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INFECTIOUS DISEASES

Surveillance of perceptions, knowledge, attitudes and behaviors of the Italian adult population (18–69 years) during the 2009–2010 A/H1N1 influenza pandemic

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Abstract Monitoring perceptions, knowledge, attitudes and behaviors of populations during pandemic flu outbreaks is important as it allows communication strategies to be adjusted to meet emerging needs and assessment to be made of the effects of recommendations for prevention. The ongoing Italian Behavioral Risk Factor Surveillance System (PASSI) offered the setting for investigating people's opinions and behaviors regarding the A/H1N1 pandemic. PASSI surveillance is carried out in 126/148 Italian Local Health Units (LHU) through monthly telephone interviews administered by public health staff to a random sample of the resident population 18–69 years. In fall 2009 additional questions exploring issues related to the A/H1N1 flu were added to the standard questionnaire. The pandemic module was administered on a voluntary basis by the 70 participating LHUs from November 2nd, 2009 to February 7th, 2010; 4 047 interviews were collected. Overall 33% of respondents considered it likely that they would catch flu, 26% stated they were worried, 16% reported having limited some daily activities out of home and 22% said they would accept vaccination if offered. All these indicators showed a decreasing trend across the four-month period of observation. The most trusted sources of information were family doctors (81%). Willingness to be vaccinated was associated with worry about pandemic, age, sex, having a chronic disease and timing of the interview. The surveillance allowed us to gather relevant information, crucial for devising appropriate public health interventions. In future disease outbreaks, systems monitoring people's perceptions and behaviors should be included in the preparedness and response plans.

Keywords Behavioral risk factor surveillance system · Pandemic · A/H1N1 · Perception · Knowledge · Attitude · Behavior

Preliminary results were presented in part at the 4th European Scientific Conference on Applied Infectious Disease Epidemiology (ESCAIDE). Lisbon, 11–13 November 2010.

This study is conducted On behalf of the PASSI Working Group.

Please refer the "Appendix" section for PASSI Working Group members and list of local and regional PASSI coordinators participating in the sentinel survey.

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Introduction

In 2009 a novel form of influenza, caused by the virus A/H1N1, emerged in Mexico and spread to many countries, causing the World Health Organization to declare that a pandemic existed in June 2009 [1]. In Italy before an effective vaccine was made available, recommended measures for preventing the spread of the infection in the general population centered on the adoption of effective hygienic measures. Unlike other countries, antiviral treatment was limited to the first imported cases and was not recommended as common practice during the pandemic [2, 3]. Pandemic vaccination was available from

mid-October 2009, and was offered in phases, starting with young high risk individuals [4].

Adoption of protective behaviors was a crucial aspect of prevention strategies worldwide [5] and communication was focused on daily precautionary behaviors that the public could take to reduce the viral spread.

In general, individuals are motivated to take protective actions in emergent situations by a complex interaction of cognitive (e.g., risk perception), affective (e.g., emotional response) and social (e.g., social norms) factors [6].

In particular, willingness to adhere to the recommendations has been observed to vary according to the perceived infectiousness and severity of the disease [7–11], perceptions about the effectiveness of control measures [7, 8] and trust in the information provided by national and international public health authorities [7].

For this reason several cross-sectional studies were carried out during the A/H1N1 pandemic in different countries to investigate opinions, attitudes and behaviors of the population and to identify factors that influence willingness to be vaccinated and trust in official recommendations. Because such indicators can change over time, in some countries the surveys were repeated [12–14].

In Italy a behavioral risk factor surveillance system (known as PASSI, Progressi delle Aziende Sanitarie per la Salute in Italia) has been running since 2007 to investigate the lifestyles and the health status of the Italian adult population [15]. PASSI offers an opportunity to study emerging events relevant for public health by adding questions to the main questionnaire.

In order to provide useful information for planning and evaluating public health interventions, when the A/H1N1 influenza spread to Europe, a pandemic module within the PASSI surveillance was implemented to describe perceptions, knowledge, attitudes and behaviors of the population regarding the flu pandemic. Here we report the main results and evaluate feasibility, validity and timeliness of this approach.

Methods

PASSI is an ongoing surveillance system which provides prevalence estimates for the main behavioral risk factors and preventive measures, allowing to monitor their changes over time and differences among areas within the country. The characteristics of the system have been described elsewhere [15, 16].

In brief, the unit of data collection for PASSI are local health units (LHU). Each of the 21 Italian regions comprises between 1 and 22 LHUs. A sample of persons 18–69 years of age, stratified by gender and age groups, is randomly selected at monthly intervals from the list of residents enrolled in the unit; the size of each stratum is proportional to the demographic composition of the local population. Specially trained LHU personnel (usually public health practitioners) administer telephone interviews (minimum 25 per month per LHU) through a standardized questionnaire. Data are anonymized, encrypted and electronically recorded in a common national database.

In 2009, 126 of the 148 Italian LHUs participated in PASSI, with coverage corresponding to about 85% of the Italian population aged 18–69 years. The number of complete interviews gathered in 2009 was 39 231. PASSI adopted the American Association for Public Opinion Research (AAPOR) guidelines to calculate outcome rates [15]. The response rate (resembling AAPOR RR4) was 83% in 2009 for the national pool.

Planning and implementation of the pandemic survey occurred between September and October 2009. An additional module comprising seven questions was prepared [17]. Table 1 shows the main indicators which express the most relevant opinions, attitudes and behaviors of the population relative to the flu pandemic.

All the 126 LHUs participating in PASSI received a call to join the pandemic survey: 70 LHUs agreed to administer the additional module to a sub-sample of the population included in the surveillance. To avoid an excessive burden for the interviewers, most of whom were involved in prevention activities during that period, LHUs were left free to organize data collection according to the working schedules and the willingness to cooperate of their staff. Collaborating health practitioners were invited to administer the pandemic module to all the persons they interviewed.

A separate database was created and the additional questions were entered through a dedicated web form. LHUs were asked to enter pandemic data within few days after collection, to ensure timely analyses during the pandemic, while data from the main questionnaire could be entered later on. An identifying code was assigned to each interviewed person to allow a subsequent record linkage between the two datasets. In this way, within the PASSI surveillance a sentinel system was set up by voluntary recruitment.

Statistical analyses were conducted using the software Stata 11. The population under study was described through the frequency distribution of socio-demographic variables. Prevalence of the main indicators regarding the new influenza A/H1N1 was estimated through a complex survey design analysis accounting for the sampling method adopted for PASSI. This method uses a weighting system that takes into account the size of the studied population, the number of observations and the stratification of the sample by age and sex.

Preliminary analyses showed an association between some variables/indicators and residence in one of the three

Table 1 Definition of the indicators

Indicator	Definition
Perception of high risk of being infected	Responding "likely" ("very likely" or "fairly likely") to the question: "in your opinion how likely is the chance that you or a member of your family will contract this new form of influenza (A/H1N1)?"
Worry about the pandemic	Responding "worried" ("very worried" or "somewhat worried") to the question: "thinking of you and your family, how do you feel about the current situation of the influenza A/H1N1?"
Social distancing	Responding "yes, often" or "yes sometimes" to the question: "in the last 30 days, due to the new influenza, have you restricted any activity of your life out of home (for example, going to the cinema, using public transportation, attending crowded places)?"
Willingness to be vaccinated	Responding "certainly yes" or "probably yes" to the question: "would you accept vaccination against the new influenza A/H1N1 if the vaccine was offered?", excluding those who responded that they had been vaccinated against the A/H1N1 flu or that they had already had the flu
Knowledge of the main hygienic measures to control the spread of the virus	Reporting having heard about both recommendations "to cough or sneeze in a tissue and throw it" and "to wash the hands often and properly"
Most trusted source of information	Reporting the professional or institution that would be contacted/consulted if more information were needed. Possible answers were: dedicated toll free telephone number, GPs and family pediatricians, other health practitioners, public health departments, internet, TV/radio, newspapers/magazines (multiple answers allowed)
Judgment about received information	Responding "yes" to the question: "Do you consider sufficient the information you received about how to prevent the new influenza?"

macro-areas of the country defined according to the census criteria of the Italian National Institute of Statistics (Northern Italy; Central Italy; Southern Italy, comprising the two major islands: Sicily and Sardinia). Because the representation of those areas in the pandemic sample did not correspond to the census data, it was decided to carry out both an analysis stratified for the three macro-areas and an overall analysis on the entire sample. In the latter case the weighting system took into account also the area where respondents resided.

We explored the association between willingness to be vaccinated and socio-demographic and clinical variables, and also period of interview. A multivariate logistic model, built through step-wise and backward techniques, was adopted. In both cases the final result confirmed the same model. Furthermore, the trend over time of the main indicators was described, splitting up the overall period of observation in seven two-week periods.

Results

Data collection began on November 2, 2009 and ended on February 7, 2010.

The response rate for the 70 participating LHUs was 82%. Of the 5 646 complete interviews gathered during the period of the pandemic survey, 4 047 (72%) comprised the pandemic module.

The size of the sub-samples remained steady in the first four two-week periods of the survey (mean number of observation = 717) while decreased in the last three two-week periods (mean number of observation = 393). This drop was mainly due to a reduction in number of LHUs administering the pandemic module.

The composition of the sub-samples by age and sex did not change significantly over time: a chi-square test showed a homogeneous distribution of interviews in the six sampling strata along the different periods ($P > 0.15$).

Considering the area of residence, in the pandemic survey the proportion of interviews gathered in Southern Italy was lower than that observed in the 2009 PASSI pool.

Applying the previously described weights that take into account the area of residence, no systematic difference on any major issue was found between estimates in the pandemic sample and in the overall PASSI sample. Confidence intervals of the prevalence of the main variables used in the analysis of the pandemic dataset overlapped with the estimates of the 2009 PASSI pool: overweight (31.5%—95% CI 29.9, 33.1—in the pandemic sample vs. 31.8% in the 2009 PASSI pool), obesity (11.3%—CI 10.2, 12.6—vs. 10.4%), depressive symptoms (7.0%—CI 6.1, 8.0—vs. 6.8%), at least one chronic disease reported (18.5%—CI 17.2, 19.8—vs. 17.3%), excellent or good perceived health status (68.1%—CI 66.5, 69.7—vs. 67.5%).

Table 2 summarizes the individual characteristics of the interviewed subjects.

Table 3 shows indicators of perceptions, knowledge, attitudes and behaviors regarding the pandemic influenza. Overall during the pandemic, 33% of interviewed persons considered it likely that they or a member of their family

Table 2 Socio-demographic characteristics of the population 18–69 years in the pandemic sample and in the PASSI 2009 pool

	Pandemic sample [$n = 4,047$] (%)	2009 PASSI pool [$n = 39,231$] (%)
Sex		
Male	48.4	49.3
Female	51.6	50.7
Age		
18–34	26.5	28.1
35–49	36.3	34.7
50–69	37.2	37.2
Educational attainment[a]		
Low	43.7	42.3
High	56.3	57.7
Economic difficulties[b]		
A lot	11.0	13.4
Some	36.2	40.7
None	52.8	45.9
Geographic area of residence		
Northern Italy	55.4	50.0
Central Italy	30.9	25.5
Southern Italy	13.8	24.5

[a] Low (primary school or less, middle school), high (high school, university)

[b] "With the financial resources you have at your disposition, either from your income or from your family's, how do you get to the end of the month?'' (easily/very easily, with some difficulty, with much difficulty)

would become infected, 26% stated they were worried and 16% reported having limited some daily activities out of home. The prevalence of these indicators varied by geographic area and for many of them the differences were statistically significant.

In the South the percentage of interviewees worried about pandemic was 35% versus 26% in the Center and 20% in the North; in the South people who reported to have limited their daily outdoor activities due to the pandemic were 23% versus 14% in the Center and 12% in the North.

Among those who had not been vaccinated yet and who thought they had not yet had influenza, the proportion of people who would accept the vaccine was 22%. Regarding the subgroups of population at risk, that were actively invited to get vaccinated according to the Italian Pandemic Plan [4], the surveillance allowed us to obtain estimates in two of the target groups: youths 18–27 years (25% would consent to be vaccinated) and people affected by chronic diseases (29%).

93% of interviewed persons were aware of the main hygienic measures to control the spread of virus and 83% considered the information received sufficient for preventing the disease. Statistically significant differences were observed among geographic areas: the proportion was 80% in the South, while in the Center and in the North it was respectively 83 and 85%.

The most reliable sources of information, which people would contact in case of need, were: GPs and family

Table 3 Indicators of perceptions, attitudes, knowledge and behaviors towards pandemic influenza

	Total % (95% CI)	Northern Italy % (95% CI)	Central Italy % (95% CI)	Southern Italy % (95% CI)
Perception of high risk of being infected	33.1 (31.4–34.9)	32.9 (30.9–34.9)	31.0 (28.4–33.6)	34.3 (30.4–38.4)
Concern about the pandemic[a]	26.4 (24.8–28.1)	20.0 (18.4–21.7)	25.6 (23.2–28.1)	34.6 (30.8–38.7)
Social distancing[a]	16.2 (14.9–17.7)	11.9 (10.6–13.3)	13.8 (12.1–15.9)	22.8 (19.5–26.5)
Willingness to be vaccinated in the general population	22.3 (20.8–23.8)	21.6 (19.9–23.3)	21.2 (19.0–23.6)	23.9 (20.5–27.8)
Willingness to be vaccinated in the youths 18–27 years	24.9 (21.0–29.3)	23.8 (19.6–28.7)	22.7 (17.0–29.7)	27.4 (19.5–37.0)
Willingness to be vaccinated in people with chronic diseases	29.2 (26.1–32.2)	30.4 (26.0–35.1)	27.6 (22.4–33.6)	28.4 (20.5–37.9)
Knowledge of the main hygienic measures to control the spread of the virus	93.3 (92.3–94.1)	93.0 (91.8–94.0)	92.8 (91.2–94.1)	93.9 (91.6–95.6)
Information received considered sufficient[a]	82.9 (81.4–84.2)	85.1 (83.5–86.6)	82.5 (80.3–84.5)	80.1 (76.6–83.3)
Sources of information to refer to:				
General practitioners/family pediatricians	81.2 (79.7–82.6)	81.6 (80.0–83.2)	82.1 (79.9–84.2)	79.9 (76.3–83.1)
Other health practitioners[a]	11.1 (10.0–12.4)	9.4 (8.3–10.7)	10.1 (8.5–11.9)	13.9 (11.3–17.1)
LHU's public health departments	8.7 (7.7–9.9)	7.7 (6.7–9.0)	7.3 (5.9–8.8)	10.9 (8.5–13.8)
TV/Radio[a]	3.8 (3.1–4.6)	2.6 (2.1–3.4)	2.7 (1.9–3.8)	5.8 (4.1–8.0)
Newspapers/magazines[a]	3.3 (2.6–4.1)	2.3 (1.7–3.0)	2.2 (1.5–3.2)	5.1 (3.5–7.2)
Dedicated toll free telephone number	2.6 (2.0–3.3)	2.0 (1.4–2.6)	3.2 (2.4–4.4)	3.1 (1.9–4.9)

2 November 2009–7 February 2010 ($n = 4,047$)

[a] Significant differences among geographic areas

pediatricians (81%), the internet (12%), other health practitioners (11%) and LHU public health departments (9%); TV, radio, newspapers, magazines and dedicated toll free telephone number were mentioned by less than 4%.

Figure 1 shows the trend over time of the four main indicators of psychological and behavioral responses towards influenza A/H1N1. From the beginning of the observation period, corresponding to the peak of the epidemic curve, to the end of it, a progressive and significant decrease of all monitored indicators was observed. The percentage of people who perceived a high risk of being infected by the new virus dropped from 45 to 17%; the proportion of concerned interviewees decreased from 45 to 14%; persons who limited their daily out of home activities diminished from 20 to 6%; the prevalence of people willing to be vaccinated in the general population declined from 36 to 10%.

The association between willingness to be vaccinated and concern about the pandemic, socio-demographic variables, health status and period of interview is described in Table 4. The multivariate analysis shows that people worried about the new influenza were much more likely to accept vaccination than those not worried (OR 2.8; P value < 0.001). Interviewed persons in the central age group (35–49 years) were less likely to want vaccination (OR 0.6; P value < 0.001) and males appeared more inclined than females (OR 1.6; P value < 0.001). The vaccine was better accepted among people with at least one chronic disease (OR 1.5; $P < 0.001$).

Discussion

Obtaining reliable and timely information on perceptions, knowledge, attitudes and behaviors of the population can provide important support to health authorities in devising effective public health actions, e.g., targeting interventions for improving adherence of specific groups to preventive measures, providing appropriate information to the public, evaluating the impact of communication strategies [18].

During a pandemic, people's perceptions, knowledge, attitudes and behaviors regarding the disease can show dynamic spatiotemporal patterns, which may influence the effectiveness of control measures [11, 13, 14]. This study confirms this observation: we found that some indicators (perception of high risk of catching the A/H1N1 flu, worry about the pandemic, limitation of outdoor activities, willingness to accept vaccination) were highest in the first two-week period of pandemic surveillance (corresponding to the peak of the epidemic curve in Italy) and then followed a progressive decline. About one-half of the Italian adult population perceived initially a high risk of being infected and a similar proportion was worried about the pandemic.

Another noteworthy finding is the substantial difference in perceptions, knowledge, attitudes and behaviors in the three major Italian areas (North, Center and South), which are likely explained by the different socio-cultural and health conditions of the respective populations. In Italy, regional approaches that take into account these features are advisable to plan and fine-tune appropriate preventive strategies.

If immunization programs against the flu depend on voluntary adherence, identifying the strength of people's motivations, the associated factors and their evolution may be helpful to modulate the vaccine offer.

In Italy, even when the spread of the disease reached its maximum level, just one-third of the adult population would agree to be vaccinated and this proportion showed a further decline later on. This indicator showed a significant variability in the different socio-demographic categories and was found to be strongly associated with worrying about the flu.

Other surveys have measured low acceptance rates for vaccination, associated with low levels of public worry about the possibility of catching the flu [12].

Of local relevance, groups targeted as 'priority' by the Italian Ministry of Health were more inclined to accept vaccination; however there still remains substantial room for improvement existed. In fact, modest vaccination coverage against A/H1N1 influenza was observed in Italy, even in high risk groups [19].

In the months preceding our survey widespread media coverage was given on the topic in Italy and messages on A/H1N1 influenza were disseminated by national and local health authorities through different means. In particular an educational campaign on the most effective precautionary measures, was implemented by the Italian Ministry of Health in October 2009, just before the start of the surveillance. From the beginning of data collection (November 2009) the great majority of interviewed persons appeared to have a sufficient knowledge of the recommended behaviors to prevent the virus's spread and the proportion of people judging sufficient the information received was high.

From our data we cannot tell which means were more effective in obtaining the high observed level of awareness about those issues. Other studies have found that media coverage and advertising can raise the perceived efficacy of hygiene behaviors [12] and may have an influence on compliance with recommendations [6].

Making appropriate health information available to citizens is a priority in emergency situations. For this purpose an effective contribute could come from the cooperation of health professionals. In fact, our data show that in Italy, when people search information to protect themselves from an emergent health risk, the most trusted sources are the

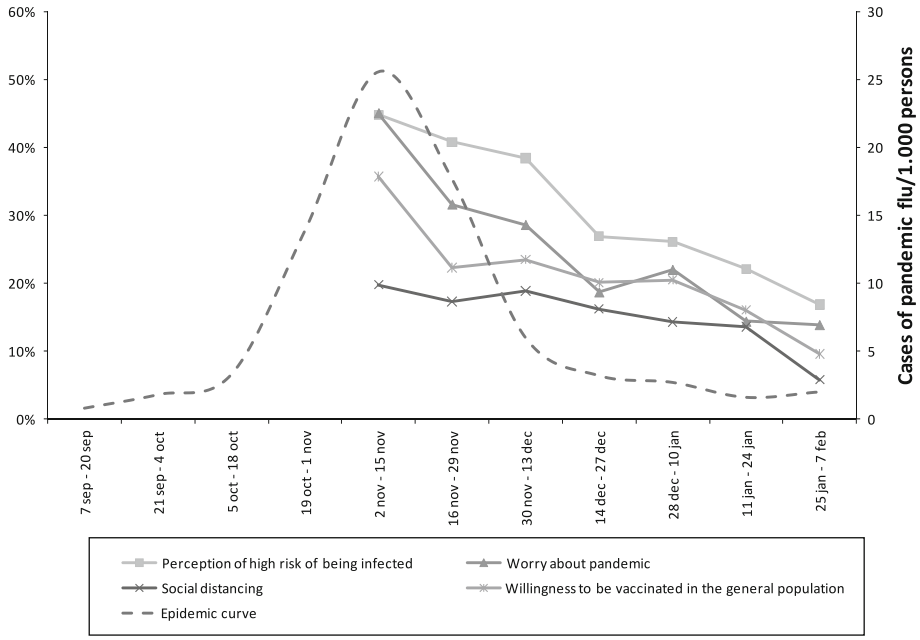

Fig. 1 Trend over time of the main indicators of perceptions, attitudes and behaviors regarding the influenza pandemic in relation to the epidemic curve ($n = 4{,}047$)

GPs and family pediatricians, while media like newspapers and TV are considered reliable only by a small proportion of persons. Our data confirm the idea that involving family doctors in the communication strategies is important for designing preparedness and response plans [20].

This study has some limitations. PASSI data, except for the demographic characteristics, are self-reported. As with any health interview survey, the answers can be influenced by various biases, in particular by a "social conformity bias". However the questions of the pandemic module concern mainly subjective aspects, necessarily self-related, that do not appear associated with social stigma.

The pandemic sample is not fully representative of the whole Italian population, because it was collected in 70 out of the 148 Italian LHUs; furthermore not all the interviews performed during the survey period comprised the emergency module. Nonetheless, this spontaneous recruitment was piggybacked by a system operating with an efficient random sampling mechanism and the added module was administered in approximately three-quarters of interviews performed in the 70 participating LHUs. An assessment of internal validity can be made, comparing the whole PASSI sample with the pandemic data. The demographic composition, by age and sex, of the pandemic sample closely resembles that of the 2009 PASSI pool, and shows non-significant changes during the period of data collection. Furthermore, there is an overlap of the estimates of the most important variables in the pandemic sample with those in the 2009 PASSI pool. Therefore the quality of the results can be considered as good as that of the overall surveillance.

The geographic distribution of the pandemic sample was uneven with an under-representation of Southern Italy. To make up for this unbalance, specific weights were adopted, taking into account also the area where the interviewed persons lived.

In order to administer the pandemic module, we decided to set up an agile inexpensive instrument. The survey was conducted in the routine context of the surveillance system without any additional funding.

A fast track was created to collect the pandemic data: a dedicated web form, a separate database and an accelerated procedure to enter the data. This organizational choice proved successful in allowing timely analyses and prompt communication of the results. The first data were presented on the PASSI website [21] and in the Bulletin of the Italian Flu Surveillance Network [22] on November 26, 2009, and thereafter fortnightly until February 2010.

Planning and implementation took about 2 months. If data collection had started earlier, it would have been possible to monitor the situation also in the ascending branch of the epidemic, producing more helpful information.

It was the first time that PASSI implemented an emergency module: finding appropriate technical and organizational solutions to problems never approached before required a substantial amount of time.

In the next major public health incident, the acquired experience will make our surveillance system able to deal more quickly and efficiently with those problems.

Because the survey explored subjective aspects of people's response to the pandemic, no objective gold standards are available for validating our results.

Comparison with other surveys is not easy, because to our knowledge no similar studies on these topics have been carried out in Italy, and those performed in other countries

Table 4 Association between willingness to be vaccinated, worry about pandemic, socio-demographic variables, health status and period of interview

	% (95% CI)	Crude OR	*P* value	Adjusted OR[a]	*P* value
Total	22.3 (20.7–23.8)				
Worry about pandemic					
No	17.0 (15.5–18.6)	1.0		1.0	
Yes	37.3 (33.6–41.3)	2.9	<0.001	2.8	<0.001
Age groups					
18–34	23.8 (20.9–27.0)	1.0		1.0	
35–49	18.4 (16.0–20.9)	0.7	0.005	0.6	<0.001
50–69	24.7 (22.2–27.4)	1.1	0.650	0.9	0.295
Sex					
Females	19.3 (17.3–21.5)	1.0		1.0	
Males	25.3 (23.1–27.7)	1.4	<0.001	1.6	<0.001
Educational attainment[b]					
Low	23.4 (21.1–25.8)	1.0		–	
High	21.4 (19.4–23.5)	0.9	0.173	–	–
Economic difficulties					
Many	27.2 (22.5–32.4)	1.0		–	
Some	21.9 (19.4–24.6)	0.7	0.055	–	–
None	21.3 (19.3–23.4)	0.7	0.021	–	–
Living with children					
No	22.8 (21.1–24.7)	1.0		–	
Yes	20.7 (17.9–23.9)	0.9	0.243	–	–
Chronic diseases[c]					
No	20.7 (19.1–22.5)	1.0		1.0	
Yes	29.1 (25.4–33.1)	1.6	<0.001	1.5	<0.001
Perceived health status					
Good	20.5 (18.7–22.4)	1.0		–	
Bad	26.1 (23.3–29.0)	1.4	<0.001	–	–
Depressive symptoms					
No	21.8 (20.3–23.5)	1.0		–	
Yes	29.6 (23.3–36.7)	1.5	0.021	–	–
Nutritional status					
Under/normal weight	20.6 (18.7–22.6)	1.0		–	
Overweight	23.4 (20.6–26.4)	1.2	0.090	–	–
Obese	27.6 (22.9–32.9)	1.5	0.005	–	–
Period of interview					
2 Nov–15 Nov	35.7 (31.3–40.3)	1.0		1.0	
16 Nov–29 Nov	22.3 (19.0–25.9)	0.5	<0.001	0.5	<0.001
30 Nov–13 Dec	23.5 (20.0–27.4)	0.5	<0.001	0.6	0.001
14 Dec–27 Dec	20.1 (16.8–23.9)	0.4	<0.001	0.5	<0.001
28 Dec–10 Jan	20.5 (15.8–26.1)	0.5	<0.001	0.6	0.009
11 Jan–24 Jan	16.1 (12.8–20.2)	0.3	<0.001	0.4	<0.001
25 Jan–7 Feb	9.6 (6.7–13.6)	0.2	<0.001	0.2	<0.001

[a] In this logistic model the association between willingness to be vaccinated and worry was adjusted for age groups, sex, chronic diseases and period of interview. Other variables were not included in the final model, because they did not fit it

[b] Low (primary school or less, middle school), high (high school, university)

[c] Diabetes, chronic respiratory disease, previous heart attack or other cardiovascular disease, cancer and renal insufficiency

must be interpreted with caution because of their different characteristics (wording of questions, socio-cultural context, epidemic phase surveyed). However, some other surveys reported results similar to ours: prevalences, trends and significant associations of indicators, such as concern about getting sick in the United States [13] or likely acceptance of the vaccine and worry about the disease in the UK [12].

In our opinion, this experience shows that a surveillance system like PASSI is able to gather relevant information on the psychological and behavioral responses of the general population to the pandemic, making this information available in a timely fashion for devising and evaluating public health interventions. We believe that systems monitoring people's perceptions and behaviors should be included in the preparedness and response plans for future disease outbreaks.

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Appendix

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