

Influenza like illness monitoring in adults of the State Capitals and Federal District in Brazil by telephone survey

Monitoramento da síndrome gripal em adultos nas capitais do Brasil e no Distrito Federal por meio de inquérito telefônico

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Abstract

Objectives: In order to estimate the prevalence of influenza like illness (ILI) in adults from all state capitals and geographic regions in Brazil, a periodical monitoring of ILI cases by the national telephone survey (VIGITEL) was carried out in 2010.

Method: A cross-sectional study with 47,876 telephone interviews in the state capitals and Federal District, a probabilistic sample of adult population (≥ 18 years-old) with landline telephone. Questions concerning the results of ILI cases and pandemic influenza (H1N1) 2009, from January 10 to November 30, were analyzed. The proportion of cases stratified by sociodemographic characteristics and Brazilian geographic region was weighted with data from the National Survey with Household Sampling (PNAD) 2008. **Results:** The prevalence of ILI cases in the last 30 days before interview was 31.2% (95%CI 30.2-32.2) for all state capitals and the Federal District. This prevalence was higher among women, young adults (18 to 29 years-old) and individuals with 9 to 11 years of schooling. According to the geographic region analysis, Northern Brazil presented the highest prevalence of ILI cases. A tendency to increase with further decrease was observed among the geographic regions, except the Northeast. Need for health care assistance was reported by 26.8% (95%CI 25.1-28.5) from ILI cases. Among ILI cases that sought health care assistance, 2.6% (95%CI 1.8-3.4) reported pandemic influenza (H1N1) 2009 medical suspicion. **Conclusion:** The results of this survey supported influenza surveillance as it provided timeliness and useful surveillance information, which were not captured by the traditional surveillance system, as the occurrence of ILI and need of health care assistance.

Keywords: health surveys; surveillance; cross-sectional studies; influenza A virus.

Objetivo: Com o objetivo de estimar a prevalência da síndrome gripal em adultos das capitais e regiões do Brasil, realizou-se monitoramento da ocorrência de sinais e sintomas compatíveis por inquérito telefônico (VIGITEL) em 2010. **Método:** Estudo transversal que contou com 47.876 entrevistas nas capitais dos estados brasileiros e no Distrito Federal, com amostragem probabilística da população ≥ 18 anos, residente em domicílios com linha fixa de telefone. Foram analisadas as questões referentes à síndrome gripal e *influenza* pandêmica (H1N1) 2009, no período de 10 de janeiro a 30 de novembro de 2010. Os percentuais foram calculados para as regiões do país e para o Brasil e ponderados segundo a distribuição sociodemográfica da PNAD 2008. **Resultados:** A prevalência de indivíduos, com algum sinal ou sintoma de gripe nos 30 dias anteriores à entrevista, foi de 31,2% (IC95% 30,2-32,2). O relato de síndrome gripal foi mais frequente entre as mulheres, adultos jovens (18 a 29 anos) e aquelas pessoas com 9 a 11 anos de estudo. A maior prevalência de sinais ou sintomas gripais ocorreu na região Norte. Verificou-se tendência crescente com posterior decréscimo em todas as regiões, exceto na Nordeste. A procura pelo serviço de saúde foi relatada por 26,8% (IC95% 25,1-28,5) das pessoas que adoeceram. A suspeita médica de *influenza* pandêmica (H1N1) 2009 ocorreu em 2,6% (IC95% 1,8-3,4) dos entrevistados que relataram ter procurado o serviço de saúde. **Conclusão:** Os resultados deste inquérito forneceram informações oportunas e úteis, as quais não foram captadas pelo sistema de vigilância tradicional, como a ocorrência de sinal ou sintoma gripal e a procura pelo serviço de saúde.

Palavras-chave: levantamentos epidemiológicos; vigilância; estudos transversais; vírus da *influenza* A.

In April 2009, starting from the identification of pandemic *influenza* virus (H1N1) 2009 (pH1N1) and the establishment of public health emergency of international concern by the World Health Organization (WHO), with the consequent global spread of the virus, the ability of influenza surveillances to respond all over the world was tested¹.

In Brazil, epidemiological surveillance for influenza functions through the intervention of different strategies, which include syndromic surveillance for influenza-like illness (ILI) in sentinel units, the monitoring of hospital admissions and mortality by influenza and pneumonia, the investigation of ILI outbreaks in restrict environments and, since the pandemic in 2009, the surveillance of severe acute respiratory syndrome (SARS) and the investigation and follow-up of the evolution of hospitalized SARS cases. Thus, surveillance gathers all information from different databases, which is daily used to analyze the health situation.

Information regarding the demand for ILI care and respiratory viruses in the country are registered by sentinel units and Central Public Health Laboratories (*Laboratórios Centrais de Saúde Pública - Lacen*) of each unit of the federation, and reference laboratories for Influenza (*Fundação Oswaldo Cruz*, in Rio de Janeiro, *Instituto Evandro Chagas*, in Pará, and *Instituto Adolfo Lutz*, in São Paulo of the System of Epidemiological Surveillance of Influenza Virus in Brazil - SIVEP_Gripe)².

Information regarding admissions at the public and insured health systems are provided by the Brazilian Hospital Information System (SIHSUS)³, and data on casualties are given by the National Mortality Information System (SIM)⁴.

After the establishment of pH1N1 pandemic in April 2009, the Health Ministry developed an online notification system for suspicious cases of influenza (Sinan

online Influenza)⁵. This system has enabled the daily follow-up of suspicious cases of ILI and SARS according to the definition of the case, as well as admissions and closure of such cases in the national territory.

In response to the pandemic and with the goal to complement other monitoring mechanisms, starting from January 2010, questions regarding the occurrence of influenza signs in the past 30 days, the search for health services and specific antiviral treatment was included in the Telephone-based Surveillance of Risk and Protective Factors for Chronic Diseases (VIGITEL). The inclusion of these questions made it possible to estimate the number of people who get sick and do not seek health care, besides performing continuous regional and seasonal analyses of ILI in the country; this characteristic was incorporated to the agility of the system. This was the first time VIGITEL included questions regarding communicable diseases to its rotational module.

Many countries use telephone surveys as a surveillance tool for ILI and *influenza*⁶⁻⁹. At a pandemic, this kind of survey may offer a practical and convenient solution to understand the knowledge gaps about the *influenza* status¹⁰.

This article aimed to estimate the prevalence and to describe the tendency of ILI in the capitals and regions of Brazil from January to November 2010, based on periodic monitoring by VIGITEL.

Methods

Since 2006, VIGITEL has continuously collected data on health behavior. It is a cross-sectional study conducted by probability sampling of the adult population (≥ 18 years) living in the capitals of Brazil and the Federal District. It consists of more than 2,000 telephone interviews in each location, in households containing at least one telephone line.

Active residential telephone lines are eligible for the system, and up to six calls

are made in different days and times for identification. In each household, individuals aged 18 years or more are listed in order to draw the one to be interviewed. The interviews are performed during the months of the year and days of the week. Details on the survey methodology are available in previous publications^{11,12}.

VIGITEL is usually comprised of 94 questions divided into the following sections: demographic and socioeconomic characteristics, reported weight and height, eating and physical activity habits, smoking and drinking, self-evaluation of health status, cancer prevention and previous medical diagnosis of diseases such as arterial hypertension and diabetes.

In 2010, the following questions regarding ILI and pandemic *influenza* (H1N1) 2009 were included: "In the past 30 days, have you presented any signs of influenza, like runny nose, fever, general discomfort, cough or sore throat?"; "Have you searched for a health service?"; "Has the doctor mentioned if you might have influenza A H1N1, also known as swine flu?"; and, "Has the doctor prescribed any specific medicine called Tamiflu (Oseltamivir)? (Not considering vitamin C, painkillers, antipyretics, decongestants etc.)".

Monthly analyses of suspected ILI cases were conducted, that is, individuals who reported runny nose, fever, general discomfort, cough or sore throat in the past 30 days. Trend was estimated by polynomial models 1 (linear regression) and 2.

Data were measured with the design weight and the post-stratification weight. Design weight was constructed in compliance with VIGITEL, by multiplication of two factors: the inverse number of telephone lines at the household, in order to adjust the higher probability of individuals living in households with more than one telephone line to participate in the sample; the number of adults in the household, in order to correct the lower chance that individuals in households

with more occupants have to participate in the sample.

For post-stratification, characteristics related to sex, age and schooling of the sample and the total population were considered. Thus, updated population data from the National Household Sample Survey (PNAD), performed by the Brazilian Institute of Geography and Statistics (IBGE) in 2008¹³ was used. There were a total of 24 population strata: men and women aged from 18 to 29, 30 to 39, 40 to 59, 60 years or more, and with school years between 0 and 8, 9 and 11, and 12 or more.

The value for each stratum was calculated by dividing the proportion of population as to sex, age and school years (PNAD) by the percentage of the VIGITEL sample for sex, age and school years. As to the analyses for the capitals, the probability of the telephone line draw in each capital was considered. The final weight is the result of the multiplication of all factors, given by the formula:

$$\text{Final weight}_{ij} = \text{weight1}_j * \text{weight2}_{ij} * \text{weight3}_{ij} * \text{postweight}_{ij}$$

In which,

i: interview;

j: capital;

Weight1: 1/probability of the telephone line draw for the j-th capital, this weight is necessary for the analysis in Brazil, since different draw probabilities are considered;

Weight2: 1/number of telephone lines in the household;

Weight3: number of adults in the household.

In this article, results of questions regarding ILI and pandemic *influenza* (H1N1) 2009 were analyzed in the period between January 10 and November 30, 2010. Weighted percentages by month, regions of the country and capitals, and the Federal District were calculated, which were known as the analyses for Brazil, and respective confidence intervals (95%CI).

At VIGITEL, the informed consent form was replaced by the verbal consent at the moment of telephone contact with the participant. The study was approved by the Human Research Ethics Committee (report number 749/2006).

Results

From January to November 2010, 47,876 interviews were conducted in the 26 capitals of Brazil and the Federal District. Success rate (performed interviews/total eligible lines) in this period was 72.2%.

The prevalence of individuals with some sign of flu in the 30 days prior to the interview during the studied period was 31.2% (n=15,248; 95%CI 30.2-32.2) for the capitals and the Federal District. Among the participants, report of flu sign or symptom was prevalent for the females (32.8%; 95%CI 31.6-34.0) and among individuals with 9 to 11 school years (33.5%; 95%CI 31.9-35.0). Young adults (18 to 29 years) reported ILI more frequently (38.0%; 95%CI 35.8-40.2) in relation to the elderly (≥ 60 years) (21.2%; 95%CI 19.4-23.2), as demonstrated in Table 1.

In the analysis per region, the North region had the highest ILI prevalence (36.8%; 95%CI 35.3-38.3). The other regions presented similar prevalence, ranging from 29.7% (95%CI 28.0-31.4) in the Southeast region, to 31.9% (95%CI 30.1-35.6) in the South region (Table 1).

The monthly analyses showed a growth trend with posterior decrease in the proportion of individuals who reported signs of flu in almost all regions, except for the Northeast, which kept a discrete growth trend throughout the year. The period with more occurrences varied according to region. The highest percentages of individuals who reported signs of flu occurred: between August and September in the Northeast region; in May, in the North region; in June, in the Center-West; between May and July, in the Southeast; and in June and August, in the South region.

Table 1. Sociodemographic characteristics of influenza like illness cases (n=15,248)

Tabela 1. Características sociodemográficas dos indivíduos que referiram sinais e sintomas de SG (n=15.248)

Variables	% ¹	95%CI
Total	31.2	30.2-32.2
Sex		
Female	32.8	31.6-34.0
Male	29.2	27.6-30.8
Age group (years)		
18-29	38.0	35.8-40.2
30-39	33.3	31.3-35.3
40-59	28.9	27.3-30.5
≥60	21.2	19.4-23.2
Schooling (years)		
0-8	28.9	27.2-30.6
9-11	33.5	31.9-35.0
≥12	31.7	29.9-33.5
Region (n=15,248)		
North	36.8	35.3-38.3
Northeast	32.5	31.4-33.7
Southeast	29.7	28.0-31.4
South	31.9	30.1-35.6
Center-West	31.3	29.8-32.9

¹Weighted proportion by sex, age, and schooling (years) according to the National Household Sample Survey, 2008. Source: VIGITEL, 2010.

¹Valores ponderados por sexo, faixa etária e escolaridade segundo PNAD, 2008

After the previously reported peaks, the regions presented different decline patterns, especially the Center-West and Southeast regions, which had a second peak in September (Figure 1a).

In the capitals and Federal District, 26.8% (95%CI 25.1-28.5) of the people who got sick reported looking for some type of health service. This search presented peaks in February (30.5%) and November (30.4%), and kept the same sickening trend in the North, Northeast and South regions. In other regions, despite the depletion in the flu sickening proportion observed in the year, the search for health services had a growing trend (Figure 1b).

Medical suspicion of pandemic influenza (H1N1) 2009 occurred in 2.6% (95%CI 1.8-3.4) of the participants who looked for health care. Oseltamivir prescription was reported by 4.9% (95%CI 1.1-

8.7) among people who looked for health care and had suspicion of pandemic influenza (H1N1) 2009 (n=118).

Discussion

VIGITEL monitoring demonstrated that ILI affected approximately one third of the population in the capitals and the Federal District from January to November 2010. Most patients who reported symptoms related to ILI were young adults (18 to 29 years). Approximately one fourth of the patients searched health care services due to the flu, and less than 3% of these cases presented medical suspicion of pandemic influenza (H1N1) 2009. Among the suspected cases, a small proportion referred receiving the prescription of the antiviral recommended by the Health Ministry to treat for pandemic influenza (H1N1) 2009.

Telephone surveys, especially the Behavioral Risk Factors Surveillance System (BRFSS), have been used in the United States for years to monitor risk factors for chronic non-communicable diseases. Recently, these surveys have been used to monitor situations that are considered as emergency, like the case of pH1N1 epidemic, with the objective to analyze vaccine coverage, as well as the effectiveness and adverse effects of the vaccine against pH1N1¹⁴⁻¹⁷. This strategy enables the monitoring of population data, and the agility in diagnosing risk situations, which favors the real-time decision making. In Brazil, this strategy began in 2010 and was proven efficient, which justifies its use in the following years.

Epidemiological data about ILI and influenza in the Brazilian population were scarce and mostly restricted to specific populations and locations¹⁸⁻²¹. This was the first time the Health Ministry analyzed the ILI prevalence in Brazil by a telephone survey. Preliminary results were properly used and cooperated with influenza surveillance, since they provided infor-

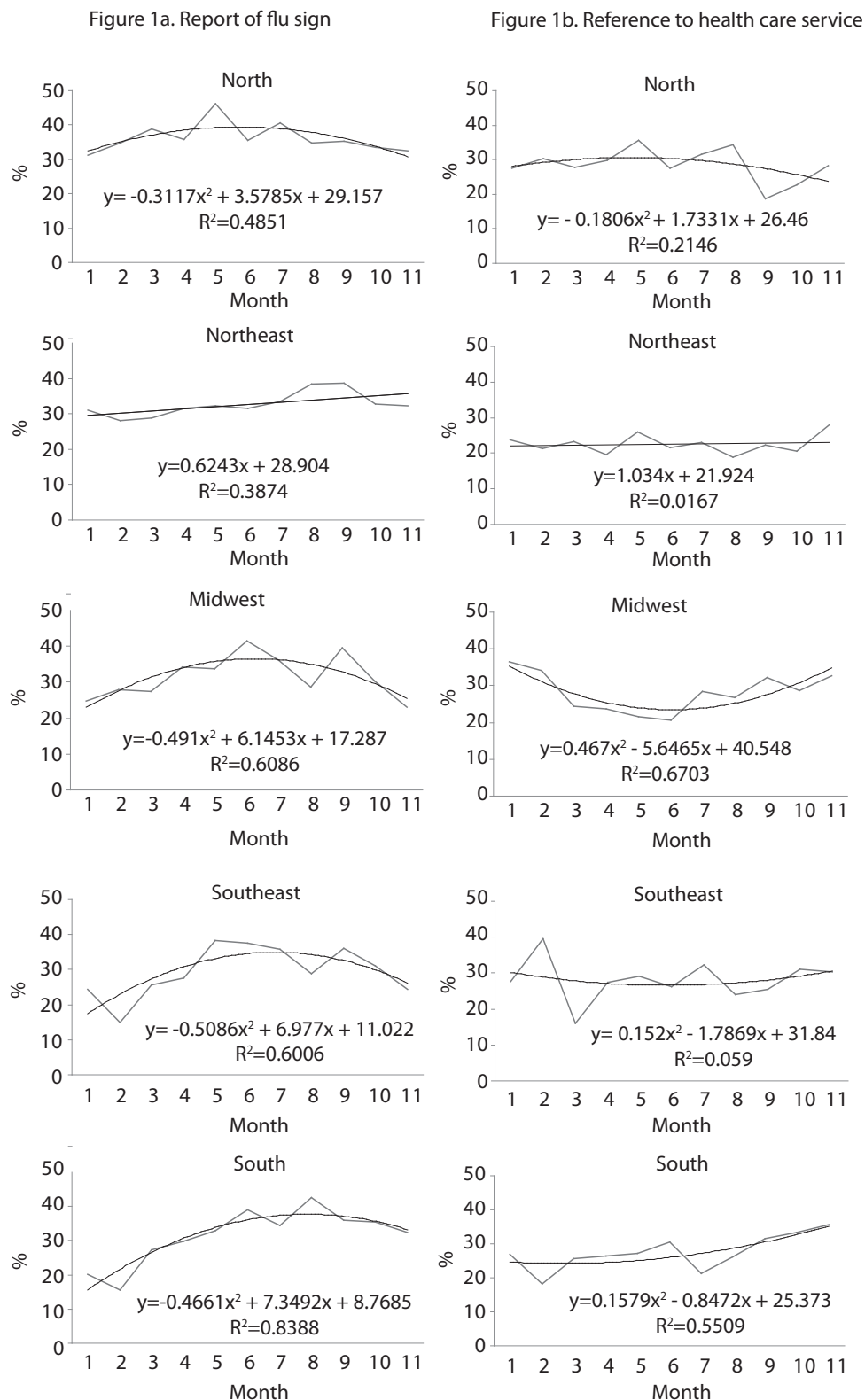


Figure 1. Proportion of influenza like illness cases (1a) and need for health care assistance (1b) according to Brazilian geographic regions, January to November, 2010

Figura 1. Proporção de entrevistados que referiu algum sinal (1a) e que procuraram o serviço de saúde (1b), segundo regiões do Brasil, janeiro a novembro de 2010

Figure 1a. Report of flu sign

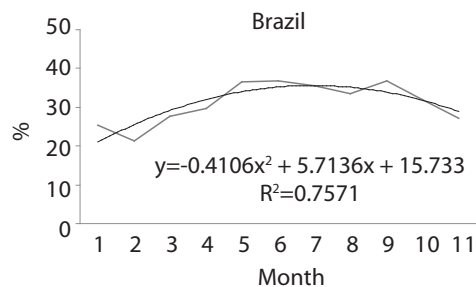


Figure 1b. Reference to health care service

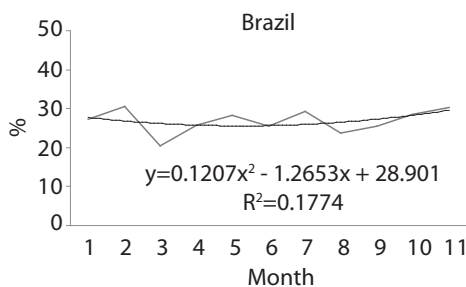


Figure 1. Continuation

Figura 1. Continuação

mation which had not been observed in other databases.

With the information, it is possible to estimate that a large part of the population that presented compatible symptoms did not look for health care. Possibly, the population considered these cases to be mild, thus, not referring to the health system. Such cases would not be measured by the traditional influenza surveillance system. So, data from the survey enable the creation of a base to estimate future ILI trends in the country, supporting surveillance and decision making.

The information provided by telephone surveys is really important for ILI surveillance, especially because of the more agile and efficient methods of data collection used in the surveillance routine⁶. ILI case notification is the base of the national sentinel surveillance system in Brazil and other countries. Influenza surveillance, unlike other diseases and disorders, must be comprised of a group of strategies; the adoption of a telephone survey allows the administrator to observe the *influenza* profile along the seasonal period in different regions of the country, as well as the level and duration of influenza in the period. However, it is difficult to estimate the disease load in the population, since it depends on individuals who are prone to the circulating virus in the period, on those who look for medical assistance⁷ and on the notification of cases. It is important to

emphasize that influenza viruses present minor mutations that provide them with the ability to infect the same individuals each year, which may change the situation every season. Thus, WHO annually performs the viral monitoring for the vaccine composition in the North and South hemispheres. Brazil is part of this initiative, providing information about the viruses circulating in the country.

During the influenza pandemic in 2009, the Health Ministry regularly published epidemiological reports on the situation. Data from SINAN online influenza, the sentinel surveillance system and the telephone survey, besides SIM and SIH, were analyzed per epidemiological week and region, thus enabling periodic evaluation and decision making.

In Brazil, the distribution of ILI medical care which was informed in sentinel units increased in the first semester after a decrease in the posterior period (sentinel surveillance data, non-published), similar to data from ILI reported in the telephone survey.

The importance of this broader characterization is owed mainly to the fact that Brazil is a large territory, with great climatic diversity, ranging from the tropical climate in the North region to the subtropical climate in the South of the country²². Previous studies showed that subtropical and tropical regions have a seasonal distribution of influenza. At VIGITEL data

analysis, a different seasonal trend was identified according to the region: the increase of the disease in the North occurred approximately two months earlier (March/May) in relation to the South²²⁻²⁶. At this time, the North region is rainy, and these months are considered to be cold. In the South and Southeast, the increased occurrence of the disease was related to the winter months, especially May and June in the Southeast, and June and August in the South. The Center-West region had its peak in June, which is also the coldest month, and the Northeast region, between July and September, the rainiest months. Therefore, regionally, months with lower temperatures had higher ILI incidence.

Among the different respiratory viruses, influenza offers more risk to the population¹⁹. Between March and June 2010, there was a wide vaccination campaign against pandemic influenza (H1N1) 2009 in Brazil directed to health workers, the indigenous population, the ones with chronic diseases, children aged between six months to two years, young adults aged between 20 and 39 years, and pregnant women, together with the routine campaign against seasonal influenza, which happens annually in April and is destined to the population aged over 60 years. The campaign established by the Health Ministry affected 89,579,758 people in 2010²⁷. The number of vaccinated people, associated with the low circulation of the pandemic virus and with the unknown proportion of virus immunization, during the pandemic peak in 2009, may have contributed with the low prevalence, although there are no previous data in the Brazilian literature to support this hypothesis.

The lowest prevalence of individuals with flu symptoms was observed in the elderly population, who received both the vaccine against seasonal influenza and against pandemic influenza (H1N1) 2009, at the presence of a chronic disease.

The reference to a health service had two distinct patterns. In the capitals of the Southeast and Center-West regions, despite the increased number of people with flu signs, the search for health care was lower. The broad media coverage about signs and symptoms of influenza, and also about its severe signs, may have led to a lower reference to medical care in these regions, once these individuals probably presented mild symptoms. On the other hand, the increased search for services, especially in the South region, may be preliminarily related to a greater concern about flu symptoms in the post-pandemic period, especially in regions where mortality rates were higher in 2009². Thus, more detailed studies are necessary to understand the reasons of such phenomenon.

In order to extrapolate the results from the telephone survey, one must consider that VIGITEL estimates represent adults living in Brazilian capitals and the Federal District only. The definition of "flu sign" for this study was more sensitive than the ILI definition in the Handbook of Epidemiological Surveillance, by the Health Ministry (fever with cough or sore throat), which may have overestimated the prevalence of the disease. Besides, no etiological diagnosis was conducted for ILI cases, which may have caused a classification bias.

Conclusion

VIGITEL was established in 2006 as a monitoring system for Chronic Non-Communicable Diseases (CNCD) risk factors. The inclusion of questions regarding communicable diseases in the system showed its potential as an important tool for *influenza* surveillance to estimate ILI prevalence in the population. Besides, the survey results enabled to estimate the percentage of adults with flu signs who did not look for health care services, which would hardly be noticed by traditional surveillance and medical care information systems (ambulatory and/or hospital).

The continuity of the influenza module at VIGITEL as a complementary strategy to influenza surveillance in Brazil, for a minimum period of five years, will allow the country to establish a base of ILI cases and contribute to plan prevention and control actions for this important disease in Brazil.

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