

## Prevalence of influenza vaccination in adults and elderly with chronic respiratory diseases

Prevalência de vacinação contra gripe nas populações adulta e idosa com doença respiratória pulmonar crônica

Prevalencia de vacunación contra gripe en poblaciones adultas y de la tercera edad con una enfermedad respiratoria pulmonar crónica

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### Abstract

The objective was to estimate the prevalence of influenza vaccination in adults and elderly with chronic respiratory diseases (CRDs). The sample included individuals 20 to 59 years of age ( $n = 23,329$ ) and  $\geq 60$  years ( $n = 9,019$ ) that participated in the Brazilian National Survey on Access, Utilization, and Promotion of Rational Use of Medicines (PNAUM) in 2013–2014. We estimated influenza vaccination prevalence rates and respective 95% confidence intervals (95%CI). Associations were verified with the Rao-Scott chi-square test, with significance set at 5%. For all adults and elderly with CRD, prevalence of vaccination was 42.1% (95%CI: 37.2–47.1), with a statistically difference between the two age groups ( $p < 0.001$ ). The adult population showed significant differences according to marital status ( $p < 0.05$ ), and the elderly population showed higher vaccination prevalence in the South of Brazil compared to the Northeast ( $p < 0.05$ ). For the sample as a whole, chronic bronchitis was the most frequently reported disease (43.5%). Considering each specific disease, the percentage of vaccinated adults was low, varying from 25% (other respiratory diseases) to 42% (chronic bronchitis), without a statistically significant difference ( $p = 0.330$ ). Individuals with respiratory diseases and the elderly in general ( $\geq 60$  years) are priority groups for influenza vaccination; in general, in all the subgroups, prevalence rates were below the target set by the Brazilian Ministry of Health. The recommendation that the vaccine should be applied by a health professional may explain this low adherence to vaccination by the elderly.

Vaccination; Human Influenza; Respiratory Tract Diseases; Adult; Aged

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## Introduction

Influenza virus infection frequently causes complications, the most common of which is pneumonia (primary or secondary), often leading to hospitalization and death. Influenza also exacerbates chronic diseases (chronic obstructive pulmonary disease, or COPD, cardiopathies, and other diseases with systemic repercussions) <sup>1</sup>. Influenza virus is one of the most prevalent respiratory viruses implicated in complications of COPD <sup>2</sup>.

Vaccination is one of the most effective ways of preventing influenza and its complications <sup>3</sup>. In Brazil, annual vaccination campaigns have been held since 1999 and have contributed to the prevention of seasonal influenza in the population, with positive results in reducing complications, hospitalizations, expenditures on medication, and avoidable death <sup>1,4</sup>. In unvaccinated adults, the majority of complications and deaths occur in individuals with underlying diseases, while deaths from seasonal influenza in the unvaccinated population are reported mainly in the elderly <sup>4</sup>.

The Centers for Disease Control and Prevention (CDC) <sup>3</sup> and the Brazilian Ministry of Health <sup>1</sup> recommend annual influenza vaccination in individuals with increased risk of complications of the disease, and for those living with or caring for these persons. Priority groups with formal recommendation of vaccination include the elderly ( $\geq 60$  years) and individuals with chronic noncommunicable diseases (NCDs). In individuals with NCDs, the recommendation features those with chronic respiratory diseases (asthma, COPD, bronchiectasis, and pulmonary arterial hypertension, among others) <sup>1,3,4</sup>.

The benefits of vaccination in the elderly and individuals with chronic diseases have been reported in recent decades <sup>3</sup>, and many studies demonstrate the vaccine's importance for preventing serious forms of influenza and pneumonia and reducing deaths in high-risk groups <sup>5,6,7,8,9,10</sup>. Still, despite national and international recommendations for vaccination of these groups, international studies point to low vaccination rates in patients with chronic respiratory diseases <sup>10,11,12,13</sup>.

Surveys on vaccination coverage in Brazilian adults and elderly with chronic respiratory disease (CRD) provide scarce data, and the prevalence of vaccination in this specific subgroup is insufficiently measured in general. The aim of this brief communication was thus to verify the prevalence of influenza vaccination in adults and elderly with CRD.

## Methods

The study used public domain data for Brazilian adults (20-59 years;  $n = 23,329$ ) and elderly ( $\geq 60$  years;  $n = 9,019$ ) from the *Brazilian National Survey on Access, Utilization, and Promotion of Rational Use of Medicines* (PNAUM), conducted from September 2013 to February 2014, available at <http://www.ufrgs.br/pnaum/documentos/micro-dados>.

The survey sample in the PNAUM included individuals living in urban households in Brazil. Calculation of the sample considered eight demographic domains (sex and age brackets) replicated for each of the five major geographic regions (40 sampling domains). The survey estimated 960 interviews per domain, and the selection was performed with three-stage probabilistic sampling: municipality (primary unit), census tract, and household. In the households, selection of individuals to participate in the survey was based on the expected proportion of each age group and sex to establish the final sample. The complex design guaranteed national representativeness of Brazil's five major geographic regions, stratified by sex and age group. Details on the PNAUM methods were described by Mengue et al. <sup>14</sup>.

As for target variables selected for the study, the section with individual information collected sociodemographic characteristics, and the section on chronic diseases gathered information on influenza vaccination among individuals that reported CRDs.

The prevalence rates for influenza vaccination were estimated with respective 95% confidence intervals (95%CI). Associations were verified with the Rao-Scott chi-square test with significance set at 5%. All the analyses were performed with Stata 14.0 (StataCorp LP, College Station, USA), considering the study's complex sampling design.

This study was performed with secondary data from the PNAUM survey and approved by the National Commission for Research Ethics (CONEP; case review 398.131, September 16, 2013).

## Results

The mean age of the population  $\geq 20$  years was 44.0 years (95%CI: 43.4-44.6), and prevalence of CRD was 3% (95%CI: 2.7-3.3). Of the latter, 42.1% (95%CI: 37.2-47.1) reported influenza vaccination.

Some 50% of the sample resided in Southeast Brazil, the majority women, married, with  $\leq 8$  years of schooling, and without private health plans. In adults with CRD, there was a statistically significant difference in vaccination prevalence rates according to marital status ( $p < 0.05$ ). In the elderly, there was a difference between the South and Northeast of Brazil ( $p < 0.05$ ) (Table 1). Overall vaccination prevalence rates were 35.7% and 56.7% in adults and elderly, respectively (data not shown in table).

Table 2 shows the population's distribution according to one or more CRDs (asthma, bronchitis, emphysema, or other respiratory disease) and vaccination rate. Chronic bronchitis was the most frequently reported disease (43.5%), and considering each specific disease, the proportion of vaccinated adults was low, ranging from 25% (other respiratory diseases) to 42% (chronic bronchitis), without a statistically significant difference ( $p = 0.330$ ). The elderly also showed no significant difference in the vaccination rate ( $p = 0.225$ ). The percentage of vaccinated elderly was higher than that in adults, among those reporting asthma, and in those reporting other respiratory diseases.

## Discussion

In our study, influenza vaccination prevalence rates were low in adults and elderly with CRDs. According to the Brazilian Ministry of Health, in 2013, 7.3 million doses were administered in the "comorbidities" group, the majority of which in individuals with chronic respiratory disease (some 3.7 million)<sup>1</sup>. In 2016, this figure increased to 9.4 million doses (48% in the CRD subgroup)<sup>4</sup>.

**Table 1**

Distribution of the population with chronic respiratory disease and prevalence of influenza vaccination, according to sociodemographic characteristics. Brazil, 2014.

Variables	n *	%	Prevalence of influenza vaccination					
			Adults (20-59 years)			Elderly ( $\geq 60$ years)		
			%	95%CI	p-value	%	95%CI	p-value
Region of residence					0.301			0.043
North	203	5.5	26.4	18.3-36.5		59.6	44.9-72.8	
Northeast	166	17.3	34.2	22.9-47.8		52.9	40.9-64.5	
Southeast	195	49.7	37.2	27.5-48.2		52.1	40.2-63.8	
South	240	16.9	43.6	32.7-55.2		71.7	60.3-80.9	
Central	203	10.6	26.5	18.4-36.6		63.9	51.9-74.4	
Sex					0.236			0.970
Male	288	30.3	29.4	18.7-42.8		57.2	46.5-67.2	
Female	719	69.7	38.1	31.8-44.7		57.4	47.7-66.5	
Marital status					0.029			0.603
Married/With partner	643	63.8	40.3	33.5-47.4		58.8	49.8-67.2	
Without partner	363	36.2	26.7	18.3-37.3		54.8	42.3-66.8	
Schooling (years)					0.651			0.486
0-8	568	56.5	36.2	28.4-44.8		59.4	48.6-69.4	
9-11	308	31.2	37.2	27.1-48.6		55.9	43.5-67.5	
$\geq 12$	122	12.3	28.5	16.1-45.3		46.9	31.9-62.5	
Private health plan					0.682			0.167
Yes	274	33.7	37.6	27.9-48.4		51.0	38.1-63.8	
No	732	66.3	35.0	28.2-42.5		61.9	53.4-69.7	

\* Number of observations in the unweighted sample.

**Table 2**

Distribution of the population according to one or more specific respiratory diseases and prevalence of influenza vaccination. Brazil, 2014.

	n	%	Prevalence of influenza vaccination					
			Adults (20-59 years)			Elderly (≥ 60 years)		
			%	95%CI	p-value	%	95%CI	p-value
Diseases					0.330			0.225
Asthma	410	38.0	35.4	27.7-43.8		62.2	51.8-71.5	
Chronic bronchitis	378	43.5	42.0	32.8-51.8		57.3	43.1-70.3	
Enphysema	82	7.5	34.3	10.5-70.0		45.7	30.0-62.3	
Others	120	11.0	25.0	13.9-40.8		70.8	52.8-84.0	

No information is available on prevalence of influenza vaccination in specific groups of comorbidities in Brazil. However, international studies report low vaccination rates in persons with chronic respiratory diseases <sup>10,11,12,13</sup>. In Canada, prevalence of influenza vaccination was low in individuals with asthma (36.3%) and COPD (47.9%), and the main reason for non-vaccination was that the vaccine was considered unnecessary <sup>11</sup>. In Poland, besides low vaccination of patients with respiratory diseases (58%), the main barrier was lack of recommendation by healthcare professionals <sup>13</sup>.

Various factors can contribute to the low prevalence of vaccination in individuals with chronic respiratory diseases. According to Vozoris & Loughheed <sup>11</sup>, younger age groups, smokers, and individuals without access to family physicians are less likely to vaccinate. In Spain, older age, worse self-rated health, presence of comorbidities, and marital status (married) correlated with vaccination <sup>12</sup>.

The observed differences between the South and Northeast of Brazil may be explained partly by influenza prevalence, access to health services, vaccination coverage, and recommendation by physicians and other healthcare professionals, among other factors. Older individuals with chronic diseases may be more inclined to vaccinate due to the vaccine's blanket recommendation for the elderly <sup>12</sup>. Studies on reasons for low uptake by individuals with CRDs are still scarce in Brazil, as are studies on the relationship between different variables and vaccination.

We thus need to understand the reasons for the low coverage rates in this specific subgroup in order to develop appropriate strategies. Awareness-raising on influenza and the importance of vaccination, as well as recommendation of the vaccine by healthcare professionals, especially for individuals with chronic respiratory diseases, are strategies that can help increase vaccination coverage.

The study's potential limitations should consider those reported by Mengue et al. <sup>14</sup> that are inherent to household surveys such as addressing multiple topics. In this study in particular, the use of self-reported measures limited to cases of persons with CRD diagnosed by a physician may have been influenced by unequal access to healthcare and diagnostic services.

## Conclusion

Considering the specific diseases analyzed here and that both individuals with CRDs and the elderly (≥ 60 years) are priority groups for annual influenza immunization, the findings point to low prevalence of vaccination and the need for strategic measures to improve adherence in this population subgroup.

## Contributors

A. G. M. Bacurau contributed to the data analysis, interpretation of the findings, and writing of the manuscript. P. M. S. B. Francisco collaborated with the data analysis, interpretation of the findings, and critical revision of the manuscript.

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## Resumo

O objetivo foi estimar a prevalência de vacinação contra gripe nas populações adulta e idosa com doença respiratória pulmonar crônica (DRPC). Foram considerados os indivíduos com idades entre 20 e 59 anos ( $n = 23.329$ ) e  $\geq 60$  anos ( $n = 9.019$ ) que participaram da Pesquisa Nacional sobre Acesso, Utilização e Promoção do Uso Racional de Medicamentos (PNAUM), realizada em 2013-2014. Estimaram-se as prevalências de vacinação contra gripe e os respectivos intervalos de 95% de confiança (IC95%). As associações foram verificadas pelo teste qui-quadrado (Rao-Scott), considerando-se um nível de 5% de significância. Para o conjunto dos indivíduos com DRPC, a prevalência de vacinação foi de 42,1% (IC95%: 37,2-47,1), com diferença estatisticamente significativa em relação aos grupos etários ( $p < 0,001$ ). Para a população adulta, verificaram-se diferenças significativas em relação à situação conjugal ( $p < 0,05$ ), e para os idosos, observou-se maior prevalência no Sul em relação ao Nordeste ( $p < 0,05$ ). Para o conjunto dos entrevistados, bronquite crônica foi a doença mais referida (43,5%). Considerando-se cada doença específica, o percentual de adultos vacinados foi baixo, variando de 25% (outras doenças pulmonares) a 42% (bronquite crônica), sem apresentar diferença estatisticamente significativa ( $p = 0,330$ ). Tanto os portadores de doença pulmonar quanto os idosos em geral ( $\geq 60$  anos) fazem parte de grupos prioritários para a vacinação contra gripe e, de modo geral, para todos os subgrupos considerados, as prevalências estiveram abaixo da meta estabelecida pelo Ministério da Saúde. A recomendação da vacina pelos profissionais de saúde pode contribuir para uma maior adesão desse grupo à vacinação.

Vacinação; Influenza Humana; Doenças Respiratórias; Adulto; Idoso

## Resumen

El objetivo fue estimar la prevalencia de la vacunación contra la gripe en las poblaciones adultas y de la tercera edad con enfermedad respiratoria pulmonar crónica (DRPC). Se consideraron a individuos con edades entre 20 y 59 años ( $n = 23.329$ ) y  $\geq 60$  años ( $n = 9.019$ ) que participaron en la Encuesta Nacional sobre Acceso, Utilización y Promoción del Uso Racional de Medicamentos (PNAUM), realizada en 2013-2014. Se estimaron las prevalencias de vacunación contra la gripe y los respectivos intervalos del 95% de confianza (IC95%). Las asociaciones fueron verificadas por el test chi-cuadrado (Rao-Scott), considerándose un nivel de significancia de un 5%. Para el conjunto de los individuos con DRPC, la prevalencia de vacunación fue de un 42,1% (IC95%: 37,2-47,1), con una diferencia estadísticamente significativa, en relación con los grupos etarios ( $p < 0,001$ ). Para la población adulta, se verificaron diferencias significativas respecto a la situación conyugal ( $p < 0,05$ ), y para los ancianos, se observó una mayor prevalencia en el Sur, en comparación con el Nordeste ( $p < 0,05$ ). Para el conjunto de los entrevistados, la bronquitis crónica fue la enfermedad más reportada (43,5%). Considerándose cada enfermedad específica, el porcentaje de adultos vacunados fue bajo, variando de un 25% (otras enfermedades pulmonares) a un 42% (bronquitis crónica), sin presentar una diferencia estadísticamente significativa ( $p = 0,330$ ). Tanto los portadores de enfermedad pulmonar, como los ancianos en general ( $\geq 60$  años), forman parte de grupos prioritarios para la vacunación contra la gripe y, de modo general, en todos los subgrupos considerados las prevalencias estuvieron por debajo de la meta establecida por el Ministerio de Salud. La recomendación de la vacuna por parte de los profesionales de salud puede contribuir a una mayor adhesión de ese grupo a la vacunación.

Vacunación; Gripe Humana; Enfermedades Respiratorias; Adulto; Anciano

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