

Influenza Vaccination Coverage Rates in 5 European Countries: a Population-Based Cross-Sectional Analysis of the Seasons 02/03, 03/04 and 04/05

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Abstract

Introduction: Influenza continues to be a considerable health problem in Europe. Vaccination is the only preventive measure, reducing mortality and morbidity of influenza in all age groups.

Objectives: The objective of this survey was to assess and compare the level of influenza vaccination coverage during three consecutive influenza seasons (02/03, 03/04, 04/05) in the five European countries United Kingdom, France, Italy, Germany and Spain, understand the driving forces and barriers to vaccination now and 3 years ago and determine vaccination intentions for the following winter.

Methods: We conducted a random-sampling, telephone-based household survey among non-institutionalized individuals representative of the population aged 14 and over. The surveys used the same questionnaire for all three seasons. The data were subsequently pooled. Four target groups were determined for analysis: (1) persons aged 65 and over; (2) people working in the medical field; (3) persons suffering from chronic illness and (4) a group composed of persons aged 65 and over or working in the medical field or suffering from a chronic illness.

Results: The overall sample consisted of 28,021 people. The influenza vaccination coverage rate increased from 21.0% in season 02/03 to 23.6% in season 03/04 and then to 23.7% in season 04/05. The differences between the seasons are statistically significant ($p = 0.01$). The highest rate over all countries and seasons had Germany in season 04/05 with 26.5%, Spain had in season 02/03 with 19.3% the lowest rate totally. The coverage rate in the target group composed of person's aged 65 and over or working in the medical field or suffering from a chronic illness was 49.7% in season 02–04 and 50.0% in season 04/05. The driving forces and barriers to vaccination did not change over the years. The most frequent reasons for being vaccinated given by vaccines were: influenza, considered to be a serious illness which people wanted to avoid, having received advise from the family doctor or nurse to be vaccinated and not wanting to infect family and friends. Reasons for not being vaccinated mentioned by people who have never been vaccinated were: not expecting to catch influenza, not

having considered vaccination before and not having received a recommendation from the family doctor to be vaccinated. Options encouraging influenza vaccination are: recommendation by the family doctor or nurse, more available information on the vaccine regarding efficacy and tolerance and more information available about the disease. The adjusted odds ratio of receiving influenza vaccine varied between 2.5 in Germany and 6.3 in the United Kingdom in any risk group.

Conclusion: The vaccination coverage rate increased from the first season (21.0%) to the third season (23.7%) by 2.6%. The family doctor is the most important source of encouragement for people to be vaccinated against influenza. It seems that the public would be more likely to be vaccinated if they had more information on the efficacy and tolerance of the vaccine, as well as the disease. We therefore suggest that family doctors be better informed on influenza vaccine and the disease itself, so that they can actively inform their patients on these topics.

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Introduction

Influenza is often seen as a problem-free and self-limiting disease despite putting a high burden on patients as well as being of high socio-economic relevance to society [1]. It continues to be a considerable health problem in Europe. Influenza is a major cause of morbidity and mortality affecting up to 25% of the population each year [2]. The typical case of influenza may be characterized by the abrupt onset of fever, sore throat, non-productive cough, myalgias,

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headache and malaise. Symptoms usually last for 5–6 days. Elderly and other high-risk persons are especially vulnerable to the serious complications of influenza [2].

Vaccination is an effective way of reducing the mortality and morbidity of influenza especially in the elderly and patients with high-risk conditions [3]. Vaccination can prevent about 50% of deaths from pneumococcal disease and 80% of deaths from influenza-related complications in the elderly [4]. In addition to providing substantial health benefits, vaccination may also be associated with significant economic benefits, not only among the elderly but also among healthy working adults and even children. Healthy working adults traditionally have not been included among the priority groups targeted for annual influenza vaccination. Fewer than 25% of the persons aged between 18 and 64 years received an influenza vaccination during 1997. Nevertheless, the effect of influenza on this group is also substantial. Influenza vaccination of healthy working adults is, on average, cost saving [2].

In general, population-based studies of influenza vaccination coverage for a country do not exist. A Canadian study found 13.8% influenza vaccination coverage in fall and winter 1990–1991 [5]. Most studies on influenza vaccination coverage investigate specific groups such as the elderly [6–15], patients from general practices [16, 17], or hospitalized patients [18].

The official recommendations in all of the five countries studied are the same: age > 65, chronic illness [cardiovascular, respiratory, diabetes mellitus, renal, immunology, HIV (except Italy)], nursing home residents and health care workers [19].

In order to monitor the changes in vaccination coverage rates and behaviours in comparison to previous seasons (2002–2003 and 2003–2004), this survey was repeated during winter 2004–2005.

Objectives

The primary aim of this study is to identify the level of influenza vaccination coverage in three consecutive influenza seasons in five European countries. We also wanted to know whether coverage was associated with demographic parameters.

The second objective is to understand the determinants for being vaccinated or not and to obtain the population's opinion on influenza and vaccination. A further objective was to examine the options, which encourage people to be vaccinated and to find out their vaccination intentions for the following winter. Furthermore it is important to see, which determinants for being vaccinated have changed in the last years.

Methods

This study is a population-based survey performed during three consecutive influenza-seasons (02/03, 03/04 and 04/05 for Germany, Italy, Spain and the United Kingdom and 02/03 and 04/05

Table 1

Overview of the possible answers (more than one answer possible).

Why did you get vaccinated this winter?

- Because it's free : the Social Security pays for it
- So that I do not pass the flu bug to my family and friends
- Because flu is a serious illness and I did not want to get it
- The doctor at work offered to do it for me
- My family doctor/nurse advised me to do it
- My pharmacist advised me to do it
- Because of my age
- Because I am not in very good health
- To prevent the flu from interrupting my professional activities
- Because it is required/indicated for my job
- Because I got the flu last year
- Other reasons
- Do not know/no answer

Why do you not get vaccinated against the flu?

- I do not think I am very likely to catch the flu
- I thought about it but I did not end up getting vaccinated
- My family doctor has never recommended it to me
- My doctor at work has never recommended it to me
- My pharmacist has never recommended it to me
- I got the flu before, even though I had been vaccinated
- It is not a serious enough illness
- I do not think the vaccine is effective enough
- I do not like injections/needles
- I have never considered it before
- There is a new treatment which helps cure the flu
- I am too young to be vaccinated
- I am against vaccinations
- It is too complicated to get vaccinated
- It is too expensive, it is not reimbursed
- Other reasons
- Do not know/no answer

Which of the following options would encourage you to be vaccinated against flu ?

- If I could be vaccinated at work
- If my doctor/nurse recommended it to me
- If my pharmacist recommended it to me
- If there were other ways of administering the vaccine (orally, injection without a needle, etc.)
- If it were cheaper
- If I had more information on the vaccine regarding efficacy and tolerance
- If I knew more about the disease
- If there were more reports in the media saying to get it done
- I would not change my mind, I would never be vaccinated
- Other
- Do not know/no answer

for France. The questionnaire (see Appendix) was circulated via telephone omnibus among non-institutionalized individuals representative of the population, between December and January. Mobile phones were not included. For France, data were based on the yearly survey by GEIG (Groupe d'Etude et d'Information sur la Grippe) carried out by mail. The questions were identical in all three seasons. The list of possible answers with respect to determining driving forces and barriers to vaccination, as well as encouragement to be vaccinated, is inserted in table 1.

	United Kingdom	Germany	Italy	France	Spain	All
Age cut-off (years)	> 16	> 14	> 14	> 15	> 15	
02/03 members	2,020	1,990	2,005	1,997	2,034	10,046
03/04 members	2,026	2,006	2,005		2,000	8,037
04/05 members	2,005	1,994	2,002	1,937	2,000	9,938
Number of participants	6,051	5,990	6,012	3,934	6,034	28,021
Mean age (years)	45.5	47.0	44.4	45.7	41.7	44.8
Aged 65 and over	19.0%	21.8%	16.5%	19.8%	12.3%	17.7%
Male	48.7%	47.8%	48.6%	48.0%	49.6%	48.5%
Work in medical field	7.4%	6.6%	3.8%	6.5%	4.3%	5.7%
Chronic illness	8.6%	15.8%	7.8%	7.2%	8.8%	9.8%
Target group: 65 and over or chronic illness or work in medical field	30.8%	36.8%	24.5%	30.0%	22.4%	28.8%

The response rates were similar in the various countries over time. In order to obtain highest possible response rates, the same interviewers were utilized for this project. These interviewers knew how to motivate possible study participants and meet any objectives, which were raised in the recruiting phase. In addition, primarily unanswered phone calls were followed up as much as possible and in new appointments were scheduled in situations where respondents were unable to set aside time at the first encounter.

For each respondent, the following parameters were collected in the survey: gender, age, city size, size of household, household income, whether participants work in a medical field or suffer from a chronic illness (such as heart or lung disease, diabetes or others). As well as studying each parameter separately, we also defined four target groups based on recommendations in Europe at the time of the survey. The target groups were:

- all individuals aged 65 and over
- all individuals who suffer from a chronic illness
- all individuals who work in the medical field
- all individuals aged 65 and over or suffer from a chronic illness or who work in the medical field.

The data were pooled and weighted for age and gender. Statistical evaluation was performed using the statistic program SPSS (Statistical Package for the Social Sciences). Bivariate associations of categorical variables were analyzed using Chi-square tests. In case of one continuous variable, a T-test or Mann-Whitney tests was used, depending on the kind of distribution observed. In all cases, $p = 0.05$ was used as the level of statistical significance. Where applicable, odds ratios were calculated from 2×2 tables, including 95% confidence intervals. Predictor variables with strong associations ($p < 0.02$) were considered candidates for multivariable analyses to identify the independent correlates of the outcome of interest, i.e., vaccination coverage. To develop the explanatory variables we used the following analytic strategy: the dependent variable vaccination rate. Using multiple logistic regression techniques we evaluated each predictor separately at the beginning and then proceeded to build multivariable models that included several of them at a time. Backward elimination and forward selection procedures were used in order to assess the relative importance

of the predictors and derive a parsimonious model. Only models with adequate goodness-of-fit characteristics were presented.

Results

Demographic Data

The overall sample consisted of 28,021 persons. An overview of the sample is given in table 2. The samples are representative of the country's adult population.

Vaccination Rate

The vaccination coverage rate in all surveyed countries increased from 21.0% in season 02/03 to 23.6% in season 03/04, and again in season 04/05 to 23.7%. The differences between the seasons are statistically significant ($p = 0.001$). The differences between the countries are only significant in season 04/05 ($p = 0.001$). Over all three seasons, Germany had the highest population vaccination coverage rate in season 04/05 (26.5%). The lowest vaccination rate was in Spain in season 02/03 with 19.3%. The best increment was also in Germany, the vaccination rate increased from 22.3% in season 02/03 to 26.5% in season 04/05. The time trend over the seasons was statistically significant for the UK (Chi-square test for trend, $p = 0.007$), Germany ($p = 0.04$), Spain ($p = 0.05$) and France ($p = 0.001$), but not for Italy ($p = 0.2$) (Figure 1).

For the subsequent winter (05/06) 31% of the respondents intend to be vaccinated against influenza. In the season 02/03 32% of the people wanted to get vaccinated for the next season, but the vaccination rate of the season 03/04 was lower than expected (24%). In season 03/04 34% wanted to obtain the vaccination, but only 24% received the vaccination in season 04/05 (Figure 2).

Vaccination Coverage in Target Groups

The vaccination coverage rate for the group aged 65 and over remained stable over the entire period, as 61.5% in the seasons 02–04 and 63.7% in 04/05. This was significantly different from the population under 65, where the vaccination coverage rates reached 13.8% (02–04, $p = 0.001$) and 14.8% (04/05, $p = 0.001$). The influence of age is clearly apparent in figure 3: the older the people, the higher the vaccination coverage rate. The group suffering from chronic illness recorded a significantly higher vaccination coverage rate than the group not suffering from chronic: 49.6% vs 20.2% respectively during 02–04 ($p = 0.001$) and 52.8% vs 18.3% in the season 04/05 ($p = 0.001$). Individuals with a chronic illness older than

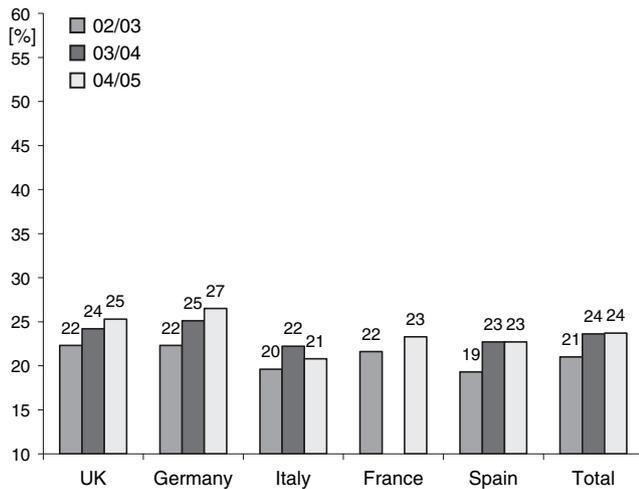


Figure 1. Vaccination rates per country.

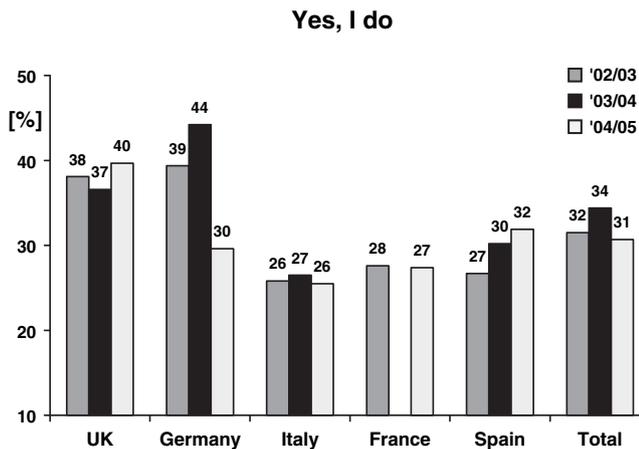


Figure 2. Vaccination next winter: do you intend to be vaccinated against influenza next winter?

65 years have a higher vaccination rate (76.1%) than those under 65 years (38.0%). During the seasons 02–04 the fact of working in the medical field did not seem to be a driving force for vaccination uptake as the vaccination coverage rate in this population (22.4%) is almost equal to the coverage rate in the non medical-professional group (22.1%) ($p = 0.946$). In 04/05 the difference between people who worked in the medical field and those who did not is also not statistically significant (23.5% vs 23.7%, $p = 0.919$). Concerning the people who are above 65 years or suffer from chronic illness or work in a medical field, representing the major combined target population for influenza vaccination, the rate was 49.7% in the season 02–04 and 50.0% in the season 04/05.

The vaccination rate did not seem to be associated with gender. Women had a vaccination rate of 22.8% in season 02–04 and 24.0% in season 04/05. Men had a rate of 21.4% and 23.5% (Table 3).

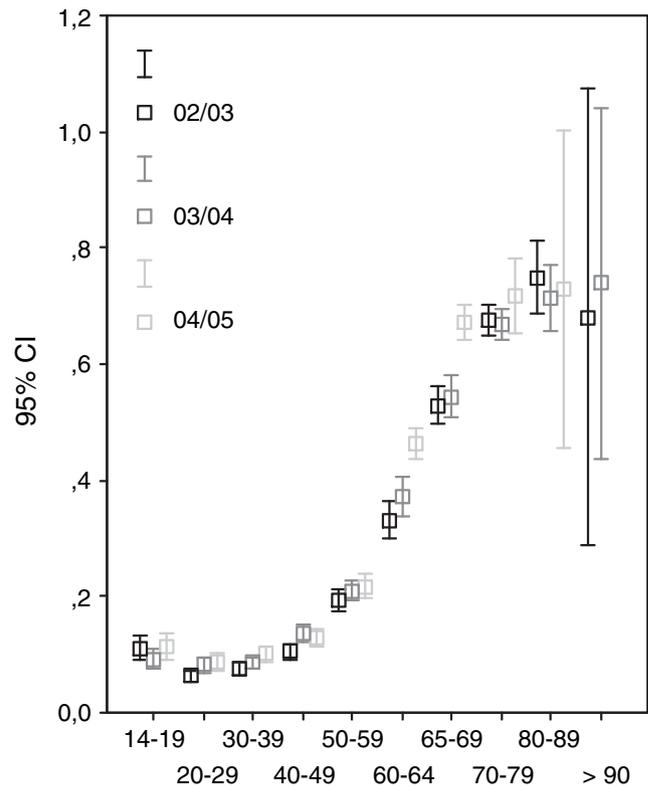


Figure 3. Profile of vaccinated population by age groups.

Table 3
Vaccination coverage in target groups.

	Vaccination rate 02–04 (%)	Vaccination rate 04/05 (%)
Gender		
Male	21.4	23.5
Female	22.8	24.0
p-value ^a	0.026	0.540
Age: years		
< 65	13.8	14.8
> 65	61.5	63.7
p-value ^a	0.001	0.001
Chronic illness		
Yes	49.6	52.8
Yes, < 65	39.5	38.0
Yes, > 65	67.7	76.1
No	20.2	18.3
p-value ^a	0.001	0.001
Work in medical field		
Yes	22.4	23.5
No	22.1	23.7
p-value ^a	0.879	0.919
Target group: 65 and over or chronic illness or work in medical field		
Yes	49.7	50.0
No	11.2	12.0
p-value ^a	0.001	0.001

^a Chi square test

Table 4
Questions put to people who have been vaccinated: "Why did you get vaccinated this winter?"

The most frequently stated reasons (%)	02–04	04/05
Because influenza is a serious illness and I did not want to get it	55.8 ^a	49.3 ^a
My family doctor/nurse advised me to do it	55.2 ^a	50.6 ^a
Because of my age	34.8	34.8 ^a
So that I do not pass influenza bug to my family and friends	36.1 ^a	32.1
Because it's free: the Social Security pays for it	28.1	24.0
Because I am not in very good health	22.9	26.1
<i>Chronic illness, under 65 years</i>		
My family doctor/nurse advised me to do it		53.7
Because I am not in very good health		49.4
Because influenza is a serious illness and I did not want to get it		45.0
So that I do not pass influenza bug to my family and friends		26.9
Because it's free: the Social Security pays for it		23.4
<i>Working in medical field</i>		
To prevent influenza from interrupting my professional activities		40.8
Because influenza is a serious illness and I did not want to get it		40.7
So that I do not pass influenza bug to my family and friends		40.2
Because it is required/indicated for my job		37.5
My family doctor/nurse advised me to do it		30.8
The doctor at work offered to do it for me		28.5
<i>Older age, > 65 years</i>		
My family doctor/nurse advised me to do it		58.6
Because of my age		56.9
Because influenza is a serious illness and I did not want to get it		54.8
So that I do not pass influenza bug to my family and friends		31.6
Because it's free: the Social Security pays for it		29.9
Because I am not in very good health		23.4

^a Main three reasons stated amongst the different groups

Questions about the Vaccination

For those who were vaccinated during the last season, the most frequently stated reasons for being vaccinated were advice received from the family doctor or nurse (55.2% (02–04) and 50.6% (04/05)), influenza being considered as a serious illness which people wanted to avoid (55.8% (02–04) and 49.3% (04/05)), age (34.8 % and 34.8%) and not wanting to infect family and friends (36.1% and 32.1%). People with a chronic illness and people over 65 years have the same reasons. Driving forces for medical staff were not to interrupt their professional activities, indication for the job and offer of the doctor at work (Table 4).

For those who have never been vaccinated, reasons against vaccination were: not expecting to catch influenza (40.4% and 36.7%), never having considered vaccination before (33.3% and 31.3%) and the fact that the family doctor has never recommended it (27.3% and 23.2%). For the target groups side-effect problems with a previous influenza vaccine, getting the flu before, even though they had been vaccinated and not think the vaccine is effective enough are further reasons (Table 5).

Most of the respondents agreed with the following opinions about the vaccine:

- You can catch influenza even if you are vaccinated against it.
- If you catch the flu after having had the vaccine, the infection is less severe.
- The side effects associated with the vaccine (fever, headache, ...) are acceptable.
- It is important to get the influenza vaccine each year.

Most of participants did not agree to the following opinions: the vaccine is not useful if you are in good health and if you have the vaccine, you will not catch influenza (Table 6).

Options, which encourage vaccination against influenza are more available information about the vaccine regarding efficacy and tolerance (32.1% and 56.0%), a recommendation by the family doctor or nurse (53.1% and

46.9%), more information on the disease (26.7% and 22.9%) (Table 7).

Likelihood of High-Risk Groups Receiving Vaccination Across Countries

Large variations exist in the likelihood of high-risk individuals (i.e., elderly over 65, health care workers and people with chronic illnesses) receiving influenza vaccine between countries. The adjusted odds ratio of receiving influenza vaccine varied between 2.5 in Germany and 6.3 in the United Kingdom in any risk group (factor between the lowest and the highest likelihood = 1.2). Table 8 displays an overview of the likelihood of vaccination in these groups according to country for the 2004/5 season.

Discussion

This survey was performed internationally (France, United Kingdom, Italy, Spain, Germany) for three consecutive seasons. We believe a telephone survey is an appropriate method in establishing influenza vaccination coverage rates in different groups of the population. It can be started at short notice, it is an easy way to reach a large number of subjects rapidly, does not extend over more

The most frequently stated reasons (%)	02-04	04/05
I do not think I am very likely to catch influenza	40.4 ^a	36.7 ^a
I have never considered it before	33.3 ^a	31.3 ^a
My family doctor has never recommended it to me	27.3 ^a	23.2 ^a
I am too young to be vaccinated	23.0	22.1
It is not a serious enough illness	20.0	16.5
I thought about it but I did not end up getting vaccinated	14.4	12.8
<i>Chronic illness, under 65 years</i>		
I thought about it but I did not end up getting vaccinated		33.9
I had side-effect problems with a previous flu vaccine		25.4
I got the influenza before, even though I had been vaccinated		25.3
I have never considered it before		22.1
My family doctor has never recommended it to me		21.6
<i>Working in medical field</i>		
I thought about it but I did not end up getting vaccinated		39.5
I got the influenza before, even though I had been vaccinated		30.4
I had side-effect problems with a previous flu vaccine		21.4
I do not think the vaccine is effective enough		20.2
<i>Older age, > 65 years</i>		
I thought about it but I did not end up getting vaccinated		27.9
I had side-effect problems with a previous flu vaccine		27.0
I have never considered it before		24.0
I got the influenza before, even though I had been vaccinated		22.1
I do not think the vaccine is effective enough		21.3

^a Main three reasons stated amongst the different groups

21]. Non-response in telephone surveys was found to be less content-oriented than in mailed surveys [22]. Also, bias due to different sociodemographic characteristics of people not accessible by telephone affected reports of illness and related use of services only marginally, if the general population was addressed and telephone coverage was at least 90% [22, 23]. People living in institutions could not be included, which would be critical in the study of a disease affecting higher age groups differentially or directly causing institutionalization. Not having asked the chronic illness question during the 2002/2003 season may have affected the chronic illness figures. However, it is hypothesized that this impact is minimal as the responses would have been similar for both seasons. One bias could emerge from over- or under-reporting for chronic illness.

than a few weeks and can be repeated over several influenza seasons.

Several limitations of the present evaluation are acknowledged. The most important potential reason of selection bias despite correct sampling is non-response. Comparisons of face-to-face, mailed and telephone surveys addressing health-related issues showed small differences between modes of administration and small non-response effects with respect to prevalence estimates [20,

sponses would have been similar for both seasons. One bias could emerge from over- or under-reporting for chronic illness.

We estimate, for Europe, that approximately 24% of the population studied > 15 years of age had been vaccinated against influenza for the 2004/5 influenza season respectively. This percentage corresponds approximately to the 20% maximum estimate for the immunization rate for the entire population calculated from the number of

	%	Totally agree	Quite agree	Do not really agree	Do not agree at all	Do not know
You can catch influenza even if you are vaccinated against it.	02-04	42.1	37.4	9.8	4.7	6.1
	04/05	30	27.2	6.9	3.3	32.6
If you catch influenza after having had the vaccine, the infection is less severe.	02-04	32.6	36	12.9	8.4	10.1
	04/05	22.3	25.7	9.3	6.2	36.4
The side effects associated with the vaccine (fever, headache, etc.) are acceptable.	02-04	22.4	30	19.6	13.6	14.4
	04/05	16.6	20.1	13.4	9.7	40.1
If you have the vaccine you won't catch influenza.	02-04	9.3	19.4	32.3	33.9	5.2
	04/05	7	14.8	22.6	23.4	32.2
The flu vaccine is not useful if you are in good health.	02-04	19.7	22.4	26.6	25.2	6.2
	04/05	14.1	16.4	18.5	18.3	32.6
It is important to get the flu vaccine each year.	02-04	28.9	27.7	23	15.6	4.8
	04/05	22.5	20.7	14.6	10.7	31.5

The most frequently stated reasons (%)	02–04	04/05
If my family doctor/nurse recommended it to me	53.1 ^a	46.9 ^a
If I had more information on the vaccine regarding efficacy and tolerance	32.1 ^a	56.0 ^a
If I knew more about the disease	26.7 ^a	22.9 ^a
If there were other ways of administering the vaccine (oral, injections without a needle, etc...)	22.1	18.2
If I could be vaccinated at work	20.9	17.7
If my pharmacist recommended it to me	17.7	15.7
If it were cheaper or reimbursed	16.7	14.2
<i>Chronic illness, under 65 years</i>		
If my family doctor/nurse recommended it to me		57.9
If I had more information on the vaccine regarding efficacy and tolerance		33.7
If I knew more about the disease		30.6
If I could be vaccinated at work		25.0
If there were other ways of administering the vaccine (oral, injections without a needle, etc...)		25.0
<i>Working in medical field</i>		
If my family doctor/nurse recommended it to me		38.3
If I could be vaccinated at work		28.1
If I had more information on the vaccine regarding efficacy and tolerance		20.2
If I knew more about the disease		19.2
If there were other ways of administering the vaccine (oral, injections without a needle, etc...)		18.6
<i>Older age, >65 years</i>		
If my family doctor/nurse recommended it to me		57.0
If I had more information on the vaccine regarding efficacy and tolerance		23.7
If I knew more about the disease		23.7
If my pharmacist recommended it to me		20.2
If there were other ways of administering the vaccine (oral, injections without a needle, etc...)		20.0

^a Main three reasons stated amongst the different groups

vaccine doses sold for the 2002–2004 immunization period, assuming all doses sold were given (90 million doses for the 2002–2004 influenza vaccination period in Europe; data provided by the suppliers) [24].

Vaccination coverage in the five countries together increased during the 04/05 season relative to the 02/03 season (23.7% vs 21.0%). This increase was statistically significant and concentrated in all but one age group (> 90 years). Regarding the surveyed populations across Europe, the German population over 15 years of age has the highest vaccination coverage rate in Europe: 26.5% (04/05). It needs to be mentioned however that this is due to higher vaccination coverage of the adult working population. Italy has the lowest over 15 population vaccination with 20.8% (04/05). In comparison to other European countries the vaccination rate of 23.7% may be judged to adequate. The Netherlands reported a vaccination rate of 24% [25], Poland 10% and Sweden 11% [26].

For the subsequent winter 05/06 31% of the individuals surveyed intended to get vaccinated against influenza. This is higher than the current surveyed population coverage rate (23.7%), indicating that more people intend to be vaccinated during the winter of 2005/2006 than were vaccinated during winter 2004/2005. There is a gap between the vaccination intentions and the actual vaccination acts, indicating an unfulfilled vaccination potential in Europe. By activating the correct drivers to vaccination with the population and by dealing with the vaccination barriers, it can be expected that higher coverage rates could be achieved rapidly. A realistic vaccination coverage rate target could be set at the level of vaccination intentions expressed by the population. According to this survey, the coverage target for 2005/2006 could be set at 31% of the population over 15 years of age.

The most important predisposing factors affecting vaccination rate are age (advanced age) and suffering from chronic illness. The assumption that health care workers have a higher vaccination rate than non health care workers has not been confirmed. Their vaccination rate is, with 23%, extremely low. Rehmet showed this tendency (7% of health care workers were immunized in 1999) [27] as well as Gil (20% were immunized in 2004) [28] and Hofmann [29]. This is in opposite to the fact that the healthcare professionals are at increased risk of influenza infection and could potentially transmit the disease to fragile patients in hospitals. Szucs showed that physicians have a higher vaccination rate (12.1%) than nurses (9.8%) [30].

We explored the drivers and barriers that could improve influenza vaccine uptake in Europe. The survey demonstrated that there are some clear reasons driving vaccination for people who had an influenza vaccine. The four most important mentioned were influenza being considered as a serious illness, family doctor or nurse actively recommending vaccination, not wanting to infect family

Table 8
Likelihood of receiving influenza vaccination among high-risk individuals between countries (expressed in crude and adjusted^a odds ratios, incl. 95% confidence intervals) in the 2004/2005 season.

	Any high risk group	Age > 65 years ^b	Healthcare worker	People with chronic illness
All countries				
Crude	7.8 (7.1; 8.7)	10.0 (9.0; 11.2)	1.0 (0.8; 1.2)	5.0 (4.4; 5.6)
Adjusted	3.7 (3.3; 4.2)	3.1 (2.6; 3.7)	1.7 (1.4; 2.1)	3.1 (2.8; 3.5)
UK				
Crude	12.9 (10.2; 16.4)	14.1 (10.8; 18.39)	0.9 (0.6; 1.4)	8.6 (6.5; 11.3)
Adjusted	6.0 (4.5; 7.9)	4.2 (2.3; 6.2)	1.3 (0.8; 2.1)	6.9 (5.0; 9.4)
Germany				
Crude	5.1 (4.1; 6.3)	6.2 (4.9; 7.8)	0.9 (0.6; 1.3)	3.6 (2.9; 4.5)
Adjusted	2.5 (1.9; 3.2)	1.9 (1.3; 2.7)	1.5 (1.0; 2.3)	2.3 (1.8; 3.0)
Italy				
Crude	10.2 (8.0; 13.0)	9.5 (7.4; 12.3)	0.9 (0.5; 1.8)	7.7 (5.9; 10.2)
Adjusted	4.7 (3.5; 6.5)	2.5 (1.7; 3.7)	1.6 (0.8; 2.9)	4.4 (3.3; 6.0)
France				
Crude	10.2 (8.0; 13.0)	17.4 (13.2; 22.7)	0.8 (0.5; 1.3)	4.8 (3.7; 6.2)
Adjusted	4.1 (3.0; 5.5)	5.3 (3.4; 8.2)	2.4 (1.4; 3.9)	2.7 (2.0; 3.6)
Spain				
Crude	5.1 (4.0; 6.4)	8.3 (6.2; 11.0)	1.4 (0.9; 2.2)	3.1 (2.4; 4.1)
Adjusted	2.8 (2.1; 3.6)	3.2 (2.1; 4.7)	1.6 (1.0; 2.6)	2.1 (1.6; 2.9)

^a Adjusted odds ratios are adjusted for age and gender; ^b Adjusted for gender

and friends and advanced age. The three main reasons for not being vaccinated noted by those who have never been vaccinated were: not expecting to catch influenza, not having considered vaccination before and not having received a recommendation by the family doctor or nurse to be vaccinated. Both those being vaccinated and those who have never been vaccinated note the doctor or nurse as people playing a key role in public vaccination behaviour. In the vaccinated group, healthcare professionals were able to stimulate their patients towards vaccination by active recommendation whereas in the non-vaccinated group, omitting to recommend vaccination had a negative effect on uptake. This clearly indicates the key role of healthcare workers in vaccination uptake.

The family doctor is the most important person to encourage people to be vaccinated against influenza; this was also confirmed by *Kamal* [4], *Kroneman* [3] and *Rehmet* [26]. Rehmet demonstrated that having a family doctor increased the vaccination rate and that family physicians performed 93% of the vaccinations. This indicates that active recommendation from the family doctor could really impact vaccine uptake. This is confirmed by the surveyed people themselves, who state that an active recommendation by their doctor would indeed encourage them to be vaccinated (Table 8).

Further reference to table 8 shows that people would like more information on influenza as a disease and on influenza vaccines, so as to be vaccinated. Effective and educational communication campaigns by recognized authorities on influenza and influenza prevention could fill this information gap and provide the requested

information to the public. We also suggest that family doctors be better informed about the influenza vaccine and the disease itself, so that they can actively inform their patients about these topics and recommend vaccination accordingly. This could lead to an increase in vaccine uptake.

In May 2003, through the World Health Assembly, the WHO passed a resolution on the prevention and control of influenza pandemics and annual epidemics. The resolution urges Member States where national influenza recommendations for people at risk (elderly and persons with underlying diseases) exist,

to attain a vaccination coverage rate in the elderly of 50% in 2006 and 75% in 2010 [31]. This resolution was reinforced by the WHO in 2005 [32] and the WHO vaccination coverage rate objectives endorsed by the Commission of the European Communities [33].

In the context of this paper, we compared these vaccination coverage objectives with the situation in the five countries, considering that the elderly population was the population recommended for vaccination (i.e., those aged 65 and over). When referring to figure 3, people aged 65 and over match the 50% objective for 2006. Efforts to increase vaccination coverage rate and match the objective for 2010 will however be necessary. A stronger implementation of the current recommendations is needed and doctors should be informed of their importance in this process. To improve the situation doctors need to be educated on influenza and influenza vaccine benefits in order to be vaccinated themselves first. Then they must be informed that they should actively recommend the vaccine, as well as inform their patients on vaccine efficacy and tolerance and the disease itself. Active recommendation to the target groups could really impact vaccine uptake. They should also be made aware of the fact that patients are willing to receive information on the diseases and vaccines. In general, more education on disease and influenza vaccine benefits should be made available.

These results are consistent with other studies showing the importance of physicians or health-care personnel in motivating people for influenza vaccination [3, 9, 34].

Efforts must be made at all national and international levels to increase the coverage according to WHO

objectives. Further research should be performed to provide consistent comparison between different countries and seasons over time.

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For Appendix see next page.

Appendix

AVENTIS PASTEUR MSD Flu Vaccination in Europe 2003 MASTER QUESTIONNAIRE

1. Have you had a flu vaccine this winter?
(READ. ONE RESPONSE ONLY)
- Yes, and it was **the first time** that I had ever been vaccinated against the flu 1 → Go to Q2
 - Yes, and I have been vaccinated in previous years against the flu 2 → Go to Q1a
 - No, but I have been vaccinated against the flu in the past 3 → Go to Q1b
 - No, and I have **never** been vaccinated against the flu 4 → Go to Q4

IF CODE 2 IN Q1, ASK Q1a

- 1a. Do you get vaccinated against the flu every year?

Yes 1 → Go to Q2
 No 2 → Go to Q1b
 Dont know 3 → Go to Q1b

IF CODE 3 IN Q1 or IF CODE 2 or 3 IN Q1a, ASK Q1b

- 1b. Did you get vaccinated last winter (the winter of 2002/2003)?

Yes 1
 No 2
 Don't know 3

IF CODE 1 OR 2 IN Q1, ASK Q2

2. Why did you **get vaccinated this winter**?
(READ LIST. SELECT ALL THAT APPLY)
- Because it's free : the Social Security (*to be adapted to each country; eg : UK - National Health Service*) pays for it 01
 - So that I do not pass the flu bug to my family and friends 02
 - Because the flu is a serious illness and I did not want to get it 03
 - The doctor at work offered to do it for me 04
 - My family doctor advised me to do it (GERMANY, ITALY, SPAIN) 05
 - My family doctor / nurse advised me to do it (UK ONLY) 06
 - My pharmacist (chemist in UK) advised me to do it 23
 - Because of my age 07
 - Because I am not in very good health 08
 - To prevent the flu from interrupting my professional activities 09
 - Because it is required / indicated for my job 10
 - Because I got the flu last year 24
 - Other reasons 11
 - Don't know/ no answer (DO NOT READ) 99

(Continued next page)

IF CODE 3 IN Q1, ASK Q3

3. And why **didn't you get vaccinated** against the flu this winter?
(READ LIST. SELECT ALL THAT APPLY)

- I didn't really think about it, I forgot to do it 01
- My family doctor did not recommend it to me 02
- My doctor at work did not recommend it to me 28
- My pharmacist did not recommend it to me 29
- I got the flu before, even though I had been vaccinated 03
- I had side-effect problems with a previous flu vaccine 04
- There is a new treatment which helps cure the flu 05
- It is too expensive, it is not reimbursed 06
- I do not think the vaccine is effective enough 30
- I do not like injections/needles 31
- I don't feel concerned 32
- Other reasons 07
- Don't know/ no answer (DO NOT READ) 99

IF CODE 4 IN Q1, ASK Q4

4. Why **do you** not get vaccinated against the flu ?
(READ LIST. SELECT ALL THAT APPLY)

- I don't think I am very likely to catch the flu 01
- I thought about it but I didn't end up getting vaccinated 25
- My family doctor has never recommended it to me 02
- My doctor at work has never recommended it to me 26
- My pharmacist has never recommended it to me 27
- It is not a serious enough illness 03
- I do not think the vaccine is effective enough 04
- I do not like injections/needles 05
- I have never considered it before 06
- There is a new treatment which helps cure the flu 07
- I am too young to be vaccinated 08
- I am against vaccinations 09
- It is too complicated to get vaccinated (INTERVIEWER, READ ONLY IF NECESSARY -- appointment with the doctor to get the prescription, buying the vaccine at the chemist, vaccinated by the doctor) (ITALY, and SPAIN) 10
- It is too complicated to get vaccinated (UK and GERMANY) 11
- It is too expensive, it is not reimbursed 12
- Other reasons 13
- Don't know/ no answer (DO NOT READ) 99

TO ALL

5. Here are some opinions which might be expressed about FLU VACCINE. For each of these please tell me whether you, personally, totally agree, quite agree, don't really agree, or don't agree at all. (READ AND ROTATE A-F).

<i>1 answer per line</i>	Totally agree	Quite agree	Don't really agree	Don't agree at all	Don't know
a. You can catch the flu even if you've been vaccinated against it	1	2	3	4	5
b. If you catch the flu after having had the vaccine, the infection is less severe	1	2	3	4	5
c. The side effects associated with the vaccine (fever, headache,...) are negligible	1	2	3	4	5
d. If you have the vaccine you won't catch the flu	1	2	3	4	5
e. The flu vaccine is not useful if you are in good health	1	2	3	4	5
f. It is important to get the flu vaccine each year	1	2	3	4	5

(Continued next page)

6. Do you intend to get vaccinated against the flu next winter (the winter of 2004/2005)?
- Yes 1
 - No 2
 - Don't know 3
7. In general, and whether or not you have been vaccinated this winter, please tell me which of the following options would encourage you to be vaccinated against the flu ?
(READ LIST. SELECT ALL THAT APPLY)
- If I could be vaccinated at work 01
 - If my family doctor recommended it to me (GERMANY, ITALY, SPAIN) 02
 - If my doctor / nurse recommended it to me (UK ONLY) 03
 - If my pharmacist recommended it to me 14
 - If there were other ways of administering the vaccine (orally, injection without a needle, etc...) 04
 - If it were cheaper or reimbursed (GERMANY, ITALY, SPAIN) 05
 - If it were cheaper (UK ONLY) 06
 - If I had more information on the vaccine regarding efficacy 15
 - If I had more information on the vaccine regarding tolerance 16
 - If I knew more about the disease (who gets it, the severity of it, etc.) 08
 - I would not change my mind, I would never be vaccinated (DO NOT READ) 09
 - Other (*specify* _____) 10
 - Don't know/ no answer (DO NOT READ) 99
8. Do you suffer from a chronic illness (like heart or lung disease, diabetes or others)?
- Yes 1 → Q8a and then Q8b
 - No 2 → Q9
 - Don't know 3 → Q9

TO ALL

- 9 Do you work in the medical field?
- Yes 1 → Q9a
 - No 2 → demographics
 - Don't know 3 → demographics