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Influenza Vaccination Coverage Rates in Germany A Population-Based Cross-Sectional Analysis of the Seasons 2002/2003 and 2003/2004

Daniela Müller¹, Peter Wutzler², Thomas D. Szucs¹**ABSTRACT**

□ **Background und Purpose:** 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. The objectives of this survey were to assess the level of influenza vaccination coverage in the 2002/2003 season compared with the 2003/2004 season in Germany, to understand the driving forces and barriers to vaccination, and to determine vaccination intentions for the following winter.

□ **Methods:** The authors conducted a random-sampling, telephone-based household survey among noninstitutionalized individuals representative of the population aged ≥ 14 . The surveys for 2002/2003 and 2003/2004 used the same questionnaire and were subsequently pooled. Four target groups were determined for analysis: (1) persons aged ≥ 60 ; (2) people working in the medical field; (3) persons suffering from chronic illness; and (4) a group composed of persons aged ≥ 60 or working in the medical field or suffering from a chronic illness.

□ **Results:** The overall sample consisted of 4,011 people. The influenza vaccination coverage rate in Germany increased from 22.3% in 2002/2003 to 25.1% in 2003/2004. This increase is not significant. The most frequent reasons for being vaccinated given by vaccinees were: influenza considered to be a serious illness, which people wanted to avoid (90.1%), having received advice from the family doctor or nurse to be vaccinated (71.3%), and not wanting to infect family and friends (70.4%). Reasons for not being vaccinated mentioned by people who have never been vaccinated were: thinking about it, however, not being vaccinated in the end (47.7%), not expecting to catch influenza (43.6%), and not having received a recommendation from the family doctor to be vaccinated (36.6%). Options encouraging influenza vaccination are: recommendation by the family doctor or nurse (66.6%), more available information on the vaccine regarding efficacy and tolerance (54.2%), and more information available about the disease (52.4%).

□ **Conclusion:** The vaccination coverage in the 2003/2004 season increased in comparison to the 2002/2003 season, although not significantly. 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. It is therefore suggested that family doctors be better informed on influenza vaccine and the disease itself, so that they can actively inform their patients on these topics.

Key Words: Influenza · Vaccination · Coverage · Germany · Health care · Elderly

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Influenza is often seen as an unproblematic and self-limiting disease despite putting a high burden on patients as well as being of high socioeconomic relevance to societies [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 costs of influenza in Germany in 1996 came to nearly € 2.5 billions. The bulk of the indirect costs is due to inability to work [1]. The typical case of influenza may be characterized by the abrupt onset of fever, sore throat, nonproductive cough, myalgias, 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]. The estimated influenza incidence in Germany was 4 million cases in 1996 [1].

Vaccination is an effective intervention reducing mortality and morbidity of influenza especially in 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].

The German Standing Commission on Immunization has recommended that the following groups receive influenza vaccination: (1) persons who are ≥ 60 years of age, (2) people

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with a higher health risk condition (chronic lung, heart, liver and kidney diseases, diabetes and other metabolic diseases, immunodeficiency, HIV infection as well as persons living in institutions), (3) people with an increased professional risk of influenza infection (health care professionals, persons who have extensive contacts with the general public as well as people at risk of infecting unvaccinated persons with a higher health risk). Vaccinations are administered free of charge [5]. Van Essen et al. showed that in the year 2000 in Germany 186 doses of influenza vaccine were distributed per 1,000 population [6].

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 [7]. Most studies on influenza vaccination coverage investigate specific groups such as the elderly [8–17], patients from general practices [18, 19], or hospitalized patients [20].

The primary aim of this study was to identify the level of influenza vaccination coverage in the 2002/2003 and 2003/2004 seasons in Germany. We also wanted to know whether coverage was associated with demographic parameters.

The second objective was 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.

Methods

This study is a population-based survey performed during two influenza seasons, 2002/2003 and 2003/2004, in Germany. The questionnaire was circulated via telephone omnibus among noninstitutionalized individuals representative of the population, between December and January.

The questions were identical in both seasons. The list of possible answers with respect to determining driving forces and barriers to vaccination, as well as encouragements to be vaccinated, is inserted in Table 1.

ZUSAMMENFASSUNG

Influenza-Durchimpfungsraten in Deutschland. Eine bevölkerungsbezogene Querschnittsuntersuchung der Jahre 2002/2003 und 2003/2004

□ **Hintergrund und Ziel:** Die Influenza ist ein bedeutendes Gesundheitsproblem in Europa. Die Impfung ist die einzige präventive Maßnahme, welche die Morbidität und Mortalität der Influenza in allen Alterskategorien zu reduzieren vermag. Ziele der vorliegenden Untersuchung waren, die Durchimpfungsraten in der Saison 2003/2004 zu erheben und mit der Saison 2002/2003 in Deutschland zu vergleichen, die Beweg- und Ablehnungsgründe der Impfung zu verstehen sowie die Absicht zu erfassen, im nächsten Jahr geimpft zu werden.

□ **Methodik:** Die Autoren führten eine zufallsgesteuerte Telefonbefragung in Haushalten durch. Zielgruppen waren nichtinstitutionelle Personen, repräsentativ für die Alterskategorien ≥ 14 Jahre. Die Untersuchungen der beiden Saisons waren identisch und konnten gepoolt werden. Vier spezifische Zielgruppen wurden für diese Untersuchung definiert: 1. Personen ≥ 60 Jahre, 2. Personen, die in medizinischen Einrichtungen arbeiten, 3. Personen mit chronischen Erkrankungen sowie 4. Personen, die zu einer oder mehreren der Gruppen 1–3 gehören.

□ **Ergebnisse:** Die Stichprobe umfasste 4 011 Personen. Die Durchimpfungsrate in Deutschland nahm von 22,3% in der Saison 2002/2003 auf 25,1% in der Saison 2003/2004 zu. Diese Zunahme ist statistisch nicht signifikant. Die häufigsten Gründe für eine Impfung waren: 1. Influenza ist eine schwerwiegende Erkrankung, welche vermieden werden sollte (90,1%), 2. die Empfehlung des Arztes oder einer Krankenschwester, sich impfen zu lassen (71,3%), und 3. die Verwandten und Freunde nicht anstecken zu wollen (70,4%). Die Gründe für eine Ablehnung der Impfung bei Personen, die noch nie geimpft wurden, waren: 1. Man denkt daran, aber schlussendlich lässt man sich nicht impfen (47,7%), 2. man erwartet keine Ansteckung (43,6%), 3. man erhielt keine Empfehlung seitens des Arztes oder einer Krankenschwester (36,6%). Die wichtigsten Optionen zur Veranlassung einer Grippeimpfung sind: 1. Empfehlungen durch den Arzt oder die Krankenschwester (66,6%), 2. mehr Informationen hinsichtlich der Wirksamkeit und Verträglichkeit der Impfung (54,2%) und 3. mehr Informationen über die Erkrankung (52,4%).

□ **Schlussfolgerung:** Der Durchimpfungsgrad nahm in der Saison 2003/2004 im Vergleich zur 2002/2003 zu, obschon nicht signifikant. Der Hausarzt scheint der wichtigste Ansprechpartner zu sein, der die Bevölkerung zu einer vermehrten Grippeimpfung motivieren kann. Es scheint, dass die Bevölkerung mehr Informationen hinsichtlich der Wirksamkeit und Verträglichkeit der Impfung sowie über die Influenza benötigt, um sich impfen zu lassen. Deshalb wird Grundversorgern empfohlen, sich weiterhin ausführlich über die Erkrankung und die Impfung zu informieren und entsprechend ihre Zielgruppen vermehrt zu informieren.

Schlüsselwörter: Influenza · Impfung · Durchimpfungsraten · Deutschland · Gesundheitsversorgung

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For each respondent, the following parameters were collected in the survey: gender, age, size of household, household income, educational level, and 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 the recommendations in Germany at the time of the survey. The target groups were:

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Table 1. Overview of the possible answers.

<p>Why did you get vaccinated this winter?</p> <ul style="list-style-type: none"> • 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 the 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 • Don't know/no answer <p>Why do you not get vaccinated against the flu?</p> <ul style="list-style-type: none"> • I don't think I am very likely to catch the flu • I thought about it, but I didn't 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 • 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 • Don't know/no answer <p>Which of the following options would encourage you to be vaccinated against the flu?</p> <ul style="list-style-type: none"> • 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 • I would not change my mind, I would never be vaccinated • Other • Don't know/no answer 	
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- all individuals ≥ 60 years of age,
- all individuals who suffer from a chronic illness,
- all individuals who work in the medical field,
- all individuals aged ≥ 60 or who suffer from a chronic illness or who work in the medical field.

The data were pooled and weighted for age and gender. The statistical evalua-

tion has been performed with the statistic program SPSS (Statistical Package for the Social Sciences). Bivariate associations of categorical variables were analyzed using χ^2 -tests. In case of one continuous variable, a t-test or Mann-Whitney test 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.

Results

Demographic Data

The overall sample consisted of 4,011 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 rate for 2002/2003 was 22.3% and 25.1% for 2003/2004 (Figure 1). The influenza vaccination rate increased by 2.8%. This increase is not significant ($p = 0.054$).

For the subsequent winter (2004/2005) 44% of respondents intend to be vaccinated against influenza.

Vaccination Coverage in Target Groups

Pooling both influenza seasons together, the vaccination coverage rate for the group aged ≥ 60 was 45.0%, significantly different from the population < 60 , where the vaccination coverage rate reached 14.7% ($p = 0.001$; Table 3).

The group suffering from chronic illness recorded a significantly higher vaccination coverage rate than the group not suffering from chronic illness (39.6% and 20.8%; respectively; $p = 0.001$).

Working in the medical field does not seem to be a driving force for vaccination, as the vaccination coverage rate in this population (18.0%) is lower than the coverage rate in the non-medical-professional group (24.1%). The difference between the two groups is significant ($p = 0.029$). Concerning the people who are ≥ 60 or suffer from chronic illness or work in the medical field, the vaccination rate is 38.7%. This is significantly higher than the people not included in that group (13.3%; $p = 0.001$).

The vaccination coverage rate is not associated with gender, but with age. People ≥ 60 have an odds ratio of 4.7 for being vaccinated versus those < 60 . The influence of age is also clearly apparent in Figure 2: the older the

Table 2. Overview of samples.

	2002/2003	2003/2004	Total
Total	1,999	2,012	4,011
Mean age (years)	46.9	46.8	46.8
Age ≥ 60 years	29.6%	29.6%	29.6%
Male	47.8%	47.8%	47.8%
Work in medical field	6.4%	6.4%	6.4%
Chronic illness	Not available	23.3%	23.3%
Target group: ≥ 60 or chronic illness or work in medical field	35.4%	46.2%	40.8%

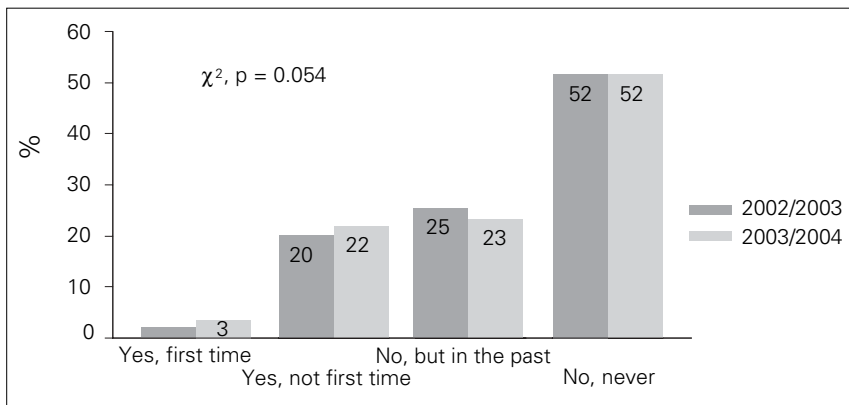


Figure 1. Vaccination rate in Germany: Have you had an influenza vaccine this winter?

Table 3. Vaccination coverage in target groups. CI: confidence interval.

	Vaccination rate (%)	p-value ^a	Odds ratio (95% CI)
Gender			
• Male	22.5		
• Female	24.7	0.106	1.1 (1.0–1.3)
Age (years)			
• < 60	14.7		
• ≥ 60	45.0	0.001	4.7 (4.1–5.5)
Chronic illness			
• Yes	39.6		
• No	20.8	0.001	2.5 (2.0–3.1)
Work in medical field			
• Yes	18.0		
• No	24.1	0.029	0.7 (0.5–1.0)
Target group: ≥ 60 or chronic illness or work in medical field			
• Yes	38.7		
• No	13.3	0.001	4.1 (3.5–4.8)
^a χ ² -test			

people, the higher the vaccination coverage rate. Comparing the evolution of vaccination coverage rate between 2003/2004 and 2002/2003 for age

groups, it is striking that all age groups < 70 increased vaccination coverage rate while there was a decrease for the groups aged ≥ 70.

People suffering from chronic illness have an odds ratio for vaccination of 2.5 over people with no chronic health problems. Medical professionals have less probability of being vaccinated than people not working in the medical field: the odds ratio for vaccination equals 0.7.

Demographics and Vaccination Rates

The education level, the size of household and the household income have a significant influence on vaccination coverage (Table 4). People with a low income (< 1,000 € per month) have a higher vaccination coverage rate (31.7%) than those with an income ≥ 3,000 € per month (17.9%). Our survey also demonstrates that small households (one to two members) have less influenza vaccine uptake than larger households (three or more). People with a high school examination have a lower vaccination rate than people who went to primary school without further professional training (15.4% vs. 33.5%). In our survey, the respondents with low social grade (low educational level, low income) seemed to be better vaccinated than people with high social grade.

Questions about the Vaccination

For those who have been vaccinated during the last season, the most frequently stated reasons for being vaccinated were the fact that influenza is considered to be a serious illness, which people want to avoid (90.1%), advice from the family doctor or nurse (71.3%), and not wanting to pass flu to family and friends (70.4%; Table 5).

For those who have never been vaccinated, reasons against vaccination were the fact that people think about it, but do not end up being vaccinated (47.7%), not expecting to catch influenza (43.6%), and the fact that the family doctor has never recommended it (36.6%; Table 6).

More than 50% of the respondents agreed with the following opinions about the vaccine:

- You can catch the flu even if you are vaccinated against it.
- If you catch the flu after having had the vaccine, the infection is less severe.

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- The side effects associated with the vaccine (fever, headache, etc.) are acceptable.
- It is important to get the influenza vaccine each year.

More than 50% of the 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 7).

Options which encourage vaccination against influenza are: recommendation by the family doctor (66.6%), more information about the vaccine regarding efficacy and tolerance (54.2%) and about the disease (52.4%; Table 8).

DISCUSSION

This survey has been performed internationally (France, United Kingdom, Italy, Spain, Germany) for two consecutive seasons, 2002/2003 and 2003/2004. We believe a telephone survey is an appropriate method in establishing influenza vaccination coverage rates in different groups in 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 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 nonresponse. Comparisons of face-to-face, mailed and telephone surveys addressing health-related issues showed small differences between modes of administration and small nonresponse effects with respect to prevalence estimates [21, 22]. Nonresponse in telephone surveys was found to be less content-oriented than in mailed surveys [23]. Also, bias due to different sociodemographic characteristics of persons inaccessible by telephone affected reports of illness and related use of services only marginally, if the general population was addressed and if telephone coverage was at least 90% [21, 24]. Persons living in institutions could not be included, which would be critical in the study of a disease affecting the higher ages differentially or directly causing institutionalization. The fact for not having asked the chronic illness

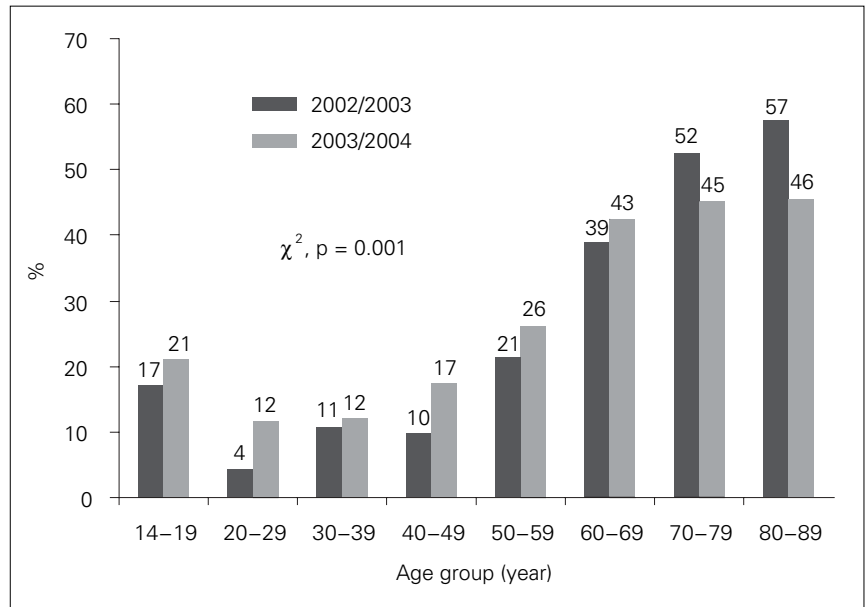


Figure 2. Profile of vaccinated population by age groups.

Table 4. Demographics and vaccination rates.

	Vaccination rate (%)	p-value ^a	
Size of household (members)			
• 1	10.5	0.001	
• 2	13.1		
• 3	26.6		
• 4	32.4		
• 5	20.2		
Educational level of respondent			
• Elementary, primary school without further professional training	33.5	0.003	
• Elementary, primary school with further professional training	25.8		
• Intermediate, high school without high school examination	23.6		
• High school examination; qualification for the technical college	15.4		
• Higher education (university, academy, technical college)	28.2		
• Still go to school	25.4	0.001	
Household income per month			
• < 1,000 €	31.7		
• 1,000 up to < 1,500 €	27.5		
• 1,500 up to < 2,000 €	28.9		
• 2,000 up to < 2,500 €	20.5		
• 2,500 up to < 3,000 €	21.0		
• ≥ 3000 €	17.9		
^a χ ² -test			

question in season 2002/2003 may have impacted chronic illness figures. However, it is hypothesized that the

impact is minimal as the responses would have been similar for both seasons. One bias could emerge from

Table 5. Questions asked to the population who has been vaccinated: “Why did you get vaccinated this winter?” The most frequently stated reasons (%).

	All	Medical staff	Chronic illness	≥ 60 years
Because influenza is a serious illness and I did not want to get it	90.1 ^a	86.9 ^a	88.9 ^a	92.3 ^a
My family doctor/nurse advised me to do it	71.3 ^a	48.1	76.3 ^a	76.3 ^a
So that I do not pass the influenza bug to my family and friends	70.4 ^a	53.4 ^a	70.8 ^a	66.8 ^a
Because of my age	40.3	27.4	39.8	56.9
Because it’s free: the Social Security pays for it	34.5	45.8	29.3	27.7
Because I am not in very good health	29.2	23.2	48.0	35.8
To prevent influenza from interrupting my professional activities	26.5	40.2	17.8	9.6
Because it is required/indicated for my job	19.0	68.1 ^a	14.8	6.6
The doctor at work offered to do it for me	14.9	34.4	8.4	10.2

^amain three reasons stated amongst the different groups

Table 6. Questions asked to the population who has never been vaccinated: “Why do you not get vaccinated against influenza?” The most frequently stated reasons (%).

	All	Medical staff	Chronic illness	≥ 60 years
I thought about it, but I didn’t end up getting vaccinated	47.7 ^a	42.0 ^a	49.9 ^a	48.1 ^a
I don’t think I am very likely to catch the flu	43.6 ^a	43.9 ^a	36.0 ^a	45.7 ^a
My family doctor has never recommended it to me	36.6 ^a	43.3 ^a	27.8	29.3
It is not a serious enough illness	36.2	38.7	31.9 ^a	29.5
My pharmacist has never recommended it to me	34.9	37.4	25.4	15.7
I have never considered it before	30.8	27.4	28.6	31.9 ^a
I do not like injections/needles	30.5	22.0	29.0	25.1
I do not think the vaccine is effective enough	27.7	31.0	29.1	26.1
My doctor at work has never recommended it to me	21.2	36.1	14.4	9.9

^amain three reasons stated amongst the different groups

Table 7. Opinions about influenza vaccine (%).

	Totally agree	Quite agree	Don’t really agree	Don’t agree at all	Don’t know
You can catch influenza even if you are vaccinated against it	33.9	44.8	13.8	5.7	1.8
If you catch influenza after having had the vaccine, the infection is less severe	27.6	41.3	17.7	9.3	4.1
The side effects associated with the vaccine (fever, headache, etc.) are acceptable	24.3	37.6	21.5	10.6	6.0
If you have the vaccine, you won’t catch influenza	8.5	25.7	36.8	27.2	1.8
The influenza vaccine is not useful if you are in good health	17.6	26.4	29.2	25.5	1.3
It is important to get the flu vaccine each year	25.9	28.3	29.4	15.4	1.0

over- or underreporting of chronic illness.

We estimate, for Europe, that approximately 22% and 23% of the population studied > 15 years of age had received influenza vaccination for the 2002/2003 and 2003/2004 influenza seasons, respectively [25]. This percentage corresponds approximately to the 20% maximum estimate for the immu-

nization rate for the entire population calculated from the number of 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) [26].

Vaccination coverage in Germany increased during the 2003/2004 season

relative to the 2002/2003 season (25.1% vs. 22.3%), but the increase is not statistically significant. One of the major explanations of this increase can be seen in the increased efforts from the German health authorities to inform their people on the dangers of influenza.

People who were previously vaccinated picked up vaccination again while first-time users increased in par-

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Table 8. Questions about the vaccination. Options encouraging to be vaccinated against influenza (%).

	All	Medical staff	Chronic illness	≥ 60 years
If my family doctor/nurse recommended it to me	66.6 ^a	55.0 ^a	70.4 ^a	71.9 ^a
If I had more information on the vaccine regarding efficacy and tolerance	54.2 ^a	44.0 ^a	54.1 ^a	49.0 ^a
If I knew more about the disease	52.4 ^a	39.6	50.8 ^a	48.4 ^a
If it were cheaper or reimbursed	42.0	36.6	44.7	36.5
If I could be vaccinated at work	39.8	48.3 ^a	36.7	28.1
If there were other ways of administering the vaccine (orally, injection without a needle, etc.)	39.3	29.3	40.0	40.2
If my pharmacist recommended it to me	29.8	24.4	35.5	36.2

^amain three reasons stated amongst the different groups

allel (Figure 1). To be noted is that the increase is situated in all but two age groups (70–79 and 80–89). This means that the uptake of influenza vaccination was more pronounced in the age population not recommended for vaccination (people < 60) than in the age-population recommended for vaccination (people ≥ 60). Regarding the surveyed populations across Europe, the German population ≥ 14 has the highest vaccination coverage rate in Europe. This is due to a higher than average uptake in the adult working population when compared with other European countries. By contrast, the population ≥ 60 has the lowest vaccination coverage in Europe [25].

For the subsequent winter (2004/2005) 44% of the individuals surveyed intend to be vaccinated against influenza. This is higher than the current overall population coverage rate, implying that more people intend to be vaccinated during the winter 2004/2005 than were vaccinated during winter 2003/3004.

The most important predisposing factors affecting vaccination rate are age (being old) and suffering from chronic illness. These two groups of people are also the two main target groups mentioned in the German recommendations. This demonstrates that the German doctors identify the people which need vaccination. Kamal et al. also showed that comorbidities influence vaccination rate [4]. Other factors influencing vaccination are size of household, household income, and educational level.

The assumption that health care workers have a higher vaccination rate

than non-health care workers is not the case in Germany. The health care professionals' vaccination rate is low (18%). Rehmet et al. showed this tendency as well (7% of health care workers in 1999 were immunized) [5]. This is opposite to the fact that the health care professionals are at increased risk of influenza infection and could potentially transmit the disease to fragile patients in hospitals.

The survey demonstrated that there are some clear reasons driving vaccination for people who had an influenza vaccine. The three most important mentioned were: influenza being considered a serious illness, family doctor or nurse actively recommending it, and not wanting to pass flu to family and friends. The three main reasons for not being vaccinated noted by those who have never been vaccinated were: thinking about it but not being vaccinated in the end, not expecting to catch influenza, and not being recommended to have a vaccination by the family doctor or nurse.

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 behavior. In the vaccinated group, health care professionals were able to stimulate their patients toward vaccination by active recommendation whereas in the nonvaccinated group, omitting to recommend vaccination had a negative effect on uptake. This clearly indicates the key role of health care 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 et al. [4], Kroneman et al. [3], and Rehmet et al. [5]. Rehmet et al. 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 referring to Table 8 shows that the patients would like more information on influenza as a disease and on influenza vaccines, so as to be vaccinated. We therefore 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 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 (Resolution of the World Health Assembly WHA 56.19, Prevention and control of influenza pandemics and annual epidemics, 56th WHA, 10th plenary meeting, May 28, 2003).

In the context of this paper, we compared this objective with the situa-

tion in Germany, considering that the elderly population was the population recommended for vaccination (i.e., those aged ≥ 60). When referring to Figure 2, the current situation in Germany is far from matching this objective. Only the ≥ 70 years of age match the 50% for 2006 (and only during 2002/2003). The 60–69 are well under that objective. The situation is worse for 2003/2004, where no elderly group matches the 50% objective. In Europe, Germany is the country with the lowest vaccination coverage rate of the elderly population [26]. A lot of efforts to increase vaccination coverage rate will therefore be necessary to match this objective. A stronger implementation of the current recommendations is needed: doctors should be made aware 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 need to be informed on the fact that they should actively recommend the vaccine, as well as inform their patients on influenza and influenza vaccine. Active recommendation to the target groups in the recommendations could really impact vaccine uptake in these at-risk groups. They should also be made aware of the fact that patients are in demand for 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, 7, 11, 12].

Efforts must be made at all national and international levels to increase the coverage according to the WHO objectives. Further research should be performed to provide consistent comparison between different countries and seasons over time.

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References

1. Szucs TD, Behrens M, Volmer T. Costs of influenza in Germany 1996 – a cost-of-illness study. *Med Klin* 2001;96:63–70.
2. Nichol KL. Cost-benefit analysis of a strategy to vaccinate healthy working adults against influenza. *Arch Intern Med* 2001;161:749–59.
3. Kroneman M, Paget WJ, van Essen GA. Influenza vaccination in Europe: an inventory of strategies to reach target populations and optimise vaccination uptake. *Eurosurveillance* 2003;8:6.
4. Kamal KM, Madhavan SS, Amonkar MM. Determinants of adult influenza and pneumonia immunization rates. *J Am Pharm Assoc* 2003;43:403–11.
5. Rehmet S, Ammon A, Pfaff G, et al. Cross-sectional study on influenza vaccination, Germany, 1999–2000. *Emerg Infect Dis*:in progress.
6. Van Essen GA, Palache AM, Forleo E, et al. Influenza vaccination in 2000: recommendations and vaccine use in 50 developed and rapidly developed countries. *Emerg Infect Dis* 2002 Dec;8(12):1442–7. *Vaccine* 2003;21:1780–5.
7. Duclos P, Hatcher J. Epidemiology of influenza vaccination in Canada. *Can J Public Health* 1993;84:311–5.
8. Calder L. Influenza vaccination coverage in old people's homes in central Auckland. *N Z Med J* 1994;107:202.
9. Evans MR. Monitoring influenza immunisation uptake in nursing homes. *Commun Dis Rep CDR Rev* 1996;6:R170–2.
10. Ganguly R, Webster TB. Influenza vaccination in the elderly. *J Investig Allergol Clin Immunol* 1995;5:73–7.
11. Robert Koch-Institut. Influenza-Impfung bei medizinischem Personal. *Epidemiol Bull* 2001;44:335–6.
12. Honkanen PO, Keistinen T, Kivela SL. Factors associated with influenza vaccination coverage among the elderly: role of health care personnel. *Public Health* 1996;110:163–8.
13. Mulet Pons MJ, Sarrion Ferre MT, Barea Montoro A, et al. Evaluation of the completion of influenza vaccination. *Aten Primaria* 1995;16:423–7.
14. Nicholson KG, Wiselka MJ, May A. Influenza vaccination of the elderly: perceptions and policies of general practitioners and outcome of the 1985–86 immunization programme in Trent, UK. *Vaccine* 1987;5:302–6.
15. Pregliasco F, Sodano L, Mensi C, et al. Influenza vaccination among the elderly in Italy. *Bull World Health Organ* 1999;77:127–31.
16. Stehr-Green PA, Sprauer MA, Williams WW, et al. Predictors of vaccination behavior among persons ages 65 years and older. *Am J Public Health* 1990;80:1127–9.
17. Centers for Disease Control and Prevention. Influenza and pneumococcal vaccination coverage levels among persons aged > 65 years – United States, 1973–1993. *JAMA* 1995;274:530–1.
18. Booth LV, Coppin R, Dunleavy J, et al. Implementation of influenza immunisation policy in general practice: 1997 to 1998. *Commun Dis Public Health* 2000;3:39–42.
19. Hak E, Hermens RP, van Essen GA, et al. Population-based prevention of influenza in Dutch general practice. *Br J Gen Pract* 1997;47:363–6.
20. Centers for Disease Control and Prevention. Missed opportunities for pneumococcal and influenza vaccination of Medicare pneumonia inpatients – 12 western states, 1995. *MMWR Morb Mortal Wkly Rep* 1997;46:919–23.
21. Marcus AC, Crane LA. Telephone surveys in public health research. *Med Care* 1986;24:97–112.
22. O'Toole BI, Battistutta D, Long A, et al. A comparison of costs and data quality of three health survey methods: mail, telephone and personal home interview. *Am J Epidemiol* 1986;124:317–28.
23. Fowler FJ Jr, Gallagher PM, Stringfellow VL, et al. Using telephone interviews to reduce nonresponse bias to mail surveys of health plan members. *Med Care* 2002;40:190–200.
24. Ford ES. Characteristics of survey participants with and without a telephone: findings from the third National Health and Nutrition Examination Survey. *J Clin Epidemiol* 1998;51:55–60.
25. Szucs T, Verwee B, Müller D. Influenza vaccination coverage rates in Europe – A population-based cross-sectional analysis of the seasons 2002/3 2003/4: in progress.
26. European Vaccine Manufacturers. Newsletter, Spring 2004 (www.evm-vaccines.org).

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