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Major motives in non-acceptance of A/H1N1 flu vaccination: The weight of rational assessment

Baruch Velan[a,e,*], Giora Kaplan[b], Arnona Ziv[c], Valentina Boyko[d], Liat Lerner-Geva[d,f]

[a] Genetic Policy and Bioethics Unit, Gertner Institute for Epidemiology and Health Policy Research, Tel-Hashomer, Israel
[b] Psychosocial Aspects of Health, Gertner Institute for Epidemiology and Health Policy Research, Tel-Hashomer, Israel
[c] Information and Computerization Unit, Gertner Institute for Epidemiology and Health Policy Research, Tel-Hashomer, Israel
[d] Women and Children's Health Research Unit, Gertner Institute for Epidemiology and Health Policy Research, Tel-Hashomer, Israel
[e] Israel Institute for Biological Research, Ness-Ziona, Israel
[f] School of Public Health, Sackler Faculty of Medicine, Tel Aviv University, Israel

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ABSTRACT

Recent efforts of health authorities to promote vaccination against influenza A/H1N1 were met with low compliance rates in most industrialized countries. Here we analyzed the attitudes of the Israeli public towards A/H1N1 vaccination based on a telephone survey conducted several months after the peak of the outbreak. The findings attest to the low uptake of the A/H1N1 vaccine (17%) in Israel, and identify the socio-demographic characteristics associated with non-compliance. In addition, the survey reveals passiveness, fear and distrust as motives leading to non-compliance. Most importantly, the study identified the substantial weight of reflective assessment in the attitude of lay individuals towards the A/H1N1 vaccine. As many as 30% of the non-vaccinated responders provided reasoned arguments for rejecting the vaccine, based mainly on assessment of threat versus actual risk. These observations highlight the need to consider the opinion of the lay public when implementing new vaccination programs.

1. Introduction

The A/H1N1 influenza of 2009 (H1N1 hereafter) is considered one of the most widespread pandemics in recent history. In March 2009, the outburst of a novel strain of influenza, linked to swine influenza was detected in Mexico [1,2] and as of January 2010 it had caused nearly 15,000 deaths in 209 countries [3]. H1N1 was declared a pandemic by the World Health Organization on the 11th of June 2009, as soon as infection had shown sustained human-to-human transmission in different geographic regions [4,5]. The WHO declaration boosted the implementation of various countermeasure programs by national organizations worldwide, and prompted the development and production of vaccines against H1N1 [4,5].

The first H1N1 vaccines were licensed in mid-September, and by October 2009 most industrialized countries had rolled out national vaccination programs. In parallel, the public's attitude towards H1N1 vaccination was examined by several public opinion polls [6–11]. At this stage, the reported willingness to accept vaccination was relatively high (55% in Australia, 45% in Hong Kong, and 60% France).

The positive attitude of the public towards vaccination has quickly changed. On the one hand concerns about the safety of the vaccine were expressed by various lay and expert agents worldwide. On the other hand the severity of the disease turned out to be lower than expected [12,13]; most people experienced mild symptoms and severe illness was uncommon, mainly occurring in individuals with underlying chronic health conditions. Eventually the discrepancy between what was expected and what happened resulted in vast rejection of the vaccination by the general public. When the wave of H1N1 began to recede in the first quarter of 2010, many countries were left with large stockpiles of unused vaccines. Health authorities were then blamed for mismanaging the preparedness efforts and for wasting public funds [14].

In many aspects, the sequence of the H1N1 events in Israel resembled those observed in other industrialized countries. The first case of H1N1 was identified in Israel on the 24th of April, and by the end of July, 1500 confirmed cases were reported. The Israeli government placed an order for 7.7 M doses on the earlier stages of the pandemic, and the vaccination program was launched at the beginning of November 2009. Vaccination was offered to everyone, free of charge, supplying the vaccine progressively, according to the level of risk. Controversies related to vaccination, focusing mainly on the safety of the adjuvant-containing inactivated vaccine prepa-

* Corresponding author at: Genetic Policy and Bioethics Unit, Gertner Institute for Epidemiology and Health Policy Research, Tel-Hashomer 52621, Israel.
Tel.: +972 3 5303964; fax: +972 3 5305960.
E-mail addresses: baruchv@gertner.health.gov.il, baruchv@iibr.gov.il, baruch_v@yahoo.com (B. Velan).

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rations purchased by Israel started early on. The government's efforts to promote the H1N1 vaccine were met with skepticism, resulting in a low compliance rates among Israelis.

In this study, the attitudes of the Israeli public towards H1N1 vaccination were analyzed. The extent of non-compliance among various socio-demographic groups was examined, and the reasons for the rejection of the H1N1 vaccination during the 2009 pandemic were evaluated.

2. Methods

2.1. Study population

This cross-sectional study was based on a randomly selected representative sample of the Israeli adult population (aged 18 and over). A probabilistic stratified sampling of households was built based on the official statistical areas characterized by socio-demographic characteristics. Areas were then matched with the computerized list of subscribers to the national telephone company and households were randomly chosen. Only one adult in each household was interviewed. The proportion of Israeli households that possess landline telephones is ~85% [15]. The number of households in the target sample was 2035. 470 contacts turned out to be abortive (fax numbers, disconnected numbers, failure to establish contact following up to 5 trials). Contact was established with 1567 households. Of these, 505 agreed to take part in the survey, yielding a response rate of 32.3%. The final sample included 501 fully complete questionnaires.

2.2. Data collection

In order to collect data on public behavior and attitudes during the resent vaccination campaign against H1N1 in Israel, two relevant questions were included in an "omnibus" survey conducted periodically by the Cohen Institute for Public Opinion Research of Tel Aviv University (The War and Peace Index). The survey was conducted on the 15th and 16th of March 2010 by telephone.

The interviews were conducted in Hebrew, Arab and Russian. The questionnaire included data regarding gender, age, income, education and ethnicity (Jewish or Arab).

Interviewees were asked if they were vaccinated against "swine-flu" during the past 6 months (yes\no). Interviewers were instructed to double-check with the respondents that they were not referring to seasonal flu vaccine. Respondents answering in the negative were then asked to explain, in their own words, the reason for not being vaccinated (open-ended question).

2.3. Data analysis

People of Arab ethnicity was defined as those describing themselves as Arab Muslims, Arab Christians or Druze. Education was assessed by the highest degree the respondent attained, and two categories were formed: those completing 12 or less years of schooling, and those completing more than 12 years of schooling. Income was categorized as below average, average or above average as assessed according to the national average household income of 11,000 NIS [15].

2.4. Coding of the open-ended question

Three investigators independently coded all 416 answers of the non-vaccinated respondents. Coding was compared between investigators and a unified list of response patterns was formulated. In 16 cases agreement was not achieved regarding the interpretation of the answer, and these responses were categorized as indecipherable. In addition 21 answers were found to lack informative value, and these were defined as "not informative". In most cases only one response pattern was identified for each interviewee. In 19 cases two patterns were identified in a single response. In these cases, only the pattern that was presented first was recorded. During the first round, 29 response patterns were identified and agreed upon by the authors. After identifying similarity in some of the patterns, these were then reduced to 21 patterns. These 21 patterns were further grouped into five major categories of attitude.

2.5. Statistical analysis

Comparison of compliance to vaccination between subgroups of categorical variables was performed using the two-tailed chi-square test. A multivariable logistic regression model was used to calculate the adjusted odd ratios of acceptability of H1N1 vaccination for gender, age, education, income and ethnicity.

In addition, five separate multiple logistic models were calculated for each of the reasons for declining H1N1 vaccination. Each reason was analyzed separately as a dependant outcome adjusted for the socio-demographic variables. Results of each multivariable model are presented with the adjusted odds ratio (OR) and corresponding 95% confidence interval (CI). A *P*-value of less than 0.05 was considered statistically significant. Analysis was performed using SAS statistical software (version 9.1, SAS Institute, Cary, NC, USA).

3. Results

3.1. Declared acceptance of H1N1 vaccination by the adult population

The survey sample (Table 1) included 501 adult participants. Representation of the main socio-demographic variables in the sample was not significantly different from their representation in the adult Israeli population in terms of gender, income, and ethnicity [15]. The older age group (>60) is over represented in our survey (30% vs. 22% in the general population), on the expanse of the younger age group. In addition, over-representation of individuals with lower level of education was noted (54% vs. 35%).

Only 17% of the respondents in our survey group declared that they had been vaccinated against H1N1 flu during the period September 2009 to February 2010. Examination of the socio-demographic characteristics of the vaccinated sub-group reveals significant deviations from the entire survey group, as well as from the non-vaccinated group (Table 1). The representation of males among vaccinees is significantly higher than that of females, and the representation of the younger age group (18–39) is significantly lower. Most strikingly the Arab population is strongly under-represented. These observations were corroborated by multivariable regression analysis (Table 2). Greater acceptability of H1N1 vaccination was noted among males (OR = 1.67; 95%CI 1.02–2.73), among older people (OR = 2.08; 95%CI 1.08–4.00 and OR = 2.46; 95%CI 1.24–4.86 for respondents aged 40–59 and ≥60, respectively), and among the Jewish population (OR = 2.77; 95%CI 1.06–7.26). The effect of income on vaccine acceptance was less pronounced, yet a trend towards non-compliance among participants of lower income was noted. Interestingly, education level had no effect on compliance. It should be noted that when education level was divided into more specific groups (primary school, high school, non-academic higher education and academic education) vaccination acceptability still remained independent of education (data not shown).

Table 1
Socio-demographic characteristics of the entire survey sample and of the H1N1-vaccinated and non-vaccinated subgroups.

Variable	Representation in survey		Representation among vaccinated		Representation among non-vaccinated		*P*-Value
	N = 501		*N* = 85		*N* = 416		
	n	%	*n*	%	*n*	%	
Gender							0.02
Male	247	49.3	52	61.2	195	46.9	
Female	254	50.7	33	38.8	221	53.1	
Age							0.01
18–39	153	30.5	15	17.7	138	33.2	
40–59	197	39.4	37	43.5	160	38.5	
≥60	151	30.1	33	38.8	118	28.4	
Education							0.39
≤12 years	265	54.3	41	50.0	224	55.2	
>12 years	223	45.7	41	50.0	182	44.8	
Income							0.06
Below average	122	24.3	13	15.3	109	26.2	
Average	206	41.1	35	42.2	171	41.1	
Above average	129	25.8	25	29.4	104	25.0	
Non-disclosure	44	8.8	12	14.1	32	7.7	
Ethnicity							0.004
Jewish	419	83.6	80	94.1	339	81.5	
Arab	82	16.4	5	5.9	77	18.5	

3.2. Reasons given for non-compliance with H1N1 vaccination

Among the 501 respondents, 416 reported that they did not receive the H1N1 flu vaccination. The reasons for non-compliance were examined by a direct open-ended question. All respondents who were not vaccinated were asked to provide an explanation for their non-compliance, and the precise verbal statements were recorded. All 416 statements were analyzed (see Section 2) and 21 defined response patterns were identified. Two additional response patterns were added: a group of non-informative responses and a group of responses that could not be deciphered (see Section 2).

Analysis of the various response patterns allowed identification of several major arguments. A large number of respondents provided reasons related to various manifestations of passiveness (Table 3, response patterns #1, #2, #3). A certain gradation in the passiveness could be identified, ranging from apathy (#1), through neglect (#2), to blaming the establishment for not encouraging them to act (#3). A few respondents ($n = 5$) indicated that their non-compliance was based on the advice by others (#4), suggesting a certain degree of passiveness which would better defined as dependence.

Table 2
Vaccination rates and multivariable logistic regression.

Variable	Vaccination rate (%) (vaccinated/total)	Logistic regression analysis	
		OR (95%CI)	*P*-value
General population	17.0 (85/501)		
Gender			0.04
Male	21.0 (52/247)	1.67 (1.02–2.73)	
Female	13.0 (33/254)	1.0	
Age			0.03
18–39	9.8 (15/153)	1.0	
40–59	18.8 (37/197)	2.08 (1.08–4.00)	
≥60	21.8 (33/151)	2.46 (1.24–4.86)	
Education[a]			0.89
≤12 years	15.5 (41/265)	1.0	
>12 years	18.4 (41/223)	1.1 (0.68–1.68)	
Income			0.13
Below average	10.7 (13/122)	1.0	
Average	17.0 (35/206)	1.59 (0.78–3.21)	
Above average	19.4 (25/129)	1.81 (0.85–3.85)	
Non-disclosure	27.3 (12/44)	2.99 (1.19–7.55)	
Ethnicity			0.04
Jewish	19.1 (80/419)	2.77 (1.06–7.26)	
Arab	6.1 (5/82)	1.0	

[a] 13 interviewees did not disclose their education level.

Table 3
Reasons for non-acceptability of vaccination.

#	Reason given for not non-acceptability of pandemic flu vaccination	Number of responses
1	I don't know; I did not think about it	38
2	I somehow did not manage to do it	22
3	No one told me to do it	16
4	I was advised not to get vaccinated	5
5	I did not want to get vaccinated	27
6	I believed that there was no need to do it	39
7	After some deliberation I have decided not to do it	8
8	I was afraid to do it	5
9	I realized that the disease is not serious, that it is not spreading	24
10	I was not endangered by the disease personally (health, age, habits)	27
11	I did not need to it since I was vaccinated against seasonal flu	11
12	Others were vaccinated so I don't need to (free riding)	1
13	Physicians did not get vaccinated; there is no need to do it	7
14	I believed that the vaccine is not efficient	12
15	Vaccine is not safe, causes side effects	34
16	My medical condition puts me at greater risk if vaccinated	11
17	I mistrusted the vaccine	32
18	All this is just pure non-sense	12
19	The vaccination recommendation is driven by ulterior motives	15
20	I don't believe in vaccination in general	25
21	I put my trust in god	8
22	Response is not informative	21
23	Response is not decipherable	16
	Total	416

Table 4
Major motives in the reasons for non-acceptability of vaccination.

Group	Major motive	Response patterns included[a]	Number of responses	Percent of total
A	Passiveness, inaction, dependence	#1, #2, #3, #4	81	19.4
B	Implicit assessment	#5, #6, #7, #8	79	19.2
C	Reasoned assessment	#9, #10, #11, #12, #13, #14, #15, #16	127	30.4
D	Distrust, alternative beliefs	#17, #18, #19, #20, #21	92	22.1
E	Others	#23, #22	37	8.9

[a] See Table 3.

A substantial number of the respondents indicated that "they did not want to get vaccinated" (#5) or believed that there was "no need to get vaccinated" (#6). These response patterns suggest some process of evaluation or assessment, but might also suggest intuitive action. The motive of implicit assessment becomes more pronounced in an additional set of responses (#7), were respondents clearly indicated that they made their decision after a process of reflection and self-deliberation. In all of these cases (#5, #6, #7), the respondents did not communicate to the interviewer the arguments underlying their non-acceptance. In addition, a small group of respondents ($n = 5$) just stated that they were fearful (#8), without indicating the actual reason for their fear. This could be interpreted as another form of non-communicated assessment.

Contrary to the above-described response patterns, in which assessments appear to be implicit, a large cluster of responses (#9–#16) provided very explicit arguments for complying with H1N1 vaccination. Many respondents did not perceive the pandemic as threatening (#9). They believed that the disease was not spreading as anticipated, and its manifestations were not disastrous ("people were not dropping dead around me", as one respondent put it). In addition, many believed that their specific life style, dietary habits, age or health status made them resistant to the disease or to its harsher manifestations (#10). Several respondents believed that they did not need to be vaccinated against pandemic flu since they had been vaccinated against seasonal flu (#11). This was evident despite the clear instructions of the Israel health authorities in the autumn of 2009 to be vaccinated against both seasonal and pandemic flu. It is interesting to note that only one responder provided an unequivocal 'free-riding' argument (#12), stating that the vaccination of others would provide protection for him. Taken together, these four response patterns (#9–#12) indicate that respondents exercised some form of risk assessment before declining vaccination. A related response pattern included the argument that vaccination was unnecessary, since health care professionals (HCP) themselves did not comply with the vaccination requirements (#13). It should be noted that Israeli HCP were encouraged to get vaccinated against H1N1 at the very early stages of the campaign, yet their compliance rate was low.

3.3. Classification of reasons for non-compliance with H1N1 vaccination

While the explanations for not complying with vaccination, as reflected by the various response patterns were diverse, they could be grouped into four major categories of attitudes (Table 4). These categories include: passiveness, implicit assessment, reasoned assessment and distrust. To these four, a fifth category was added, a category defined as 'others', which included non-informative and non-deciphered responses.

Almost one fifth (19.4%) of the responses reflected various forms of passiveness on the part of the respondent (Table 4). In 19.2% of the responses, some form of intuitive evaluation or assessment was noted described as 'implicit assessment', and in 30.4% of the responses the reasons leading to non-compliance were clearly stated ('reasoned assessment'). In the forth group (22.1%) responses reflecting mistrust in health authorities were grouped together with those reflecting trust in alternative ideologies. Nine percent of the responses were included in the residual category ('others').

Once the five major categories of attitudes leading to non-compliance with H1N1 vaccine were defined, their frequency with respect to socio-demographic groups (gender, age, education, income, and ethnicity) was examined (Table 5). The relative prevalence of the various attitudes was not found to be statistically significant in most cases.

Nevertheless, three cases of significant group-associated attitudes could be identified:

(a) The relative distribution of the various attitudes did differ significantly when Israeli Arabs were compared to Israeli Jews ($P = 0.04$). The most notable difference was found in the degree of distrust towards H1N1 vaccination: distrust appeared to motivate 35% of the non-compliers in the Arab group, compared to 19% among Jewish respondents. Multivariate analysis further underlines this difference (OR = 2.46; 95%CI 1.39–4.35 for Arabs compared to Jews).
(b) Passiveness was less evident in people of older age that in younger individuals, as revealed by multivariable analysis, with passiveness as the dependent variable (OR = 0.52; 95%CI 0.29–0.91 and OR = 0.33; 95%CI 0.17–0.67 for ages 40–59 and 60+ compared to 18–39 years of age, respectively).
(c) Gender-specific difference was observed in the tendency to practice reflective evaluation: when reasoned assessment was used as the dependent variable, men appeared (with borderline significance) to rely less on assessment when declining vaccination (OR = 0.66; 95%CI 0.43–1.02).

4. Discussion

Healthcare professionals worldwide can be credited for a number of outstanding achievements in the control of the recent H1N1 influenza pandemic. These include: immediate identification of the new outbreak, effective mapping of disease propagation, effective coordination of international endeavors, as well as rapid development and production of safe licensed vaccines [16]. However, the H1N1 control efforts are marked by the failure to convey to the public the need to be vaccinated against the pathogen [17]. In most industrialized countries vaccination acceptance was very low. Analysis of this phenomenon is of great importance, and is the focus of several studies conducted worldwide [6–11,18]. In this study we examined the attitudes towards H1N1 vaccination in Israel. The vaccination scene in Israel provides a good case for study since compliance with childhood vaccination is among the highest in the world [19], yet H1N1 vaccination was generally rejected.

As a first step in examining the attitude of the Israeli population towards H1N1 vaccination, the low compliance rate was verified. The report acceptance of H1N1 vaccine in the survey group Israeli adults, during the six most relevant months was 17%. This rate is somewhat higher than that reported by the Israeli Ministry of Health, which was 11% in the general population and 13% in the adult population (Grotto I, Director of Israeli Public Health Services

Table 5
Major motives in the reasons for non-acceptability of H1N1 vaccination by socio-demographic characteristics.

Demographic characteristic	Reasoned assessment (%)	Assessors/non-vaccinated	Implicit assessment (%)	Assessors/non-vaccinated	Distrust (%)	Distrust/non-vaccinated	Passiveness, inaction (%)	Passives/non-vaccinated	Others (%)	Others/non-vaccinated	*P*-Value
General population	30.5	127/416	19.0	79/416	22.1	92/416	19.5	81/416	8.9	37/416	
Gender											0.37
Male	26.1	51/195	19.5	38/195	22.5	44/195	22.5	44/195	9.2	18/195	
Female	34.4	76/221	18.5	41/221	21.7	48/221	16.7	37/221	8.6	19/221	
Age											0.20
18–39	29.0	40/138	17.4	24/138	19.6	27/138	27.5	38/138	6.5	9/138	
40–59	30.0	48/160	18.1	29/160	24.4	39/160	17.5	28/160	10.0	16/160	
≥60	33.0	39/118	22.0	26/118	22.0	26/118	12.7	15/118	10.2	12/118	
Education[a]											0.67
≤12 years	27.7	62/224	19.6	44/224	21.9	49/224	21.0	47/224	9.8	22/224	
>12 years	33.0	60/182	19.2	35/182	23.1	42/182	17.0	31/182	7.7	14/182	
Income[b]											0.34
Below average	28.4	31/109	22.0	24/109	23.8	26/109	21.1	23/109	4.6	5/109	
Average	33.3	57/171	15.8	27/171	18.1	31/171	21.0	36/171	11.7	20/171	
Above average	31.7	33/104	19.2	20/104	24.0	25/104	14.4	15/104	10.6	11/104	
Ethnicity											0.04
Jewish	32.1	109/339	19.8	67/339	19.2	65/339	19.5	66/339	9.4	32/339	
Arab	23.4	18/77	15.6	12/77	35.1	27/77	19.5	15/77	6.5	5/77	

[a] 10 interviewees did not disclose their education level.
[b] 33 interviewees did not disclose income.

at Ministry of Health; personal communication). This apparent discrepancy could stem from confusion between H1N1 vaccination and seasonal-flu vaccination, from the effect of social desirability, or from some response bias. However, when considering sampling error of 4.4% in a sample of 501 participants, the difference between 13% and 17% compliance is not significant.

Analysis of the association between vaccination rate and socio-demographic parameters reveals two interesting findings: firstly, very low compliance rates with H1N1 vaccination were noted among Israeli Arabs. A similar tendency was observed when acceptance of seasonal flu vaccination by Israeli Arabs was evaluated [30]. These observations might be explained by their feelings of alienation and objection to institutional recommendations. Secondly, the significantly lower rates of vaccine acceptance among females are notable. It is expected that women would be more compliant than men to H1N1 vaccination, since they are perceived as more likely to exhibit health-promoting behavior [20]. It is interesting to note that in three other studies, in which the anticipated willingness to be vaccinated against H1N1 was evaluated, women were found to be more reluctant to accept this vaccine [8,9,18]. The fact that the same phenomenon was observed in four different countries with different cultures (France, Australia, Greece, and Israel), underlines the significance of this finding.

The reasons for rejecting H1N1 vaccination represent a large array of attitudes and reasoning patterns. In spite of this diversity, we managed to group all responses into four major categories: passive attitude, distrust, implicit assessment and reasoned assessment.

About one fifth of the respondents failed to comply with vaccination due to various manifestations of passiveness, inaction and omission-bias. Not surprisingly, stronger manifestations of passiveness were observed among younger people. Passiveness and omission are often associated with non-compliance with medical recommendations and constitute strong driving forces in the failure to get vaccinated [21,22]. Individuals would rather accept the risk of a potential disease in the future than the very low putative risk of vaccination [23].

Distrust was another key element in the attitude of the survey group towards H1N1 vaccination. Rejection of H1N1 vaccination could be yet another manifestation of the increasing loss of trust in health authorities worldwide [24,25], and specifically in Israel [26]. Nevertheless, the high degree of uncertainty related to the H1N1 outbreak, as well as the high level of controversy related to the H1N1 vaccine [14,27] may have contributed to the mistrust reflected in the responses. It is interesting to note that the manifestation of mistrust was most prominent among Israeli Arabs, reflecting attitudes often associated with minorities [28].

Loss of trust in the establishment may lead to increased reliance on religion or on divergent approaches to medicine. In this survey only 1.5% of the respondents stated that they rejected vaccination because they put their trust in God; another 5% exhibited anti-vaccination beliefs, stating that vaccination in general is harmful. It is reasonable to assume that the opinions of these two groups of respondents were not shaped by the H1N1 events and that they would have manifested a negative attitude towards any other recommended vaccine. This is corroborated by the fact that the rate of rejection of childhood vaccination in Israel is about 5% [19], which is concentrated mainly in ultra-orthodox Jewish communities and in communities adhering to alternative medicine [29].

Another possible outcome of distrust in authorities and experts could be an increase in the reliance on one's own judgment. This is indeed manifested by the large number of respondents indicating implicit or explicit reasoning in their answers. Thirty percent of the non-complying respondents provided explicit rational arguments to explain their rejection of H1N1 vaccine. Moreover, another 20% of respondents stated that they decided to avoid vaccination,

but did not specify the reason for doing so. It is reasonable to believe that a large number of respondents in the latter group also reached their decision following some kind of reflective evaluation. Taken together it appears that a very substantial proportion of non-complying individuals used rational assessment before rejecting H1N1 vaccination, ranging from 30% when stringent criteria are used in the analysis of responses, to 50% when criteria are less strict.

The substantial weight of reflective assessment in framing the attitudes of the lay-public towards vaccination is laudable, but does carry certain risks. While many of the arguments provided by the interviewees against H1N1 vaccination are based on realistic observations, some would be judged by health professionals as flawed, since they are not compatible with the available scientific information. When all the 127 responses defined as reasoned assessment were dissected one by one by their agreement with reality (not shown), we have identified 54 of these were based on non-realistic assessments (e.g.: seasonal flu vaccination protects against H1N1; people with heart condition should not be vaccinated; one can escape flu be adhering to specific diets).

It is interesting to note that reasoned assessment of the H1N1 vaccine was not dependent on age, income or education. Nevertheless, females tended to manifest more reflective reasoning in their evaluation of the vaccine than males. This could be attributed to higher communicability on the part of women, but can also be attributed to a more responsible attitude towards health issues. It is tempting to speculate that the dilemmas related to H1N1 vaccination were examined more carefully by women, and that this led them eventually to higher non-acceptability of vaccination.

It should be noted that elements of fear of H1N1 vaccination could be identified in 50 of the responses (Table 3; #8, #15, #16). Nevertheless, we did not choose to create a specific group of fear-related motivation. Instead, responses, in which reasons for fear were not defined (#5) were included in the 'implicit assessment' category, while responses in which fear was part of the explicit assessment of risks-versus-benefit were included in the 'reasoned assessment' group.

Taken together the results of this study reveal the dominance of reflective risk/benefit assessment in shaping the attitude of lay individuals towards H1N1 vaccination. Nevertheless, the actual weight of reasoned assessment in the public response should be evaluated with caution.

Our evaluation of vaccination acceptance is based on a telephone survey. In Israel as well as in other countries these surveys are increasingly difficult to conduct. The relative low response rate could lead to concerns regarding response bias. It should be noted, however, that refusal to participate in the study could not be related to the subject of this study, since the questions were included in an "omnibus" survey, which dealt with a variety of subjects. The sample's representativeness of the Israeli population was satisfactory as shown by the comparison with national data, with only some over representation of older persons and of individuals with lower educational level. Moreover, the vaccination rate in the sample was not significantly different then the reported population rate, as mentioned earlier. The possible response bias in the classification of reasons for non-compliance was dealt with by stratification to categories of the socio-demographic variables (as presented in Table 5) and also by adjustment to socio-demographic variables in distinct multivariate analyses for each reason.

Two additional features of the methodology should be taken into account: (a) the study is based on an open-ended questions and (b) the survey was conducted several months after the peak of the pandemia.

The reliance on an open ended question could raise criticism related to the quantitative value of this approach, as well as to possible biases in the interpretation of the answers. On the other hand the open-ended question approach does not impose specific formats of thinking on the respondents and allows the identification of a full spectrum of opinions and views. It is interesting to note that the responses in this survey resemble some of the statements used by other researchers in the evaluation of public response to H1N1 through structured multiple-choice questioning [6,7,18].

At the time of the survey the wave of pandemia was already residing, and many of the uncertainties related to the H1N1 were resolved. It is therefore possible that the reasons for non-compliance that were stated by the respondents *post-factum*, were different from the ones that shaped their actual decisions during the epidemic. Thus, fear and suspicion could have had a stronger weight in vaccine rejection than that manifested in the survey, whereas assessment of the H1N1 risk could have been less pronounced. Nevertheless, the arguments used by people to explain their past actions could have higher implications than the arguments driving their action in real-time. The former arguments are the ones to which people choose to adhere, and are probably the ones that will shape their action in the future.

In conclusion, this study identifies the major role of reflective evaluation in the public's response to a new threat and to new countermeasures. It appears that lay persons are less willing, nowadays, to blindly accept, the recommendations of health-experts, and they tend to shape their own opinion. This trait of public response became pronounced during the H1N1 pandemia. This could have been accentuated by the high uncertainties related to this epidemic and to the newly developed vaccine. Nevertheless, the growing mistrust in governing institutions suggests that the reflective assessment will continue to play a part in the response of the public to future threats.

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