i>
Up to date	BE,CY,DK,FI,IE,LV,NL,NO,PT,SI,SV	11
On time	BE,CY,DK,FI,HU,LT,LV,NL	8
Late Start	BE,DK,FI,HU,LT,LV,NL	7
Drop Off	CY,DK,FI,LT,LV,NL,SI	7
Valid Doses	CY,DK,FI,NL,NO,SK	6

Standards for Immunisation Coverage Assessment

Countries were asked if they had Standards for immunisation coverage assessment, on similar basis of the “American Standards for Immunisation registries”, which are a set of minimum functional standards for computerised registries (i.e. electronically stored data must be on all core data elements approved by the National Vaccine Advisory Committee). Four countries (CZ,DE,LT,PT) responded they have similar standards.

Immunisation Registries

Countries were asked if a computerised immunisation registry (CIR) exists either nationally or locally. If countries replied no to both questions, a further question on whether computerised registry would be considered in the future was asked.

Only those countries that have either a national and/or local computerised registry in place answered the remaining questions asked in the questionnaire (n = 15).

Table 19. Countries with CIR

<i>Type</i>	<i>Country</i>	<i>Total</i>
National	DK,NL*,NO*,SI	4
Local	BE,DE,ES,HU,IE,IS,IT,NL,NO,PT,RO,SE,UK	13
Future expansion	IE,IS,PT,RO,SE,UK	6

*Netherlands and Norway have both local and National computerised registries.

In Austria, Bulgaria, Estonia, Finland, and Slovakia future plans include the development of the first national computerised immunisation registry. In other countries plans are in relation to expanding further existing systems.

Table 20. Countries proposing to introduce a National CIR

<i>National CIR in Future</i>	<i>Planned Date</i>
AT,BG,EE,FI,RO,SK	Not Known
PT	2007
IS,UK	2008
IE,SE	2009

Privacy and Legislation

Legislation authorising immunisation registries ensuring privacy and confidentiality in relation to the use of such registries exists in eight countries.

Table 21. Countries with Specific Legislation pertaining to use of registry and the monitoring body with responsibility.

<i>Country</i>	<i>Monitoring Body</i>
Belgium	National Privacy Commission
Denmark	National Data Authority (Datatilsynet)
Iceland	The chief epidemiologist
Netherlands	Landelijke vereniging van Entadministraties
Norway	Health care providers
Portugal	Not known
Slovenia	Inspection
United Kingdom	Patient Information Advisory Group

Data Entry for CIR

Data entry is done by the health provider in all fifteen countries that have either a national or a local CIR. The Netherlands indicated that others had the ability to enter information and in the United Kingdom staff from the Department Of Child Health are able to enter data. In Ireland administrative staff from the Health Service Executive enter data.

Table 22. Countries that enter data either voluntarily or compulsory

<i>Target Group</i>	<i>Program Type</i>	<i>Countries</i>
Childhood	Voluntary	BE,ES,IE,IT,SE
	Compulsory	DK,HU,IS,NL,NO,PT,RO,SI
Adult	Voluntary	BE,ES,IT,SE,
	Compulsory	PT

Sweden at present is the only country requiring verbal consent prior to entry onto the immunisation registry, which is at present a pilot project.

Confidentiality of Data contained on Registry

Confidentiality of data contained in the immunisation registry is currently protected by legislation in all of the participant countries regardless of the extent of the immunisation registry i.e. national or local.

Data set of CIR

Six (DE,IT,NO,PT,SE,SI) of the 15 countries that have either a local and/or national CIR have an agreed core data set .

Table 23. Countries with an agreed core data set and the extent of the Computerised Immunisation Registry

<i>Extent of CIR</i>	<i>Country</i>
National	DE,NO,SI
Local	IT,NO,PT,SE

Named patient data are recorded on the registry in 13/15 countries, except in DE,DK.

Unique identifying numbers or personal identifiers are used in the registry by twelve countries (excluding DE,IE,RO). A number to identify all health system encounters is used in ten countries excluding BE,DE,IE,NL,RO. These two identifiers are the same in eight countries. Where the numbers are not the same data can be linked i.e. BE,NL.

Table 24. Details of identifying numbers used in countries with CIR

<i>Country</i>	<i>Unique Personal Identifier</i>	<i>Unique Health System Encounter Number</i>	<i>Numbers Same</i>	<i>Data Linked</i>
Belgium	Yes	No		Yes
Denmark	Yes	Yes	Yes	
Germany	No	No		No
Hungary	Yes	Yes	Yes	
Iceland	Yes	Yes	Yes	
Ireland	No	No		No
Italy	Yes	Yes	Yes	
Netherlands	Yes	No		Yes
Norway	Yes	Yes	No	No
Portugal	Yes	Yes	Yes	
Romania	No	No		No
Slovenia	Yes	Yes	No	
Spain	Yes	Yes	Yes	
Sweden	Yes	Yes	Yes	
United Kingdom	Yes	Yes	Yes	
Total	12	10	8	2

Ages covered on the immunisation registry

Countries with a CIR were asked to identify what age groups are covered therein.

Three countries (BE,IT,PT) replied that all ages are covered and various age ranges are covered in the remaining countries.

Table 25. Ages covered on the immunisation registry.

<i>Country</i>	<i>Ages Covered</i>
Belgium	All ages
Denmark	All children registered to have received a childhood
Germany	Not known
Hungary	All children under age 7 years
Iceland	Children younger than 18 years
Ireland	All children aged 24 months or younger, some areas children \leq 5years
Italy	All ages
Netherlands	All ages up to 13 years of age
Norway	Children/adolescents under the age of 18 years.
Portugal	All ages
Romania	Different ages, according to district
Slovenia	All children under age of 6 years
Spain	Until 16 years
Sweden	Varying with county (registry under implementation)
United Kingdom	0-5 yr complete, 6-15 yrs some area

Access to information on the CIR

Public Health Doctors have access to information contained in the registries of 9(60%) of countries. Portugal is the only country where the vaccinee has access.

Table 26. Access to information on CIR

<i>Individual</i>	<i>Country</i>	<i>Total</i>
Public Health Doctor	BE,ES,IE,IS,IT,NO,PT,RO,SI	9
Public Health Nurse	IS,IT,NO,PT	4
Primary Care Physician	BE,ES,HU,IS,PT,RO,SI,UK	8
National Immunisation program	BE,HU,NO,RO,SI	5
Other	BE,DK,NLSE,UK	5
Vaccinee	PT	1

Capabilities of Immunisation Register

The following section details the capabilities of the registers such as the ability to issue reminder / recall notifications, ability to link with adverse event databases etc.

Reminder/ Recall notifications

Only eight of the countries have the ability to issue reminder/recall notifications to the vaccinee. Ten countries issue reminder/recall notifications to the health care providers

Table 27. Reminder /Recall Notifications using CIR

<i>Country</i>	<i>Issue Reminder to Vaccinee</i>	<i>Issue Reminder to Health Care Provider</i>
Hungary	No	Yes
Iceland	Yes	Yes
Ireland	Yes	Yes
Italy	Yes	Yes
Netherlands	Yes	Yes
Portugal	Yes	Yes
Romania	No	Yes
Spain	Yes	Yes
Sweden	Yes	Yes
United Kingdom	Yes	Yes
Total	8	10

Record of completed vaccinations

Ten countries (n= 10/15, 66.7%) with CIR can provide information to the vaccinee on immunisations, allowing them to obtain a record of completed vaccinations. The exceptions are BE,DE,IE,IS,SI.

Feedback to health providers

All but two countries (DE, IT) are able to provide feedback to health providers.

Managing vaccine inventories

The registry in seven countries is capable of managing vaccine inventories (BE,ES,IS,IT,NL,PT,SI)

Pandemic Situation

There are eight countries that can use the registry as a means of recording influenza vaccination during a pandemic (BE,ES,IS,IT,NO,PT,RO,SE).

Link with vaccine preventable disease

Three countries are capable of linking to their vaccine preventable disease surveillance data which are Iceland, Norway and Sweden.

The immunisation registry may be used for statistical purposes in all countries except Germany.

Adverse events following immunisation

Adverse events following immunisation are recorded in one third of the countries (ES,IS,PT,SE,SI). In Italy and the United Kingdom although the registry cannot record directly adverse events, both of these countries are able to link to the adverse event database.

Table 28. Overview of the capabilities of CIR

<i>Country</i>	<i>Record of completed vaccinations</i>	<i>Feedback information to Health Providers</i>	<i>Manage Vaccine Inventories</i>	<i>Link with Surveillance Data</i>	<i>Useful in Pandemic</i>	<i>Adverse Events Recorded</i>	<i>Link with Adverse Events Database</i>
Belgium	No	Yes	Yes	No	Yes	No	No
Denmark	Yes	Yes	No	No	No	No	No
Germany	No	No	No	No	No	No	No
Hungary	Yes	Yes	No	No	No	No	No
Iceland	No	Yes	Yes	Yes	Yes	Yes	
Ireland	No	Yes	No	No	No	No	No
Italy	Yes	No	Yes	No	Yes	No	Yes
Netherlands	Yes	Yes	Yes	No	No	No	No
Norway	Yes	Yes	No	Yes	Yes	No	No
Romania	Yes	Yes	No	No	Yes	No	No
Portugal	Yes	Yes	Yes	No	Yes	Yes	
Slovenia	No	Yes	Yes	No	No	Yes	
Spain	Yes	Yes	Yes	No	Yes	Yes	
Sweden	Yes	Yes	No	Yes	Yes	Yes	
United Kingdom	Yes	Yes	No	No	No	No	Yes
Total	10	13	7	3	8	5	2

Summary and conclusions

This report demonstrates that VENICE participating countries all collect collate and analyse vaccination coverage data regularly. However, the methods they use to assess vaccination coverage and the frequency of doing so is highly variable, making comparison difficult.

- All countries assess DTP, Polio, MMR, Hib and HepB vaccine coverage where these vaccines are included to routine immunisation schedule. Different vaccination coverage assessment time intervals are used in different countries ranging from monthly/quarterly/half yearly/annually to 2-5 years. The majority of MS reported assessing vaccine coverage annually. In one country (Belgium), the frequency of vaccine coverage assessment differs in different regions of country.

Influenza vaccination coverage is assessed in more than two-thirds of MS with majority of them doing it annually.

Although not all countries have routine programmes with BCG, MenC, Pneumococcal, Varicella vaccines, among those that do, most assess vaccination coverage annually.

- Most countries assessing vaccination coverage use populations/denominators at or by first or second birthday and also age at school entry. A wide range of other age cohorts is used in some countries.
- The countries vary in the administrative level at which vaccination coverage is assessed. Nearly two-thirds assess vaccination coverage at all three administrative levels (local, regional, national) with the remainder assessing at national level, local level alone or other combinations.
- A variety of administrative methods (e.g. administrative, surveys and computerised records systems or combination of these) are used to calculate vaccination coverage. In those countries where the predominant method is administrative, the most common assessment of numerator is the number of subjects vaccinated. In those countries where survey methods predominate, the most common type of surveys used are face-to-face interviews or school surveys. Specifically for flu vaccination coverage, the most common methods for assessment are telephone surveys. Countries using computerised records systems use this method at different levels- local, national or both.
- Validation of vaccination coverage data is done in just over half of countries using a variety of methods. The most common method reported in half of these countries involves use of vaccine sales data followed by recounts of vaccination records.
- Different performance indicators (up-to-date or on-time immunisation, late start rates, drop-off rates, valid doses) were used by half of the countries, the most common performance indicator being the proportion of children who are up-to-date by the age of assessment (assessed at 12 or 24 months).

- Immunisation registries are available in more than half of the countries but vary regarding administrative level covered (i.e. either national or local immunisation registries) and also by age groups covered. Six countries with pre-existing immunisation registries have plans to expand their current or develop national immunisation registries. Although the majority of countries have named patient and personal identifiers (or unique health system encounter number) on immunisation registries only half of the countries with registries have legislation to ensure privacy and confidentiality in relation to their use.

Immunisation registries in ten of the 15 countries are used to assist the immunisation programme by issuing reminder/ recall notifications to vaccinee (8/10) or health care provider (10/10).

Number countries reported that their system had the capability to record influenza vaccination (n=8) and also adverse events following immunisation (n=5).

In conclusion, there are many varied methods for assessing vaccination coverage in the countries participating in the VENICE project. Increasingly countries are using computerised immunisation registries as a tool to measure coverage. Agreement on standards for such registries would assist in more meaningful interpretation of data on vaccination coverage assessment.