

# Differences in national influenza vaccination policies across the European Union, Norway and Iceland 2008-2009

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In 2009 the second cross-sectional web-based survey was undertaken by the Vaccine European New Integrated Collaboration Effort (VENICE) project across 27 European Union (EU) member states (MS), Norway and Iceland (n=29) to determine changes in official national seasonal influenza vaccination policies since a survey undertaken in 2008 and to compare the estimates of vaccination coverage between countries using data obtained from both surveys. Of 27 responding countries, all recommended vaccination against seasonal influenza to the older adult population. Six countries recommended vaccination of children aged between six months and <18 years old. Most countries recommended influenza vaccination for those individuals with chronic medical conditions. Recommendations for vaccination of healthcare workers (HCW) in various settings existed in most, but not all countries. Staff in hospitals and long-term care facilities were recommended vaccination in 23 countries, and staff in out-patient clinics in 22 countries. In the 2009 survey, the reported national estimates on vaccine coverage varied by country and risk group, ranging from 1.1% - 82.6% for the older adult population; to between 32.9% -71.7% for clinical risk groups; and from 13.4% -89.4% for HCW. Many countries that recommend the influenza vaccination do not monitor the coverage in risk groups. In 2008 and 2009 most countries recommended influenza vaccination for the main risk groups. However, despite general consensus and recommendations for vaccination of high risk groups many countries do not achieve high coverage in these groups. The reported vaccination coverage still needs to be improved in order to achieve EU and World Health Organization goals.

## Background

Influenza has a large impact on both individuals and the general population and can cause severe disease and deaths. The disease burden varies from year to year among countries, making it hard to estimate the annual number of deaths or economic impact. Large numbers of mild to moderate cases can result in time off work and losses to production as well as increased pressure on and costs to the health and social care services.

The estimated excess of deaths due to influenza in milder influenza seasons was around eight deaths per 100,000 population; in more severe inter-pandemic years 44 per 100,000 [1]. Another study found an average of 25 excess deaths per 100,000 between 1989 and 1998 [2]. Applying the above estimated excess mortality attributable to seasonal influenza to the European Union (EU) population, approximately 500 million in 2008, would result in between 40,000 excess deaths in a moderate season and 220,000 in a severe season [3]. These are crude figures and are not adjusted for influenza vaccination coverage in vulnerable groups or the rising proportion of very old and vulnerable people in European countries.

However, during the 2009 A(H1N1) pandemic only 4,879 A(H1N1)-associated deaths were reported to the World Health Organization (WHO) Regional Office for Europe. Excess deaths and the crude figures provided above should however be interpreted with caution.

In 2003, the World Health Assembly (WHA) of the WHO recommended increasing seasonal influenza vaccination coverage to all people at high risk of influenza or

its complications, with the goal of attaining at least 50% vaccination coverage of the elderly population by 2006 and 75% by 2010 [4].

On 13 July 2009 the European Council of Ministers recommended that EU Member States (MS) adopt and implement national action plans to achieve a vaccination coverage rate of 75% in all at risk groups by the winter season of 2014-15. Risk groups were defined as individuals 65 years and older, and people with underlying medical conditions in the following categories: chronic respiratory and cardiovascular diseases; chronic metabolic disorders; chronic renal and hepatic

diseases; immune system dysfunctions (congenital or acquired) [5].

Since late 2007, the Vaccine European New Integrated Collaboration Effort (VENICE) Project, in collaboration with the European Centre for Disease Prevention and Control (ECDC), 27 EU and two European Economic Area (EEA) MS, conducted two surveys regarding national seasonal influenza vaccination in these countries [6].

The first survey, conducted in January 2008, provided baseline information on seasonal influenza vaccination policies and immunisation programmes in EU/EEA MS,

**TABLE 1**

Age groups for which influenza immunisation is recommended, without other risk indication: national seasonal influenza vaccination survey in Europe, July 2009 (n=27 participating countries)

Age group/ Country	Children (months/years)			Adults (years)						
	6 months- 2 years	6 months- 3 years	6 months- < 18 years	> 18 - 49	> 18 - 64	≥ 50	≥ 55	≥ 59	≥ 60	≥ 65
Austria			X	X		X				
Belgium										X
Cyprus										X
Czech Republic										X
Denmark										X
Estonia			X	X	X					X
Finland		X								X
France										X
Germany									X	
Greece									X	
Hungary									X	
Iceland									X	
Ireland <sup>a</sup>						X <sup>a</sup>				
Italy										X
Latvia	X									X
Lithuania										X
Malta							X			
the Netherlands									X	
Norway										X
Poland							X			
Portugal										X
Romania										X
Slovakia			X					X		
Slovenia	X									X
Spain										X
Sweden										X
United Kingdom										X

<sup>a</sup> In Ireland vaccination is recommended for the ≥ 50 age group but only the ≥ 65 age group routinely qualifies for free vaccination.

identified specific recommendations for different risk groups in each country and obtained vaccination coverage data for the 2006-7 or previous influenza seasons [7,8].

The second survey, conducted in July 2009, sought information on changes in seasonal influenza vaccination policy since the first survey. Updated information on vaccination coverage for the 2007-8 influenza season was also collected in the EU/EEA MS in order to compare it between countries and to identify trends. Additionally, vaccination coverage was investigated at the sub-national level. The final report of survey will be available on the VENICE website following publication of this paper (<http://venice.cineca.org>) [6].

## Methods

A cross-sectional web-based survey was undertaken. This survey was a collaborative study between the ECDC, the VENICE project and EU/EEA MS. Gatekeepers, experts who represent national public health institutions and other national contact points had previously been identified. They are responsible for conducting all

VENICE surveys in their respective countries [6]. There are currently 27 EU and two EEA (Norway and Iceland) participating countries in the VENICE project.

The questionnaire used in the 2009 survey was based on the one used for the 2008 survey [7]. The web-based platform was developed by a non-profit consortium of universities (CINECA, Bologna, Italy), and the survey was made available on the platform to all participating countries [9]. Gatekeepers in each MS entered data directly on-line. The questionnaire contained prefilled data from the previous survey and gatekeepers had to update them if necessary. MS were asked to complete the electronic questionnaire in July to August 2009. Gatekeepers were asked to validate data contained in the draft report.

The survey questionnaire used predominantly closed questions. The questionnaire consisted of two parts: the main survey in which questions remained essentially the same as in the 2008 survey and the second part where countries were requested to provide vaccination coverage data at sub-national level if available.

**TABLE 2**

Underlying/medical conditions, occupational settings and other groups for which influenza immunisation is recommended without regard to age: national seasonal influenza vaccination survey in Europe, July 2009

	Number of countries where vaccination is recommended (%)
<b>Medical/Underlying conditions</b>	
Chronic pulmonary diseases	27 (100)
Cardiovascular disease	27 (100)
Renal disease	25 (93)
Hepatic disease <sup>a</sup>	15 (58)
Haematological or metabolic disorders	26 (96)
Diseases of the immune system	25 (93)
HIV/AIDS <sup>a</sup>	24 (92)
Children taking aspirin <sup>a</sup>	18 (69)
Pregnancy	10 (37)
Any condition that may compromise respiratory function	12 (44)
<b>Occupational setting</b>	
Hospitals	23 (85)
Long-term care facilities	23 (85)
Out-patient care clinics	22 (81)
Laboratory staff <sup>a</sup>	8 (31)
Essential services (police, firemen)	6 (22)
Veterinary services	9 (33)
Poultry industry	13 (48)
Families that raise poultry <sup>a</sup>	4 (15)
Military	6 (22)
<b>Other groups</b>	
Residents of long-term care facilities	22 (81)
Household contacts for whom vaccination is recommended	14 (52)

<sup>a</sup> Twenty six countries responded to these questions. Percentage calculated from 26.

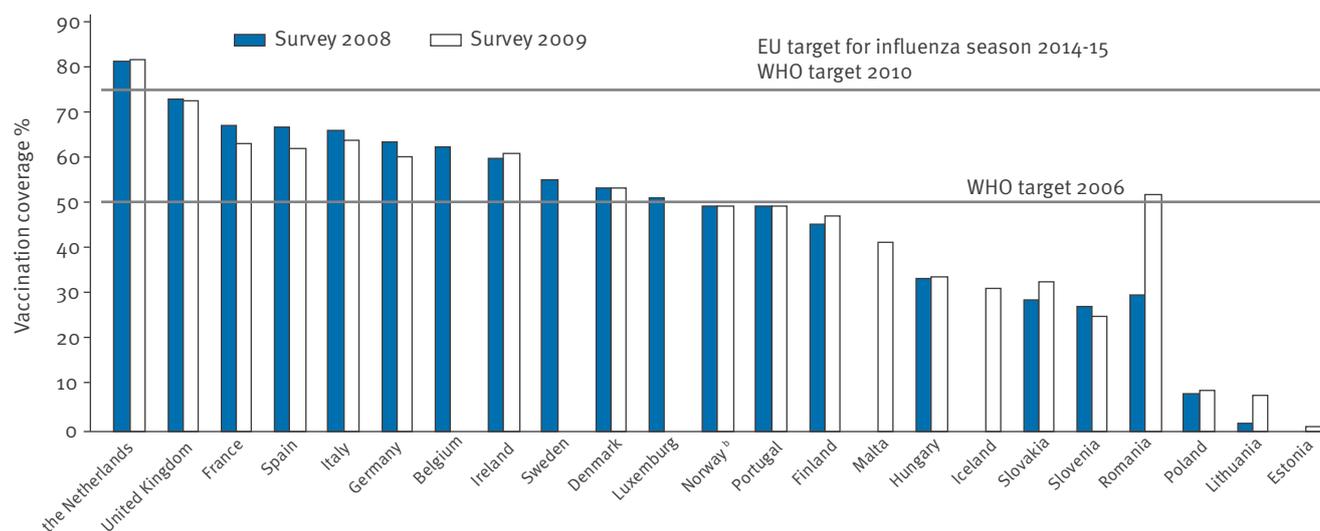
Information sought in the questionnaire related to which population groups were recommended for influenza vaccination (by age, occupation, medical risk or social situation), recent vaccination coverage results by population group, season and sub-national level

and planned policy- or operational changes over the next two years.

We compared vaccination coverage for the elderly population, clinical risk groups and healthcare workers

**FIGURE 1**

Vaccination coverage for seasonal influenza among the elderly in EU/EEA<sup>a</sup> countries: national seasonal influenza vaccination surveys in Europe, January 2008 and July 2009



WHO: the World Health Organization.

<sup>a</sup> For 23 EU/EEA Member States.

<sup>b</sup> Vaccine coverage calculated for the over 65 age group and clinical risk groups together.

Vaccine coverage data for Survey 2008: Belgium – 2003-4 influenza season; Germany, Poland – 2005-6 influenza season; the remaining countries – 2006-7 influenza season.

For Survey 2009 all countries reported vaccination coverage data for the 2007-8 influenza season.

The age limit for elderly varies by country from between 50 and ≥65.

**TABLE 3**

Vaccination coverage for seasonal influenza for clinical risk groups and/or HCW in 11 EU/EEA countries: national seasonal influenza vaccination surveys in Europe, January 2008 and July 2009<sup>a</sup>

	Vaccination coverage for clinical risk groups (%)		Vaccination coverage for HCW (%)	
	Survey 2008	Survey 2009	Survey 2008	Survey 2009
the Netherlands	75.2	71.7	-	-
Norway <sup>b</sup>	50	50	-	-
Germany	48.5	49	27	23
Belgium	47	-	-	-
United Kingdom	42.1	45.3	14	13.4
France	35	52	48	-
Hungary	-	32.9	23.7	23.5
Ireland	27.6	-	20	-
Romania	-	-	-	89.4
Portugal	-	-	40	26
Spain	-	-	34.9	28.1

EEA: European Economic Area; EU: European Union; HCW: Healthcare workers

<sup>a</sup> EU target for influenza season 2014-15 – 75%.

<sup>b</sup> Vaccine coverage was calculated for the ≥65 age group and clinical risk groups together.

Influenza season provided for clinical groups for Survey 2008: Belgium 2003-4; Germany, Ireland – 2005-6; the remaining countries – 2006-7.

Influenza season provided for HCW for Survey 2008: France – 2004-5; Germany, Ireland – 2005-6; the remaining countries – 2006-7.

All countries reported vaccination coverage data for Survey 2009 for the 2007-08 influenza season.

(HCW) obtained from the two consecutive surveys. As the influenza season for which vaccination coverage data was reported by country varied, we refer to vaccination coverage data as that reported in 'Survey 2008' (influenza seasons 2003-4 to 2006-7) or 'Survey 2009' (influenza season 2007-8) in the paper. The data on influenza policy changes refer to the 2008-9 influenza season. Data in relation to future changes related to the influenza season 2009-10, before knowledge of the pandemic influenza A(H1N1) virus.

The data presented in this paper on number of doses of influenza vaccine used in MS per 10,000 population at risk, was calculated using EU country specific estimates of the population for the two major risk groups (elderly population and clinical risk groups) as calculated by ECDC in August 2008 using methodology described by Fleming and Eliot [10,11]. Data for the number of vaccine doses used were provided by gatekeepers and are presented by influenza season. The number of doses used was not accounted for if children were recommended to receive two vaccine doses. Our data is unable to identify doses by age group.

The elderly population was defined as those individuals for whom seasonal influenza vaccine was recommended by age in each country. The age limit for influenza vaccine recommendation in elderly varied by country from 50 to  $\geq 65$  years of age.

## Results

In total, 27 of 29 countries responded to the questionnaire. Bulgaria and Luxembourg did not respond to the questionnaire.

## Groups recommended for vaccine

### Age groups

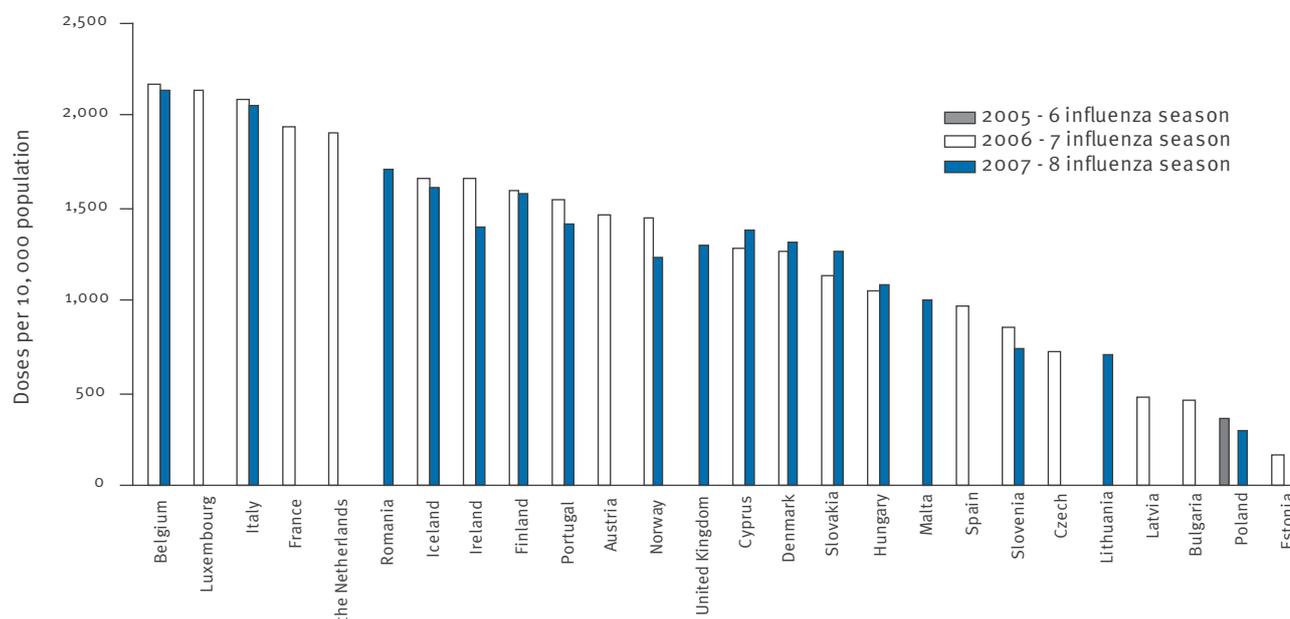
Two countries (Austria and Estonia) recommend vaccination for all age groups. Six countries (Austria, Estonia, Finland, Latvia, Slovakia and Slovenia) recommend vaccination for different age groups  $< 18$  years of age, regardless of risk conditions. Finland is the only country to have introduced routine vaccination of children aged from six months to three years (since the beginning of the 2007-8 influenza season). Other countries have also recommended childhood vaccination but have not included it in the routine childhood programmes: Slovenia and Latvia recommended vaccination of children aged six months to two years; Slovakia, Estonia, Austria of children and adolescents aged six months to 18 years.

All countries recommend vaccination of the elderly population; however the age specified differs between countries. Seventeen countries (63%) recommend seasonal influenza vaccination for individuals 65 years and older. Vaccination is recommended for those aged 60 years and older in Iceland, Hungary, the Netherlands, Germany and Greece; in Malta and Poland vaccination is recommended for those aged over 55 years; in Austria and Ireland for those over 50 years. Slovakia recommends seasonal influenza vaccination for those aged 59 years and more (Table 1).

Changes since the last survey were identified in some countries. In Ireland, the age group recommended for vaccination was lowered from 65 to 50 years of age and older (even for those without risk conditions), however only individuals  $\geq 65$  years are presently provided vaccine free of charge. Poland reported that the age group for which vaccination was recommended was 55 years

**FIGURE 2**

Number of doses of influenza vaccine used by country per 10,000 population in the EU/EEA for the 2005-6 – 2007-8 influenza seasons: national seasonal influenza vaccination surveys in Europe, January 2008 and July 2009 (n=26)<sup>a</sup>



<sup>a</sup>Germany has only data on number of licensed doses, but do not have data on doses actually used.

and older (instead of 50 years in the 2008 survey); Estonia reported that vaccination is recommended to all age groups (different from the 2008 survey; vaccination was recommended for specific age groups: children from six months to five years and those aged  $\geq$  65 years).

### Medical conditions, occupational settings and other groups

All countries recommend vaccination of patients with chronic pulmonary and cardiovascular disease, and most recommend vaccination of patients with renal and immunologic disorders (25/27) or haematologic and metabolic disorders (26/27). Vaccination of pregnant women is recommended in ten countries (10/27; Austria, Belgium, Cyprus, Denmark, Estonia, Ireland, Italy, Portugal, Slovakia, Spain).

Most countries recommend influenza vaccination of HCW in hospitals, long-term care facilities (23/27) and out-patient clinics (22/27). Few countries have specific vaccination recommendations relating to individuals belonging to essential services and military services (6/27), families that raise poultry (4/26) and veterinary services (9/27). A total of 13 of 27 countries recommend vaccination of workers in the poultry industry.

Seasonal influenza vaccine is recommended for residents of long-term care facilities in 22 countries (81%); more than half of countries (52%) recommend vaccination of household contacts of persons for whom vaccination is recommended. Detailed information is presented in Table 2.

### Changes in recommendations

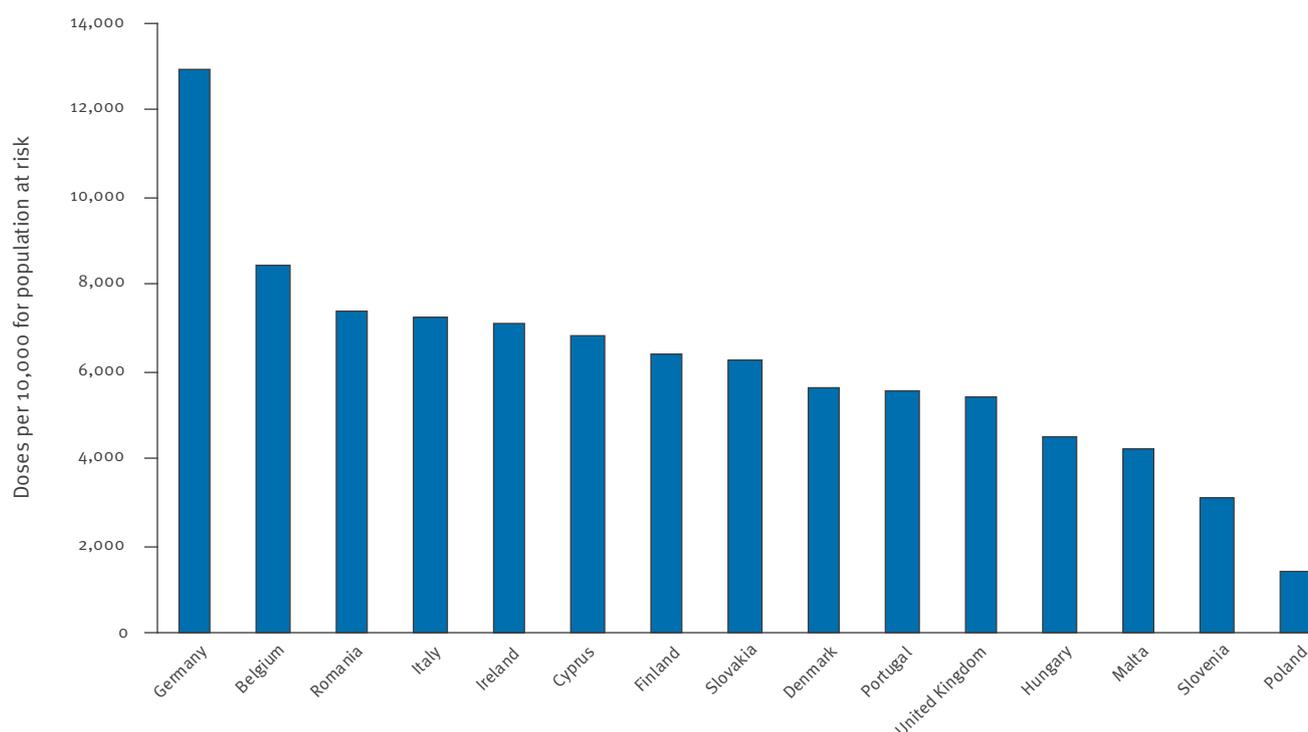
Recommendation changes since the 2008 survey were reported from several countries. Romania and Poland have stopped recommending vaccination for military personnel or those working in the essential services in their countries. Poland no longer recommends vaccine for individuals working in the veterinary services. Iceland has introduced a recommendation to vaccinate those working in veterinary services and the poultry industry.

In comparison to Survey 2008, some countries have expanded the number of risk groups for whom vaccination was recommended in 2009; Slovenia has included patients with hepatic disease in Survey 2009; Cyprus expanded their 2009 recommendations to include patients with compromised respiratory function. In Denmark pregnant women were recommended vaccination whereas Ireland recommended vaccination only for pregnant women with other medical risk conditions in 2009.

Vaccination of household contacts of persons for whom vaccination is recommended was reported by Iceland and France (in the previous survey it was reported as no recommendation). However in France, vaccination is recommended only for household contacts of babies aged  $\leq$  six months with underlying conditions. Denmark and the Netherlands reported that there is no recommendation for that population group.

**FIGURE 3**

Number of influenza vaccine doses used in each country expressed as vaccine doses potentially available per 10,000 of those at risk (those aged over 65 and with underlying conditions) by country in the European Union for the 2007-8 influenza season: national seasonal influenza vaccination survey in Europe, July 2009 (n=15)



## Vaccination coverage results

### The elderly

For Survey 2009, 20 countries provided results about vaccination coverage among the elderly. Three countries (Estonia, Malta, Iceland) who had not reported this age group in the previous survey were able to do so. However two countries, (Belgium and Sweden) which had previously reported this information were unable to do so for Survey 2009 (Figure 1). The lowest/highest range in vaccination coverage for Survey 2009 varied from 1.1% in Estonia to 82.6% in the Netherlands (1.8% in Lithuania to 82.1% in the Netherlands for Survey 2008). There was little change in coverage reported by each country, with a slight increase or decrease across most of the countries, except Romania, where vaccine coverage increased from 30.3% for the 2006-7 influenza season to 52.6% for the 2007-8 influenza season. There was also a substantial increase in vaccination coverage reported in Lithuania rising from 1.8% to 8.1%. The Netherlands (82.6%) met the WHO 2010/EU 2014-15 influenza season target of 75% and the United Kingdom (UK) almost achieved this goal (73.5%).

### Clinical risk groups

Compared to eight countries in Survey 2008, six countries provided vaccination coverage results for clinical risk groups for Survey 2009. The range of vaccination coverage varied from 32.9% in Hungary to 71.7% in the Netherlands. The reported vaccination coverage in the UK and France was higher than that reported in 2008. Vaccination coverage in Norway and Germany remained the same, or similar, at 50% and 49% respectively. The Netherlands (71.7%) almost achieved the EU target for influenza season 2014-15 (Table 3).

### Healthcare workers

Six countries reported vaccination coverage results among HCW for Survey 2009 versus seven in Survey 2008. The reported vaccination coverage was lower in four of them compared to the previous survey. The range varied from the lowest of 13.4% in the UK to the highest of 89.4% in Romania for Survey 2009 (Table 3).

### Sub-national vaccination coverage

One country (Spain) reported differences in sub-national vaccination recommendations within their country. Four countries (Lithuania, Poland, Ireland and Italy) provided data on vaccination coverage at sub-national level for the elderly population. Two countries (Italy and Lithuania) also provided vaccine coverage for the total population in addition to that for the elderly at sub-national level. Vaccine coverage for the elderly population varied slightly between regions in Italy, Ireland and Poland; however a substantial variation between regions was found in Lithuania (range 2.4% to 10.8%) for the 2007-8 influenza season. Data for the sub-national level are not presented in this paper but are available in the final report on the VENICE website [6].

## Number of doses of influenza vaccine used in Member States

In both surveys, all countries, except Germany, reported the number of doses of seasonal influenza vaccine used. These data are combined and presented by country and influenza season in Figure 2. The number of doses used in MS varied from 171 doses per 10,000 population in Estonia to 2,167 doses per 10,000 population in Belgium albeit for different influenza seasons. All countries used approximately the same quantity of vaccine for the two seasons.

In Figure 3, the doses of influenza vaccine used in each country for the 2007-8 influenza season are presented as a rate of vaccine potentially available for the at-risk population in each country (i.e. those aged over 65 and with underlying conditions), calculated per 10,000 population at risk. Although clearly not all vaccine used in these countries was given to at-risk individuals, it does demonstrate that in the 2007-8 season a number of countries had enough vaccine to cover two thirds or more of the population at risk in their country (Belgium, Romania, Italy, Ireland, Cyprus, Slovakia and Finland) if the vaccine was used for these priority groups only. In Germany all population at risk could have been covered.

## Discussion

This is the second VENICE survey conducted across EU/EEA countries to look at influenza vaccination policy and vaccination coverage. As in the previous survey, participation among the EU/EEA MS was high, with 27 of the 29 contacted countries responding to the survey. Such a high level of participation is encouraging, demonstrating the continued interest that EU/EEA MS have in sharing information on influenza vaccination programmes. Continued participation by the national gatekeepers demonstrates the acceptability of the VENICE methodology to the rapid exchange of information to mutual benefit of all.

There were no major changes in seasonal influenza vaccination policy in comparison to Survey 2008. The main finding was that most countries have implemented WHO or other internationally accepted guidelines in relation to the groups for whom vaccine is recommended. Most countries recommend vaccination in the elderly, people with medical conditions and HCW. Inclusion of other groups for vaccination, such as healthy children and pregnant women, is still relatively uncommon in MS.

The results of two consecutive VENICE surveys indicate that annual seasonal influenza vaccination for children is not common in EU/EEA MS. Only six countries recommend influenza vaccination for children between the age of six months to three years (of which two recommend up to two years only), and of these only Finland has added influenza vaccination to the routine childhood vaccination programme (since the 2007-8 influenza season). In a number of countries outside Europe vaccination is routinely recommended

for young children, because the highest rates of influenza complications and hospitalisations have been reported among young children < 2 years, with rates of hospitalisation similar to the rates of hospitalisation of persons over 65 years [12-15]. Our survey did not attempt to identify reasons why some EU/EEA countries recommend paediatric vaccination and others do not, however it may reflect key issues and knowledge gaps in relation to the lack of data on the burden, vaccine efficacy and/or effectiveness of influenza in children younger than two years old and these have been discussed in an ECDC report [16].

These VENICE surveys clearly demonstrate consensus among the participating countries about the importance of seasonal influenza vaccine for individuals with chronic medical conditions or underlying diseases (e.g. chronic pulmonary, cardiovascular, renal, hepatic diseases). However, there appears to be a lack of consensus in relation to the role of vaccination during pregnancy, as it is only recommended by approximately one third of EU/EEA countries. But even in these countries that do recommend vaccination in pregnancy no data were provided on vaccination coverage for this population group so it is hard to draw conclusions whether these recommendations are implemented. Generally, vaccine coverage for pregnant women in countries where influenza vaccine is recommended tends to be low, varying from <0.1% to 12.8%. Reasons for low coverage in pregnant women could be attributed to inadequate information about safety aspects, risks and benefits of vaccination among both patients and providers [17].

Only two countries had exceeded or nearly reached the WHO 2010 target of 75% vaccination coverage for the elderly. The vaccination coverage among elderly individuals was considerably higher in all countries with available information than among clinical risk groups and HCW.

Although all countries recommend influenza vaccination for their elderly population, five countries (Czech Republic, Cyprus, Austria, Greece, Latvia) were unable to monitor vaccine coverage and were not able to present vaccination coverage data for this specific age group. However, progress was made in three countries (Malta, Iceland and Estonia) which provided this information for Survey 2009 but had been unable to do so in the previous survey. Overall vaccination coverage for the elderly group varied markedly across countries but the uptake reported in each country in the Survey 2009 survey was similar to that reported in the Survey 2008, with the exception of Romania. Those countries which reported high coverage in Survey 2008 maintained similar levels of high coverage, and those with low coverage demonstrated little change between the two surveys. The high vaccination coverage for elderly in the Netherlands and the UK is particularly noteworthy, with coverage rates among the elderly population similar to or even higher than that reported on average in some

countries outside Europe (67.2% in the United States (US) for the 2008-9 influenza season; 71% in Canada in 2005; 79.1% in Australia in 2004) [18-20]. Romania reported an approximate doubling in vaccination coverage rates in comparison to the previous season.

The near universal ability of most countries to provide vaccination coverage data for their elderly population is in marked contrast to their ability to provide such data for clinical risk groups and HCW. Only one third of countries provided vaccine coverage data for these groups although recommendations for getting vaccine are long standing in most of the countries. Vaccination coverage rates for both clinical risk groups and HCW were relatively low across countries that were able to report such data, with exception of the Netherlands for clinical risk groups and Romania for HCW, where vaccination coverage was high in both countries for these respective groups. Information related to factors influencing high coverage was not sought but future surveys should seek such information.

As vaccination is mainly recommended for risk groups, an accurate estimate of the size of major risk groups is necessary within each country, in order to procure vaccine for this group and to estimate coverage within the risk group. Knowledge of trends in uptake can influence vaccination policy, procurement and strategy. For instance low levels of uptake by risk group will inform those responsible for vaccine procurement for the following season but in order to reach the EU/WHO goals additional supplies are needed to meet the required increase demand. Estimates of the size of the elderly population are usually easily available in each MS using routine administrative census data. However estimating the size of the clinical risk group population becomes challenging, as not all countries have a chronic diseases register and duplicates in available statistical data can happen. Some countries estimate the risk group denominator using health service utilisation data using international classification of disease (ICD) or diagnosis-related group (DRG) codes. Other countries may use prescribing data for disease-specific common medications. However, use of such data for estimating a denominator may be misleading due to duplications mentioned above (individuals with co-morbidities).

In this study we have used the estimated number of influenza vaccine doses used in each country, expressed as a rate (per 10,000 of total of population at risk) as a very crude indicator to assess supply against need and does not reflect the capacity of the countries. As vaccine procurement must take into account the expected uptake by risk group (usually identified by demand reported in most recent season) most countries will order quantities to match expected demand, to minimise vaccine wastage and inefficient use of public funds. In this survey, two countries (Belgium, Germany) procured sufficient vaccine *per capita* at risk (clinical risk group and elderly), to vaccinate almost all

of the estimated population at risk, if targeted specifically at these groups only.

Six countries (Cyprus, Finland, Ireland, Italy, Romania, and Slovakia) procured vaccine in sufficient quantities that could be used to vaccinate two thirds of the estimated population at risk. In the remaining countries the number of doses of vaccine used is less and at least in Poland vaccine supply would only be sufficient for one in ten of those. Reasons for low influenza vaccination coverage may be attributed to low supply of vaccine in those countries.

The survey limitations were similar to that reported in the previous publication and include different methodologies used to estimate vaccination coverage among the population at risk. Comparison of vaccination coverage data may be difficult across countries as different methods are often used, not only for denominator data but also for numerator data. Denominator data for clinical risk groups are difficult to estimate accurately for a majority of EU/EEA countries, reflecting the lack of information systems (disease registers) or other standardised methodologies. Some countries have used population surveys to estimate the number of at-risk populations. But even this may not be comparable between countries as a variety of methodologies have been used (household surveys, mail, face to face, telephone), each of which has recognised limitations and may depend on the socio-cultural characteristics of the population surveyed. Such surveys are routinely conducted (annually or less frequently) in the US, Australia and Canada and found to be useful [18-21]. Whether in the future it would be feasible for all MS to conduct such studies is worth considering [22-26]. The advantage of conducting studies using standard survey methodology would be an ability to estimate denominator (clinical at risk, occupational risk, and age and gender), at the same time as obtaining information on reasons for vaccination, or non-vaccination, which could be analysed by risk group. If such surveys were to be implemented, timely data for each influenza season could be obtained and progress of immunisation performance could be monitored in relatively real time [27].

In conclusion, results of our survey indicate that recommendations for influenza vaccination exist in most of the countries for the main clinical and occupational risk groups in addition to the elderly. A substantial number of countries have extended the recommendation to those at risk defined by the extremes of age, either older age or young children. Although there is consensus that the elderly should be vaccinated, vaccination coverage for the elderly is lagging in most of the countries and it is unlikely that EU/WHO targets will be met in 2010. Additionally, large discrepancies between recommendations and real vaccination coverage exist for clinical risk groups and HCW; reported vaccination coverage is substantial or low for these groups of individuals and vaccination coverage should be increased.

Additional efforts are needed to increase vaccination coverage among these groups and may require research to identify the reasons for non vaccination and address these through more specific promotion campaigns. All countries should strive to collect information on vaccine coverage for the elderly as well as these risk groups, without which monitoring progress is not possible. All countries regardless of their *per capita* spend on vaccine have an interest and need to monitor the usage of vaccine.

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