



TECHNICAL REPORT

Review of outbreaks and barriers to MMR vaccination coverage among hard-to-reach populations in Europe

Venice II Consortium – September 2012

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Abbreviations

CAM	Complementary and alternative medicine
CI	Confidence intervals
CINECA	Consortium of University, Bologna, Italy
CRS	Congenital rubella syndrome
ECCH	European Central Council of Homeopaths
ECDC	European Centre for Disease Prevention and Control
ECSWE	European Council for Steiner Waldorf Education
EEA	European Economic Area
EMA	European Medicines Agency
EPIS	Epidemic Intelligence Information System (EPIS)
EU-MIDIS	European Union Minorities and Discrimination Survey
EUVAC	Surveillance Community Network for Vaccine-preventable Infectious Diseases
FRA	European Agency for Fundamental Rights
HPSC	Health Protection Surveillance Centre, Ireland
MMR	Measles, mumps, rubella vaccine
MOH	Ministry of Health
MS	Member States
OR	Odds ratio
PICUM	Platform for International Cooperation on Undocumented Migrants
RR	Relative risk
UNHCR	United Nations High Commissioner for Refugees
VENICE	Vaccine European New Integrated Collaboration Effort
VPD	Vaccine-preventable disease
WHO	World Health Organization

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
MT	Malta
NL	The Netherlands
NO	Norway
PL	Poland
PT	Portugal
RO	Romania
SK	Slovakia
SI	Slovenia
ES	Spain
SE	Sweden
UK	United Kingdom

Executive summary

Background

WHO Regional Office for Europe (WHO EURO) recently recommitted to the elimination of endemic measles and rubella, which will also lead to the elimination of Congenital Rubella Syndrome (CRS) in Europe. The WHO European Region elimination target date is now set for 2015. To meet this goal it will be necessary to achieve and sustain a very high vaccination coverage ($\geq 95\%$) with two doses of measles and at least one dose of rubella vaccine through high-quality, routine immunisation services. Substantial progress had been made towards the elimination target in the World Health Organization's European Region, with measles vaccine coverage on the rise and measles cases decreasing in many countries. However, several large outbreaks of measles, mumps and rubella have been reported in European countries in recent years.

A decline in immunisation rates in some countries or regions can be attributed to many factors: increasing vaccine scepticism; increasing migration and population movement; a growing community of hard-to-reach populations and literacy and language problems among migrant or ethnic groups.

Aim and objectives

The overall aim of this project was to report on activities being undertaken to monitor and improve MMR vaccination coverage among hard-to-reach population groups in European countries, building upon previous work done by the VENICE II project on barriers to MMR immunisation.

The objective was to describe measles, mumps and rubella outbreaks reported over the last two decades, to provide information on MMR vaccination coverage and to describe known barriers to MMR vaccination among hard-to-reach population groups in EU countries.

Methodology

A literature search was carried out using three data sources. Initially information was sourced on published literature from the PubMed database and relevant additional papers identified from references and citations. Links were then used to the publications and reports provided by VENICE project country experts at the time of the MMR survey (conducted in 2010–2011), analysing low MMR vaccination coverage. We also included the literature, publications, reports and discussion points provided by experts through an e-forum organised by the VENICE network and ECDC (EPIS-VPD). Finally, selected keywords were used to search Google for unpublished reports (grey literature), studies, websites and European documents on human rights, socio-economic conditions, health status, access to public services and vaccination coverage among hard-to-reach groups.

To investigate the magnitude of the problem, outbreak-related publications from 1995 to July 2012 were included. The literature search encompassed reports/studies or scientific papers published in full and in English. After examining the selected papers/reports/documents the information was classified according to the review objectives and described in this report.

Results

The review identifies various hard-to-reach population groups in Europe and describes their health status and vaccination coverage. It summarises outbreaks of measles and rubella reported in the literature or by national experts on vaccine-preventable diseases, describing the size of the outbreaks, the risk factors resulting from under-vaccination and measures taken to control the outbreaks and prevent further spread. Public health interventions to improve overall uptake and barriers to MMR vaccination within these populations are also described.

Under-vaccinated populations identified in Europe include migrants and nomadic groups; immigrants; religious groups (often country-specific); anthroposophic groups, complementary medicine users and healthcare workers.

Health status of hard-to-reach groups

Studies have clearly shown that the health status of many nomadic groups is inferior to that of the non-nomadic population. Reasons for poor health status include socio-economic disadvantage, lower levels of education and literacy, poorer living conditions, geographic isolation, discrimination and difficulties accessing health services.

The health status of the non-nomadic, hard-to-reach groups is not described in as much detail but in general the health status of these groups appears to be similar to the rest of the population.

Vaccination coverage

At European level there is little information on vaccination coverage among the hard-to-reach populations, and if reported it is usually in the context of outbreaks, when coverage is determined through surveys or administrative data from the outbreak area. When reported in the literature, vaccination coverage was generally low and varied greatly, ranging from 7–46% for religious groups; 0.6–65% for anthroposophic groups and 0–82% for nomadic groups (Travellers and Roma¹).

The reason for the lack of information on MMR vaccination coverage in this population is that few countries collect information on ethnic, religious and migrant status. Without information on MMR immunisation within these groups it is not possible to monitor progress in vaccination coverage or to prevent outbreaks.

Reported outbreaks

There are many outbreaks of measles and rubella among hard-to-reach groups described in the literature. From 1997 to 2011, measles outbreaks associated with anthroposophic population groups were reported in six European countries: Austria, Belgium, Denmark, Germany, the Netherlands and the United Kingdom. During the period 2004–2010 measles outbreaks (or clusters) associated with travellers were described in four European countries (Ireland, Norway, Slovenia and the United Kingdom) and associated with Roma communities in eight countries (Bulgaria, Germany, Greece, Italy, Poland, Portugal, Romania, Spain). Outbreaks of rubella and mumps among members of religious communities were reported in the Netherlands in 2004–05 and 2008 respectively. Mumps outbreaks were reported in a religious community in the United Kingdom in 1998–99.

These outbreaks are often the first demonstrable sign of hard-to-reach populations within a community. When such outbreaks occur it is vital that the underlying issues and reasons for non-vaccination identified during the course of the outbreak are acted upon and used to inform national and European policy.

Barriers to vaccination

The barriers to vaccination are many and varied, yet they are often group-specific. The list of barriers includes discrimination; administrative and financial problems; language or literacy difficulties; lack of cultural knowledge; lack of information on health and vaccination; religious beliefs; a fatalistic approach to life or a distorted risk perception in relation to vaccines and vaccine-preventable diseases among some individuals and groups.

Addressing MMR under-vaccination is the responsibility of every national authority, and every health professional working in the area of disease prevention and health promotion. MMR vaccination coverage needs to be monitored within each population group at risk of under-vaccination. Improving access to health services is critical in order to ensure that vaccination is available to those who need it. Issues of discrimination and culturally appropriate communication also need to be addressed.

When working with local communities, the use of mediators or local healthcare workers has proved effective in improving uptake. Improving healthcare workers' understanding of the population in question also enables them to meet the needs of the community more effectively and respond more positively to their concerns.

Conclusions

There are recognised hard-to-reach population groups within Europe who have a disproportionate risk of measles susceptibility due to under-vaccination with the MMR vaccine. Across Europe, national immunisation programmes lack adequate information to monitor vaccination coverage in these hard-to-reach groups. Examples of successful immunisation programmes demonstrate that MMR coverage can be improved. This is based on an accurate understanding of the obstacles, the breaking down of barriers and facilitating access to services and information. It is hoped that the continued sharing of information and strategies to improve immunisation activities for all under-vaccinated population groups will lead to a more cohesive and standardised approach to addressing the needs of these groups, resulting in improved MMR vaccination coverage in the foreseeable future.

¹ The terms 'Roma' and 'Travellers' are defined as follows in the appendix to the Council of Europe's Committee of Ministers Recommendation Rec(2008)5 on policies for Roma and/or Travellers in Europe: 'The term 'Roma and/or Travellers' in the present text refers to Roma, Sinti, Kale, Travellers, and related groups in Europe, and aims to cover the wide diversity of groups concerned, including groups which identify themselves as Gypsies'.

Introduction

WHO EURO has recommitted to the goals of eliminating endemic measles and rubella, which will also lead to the elimination of Congenital Rubella Syndrome (CRS) in Europe. The WHO European Region elimination target date is now set for 2015. To meet these goals it is necessary to achieve and sustain very high vaccination coverage ($\geq 95\%$) with two doses of measles and at least one dose of rubella vaccine through high-quality routine immunisation services [1]. High vaccination coverage rates produce effective herd immunity for the general population and also indirect immunity for those who cannot be vaccinated. The measles virus is highly infective and susceptible individuals can be exposed unknowingly before the disease is evident in the index case. Geographic dispersion is common as exposed individuals travel, develop the disease and transmit the infection. This rapid dispersal among susceptible populations has implications for both measles elimination strategies and national immunisation programmes.

Until recently substantial progress had been made in the European countries towards elimination of measles and rubella with vaccine coverage increasing and cases decreasing in many countries. However several large outbreaks of measles, rubella and mumps have been reported in European countries in recent years (Austria, Belgium, Bulgaria, Denmark, Germany, Greece, France, Italy, Ireland, the Netherlands, Norway, Poland, Portugal, Romania, Slovenia, Spain and the United Kingdom). Many of these outbreaks have occurred or been introduced among children, teenagers or young adults, some of whom had missed vaccination during the early childhood programme in their country of origin [2].

Although the diseases can be avoided through simple and inexpensive vaccines, many European citizens continue to run a significant risk of infection due to under-vaccination. Immunisation rates in some countries have declined for a variety of reasons including increasing vaccine scepticism; greater migration and population movement and a growing community of hard-to-reach population groups.

The success of immunisation programmes in earlier generations with the subsequent decline in vaccine-preventable diseases may have changed the risk perception, meaning that some individuals no longer see the disease as a problem. In every country there are vulnerable groups who are hard to reach for vaccination services. Furthermore, anti-vaccination advocacy campaigns pose challenges to immunisation by disseminating misleading information.

There are similarities among countries in their approach to MMR vaccination and the monitoring of vaccination coverage. The recently (2010–2011) conducted VENICE survey on MMR vaccination found that 25 EU countries that responded recommend two doses of MMR vaccine and that they all monitor MMR vaccination coverage for the first dose of vaccine. However, at the time of the survey, not all monitored vaccination coverage for the second dose. In 2009, national vaccination coverage for the first vaccine dose varied widely among countries from 82% to 100%, with 15 of them reporting coverage over 95%. Reported vaccination coverage for the second MMR dose in the same year also varied but was generally lower (range 79–99.3%). Six out of 16 countries reported vaccination coverage over 95% (measured by administrative method). Eight countries reported an estimated coverage for the second dose of 45–90% (estimated by survey methods) [3]. However, national vaccination coverage does not provide information on the presence of possible pockets of unvaccinated individuals.

Aim and objectives

The overall aim of the project was to learn more about prevention and control activities in order to eliminate vaccine-preventable diseases (measles and rubella) in the EU.

The objectives of this project were to

- describe measles, mumps and rubella outbreaks among hard-to-reach populations reported in the last two decades;
- provide information on MMR vaccination coverage;
- describe barriers to MMR vaccination;
- report on activities to monitor and improve MMR vaccination coverage among hard-to-reach population groups.

The following activities have been performed:

- A literature review in order to identify barriers and best practices for measles and rubella vaccination coverage and identify the gaps and deficiencies in monitoring vaccination coverage in hard-to-reach groups.
- Consultation with immunisation professionals and public health experts via an ad-hoc e-forum hosted by the ECDC EPIS web portal for vaccine-preventable diseases.
- An outline of a concept to monitor and evaluate public health prevention and control activities targeting hard-to-reach population groups.

Methodology

The project, which began in June 2011, involved regular meetings with the project team to discuss methodology and progress. A literature search was carried out using three data sources. Firstly, we sourced information on published literature from PubMed database (<http://www.ncbi.nlm.nih.gov/pubmed>) and identified relevant additional papers from references and citations in these publications. Secondly, we used the links to the publications or reports provided by VENICE gatekeepers/contact points at the time of the MMR survey (conducted in 2010–2011) to analyse low MMR vaccination coverage [3]. We also included the literature, publications, reports and discussion points provided by experts through an e-forum organised by the VENICE network and ECDC (EPIS-VPD). Thirdly, selected keywords were used to search Google for unpublished reports (grey literature), studies, websites and European documents on human rights, socio-economic conditions, health status, access to public services and vaccination coverage among hard-to-reach groups. The literature search and review activity continued for the duration of the project (until June 2012).

The following MESH terms were used to search for publications: vaccination or immunisation; population or population groups; ethnic groups; religious; vulnerable populations and minority groups. We also used the following key words to identify relevant publications: vaccination or vaccination coverage; cover or coverage; hard-to-reach or difficult-to-reach; vulnerable group; religious group; migrant; anthroposophic groups; MMR vaccination; vaccination rates; cultural or ethnic minority groups or nomadic groups; homeopathy and philosophical beliefs.

To review the current magnitude of the problem, outbreak related publications from 1995 to July 2012 were included. Following a review of selected papers/reports/documents the information was classified according to the review objectives and described in this report.

Reports/studies or scientific papers published in full, in the English language were included in the literature search. For a few publications/reports, the link to the original language (German, French, Bulgarian) was provided by the national counterparts. For these publications we used a summary in English or asked for summary information from members participating in this project. As the scope of the project was large the literature review was led by one expert and supported by another two experts. Abstracts, published reports and web-based information were reviewed and included based on relevance. For some reports it was necessary to consult with national counterparts to clarify details. The focus was mainly on papers originating from the EU/EEA region, however, some English literature and information originating from other parts of the world (Canada, United States, Australia) that addressed relevant questions (e.g. use of homeopathy in the western world) was used. More than 300 relevant publications, reports and websites were identified. A database of these publications was created using Reference Manager. Over one hundred and fifty publications, reports and websites are reviewed and cited in this report (Annex 5).

Additionally, the report includes results and information from work that has already been undertaken by the VENICE project (during the MMR survey conducted in late 2010) [3] and by EUVAC.net (prior to EUVAC.net moving to ECDC). EUVAC.net information on Member States' measles elimination plans was updated and is included in the report (Annex 1). Information on MMR vaccination schedules for EU Member States is presented in Annex 3. The information from EU-funded projects was collated and gaps in knowledge were identified.

Professional and non-governmental community groups were consulted via an ad-hoc e-forum, hosted by ECDC on the EPIS vaccine-preventable disease web platform (EPIS-VPD ad hoc forum). The forum was established shortly after an ECDC meeting on communicable disease prevention among Roma (Vienna, November 2011) [4]. Professionals with experience in providing services for ethnic minority groups (epidemiologists, representatives from ministries of health, family doctors, community workers and various managers, including VENICE gatekeeper representatives from all EU and EEA countries), were invited to participate in the ad-hoc e-forum. Representatives from some non-EU countries (e.g. members of EpiSouth network) were also invited. In total, 42 participants from 18 countries (14 EU/EEA: Bulgaria, Czech Republic, Denmark, Finland, Germany, Greece, Hungary, Ireland, Italy, Norway, Romania, Slovakia, Spain and Sweden and four non-EU: Albania, the Former Yugoslav Republic of Macedonia, Montenegro and Turkey) agreed to take part in this forum. The ad hoc forum started its life on 7 December 2011 and lasted until the middle of May 2012. Questions related to MMR vaccination for hard-to-reach population groups were posted every one to three weeks. Overall around 15 questions were posted on the e-forum. Information was sought on hard-to-reach population groups (ethnic, anthroposophic, and religious) identifying barriers (attitudes, knowledge, behaviour) to achieve higher MMR vaccination coverage and gaps in vaccination coverage monitoring for these groups. Responses, publications or reports that were shared in the forum are included in the relevant sections of this report. More details on the forum are presented in Annex 4.

This report presents information for each hard-to-reach group identified: migrant and nomadic (Roma, Travellers, migrants); religious; anthroposophic; followers of complementary and alternative medicine (including homeopathy) and healthcare workers who have been identified as particularly vulnerable to infection or liable to spread measles. Each of these population groups is described separately so the reader is able to read information for the group of particular interest without having to read the full report.

Terms are explained and a glossary is attached at the end of the document. We also collected data on estimated population size for hard-to-reach groups if this information was available; estimates were sourced from websites, scientific publications, reports and national statistical offices.

Limitations

The literature review was limited to a search in only one scientific database (PubMed) and consequently some publications might be missing if they were not included in this database.

Papers published during the last two decades were reviewed and relevant information may be missing if it was published prior to this period. Although, relevant studies on barriers to MMR vaccination have been carried out worldwide, we restricted the review to EU/EEA data only.

The majority of papers/websites/reports reviewed were in the English language. Some papers/reports provided by the VENICE survey, conducted in 2010–11, or by the EPIS VPD e-forum were in other languages (German, French, Bulgarian). We used data extracted from abstracts that were in English or consulted experts fluent in these languages. Relevant publications, websites or reports produced at local level and published in other languages have not been revised. Through peer consultation we also established that formal and scientific reports do not always accurately identify reasons for non-vaccination, perhaps due to the local sensitivities of hard-to-reach groups.

Hard-to-reach population groups

1. Migrant and nomadic groups (ethnic minority population groups)

Within Europe there are a variety of nomadic/semi-nomadic social or ethnic groups, many of whom move relatively frequently within or beyond national boundaries. Europe also has displaced persons, asylum seekers, migrant workers and their families. Whenever individuals take up residency in a new country or region there is an increased risk of a temporary or more permanent break in their access to health services. There could also be other disruptions to what may have been a relatively normal life with established routines linking them to public services in their area of origin.

Often migrants and nomadic groups are at risk of marginalisation, but the extent to which this may occur often depends on their socio-economic situation, gender, age, education, literacy, language, real or perceived rights of residency (and associated rights) in the new country or region. Whereas some individuals and families of migrant or nomadic origin will integrate rapidly into the new community, rapidly availing themselves of health and other public services, others may remain marginalised and at risk of poorer health status than the general population. Research undertaken by the EU Agency for Fundamental Rights (FRA) has identified specific areas of discrimination among minority population groups within Europe. In a 2009 study ethnic minorities were almost five times more likely to experience multiple discrimination than those from the majority of the population [5].

Although migrant and nomadic populations are generally a small proportion of any EU country, studies have shown that some members of these communities are at increased risk of under-vaccination. The following sections will discuss some of these groups, focusing on migrants and nomadic groups that have been identified as having low immunisation coverage and poor health status.

The Council of Europe has estimated that there are 10-12 million Roma and Travellers spread across Europe [6]. In the European Union, it is estimated that there are between 4.3 and 5.9 million [6], with, on average, 1.18% estimated to be of Roma or Traveller heritage. However, there is great variation in the distribution of Roma/Travellers, from 0% in Malta, Iceland and Luxembourg to 10.3% in Bulgaria.

1.1 Roma

Background

In recent years, the situation of Roma has increasingly become the focus of political attention for Europe. Roma – Europe's largest minority of about six million people (see Table 2) – are very often the victims of racism, discrimination and social exclusion and live in abject poverty, lacking access to healthcare and decent housing. Many Roma women and children are the victims of violence, exploitation and trafficking, even within their own communities. Many Roma children do not regularly attend school, resulting in poorer education, higher unemployment and lower wages compared to non-Roma when employed. Substantial efforts are required to ensure greater inclusion of the Roma within society [7].

In April 2011, the European Commission issued an EU framework for National Roma Integration Strategies up to 2020. This document set up Roma integration goals in four crucial areas: access to education, employment, healthcare and housing. By 2012, all Member States had submitted reports to the European Commission on their National Roma Integration activities [8].

The EU goal is to reduce the gap in the health status between Roma and the rest of the population. Systematic and integrated approaches across Member States are still lacking. Although access to healthcare is universal in all Member States, in reality not all Roma can access these services to the same extent as the rest of the population. Most Member States aim to improve healthcare access for Roma through outreach activities. Some Member States are trying to reduce health inequalities between the Roma and non-Roma population, involving a range of preventive actions. However, only a few Member States have defined a comprehensive approach to improving the health of Roma.

Several countries have been using or are considering introducing programmes which involve qualified Roma as mediators. The mediators have an important role to improve access to healthcare. However, they cannot succeed on their own and need to work within the framework of the health services. Services must be responsive to the needs of Roma and facilitate access if inequalities in healthcare are to be successfully addressed. A number of Member States have focussed on children's and women's health and the importance of training health professionals to work with people of different socio-cultural backgrounds [8]. Table 1 provides a summary of measures being implemented in Member States.

Table 1. Measures being implemented to improve healthcare for Roma in EU Member States

Measures required by the EU framework	Member States that have addressed them
Endorsement of the general goal	BG, CZ, IE, EL, ES, FR, IT, HU, RO, SI, SK, SE
Concrete goals to reduce the health gap	BG, CZ, IE, EL, ES, FR, IT, HU, RO, SI, SK
General measures relying on existing structures to reduce the health gap	DK, DE, EE, FR, CY, LV, LU, NL, AT, PL, PT, SE
Access to quality healthcare especially for children and women	EE, EL, ES, FR, IT, HU, PL, SK, SE
Additional measures	BE, BG, CZ, EE, ES, HU, PT, RO, SI, SK, FI, SE, UK

Source: European Commission (2012), Communication from the Commission to the European Parliament, the Council, the European economic and social committee and the Committee of the regions. National Roma Integration Strategies: a first step in the implementation of the EU Framework, http://ec.europa.eu/justice/discrimination/files/com2012_226_en.pdf

The size of the overall Roma population in EU/EEA countries is reported to be around six million people on average. The number/proportion of Roma varies greatly between countries, with the greatest proportion and numbers seen in Eastern European countries (Table 2) [6].

Table 2. Estimated Roma population among EU/EEA countries

European countries	Total country population	Official number	Minimum estimate	Maximum estimate	Average estimate	% of total population
RO	22 246 862	535 140 (2002)	1 200 000	2 500 000	1 850 000	8.32%
BG	7 262 675	370 908 (2001)	700 000	800 000	750 000	10.33%
ES	46 157 822	NA	650 000	800 000	725 000	1.57%
HU	9 930 915	190 046 (2001)	400 000	1 000 000	700 000	7.05%
SK	5 455 407	89 920 (2001)	400 000	600 000	500 000	9.17%
FR	64 057 790	NA	300 000	500 000	400 000	0.62%
GR	10 722 816	NA	180 000	350 000	265 000	2.47%
UK	60 943 912	NA	150 000	300 000	225 000	0.37%
CZ	10 220 911	11 718 (2001)	150 000	250 000	200 000	1.96%
IT	59 619 290	NA	110 000	170 000	140 000	0.23%
DE	82 400 996	NA	70 000	140 000	105 000	0.13%
PT	10 676 910	NA	40 000	70 000	55 000	0.52%
SE	9 276 509	NA	35 000	50 000	42 500	0.46%
NL	16 645 313	NA	32 000	48 000	40 000	0.24%
PL	38 500 696	12 731(2002)	15 000	60 000	37 500	0.10%
IE	4 156 119	22 435 (2006)	32 000	43 000	37 500	0.90%
BE	10 414 336	NA	20 000	40 000	30 000	0.29%
AT	8 205 533	NA	20 000	30 000	25 000	0.30%
LV*	2 245 423	8 205 (2000)	13 000	16 000	14 500	0.65%
FI	5 244 749	NA	10 000	12 000	11 000	0.21%
NO	4 644 457	NA	4 500	15 700	10 100	0.22%
SI	2 007 711	3 246 (2002)	7 000	10 000	8 500	0.42%
DK	5 484 723	NA	1 000	10 000	5 500	0.10%
LT	3 565 205	2 571 (2001)	2 000	4 000	3 000	0.08%
CY	792 604	560 (1960)	1 000	1 500	1 250	0.16%
EE	1 307 605	584 (2009)	1 000	1 500	1 250	0.10%
LU	486 006	NA	100	500	300	0.06%
IS	304 367	NA	0	0	0	0.00%
MT	403 532	NA	0	0	0	0.00%
EU area			4 359 100	7 456 500	5 907 800	1.18%

Source: Council of Europe, Roma and Travellers Division (updated: 14/09/2010); available at: http://www.coe.int/t/dg3/romaTravellers/default_en.asp

NA - not available.

* According to information provided by the Central Statistical Bureau, on 1 January 2012 the total Latvian population was 20 417 63, of which 6 515 were Roma. (<http://data.csb.gov.lv/DATABASEEN/iedzoc/Annual%20statistical%20data/04.%20Population/04.%20Population.asp> Table: ISG191. Resident population by ethnicity and statistical region and city at the beginning of the year).

Health status

The health status of Roma has been described in a number of reports and publications by European Agencies, non-governmental organisations and in the scientific literature. In general, this population group experiences poorer health outcomes and reported less access to health services than non-Roma population groups [9]. The health of the Roma people is closely linked to the social determinants of health [10]. Across EU Member States there is evidence that Roma people face barriers in access to healthcare, such as lack of health insurance; lack of official documentation (excluding them from health services); geographic isolation and mobility; insufficient information; language and communication difficulties; direct and indirect discrimination; degrading treatment and human rights violations during the provision of care². The impact of obtaining access to health services is of particular importance to Roma children who require both preventive services and possible rapid access to emergency healthcare.

Objectives

- To provide information on MMR vaccination coverage among the Roma population;
- To describe measles, mumps and rubella outbreaks among Roma in EU countries;
- To describe known barriers to MMR vaccination among Roma population.

Vaccination coverage

Only a few studies were identified in which vaccination coverage among Roma population was calculated. Results from these studies are presented below (Table 3).

Table 3. Vaccination coverage among Roma population groups

Country	Vaccination coverage calculated during outbreak or while conducting surveys	Comments	Reference
BG	MMR first dose 76%	Cross sectional survey to assess vaccination coverage, timeliness of vaccination among Bulgarian and Roma children aged 6–18 months for cohort of children born in 2006 in Sofia region. Vaccination coverage estimated at 76% for all children. Roma infants are immunised later than Bulgarian infants.	[11] (paper in Bulgarian)
GR	2%–12%	Vaccination coverage was estimated in 2003–2005 as part of studies conducted in Greece. A number of vaccination campaigns took place in this population group.	[12]
GR	MMR first and second dose at six years age – 82% and 45% respectively	Survey conducted and estimated vaccination coverage in the Roma community in 2006.	[3]
FR	55% in < 30 years of age	Survey estimated vaccination coverage for MMR vaccination (report published in July 2011).	[3;13]
PL	MMR first dose 56% MMR second dose 37%	During mass immunisation campaign in 2009 following an outbreak of measles in a Roma community settled in Pulawy, Poland, the size of Roma population and vaccination coverage was estimated.	[14]
SI	33% of school-aged Roma children had two doses of MMR vaccine.	Study of preschool (n=436) and school-aged (n=551) Roma children in three regions. Comparison of two generations of Roma children who were preschool and school-aged in 2001. Preschool-aged children had higher vaccination coverage than the school-aged generation.	[15]

Outbreaks of rubella, measles and mumps

Many outbreaks of measles have been reported in EU countries during recent decades. The size of outbreaks varies widely from small clusters to large outbreaks, often extending to the wider community, and not limited to Roma population groups. In 2012, an outbreak of rubella was reported in Romania, and a subsequent rubella outbreak was reported from Spain, linked to the Roma community. There were no mumps outbreaks reported in the literature for this specific population group (Table 4).

² European Roma Rights Centre 2006, Council of Europe and EUMC 2003

Table 4. Reported outbreaks of measles and rubella in EU/EEA countries associated with Roma population group in EU countries in 2004–2011

Country	Year	No. of people affected	Comments	Ref.
Measles				
RO	2004-2007	>8000 cases	Outbreak started among unvaccinated members of Roma and Sinti communities and spread to the general population.	[16]
PT	2005	6 cases	An imported measles case from Romania resulted in an outbreak affecting six children in two Romanian communities living in Portugal.	[17]
GR	2005-2006	171 cases	Of 171 cases, 94 (55%) belonged to Roma families, mostly unvaccinated pre-school children. Outbreak also involved 25 (15%) immigrants (un- or incompletely vaccinated). Of 110 patients with known vaccination status 98 (89%) were unvaccinated for measles and 12 (11%) had had one dose of MMR.	[12]
	2010	126 cases	Cases related to the outbreak in BG. Most cases among the unvaccinated Roma population. Of 106 measles cases with known vaccination status 93 (88%) were reported as unvaccinated.	[24]
IT	2006	124 cases	An outbreak of 17 cases in the Autonomous Province of Bolzano-South Tyrol with 13 Roma/Sinti cases. Another outbreak of nine cases among Roma/Sinti occurred on Sardinia, included four children who had returned from Rome after attending a funeral. None of the Roma/Sinti had been vaccinated against measles. An outbreak involving 98 cases was reported in the Roma/Sinti community in 19 settlements in Rome. At the same time 2 014 cases were reported in the general population. None of the Roma/Sinti cases had been vaccinated against measles and 5.5% of the Italian ethnic population had received one dose of measles-containing vaccine.	[18] [19]
	2007-2008	2 079 cases	Outbreak, which started in the region of Piemonte, spread to other regions. Transmission occurred in the general population, in families, schools, hospitals, anti-vaccination groups and in Roma/Sinti. Importation from UK reported.	[21]
ES	2006	11 cases	The first two cases occurred within the Traveller community living mainly in the UK. In addition, the outbreak involved nine cases in members of the Roma community and the general population.	[20]
BG	2009	957 cases	The outbreak emerged after seven years without indigenous transmission. Index case was reported to be imported from Germany. By the end of week 48 of 2009, 957 measles cases were recorded; 90% were Roma. Measles vaccination status known in 482 cases, of whom 142 (29%) were not vaccinated, 248 (52%) had had one dose, and 91 (19%) two doses of vaccine. For 2009–2010 there were 24 253 cases and 24 deaths, 90% among Roma. (Source: National Centre for Infectious and Parasitic Diseases ,personal communication).	[22]
PL	2009	41 cases	Among 41 cases reported in an outbreak in Pulawy, 35 were in Roma ethnic group. Importation from England reported. Of 32 confirmed cases 28 were unvaccinated; one case had been vaccinated with one dose of measles vaccine.	[23]
	2008-2009	214 cases	In total, 79% of cases in the outbreak belonged to Roma ethnic group. Outbreaks in the non-Roma Polish population had different dynamics compared to those in the Roma population.	[25]
DE	December 2008–June 2009	216 cases, 40 of these among Roma population	From December 2008 to June 2009 a measles outbreak occurred in the Federal State of Hamburg, Germany. The outbreak affected 216 persons. In one of the seven boroughs of Hamburg a local Roma community comprised more than 50% of the notified cases. We compared the age distribution of these cases with cases of citizens who did not belong to the Roma community in a stratified analysis. Infants (0–11 months) comprised 33% of the non-Roma measles cases, while in the Roma community only 4% belonged to this stratum. In the stratum of 5–17 year-olds only 8% were affected among the non-Roma cases, whereas in the Roma community 50% belonged to this age group.	[26, 27]
	2010	30 cases	Measles outbreak among Bulgarian Roma in Bavaria.	[28]
Rubella				
RO	September 2011–January 2012	1 840 cases	Rubella outbreak among adolescents in Salaj, Romania, 1 840 probable and confirmed cases among mainly unvaccinated adolescents. The highest number among 10–14 year olds and 15–19 year olds. Vaccination coverage among the reported cases was low: 38 (2.1%) of the total number of cases were vaccinated with one dose of rubella-containing vaccine. Community outbreak (not specific to Roma population).	[29]

Barriers to MMR vaccination

The barriers to access healthcare for members of the Roma population are well described in a number of studies, including one recently conducted in Bulgaria. This study (published in 2009) conducted 50 in-depth interviews with users, providers and policymakers concerned with child health services in Bulgaria. The study was conducted in two villages, one town of 70 000 inhabitants and the capital, Sofia. The barriers identified are listed in Table 5.

Table 5. Barriers causing low MMR vaccination coverage among Roma population groups

Barriers	Details about study	Findings	Ref
Access to healthcare/specific to Roma population but not specific to vaccination			
Access to healthcare	Most important barriers were poverty, administrative and geographical obstacles, low levels of parental education, lack of accommodation of cultural, linguistic and religious attitudes specific to the population. Inability to access healthcare is one of many problems experienced by the group (poverty, restricted access to education and social exclusion).		[30]
Poor socio-economic status/poverty	Financial barriers experienced by parents of Roma children – formal (official-co-payments) and informal payments, costs of drugs, tests and travel. Difficulties paying for health services, inferior nutrition of infants and young children.		
Geographical isolation/poor housing and sanitary conditions	Poorer health infrastructure in rural areas and lack of healthcare providers (including emergency services) in Roma settlements within large cities. Lack of basic amenities such as running water, electricity and sanitation.		
Low levels of education/language barriers	Limited education of Roma parents seen as major barrier to accessing health services, basic health and hygiene habits, employment and better living conditions. Illiteracy among Roma population is high; 30-40% of young generation cannot read/write/speak Bulgarian well. Low maternal education linked to poor health outcomes in children.		
Administrative barriers	Roma children not registered with family doctor practices, despite being entitled to free access to primary care regardless of the insurance status of their parents. Changes in place of residence and lack of identity documents pose another problem to accessing health services.		
Healthcare reforms	Healthcare reforms related to access have introduced changes which have further disadvantaged the Roma.		
Discrimination	Discriminatory attitudes interfere with the process of seeking and receiving health services and constitute communication barriers between ethnic Bulgarian doctors and Roma patients. Although attitudes may not always be discriminatory, stereotypes and anticipated discrimination have an impact on access to health services.		
Cultural differences	Cultural, linguistic and religious differences can act as barriers to accessing health services. Other cultural barriers were religious beliefs, traditional remedies, early marriage and lower social position of women in Roma communities.		

Discussion

The wider determinants of health (housing, lifestyle, poverty, education, access to services) are interlinked. To achieve high MMR vaccination coverage requires society, policymakers and service providers to address all of these determinants. Ensuring equal rights and opportunities for Roma (including access to preventive services) requires national strategies that are implemented and monitored. During outbreaks, when targeted campaigns are supported by local health authorities, vaccination coverage has improved. Improvements in coverage suggest that there is a willingness to be vaccinated, if the services are made available to this population group. Therefore systematic action is needed before the outbreaks occur. It is vital to identify the population group, ensure access to the appropriate services and monitor vaccination coverage in all jurisdictions.

The EU framework for Roma inclusion has listed approaches to improving health and social well-being for Roma which could be applied in immunisation policies to improve vaccination coverage [7]. Recommendations include setting achievable goals; identifying disadvantaged micro-regions or segregated neighbourhoods, where communities are most deprived and at particular risk; allocating sufficient funding for activities and putting in place appropriate monitoring methods to evaluate the impact of Roma integration actions [7].

It is evident that although substantial work is being done at European and national level to identify and respond to Roma needs, it is important to involve health professionals more actively in such initiatives. Inter-sectoral collaboration at all levels is needed if progress is to be made in this area.

The successful role of Roma health mediators in addressing the health needs of the Roma population has been demonstrated. Health inequalities have decreased and improvements have been made in access to health services in a number of EU countries through the implementation of Roma health mediator projects. Where Roma health mediators work they have helped increase vaccination rates among Roma, helped clients obtain identification and insurance documents, provided health education to Roma children and adults, and improved healthcare provider knowledge and attitudes towards Roma [31].

1.2 Travellers/Gypsies – UK/Ireland

Background

The term ‘Travellers’ or ‘Gypsies’ is used to refer to a group of nomadic, ethnic or social groupings (including Roma).

In the UK and Ireland the term is used to cover the Gypsy/Traveller population (and does not particularly refer to Roma): Scottish Travellers; English Gypsies; Irish Travellers and Welsh Gypsies are usually included in this definition. In addition, Britain also has traveller groups known as New Age Travellers [32]. The estimated overall population in the UK is 0.38% (with some country variation) and in Ireland 0.9% (Table 6).

Table 6. Nomadic population estimates in the UK and Ireland

Country	Size of population	Ref.
Ireland	41 000 (Central Statistical Office (CSO) 2006 and National Traveller Accommodation Consultative Committee (NTACC) 2007.	[33]
Scotland	497 Gypsy/Traveller households living on Council/Registered Social Landlord Sites (population of 1 547) in 2009.	[34]
England	18 720 caravans in 2011	[35]
Wales	774 Gypsy/Traveller trailers in 2009	[36]
Northern Ireland	531 households identified in 2008	[37]

Many Travellers in Ireland and the United Kingdom have a semi-nomadic lifestyle, which is often seasonal, moving from country to country. They are also known to follow work/recreational opportunities across Europe and have been associated with measles outbreak in a number of EU countries in recent years.

1.3 New Age Travellers

The term ‘New Age Travellers’, refers to a group who follow new age or ‘hippie’ beliefs. They are particularly common in the United Kingdom and Ireland and were originally identified as individuals who often travelled between music festivals and fairs in the 1980s and early 1990s in Britain. There are no statistics about New Age Travellers but the number is believed to be small. They tend to live in communities with others who hold similar beliefs. Originally their transport and homes consisted of various forms of mobile transport (vans, lorries, buses, caravans and tents). A small number continue to travel in Britain, and cultural groupings of similar composition have also manifested themselves in other countries, e.g. New Zealand [38]. In Ireland, small numbers of New Age Travellers have settled in rural areas (most notably in the south west of Ireland) where they have become more integrated into the community, although they continue to lead less conventional lifestyles than the rest of the population (personal communication HSE South).

1.4 Irish Travellers

Irish Travellers are a distinct ethnic minority population group, who are most commonly found in Ireland and the United Kingdom. Irish Travellers share a similar lifestyle, culture and values, whether based in Ireland, the United Kingdom or elsewhere in Europe.

In Ireland, under the Equal Status Act (Government of Ireland 2002) Travellers are defined as follows: ‘The traveller community means the community of people who are commonly called Travellers and who are identified (both by themselves and others) as people with a shared history, culture and traditions, including, historically a nomadic way of life on the island of Ireland.’ This is the same definition as that which appears in the Race Relations Order of Northern Ireland (UK Parliament, 1997)³.

Until recent decades, Irish Travellers had a distinct nomadic lifestyle which set them apart from the general, settled population in both Ireland and the United Kingdom. Many from this community have now settled in more permanent or semi-permanent accommodation. However, semi-permanent accommodation is often inadequate and lacking in basic hygienic facilities. Many Irish Travellers continue to have a semi-nomadic lifestyle, most often during holidays and summer months when they travel to relatives. Additionally, some Travellers will follow temporary work opportunities, moving with extended family groups across European countries.

Discrimination and hostility from the settled community and service providers leads to low social status and exclusion for Travellers (similar to that reported for Roma in previous section). Despite a lack of recognition of the value of the Traveller culture from outside the Traveller community it is recognised that there are many positive aspects associated with the Traveller culture, including their social cohesiveness linked to strong social support networks, family ties and kinship, community participation and cross-generational response, all of which are hallmarks of traditional Traveller culture [39].

³ <http://www.legislation.gov.uk/nisi/1997/869/contents/made>

Health status

Information on inequalities and health status of Travellers comes mainly from Ireland and the United Kingdom where the majority reside.

In 2010, the All Ireland Traveller Health study was published. This report was the result of an all-island study, funded by the Irish and Northern Irish governments, supported by local health services and carried out by researchers from University College Dublin with Travellers and Traveller organisations [40].

The study reported health inequalities and difficulties accessing health services and findings were similar to those in the UK Equality and Human Rights Commission study of 2009 [41]. This population group experience wide-ranging inequalities and discrimination in all areas of life – accommodation, education, access to health and social services and labour – and were recognised as one of the most deprived population groups in these countries.

‘One core theme which arises across all topics is the pervasive and corrosive impact of experiencing racism and discrimination throughout an entire lifespan and in employment, social and public contexts’ [41].

The socio-economic situation of the Travellers and Gypsies is affected by low employment, low educational attainment and overall lack of recognition of this population group in the general community.

- Children’s educational achievements are below those of the general population.
- Secondary school attendance was extremely low: discrimination and abusive behaviour on the part of school staff and other students are frequently cited as reasons for children and young people leaving education at an early age.
- Lack of access to pre-school, extra-curricular activities and leisure services for children and young people.
- Employment rates were low and poverty high.
- There was an increasing problem of substance abuse among unemployed and disaffected young people.
- Gypsies’ and Travellers’ culture and identity receive little or no recognition, with consequent and considerable damage to their self-esteem [42].

The key findings from the studies with particular reference to health are:

- Travellers have poorer health, yet are less likely to receive effective, continuous healthcare.
- Life expectancy for Gypsy and Travellers is substantially lower than the national average.
- Traveller and Gypsy mothers are 20 times more likely to experience the death of a child than the rest of the population [42].

These findings are similar to other studies of ethnic minority population groups in Europe.

Objectives

- To provide information on MMR vaccination coverage among Travellers;
- To describe measles, mumps and rubella outbreaks among Travellers;
- To describe known barriers for MMR vaccination among Travellers.

Vaccination coverage

Almost all parents (96.1% in the Republic of Ireland (ROI) and 93.4% in Northern Ireland (NI)) reported that their children receive vaccinations (‘receiving needles’). Nevertheless, outbreaks in the Traveller community (Ireland, measles outbreaks 2009–2010, UK measles outbreak 2007) indicated that there are pockets of individuals within the community who are under- or unvaccinated. When questioned about vaccination status, the majority of parents were unaware whether their child was fully immunised. Moreover, no vaccination records could be located from family doctors or local immunisation information systems (personal communication to HPSC from HSE areas investigating cases). Many of these parents were not aware what vaccines their children had received. (For more information see Table 7).

Table 7. Vaccination coverage among Irish Travellers

Country	Vaccination coverage identified during an outbreak in a specific population setting	Comments	Reference
Vaccination coverage estimated during outbreak			
IE	Irish Travellers with spread into local community. Nearly two-thirds of cases (n=206) were unvaccinated.	320 cases notified between August 2009 and March 2010. Many cases were linked to the Traveller community (local reports). Ethnicity information is not routinely collected as part of notification data.	[43]
NO	Irish Travellers None were vaccinated.	June 2009, 15 cases were reported. Age range seven months–adults.	[44]
UK	Irish Travellers None were vaccinated.	Measles outbreak in Irish Traveller group attending a funeral (May 2007); 21 confirmed cases among attendees of a funeral in London; 173 outbreak-associated cases from seven regions throughout England identified; 156 cases in Irish Travellers and 17 epidemiologically-linked to cases in that community. Median age of cases was 7.5 years (range two months to 32 years).	[45]

Outbreaks of rubella, measles and mumps

Some measles clusters or outbreaks have been described in the scientific literature related to the Traveller community. A measles cluster reported from Slovenia also involved healthcare workers. No outbreaks of rubella or mumps were described in this specific population group. Reported outbreaks are presented in Table 8.

Table 8. Reported outbreaks of measles in EU/EEA associated with Travellers in EU countries, 2006–10

Country	Year	No. of people affected	Comments	Ref.
Measles				
SI	March 2010	Three (index Irish Travellers), transmission to healthcare workers and a visitor to ward while index case was on ward	Healthcare worker caring for index case. Self-reported as vaccinated once. Allowed to care for Patient 1. Wore a mask. Tested for immunity to measles was IgG-negative, not excluded from work. Became symptomatic and lab confirmed, then excluded.	[46]
UK	March 2006	Three measles cases in Irish Traveller community	A 13 year-old boy from a Travellers' site admitted to hospital. Subsequently died. Two brothers, also ill at site. All non-vaccinated. Not registered with a family doctor, new arrivals in camp. Community concerns regarding safety of MMR vaccine, and need for second dose. Some thought that only one dose needed.	[47]
IE	August 2009	320 cases	Many cases were linked to the Traveller community (anecdotal reports). Ethnicity information is not routinely collected as part of notification data.	[43]
NO	June 2009	15 cases	Age range seven months – adults.	[44]

Barriers to MMR vaccination

Based on data from a recent VENICE survey (2010) among the six countries (Greece, France, Ireland, Italy, Netherlands, United Kingdom) that reported on nomadic groups, the size of ethnic minority groups was often unknown, attributed in part to the nomadic lifestyle of many individuals in these groups (making enumeration difficult); some nomadic groups refrain from vaccination even though the entitlement and access to vaccination services was reported to be easily available; in these countries MMR vaccination was provided by the national health services and was free for the majority of individuals. Results are presented in Table 9.

Table 9. Barriers to MMR vaccination among ethnic minority population groups (Roma, Travellers)

VENICE survey – data sought	Known/exist/yes	Unknown/do not exist/no
The size of ethnic minority population groups in the countries	IE: Roma ~ 4 000 (not known exactly) (< 0.1 population), Irish Travellers 22 000 (~0.6% population). IT: Roma/Sinti ~ 130 000.	FR, GR, NL, UK
Refuse vaccination	GR, UK, IT, IE (some of them)	FR, NL
Official vaccination coverage data for ethnic minority population groups at national, sub national level	FR, GR have this information from conducted surveys	IE, NL, UK, IT do not collect this information
Special strategy on how to reach ethnic minority population groups	GR, IE, UK	NL, IT
Location of ethnic minority population groups in specific regions or sub-regions in the country	GR, IT, IE	FR, UK, NL
School attendance by children of ethnic minority population groups	Some of them: FR, GR, IE, UK	NL
Accessibility to MMR vaccination services of ethnic minority population groups	Easily accessible for some of them: GR, IE, UK, IT	NL
MMR vaccination funding for ethnic minority population groups	MMR vaccination is funded by the state in all six countries covered by the study: GR, FR, IE, IT, NL and UK.	
Entitlement to healthcare services for ethnic minority population groups	Members of these communities entitled to health services in GR,IE,NL,UK countries (in IT some of them)	
Average living standard of ethnic minority population groups in comparison to average population	Lower: GR, IE, UK, IT	NL
Level of education of ethnic minority population groups in comparison to average population	Lower: GR, IE, UK, IT	NL
Specific information materials targeted for ethnic minority population groups	IE, UK	NL, IT, GR
Communication campaigns targeted for ethnic minority population groups	UK	NL, IE, GR, IT
Special clinical staff trained to work with ethnic minority	GR, IE, UK, IT	NL
Special vaccination clinics in ethnic minority population groups organised recently (4–5 years)	GR, IE, UK, IT	NL

Source: VENICE MMR survey results, 2010.

Discussion

Ethnic minority population groups (Gypsies and Travellers) have been disproportionately affected by measles outbreaks in recent years (Ireland, UK, Norway, Slovenia). Such outbreaks are directly linked to low MMR vaccination coverage within these groups and have not only disproportionately affected their own communities, spreading rapidly among non-vaccinated individuals of all ages, but have also spread into the wider community.

In many countries it is evident that racism and discrimination are key factors hindering equal access to public programmes and services and need to be addressed. Although countries have anti-racism and anti-discrimination legislation, it is vital to ensure that this translates into equal access in everyday life. (Reference: Ireland and UK [39,41]) and European Agency for Fundamental Rights [5, 56]. In all EU countries it is evident that there is a lack of data on vaccination coverage among Gypsies and Travellers as this information is not routinely collected at the time of registration or when accessing vaccination services. Consequently, most countries are unable to accurately estimate coverage among these populations. Moreover, there is little evidence that surveys or investigations are routinely carried out when outbreaks occur. As a result, the extent of under-vaccination among these population groups is poorly described [42].

Public health sector agencies and services should undertake specific activities to monitor the impact of their policies on these population groups; assess user satisfaction with the services; look at cultural, linguistic, and geographical accessibility and review knowledge and understanding of what is on offer.

Performance indicators of service provision should be monitored (improvements in access to healthcare and MMR vaccination coverage and decrease in vaccine-preventable disease). Only then will it be possible to ascertain if the design of services is suitable to meet their different needs.

Provision of services should be adjusted to the cultural norms of the ethnic minority population groups. Training is required on cultural issues related to the Traveller community to ensure that services appropriate to the community for whom they are intended. Health services which are attuned to the knowledge, attitudes and behaviour of a community are more likely to provide a welcoming or culturally appropriate service.

Engagement with these communities is needed to improve vaccination coverage. In recent years there has been increasing community mobilisation and strong leaders have emerged from many of the Traveller communities. Some of these have attained prominent positions within the wider community (for instance, as mayors and county councillors in some countries). Such individuals can be particularly influential in highlighting the need for the wider community to work together to address problems for the benefit of all.

1.5 Migrants (immigrants)

Background

The [UN Convention on the Rights of Migrants](#)⁴ defines a migrant worker as a 'person who is to be engaged, is engaged or has been engaged in a remunerated activity in a State of which he or she is not a national'. The term 'migrant' includes individuals whose decision to migrate is one of choice, for reasons of 'personal convenience' and without the intervention of an external compelling factor. More detailed classification specifies these groups of migrants: international; temporary labour; highly-skilled and business; irregular migrants (undocumented/illegal); forced migration (refugees and asylum seekers) [48,49].

According to EUROSTAT data in 2010, there were 32.5 million foreigners in the European Union (6.5% of the total population); 20.2 million were citizens of non-EU countries and 12.3 million were citizens of another EU country. More than 75% of the foreigners in the EU resided in five Member States: Germany, Spain, the United Kingdom, Italy and France. Citizens of Turkey and Romania were the most numerous among foreigners in the EU (over two million from each country). Among the other EU nationals living as migrants, Polish and Italian nationals were second and third, each with more than one million citizens living in another Member State. Among the non-EU foreigners, citizens of Morocco and Albania were most numerous, followed by those of Turkey [50].

Health status

There are a number of initiatives to improve the socio-economic and health status of migrants in the EU:

- European Parliament and Council decision establishing a 'second programme of community action in the field of health 2008–2013' (issued in 2007)⁵
- Commission implementing decision – work plan for 2012 (issued in 2011) which specifies the need to improve access to and appropriateness of healthcare services, health promotion and prevention to meet the needs of migrants, Roma and other ethnic minority population groups, including irregular/illegal migrants [51,52].

⁴ http://www.unesco.org/most/migration/mwc_toc.htm

⁵ <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2007:301:0003:0013:EN:PDF>

In 2009, ECDC conducted an analysis of migrant health status in the European Union. This study found a lack of comprehensive information in most EU countries in relation to infectious diseases and migration. The prevalence of some infectious diseases was higher in some countries than others. Limited access to healthcare for migrants was recognised as a critical factor for the differences in incidence of infectious diseases. Access and vaccination coverage of services was influenced by policies, laws and regulations governing service delivery which was also affected by the characteristics of migrant communities and wider social attitudes. Legal status, lack of residential rights and health insurance were identified as barriers to accessing healthcare. Additional barriers were lack of culturally sensitive information in the community languages and a lack of suitably trained professionals and services tailored to the specific needs of migrants. Migrant communities do not use services due to cultural and/or religious beliefs about health, disease prevention and healthcare and because they have limited knowledge of the services available. Furthermore, overcrowded living conditions are recognised as increasing the risk of infectious disease transmission [53].

For this study we sought information on migration and access to vaccination services on the ECDC EPIS VPD e-forum. Information was provided by the EpiSouth project – a European project to create a framework of collaboration on epidemiological issues with a view to improving communicable disease surveillance, communication and training in the countries of the Mediterranean and the Balkans⁶. EpiSouth shared information obtained in 2008 when a study identified the following issues related to health and vaccination: lack of uniform appropriate definitions in the process of data collection; lack of data monitoring related to migrant populations; insufficient information regarding legal/illegal migrants and Roma population and lack of trained public health/social workers [54,55].

A recent report published by the Platform for International Cooperation on Undocumented Migrants (PICUM) (co-funded by the European Commission) reviewed access to healthcare for undocumented migrants in 11 EU Member States. The report notes that most countries have ratified international instruments for human rights law (including the right of everyone to healthcare as a basic human right) but have failed to fully implement the obligations associated with the legal framework. Undocumented migrants' entitlements to healthcare are not always uniformly implemented by regional and local authorities [56,57].

Objectives

- To provide information on MMR vaccination coverage among migrants
- To describe measles, mumps and rubella outbreaks among migrants in EU countries
- To describe known barriers to MMR vaccination among migrants.

Vaccination coverage

Countries do not routinely collect MMR vaccination coverage data for migrants. Vaccination coverage data from this specific population group might be available in outbreak settings or from data collected in studies (Table 10).

Table 10. Vaccination coverage among migrants in EU/EEA countries

Country	Vaccination coverage	Comments	Reference
Vaccination status identified during outbreaks			
UK (originating from PL)	Case in six-year-old girl (born in Poland), arrived in UK aged four years. Only one dose of MMR.	Registered with family doctor as up-to-date (correct for Polish schedule but not for UK schedule). Had not received pre-school MMR booster dose. Paper published in 2009.	[58]
NO	The majority of cases in a mainly unvaccinated immigrant community.	January–February 2011. Index case was an unvaccinated two-year-old child from the Somali immigrant population. Ten cases of measles were reported in Oslo. Two cases were identified outside the immigrant community, in Norwegian children.	[59]
Vaccination coverage estimated conducting studies			
ES	MMR dose coverage for first vaccination among indigenous children was 98.95%; among immigrants 93.33%; OR 6.7 (1.8-24.5) $p = 0.01$.	A retrospective cross-sectional descriptive study was carried out by stratified random probabilistic sampling of children born in October 2001 and registered as resident in Catalan municipalities. Vaccination in a sample of children < three years of age, Catalonia (Spain) ($n=630$). Primary vaccination (three doses of DTP, three doses of OPV, one dose of MMR, Hib and Men C according to age) coverage was 96.5% (indigenous), and 85% (immigrant children) ($p = 0.0001$). Vaccination coverage for primary vaccination plus booster doses was 88.6% (indigenous) and 78.3% (immigrant) ($p = 0.02$). Vaccination coverage for routine vaccines was higher in immigrant children from South America (83.3%) and Oceania (75%) than in those from Europe (68.4%) and Africa (64%).	[60]

⁶ <http://www.episouth.org/>

Outbreaks of rubella, measles and mumps in migrants

Data from the literature review identified outbreaks of measles occurring in Spain and Poland among immigrants during the last decade. In addition, two outbreaks of rubella were also reported in Spain among individuals born in South American countries. No mumps outbreaks specifically related to immigrants were reported in EU countries for the same period (Table 11).

Table 11. Reported outbreaks of measles and rubella associated with migrant population groups in EU countries, 2003–2007

Country	Year	No. of people affected	Comments	Reference
Measles				
PL	2003	48 cases	In Poland, 48 measles cases were registered in 2003 (0.13 per 100 000 population) of which 65% were cases imported from Chechnya and Afghanistan. Measles outbreaks occurred in three centres for immigrants. In total, 31 cases; 96.8% unvaccinated; 93.5% < 15 years of age.	[61]
ES	2006–2007	39 (10.2%) cases immigrants	Large community (n=381) outbreak Catalonia, Spain; highest incidence children < 15 months of age	[62]
Rubella				
ES	February 2003	19 cases identified	Rubella outbreak in Spain ex Latin America; 14 (73.7%) cases were women of childbearing age; mean age 25.1 years; mean length of residence in Spain was 41 months. Ecuador was country of origin for 11 cases (58%); other patients were born in Argentina, Colombia and the Dominican Republic.	[63]
ES	2005	431 suspected cases of rubella were notified to regional health authorities.	Madrid. Young adults of Latin American origin made up a high proportion of cases. Most cases were between 20 and 29 years of age; 251 (58%) were of foreign, mainly Latin American, origin.	[64,65]

Barriers to MMR vaccination

The barriers identified in the literature search are presented in Table 12. Several studies indicated that the vaccination rate is lower among migrants or foreign born residents than among the indigenous population.

Table 12. Barriers for low MMR vaccination coverage among migrants

Barriers	Details of study	Findings	Reference
Vaccination rates lower among foreign-born children (DE)	German health interview and examination survey for children and adolescents 2003–2006 (KiGGS)	Measles vaccination coverage was low among children < 3 years, having > or =3 siblings and in foreign-born migrants. Vaccination coverage strongly related to place of birth: for foreign-born children the odds of being unvaccinated were three times higher. The odds were also higher for children living in former West Germany, having > or =3 siblings. They were particularly high for children whose parents had concerns about vaccination.	[66]
Higher rate of measles hospitalisation among immigrants (FR, 2009)	A comparison of hospitalisation rates for common diseases between immigrants and beneficiaries of the general health service scheme under 60 years of age with (4.5 million) or without complementary universal health insurance (CMUC) (34.1 million). Data derived from French national health insurance reimbursements and short-stay hospital discharge databases.	Higher rate of hospitalisation among immigrants for measles (2.7/1000, RR = 5.0).	[67]
Sero-epidemiology of measles-specific IgG antibodies (DE)	German health interview and examination survey for children and adolescents 2003–2006 (KiGGS)	A higher level of susceptibility was observed if parents did not comply with requests to present child's vaccination card. In vaccinated children, immigration, male gender, very young age at first vaccination and a longer time period since last vaccination were associated with a higher level of susceptibility.	[65,68]
Vaccination rates (NL)	Study population – children living in a multicultural population in Amsterdam (2003); 57 382 children (aged 5–12 years), vaccination and socio-demographic data collected routinely by Department of Child Healthcare.	Foreign children who had been born abroad (e.g. Surinam, Morocco, Turkey) were most likely not to have been fully vaccinated.	[69]

Discussion

Outbreaks of measles and rubella in some EU countries have been linked to low or sub-optimal protection in migrant populations, often with the outbreaks commencing in the migrant community before spreading to the wider population. These outbreaks of measles and rubella infection are evidence that MMR vaccination programmes do not reach all of those targeted by the vaccine, irrespective of country of origin.

National MMR vaccination coverage rates vary across the EU. However there is very little data on vaccination coverage among migrants or other specific population groups as these data are not collected or monitored in EU/EEA countries. Only a few available studies suggest that MMR vaccination coverage, along with vaccination coverage for other childhood vaccines, is lower than among indigenous populations [53].

Experience from some countries indicates that there are challenges in reaching migrants with routine vaccination services, because they are either unaware of these services due to linguistic difficulties or are unwilling to use them for cultural, religious or other reasons. The communication campaign offering MMR vaccine at local level, supported by the identification, training and use of key individuals from the migrant community who informed and motivated immigrants to get vaccinated, was a successful intervention to increase vaccination coverage in this population group [70].

2. Religious groups

Background

There are various population groups that refuse vaccination based on religious beliefs worldwide (e.g. Amish in USA, Muslim groups in Nigeria). The following section describes the population groups that resist vaccination in three EU countries where outbreaks of measles, mumps or rubella have been reported: Orthodox Protestant communities in the Netherlands, the Jewish community in Antwerp, Belgium and London, UK (Table 13).

Table 13. Estimated size of religious population groups (selected EU countries)

Religious population group	Size of population	Ref.
Orthodox Protestant communities in the Netherlands	Around 250 000 (1.5% of total Dutch population)	[71,72]
Jewish community in Antwerp, Belgium	Around 15 000	[73]
Jewish community in London, UK	Approximately 20 000	[74]

2.1 Orthodox Protestant communities in the Netherlands

In the Netherlands the Orthodox Protestants (*bevindelijk gereformeerden* in Dutch) constitute a minority that has religious objections to vaccination. Within the Orthodox Protestant minority there are many subgroups (denominations) with their own specific interpretation of the confession. Some Orthodox Protestants object to vaccination because health and disease are sent by God and man should not interfere with divine providence, while others accept vaccination as a gift of God that may be used in trust. The Orthodox Protestant churches leave the final decision on vaccination to their individual members. There are large differences in vaccination coverage among the various Orthodox Protestant denominations, ranging from less than 25% to more than 85% [78,79].

The majority of the Orthodox Protestants live in an area which stretches from the south-west to the northeast of the Netherlands, the so-called Bible Belt. They form a coherent group with their own schools and usually have large families [71,72].

The Church plays a central role in the life of the community and they typically oppose the liberal ways of Dutch life, such as euthanasia, gay rights, abortion, etc. In Bible Belt communities, a strong religious philosophy is accompanied by a conservative outlook, preference for large families and an emphasis on traditional values. Recent outbreaks of vaccine-preventable disease have drawn attention to under-vaccination in this community [71].

2.2 Orthodox Jewish communities

Similar to other culturally closed communities, such as Roma and Irish Travellers, Orthodox Jewish communities have also been identified as hard to reach in Europe where uptake of preventive health programmes has traditionally been low. Lower vaccination coverage rates have been found in this group which contributed to the measles outbreak. Although members of the Jewish community who follow traditional or Orthodox practices are found throughout Europe, certain countries and cities have larger communities than others, notably, Antwerp and London. In both cities members of the Jewish Orthodox community have experienced measles outbreaks in recent years as a result of low MMR vaccination rates. Further detail is provided in the following sections.

2.3 Jewish community in Antwerp, Belgium

The current Jewish community of Antwerp was officially established in 1816, when there were about one hundred Jews living in the city. The community now numbers approximately 15 000 members. The majority of residents identifying themselves as Jewish belong to traditional or Orthodox communities, although levels of practice vary. The Haredi, or Ultra-Orthodox Jews, tend to live in the city centre in an area referred to as 'Jewish Antwerp' (Dutch: Joods Antwerpen). This area is close to the diamond exchange, where historically many of the community worked. Jewish schools, kosher food outlets, and general Jewish amenities are also located here [73].

In recent years many from this community (notably younger and more secular Jews) have moved away from the city centre area. There are now Orthodox satellite communities in the Antwerp suburbs. After New York, London and Paris, Antwerp is one of the largest communities of Haredi Jews outside Israel.

The religious community is represented by two religious councils, known as kehillas:

- The Israëlitische Gemeente van Antwerpen *Shomre Hadass*; primarily oriented toward the Modern Orthodox community.
- The *Orthodoxe Israëlitische Gemeente Machsike Hadass* representing the Ultra-Orthodox Haredi community (73).

Most Jewish children in Antwerp attend Jewish schools and receive a religious education. These schools provide instruction in religious as well as secular studies (according to the Belgian Ministry of Education) and care for children from pre-school/kindergarten to secondary-school age.

There are additional schools of religious education where married men can continue their studies. These schools frequently attract students from around the world.

Community activities and social support activities are provided through synagogues, schools, charities and social groups.

Most members of the Jewish community living in Antwerp are multilingual and Yiddish, French, Hebrew, English, Dutch and German are widely spoken [73].

2.4 Jewish community in Hackney, London, UK

The Jewish community in the United Kingdom is predominantly centred in large urban areas, most notably London. In 2001 (census) 5.3% (about 10 000) of the residents in Hackney (north east London) identified themselves as Jewish. However, local estimates have suggested there are probably twice as many. The Orthodox Jewish community in north east London is the largest such community in Europe [74,75].

The Orthodox Jewish (Charedi) community in this area can trace its origins back to immigrants from Eastern Europe who arrived in London's East End in the late 19th Century and early 20th century. This community was driven from their birth countries by persecution and economic hardship. Many came from Eastern and Central Europe prior to and after the Second World War. The community was later enlarged when refugees and migrants from a range of non-European geographical locations came to join them (Indian sub-continent, North Africa, the former Soviet Union, Aden, Israel and more recently the Yemen).

The common denominator for this Orthodox Jewish community is strict adherence to the main tenets of Judaism. This includes strict observance of the Jewish Sabbath and Jewish festivals; special dietary laws; fixed daily times for prayer; and observance of numerous other Judaic laws pertaining to various aspects of daily life.

The life of this community is centred on the family and the preservation of Jewish laws and values. To preserve these customs the community has set up its own network of organisations, homes for the elderly and vulnerable, kosher food outlets, synagogues, social welfare organisations, special housing projects, places of study and independent faith schools.

Geographically, the community is clustered around specific sub-districts in the north east of Hackney. As they are prohibited to use any vehicular mode of transport on the Sabbath and Jewish holidays, such proximity is necessary if they are to attend synagogue, which must be within walking distance.

The community has only assimilated into society to a limited extent. Like the Jewish community in Antwerp there is gender separation in educational facilities from a young age. The language spoken varies but Yiddish, Hebrew or Arabic may often be the first language. There is limited access to mainstream media such as television, daily newspapers and the Internet, which is considered to be secular [74].

The majority of the community are in receipt of supplementary benefit from the government (55%) reflecting their relative poverty level. The schools of the community are not state maintained but are supported by the community and parents.

The education provided in these schools is considered to be of high religious value but does not necessarily provide students with the skills needed for further vocational or professional education, meaning that employment opportunities may be limited. Similarly, limited English may make it difficult to find employment, the result of which may be disproportionate poverty within this community [74].

2.5 Other religious groups

There is little published information to indicate that other religious groups in Europe are under-vaccinated. However, as information on religious belief or affiliation is not routinely collected during most outbreak investigations or routinely as part of immunisation information system core data requirements, it is unknown whether other religious groups also have lower levels of vaccination. Knowledge of the community and its beliefs and values is probably best understood at local level, particularly if members of the community work within the healthcare system.

Health status

There is little published information available on the overall health status of these religious groups. One outbreak (see below) caused a large number of cases among students at a traditional Catholic school in France. The exact reasons for non-vaccination were not specifically explored, although at the local level this information may be known. From the literature it is recognised that health status is strongly influenced by socio-economic status, access to health services and health knowledge and literacy. However, it is known that some of these communities may be at increased risk of infectious disease outbreaks due to low immunisation or poorer living conditions (e.g. polio outbreak in Canada originating from the Netherlands, measles outbreak in Israel and Belgium originating from UK.)

A number of studies have been published on the Orthodox Jewish community and risks of outbreaks identified including low vaccination coverage (not always due to ideological beliefs), large family size, close proximity and intermingling within the community (76). A recent study from Israel found that among a community of Orthodox

Jewish families large family size (> six children), a lower level of maternal education, parental religious beliefs against vaccination, perceived risk of vaccine-preventable diseases as low, and mistrust in the Ministry of Health were associated with low vaccination rates [77,78].

Objectives

- To provide information on MMR vaccination coverage among religious groups;
- To describe measles, mumps and rubella outbreaks among religious groups;
- To describe known barriers for MMR vaccination among religious groups.

Vaccination coverage

Countries do not collect MMR vaccination coverage data among religious subgroups on a routine basis. In some countries this is considered to be sensitive individual data that cannot be collected. Most often vaccination coverage data are available from outbreak settings. Some data may also be available from data collected at municipality level [75] or specific studies [79,80] The data published in the scientific literature suggests that MMR vaccination coverage among religious groups varies greatly, however it is usually low (Table 14).

Table 14. Vaccination coverage among religious groups

Country	Vaccination coverage	Comments	Reference
Vaccination coverage estimated during outbreak			
NL	7%	Measles outbreak in NL in 1999–2000 started from an outbreak in an Orthodox reformed elementary school; vaccination coverage reflects low uptake in this school.	[81]
BE	22% measles cases vaccinated with one dose of MMR vaccine (parental report) but vaccination coverage 15% when data validated.	Measles outbreak in Antwerp, BE 2007–2008 among Jewish Orthodox community; Information gathered from 128 (of 137) measles cases reflects affected community; vaccination coverage low.	[82]
UK	13%	97 cases Orthodox Jewish community in Salford notified with measles since November 1999. Vaccination coverage MMR vaccine at two years of age was 70–85%, below 88% average for district/UK. Only 13% (8/61) notified cases with immunisation histories available had received MMR vaccine.	[83]
Vaccination coverage estimated conducting studies			
UK	46%	MMR coverage in London City and Hackney by ethnic group, 2002	[75]
UK	MMR1 67% MMR2 86%	Mumps outbreak in London, UK 1998–1999, Orthodox Jewish community.	[84]
NL	MMR vaccination coverage 44% among nine-year-olds in a village in 2007. Study findings on vaccination coverage in Orthodox Protestant schools: School A: MMR1 & MMR2 – 6%; School B: MMR1 – 9%; MMR2: - 5%.	The study assessed the roles of elementary schools in the spread of mumps among unvaccinated children in a village with a low vaccination coverage due to religious objections.	[79]

Outbreaks of rubella, measles and mumps

Outbreaks of all three infections – measles, rubella and mumps – were reported in the last few decades in some EU countries (UK, BE, NL) affecting hundreds or thousands of people and sometimes causing death or leading to congenital rubella syndrome in new-borns (Table 15).

Table 15. Reported outbreaks of measles, rubella and mumps associated with religious population groups in EU countries, 1999–2010

Country	Year	No of people affected	Comments	Ref
Measles				
NL (Bible Belt)	1999–2000	3 292 cases	94% not vaccinated; 83% reported religious or fundamental objections to vaccination; 3 measles deaths recorded; 16% had measles complications;	[85]
BE (Orthodox Jewish communities, Antwerp)	2007–2008	137 cases	Vaccination coverage among this community was unknown; index cases attended summer camp in UK; later two Jewish schools affected in BE by outbreak; 81% of cases younger than 10 years	[82]
UK (Orthodox Jewish, south east London)	2007	187 cases	Members of Orthodox Jewish community were involved	[75,86,86-88]
UK (Orthodox Jewish, Salford)	1999	97 cases	Outbreak with 97 cases from Orthodox Jewish community in Salford	[83]
FR (Traditional Catholic) (Bourgogne, Nord-Pas-de Calais)	Spring 2008	More than 550 cases notified in 2008 Bourgogne - Girls' school 43 cases identified among 147 girls (AR 29%) Nord-Pas-de-Calais - Boys' school nine cases among 154 boys AR 6% (9/154)	Among students (and families/contacts) attending one of two traditionalist Catholic private schools – low vaccination coverage identified retrospectively. Girls' school – 40% for first dose, 26% for second dose MMR. Boys' school 65% for first dose, 44% for second dose. Many parents declined vaccinating their other children due to personal beliefs and did not consult a general practitioner when additional cases occurred in their household.	[89]
FR (Traditional Catholic, then spread)	2008–2010	4 753 cases (30 June 2010): 604 cases in 2008, 1 544 in 2009 and 2 605 in the first half of 2010	Outbreak started early spring 2008 among students attending traditionalist Catholic private schools (above). Spread to other schools including state schools. By end of 2008 had spread into general population. Outbreak also affected socially vulnerable communities, nomadic minorities ('gens du voyage') and Roma.	[90]
Mumps				
NL (Bible Belt)	2008	89 cases	Cases mainly among community with low vaccination coverage in the Bible Belt. Cluster in south involved members of anthroposophic community. Of 87 cases for whom vaccination status was known 67% were unvaccinated.	[91]
UK (Orthodox Jewish, London)	1998–1999	144 cases	Cases among members of Jewish community, London. Half of all cases not immunised. Links to Belgium and Israel and possible importation.	[84]
Rubella				
NL (Bible Belt)	2004–2005	309 laboratory confirmed cases;	Outbreak started among members of religious community in NL and spread to Canadian Christian community where 214 confirmed cases reported.	[92]
NL (Orthodox Christian)	2004–2005	Rubella outbreak in NL led to cases of congenital rubella syndrome.	During the outbreak, 29 women were infected with rubella virus during pregnancy. None were vaccinated; all belonged to the Orthodox religious community. 16 children were born from these pregnancies; one pregnancy ended in intrauterine death.	[93]

Barriers to MMR vaccination

The barriers identified while conducting the literature review and the VENICE MMR survey are presented in Tables 16 and 17. Data in Table 17 represents the response from the Netherlands.

Table 16. Barriers to MMR vaccination among religious groups

Barriers	Details about study	Findings	Ref
Barriers identified during outbreak			
Religious beliefs – Orthodox Protestant as reason for non-vaccination	Information on reasons for non-vaccination collected during mumps outbreak, 2008 in NL among an unvaccinated religious subgroup (anthroposophic community was also involved in this outbreak).	92% of respondents (36/39) clearly stated that the main reason for non-vaccination was religion	[91]
	Outbreak in NL 1999–2000	83% respondents reported religious or fundamental objections to vaccination	[85]
No religious reasons for opposition to vaccination/ reasons for non-vaccination	Measles outbreak in Antwerp, BE 2007–2008 among Jewish Orthodox community. Information from 128 (of 137) measles cases; reasons for non-vaccination collected; ~ 500 non- vaccinated children were vaccinated in schools in response to the outbreak.	Reasons for non-vaccination: 38% on advice of doctor; 26% by omission; 23% fear of side effects, allergy or frequent disease in childhood; 13% opposition to vaccination; 56% non-vaccinated eligible cases were patients of one family doctor (known opponent of vaccination). None mentioned religious beliefs as a reason for non-vaccination.	[82]
Barriers identified in specific studies			
Rumours, incorrect information about MMR	Qualitative interviews with 25 Orthodox Jewish mothers and ten local healthcare workers assessing reasons for low vaccination coverage among Orthodox Jewish families in the North East London, UK.	Low rates of immunisation in this community were not perceived to be due to practical difficulties associated with large families or intensive cultural practices of healthcare providers. Community relatively insulated from direct media influence, word of mouth is a source of rumours and misinformation. Additive influence was religious fatalism, concern about potential for harm from outside influence. Range of views evident. Changes in attitudes over time evident, influenced by circulating information at time of vaccination.	[75]
Educational concept	The study assessed roles of four elementary schools (two of them Orthodox protestant schools) in the spread of mumps among unvaccinated children in a village with a low vaccination coverage due to religious objections - conducted in NL in 2007–2008.	Mumps attack rates among unvaccinated children were higher for children attending Orthodox Protestant schools (School A and B) than in other schools (Schools C and D): 75% and 72% (School A and B) versus 32% and 0% (Schools C and D). Household size independently influenced the risk of getting mumps for unvaccinated children from large households (>3 children) versus unvaccinated children from small household (Hazard ratio 1.44; 95%CI 1.16-1.79);	[79]
Vaccination behaviour	A 2007–2008 measles outbreak in Antwerp, Belgium - Orthodox Jewish communities identified as a new risk group. A study was conducted and vaccination data for 949 school children from four belief systems (Orthodox Jewish, anthroposophic, modern Jewish and mainstream schools) assessed for completeness/timeliness of MMR vaccination.	Orthodox Jewish children were four times less likely to have completed vaccination, have delayed start or had more temporal spacing between vaccinations. Issues identified included beliefs and difficulties accessing the regular vaccination programme.	[94]

Table 17. Barriers to MMR vaccination in the Netherlands

Barriers	Known/unknown	Comments
What is unknown		
The size of the religious community in the countries.	Estimation of this population is unknown.	Although data is available from other sources, as found during literature search.
Official vaccination coverage data for this specific population group at national, sub-national level	These data are not available.	There is no religious population group identifier in the immunisation system.
Special strategy on how to reach this population	No special strategy was developed (according to VENICE survey- but see comment)	However, reports on interventions are described in literature and grey literature and from EPIS-VPD ad hoc e-forum.
Average living standard compared to average population	Average living standard unknown	Varies – as seen in literature.
Level of education of this population compared to average population	Level of education unknown	Varies – as seen in literature.
Specific information materials targeted for this population group	No specific information for this population	Yes, in some studies – as per literature and EPIS VPD ad hoc e-forum.
Special clinical staff trained to work with this community	No specific staff trained for this population	However, there is evidence that training in cultural sensitivity is valuable.
Special vaccination clinics in these communities organised recently (4–5 years)	No vaccination clinics organised.	However, seen to occur in literature and can be successful.
What is known		
Location in specific regions or sub-regions of the country	Some of these communities located in the Bible Belt (NL) and in urban areas (Orthodox Jewish in Antwerp and London).	If population known then there is a potential to target activities.
Special crèches/schools for children	There are special schools for these community groups.	As above.
Mass gatherings that can facilitate spread of measles, mumps and rubella	Yes- church or synagogue as appropriate for religious group, other social or religious gatherings, political party (SGP)	Early and pre-emptive actions could avoid transmission
Accessibility to MMR vaccination services	MMR vaccination is easily accessible in all countries through primary care services (reported).	But may not be accessed.
MMR vaccination funding	MMR vaccination covered by state budget	Some private schools may not participate in public programmes.
Entitlement to healthcare services	Members of this community entitled to the same primary healthcare as the rest of the population.	
Communication campaigns targeted this population group	Campaigns have been organised to address outbreaks and low immunisation coverage.	

Source: VENICE MMR survey results, 2010.

Discussion

Vaccination coverage data are not collected routinely at the national level for these religious communities. However, it is often evident that areas with a high population density of such Orthodox groups may have lower rates than other areas. Some data are available at the sub-regional level where these Jewish communities live (e.g. the Netherlands), but interpretation of this data requires good knowledge of the local community. In general, sub-regional vaccination coverage typically represents the whole region and not specific population groups within the region. The data currently available suggests that MMR vaccination coverage is substantially lower in these religious communities when comparing data with other regions or national data. In Hackney (London) vaccination coverage data were available locally by ethnic group and indicated that MMR vaccination coverage was one of the lowest compared to other ethnic groups (e.g. 46% Orthodox Jewish versus >90% Turkish). Some data on vaccination coverage are also available from outbreaks of measles, mumps or rubella for a specific population setting, e.g. when outbreaks occur in schools. Overall, the data provide evidence that low MMR vaccination coverage has led to an accumulation of susceptible individuals and that infection spreads quickly causing outbreaks of these diseases. This is supported by reports from published scientific papers. Outbreaks of rubella and measles have been reported among religious population groups in some EU countries in recent years, with exportation to and importation from other countries evident (most notably among similar communities).

From the literature review it is evident that within Europe there are currently two categories of religious population groups that may opt for non-vaccination.

Among the Orthodox Jewish population, particularly in the UK (Salford, Hackney and London) and Belgium (Antwerp) where outbreaks of measles have been reported there does not appear to be a specific religious objection to vaccination. The most frequently cited reasons for non-vaccination were lack of information, misinformation, language barriers, family size, and preference for family doctors practicing alternative medicine. One study conducted during a measles outbreak in Antwerp found that 56% of cases were registered with one family doctor known to be opposed to vaccination. The lack of access to the national MMR catch-up campaigns (as implemented in non-private schools) appears to have been a factor in contributing to some of the outbreaks reported. When an MMR catch-up campaign was implemented in the outbreak setting (school) it was successful, as parents of many unvaccinated children agreed to receive vaccine. The findings from a quantitative study conducted in the UK showed that individuals in this community who may have been averse to immunisation could change their attitudes towards immunisation over time and agree to vaccinate at a later date (similar to other sectors of the community) [75].

On the other hand, religious beliefs were cited as the main reason for non-vaccination among those living in the Bible Belt of the Netherlands. In this area during one outbreak 92% of respondents reported religious or fundamental objections to vaccination [91]. During polio outbreaks in this community the media reacted negatively to the community, depicting the Orthodox Protestants as backward and accusing them of child abuse. Such negative reactions resulted in the community becoming more insular. Research has indicated that refusal to vaccinate may be limited to the very conservative denominations. Predestination of fate and health appears to underlie the most conservative of these population groups whereas there are others who regard vaccines as a gift from God to maintain health. Similarities were found with the Jewish community in this regard and a certain fatalism towards life and disease can often be found in very religious groups.

Information on the education system in both the Netherlands and the United Kingdom is available. In the Netherlands there are state schools, denominational schools and a small number of private schools which are not financed by the government. State schools are open to all children and are secular. About one third of all children go to state schools. Denominational schools are run as an association which parents can join, or as a foundation. Various religious population groups are represented, most are Roman Catholic or Protestant. Additionally, there are Jewish, Islamic, Hindu and 'free schools' that base their education on the philosophy of Rudolf Steiner. There are also schools that organise their education according to certain pedagogical principles, such as Montessori, Jenaplan, Dalton and Freinet schools (these can be either state-run or denominational). There is also a non-denominational private education which does not adhere to any special philosophy. About two thirds of all children go to denominational schools [95].

The current situation (VENICE MMR survey) shows that not all countries take into consideration religious population groups, some of whom oppose vaccination. Reasons may be partly lack of insight and understanding of the problem or having insufficient resources to address the problem. However, there are good examples in the Netherlands of how groups opposing vaccination have been identified and studies conducted with them to establish reasons for non-vaccination [72]. These studies also show that any group opposing vaccination might not be homogenous in terms of attitudes towards vaccination.

Clinical staff must be trained to deal with those opposing vaccination and to use their skills to provide the community with the information required to make a positive choice for protection. The arguments in favour of prevention must be identified specifically for each population group via its leaders in order to encourage vaccination (e.g. in the Netherlands some of the arguments in favour were identified in the Bible). Involvement of

sociologist/philosophers/theologians/anthropologists or other relevant professionals or their contribution could be considered, either within immunisation teams or by providing advice to the teams.

In communities that continue to oppose vaccination even when outbreaks occur, disease control measures have been successful by excluding non-immune pupils/school staff from schools (e.g. rubella outbreak in Ontario, Canada) [92]. It is unclear if such policies are implemented (or implementable) in EU countries. School closure in the event of an outbreak might be effective in interrupting the chain of infection transmission; however other places of community socialisation must be also taken in to account (e.g. church mass, libraries, etc.)

3. Anthroposophic groups

Background

Anthroposophy was developed by Rudolf Steiner (1861–1925) at the end of the nineteenth and the beginning of the twentieth century [96]. It was born out of a philosophy of freedom which is the core of anthroposophic beliefs. This philosophy is based on spiritual questions of humanity, basic artistic needs, relationship to the world in complete freedom and the need to make individual judgments and decisions.

While rooted in a philosophy of freedom and developed as a method of spiritual research and an impulse to nurture a purely human interest in other people, it also has practical implications through the various anthroposophic movements it has spawned. The most developed of these are biodynamic farming, Waldorf schools, anthroposophic curative education and anthroposophic medicine [97,98].

Waldorf or Rudolf Steiner education is based on an anthroposophic view and understanding of the human being, that is, as a being of body, soul and spirit. The education mirrors the basic stages of a child's development from childhood to adulthood, which in general reflects the development of humanity through history from our origin right up to the present.

Today there are over 900 schools, 1 080 kindergartens, 300 health pedagogical establishments and 60 institutes for teacher education in over 50 countries based on Rudolf Steiner's education worldwide. A worldwide list of Waldorf schools and teacher training centres is available on the Waldorf schools website [100].

Anthroposophic medicine is medicine for the human being as an individual. In diagnosis, how the patient feels takes precedence over diagnostics and psychosomatic, biographical and social perspectives are also incorporated. Physical, psychological, family and occupational factors are taken into account in a holistically orientated therapy [99].

Currently there are about 4 800 trained anthroposophic doctors who are members of national associations of anthroposophic doctors. Based on the number of prescriptions it has been estimated that anthroposophic medicinal products are prescribed by more than 30 000 physicians in 21 of the 27 EU Member States, as well as in Norway and Switzerland [101].

The European Council for Steiner Waldorf Education (ECSWE) declares that there is no official Waldorf position on immunisation. Instead, immunisation decisions should be informed by medical professionals, and ultimately parents should decide whether or not to immunise their own children [102]. In general, Waldorf schools do not specifically encourage parents to immunise their children against the common vaccine-preventable diseases [103].

While there may not be an official position on immunisation at Waldorf, there does seem to be a strong cultural anti-immunisation preference among the leaders of the Waldorf community, despite the formal statement from the Waldorf educators. This preference is usually traced back to Steiner himself, who believed that immunisation interferes with karmic development and the cycles of reincarnation. Many respected Waldorf leaders continue to share this view today. For example, in an article entitled 'Childhood Illness: Waldorf View' childhood disease is described as a 'rite of passage' and it is suggested that when a child has measles it is 'as though he or she has had a form of ritual experience' [103].

Health status

There is little information in the scientific literature on the overall health status of the anthroposophic community. In general, it would appear that it is similar to the rest of the population. Individuals who follow anthroposophy may follow a lifestyle somewhat different from other members of the community, seek alternative types of healthcare and sometimes use complementary or alternative medical treatments. However, from the limited publications comparing health outcomes among those following anthroposophic treatments for chronic diseases and those receiving standard treatment [104,105], it would appear that outcome scores are similar [106].

Objectives

- To provide information on MMR vaccination coverage among anthroposophic communities;
- To describe measles, mumps and rubella outbreaks among anthroposophic communities in the EU
- To describe known barriers for MMR vaccination among anthroposophic communities.

Vaccination coverage

From the recent VENICE MMR survey it is clear that data on vaccination coverage for anthroposophic populations are not available. The only known vaccination coverage for this specific population group comes from published studies or may be calculated during the outbreaks that occurred in this population group (e.g. school or kindergarten). Data on vaccination coverage among this group from scientific literature highlights the wide variation in vaccination coverage among children educated in anthroposophic schools, following the Waldorf philosophy. In many outbreaks the low vaccination coverage creates a situation where measles can spread rapidly (Table 18).

Table 18. Vaccination coverage among anthroposophic groups

Country	Vaccination coverage	Comments	Refs
Vaccination coverage estimated during outbreak			
AT	0.6%	Measles outbreak in Austria, 2008. Vaccination coverage was estimated among measles cases in anthroposophic community.	[107]
NL(The Hague)	65%	Measles outbreak in the Netherlands, 2008. Vaccination coverage was estimated in the second school (two schools were involved in this outbreak) for second MMR dose for 2007; many students in this school were from the anthroposophic community; estimated vaccination coverage reflects both: non and anthroposophic community.	[108]
DE (Berlin)	Significantly below 70%	Measles outbreak in Germany, 2010. Vaccination coverage was estimated in one affected Waldorf school.	[109]
	<60%	Measles outbreak in Germany, 2010. Vaccination coverage was estimated in one of the Waldorf kindergartens in the outbreak area. At the time of publication this kindergarten was not affected by the measles outbreak.	
DE (Coburg)	9%	Measles outbreak in Germany, 2003. Vaccination coverage was estimated among measles cases. Outbreak started in anthroposophic community and later spread to general unvaccinated population.	[110]
Vaccination coverage estimated in conducting studies			
NL	65.4%	Study conducted among 57 382 children aged 5–12 years living in Amsterdam on 1 January 2003. Study estimated MMR vaccination coverage among different population groups including anthroposophic schools. Vaccination coverage presented here reflects coverage in such schools. In the past five years, two private paediatric health clinics have opened up in Amsterdam that are run along anthroposophic lines. On 1 January 2003, the vaccination rates for 2–4 year olds registered at these clinics (201 children) was 22.4% for MMR.	[69]

Outbreaks of rubella, measles and mumps

Measles cases over the last two decades indicate that pockets of susceptible individuals exist, such as in anthroposophic groups. This has led to measles outbreaks in several EU countries (Table 19). In some countries where reported overall vaccination coverage is high (e.g. the Netherlands) such outbreaks have been strictly limited to this specific population. However in other countries where overall vaccination coverage is lower (or varies substantially at sub-national level) outbreaks have started among anthroposophic community members and later spread and affected the general population.

Table 19. Reported outbreaks of measles among anthroposophic community in EU countries, 1997–2011

Country	Year	No. of people affected/reported	Comments	Refs
Measles				
UK	1997–1998	293 clinical cases (138 confirmed)	Outbreak began in London, imported from Italy; later spread to non-immunised anthroposophic community in north, south west and south coast of England; 90% of cases were <15 years; only two vaccinated.	[111]
NL	2008	34 cases	The Hague: Two schools with pupils from anthroposophic community initially affected; later cases outside schools were reported; 31 non-immunised.	[108]
AT	2008	394 cases reported; 168 cases in anthroposophic community	Of 394 cases, 123 attended two anthroposophic institutions in Salzburg: kindergarten (7/123) and school (116/123). Of 386 cases with known vaccination status 6.5% were vaccinated with one dose of MMR vaccine.	[107, 115]
DE	2003	1 191 cases	Total of 43 hospitalised and of 393 cases 89% were unvaccinated. The outbreak was limited to the district of Coburg, where vaccination coverage was 77% compared to 90% or above in the surrounding districts. First cases appeared in anthroposophic school and outbreak spread to the community in Coburg.	[110]
	2005	223 cases	State of Hesse: age-specific attack rates highest in the 1-4 year and 5-9 year age group. A 14 year old girl died; the first clusters of measles cases were reported in families considered to be hard-to-reach by health services; 95% of cases were unvaccinated.	[116]
	2005	279 cases	Bavaria: Age-specific attack rates were highest in children 5-9 and 10-14 years; 98% of cases were unvaccinated.	[116]
	2006	1 749 cases	State of North Rhine Westphalia: of 465 patients for whom information was available 80% unvaccinated.	[117]
	2008	217 cases	Bavaria: Among the 217 Bavarian measles cases identified, 28 (13%) cases were attendees of the anthroposophic school just over the border in Salzburg, Austria, 97% of 161 who completed the questionnaire were not vaccinated;	[112]
	2010	62 cases	Berlin: index case travelled to India; attended Waldorf school; outbreak spread in Waldorf kindergartens and schools; later to state schools among unvaccinated children;	[109]
	2010	71 cases	Essen: virus identified was similar, but not identical to that identified in Berlin outbreak. Of 71 cases 15 serologically confirmed. Of 71 cases 30 attended Waldorf school or kindergarten.	[113]
	2011	139	Ortenaufkreis district, west of Baden Württemberg: 132 of 194 cases in the outbreak attended a Waldorf school and seven a Waldorf kindergarten. Outbreak lasted 16 weeks, two different strains were confirmed.	[114]
DK	2011	Cluster: seven reported cases	Cluster occurred in an anthroposophic village; 50% of parents in this village refused MMR vaccination; some because MMR vaccine contains mercury; others chose homeopathic vaccination.	[118]
BE	2011	155 cases (56 cases among anthroposophic community)	Measles resurgence in Belgium this year began with an outbreak in anthroposophic schools in Ghent (Flanders) in February. A total of 56 children were affected – most of their parents were opposed to MMR vaccination. Outbreaks/sporadic cases reported elsewhere in Belgium, especially in Brussels and Wallonia.	[119]

Barriers to MMR vaccination

Known barriers that were identified while conducting the literature review can be broadly divided in two categories: socio demographic/economic factors and parental attitudes/lack of knowledge in relation to measles vaccination. The findings are presented in Table 20. Some of the studies conducted focus specifically on anthroposophic population groups, while other studies are concerned with the general population. Nevertheless findings are specifically related to anthroposophic or under-vaccinated groups.

Table 20. Barriers causing low MMR vaccination coverage among anthroposophic groups and general populations known to contain followers of anthroposophy

Barriers	Details of study	Findings	Reference
Specific to anthroposophic population group			
Anthroposophic statement that measles infection strengthens child's development.	Measles outbreak in an anthroposophic community in Gloucestershire, UK, 1997–98. Questionnaires (number of questionnaires not specified) were sent to notified measles cases. A total of 126 questionnaires returned; response rate 59%.	62% of respondents reported a change in their child's personal development following measles infection (strengthening and maturing their child mentally and physically). In total, 83% of respondents viewed measles as a serious infection, however only three felt that their child's illness changed their opinion towards immunisation.	[120]
Parents' attitudes towards measles vaccination/lack of knowledge of the actual risk associated with vaccination. Risk perception, Fear of vaccine-related adverse events	Same as above	Reasons for not being vaccinated (no percentage reported): issues relating to the safety of the vaccine and its effectiveness; concern about long-term side effects of the vaccine and the effects of the vaccine on the immune system.	[120]
	Outbreak in Bavaria, Germany in 2008. Questionnaires were given to measles cases to ascertain reasons for non-vaccination. Parents were interviewed for children <16 years old; response rate 71% (156/217). Outbreak occurred initially in an anthroposophic community and later spread to general population.	Reasons for not being vaccinated: 33% of respondents reported fear of vaccine-related adverse events; 30% of respondents reported opposing measles vaccination in general; 18% of respondents reported a belief that measles is not a severe disease; 12% of respondents reported doctor had advised against vaccination.	[112]
	Outbreak in Germany, North Rhine Westphalia, 2006. Questionnaires were given to measles cases to ascertain reasons for non-vaccination.	Reasons for not being vaccinated: 36% of parents reported that they forgot about vaccination; 28% parents responded that they opposed vaccination; 17% of parents responded that family doctor or paediatrician advised against vaccination.	[117]
General population known to have followers of anthroposophy			
Socio-economic factors with delayed or missed measles vaccination.	Representative German-wide survey; the information on vaccination status from vaccination records of 2 116 children born January–December 2004 was reviewed.	Chance of getting measles vaccination at an early age reduced by more than 50% if the parents discussed vaccination with naturopathic doctor. First born children had higher chance of receiving timely measles vaccination than the second- or third-born children in family. Parents who seek advice from healing practitioners/naturopaths had 55% less chance of vaccinating their children early against measles than parents not following this advice.	[121] (published in German)
Socio-demographic variables and not being vaccinated with MMR vaccine.	Study conducted among 57 382 children aged 5–12 years living in Amsterdam, Netherlands on 1 January 2003. Study looked at association between socio-demographic variables and not being vaccinated with MMR vaccine.	Incomplete MMR vaccination status was higher among children attending anthroposophic schools than among children at state schools (adjusted odds ratio 15.16 95%CI [11.1-20.8]). Children who attended anthroposophic schools were also much less frequently fully immunised than those at other types of schools.	[69]
Socio-demographic variables and risk of not being vaccinated against measles/parental attitude to vaccination.	German health interview and examination survey for children and adolescents (KiGGS) conducted May 2003 – May 2006 to identify unvaccinated subgroups that should be targeted by vaccination programmes to interrupt measles transmission. Survey was based on nationally representative sample of 17 641 children and adolescents.	Vaccination coverage: The proportion of unvaccinated children was higher in children with three or more siblings than in children without sibling; Vaccination coverage in foreign children with migration background was lower than in children without migration background; In the second generation of migrants vaccination coverage was similar to that for children without a migration background. Factors associated with missing measles vaccination: foreign-born children were more likely to be unvaccinated against measles than German-born children without migration background (adjusted OR 3.03; 95%CI(2.06-4.45)). Parents stated that one or more vaccines had not been given because they prefer children to have the disease (Adjusted OR 30.92; 95% CI(24.1-39.65)). Proportion of parents with reservations against vaccinations was four-fold in parents with a high socio-economic status compared to parents with a low socioeconomic status (adjusted OR 4.76; 95% CI(3.5-6.46)).	[66]

In 2010, the VENICE project conducted a survey on determinants for low MMR vaccination coverage in Europe in EU countries, Norway and Iceland. The questionnaire collected information on MMR vaccination determinants among anthroposophic population groups. Overall 25 of 29 countries responded to this survey. However only four of the 25 countries indicated that they had anthroposophic population groups in their countries (Germany, Ireland, United Kingdom and the Netherlands). Table 21 presents known or unknown barriers for the anthroposophic population groups identified in this survey in the four countries [3].

Table 21. Information on potential barriers to MMR vaccination among anthroposophic groups

Information required	Known/unknown	Comments
What is unknown		
Size of anthroposophic community in the countries	Countries do not know this information	
Official vaccination coverage data for this specific population group at national, sub national level	Countries do not collect this information	Main reasons for not collecting this information: population is included in the general population vaccine vaccination coverage estimate; there is no anthroposophic population group identifier in the immunisation system and there is no legal or ethical approval to collect this information.
Special strategy how to reach this population	Countries do not have specific strategies on how to increase vaccination coverage among this population (except UK).	Reference to UK document [122]
What is known		
Location in specific regions or sub-regions in the country	Usually this population is resident uniformly across the country	In Ireland possibly higher proportion of this population concentrated in south and south west of the country.
Special crèches/schools for children	Special schools exist in DE, IE, NL	
Accessibility to MMR vaccination services	MMR vaccination is easily accessible	
MMR vaccination funding	MMR vaccination is funded by the state	
Entitlement to healthcare services	Members of these communities are entitled to health services	
Average living standard compared with average population	Average/high	
Level of education of this population compared with average population	Average/higher	
Language barriers	No language barriers exist	
Specific information materials targeted for this population group	There is specific information in German.	
Communication campaigns targeted at this population group	Communication campaign conducted in German.	
Special clinical staff trained to work with this community	Staff exist in DE; not in IE, NL or UK.	
Special vaccination clinics in these communities organised recently (last four to five years).	Organised in IE (special school clinics), DE (special community clinics) regionally; not in UK, NL.	

Source: VENICE MMR survey results, anthroposophic community, 2010.

Discussion

Steiner proposed that febrile illnesses such as measles and scarlet fever were related to a child's spiritual development. The avoidance of immunisation in anthroposophic communities is more than a refusal to accept conventional medicine. Some adherents see measles and other infections as a positive opportunity for the child to benefit from the illness itself. Anthroposophists believe that if a child becomes ill without being vaccinated, the illness has to run its course in a peaceful environment, with due care and attention being provided to the child. The idea is that the discomfort benefits the child's development. Based on this statement MMR and other vaccines are refused. However the refusal of vaccination might be not absolute, but relative. The anthroposophic point of view emphasises making one's own choices, such as refusing vaccination or postponing it [72]. Anthroposophic doctors

in Germany have published a guidelines for measles vaccination and stress that vaccination should be based on the individual decision of doctor and patient. Since measles is a highly contagious disease the doctor should stress the social significance of vaccination [123].

Work undertaken by the Robert Koch Institute in Germany a number of years ago showed that in general anthroposophic groups were not uniformly against vaccination. They identified the importance of information required by the community and professionals to influence behaviour. During outbreaks in school, especially in the north of Germany there was good collaboration with anthroposophic school doctors. However, in the south of the country where outbreaks also occurred such collaboration was notably absent (communication from EPIS VPD ad hoc e-forum, December 2011) [124].

As a result of the high transmissibility of the measles virus, the herd immunity threshold is very high and extensive coverage ($\geq 95\%$) is necessary to interrupt virus transmission. From an overview of outbreaks it is clear that in countries with high vaccination coverage, outbreaks were localised predominantly in those populations with low vaccination coverage. The herd immunity protection provided to children in these populations as a result of high coverage in the general population is evident until such time as an outbreak occurs and children from these communities are affected. Infection can then spread to the larger community and reach the minority who may not be vaccinated, either due to age or other specific circumstances. This was the case in an outbreak in Bavaria, Germany which spread from an anthroposophic community to the general population. The reported vaccination coverage in Bavaria was low (85% in 2008) and lower than in the neighbouring German regions.

In the literature, most reported measles outbreaks occurred in anthroposophic educational institutions (kindergartens and/or schools) where MMR vaccination coverage was low. The infection spread quickly as there was an accumulation of susceptible individuals who were not vaccinated. In such settings infection transmission may be interrupted during summer holidays [85] although the role of school camps in facilitating transmission is also well recognised [72]. Considering the growth in the number of Waldorf kindergartens and schools over the last few decades, it is likely that more and more people will come into contact with these ideas and adopt them [72].

Investigating measles outbreaks in educational institutions can be challenging in terms of the application of public health preventive measures. In an outbreak situation educational institutions are offered MMR vaccine as one of the preventive measures. However, parents that oppose vaccination usually refuse the offer of immunisation, preferring their child to contract the disease naturally. The challenges faced by health departments in these outbreak situations are well described in recent outbreak reports from Germany and the Netherlands [108,109].

A recent measles cluster in Denmark [118] clearly illustrates that some parents with anthroposophic beliefs prefer homeopathic vaccines. Data on vaccine coverage or the monitoring of homeopathic vaccination coverage is currently unknown. The efficacy is poorly described or not at all. There is a need for future investigation of this issue within countries (regional/local specificities) as well as across the EU.

Data from the VENICE MMR survey (2010) and the literature search indicated that only a few countries specified having hard-to-reach anthroposophic populations. However, the list of Waldorf schools suggests that almost every EU/EEA country has such schools. This fact emphasises the need to learn more about the population groups that oppose vaccination in each country. Institutions responsible for vaccination must collect information on reasons for non-vaccination as it is important to know the motives for refusing vaccination within each population group.

Internet websites including media reports should also be investigated in order to describe the context in individual countries. Individual doctors or associations known to oppose vaccination should be approached for a more detailed analysis of the issues.

4. Practitioners of complementary and alternative medicine

Background

Complementary and alternative medicine is associated with diverse medical and healthcare systems, practices and products that are not generally considered part of the conventional medicine or standard care provided by medical doctors and allied health professionals. A growing number of people are turning to complementary and alternative medicine. Use of complementary and alternative medicine may result from word-of-mouth recommendation, dissatisfaction with conventional medicine or a fear of side-effects from conventional treatments. Approximately 30–50% of Europeans are estimated to use complementary or alternative medicine to some extent [101]. Using complementary and alternative medicine does not preclude the use of conventional medical treatments at the same time and often depends on the condition being treated, the severity and the nature of the complaint. Information on the widespread use of complementary and alternative medicine is provided at European level from population-based surveys. Studies undertaken in recent years have found that 6 – 49% of Europeans use or have used complementary and alternative medicine [125,126,127,128,129,130]. This is comparable to usage in the United States where 38% of adults and 12% of children have been identified as using some type of complementary or alternative medicine [131]. A recent NHIS study identified an increase in the proportion of the population using complementary and alternative medicine (a 2% increase in adults reporting usage compared with the 2002 survey). In all surveys, the demographic profile of users is similar, with usage highest among women, and notably those with higher levels of education and higher incomes [131].

In some European countries, complementary and alternative medicine is covered by national or private insurance.

The variety of treatments is wide and includes therapies with a cultural or historical basis including herbalism, meditation, yoga, hypnosis, biofeedback, acupuncture and traditional European or Chinese medicine. Depending on the country complementary and alternative medicine may be referred to as integrative medicine, alternative medicine, holistic medicine, medicine douce, Ganzheitsmedizin, Naturheilkunde, naturopathy, traditional European/Chinese medicine or Erfahrungsheilkunde [132].

Within the EU research is currently ongoing to review, describe and document the evidence for and usage of complementary and alternative medicine among European citizens. The network is called CAMbrella and is described as 'a pan-European research network for complementary and alternative medicine (CAM). It was established under the Seventh Framework Programme (FP7) in January 2010 for three years⁷. The project's specific objectives include development of consensus-based terminology widely accepted in Europe to describe complementary and alternative medicine interventions, creation of a knowledge base that facilitates understanding of patient demand for complementary and alternative medicine and its prevalence and exploration of the needs, beliefs and attitudes of EU citizens with respect to complementary and alternative medicine [132].

What is homeopathy?

Much interest has focussed in recent years on homeopathy and concerns that followers of homeopathy are against vaccination. Homeopathy is a system of healthcare founded by the German physician Christian Friedrich Samuel Hahnemann (1755-1843) in Leipzig in 1796. It is based on the theory of 'like curing like' (i.e. giving patients a minute dose of a drug that produces symptoms resembling those of the disease they appear to have). A notable feature of modern homeopathic medicine is its reliance on extremely dilute solutions of the active ingredient. This suggests that when the treatment works, it does so either in response to as-yet-undiscovered physiological processes or through the power of suggestion. The de-sensitising methods used by allergy specialists resemble aspects of homeopathy in that they involve minuscule and slowly increasing doses of allergens [133].

Within the EU there are a number of directives which relate to homeopathic medicines. According to the EU Directive 2001/83/EC of the European Parliament and of the Council of 6 November 2001 on the Community code relating to medicinal products for human use [134,135], homeopathic medicines are defined as follows:

'Any medicinal product prepared from substances called homeopathic stocks in accordance with a homeopathic manufacturing procedure described by the European Pharmacopoeia or, in the absence thereof, by the pharmacopoeias currently used officially in the Member States.'

Systematic reviews and meta-analyses have conclusively demonstrated that homeopathic products perform no better than placebos [137] [136].

In Europe there are no licensed homeopathic 'vaccines' but there are substantial reports and websites advocating their use instead of conventional vaccines, albeit with an absence of evidence regarding the benefit.

Homeopathic medicine is recognised by law in a number of European countries: Belgium (1999), Bulgaria (2005), Germany (1998), Hungary (1997), Latvia (1997), Portugal (2003), Romania (1981), Slovenia (2007) and the United

⁷ Topic: FP7-HEALTH-2009-3.1-3 Complementary and Alternative Medicine coordination and support action Grant Agreement No. 241951

Kingdom (1950). In some of these countries the law explicitly allows the practice of homeopathic medicine only by medical doctors while in other countries the law does not exclude non-medical practitioners [134].

In a number of European countries optional courses about homeopathic medicine are provided as part of the medical undergraduate curriculum at some universities, predominantly in Bulgaria, Germany, Hungary, Italy, the Netherlands, Romania, Switzerland and the United Kingdom. Postgraduate training courses in homeopathy for doctors are provided at some universities in Bulgaria, France, Italy, Lithuania and Spain and in other countries at private teaching centres. Homeopathic medicine is an official part of the continuing education programme for doctors in Hungary and Romania. Many countries also have courses accredited by the national homeopathy societies.

Barriers to MMR vaccination

A number of studies have found that users of complementary medicine are more likely to refuse the basic vaccination schedule than non-users but this appears to reflect parental wishes rather than physicians' recommendations [139]. Studies report that parents who delayed and refused vaccine doses were more likely to have vaccine safety concerns and perceive fewer benefits associated with vaccines [140].

Table 22 presents some of the barriers to vaccination among homeopathic population groups.

Table 22. Barriers causing low MMR vaccination coverage among practitioners of complementary medicine (medical professionals or public)

Barriers	Details of study	Findings	Ref
Negative attitude towards MMR vaccination.	Homeopaths, chiropractors and family doctors in UK were contacted by email. All of them received an email from a fictitious patient asking for advice on MMR vaccination. A later follow-up letter was sent explaining the nature and aim of this study to each practitioner offering the option of the withdrawal of their response (paper published in 2002).	No homeopaths and only one chiropractor advised in favour of the MMR vaccination. Two homeopaths and three chiropractors indirectly advised vaccination. More chiropractors than homeopaths displayed positive attitudes towards MMR vaccination.	[141]
Attitudes towards vaccination (not specifically MMR)	Children whose parents use complementary medicine often have a lower rate of vaccination than those of parents favouring conventional medicine. A cross-sectional survey was performed of paediatric patients presenting to an urban, tertiary paediatric emergency department in Switzerland.	12.7% of all respondents reported refusing some basic vaccination: 3.9% based on physician recommendation, 8.7% despite physician's recommendation. Characterisation of the patients refusing vaccination - older children, higher proportion of girls, single-mother families and decreased household income. Refusal of basic vaccination among users of complementary medicine (18.2%) versus 3.5% non-complementary medicine users) ($p < 0.001$). The highest frequency of refusals was among families who consulted physicians practicing herbal medicine, anthroposophic medicine or homeopathy.	[139]
Attitudes towards vaccination (not specifically MMR)	In the course of this study, 219 medically qualified homeopathic and 281 non-homeopathic physicians in Germany (response rate 30.4%) returned a questionnaire about the application and recommendation of 17 different vaccinations in their practices (paper published in 2001).	The answers show that the responding homeopathic physicians do not generally refuse to give vaccines but rather view them with a specific hierarchy. The 'classic' vaccines against tetanus, diphtheria and poliomyelitis are administered to nearly the same extent as by non-homeopathic colleagues. Active immunisation against other infectious diseases (including MMR) and acceptance of it was lower among homeopathic physicians. A logistic regression model application of these vaccines reveals a genuine reducing effect.	[142]
Socio-demographic and health related predictors of vaccination coverage – first MMR immunisation	A cross-generation cohort study was conducted with prospective linkage to primary care and hospital health records in urban and rural settings in Ireland 2001–2004. Seven hundred and forty-nine children were included, with an MMR vaccination coverage of 88.7% by the age of five years (published in 2010).	In addition to factors associated with disadvantage, other health practices and beliefs, particularly a mother's use of complementary and alternative medicine, are associated with decreased MMR vaccination coverage (adjusted OR 2.65 (1.76-3.98)). This information suggests that parental attitudes and beliefs regarding vaccines must be considered when developing programmes to improve immunisation vaccination coverage.	[143]
Attitudes towards vaccination (not specifically MMR)	To document and review the theoretical basis of the vaccination practices and policies of homeopaths in Sydney. After preliminary interviews, a questionnaire was designed and mailed to all 29 homeopaths listed in the Sydney telephone directory and practising in central Sydney, Australia (published 1994).	Six homeopaths (21%) returned the completed questionnaire and 10 others were interviewed. Their attitudes to vaccination varied widely. The two medically qualified homeopaths recommended routine vaccination routinely for most children. Five of the six respondents did not recommend routine vaccination by any method. We could not obtain any scientific data about the contents of homeopathic vaccinations. No reports evaluating homeopathic vaccination were found in the peer-reviewed medical literature from 1982–1993. Homeopathic vaccination practices are variable, with no statutory body regulating them in Australia. Medically-qualified homeopaths frequently recommend routine vaccination.	[144]

Outbreaks

We did not find any information specifically relating to outbreaks among followers of complementary and alternative medicine although within the literature for anthroposophy there was evidence that complementary and alternative medicine was often practiced by this group.

Discussion

There are two groups that practice homeopathy: medically trained physicians and non-physicians (lay practitioners). The training, regulatory status, usage and acceptance of complementary and alternative medicine as an integral part of the health services varies between countries.

With regard to childhood vaccination, officially the European complementary medicine organisations are not against vaccination. In view of the high MMR vaccination coverage rates across Europe overall and the apparently extensive usage of complementary medicine among European adults, it would appear that complementary medicine and vaccination are not mutually exclusive. However, there is evidence from outbreaks and information posted on publicly available websites that European complementary medicine organisations are not uniformly pro-vaccine.

Details on the use of 'homeopathic vaccination' among EU Member States are unknown. Officially complementary medicine organisations in Europe do not endorse such products. However, there appears to be a perception among some public health professionals that anti-vaccine sentiment is on the increase, even if this is not evident from statistics on vaccination coverage across the EU. Measles outbreaks do suggest that sufficient individuals are abstaining from vaccination for their children to have a negative impact on measles control. The issue may be more related to the MMR vaccine than other vaccines [137]. For example, the official position of the British Homoeopathic Association is that children should receive conventional immunisations unless a medical condition precludes this [145].

Neither complementary medicine users nor practitioners are automatically against vaccination. Dialogue with both users of complementary medicine and the practitioners should explore the roles of each type of therapy in ensuring children's health. The role of vaccination to prevent measles needs to be affirmed as there is no evidence that any homeopathic treatment has an effective role. Misinformation, fear and perhaps the limited efforts of homeopathic practitioners in convincing their patients to be vaccinated may have a major impact on parents abstaining for a prolonged period and often waiting until a child is older. Particularly when measles appeared to be on the wane, some parents perceived the MMR vaccine as being a greater risk than measles.

5. Healthcare workers

Background

Immunisation against measles, rubella and mumps is an important aspect of infection control for healthcare workers as measles clusters or outbreaks occur in health facilities throughout Europe. At the same time immunisation of healthcare workers is a serious issue for infection control in healthcare facilities. Most countries have recommendations that healthcare workers should be immunised with certain vaccines, including MMR. Despite longstanding recommendations, there is little data available on uptake among healthcare workers and MMR vaccine coverage is thought to be low. Susceptible healthcare workers face a high risk of acquiring and transmitting these infections to vulnerable patients. Therefore it is extremely important for healthcare workers to be immune to measles, mumps and rubella. In addition, it is important to know the extent to which healthcare workers are affected by outbreaks of these infections, details of uptake and the barriers reducing uptake of MMR vaccination.

Objectives

- To provide information on MMR vaccination coverage among healthcare workers;
- To describe measles, mumps and rubella outbreaks among healthcare workers in EU countries;
- To describe known barriers for MMR vaccination among healthcare workers.

Vaccination coverage

Vaccination coverage data for measles, mumps and rubella identified in the literature search came mostly from surveys conducted in individual countries. Most of these studies were conducted in particular healthcare facilities and present data only for specific healthcare professionals, e.g. medical students. Only one of these studies estimated national vaccination coverage among healthcare workers including vaccination coverage for measles vaccine. Available data suggest that vaccination coverage among healthcare workers is low or suboptimal. Findings from the literature search are presented in Table 23.

Table 23. Vaccination coverage among healthcare workers

Country	Vaccination coverage	Comments	Ref.
FR	Measles vaccination coverage was 79.3% for one dose and 49.6% (95% CI 40.3%-59.1%) for two doses.	A cross-sectional survey in the university hospitals of Paris, France was conducted to assess measles vaccination coverage in healthcare students. Vaccination against measles is recommended, not mandatory, for health professionals and healthcare students (medicine, nursing, and midwifery) who have no history of measles (published in 2002).	[146]
	Vaccination coverage was 49.7% for one dose of measles (non-compulsory vaccination).	A national cross-sectional survey was conducted to investigate vaccination coverage in healthcare personnel working in clinics and hospitals in France. A two-stage stratified random sampling design was used to select 1 127 persons from 35 healthcare settings. Data were collected in face-to-face interviews and completed using information gathered from the occupational health doctor. A total of 183 physicians, 110 nurses, 58 nursing assistants and 101 midwives were included (published 2009).	[149]
GR	Self-reported, completed vaccination coverage: 33% for measles and mumps, 41.7% for rubella.	The aim of the study was to assess attitudes regarding occupational vaccines and vaccination coverage against vaccine-preventable diseases among healthcare workers working in paediatric departments in Greece (published in 2012).	[147]
DE	Only 62.3% of medical students had received two doses of measles vaccine.	Questionnaire survey, serological tests and check-up of vaccination certificates were offered to second year medical students at Goethe University Frankfurt/Main, Germany. Serological data showed that 23.1% were not immune to measles (published 2011).	[148]

Outbreaks (nosocomial transmission of rubella, measles and mumps)

Measles cases, clusters or outbreaks associated with nosocomial transmission have been reported over the years in many EU countries (Table 24). Unlike other parts of the world, there has been no reported nosocomial transmission of rubella or mumps in Europe in recent years.

Table 24. Nosocomial transmission of measles in Europe involving healthcare workers

Country	Year	Comments	Ref.
BG	Oct 2009–Apr 2010	Measles. Transmission in medical settings was reported for 326 cases. Hospital was the most frequently reported setting; 286 were not healthcare workers but acquired measles in a hospital or primary care setting. Forty healthcare workers (0.16% all cases) in seven different regions of Bulgaria contracted measles.	[150]
FR	2007	A cluster occurred after the index case returned from Thailand infecting his doctor who subsequently infected his wife.	[158]
	2007–2009	The study retrospectively looked at all the consecutive cases of measles seen in adults 1/1/2007 to 30/4/2009 in four Parisian hospitals. Twenty-one patients were included. Six patients (29%) were healthcare workers including five (83%) who were vaccinated.	[163] (in French)
	2010	Measles. In all, 122 cases managed in three teaching public hospitals in Marseille; 14 laboratory-confirmed measles cases among healthcare workers (April–November). Mean age was 27.54 +/- 4.70 years (range 22–39), nine were female. Six healthcare workers were unvaccinated and four had received only one dose of measles-containing vaccine in childhood. Attack rate of measles was ~ 93 cases/100 000 healthcare workers. 108 cases of measles were diagnosed among patients treated in their institution.	[151]
ES	2005–2006	La Rioja. The outbreak involved patient-to-doctor and doctor-to-patient transmission as part of a larger outbreak of 18 confirmed cases.	[155]
	2006	Madrid. Nine cases were reported to have occurred in healthcare staff.	[20]
	2006–2007	Healthcare centres were identified as sources of infection in 37 cases.	[62]
	Jan–Mar 2012	Outbreak in Elche, Spain. In total, 109 cases and 66 of them were unvaccinated. Out of 4 healthcare workers, two worked in the intensive care unit and were unvaccinated against measles. Vaccination status of the remaining two healthcare workers was unknown.	[152]
NL	2000	A fatal measles case in an immune-compromised Indonesian child associated with transmission to healthcare workers.	[153]
	2007	Amsterdam. Two healthcare workers and a medical student were affected by measles after contact with index case in hospital.	[157]
SI	March 2010	Cluster of three cases identified. One was a healthcare worker taking care of the cluster's index case.	[154]
GR	2005–2006	The outbreak consisted of two hospital clusters with four cases in each.	[12]
IT	2006	A total of 40 cases in outbreak, 14 admitted to hospital (35%), including eight of the 12 patients who acquired measles by nosocomial transmission and six of the remaining 28 cases.	[156]
	2006	Lazio. Healthcare setting transmission reported as part of larger outbreak involving a total of 161 cases.	[18]
	2007–2008	Outbreak started in Piemonte and spread to other regions. Various settings were identified, including hospitals.	[21]
	2008	Apulia. Of the eight cases related to a healthcare setting outbreak, five had been in-patients in same infectious diseases ward.	[160]
SE	2008	Outbreak that involved two visitors in the emergency department. Index case had returned from France.	[159]
UK	2008	London. Nine cases were linked to a child admitted to a paediatric ward.	[87]
DK	2008	Copenhagen. Two cases were believed to have acquired measles in the waiting room of a general practitioner and another one at the hospital in which the index case was admitted. The index case had returned from Nepal and India.	[161]
	2008–2009	Cluster of six confirmed cases of measles occurred among children admitted to the paediatric department of a hospital. The index case had returned from East Africa.	[162]

Barriers to MMR vaccination

There are few barriers to non-vaccination with MMR among healthcare workers. Information on studies aimed at reviewing vaccination status of healthcare workers is presented in Table 25.

Table 25. Initiatives to improve low MMR vaccination coverage among healthcare workers

Initiatives	Details of study	Findings	Ref.
Prevalence of measles susceptibility/pre-employment screening	April–July 1998 study of healthcare workers in a UK hospital. 218 healthcare workers with patient contact on medical wards provided an oral fluid sample/answered a questionnaire (2003).	In all, 3.3% cases found to be non-immune to measles; less than one third of a sample of 80 National Health Service (NHS) occupational health departments inquired about measles immunity.	[164]
Serological screening	Between 1998 and February 2001 in Italy 333 healthcare workers were asked to submit blood samples to test antibody levels to measles, mumps, rubella and varicella (published 2002).	Of the workers tested, 98.2% were positive for measles, 85.9% for mumps, 97.6% for rubella. Serological screening in high-risk departments (paediatrics, oncology, radiotherapy, infectious diseases, maternity and laboratory) and vaccination of susceptible employees were suggested.	[146]
Serological screening	The immunity to varicella, rubella, mumps and measles was evaluated in 1 024 students on degree courses in health professions at Padua University Medical School. Subjects were subdivided according to gender and age (25 years or less, and over 25 years).	Prevalence of positive antibodies (IgG) to rubella (94.5%) mumps (78.6%) and measles (86.3%). Prevalence of positive antibodies to rubella in females (97.4%) higher ($p < 0.001$) than males (87.5%), but only if aged 25 years or under. Males older than 25 years were more immune to measles (93.0%) than younger ones (84.3%). Vaccination strategy was applied but compliance was <50%.	[165]
Serological screening/age as barrier for vaccination	Three university hospitals in Paris (France), 353 healthcare workers were included between 27 April and 30 June 2011.	8.2% were susceptible to measles, mostly among the youngest (<35 years). The risk factors for being unprotected were age (18–24 years, OR 11.8, 95% CI [2.4–58.4] and 25–34 years, OR 8.4, 95% CI [1.8–38.4] compared > 35 years), absence of history of measles and absence of vaccination. Global acceptance rate for a measles vaccination, before knowing their results was 80.8%. Vaccination campaign in healthcare settings should target healthcare students and junior healthcare workers.	[166]
Serological screening	Public Hospitals of Marseilles, France 2010	Immune status among 154 healthcare worker volunteers checked; 93% and 88% were immune to measles and mumps respectively. Healthcare workers not immune to measles were all under 30 years of age. Healthcare workers in age groups 19–24 and 25–29 years had a seroprevalence of 86.5% and 91.2% respectively. Absence of measles immunity was significantly associated with younger age groups.	[151]
Recommended vs. mandatory MMR vaccination	The aim of the study was to assess attitudes regarding occupational vaccines and vaccination coverage against vaccine-preventable diseases among healthcare workers working in paediatric departments in Greece (published 2012).	Mandatory vaccination policy supported by 70.6% of 276 healthcare workers; however considerable differences were noted by target diseases. Physicians and nurses working in general paediatric departments more frequently supported a mandatory vaccination policy compared to those working in non-general paediatric departments (73.5% vs. 60.9%).	[147]
Recommended vs. mandatory vaccination	A national cross-sectional survey was conducted to investigate vaccination coverage in healthcare personnel working in clinics and hospitals in France.	Healthcare personnel are overall well covered by compulsory vaccinations, whereas vaccination coverage for non-compulsory vaccinations is insufficient. The vaccination policy regarding the latter should be reinforced in France.	[149]
Vaccination policies for healthcare workers in Europe	Survey was conducted from September 2010 – February 2011. Expert in infection control or occupational health contacted in each country and asked to complete questionnaire. Response rate was 100%.	Policies regarding healthcare worker vaccination exist in the European Union and Norway; for mumps in 11 countries; for measles and rubella in 13 countries; Finland has mandatory MMR vaccination for healthcare workers.	[167]
Surveillance system to monitor vaccination coverage	UK. In 2008, a survey of occupational health departments was conducted in 162 National Health Service foundation and acute hospital trusts (England) on immunisation policies and methods of storing vaccination coverage data.	In all, 104 hospital trusts (64.2%) responded. All respondents offered hepatitis B, tuberculosis, measles-mumps-rubella, and influenza vaccines to healthcare workers; 66.4% record staff eligible for immunisations and 68.2% record staff they have immunised. Conclusions; surveillance system to monitor vaccination coverage in healthcare workers is possible but would be challenging, given the variation in current systems.	[168]

According to the VENICE MMR survey (see Table 26), 13 countries recommend that all or some healthcare workers should be vaccinated with MMR vaccine, however, most countries do not routinely monitor vaccination coverage in this population.

Table 26. MMR vaccination recommendations for healthcare workers

Recommendations	Implemented in	Comments
MMR vaccination recommended to healthcare workers	13 of 24 countries	In one of the countries where vaccination is recommended to healthcare workers, vaccination is compulsory for female healthcare workers. In three of 13 countries vaccine is recommended to some healthcare workers, in the remaining 11 to all healthcare workers.
Reported outbreaks of measles, mumps and rubella among healthcare workers.	12 of 24 countries	
Studies undertaken to identify barriers to vaccination among healthcare workers.	2 of 24 countries	

Source: VENICE MMR survey results, 2010

Discussion

Over the last few decades, many measles outbreaks have been reported in different EU countries. The extent of these outbreaks varies between countries from small clusters to nationwide epidemics. The data from the literature search indicates that healthcare workers are affected in these outbreaks and transmission in healthcare settings occurs [12,18,20,21,62,87,152-163,169,170]. Transmission in healthcare settings occurs both when infection is transmitted from healthcare workers to patient and vice versa. The greatest risk of severe measles infection and its complications is for vulnerable patients especially in settings such as intensive care units. The measles cases recorded among healthcare workers suggest that there are several issues associated with MMR vaccination: vaccination policy for healthcare workers and whether it is mandatory or recommended; inadequate vaccination coverage; difficulty of monitoring vaccine in healthcare settings and screening of healthcare workers entering employment for MMR antibodies.

The data from previous VENICE MMR surveys and current publications suggest that only half of the EU/EEA countries have a specific policy recommending vaccine against measles, mumps and/or rubella for healthcare workers [3]. However there is currently a lack of accurate and detailed information at EU level as to whether these recommendations are implemented in the form of special legislation or as guidelines and recommendations.

Monitoring of MMR vaccination coverage at EU or national level among healthcare workers could be complicated as it is difficult to collect these data due to variation not only between countries but also in country or even healthcare settings. Moreover, MMR vaccine recommendations differ among healthcare professions and even by gender (according to the VENICE survey, Slovenia recommends MMR vaccine only to female healthcare workers) [3]. In some countries vaccination is recommended to all healthcare workers, in other only to those working in health occupations which place them 'at risk' (e.g. paediatric or obstetric units). Unlike seasonal influenza vaccination coverage that can be monitored annually, there are difficulties with MMR monitoring as the vaccine is administered once (in two doses) and only if the healthcare worker did not receive this vaccine as part of their routine childhood immunisation. Strategies to monitor vaccination coverage among healthcare workers should be established. In some settings monitoring can be at the beginning of recruitment, as part of recruitment policy, while in others different strategies may be used. In countries where policies have not been implemented it may be necessary to undertake seroprevalence studies to identify the proportion of susceptible staff, and based on that to adapt vaccination programmes to reflect the risk analysis [146,148,164,165,169,171]. Although studies done in recent years have generally found a low prevalence of measles susceptibility in healthcare workers, it is still important to identify those who are at risk and advise on MMR vaccination. To our knowledge, no data are currently available on screening policies before vaccination at EU level. In general, the findings from VENICE studies and the literature show that vaccination coverage among some healthcare workers, particularly younger ones, is too low. In fact this group is at greatest risk of being infected or infecting vulnerable patients [146,148].

Few EU countries currently have mandatory immunisation for MMR vaccine. According to one European study only Finland had mandatory MMR vaccination [167]. Data from the VENICE survey found that MMR vaccine is mandatory for female healthcare workers in Slovenia [3].

Conclusions

Consensus on need to improve MMR coverage

Among public health authorities and the majority of healthcare providers in Europe, achieving high immunisation levels among children in all EU countries is seen as a necessary step towards limiting vaccine-preventable disease. All European countries have a long tradition of strong national immunisation programmes for children. Although the payment systems differ slightly, essentially all countries pay for vaccination from the national system, national health insurance or other insurance mechanisms.

The majority of Europe's population follows their country's immunisation recommendations. However, there are population groups who are either unable to or prefer not to vaccinate. For the purpose of this report these minority groups have been referred to as hard-to-reach. Individuals from these population groups come from diverse ethnic, religious and social groups with different beliefs, cultures, religious values, and ways of life. The socio-economic living conditions among these individuals can also vary widely, from highly affluent and well educated, to impoverished, disadvantaged or poorly educated.

Reasons for non-vaccination

Reasons for non-vaccination are many and varied and may reflect marginalisation, lack of integration with the local community and inability to access services, often compounded by difficulties in communication between service providers and the recipients. These groups may come from within or from beyond European countries and include ethnic groups such as Roma/Sinti/Travellers/migrants or communities who are long-term residents in a country but still not fluent in its language. Some of these groups may not speak the language well enough to take advantage of the health services on offer and may live a relatively insulated life on the margins of the wider community [9,172].

Service providers do not always appreciate or explore reasons for non-vaccination. Sometimes the primary healthcare provider may know, but at a regional programme level this detail is not evident and reporting on reasons for non-vaccination is not requested or enforced by authorities. Sometimes immunisation programme staff may assume that non-vaccination is determined by parental choice and not be aware that access, literacy or language was the main problem for non-attendance. Lack of permanency and rights of residency can severely impact on the health of children in migrant families or nomadic groups who are unable to access immunisation services, due to lack of knowledge on how and where. For such populations the health services need to reach out to the community and ensure that basic services are provided.

Given the increasing source of alternative treatments, immunisation services must now put more effort into addressing inaccuracies and misinformation that may circulate about vaccines. The more accurate and easy-to-understand information that can be provided to the population on vaccines and the diseases they prevent the easier it will be to become better informed. Many European countries have specific websites containing scientific information on national immunisation programmes which can be accessed by the population. Such websites can provide a valuable source of information to both health professionals and the public on specific and detailed aspects of vaccination which are frequently misunderstood by the wider audience (e.g. what are the adjuvants in the vaccines?)

There is a continuing need for immunisation programmes to meet the needs of the entire population. Evidence from recent outbreaks has demonstrated that often those affected by measles are not hard to reach but have simply not been vaccinated. Monitoring vaccination coverage, following up on non-vaccinated children systematically and offering opportunistic vaccination can make substantial improvements in national coverage.

Sharing information across Europe is important if we are to make efficient use of our resources. In communities with low vaccination coverage due to religious objection and/or anthroposophic ideology the patterns are often common across countries. Each country should identify their under-immunised groups and reasons for not vaccinating. Work undertaken by the VENICE group has shown that many countries have limited information on MMR vaccination to provide to their programmes. Only good knowledge and understanding of the circumstances will support public health authorities in appropriately implementing programmes to meet the needs of these communities.

In order to successfully implement an immunisation programme health professionals involved in vaccination programmes/health education/health promotion activities need to be aware of the diversity of knowledge, attitudes, behaviour and practices of the community they serve. Health services need a good understanding of the lifestyle issues, health seeking behaviour and attitudes towards vaccination, disease prevention and health promotion of the population they serve. Public health professionals involved in implementing and monitoring vaccination programmes need to be aware of the subgroups in the population and provide these groups with the information they require to inform and positively influence their decisions to vaccinate their children and, if necessary, to seek advice from population experts [173,174].

Health professionals who deliver primary care often play a vital role in influencing parental decisions about vaccination. Additional training should be routinely undertaken for these clinicians and they should receive feedback about their pivotal role in patient protection. In many countries doctors provide both traditional medicine and complementary alternative medicine. It is important to educate and provide them with accurate information on disease incidence and the importance of vaccines so that they can convey this message to their patients. Alternative healthcare providers (complementary and alternative medicine practitioners and anthroposophic medicine practitioners) also need to be informed about the value of vaccines and the risks of non-vaccination. This can be done in association with national societies and training schools [174].

Communication is a key to improving vaccination coverage. Substantial work and recommendations have already been developed within some health authorities and organisations and at ECDC and WHO. Issues that need to be addressed are accurate and simple information, trust and credibility of the source and rapid response to counteract rumours and misinformation [173].

Whenever there is a case of measles or rubella the reasons for non-vaccination should always be established. Non-vaccination may be a question of choice, but it may also be related to lack of knowledge, or limited access to services. Each case should be seen as providing an opportunity to evaluate the vaccination programme in order to address its weaknesses and build on its strengths.

In July 2011, the Council of the European Union published conclusions on what Member States can and should do to improve vaccination among children in Europe (see Annex 7). An assessment of progress on the Council conclusions, based on the current literature review and practices in EU countries, is presented in Table 27.

Table 27. Assessment of progress on actions listed in the Council of European Union conclusions

Council of the European Union conclusions (July 2011)	VENICE Project group comment on current status (2012)	VENICE Project group recommendation
1. Assess and map barriers/challenges affecting access to and reach of vaccination services and refine and/or strengthen strategies (national or sub-national) accordingly.	Some countries have done substantial work on this, but in most countries published work is not readily available.	More work needed at country and regional level to assess and map barriers and challenges to achieving high vaccination rates.
2. Maintain and strengthen their processes and procedures for offering vaccines to children with unknown or uncertain vaccination history.	Recommendations exist in most countries but there is a lack of evidence of effectiveness and implementation of recommendations.	Recommend monitoring and evaluation of vaccination programme in country through surveys and qualitative research.
3. Maintain and strengthen public trust in childhood immunisation programmes and the benefits of vaccination.	Efforts to improve public knowledge reported from most countries – some countries appear to be particularly proactive in efforts to reach different target groups.	Consideration should be given to routine evaluation of trust and areas of concern so that corrective measures can be taken if needed.
4. Increase health professionals' awareness of the benefits of vaccines and strengthen their support for immunisation programmes.	Routinely done – evaluation not measured.	Targeted and general information and education campaigns are recommended – healthcare workers are also influenced by public media.
5. Reinforce education and training of health professionals and other relevant experts on childhood immunisation.	Local work - not measured	Include non-traditional health professionals in educational activities – e.g. schools of complementary and alternative medicine.
6. Co-operate closely with local communities, involving all relevant actors and networks.	Local work is reported – in some reports effectiveness of such interventions is evident but more work is needed.	Strong evidence that local work and strong community participation is most valuable in terms of sustainable programme.
7. Identify hard-to-reach groups and ensure their equitable access to childhood vaccinations.	Not routinely done in most countries – difficult to identify data.	Countries should use current information sources to identify gaps. Monitoring and evaluation should be supported with surveys
8. Ensure close co-operation of relevant public health, paediatric and primary care services for the continuous follow-up and evaluation of individual vaccination records, including the timeliness of vaccine administration from birth until adulthood.	Done in most countries (previous VENICE surveys) but not routinely reported at European level.	All countries should establish performance indicators on their immunisation programme, including completion rate, timeliness of vaccination, drop- out rates, lost to follow up, etc.

Recommendations for action

Monitoring vaccination coverage

Despite immunisation programmes being a fundamental and key function of public healthcare in all countries, inadequate attention has been paid to monitoring and evaluating the immunisation programmes in relation to hard-to-reach groups. Knowledge of baseline data on vaccination coverage and reasons for non-vaccination are needed in order to monitor progress, identify success and address obstacles.

Suitable methods need to be identified and implemented to monitor vaccination coverage among hard-to-reach populations. Surrogate markers of vaccination coverage in regions, cities or towns known to have a higher proportion of population groups at increased risk of non-vaccination (from secondary data sources such as census data or local knowledge of religions, culture, language) may be helpful for targeted communication. Current immunisation information systems do not routinely collect such demographic and social information and may not be permitted (e.g. national data protection regulation). However, a survey or qualitative research is useful for determining vaccination coverage and additional information such as culture, religion, coverage and reasons for or against vaccination.

The use of sero-epidemiological surveys of measles and rubella immunity is one method of monitoring vaccination coverage among the population. This requires resources and is labour-intensive but may play a role in identifying particularly low vaccination coverage or monitoring trends in some at-risk groups.

Meeting minority needs

Additional efforts and creativity are needed to ensure that minority needs are met by immunisation programmes. This requires substantial effort and resources to understand the obstacles and to develop group-specific communication tools and services. For many countries the hardest-to-reach communities are often the groups that are most different from the majority population in terms of culture, language and permanent legal status, such as Roma, Travellers, or other immigrant groups with difficulties understanding the language and or system in the country where they live. When discrimination and racism occurs, this creates additional barriers to accessing healthcare and preventive services. The challenges that these groups face need to be identified and addressed.

Health as a right and ease of access

Health as a human right and the importance of access to health services is recognised in all EU states. However, in the area of immunisation there appears to be little formal policy at national level. Countries need to clearly articulate and make recommendations on how to achieve immunisation in hard-to-reach groups. Under EU legislation all European countries provide vaccination free of charge to children irrespective of their insurance or legal status. Nevertheless, guidance on how to address this at the local level is missing [175].

Addressing discrimination

A number of studies identified subgroups that experience significant discrimination. The nomadic groups in particular (e.g. Roma) have been highlighted as being particularly disadvantaged. Reports have highlighted refusal of care, segregation and insulting or degrading treatment. Additionally some groups (including Roma) experience difficulties in certain countries with regard to legal status, residential rights and the right to health and education services. Having no identity card, passport, birth certificate or other official documentation also prevents access to services in many countries. Additional financial barriers (perceived or real) may also deter Roma, and other discriminated groups, from seeking healthcare in the appropriate setting. All countries should ensure that all residents have equal access to the public services to which they are entitled [9,176,177].

Engagement with communities

Service providers should engage with the communities to understand and respond to their needs. Health services should recognise traditional and cultural attitudes and seek to improve access to healthcare by correcting misinformation and facilitating traditions and culture. Such engagement with hard-to-reach groups and service providers facilitates the development of services that are culturally appropriate and will maximise vaccination coverage. The role of mediators, community health or development workers and community leaders in fostering improved understanding between service providers and the recipients of the service is well recognised as being valuable for improving services and vaccination coverage. If not already in existence, action should be taken to establish or designate organisations within the public sector to advocate for access to services and to promote

initiatives to fight against discrimination or racism. Healthcare workers and services need to be aware of patients' experiences and inform themselves on how to improve services and promote positive patient experiences [31].

Ideally, the goal is to adequately address the needs of the population groups, to provide services that meet their needs and to ensure that most individuals have easy access to vaccination, understand and actively choose vaccination. The minority of the population who actively abstain will be a smaller group and will pose less of a threat to public health.

Recommendations on monitoring and evaluation

The following standards for monitoring and evaluation of any public health programme are relevant to MMR vaccination and, if followed, will enable Europe to improve vaccination coverage among hard-to-reach groups:

- Routinely identify and quantify the problem of non-vaccination with MMR in hard-to-reach groups
- Develop programme activities to address the issues, set specific targets for each hard-to-reach group
- Decide and agree on the indicators to be used for each hard-to-reach group
- Define data collection process requirements and usage for each hard-to-reach group that will be useful for the monitoring of programmes
- Use information that follows ethical and agreed data protection guidelines
- Report back to stakeholders regularly
- Routinely monitor and evaluate progress, assign responsibilities and resources for such activities
- Implement change based on evaluation.

National plans for measles and rubella elimination, including hard-to-reach groups (Annex 1)

During the project we sought information on whether EU/EEA countries had national policy documents for vaccine-preventable diseases. VENICE gatekeepers were asked to provide an update on the national measles and rubella elimination strategies. We asked if these plans included specific measures for hard-to-reach groups in their countries.

Among the countries that provided information, most reported that they had recommendations or policies for specific vaccine-preventable diseases (and not necessarily an overarching document addressing all vaccine-preventable diseases). Links to these documents were provided. Few countries reported strategies for improving coverage in hard-to-reach groups. In the Netherlands they have developed guidance and information booklets on how to reach Orthodox groups, the UK has developed NICE guidance on how to improve vaccination among hard-to-reach groups, and Sweden reported inclusion of hard-to-reach groups in their national measles and rubella elimination plan.

Links to the national measles and rubella elimination plans are provided in Annex 1.

Recommendations for improving MMR vaccination uptake and reducing outbreaks (Annex 2)

Annex 2 presents a summary table detailing the different population groups within EU/EEA countries at risk of measles or rubella outbreaks, examples of successful public health interventions to improve MMR coverage, gaps in knowledge on coverage and future challenges.

Glossary of terms

Ethnic groups

Roma

The definition of Roma used in this document includes a diverse range of groups, including Romany Gypsies and Irish Travellers, as well as Roma who have migrated within Europe.

Migrants (UN definitions)

Migrant: person moving from one place of residence to another.

International migrant: person who changes his or her country of usual residence.

Nomad: person without a fixed place of residence who moves from one site to another (internal or international migrant).

Mobile population: person moving from one place to another (including migrant and nomad).

Refugee: person granted refugee status either before arrival or upon arrival in the receiving country. Refugee status can be granted on the basis of the UNHCR 1951 Refugee Convention and the 1967 Protocol relating to the Status of Refugees or pertinent regional instruments.

Asylum: Asylum is a form of protection given by a State on its territory based on the principle of 'non-refoulement' and internationally and nationally recognised refugee rights. It is granted to a person who is unable to seek protection in their country of citizenship and/or residence for fear of being persecuted due to race, religion, nationality, political opinion or membership of a particular social group.

Asylum seeker (refugee claimant): person whose application for asylum (under the UNHCR 1951 Refugee Convention) is pending in the asylum procedure or who is otherwise registered as an asylum seeker.

Seasonal labour migration: arranged with farmers to provide the necessary help during harvest time, often with foreign nationals whose employment opportunities are more limited in their home country.

Legal immigrant: immigrant whose stay is legal in the host country.

Illegal immigrant: immigrant whose stay is illegal in the host country [48].

Alternative medical treatments

CAM – complementary and alternative medicine – includes herbal treatments, reflexology, acupuncture and other non-traditional medical treatments.

Homeopathy – system of healthcare founded by German physician Dr Christian Friedrich Samuel Hahnemann (1755-1843) based on theory of 'like curing like', individualisation of treatment for patient and use of minimal dose.

Other philosophies

Anthroposophy – human-oriented spiritual philosophy based on respect for the freedom of the individual, developed by Rudolf Steiner.

Annex 1. Measles elimination plans in EU countries (updated from EUVAC.Net September 2011)

Country	General VPD policy				National measles and rubella action plan		
	National policy document for VPDs?	If not, is this planned?	If yes, source (link)	Includes specific measures for hard-to-reach populations?	National plan of action for measles and rubella exists?	If no, plan to develop?	Includes specific measures for hard-to-reach?
AT	No response			Unknown			
BE	Not specified			Not specified	Measles Elimination Plan: Belgium (2004) Rubella Elimination Plan: Belgium (2006) (in French) Rubella Elimination Plan: Belgium (2006) (Translated into English 2007)		Not specified
BG	Not specified			Not specified	National Program for the Elimination of Measles and Congenital Rubella Infection, 2005-2010 (2007) (in Bulgarian)		Not specified
CY	Not a national policy document. Guidelines, updates and practices are followed through circulars	No	NA	Not specified	No formal national plan of action, but guidance on practices for specific VPDs (including measles, rubella)	No	NA
CZ	No. Vaccination is set by Decree No. 299/2010 Coll., instituted on 1 November 2010 'on vaccination against infectious diseases'.	Not specified	NA	No specific measures	No. Vaccination in CZ is set by the Decree No. 299/2010 Coll., instituted on 1 November 2010 'on vaccination against infectious diseases'.	No	Not specified
DE	No detail	No detail	No detail	No detail	Interventions programme 'Masern, Mumps, Röteln (MMR)' (1999) (in German) Intervention Programme against "Measles, Mumps and Rubella (MMR) (1999) (Translated into English 2007)		Not specified

Country	General VPD policy				National measles and rubella action plan		
	National policy document for VPDs?	If not, is this planned?	If yes, source (link)	Includes specific measures for hard-to-reach populations?	National plan of action for measles and rubella exists?	If no, plan to develop?	Includes specific measures for hard-to-reach?
DK	Yes- see link	No	http://www.sst.dk/English/Infectious_diseases_and_vaccines/Vaccines/Childhood_vaccination_programme_in_DK.aspx	No	No national policy document however, the Danish National Board of Health recommends that children in Denmark be vaccinated according to the childhood vaccination programme.	Yes	No
EE	No response			Unknown	No response		NA
ES	No	No		NA	Measles Elimination Plan: Spain (2000)		Not specified
FR	Yes 'Guide de vaccinations'. French immunisation schedule published annually. Also 'Bulletin epidemiologique hebdomadaire'	NA	http://www.invs.sante.fr/beh/2011/10_11/beh_10_11_2011.pdf * http://www.sante.gov.fr/IMG/pdf/Guide_des_vaccinations_-_Edition_2008.pdf	No	Plan d'elimination de la rougeole et de la rubeole congenitale en France (2005) (in French) Plan for the Elimination of Measles and Congenital Rubella in France (2005) (Translated into English 2007)	No	Not specified
GR	No - except for polio. National Immunisation Committee is in charge of the national immunisation programme.	Yes		NA	No	Yes	NA
HU	Yes, regulated by law.		Only in Hungarian	No	No	Unknown	NA
IE	Yes - recommendations are made by the National Immunisation Advisory Committee (NIAC). Implementation depends on funding allocated by Department of Health for national immunisation programme.		http://www.immunisation.ie/en/HealthcareProfessionals/ImmunisationGuide/lines2008/	No	http://www.hpsc.ie/hpsc/A-Z/VaccinePreventable/Measles/Guidance/File_2511.en.pdf		No
IS	Yes- national recommendations on almost all aspects of immunisation, not one document.	Not specified	Published in Icelandic on web.	Unknown	Not specified.		Not specified.

Country	General VPD policy				National measles and rubella action plan		
	National policy document for VPDs?	If not, is this planned?	If yes, source (link)	Includes specific measures for hard-to-reach populations?	National plan of action for measles and rubella exists?	If no, plan to develop?	Includes specific measures for hard-to-reach?
IT	Not specified	Unknown		Unknown	Piano Nazionale per l'Eliminazione del Morbillo e della Rosolia Congenita 2010-2015, (2011) (in Italian) Piano Nazionale per l'Eliminazione del Morbillo e della Rosolia Congenita, 2003-2007 (2003) (in Italian) National Plan for the Elimination of Measles and Congenital Rubella in Italy, 2003-2007 (2003) (Translated into English 2007)		Not specified
LT	No	Not yet		Not applicable	No	Not specified	Not applicable
LU	Yes - however, the legislative document is restricted to the list of recommended vaccines for the country.	NA	In the legislation. http://www.legilux.public.lu/leg/a/archives/2001/0132/2001A26281.html	No	Luxembourg publishes official recommendations for all recommended vaccines http://www.sante.public.lu/fr/rester-bonne-sante/120-vaccinations/vaccination-recommandations/index.html		No
LV	Cabinet Regulation No. 330 Adopted 26 September 2000 Vaccination Regulations National Immunisation Plan for 2012–2014.	NA	http://www.likumi.lv/doc.php?id=11215 http://www.likumi.lv/doc.php?id=248094	No hard-to-reach groups.	No	Draft in the process of development	No hard-to-reach groups
MT	Yes - hard copy distributed to GPs, paediatricians and obstetricians.		https://ehealth.gov.mt/HealthPortal/health_institutions/primary_healthcare/the_primary_child_health_and_immunisation_unit/introduction.aspx	No hard-to-reach groups.	No	No	NA
NL	Annual national guideline ('Richtlijn RVP') describing the essentials of the NIP, target groups for immunisation in the coming year, etc.		http://www.rivm.nl/cib/binaries/001439%20RVP%20Richtlijnen_pp_tcm92-71518.pdf	Booklet with background information – Objections against vaccinations.	National plan for measles elimination in the Netherlands (1999)	Yes- plan to update 2012	NA
NO	No	Being prepared		NA	No	Yes	

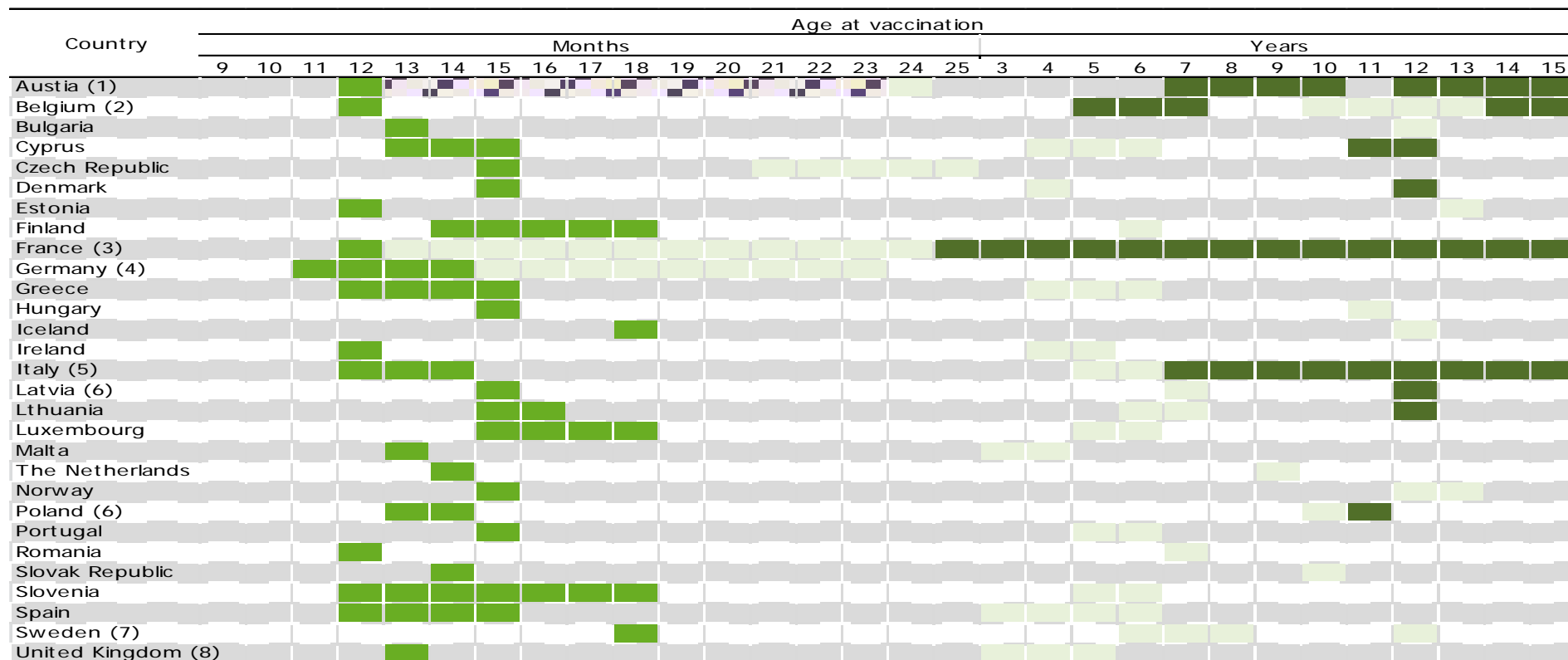
Country	General VPD policy				National measles and rubella action plan		
	National policy document for VPDs?	If not, is this planned?	If yes, source (link)	Includes specific measures for hard-to-reach populations?	National plan of action for measles and rubella exists?	If no, plan to develop?	Includes specific measures for hard-to-reach?
PL	Unknown						
PT	Not specified	Not specified		Unknown	Circular normativa: Vacinação complementar contra o sarampo (05.06.2008) (in Portuguese) Circular: Supplementary measles vaccination (05.06.2008) (Translated into English 2008)		
RO	No response	Unknown		Unknown	Unknown	Unknown	Unknown
SE	No	Yes		NA	No	Yes	NA
SI	Unknown						
SK	Yes. In the Slovak Republic existing national immunisation programme with basic information on prevention of infection diseases.		Material in annex, but this document is only in Slovak.	Not specific - mandatory vaccination requirement for all.	Action Plan for the Elimination of Measles, Congenital Rubella Syndrome and Rubella in the Slovak Republic (2008) (in Slovak) Action Plan for the Elimination of Measles, Congenital Rubella Syndrome and Rubella in the Slovak Republic (2008) (Translated into English 2008)		
SW	Yes - 2000 (outdated)	Under revision		In previous (2000) document - did not specify.	National Measles Elimination Strategy 2011–2015		Yes
UK	Yes - Green Book		http://www.dh.gov.uk/en/Publichealth/Immunisation/Greenbook/index.htm	NICE guidance 'Reducing differences in the vaccination coverage of immunisations'.	http://www.hpa.org.uk/webc/HPAwebFile/HPAweb_C/1274088429847 NICE publication reducing differences in vaccination coverage - http://publications.nice.org.uk/reducing-differences-in-the-uptake-of-immunisations-ph21		Not specifically measles control guidance.

Annex 2. Recommendations for improving MMR vaccination uptake and reducing outbreaks

Population	Recognised groups in Europe with outbreaks or documented low MMR	Successful interventions to improve vaccination coverage	Monitoring MMR vaccination coverage in hard-to-reach groups	Challenges
Hard-to-reach				
Cultural or ethnic minority groups	Orthodox Jewish, Belgium, UK	Communication, education, language and relative isolation from local media and language have been the issue.	Consider inclusion of data variable on immunisation information system to identify ethnic/religious/migrant groups – however, it may not be acceptable under data protection and governance.	Needs good local knowledge - established contacts with local leaders. Community health workers may be successful.
Nomadic groups	Irish Traveller, Roma/Sinti	Out-reach activities, working with local community leaders and training local community health workers has been successful.	Consider alternative methods of monitoring vaccination coverage and linking aggregate data with secondary data sources that obtain additional data e.g. census data which collects ethnicity/religion/immigrant status to identify areas with high subgroup density.	As above.
Civil disruption	Feuding groups/displaced persons.	As above for nomadic groups.	From surveys – either specific for immunisation or as a component of population-based surveys for other purposes. Other options that could be considered; collected as part of enrolment into education/when accessing social welfare or other public services.	As above.
Migrant worker families	Irish traveller/Roma/Other immigrants	As above for nomadic groups.		Undocumented migrant children often unidentified by services - requires good local knowledge/liaison with local health/social services to ensure access to immunisation services.
Asylum seekers	Most countries have specific services for this group - no outbreaks reported.	Targeted and focused service for documented asylum seekers has been successful.		Undocumented asylum seekers unidentified - requires local knowledge, liaison with local health/social services
Healthcare workers	Healthcare workers recognised as vulnerable (outbreaks and studies). Vaccination status unknown, unaware that their susceptibility puts patients at risk.	All countries have recommendations for healthcare worker vaccination. When recommended, high acceptance of MMR vaccination reported.	Use of occupational health records and systems in place that are routinely used. Surveys among healthcare workers.	All health care facilities should have protocols to identify susceptible healthcare workers and vaccinate as a standard of quality of care and infection control.

Population	Recognised groups in Europe with outbreaks or documented low MMR	Successful interventions to improve vaccination coverage	Monitoring MMR vaccination coverage in hard-to-reach groups	Challenges
Geographic isolation	Not identified as a significant problem. Some individuals may be unable to access services easily (lack of transport).	Identification of this population requires good local knowledge and links with local health and social services and NGOs.	Use of local immunisation information system data or surveys.	When identified - mobile clinics and out-reach services should be considered and resourced.
Hard to convince				
Religious groups	Roman Catholic groups (FR), Bible Belt (NL)	Dialogue with community and understanding of reasons for non-vaccination are needed.	As above for hard-to-reach religious groups - consider data variable to identify religious affiliation that might be used as a surrogate for attitudes to vaccine. This is dependent on data protection and governance – if acceptable.	Need to identify and engage with these groups, their leaders and healthcare providers in the community.
Anthroposophic groups	Outbreaks across Europe (DE, AU, IE, UK, FR)	Some success reported when community is engaged with these groups (DE) - success may be dependent on individuals and social cohesion.	Difficult to monitor but consider monitoring through surveys in areas known to have anthroposophic schools.	Many unwilling to be vaccinated despite discussions and information. Consideration of national regulatory mechanisms may be possible.
Homeopathic practitioners	This group often have links to practitioners of complementary and alternative medicine (CAM).	Some areas have successfully engaged with homeopathic medical practitioners who may provide vaccination.	Difficult to monitor – surveys can identify (if ask questions on CAM usage), patients of CAM practitioners.	Early engagement with homeopathic practitioners re role of vaccination in the context of measles elimination. Some may be amenable, others not.
Naturopathic	Often have links to practitioners of CAM.	Many individuals 'pick and mix' treatments, using traditional medicine and CAM. Often well educated, influenced by information from the Internet and peers. Perception that vaccines more risky than disease (not seen).	As above.	Consideration should be given to what information is needed by this group to accurately inform them of risk. May require specific research to be undertaken.
Anti-vaccine groups	Often have links to practitioners of alternative medicine.	As above.	As above.	As above.

Annex 3. MMR national vaccination schedules among EU/EEA countries



Unless otherwise stated below, each colour represents time period at which one MMR vaccine dose is recommended.

- (1) Two doses of MMR are recommended in the second year of life. The first dose is given no earlier than 12 months; the second dose is given at least 28 days after the first dose. A second dose is recommended for all children, preferably before reaching 15 years of age
- (2) Vaccination status of MMR is checked at school (first dose at five to seven years and second dose at 15–16 years). If necessary one dose of MMR is given.
- (3) For children in day-care: MMR 1 at the age of nine months and MMR 2 at 12–15 months of age.
- (4) Minimal interval of four weeks between MMR 1 and MMR 2 is required.
- (5) MMR 2 or catch-up dose given at 5–15 years.
- (6) Catch-up vaccination for all previously unvaccinated females
- (7) Children born before 2002 receive second dose at 12 years, children born in 2002 or later at age six to eight years.
- (8) Given in the 1st grade of primary school.
- (9) MMR 2 is given between the age of three years, four months and five years.

This overview is derived from national childhood vaccination schedules as provided to EUVAC.NET. More information can be obtained from individual national schedules.

European Centre for Disease Prevention and Control (ECDC) 2005-2009; <http://www.ecdc.europa.eu>

Annex 4. Background to VENICE Project e-forum

The VENICE project has been requested by ECDC to undertake a work package activity to

- identify barriers to achieving high MMR coverage among under vaccinated groups of the population;
- identify gaps and deficiencies in monitoring vaccination coverage in under-vaccinated hard-to-reach groups;
- evaluate methodologies used to monitor vaccination coverage in these groups;
- to collate information on best practices within Europe on improved delivery of MMR vaccination services (through improved communication, education, training, participation) and thereby prevent transmission of measles and rubella in Europe.

The background to the establishment of an E-forum (known as an 'ad-hoc forum') for a limited time period of three months is integral to this work in order to bring together stakeholders interested in improving MMR coverage among hard-to-reach populations. Moreover, the idea of more active exchange of good practices was proposed at a meeting convened by ECDC in November 2011 on 'Communicable disease prevention among Roma communities'.

There are a number of hard-to-reach groups within Europe who may not be vaccinated for a variety of reasons. Such groups include migrants, ethnic minority groups and individuals belonging to certain religious or philosophical groups. Obstacles to vaccination may be a lack of access to healthcare related to financial, geographic, religious educational, or language barriers. There may be fear or lack of trust between groups and health services, discrimination or prejudice. Whatever the reason the end result will be the same, individuals who could be protected against measles and rubella are not because they are not vaccinated.

To improve vaccination we need to understand the barriers and learn from those countries that have successfully achieved protective vaccination for children from these communities. We need to be able to measure vaccination coverage routinely so that we can monitor the success or failure of vaccination programmes in these different communities and target activities as appropriate. This VENICE project will investigate the best ways of achieving the goal of measles and rubella elimination.

What we expect from the forum?

This forum will provide an informal expert platform for the exchange of information and ideas on how health services can improve both MMR vaccination coverage and monitoring among hard-to-reach groups in Europe.

The purpose of the e-forum is to share experiences and comments that are constructive and helpful to health professionals engaged in immunisation activities.

The information shared on the e-forum will be collated and included as part of a final report to inform ECDC and make recommendations on future steps. Specific comments will not be attributed to individuals, institutes or settings, unless with the express permission of the contributors involved.

The forum will give the stakeholders an opportunity to participate in and influence decision-making processes to improve MMR vaccination coverage for hard-to-reach groups (recognising that MMR vaccination is a part of primary health care preventive services).

What agency is hosting the forum?

The forum is hosted by ECDC on the EPIS-VPD site but will be moderated by the VENICE project lead on this activity (Suzanne Cotter and Jolita Mereckiene in the Health Protection Surveillance Centre, Ireland). HPSC will moderate the discussions, pose specific questions and encourage dialogue on the issues raised. The postings will be collated together. All postings should be treated as confidential information and not used without the express consent of the author.

Who are the other participants?

Participants in the e-forum include VENICE gatekeepers, nominated individuals working in the delivery or monitoring of vaccinations in Europe, nominated individuals or representatives from groups and organisations working with hard-to-reach groups. There will be an ECDC contact point nominated, whose name and details will appear in the site of the 'ad-hoc forum'. The names and affiliations of those individuals granted access is attached.

What type of commitment is required?

Short postings and responses to questions are welcome. If you have time and want to make more detailed comments you are free to do so, but this is not required. We anticipate that you might spend a few minutes each day looking at the postings.

Participation in the forum is voluntary and is open to those who have been identified as potential members for practical reasons due to the time limit on the project. Members can leave the forum at any time by sending an email to the moderator.

English will be used for all postings to enable all participants to understand the exchange.

What is an ad-hoc forum?

A specific ad-hoc forum will be created by ECDC on its own initiative or at the request of Member States for specific topics/events which require restricted access from a limited group of EU/EEA VPD network members, ECDC staff and other experts interested in the topic of discussion.

What type of information will be discussed in the ad-hoc-forum?

Through the forum we will seek information to help understand why certain groups are not vaccinated. We will avoid asking questions that have already been raised either at ECDC meetings or in VENICE surveys.

Members of the forum will be invited to share their opinions, comments or experiences. Short comments are welcome. Any additional reports or information can be shared, if appropriate.

One topic/question will be discussed each week. Participants are invited to read postings as they appear and submit their own responses as they wish (on a voluntary basis).

Examples of questions that have been proposed for discussion:

- Can participants share information on any studies that have been done on knowledge, behaviour, attitudes towards vaccines among hard-to-reach groups such as Roma/travellers, migrants, anthroposophic communities and religious groups?
- With regard to religious groups, what information is available on why some are at greater risk of non-vaccination?
- What work has been done with migrant groups to ensure that they have access to vaccination services? Can countries comment?
- What studies or research have been done with religious groups about reasons for non-vaccination? Have specific interventions been made to address concerns in any country and what has been the outcome?
- Vaccination coverage among subgroups is not monitored routinely in any of the VENICE countries (according to a recent survey) - can e-forum participants comment on methodologies that they have used or are aware of which could address this knowledge gap?
- Has work been done in your country to address issues of trust and communication between under-vaccinated, hard-to-reach groups and service providers? If so, what has been successful/unsuccessful?
- Are there NGOs or other groups that advocate improved access to healthcare for under-vaccinated, hard-to-reach groups in your country?
- What more could be done to improve access to health services for your under-vaccinated hard-to-reach groups?
- Is there a clear, educational package for parents available in your country to inform about the benefits and risks of immunisation?
- For countries that did not participate in the Vienna meeting, the work of trained Roma health mediators has been identified as having a positive impact on improving access to healthcare. Not all countries have Roma health mediators or enough Roma health mediators. What is your opinion on the role of Roma health mediators in your country? Do you have such workers and what part do they play in your health services?
- In your view what are the five main steps that could be implemented immediately to improve vaccination coverage among hard-to-reach populations?

VENICE/EPIS – VPD code of conduct for e-forum

The VENICE/EPIS-VPD forum aims to provide a professional, positive environment to discuss better access to vaccination and improving the ability to monitor the impact of vaccination programmes on under-vaccinated hard-to-reach populations. To achieve this we have adapted a code of conduct for the e-forum (based on a similar code developed by the Association of Independent Software Industry Professionals).

- The members of the E-forum will access the VENICE/EPIS –VPD site after registration. They will only have access to the specific ad-hoc forum webpage linked to the current project; unless they have otherwise been nominated as full users of EPIS VPD.
- All information shared in the forum is to be considered private within the working group, and should not be shared outside the group without the message author's express permission. The final report of the Venice consortium collating the information obtained from the e-forum will be circulated to the group for comment prior to inclusion in the overall report which will be submitted to ECDC.
- You are strongly encouraged to use a genuine, readable email address as your 'reply to' address. In this way, if any members wish to contact you privately concerning a forum message, they may do so.

- Remember that this is a professional forum which will operate within a limited timeframe. Please try to stay on-topic when commenting on the questions/discussions.
- Posts containing personal views on, or references to, controversial subjects such as politics and religion that may be inflammatory are not allowed.
- If you wish to share a link to something interesting, include a short message describing what the link is for, and/or why you think it is interesting.
- Remember that this is an international group, so be open and sensitive to cultural and language differences.
- Posting of private correspondence is not allowed without the permission of both parties.
- Political discussions are not allowed, unless the subject directly affects our topic. Even then, members must use discretion and confine the discussion to topic-related issues.

Offending messages of a personal, political, racial, religious, cultural nature may be deleted without notice and will lead to termination of membership (HPSC note: we realise that this is unlikely but we have to state this).

Annex 5. List of documents, websites and access dates

Title of document/website	Link to the document/website	Access date
WHO Regional office for Europe. Eliminating measles and rubella. Framework for the verification process in the WHO European region.	http://www.euro.who.int/_data/assets/pdf_file/0003/158304/EURO_MR_Elimin_Verification_Processv2.pdf	20/06/2012
ECDC. Surveillance report. European monthly measles monitoring (EMMO)	http://www.ecdc.europa.eu/en/publications/Publications/2011_July_Measles_Monthly_Monitoring.pdf	25/04/2012
Analysis of determinants for low MMR vaccination coverage in Europe.	http://venice.cineca.org/MMR_report_2010_1.0.pdf	27/04/2012
EU-MIDIS Data in Focus 5: 'Multiple Discrimination'. European Union Agency for Fundamental Rights (FRA)	http://fra.europa.eu/fraWebsite/attachments/EU_MIDIS_DiF5-multiple-discrimination_EN.pdf	27/04/2012
Gypsy/Travellers numbers in the UK – a general overview	http://www.article12.org/pdf/GYPSY%20TRAVELLER%20NUMBERS%20IN%20THE%20UK.pdf	27/04/2012
Traveller Population	http://pavee.ie/ourgeels/traveller-population	27/04/2012
Gypsies/Travellers in Scotland: The Twice Yearly Count - No. 15: January 2009. A report by Craigforth on behalf of Scottish Government Social Research	http://www.scotland.gov.uk/Publications/2009/09/04152156/0	27/04/2012
Count of Gypsy and Traveller Caravans - July 2011	http://www.communities.gov.uk/publications/corporate/statistics/caravancountjul2011	27/04/2012
Gypsy and Traveller Caravan Count, January 2012.	http://wales.gov.uk/topics/statistics/headlines/housing2012/120314/?lang=en	27/04/2012
Travellers' Accommodation. Needs Assessment in Northern Ireland 2008	http://www.nihe.gov.uk/Travellers_accommodation_needs_assessment_2008.pdf	27/04/2012
All-Ireland Traveller Health Study	http://www.dohc.ie/publications/traveller_health_study.html	07/03/2012
Inequalities experienced by Gypsy and Traveller communities: A review	http://www.equalityhumanrights.com/uploaded_files/research/12inequalities_experienced_by_gypsy_and_traveller_communities_a_review.pdf	07/03/2012
Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. An EU Framework for National Roma Integration Strategies up to 2020	http://ec.europa.eu/justice/policies/discrimination/docs/com_2011_173_en.pdf	18/05/2012
Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. National Roma Integration Strategies: a first step in the implementation of the EU Framework.	http://ec.europa.eu/justice/discrimination/files/com2012_226_en.pdf	18/05/2012
Rapport d'enquête sur la couverture vaccinale des populations roms rencontrées par les équipes de Médecins du Monde en France	http://www.medecinsdumonde.org/Presse/Dossiers-de-presse/France/Parias-les-Roms-en-France	16/05/2012
Recommendations on Statistics of International Migration	http://unstats.un.org/unsd/publication/SeriesM/SeriesM_58rev1_E.pdf	10/04/2012
UNESCO. Social and Human Sciences	http://www.unesco.org/new/en/social-and-human-sciences/themes/international-migration/glossary/migrant/	07/06/2012
EUROSTAT. Statistics in focus. 6.5% of the EU population are foreigners and 9.4% are born abroad	http://epp.eurostat.ec.europa.eu/cache/ITY_OFFPUB/KS-SF-11-034/EN/KS-SF-11-034-EN.PDF	21/06/2012
EUROSTAT. Migration and migrant population statistics.	http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/Migration_and_migrant_population_statistic	21/06/2012
Decision No.1350/2007/EC of the European parliament and the council establishing a second programme of Community action in the field of health (2008-13)	http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2007:301:0003:0013:en:PDF	22/06/2012
Commission implementing decision on the adoption of the 2012 work plan, serving as a financial decision under the second programme of Community action in the field of health (2008-2013), for the selection, award and other criteria for financial contributions to the actions of this programme and on the EU payment to the WHO Framework Convention on Tobacco Control.	http://ec.europa.eu/health/programme/docs/wp2012_en.pdf	22/06/2012

Title of document/website	Link to the document/website	Access date
Technical report. Migrant health: Background note to the 'ECDC Report on migration and infectious diseases in the EU'.	http://www.ecdc.europa.eu/en/publications/Publications/0907_TER_Migrant_health_Background_note.pdf	22/06/2012
EpiSouth Project. Assessment of Countries Migration Status Profile and Vaccination Access of Mobile Population.	http://www.episouth.org/outputs/wp7/WP7_9_Report_Assessment_Countries_Migration.pdf	20/06/2012
EpiSouth Project. Vaccine Preventable Diseases and Migrant Population in the Mediterranean Countries and Balkans.	http://www.episouth.org/outputs/wp7/4_EpiSouth%20Strategic%20document%20on%20Vaccine%20Rev%20luglio%202010.pdf	20/06/2012
The protection of the rights and special needs of irregular immigrant minors and asylum seeking children. A thematic discussion paper prepared for the European Union Agency for Fundamental Rights by Eurasyllum Ltd. EU Agency for Fundamental Rights.	http://fra.europa.eu/fraWebsite/attachments/FRA_Thematic_IM_MIGRANT_AND_ASYLUM.pdf	08/05/2012
Platform for International Cooperation on Undocumented Migrants. Access to Health Care for Undocumented Migrants in Europe.	http://picum.org/picum.org/uploads/file_/Access_to_Health_Care_for_Undocumented_Migrants.pdf	08/05/2012
Bible Belt (Netherlands).	http://en.wikipedia.org/wiki/Bible_Belt_(Netherlands)	11/04/2012
Objections against vaccination. The perspective of those who refuse.	http://www.rivm.nl/en/Images/000652%20Bezw%20tegen%20vacc%20EN_tcm13-67802.pdf	18/04/2012
History of the Jews in Antwerp	http://en.wikipedia.org/wiki/History_of_the_Jews_in_Antwerp	11/04/2012
City and Hackney Health and Wellbeing Profile 2011/12. Our Joint Strategic Needs Assessment.	http://www.cityoflondon.gov.uk/NR/rdonlyres/CC44FE34-51D2-4E9B-8F1E-6D5BE3063283/0/BC_RS_H_WPH_CFINAL200110.pdf	10/04/2012
Measles Outbreak in Hackney	http://www.cityandhackney.nhs.uk/news/measles-outbreak-in-hackney.aspx	10/04/2012
European Agency for Development in Special Needs Education. Special needs education within the education system - Netherlands.	http://www.european-agency.org/country-information/netherlands/national-overview/special-needs-education-within-the-education-system	11/05/2012
Waldorf answers	http://www.waldorfanswers.com/Anthroposophy.htm	10/04/2012
The Anthroposophical Society in Ireland	http://www.anthroposophy.ie/	25/04/2012
General Anthroposophical Society	http://www.goetheanum.org/336.html?&L=1	27/03/2012
What is Waldorf education?	http://www.waldorfanswers.com/Waldorf.htm	23/03/2012
Rudolf Steiner (Waldorf) schools and teacher training centers worldwide	http://www.waldorfschule.info/upload/pdf/schulliste.pdf	27/03/2012
The regulatory status of complementary and alternative medicine for medical doctors in Europe.	http://www.camdoc.eu/Pdf/CAMDOCRegulatoryStatus8_10.pdf	27/03/2012
Statement of ECSWE on the Question of Vaccination	http://www.steinerwaldorfeurope.org/downloads/statements/ec_swe_vaccinationstatement.pdf	30/03/2012
The Waldorf Education. Open Waldorf.com. Health and Safety.	http://www.openwaldorf.com/health.html	04/04/2012
Masernausbruch an einer Waldorfschule in Essen (Measles outbreak at a Waldorf school in Essen)	http://www.rki.de/cln_162/nn_1759378/DE/Content/Infekt/Epi_dBull/Archiv/2010/23_10.templateId=raw.property=publicationFile.pdf/23_10.pdf	04/04/2012
Okologisk landsby strides over maeslingevaccine (in Danish)	http://www.bt.dk/sygdomme/oekologisk-landsby-strides-over-maeslingevaccine	06/06/2012
Risikofaktoren für eine verspätete oder nicht erfolgte Masernimpfung bei Kleinkindern	http://www.rki.de/DE/Content/Service/Publikationen/Bundesgesundheitsblatt.html	06/06/2012
Reducing differences in the uptake of immunisations (including targeted vaccines) among children and young people aged under 19 years	http://www.nice.org.uk/nicemedia/live/12247/45497/45497.pdf	06/06/2012
The Society of Homeopaths representing professional homeopaths. What is homeopathy?	http://www.homeopathy-soh.org/about-homeopathy/what-is-homeopathy/	09/05/2012
EU regulations. Homeopathic medicines.	http://www.homeopathyeurope.org/regulatory-status/eu-regulations/homeopathic-medicines-1	09/05/2012
European Committee for Homeopathy (ECH)	http://www.homeopathy-ecch.org/index.php?option=content&task=view&id=14	09/05/2012
European Central Council of Homeopaths (ECCH)	http://www.littlemountainhomeopathy.com/homeopathic-immunisations/frequently-asked-questions	09/05/2012
Frequently Asked Questions.		

Annex 6. National MMR vaccination coverage in EU/EEA countries

Table A. National MMR vaccination coverage (VC), measured using administrative methods, by age at which coverage is monitored, dose and year in EU/EEA countries. Analysis of determinants for low MMR vaccination coverage in Europe, November 2010

Countries	Dose 1			Dose 2			Catch-up dose		
	Age	VC	Year	Age	VC	Year	Age	VC	Year
AT	36 months	100	2009	36 months (3 years)	89	2009	12 years	84	2009
BG	13 months	96.1	2009	12 years	92.8	2009	-	-	-
EE	24 months	95	2010	14 years	95	2010	-	-	-
FR	24 months	89	2008	24 months (2 years)	NK	2008	-	-	-
DE	4-6 years	96	2008	4-6 years	89	2008	-	-	-
HU	15 months	99.8	2009	11 years	99.3	2009	-	-	-
IS	18 months	92	2009	12 years	92	2009	-	-	-
IE	24 months	90	2009	4-5 years	NK	2009	-	-	-
LT	15-16.5 months	97	2009	6-7 years	95	2009	12 years	98	2009
MT	15 months	82	2009	8 years	85	2009	-	-	-
NL	24 months	96	2010	10 years	93	2010	-	-	-
IT	24 months	89.9	2009	NK	-	-	NK	-	-
PL	36 months	98	2009	11 years	96	2009	-	-	-
PT	15 months	95	2009	5-6 years	94	2009	-	-	-
SK	14th-17th month	98.9	2009	10 years	99.3	2009	-	-	-
ES	12-15 months	97	2009	3-6 years	90	2009	-	-	-
SE	24-35 months	96.5	2009	12-13 years	94.9	2009	-	-	-
GB	24 months	86	2009	5 years	79	2010	-	-	-

NK – Not known; RO-administrative methods used, but no data provided.

Table B. National MMR vaccination coverage (VC), estimated using survey methods, by age at which coverage is monitored, dose and year in EU/EEA countries. Analysis of determinants for low MMR vaccination coverage in Europe, November 2010

Countries	Dose 1						Dose 2					
	Age	VC	Year	Age 2 years	VC	Year	Age/years	VC	Year	Age 2 years	VC	Year
BE	12 months	94.5	2009	-	-	-	10-13	83	2009	-	-	-
CY	17-24 months	86.9	2009	6	97	2009	6	90	2009	12	82	2009
FR	6 years	94	2005	11	96	2004	6	45	2005	11	74	2004
DE	24 months	89	2006	17	94	2006	2	59	2006	17	77	2006
GR	6 years	99	2006	14	92	2006	6	77	2006	14	80	2006
IS	24 months	92	2009	-	-	-	13	92	2009	-	-	-
LU	30 months	96	2005	-	-	-	6	NK*	-	-	-	-
IT	24 months	86.5	2008	16	78.1	2008	16	53.9	2008	-	-	-
SI	18 months	94	2009	-	-	-	-	NK**	-	-	-	-

NK – Not known; RO-no data provided.

*Coverage for 2nd MMR dose not monitored at the time of survey. However, since the last survey, recommendations have changed and national schedule now recommends MMR vaccination at 12 months (1st dose) and 15-23 months (2nd dose), making it possible to monitor coverage for 1st and 2nd doses with our current, validated survey tool.

**SI- MMR2 was not monitored when the VENICE survey was conducted, but in 2010 a new system was set up and data will be available later this year (2011). CZ - Vaccination coverage for all mandatory vaccinations of eligible children is still between 97- 98% and has been for several years.

Annex 7. Council of the European Union conclusions on how to improve childhood immunisation in Europe

In July 2011, the Council of the European Union published its conclusions on how to improve childhood immunisation in Europe.

The Council invited Member States and the Commission to:

- develop cooperation among national and sub-national immunisation services, further refine and co-ordinate monitoring of vaccination coverage;
- reinforce the surveillance of vaccine-preventable diseases and refine information systems and immunisation registers;
- use common indicators for vaccination to support EU-wide data collection
- ensure proper continuity of immunisation of individuals when moving across borders;
- foster the improvement of immunisation programmes;
- tailor approaches and communication strategies to address the concerns of those who are sceptical of the benefits of vaccination;
- share experiences and best practices to improve vaccination coverage of children against vaccine-preventable diseases in general, as well as amongst under-vaccinated groups;
- identify commonly-agreed guidance and methodologies for monitoring coverage, identifying public support for vaccination programmes and reaching out to broader populations;
- provide guidelines and tools to help Member States design efficient communication messages;
- develop multilingual EU vaccination resources for healthcare professionals and the public with the aim of providing objective, easily accessible (web and/or paper-based) and evidence-based information on vaccines and immunisation schedules, including vaccines used in the Member States;
- facilitate regional and EU-wide projects for increasing access to vaccination for transnational, hard-to-reach groups.

References

1. WHO Regional Office for Europe. Eliminating measles and rubella. Framework for the verification process in the WHO European Region http://www.euro.who.int/_data/assets/pdf_file/0003/158304/EURO_MR_Elimin_Verification_Processv2.pdf
2. ECDC. Surveillance report. European monthly measles monitoring (EMMO), July 2011. http://www.ecdc.europa.eu/en/publications/Publications/2011_July_Measles_Monthly_Monitoring.pdf
3. O'Flanagan D, Cotter S, Mereckiene J. Analysis of determinants for low MMR vaccination coverage in Europe. http://venice.cineca.org/MMR_report_2010_1.0.pdf [Accessed: 4 February 2012]
4. ECDC. Meeting report. Communicable disease prevention among Roma. Vienna, 27–29 November 2011. http://ecdc.europa.eu/en/publications/Publications/Forms/ECDC_DispForm.aspx?ID=895 [Accessed: 21 December 2012]
5. European Union Agency for Fundamental Rights (FRA). EU-MIDIS Data in Focus 5: 'Multiple Discrimination'. http://fra.europa.eu/fraWebsite/attachments/EU_MIDIS_DiF5-multiple-discrimination_EN.pdf [Accessed: 27 April 2012]
6. Council of Europe. Roma and Travellers. http://www.coe.int/t/dg3/romatravellers/default_en.asp [Accessed: 7 September 2012]
7. European Commission. Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. An EU Framework for National Roma Integration Strategies up to 2020. http://ec.europa.eu/justice/policies/discrimination/docs/com_2011_173_en.pdf [Accessed: 18 May 2012]
8. European Commission. Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. National Roma Integration Strategies: a first step in the implementation of the EU Framework. http://ec.europa.eu/justice/discrimination/files/com2012_226_en.pdf [Accessed: 18 May 2012]
9. Health and the Roma community. Analysis of the situation in Europe. http://www.gitanos.org/european_programmes/health/ [Accessed: 7 September 2012]
10. Foldes ME, Covaci A. Research on Roma health and access to healthcare: state of the art and future challenges. *Int J Public Health* 2012 Feb;57(1):37-9.
11. Parmakova K, Kojouharova M, Borisova M, Kurchatova A. Cross-sectional survey of vaccination coverage with routine immunizations in children born in 2006 in Sofia region. (in Bulgarian). *Pediatrics* 2010;L(3):23-8.
12. Georgakopoulou T, Grylli C, Kalamara E, Katerelos P, Spala G, Panagiotopoulos T. Current measles outbreak in Greece. *Euro Surveill* 2006;11(2):E060223.
13. Medecins du Monde. Rapport d'enquête sur la couverture vaccinale des populations roms rencontrées par les équipes de Médecins du Monde en France. <http://www.medecinsdumonde.org/Presse/Dossiers-de-presse/France/Parias-les-Roms-en-France> [Accessed: 16 May 2012]
14. Stefanoff P, Orlikova H, Rogalska J, Kazanowska-Zielinska E, Slodzinski J. Mass immunisation campaign in a Roma settled community created an opportunity to estimate its size and measles vaccination uptake, Poland, 2009. *Euro Surveill* 2010 Apr 29;15(17).
15. Kraigher A, Vidovic M, Kustec T, Skaza A. Vaccination coverage in hard-to-reach Roma children in Slovenia. *Coll Antropol* 2006 Dec;30(4):789-94.
16. Kremer JR, Brown KE, Jin L, Santibanez S, Shulga SV, Aboudy Y, et al. High genetic diversity of measles virus, World Health Organization European Region, 2005-2006. *Emerg Infect Dis* 2008 Jan;14(1):107-14.
17. Gíria M, Rebelo-de-Andrade H, Fernandes T, Pedro S, Freitas G. Report on the measles situation in Portugal. *Euro Surveill* 2008 Oct 16;13(42).
18. Filia A, Curtale F, Kreidl P, Morosetti G, Nicoletti L, Perrelli F, et al. Cluster of measles cases in the Roma/Sinti population, Italy, June-September 2006. *Euro Surveill* 2006;11(10):E061012.
19. Curtale F, Perrelli F, Mantovani J, Ciofi degli AM, Filia A, Nicoletti L, et al. Description of two measles outbreaks in the Lazio Region, Italy (2006-2007). Importance of pockets of low vaccine coverage in sustaining the infection. *BMC Infect Dis* 2010;10:62.
20. Garcia-Comas L. Measles outbreak in the region of Madrid, Spain, 2006. *Euro Surveill* 2006;11(3):E060330.
21. Filia A, De CM, Seyler T, Bella A, Ciofi Degli Atti ML, Nicoletti L, et al. Measles resurges in Italy: preliminary data from September 2007 to May 2008. *Euro Surveill* 2008 Jul 17;13(29).
22. Marinova L, Muscat M, Mihneva Z, Kojouharova M. An update on an ongoing measles outbreak in Bulgaria, April-November 2009. *Euro Surveill* 2009;14(50).
23. Orlikova H, Rogalska J, Kazanowska-Zielinska E, Jankowski T, Slodzinski J, Kess B, et al. Spotlight on measles 2010: A measles outbreak in a Roma population in Pulawy, eastern Poland, June to August 2009. *Euro Surveill* 2010 Apr 29;15(17).
24. Pervanidou D, Horefti E, Patrinos S, Lytras T, Triantafyllou E, Mentis A, et al. Spotlight on measles 2010: ongoing measles outbreak in Greece, January-July 2010. *Euro Surveill* 2010;15(30).
25. Rogalska J, Santibanez S, Mankertz A, Makowka A, Szenborn L, Stefanoff P. Spotlight on measles 2010: An epidemiological overview of measles outbreaks in Poland in relation to the measles elimination goal. *Euro Surveill* 2010 Apr 29;15(17).
26. Hegasy G, Katzner K, Helle M, Mankertz A, Baumgarte S, Wille A, et al. Description of measles D4-Hamburg outbreak in Hamburg, Germany, December 2008 to June 2009, which disproportionately affected a local Roma community. *Euro Surveill* 2012;17(24).

27. Meldepflichtige Infektionskrankheiten in Hamburg 2009. Epidemiologischer Bericht. <http://www.hamburg.de/contentblob/2463562/data/jahresbericht-2009-infektionsepidemiologie.pdf>
28. Epidemiologisches Bulletin. Zu einem Masernausbruch bei Migranten in München (A measles outbreak among migrants in Munich) http://www.rki.de/cln_116/nn_1759378/DE/Content/Infekt/EpidBull/Archiv/2010/50_10.templateId=raw.property=publicationFile.pdf/50_10.pdf
29. Janta D, Stanescu A, Lupulescu E, Molnar G, Pistol A. Ongoing rubella outbreak among adolescents in Salaj, Romania, September 2011–January 2012. *Euro Surveill* 2012;17(7).
30. Rechel B, Blackburn CM, Spencer NJ, Rechel B. Access to healthcare for Roma children in Central and Eastern Europe: findings from a qualitative study in Bulgaria. *Int J Equity Health* 2009;8:24.
31. Open Society Foundations. Roma Health Mediators: Successes and Challenges. <http://www.soros.org/reports/roma-health-mediators-successes-and-challenges> [Accessed: 7 September 2012]
32. Cadger B. Gypsy/traveller numbers in the UK – a general overview 2012.
33. Traveller Population. 2006 <http://pavee.ie/ourgeels/traveller-population/>
34. Graigforth on behalf of Scottish Government. Gypsies/Travellers in Scotland: The Twice Yearly Count - No. 15: January 2009. A report by Craigforth on behalf of Scottish Government Social Research 2012. [Accessed: 27 April 2012].
35. Department for Communities and Local Government UK). Count of Gypsy and Traveller Caravans - July 2011. <http://www.communities.gov.uk/publications/corporate/statistics/caravancountjul2011> [Accessed: 27 April 2012]
36. Welsh Government. Gypsy and Traveller Caravan Count, January 2012. <http://wales.gov.uk/topics/statistics/headlines/housing2012/120314/?lang=en> [Accessed: 27 April 2012]
37. Travellers' Accommodation. Needs Assessment in Northern Ireland 2008. http://www.nihe.gov.uk/travellers_accommodation_needs_assessment_2008.pdf [Accessed: 27 April 2012]
38. Lowe R, Shaw W. Travellers: Voices of the New Age Nomads. Fourth Estate; London. 1993.
39. Gmelch S, Langan P. Tinkers and Travellers. O'Brien Press Ltd; 1975.
40. Department of Health and Children. All-Ireland Traveller Health Study. http://www.dohc.ie/publications/traveller_health_study.html [Accessed: 3 July 2012]
41. Hawes D. Gypsies, Travellers and the Health Service: A Study in Inequality . Bristol: The Policy Press;1997.
42. Cemlyn S, Greenfields M, Burnett S, Matthews Z, Whitwell C. Inequalities experienced by Gypsy and Traveller communities: A review. http://www.equalityhumanrights.com/uploaded_files/research/12inequalities_experienced_by_gypsy_and_traveller_communities_a_review.pdf [Accessed 3 July 2012]
43. Gee S, Cotter S, O'Flanagan D. Spotlight on measles 2010: measles outbreak in Ireland 2009-2010. *Euro Surveill* 2010 Mar 4;15(9).
44. Lovoll O, Vonen L, Nordbo SA, Vevatne T, Sagvik E, Vainio K, et al. Outbreak of measles among Irish Travellers in Norway: an update. *Euro Surveill* 2007 Jun;12(6):E070614.
45. Cohuet S, Bukasa A, Heathcock R, White J, Brown K, Ramsay M, et al. A measles outbreak in the Irish traveller ethnic group after attending a funeral in England, March-June 2007. *Epidemiol Infect* 2009 Dec;137(12):1759-65.
46. Grgic-Vitek M, Frelih T, Ucakar V, Prosenc K, Tomazic J, Petrovec M, et al. Spotlight on measles 2010: a cluster of measles in a hospital setting in Slovenia, March 2010. *Euro Surveill* 2010 May 20;15(20).
47. Reynolds F, Petrovic M, Will S, Dutton A, Paver K, Kirkpatrick A, et al. Management of measles in a traveller community: public health issues of trust, choice and communication. *Public Health* 2008 Apr;122(4):390-3.
48. United Nations. Recommendations on Statistics of International Migration. http://unstats.un.org/unsd/publication/SeriesM/SeriesM_58rev1E.pdf [Revision 1]. 1998. New York [Accessed 4 October 2012]
49. UNESCO. Social and Human Sciences. <http://www.unesco.org/new/en/social-and-human-sciences/themes/international-migration/glossary/migrant/> [Accessed 6 July 2012]
50. Vasileva K. EUROSTAT. Statistics in focus. 6.5% of the EU population are foreigners and 9.4% are born abroad. http://epp.eurostat.ec.europa.eu/cache/ITY_OFFPUB/KS-SF-11-034/EN/KS-SF-11-034-EN.PDF [Accessed 21 June 2012].
51. Decision No.1350/2007/EC of the European parliament and the council establishing a second programme of Community action in the field of health (2008-13). <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2007:301:0003:0013:en:PDF> [Accessed 22 June 2012]
52. Commission implementing decision on the adoption of the 2012 work plan, serving as a financing decision, in the framework of the second programme of Community action in the field of health (2008-2013), the selection, award and other criteria for financial contributions to the actions of this programme and on the EU payment to the WHO Framework Convention on Tobacco Control . http://ec.europa.eu/health/programme/docs/wp2012_en.pdf [Accessed 1 December 2011].
53. ECDC Technical report. Migrant health: Background note to the ECDC Report on migration and infectious diseases in the EU. http://www.ecdc.europa.eu/en/publications/Publications/0907_TER_Migrant_health_Background_note.pdf [Accessed 22 June 2012].
54. Vladimirova N, Kurchatova A, Minkova A. EpiSouth Project. Assessment of Countries Migration Status Profile and Vaccination Access of Mobile Population. http://www.episouth.org/outputs/wp7/WP7_9_Report_Assessment_Countries_Migration.pdf [Accessed 20 June 2012]

55. EpiSouth Project. Vaccine Preventable Diseases and Migrant Population in the Mediterranean Countries and Balkans. http://www.episouth.org/outputs/wp7/4_EpiSouth%20Strategic%20document%20on%20Vaccine%20Rev%20luglio%202010.pdf [Accessed 20 June 2012].
56. Ingham DASMLM. The protection of the rights and special needs of irregular immigrant minors and asylum seeking children. A thematic discussion paper prepared for the European Union Agency for Fundamental Rights by Eurasyllum Ltd. EU Agency for Fundamental Rights. http://fra.europa.eu/fraWebsite/attachments/FRA_Thematic_IMMIGRANT_AND_ASYLUM.pdf [Accessed 8 May 2012].
57. Platform for International Cooperation on Undocumented Migrants. Access to Healthcare for Undocumented Migrants in Europe. http://picum.org/picum.org/uploads/file_/Access_to_Health_Care_for_Undocumented_Migrants.pdf [Accessed 5 August 2012].
58. Hodgekiss CHE. Vaccination programme in Poland: are we missing a vulnerable population? *J Public Health* 2009 Dec 4;32(1):144.
59. Vainio K, Ronning K, Steen TW, Arnesen TM, Anestad G, Dudman S. Ongoing outbreak of measles in Oslo, Norway, January–February 2011. *Euro Surveill* 2011;16(8).
60. Borrás E, Dominguez A, Batalla J, Torner N, Cardenosa N, Nebot M, et al. Vaccination coverage in indigenous and immigrant children under 3 years of age in Catalonia (Spain). *Vaccine* 2007 Apr 20;25(16):3240-3.
61. Stefanoff P, Czarkowski MP. Measles in Poland in 2003. *Przegl Epidemiol* 2005;59(2):201-7.
62. Dominguez A, Torner N, Barrabeig I, Rovira A, Rius C, Cayla J, et al. Large outbreak of measles in a community with high vaccination coverage: implications for the vaccination schedule. *Clin Infect Dis* 2008 Nov 1;47(9):1143-9.
63. Lemos C, Ramirez R, Ordobas M, Guibert DH, Sanz JC, Garcia L, et al. New features of rubella in Spain: the evidence of an outbreak. *Euro Surveill* 2004 Apr;9(4):9-11.
64. Garcia L. Outbreak of rubella in the Madrid region, Spain, 2005. *Euro Surveill* 2005 Jul;10(7):E050707.
65. Sanz Moreno JC, Garcia CL, Ramirez FR, Ramos BB, Ordobas GM. [Evolution of measles, rubella and mumps from the third seroepidemiological survey in the autonomous region of Madrid, Spain]. *Rev Esp Salud Publica* 2009 Sep;83(5):625-37.
66. Poethko-Muller C, Ellert U, Kuhnert R, Neuhauser H, Schlaud M, Schenk L. Vaccination coverage against measles in German-born and foreign-born children and identification of unvaccinated subgroups in Germany. *Vaccine* 2009 Apr 28;27(19):2563-9.
67. Tuppin P, Blotiere PO. Hospitalization rates for immigrant-related illness among individuals with low income and full health insurance coverage in France, 2009. *Bull Soc Pathol Exot* 2012 Feb 3.
68. Poethko-Muller C, Mankertz A. Sero-epidemiology of measles-specific IgG antibodies and predictive factors for low or missing titres in a German population-based cross-sectional study in children and adolescents (KiGGS). *Vaccine* 2011 Oct 19;29(45):7949-59.
69. van der Wal MF, Diepenmaat AC, Pel JM, Hirasings RA. Vaccination rates in a multicultural population. *Arch Dis Child* 2005 Jan;90(1):36-40.
70. Pallasch G, Salman R, Hartwig C. [Improvement of protection given by vaccination for socially underprivileged groups on the basis of a 'key persons approach' – results of an intervention based on cultural and language aspects for children of immigrants in Altlander Viertel provided by the Health Department of Stade]. *Gesundheitswesen* 2005 Jan;67(1):33-8.
71. Wikipedia. Bible Belt (Netherlands). [http://en.wikipedia.org/wiki/Bible_Belt_\(Netherlands\)](http://en.wikipedia.org/wiki/Bible_Belt_(Netherlands)) [Accessed 4 November 2012]
72. Woonink F. Objections against vaccination. The perspective of those who refuse. http://www.rivm.nl/en/Images/000652%20Bezw%20tegen%20vacc%20EN_tcm13-67802.pdf [Accessed 18 April 2012]
73. Wikipedia. History of the Jews in Antwerp. http://en.wikipedia.org/wiki/History_of_the_Jews_in_Antwerp [Accessed 4 November 2012]
74. NHS, East London and the City. City and Hackney Health and Wellbeing Profile 2011/12. Our Joint Strategic Needs Assessment. http://www.cityoflondon.gov.uk/NR/rdonlyres/CC44FE34-51D2-4E9B-8F1E-6D5BE3063283/0/BC_RS_H_WPH_CFINAL200110.pdf [Accessed 4 October 2012]
75. Henderson L, Millett C, Thorogood N. Perceptions of childhood immunization in a minority community: qualitative study. *J R Soc Med* 2008 May;101(5):244-51.
76. Edelstein M, Turbitt D, Balogun K, Figueroa J, Nixon G. Hepatitis A outbreak in an Orthodox Jewish community in London, July 2010. *Euro Surveill* 2010 Sep 16;15(37).
77. Coleman-Brueckheimer K, Dein S. Healthcare behaviours and beliefs in Hasidic Jewish populations: a systematic review of the literature. *J Relig Health* 2011 Jun;50(2):422-36.
78. Muhsen K, Abed El-Hai R, Amit-Aharon A, Nehama H, Gondia M, Davidovitch N, et al. Risk factors of underutilization of childhood immunizations in ultra-Orthodox Jewish communities in Israel despite high access to healthcare services. *Vaccine* 2012 Mar 9;30(12):2109-15.
79. Ruijs WL, Hautvast JL, van Ansem WJ, Akkermans RP, Van't Spijker K, Hulscher ME, et al. Measuring vaccination coverage in a hard-to-reach minority. *Eur J Public Health* 2011 Jun 29.
80. Ruijs WL, Hautvast JL, van d, V, de VS, Knippenberg H, Hulscher ME. Religious subgroups influencing vaccination coverage in the Dutch Bible Belt: an ecological study. *BMC Public Health* 2011;11:102.
81. van den Hof S, Meffre CM, Conyn-van Spaendonck MA, Woonink F, de Melker HE, van Binnendijk RS. Measles outbreak in a community with very low vaccine coverage, the Netherlands. *Emerg Infect Dis* 2001;7(3 Suppl):593-7.

82. Lernout T, Kissling E, Hutse V, De SK, Top G. An outbreak of measles in Orthodox Jewish communities in Antwerp, Belgium, 2007-2008: different reasons for accumulation of susceptibles. *Euro Surveill* 2009 Jan 15;14(2).
83. Cohen B, McCann R, van den Bosch C, White J. Outbreak of measles in an Orthodox Jewish community. *Eurosurveillance* 2000 Jan 19;4(3).
84. Van Den Bosch CA, Cohen B, Walters T, Jin L. Mumps outbreak confined to a religious community. *Euro Surveill* 2000 May;5(5):58-60.
85. van den Hof S, Conyn-van Spaendonck MA, van Steenberghe JE. Measles epidemic in the Netherlands, 1999-2000. *J Infect Dis* 2002 Nov 15;186(10):1483-6.
86. NHS City and Hackney. Measles outbreak in Hackney. <http://www.cityandhackney.nhs.uk/news/measles-outbreak-in-hackney.aspx>. 2012. 10-4-2012.
87. Heathcock R, Watts C. Measles outbreaks in London, United Kingdom - a preliminary report. *Euro Surveill* 2008 Apr 10;13(15).
88. Ashmore J, Addiman S, Cordery R, Maguire H. Measles in North East and North Central London, England: a situation report. *Euro Surveill* 2007 Sep;12(9):E070920.
89. Noury U, Stoll J, Haeghebaert S, Antona D, Parent dC, I. Outbreak of measles in two private religious schools in Bourgogne and Nord-Pas-de-Calais regions of France, May-July 2008 (preliminary results). *Euro Surveill* 2008 Aug 28;13(35).
90. Parent dC, I, Antona D, Freymuth F, Muscat M, Halftermeyer-Zhou F, Maine C, et al. Spotlight on measles 2010: update on the ongoing measles outbreak in France, 2008-2010. *Euro Surveill* 2010 Sep 9;15(36).
91. Karagiannis I, van LA, van BR, Ruijs H, Ruijs H, Fanoy E, et al. Mumps in a community with low vaccination coverage in the Netherlands. *Euro Surveill* 2008 Jun 12;13(24).
92. Hahne S, Macey J, Tipples G, Varughese P, King A, van BR, et al. Rubella outbreak in an unvaccinated religious community in the Netherlands spreads to Canada. *Euro Surveill* 2005 May;10(5):E050519.
93. van d, V, Hahne S, Ruijs H, van BR, Timen A, van Loon AM, et al. Rubella outbreak in an unvaccinated religious community in the Netherlands leads to cases of congenital rubella syndrome. *Euro Surveill* 2005;10(11):E051124.
94. Asnong C, Van HK, Lernout T, Theeten H, Van DP. Lessons learned from a measles outbreak in Antwerp, Belgium 2007-2008. *Pediatr Infect Dis J* 2011 Apr;30(4):343-5.
95. European Agency for Development in Special Needs Education. Special needs education within the education system - Netherlands. <http://www.european-agency.org/country-information/netherlands/national-overview/special-needs-education-within-the-education-system> [Accessed 11 May 2012]
96. Steiner R. *Anthroposophical Leading Thoughts. Anthroposophy as a Path of Knowledge*. 6th ed. ed. London: The Rudolf Steiner Publishing Co.;1973.
97. Waldorf answers. What is an anthroposophy? <http://www.waldorfanswers.com/Anthroposophy.htm> [Accessed 10 April 2012]
98. The anthroposophical society in Ireland. <http://www.anthroposophy.ie/> [Accessed 25 April 2012]
99. General Anthroposophical Society. <http://www.goetheanum.org/336.html?&L=1> [Accessed 27 March 2012]
100. World list of Rudolf Steiner (Waldorf) schools and teacher training centers. <http://www.waldorfschule.info/upload/pdf/schulliste.pdf> [Accessed 27 March 2012]
101. The regulatory status of complementary and alternative medicine for medical doctors in Europe. http://www.camdoc.eu/Pdf/CAMDOCREgulatoryStatus8_10.pdf [Accessed 27 March 2012]
102. Statement of ECSWE on the Question of Vaccination. http://www.steinerwaldorfeurope.org/downloads/statements/ecswe_vaccinationstatement.pdf [Accessed 27 March 2012]
103. The Waldorf Education. Open Waldorf.com. Health and Safety. <http://www.openwaldorf.com/health.html> [Accessed 4 April 2012]
104. Bussing A, Ostermann T, Heusser P, Matthiessen PF. Usage of alternative medical systems, acupuncture, homeopathy and anthroposophic medicine, by older German adults. *Zhong Xi Yi Jie He Xue Bao* 2011 Aug;9(8):847-56.
105. Kienle GS, Glockmann A, Grugel R, Hamre HJ, Kiene H. [Clinical research on anthroposophic medicine:update of a health technology assessment report and status quo]. *Forsch Komplementmed* 2011;18(5):269-82.
106. Hamre HJ, Glockmann A, Troger W, Kienle GS, Kiene H. Assessing the order of magnitude of outcomes in single-arm cohorts through systematic comparison with corresponding cohorts: an example from the AMOS study. *BMC Med Res Methodol* 2008;8:11.
107. Schmid D, Holzmann H, Schwarz K, Kasper S, Kuo HW, Aberle SW, et al. Measles outbreak linked to a minority group in Austria, 2008. *Epidemiol Infect* 2010 Mar;138(3):415-25.
108. van VE, de CE, van BR, Hahne S. Measles outbreak in an anthroposophic community in The Hague, The Netherlands, June-July 2008. *Euro Surveill* 2008 Jul 31;13(31).
109. Batzing-Feigenbaum J, Pruckner U, Beyer A, Sinn G, Dinter A, Mankertz A, et al. Spotlight on measles 2010: preliminary report of an ongoing measles outbreak in a subpopulation with low vaccination coverage in Berlin, Germany, January-March 2010. *Euro Surveill* 2010;15(13).
110. Arenz S, Kalies H, Ludwig MS, Hautmann W. Der Masernausbruch in Coburg. Was lässt sich daraus lernen? *Medizin* 2003;100(49):A3245-A3249.

111. Hanratty B, Holt T, Duffell E, Patterson W, Ramsay M, White JM, et al. UK measles outbreak in non-immune anthroposophic communities: the implications for the elimination of measles from Europe. *Epidemiol Infect* 2000 Oct;125(2):377-83.
112. Wadl M, Siedler A, Kramer W, Haindl ME, Gebrande S, Krenn-Lanzl I, et al. Measles transmission from an anthroposophic community to the general population, Germany 2008. *BMC Public Health* 2011;11:474.
113. *Epidemiologisches Bulletin*. Masernausbuch an einer Waldorfschule in Essen (Measles outbreak at a Waldorf school in Essen). http://www.rki.de/cln_162/nn_1759378/DE/Content/Infekt/EpidBull/Archiv/2010/23_10,templateld=raw,property=publicationFile.pdf/23_10.pdf [4 April 2012].
114. *Epidemiologisches Bulletin*. Zwei Masernvirus-Varianten in einem großen Ausbruch an einer Waldorfschule in Baden-Württemberg, 2011. http://www.rki.de/DE/Content/Infekt/EpidBull/Archiv/2012/Ausgaben/19_12.pdf?__blob=publicationFile
115. Schmid D, Holzmann H, Abele S, Kasper S, König S, Meusburger S, et al. An ongoing multi-state outbreak of measles linked to non-immune anthroposophic communities in Austria, Germany, and Norway, March-April 2008. *Euro Surveill* 2008 Apr 17;13(16).
116. Siedler A, Tischer A, Mankertz A, Santibanez S. Two outbreaks of measles in Germany 2005. *Euro Surveill* 2006;11(4):131-4.
117. Wichmann O, Siedler A, Sagebiel D, Hellenbrand W, Santibanez S, Mankertz A, et al. Further efforts needed to achieve measles elimination in Germany: results of an outbreak investigation. *Bull World Health Organ* 2009 Feb;87(2):108-15.
118. *Okologisk landsby strides over maeslingevaccine* (in Danish). <http://www.bt.dk/sygdomme/oekologisk-landsby-strides-over-maeslingevaccine> [Accessed 6 June 2012]
119. Sabbe M, Hue D, Hutse V, Goubau P. Measles resurgence in Belgium from January to mid-April 2011: a preliminary report. *Euro Surveill* 2011;16(16).
120. Duffell E. Attitudes of parents towards measles and immunisation after a measles outbreak in an anthroposophical community. *J Epidemiol Community Health* 2001 Sep;55(9):685-6.
121. Schönberger K, Grote V, von Kries R. Risikofaktoren für eine verspätete oder nicht erfolgte Masernimpfung bei Kleinkindern. <http://www.rki.de/DE/Content/Service/Publikationen/Bundesgesundheitsblatt.html> [Accessed 6 June 2012]
122. NICE public health guidance 21. Reducing differences in the uptake of immunisations (including targeted vaccines) among children and young people aged under 19 years. <http://www.nice.org.uk/nicemedia/live/12247/45497/45497.pdf>. [Accessed 6 June 2012].
123. Gesellschaft Anthroposophischer Ärzte in Deutschland. http://www.gaed.de/fileadmin/gaad/PDF/Aktuelles/Leitlinien/Masern-Leitlinie_2009.pdf [Accessed 21 August 2012]
124. Impfschutz im Dialog. Ein gemeinsames Projekt. http://nationale-impfkonferenz.de/doc/berichtsband_1nik.pdf
125. Hameen-Anttila KP, Niskala UR, Siponen SM, Ahonen RS. The use of complementary and alternative medicine products in preceding two days among Finnish parents - a population survey. *BMC Complement Altern Med* 2011;11:107.
126. Hanssen B, Grimsgaard S, Launso L, Fonnebo V, Falkenberg T, Rasmussen NK. Use of complementary and alternative medicine in the Scandinavian countries. *Scand J Prim Healthcare* 2005 Mar;23(1):57-62.
127. Thomas K, Coleman P. Use of complementary or alternative medicine in a general population in Great Britain. Results from the National Omnibus survey. *J Public Health (Oxf)* 2004 Jun;26(2):152-7.
128. Menniti-Ippolito F, Gargiulo L, Bologna E, Forcella E, Raschetti R. Use of unconventional medicine in Italy: a nation-wide survey. *Eur J Clin Pharmacol* 2002 Apr;58(1):61-4.
129. Schwarz S, Messerschmidt H, Völzke H, Hoffmann W, Lucht M, Dören M. Use of complementary medicinal therapies in West Pomerania: a population-based study. <http://informahealthcare.com/doi/abs/10.1080/13697130801930674> 11[2], 124-134. 2008. [Accessed 3 July 2012]
130. Fonnebo V, Launso L. High use of complementary and alternative medicine inside and outside of the government-funded healthcare system in Norway. *J Altern Complement Med* 2009 Oct;15(10):1061-6.
131. National Center for Complementary and Alternative Medicine (NCCAM). The Use of Complementary and Alternative Medicine in the United States. http://nccam.nih.gov/news/camstats/2007/camsurvey_fs1.htm [Accessed 3 July 2012]
132. Terminology and definition of CAM methods. <http://www.cambrella.eu/home.php?il=67&l=deu> [Accessed 3 July 2012]
133. Last JM. *A Dictionary of Public Health* 2007. First Edition. OUP USA; Dec 2006 [Accessed 3 July 2012]
134. The Society of Homeopaths representing professional homeopaths. What is homeopathy? <http://www.homeopathy-soh.org/about-homeopathy/what-is-homeopathy/> [Accessed 5 September 2012]
135. Directive 2001/83/EC of the European Parliament and of the Council of 6 November 2001 on the Community code relating to medicinal products for human use. <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32001L0083:EN:HTML> [Accessed 3 July 2012].
136. Government Response to the Science and Technology Committee report 'Evidence Check 2: Homeopathy'. http://www.dh.gov.uk/prod_consum_dh/groups/dh_digitalassets/@dh/@en/@ps/documents/digitalasset/dh_11781_1.pdf [Accessed 3 July 2012]
137. Ernst E. Rise in popularity of complementary and alternative medicine: reasons and consequences for vaccination. *Vaccine* 2001 Oct 15;20 Suppl 1:S90-S93.
138. European Central Council of Homeopaths (ECCH). <http://www.homeopathy-ecch.org/index.php?option=content&task=view&id=14> [Accessed 5 September 2012]

139. Zuzak TJ, Zuzak-Siegrist I, Rist L, Staubli G, Simoes-Wust AP. Attitudes towards vaccination: users of complementary and alternative medicine versus non-users. *Swiss Med Wkly* 2008 Nov 29;138(47-48):713-8.
140. Smith PJ, Humiston SG, Marcuse EK, Zhao Z, Dorell CG, Howes C, et al. Parental delay or refusal of vaccine doses, childhood vaccination coverage at 24 months of age, and the Health Belief Model. *Public Health Rep* 2011 Jul;126 Suppl 2:135-46.
141. Schmidt K, Ernst E. MMR vaccination advice over the Internet. *Vaccine* 2003 Mar 7;21(11-12):1044-7.
142. Lehrke P, Nuebling M, Hofmann F, Stoessel U. Attitudes of homeopathic physicians towards vaccination. *Vaccine* 2001 Sep 14;19(32):4859-64.
143. Jessop LJ, Murrin C, Lotya J, Clarke AT, O'Mahony D, Fallon UB, et al. Socio-demographic and health-related predictors of uptake of first MMR immunisation in the Lifeways Cohort Study. *Vaccine* 2010 Aug 31;28(38):6338-43.
144. Sulfaro F, Fasher B, Burgess MA. Homeopathic vaccination. What does it mean? Immunisation Interest Group of the Royal Alexandra Hospital for Children. *Med J Aust* 1994 Sep 5;161(5):305-7.
145. British homeopathic association. <http://www.britishhomeopathic.org/faqs.html> [Accessed 3 July 2012].
146. Fedeli U, Zanetti C, Saia B. Susceptibility of healthcare workers to measles, mumps rubella and varicella. *J Hosp Infect* 2002 Jun;51(2):133-5.
147. Maltezos HC, Lourida A, Katragkou A, Grivea IN, Katerelos P, Wicker S, et al. Attitudes Regarding Occupational Vaccines and Vaccination Coverage Against Vaccine-preventable Diseases Among Healthcare Workers Working in Pediatric Departments in Greece. *Pediatr Infect Dis J* 2012 Jun;31(6):623-5.
148. Wicker S, Rabenau HF, Pfeilschifter JM, Gottschalk R. [Measles in 2010. Knowledge and vaccination status of medical students]. *Bundesgesundheitsblatt Gesundheitsforschung Gesundheitsschutz* 2011 Feb;54(2):238-42.
149. Guthmann JP, Fonteneau L, Ciotti C, Bouvet E, Pellissier G, Levy-Bruhl D, et al. Vaccination coverage of healthcare personnel working in healthcare facilities in France: Results of a national survey, 2009. *Vaccine* 2012 May 10.
150. Komitova R, Kunchev A, Mihneva Z, Marinova L. Nosocomial transmission of measles among healthcare workers, Bulgaria, 2010. *Euro Surveill* 2011;16(15).
151. Botelho-Nevers E, Cassir N, Minodier P, Laporte R, Gautret P, Badiaga S, et al. Measles among healthcare workers: a potential for nosocomial outbreaks. *Euro Surveill* 2011;16(2).
152. Delgado de Los RJ, Arencibia JM, Navarro GJ, Alonso EE, Garcia PP, Banqueri GE, et al. Ongoing measles outbreak in Elche, Spain, 29 January to 9 March 2012. *Euro Surveill* 2012;17(11).
153. de Swart RL, Wertheim-van Dillen PM, van Binnendijk RS, Muller CP, Frenkel J, Osterhaus AD. Measles in a Dutch hospital introduced by an immuno-compromised infant from Indonesia infected with a new virus genotype. *Lancet* 2000 Jan 15;355(9199):201-2.
154. Grgic-Vitek M, Frelih T, Ucakar V, Prosenec K, Tomazic J, Petrovec M, et al. Spotlight on measles 2010: a cluster of measles in a hospital setting in Slovenia, March 2010. *Euro Surveill* 2010 May 20;15(20).
155. Perucha M, Ramalle-Gomara E, Lezaun ME, Blanco A, Quinones C, Blasco M, et al. A measles outbreak in children under 15 months of age in La Rioja, Spain, 2005-2006. *Euro Surveill* 2006;11(10):267-70.
156. Boncompagni G, Incandela L, Bechini A, Giannini D, Cellini C, Trezzi M, et al. Measles outbreak in Grosseto, central Italy, 2006. *Euro Surveill* 2006;11(8):E060803.
157. van Binnendijk RS, Hahne S, Timen A, van KG, Kohl RH, Boot HJ, et al. Air travel as a risk factor for introduction of measles in a highly vaccinated population. *Vaccine* 2008 Oct 29;26(46):5775-7.
158. Waku-Kouomou D, Freymuth F, du Chatelet IP, Wild TF, Horvat B. Co-circulation of multiple measles virus genotypes during an epidemic in France in 2008. *J Med Virol* 2010 May;82(6):1033-43.
159. Follin P, Dotevall L, Jertborn M, Khalid Y, Liljeqvist JA, Muntz S, et al. Effective control measures limited measles outbreak after extensive nosocomial exposures in January-February 2008 in Gothenburg, Sweden. *Euro Surveill* 2008 Jul 24;13(30).
160. Caputi G, Tafuri S, Chironna M, Martinelli D, Sallustio A, Falco A, et al. An outbreak of measles including nosocomial transmission in Apulia, south-east Italy, January-March 2008--a preliminary report. *Euro Surveill* 2008 Apr 17;13(16).
161. Muscat M, Hartvig CA, Bottiger BE, Plesner A, Glismann S. A cluster of measles cases in Denmark following importation, January and February 2008. *Euro Surveill* 2008 Feb 28;13(9).
162. Groth C, Bottiger B, Plesner A, Christiansen A, Glismann S, Hogh B. Nosocomial measles cluster in Denmark following an imported case, December 2008-January 2009. *Euro Surveill* 2009 Feb 26;14(8).
163. Monsel G, Rapp C, Duong TA, Farhi D, Bouaziz JD, Meyssonier V, et al. [Measles in adults: an emerging disease not sparing medical staff]. *Ann Dermatol Venerol* 2011 Feb;138(2):107-10.
164. Ziegler E, Roth C, Wreghitt T. Prevalence of measles susceptibility among healthcare workers in a UK hospital. Does the UK need to introduce a measles policy for its healthcare workers? *Occup Med (Lond)* 2003 Sep;53(6):398-402.
165. Trevisan A, Morandin M, Frasson C, Paruzzolo P, Davanzo E, Marco LD, et al. Prevalence of childhood exanthematic disease antibodies in paramedical students: need of vaccination. *Vaccine* 2006 Jan 12;24(2):171-6.
166. Freund R. Measles immunity and measles vaccine acceptance among healthcare workers in Paris, France. *ECCMID 2012*. http://registration.akm.ch/einsicht.php?XNABSTRACT_ID=144444&XNSPRACHE_ID=2&XNKONGRESS_ID=161&XNMASKEN_ID=900 [Accessed 31 March 2012].
167. Maltezos HC, Wicker S, Borg M, Heiningen U, Puro V, Theodoridou M, et al. Vaccination policies for health-care workers in acute health-care facilities in Europe. *Vaccine* 2011 Nov 28;29(51):9557-62.
168. Pezzoli L, Noakes K, Gates P, Begum F, Pebody RG. Can we know the immunization status of healthcare workers? Results of a feasibility study in hospital trusts, England, 2008. *Epidemiol Infect* 2010 Jan;138(1):45-52.

169. Botelho-Nevers E, Cassir N, Minodier P, Laporte R, Gautret P, Badiaga S, et al. Measles among healthcare workers: a potential for nosocomial outbreaks. *Euro Surveill* 2011;16(2).
170. Komitova R, Kunchev A, Mihneva Z, Marinova L. Nosocomial transmission of measles among healthcare workers, Bulgaria, 2010. *Euro Surveill* 2011;16(15).
171. Freund R, Krivine A, Prevost V, Cantin E, Aslangul E. Measles immunity and measles vaccine acceptance among healthcare workers in Paris, France. Abstract.22nd European Congress of Clinical Microbiology and Infectious Diseases(ECCMID) [Accessed 31 March 2012]
172. Health of migrants - the way forward. Report of a global consultation. http://www.who.int/hac/events/consultation_report_health_migrants_colour_web.pdf [Accessed 7 November 2012]
173. ECDC. Technical document.Conducting health communication activities on MMR vaccination. http://www.ecdc.europa.eu/en/publications/Publications/1008_TED_conducting_health_communication_activities_on_MMR_vaccination.pdf [Accessed 7 November 2012].
174. ECDC. Technical document.Communication on immunisation - Building trust. <http://ecdc.europa.eu/en/publications/Publications/TER-Immunisation-and-trust.pdf> [Accessed 7 November 2012]
175. European Union Agency for Fundamental Rights. Migrants in an irregular situation: access to healthcare in 10 European Union Member States. http://fra.europa.eu/fraWebsite/research/publications/publications_per_year/pub_irregular-migrants-healthcare_en.htm [Accessed 7 November 2012]
176. Council of Europe. Breaking the Barriers – Romani Women and Access to Public Healthcare. <http://fra.europa.eu/fraWebsite/attachments/ROMA-HC-EN.pdf> [Accessed 7 November 2012]
177. Council of the European Union. Council conclusions on Childhood immunisation: successes and challenges of European childhood immunisation and the way forward. http://www.consilium.europa.eu/uedocs/cms_Data/docs/pressdata/en/lsa/122391.pdf [Accessed 7 November 2012]