Human Exposure to Live Poultry and Psychological and Behavioral Responses to Influenza A(H7N9), China

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To investigate human exposure to live poultry and changes in risk perception and behavior after the April 2013 influenza A(H7N9) outbreak in China, we surveyed 2,504 urban residents in 5 cities and 1,227 rural residents in 4 provinces and found that perceived risk for influenza A(H7N9) was low. The highest rate of exposure to live poultry was reported in Guangzhou, where 47% of those surveyed reported visiting a live poultry market ≥1 times in the previous year. Most (77%) urban respondents reported that they visited live markets less often after influenza A(H7N9) cases were first identified in China in March 2013, but only 30% supported permanent closure of the markets to control the epidemic. In rural areas, 48% of respondents reported that they raised backyard poultry. Exposure to live commercial and private poultry is common in urban and rural China and remains a potential risk factor for human infection with novel influenza viruses.

The novel influenza A(H7N9) virus was identified in early 2013; as of March 31, 2014, a total of 404 laboratory-confirmed cases of human infection had been reported. These cases included 394 in mainland China, 2 in Taiwan, 7 in Hong Kong, and 1 in Malaysia (1,2). Only 2 laboratory-confirmed cases were identified in the summer months (June–September 2013), but beginning in early October 2013, the virus reemerged and caused many new human infections (3,4).

Previously published studies have reported that most human infections appear to have occurred as a result of exposure to live poultry, particularly through visits to live poultry markets (LPMs) in urban areas (3,5–8). No published reports have detailed population exposure to live poultry and LPMs in influenza A(H7N9) virus–affected areas in China, and few data on live poultry exposure have been previously reported in areas in which the virus has not been detected (4,9,10). In addition, little information has been reported on how the population of China responded to the outbreak and the control measures that were implemented. To clarify responses to the influenza A(H7N9) outbreak in China, we investigated patterns in human exposure to live poultry in LPMs and at home, examined risk perception and behavioral responses in the population, and compared these parameters between urban and rural areas in China that were affected or unaffected by the virus.

Methods

Study Design

We collected information on human exposure to poultry, risk perception and psychological responses to the outbreak, preventive behaviors, and attitudes toward control measures, including closure of LPMs. We used 2 approaches to collect these data. In urban areas, we conducted telephone surveys because access to mobile telephones is high, making the approach feasible. In rural areas, where telephone accessibility is lower, we conducted door-to-door surveys.

We selected 5 large cities for our study to represent diverse levels of socioeconomic development and geographic location: Chengdu, Guangzhou, Shanghai, Shenyang, and Wuhan (Figure 1). Before our study, no laboratory-
confirmed human cases of influenza A(H7N9) had been reported in these cities except Shanghai; 1 environmental sample had tested positive for the virus in Guangzhou (11). In each city, we aimed to interview ≥500 adult residents (≥18 years of age) who had been living there for ≥1 year. The telephone surveys were conducted by using a computer-assisted interviewing system, which enabled random generation of mobile telephone numbers and systematic data collection across each city. On each call, after the study was explained and verbal consent obtained, the respondent would be recruited into the study and asked to complete the survey. If a respondent were busy, a call would be made later, when the respondent was available to finish the questionnaire. Unanswered numbers were given 4 follow-up calls, made at different hours and on different days of the week, before being classified as invalid. The online Technical Appendix shows the survey used in English and Chinese (http://wwwnc.cdc.gov/EID/article/20/8/13-1821-Techapp1.pdf).

Although we had planned to use the same telephone survey approach in rural areas, a pilot study revealed it was not feasible because the survey would occur during the busy farming season, when residents would not be readily available by telephone. Instead, in rural areas we conducted door-to-door surveys. In mainland China, some cities/counties that are administrated as rural regions actually include semiurban areas, such as towns in a county, and rural areas, such as villages in a town/county. The living conditions and lifestyle of residents in semiurban areas are similar to those of urban residents, whereas residents in rural areas live in a different environment, with low population density and a more self-sustainable life, mainly dependent on farming. We used convenience sampling to choose 4 counties from rural rather than semiurban areas. Rural sites were selected on the basis of the level of economic development (measured by gross domestic product per capita) and the overall incidence of infectious diseases in 2012. Given the tiers of administration levels in mainland China, including province, city, county, town, and village, we selected a city from each of the 4 provinces with mid-level gross domestic product per capita compared with other cities in the province and with an incidence of notifiable infectious diseases above the provincial average. Within each province, we then selected a rural county from each of the 4 cities areas. As a result, we chose Dawa County (Panjin city, Liaoning Province), Zijin County (Heyuan city, Guangdong Province), Nanzhang County (Xiangfan city, Hubei Province), and Pengxi County (Suining city, Sichuan Province).
After the initial selections, all towns within a county were stratified into high, middle, and low levels of socioeconomic status on the basis of census data (12–15), and 1 town was selected at random within each strata. Then, 2 villages were selected at random within each town, a convenience sample of 50 households was recruited in each village, and 1 adult in each household (≥18 years of age and resident in the village for ≥1 year) was interviewed. To improve cooperation, each rural interviewee received a small gift worth ≈10 Chinese renminbi (6.1 renminbi = $1 US), such as a towel or a bottle of shampoo, after the survey was completed. All selected participants in the rural areas consented to be interviewed during the survey. The time taken to complete the survey was 16 minutes on average for each participant.

The urban surveys were conducted in May and June 2013 and the rural surveys in July and August 2013. Ethical approval was obtained from the Institutional Review Board of the Chinese Center for Disease Control and Prevention before the survey was conducted.

Survey Instrument

All surveys in urban and rural areas were conducted by using the same questionnaire, which was based on an instrument used during the outbreaks of severe acute respiratory syndrome (SARS) in 2003 (16,17) and influenza A(H1N1)pdm09 in 2009 (18). The survey instrument was pretested for face and content validity, length, and comprehensibility. Most answers were ranked on ordinal Likert scales. We used the State Trait Anxiety Inventory to measure the general level of anxiety in the population (16–18).

We investigated exposure to live poultry in backyards and in LPMs, which are defined as markets where the public can buy live chickens, ducks, pigeons, and other birds. Because LPMs are rare in rural areas and rural residents seldom visit LPMs, we did not ask rural respondents about exposures to live poultry in LPMs, only about backyard poultry exposure. In urban areas, we asked respondents about frequency of visits to LPMs and behaviors in LPMs (i.e., frequency of purchases, practice of picking up birds before purchasing, location where purchased live poultry were slaughtered). We asked all respondents about perception of risk for influenza A(H7N9) infection and perceived severity of such an infection, preventive practices in general and specifically in response to influenza A(H7N9), and attitudes toward influenza A(H7N9) and closure of LPMs.

Statistical Analysis

Statistical analyses were conducted in R version 2.13.0 (R Foundation for Statistical Computing, Vienna, Austria). We performed descriptive analyses of responses in each location and compared responses between urban areas with and without laboratory-confirmed cases of influenza A(H7N9) by using χ² tests. For the subset of respondents who reported purchasing live poultry in LPMs during the previous year, we used a multivariate logistic regression model to estimate the associations of age, sex, educational level, and geographic location with attitudes toward closure of LPMs and changes in habits of buying live poultry after public health authorities announced the first human influenza A[H7N9] case on March 31, 2013 (19). The sample size of 500 respondents in each city and 300 respondents in each rural county was chosen to ensure precision of answers to within ±4% and ±6%, respectively, and to ensure reasonable statistical power to identify differences in responses of 5%–10% or more between locations.
Results

In the 5 urban areas, 81,266 unique telephone numbers were dialed, and the overall response rate was 8% (number of participants [2,504] divided by number of calls with eligible respondents [29,919]) (Figure 2, panel A). The selection of 1,227 participants in 4 rural sites is illustrated in Figure 2, panel B. The surveys were conducted from May 23 through August 24. During this period, the influenza A(H7N9) epidemic had passed its peak, and few cases occurred. Guangdong Province notified its first human influenza A(H7N9) case on August 9, after the completion of the survey in Guangzhou on June 26.

Respondents in urban areas tended to have white-collar jobs or were unemployed, were younger, had more education and higher income, and were less likely to be married than those in rural areas (Table 1). However, because the surveys were conducted in different forms in urban versus rural areas and the general characteristics of participants were different, including the risk for becoming infected with influenza A(H7N9) virus and the types of potential exposure to avian influenza viruses, we did not make any further direct quantitative comparisons between urban and rural respondents. For comparisons among urban areas, respondents were generally similar, but reported incomes were higher for Shanghai and Guangzhou than for the other 3 cities (data not shown).

We assessed exposures to live poultry and visits to LPMs in the 5 cities. In total, 33% of respondents reported visiting LPMs during the preceding year, the highest proportion in Guangzhou; notable differences were found between cities (Table 2). By imputing midpoints of reported purchasing rates, we estimated that the mean number of live poultry purchased per year varied between cities: 6.8 for Shenyang, 19 for Shanghai, 20 for Wuhan, 28 for Chengdu, and 47 for Guangzhou. Age-specific patterns in exposure to live poultry were generally similar for men and women within each city, with some exceptions. In Guangzhou, women 35–54 years of age purchased poultry in LPMs much more frequently than did men of the same age, but the reverse was true for those ≥65 years of age (Figure 3). We found no evidence of a substantial difference in poultry exposures by sex in Shanghai (Figure 3).

We further analyzed exposures in LPMs among urban residents on the basis of responses from the 829 (33%) of

Table 1. Sociodemographic characteristics of participants recruited for urban and rural surveys of influenza A(H7N9) awareness, China, 2013*

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Urban, n = 2,504</th>
<th>Rural, n = 1,227</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male sex</td>
<td></td>
<td></td>
</tr>
<tr>
<td>18–44</td>
<td>1,398 (77.5)</td>
<td>685 (55.8)</td>
</tr>
<tr>
<td>45–64</td>
<td>415 (16.6)</td>
<td>405 (33.0)</td>
</tr>
<tr>
<td>≥65</td>
<td>147 (5.9)</td>
<td>137 (11.2)</td>
</tr>
<tr>
<td>Age group, y</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Educational attainment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No formal education</td>
<td>38 (1.5)</td>
<td>86 (7.0)</td>
</tr>
<tr>
<td>Primary school</td>
<td>191 (7.6)</td>
<td>259 (21.1)</td>
</tr>
<tr>
<td>Middle school</td>
<td>391 (15.6)</td>
<td>464 (37.9)</td>
</tr>
<tr>
<td>High school</td>
<td>593 (23.7)</td>
<td>268 (21.9)</td>
</tr>
<tr>
<td>College and above</td>
<td>1,291 (51.6)</td>
<td>148 (12.1)</td>
</tr>
<tr>
<td>Occupation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Service workers and shop sales workers</td>
<td>601 (24.0)</td>
<td>164 (13.4)</td>
</tr>
<tr>
<td>Professionals</td>
<td>504 (20.1)</td>
<td>66 (5.4)</td>
</tr>
<tr>
<td>Retired</td>
<td>293 (11.7)</td>
<td>61 (5.0)</td>
</tr>
<tr>
<td>Unemployed</td>
<td>678 (27.1)</td>
<td>195 (15.9)</td>
</tr>
<tr>
<td>Full-time students</td>
<td>232 (9.3)</td>
<td>111 (9.0)</td>
</tr>
<tr>
<td>Homemakers</td>
<td>96 (3.8)</td>
<td>86 (7.0)</td>
</tr>
<tr>
<td>Agricultural and fishery workers</td>
<td>100 (4.0)</td>
<td>544 (44.3)</td>
</tr>
<tr>
<td>Marital status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>941 (38.1)</td>
<td>269 (22.0)</td>
</tr>
<tr>
<td>Married</td>
<td>1,458 (59.0)</td>
<td>923 (75.4)</td>
</tr>
<tr>
<td>Divorced/separated</td>
<td>35 (1.4)</td>
<td>12 (1.0)</td>
</tr>
<tr>
<td>Widowed</td>
<td>36 (1.5)</td>
<td>20 (1.6)</td>
</tr>
<tr>
<td>Average household income, in renminbi*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No income</td>
<td>65 (3.0)</td>
<td>83 (6.8)</td>
</tr>
<tr>
<td>&lt;3,000</td>
<td>368 (17.0)</td>
<td>748 (61.2)</td>
</tr>
<tr>
<td>3,001–6,000</td>
<td>627 (28.9)</td>
<td>264 (21.6)</td>
</tr>
<tr>
<td>6,001–10,000</td>
<td>408 (18.8)</td>
<td>80 (6.5)</td>
</tr>
<tr>
<td>10,001–50,000</td>
<td>396 (18.2)</td>
<td>28 (2.3)</td>
</tr>
<tr>
<td>Not sure</td>
<td>307 (14.1)</td>
<td>20 (1.6)</td>
</tr>
<tr>
<td>Recent history of travel away from home</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>479 (19.1)</td>
<td>117 (9.6)</td>
</tr>
</tbody>
</table>

*6.1 Chinese renminbi = $1 US.
Table 2. Exposure to live poultry and attitudes toward closure of LPMs among participants recruited in urban areas for surveys related to influenza A(H7N9) awareness, by area, China, 2013*

<table>
<thead>
<tr>
<th>Exposure</th>
<th>No. (% persons)</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Frequency of LPM visits in the previous year</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≥1</td>
<td>Chengdu, n = 500</td>
<td>Guangzhou, n = 500</td>
</tr>
<tr>
<td>No. live poultry bought in the previous year†</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1–2/y</td>
<td>183 (36.6)</td>
<td>237 (47.4)</td>
</tr>
<tr>
<td>3–5/y</td>
<td>33 (18.0)</td>
<td>32 (13.5)</td>
</tr>
<tr>
<td>6–11/y</td>
<td>31 (16.9)</td>
<td>27 (11.4)</td>
</tr>
<tr>
<td>1–3/mo</td>
<td>27 (14.8)</td>
<td>25 (10.5)</td>
</tr>
<tr>
<td>1–2/wk</td>
<td>33 (18.0)</td>
<td>56 (23.6)</td>
</tr>
<tr>
<td>3–5/wk</td>
<td>19 (10.4)</td>
<td>40 (20.7)</td>
</tr>
<tr>
<td>Almost every day</td>
<td>2 (1.1)</td>
<td>4 (1.7)</td>
</tr>
<tr>
<td>Almost none</td>
<td>36 (19.7)</td>
<td>36 (15.2)</td>
</tr>
<tr>
<td><strong>Pick up live poultry before buying‡</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>120 (61.6)</td>
<td>136 (67.7)</td>
</tr>
<tr>
<td>No</td>
<td>73 (38.4)</td>
<td>64 (32.3)</td>
</tr>
<tr>
<td><strong>Where did you slaughter the live poultry?§</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>In LPM</td>
<td>123 (83.7)</td>
<td>175 (87.1)</td>
</tr>
<tr>
<td>In household</td>
<td>22 (15.0)</td>
<td>23 (11.4)</td>
</tr>
<tr>
<td>Other places</td>
<td>2 (1.4)</td>
<td>3 (1.5)</td>
</tr>
<tr>
<td><strong>Not buying or buying less since March 2013¶</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>101 (68.7)</td>
<td>139 (69.2)</td>
</tr>
<tr>
<td>No</td>
<td>49 (31.3)</td>
<td>61 (30.8)</td>
</tr>
<tr>
<td><strong>Views toward closure of LPMs#</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agree</td>
<td>37 (25.2)</td>
<td>54 (26.9)</td>
</tr>
<tr>
<td>Disagree</td>
<td>123 (74.8)</td>
<td>146 (73.1)</td>
</tr>
<tr>
<td><strong>Closeness caused by any inconvenience</strong>**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>More inconvenient</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Less</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td><strong>Distance of nearest LPM from home, km</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;0.50</td>
<td>12 (13.3)</td>
<td>39 (31.0)</td>
</tr>
<tr>
<td>0.51–1.00</td>
<td>23 (25.6)</td>
<td>42 (33.3)</td>
</tr>
<tr>
<td>1.01–2.00</td>
<td>16 (17.8)</td>
<td>20 (15.9)</td>
</tr>
<tr>
<td>&gt;2.00</td>
<td>39 (43.3)</td>
<td>25 (19.8)</td>
</tr>
<tr>
<td><strong>Backyard poultry exposure</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>73 (14.6)</td>
<td>76 (15.2)</td>
</tr>
<tr>
<td>No</td>
<td>427 (85.4)</td>
<td>424 (84.8)</td>
</tr>
</tbody>
</table>

* LPM, live poultry market; NA, not applicable.
† Respondents who bought poultry ≥1/year were further asked about the number of poultry bought in the previous year, picking up poultry or not before buying, locations where poultry was slaughtered, and changes in poultry purchase behavior since influenza A(H7N9) outbreak.
‡ Respondents who answered always/usually to the question “Did you pick up poultry for examination before deciding to buy it?” were categorized as **Yes.**
§ Respondents who stated that they always/usually have live poultry slaughtered in LPMs were categorized as “In LPM,” whereas those who answered always/usually in household were categorized as “in household.”
¶ Respondents who answered not buying since then/still buying but less than before to the question “Has your habit of buying live poultry changed since influenza A(H7N9) was identified in China in March 2013?” were categorized as “Yes.”
# Respondents who answered strongly agree/agree to the question “Would you agree to permanent closure of live poultry markets in order to control avian influenza epidemics?” were categorized as “Agree.”
** Respondents who reported that market closure caused great/some inconvenience were categorized as “More inconvenient.” This question was only asked of respondents in Shanghai because Shanghai was the only area where LPMs were closed at the time of the survey.

2,504 participants who visited LPMs ≥1 time in the preceding year. Overall, 69% of these respondents reported that they always visited the nearest LPM; median distance from home to the nearest LPM was 1 km. Most respondents reported that they “usually” or “always” picked up poultry for examination before deciding to buy, with the highest proportion in Chengdu and lowest in Shenyang; 87% of respondents always arranged for slaughter of purchased poultry in the LPM, with no notable differences between cities. During the study period, the general anxiety level among urban respondents (measured by the State Trait Anxiety Inventory) was low to moderate, but levels varied substantially between cities; the lowest mean scores were seen in Wuhan and Shenyang (Table 3). Perceived risk for influenza A(H7N9) in the following month (absolute susceptibility) and relative to others (relative susceptibility) were generally low in all cities, but highest in Shanghai. Respondents in Shanghai and Guangzhou were more likely to respond that they would be more worried than usual if they experienced an influenza-like illness (ILI). Twelve percent of respondents reported that they had worried about becoming ill with influenza A(H7N9) during the previous week; levels varied among cities, with a greater frequency of worry in Shanghai and Guangzhou (Table 3). Respondents in Shenyang reported the highest perceived severity of influenza A(H7N9) compared with seasonal influenza and avian influenza A(H5N1); respondents in Guangzhou reported the highest perceived severity of influenza A(H7N9) compared with that of SARS (Table 3).
Human Exposure to Live Poultry and Responses to Influenza

Overall, 47% reported raising chickens, 15% raised ducks, and 8% raised geese; these proportions varied between counties (Table 4). In rural areas, levels of perceived absolute and relative susceptibility and concern about ILI or confirmed influenza A(H7N9) infection were generally low; some differences were seen between the 4 rural areas. Respondents in Nanzhang and Zijin were more likely to respond that they would be more worried than usual if they had an ILI; 24% of respondents in Zijin reported that they had worried about becoming ill with influenza A(H7N9) in the previous week, and the average level of worry in Zijin was higher than that for other counties (Table 4). Most respondents in each area perceived influenza A(H7N9) to be more severe than seasonal influenza but less severe than influenza A(H5N1) and SARS.

Among respondents in urban areas who visited LPMs ≥1 time in the preceding year, 77% reported that they had stopped buying or bought lower amounts of live poultry since March 2013; this proportion was highest (91%) for Shanghai (Table 2). We examined factors affecting the likelihood of changing habits of buying live poultry and found greater changes among women, those with higher educational attainment, and those residing in Shanghai and Wuhan rather than in Chengdu. We found no statistically significant differences by age group (Table 5).

On average, across the 5 cities, 30% of respondents reported that they would support the closure of LPMs to control the epidemic; the proportion in support of closures was highest in Shanghai (39%) and lowest in Guangzhou (27%) and Chengdu (25%) (Table 2). We examined factors affecting the likelihood of supporting the closure of LPMs and found greater support among persons 55–64 years of age (odds ratio [OR] 3.28, 95% CI 1.71–6.29) and ≥65 years of age (OR 2.36, 95% CI 1.04–5.32). We also found greater support for closure of LPMs in Shanghai (OR 1.77, 95% CI 1.05–2.99) than in Chengdu but no significant differences by sex or educational attainment (Table 5). However, 32% of respondents in Shanghai reported that the closure of LPMs had caused them inconvenience.

Discussion

We have reported empirical information on human exposures to live poultry, perception of risk for influenza A(H7N9), and behavioral responses to the 2013 influenza A(H7N9) outbreak in China. We found that exposure to LPMs in urban areas is common: 20%–50% of urban residents report >1 visit to an LPM in the preceding year (Table 2). We examined factors affecting the likelihood of changing habits of buying live poultry and found greater changes among women, those with higher educational attainment, and those residing in Shanghai and Wuhan rather than in Chengdu. We found no statistically significant differences by age group (Table 5).

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On average, across the 5 cities, 30% of respondents reported that they would support the closure of LPMs to control the epidemic; the proportion in support of closures was highest in Shanghai (39%) and lowest in Guangzhou (27%) and Chengdu (25%) (Table 2). We examined factors affecting the likelihood of supporting the closure of LPMs and found greater support among persons 55–64 years of age (odds ratio [OR] 3.28, 95% CI 1.71–6.29) and ≥65 years of age (OR 2.36, 95% CI 1.04–5.32). We also found greater support for closure of LPMs in Shanghai (OR 1.77, 95% CI 1.05–2.99) than in Chengdu but no significant differences by sex or educational attainment (Table 5). However, 32% of respondents in Shanghai reported that the closure of LPMs had caused them inconvenience.
virus in certain LPMs (6), whereas official surveillance data from the Ministry of Agriculture identified the virus in only a small proportion of samples collected from across the country (of 4,488 samples tested, 0.9% were positive for the virus) (11). The absolute risk for human infection after close contact with poultry infected with the influenza A(H7N9) virus remains unclear.

We found that men in the 55–64-year age group had more exposures to live poultry than women in that age group, but no difference by sex among the small number of respondents ≥65 years of age in Shanghai (Figure 3). We had previously hypothesized that exposure to poultry in LPMs might be higher for older men than for older women (3). Our findings suggest that the higher risk for laboratory-confirmed influenza A(H7N9) virus infection among men during the spring 2013 outbreak in the Yangtze River Delta might not be explained by sex differences in exposure but rather by increased susceptibility to serious disease after infection among men (e.g., because of greater prevalence of co-existing conditions) or by increased access to health care and laboratory testing for men. However, our sample size was relatively small, particularly for respondents ≥65 years of age. As in a previous report of live poultry exposures in the southern China cities of Guangzhou in 2006 and Shenzhen in 2007 (9), we did not identify major differences in exposures among middle-aged adults compared with exposures among the elderly. However, most laboratory-confirmed influenza A(H7N9) cases have been in persons ≥60 years of age (3), consistent with our hypothesis that exposures in middle-aged adults may have led to milder disease that was less likely to result in laboratory testing (3,9).

A minority of respondents reported willingness to accept LPM closures in the event of future outbreaks of influenza A(H7N9). During the winter 2013–14 influenza season, in some areas where human cases of influenza A(H7N9) had been reported, local governments implemented short-term LPM closures; other administrations, including that of Shanghai, closed LPMs for longer periods. However, such interventions can have serious economic consequences. Given the lack of public support for LPM closure and the related economic concerns, whether
Most confirmed human cases have occurred in urban areas, but spread to backyard flocks at this time, however.

Man health can reach backyard poultry flocks and pose a risk to human residents, which indicates that avian influenza viruses are transmitted to humans. A(H5N1) cases in China were identified in rural areas, China, 2013. However, low perception of risk could pose a threat to human health, as avian influenza viruses have shown the potential to spread from backyard poultry to humans.

**Table 4. Risk perception related to influenza A(H7N9) and backyard poultry exposure among participants recruited for surveys in rural areas, by area, China, 2013**

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Dawa, n = 310</th>
<th>Zijin, n = 308</th>
<th>Nanzhang, n = 308</th>
<th>Pengxi, n = 301</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean STAI scores (95% CI)</td>
<td>1.52 (1.47–1.57)</td>
<td>1.85 (1.80–1.90)</td>
<td>1.66 (1.62–1.70)</td>
<td>1.54 (1.48–1.61)</td>
<td>&lt;0.001†</td>
</tr>
</tbody>
</table>

**Self-perceived susceptibility to influenza A(H7N9)‡**: | p value |
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Higher</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Even</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Lower</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

**Perceived susceptibility to influenza A(H7N9) compared with others§**: | p value |
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Higher</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Even</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Lower</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

**Worry induced by ILI symptoms¶**: | p value |
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>More</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Same as usual</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Less</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

**Infection with influenza A(H7N9) in next week#**: | p value |
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Worry</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Think about it but no worry</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Never think about it</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

**Severity of influenza A(H7N9) compared with** | p value |
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Seasonal influenza</td>
<td>0.001</td>
</tr>
<tr>
<td>Avian influenza A(H5N1)</td>
<td>0.003</td>
</tr>
<tr>
<td>SARS</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

**Distance, km††**: | p value |
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>482</td>
<td>0.001</td>
</tr>
<tr>
<td>2448</td>
<td>0.001</td>
</tr>
<tr>
<td>351</td>
<td>0.001</td>
</tr>
</tbody>
</table>

**Raising backyard poultry** | p value |
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of backyard poultry raised</td>
<td>0.067</td>
</tr>
<tr>
<td>Median no. live poultry raised</td>
<td>&lt;0.001†</td>
</tr>
</tbody>
</table>

**Values are no. (%) persons except as indicated. STAI, State Trait Anxiety Inventory; ILI, influenza-like illness; SARS, severe acute respiratory syndrome.**

†Respondents who answered certain/very likely/likely to the question "How likely do you think it is that you will contract H7N9 avian flu over the next 1 month?" were categorized as "High"; those who answered never/very unlikely/unlikely were categorized as "Low."  
§Respondents who answered certain/much more/more to the question "What do you think is your chance of getting infected with H7N9 avian flu over the next 1 month compared to other people outside your family of a similar age?" were categorized as "High"; those who answered not at all/much less/less were categorized as "Low."  
¶Respondents who answered extremely concerned/concerned much more than normal/concerned more than normal to the question "If you were to develop ILI symptoms tomorrow, would you be…?" were categorized as "More"; those who answered not at all concerned/much less concerned than normal/concerned less than normal were categorized as "Less."  
#Respondents who answered worried about it all the time/worried a lot/worried a bit to the question "Did you worry about H7N9 in the past week?" were categorized as "Worry."  
††Respondents who answered much higher/a little higher regarding the severity of influenza A(H7N9) compared with seasonal influenza, avian influenza A(H5N1), and SARS.

**Table 4. Risk perception related to influenza A(H7N9) and backyard poultry exposure among participants recruited for surveys in rural areas, by area, China, 2013**

- To make additional closures should be considered carefully. Regular rest days (i.e., days on which live poultry are not sold and stalls must be disinfected and left empty of live birds) and bans on overnight retention of live poultry in markets have been successful in controlling the transmission of avian influenza viruses in LPMs in Hong Kong and have been proposed in some areas of China.

- Although almost all cases of influenza A(H7N9) cases have been identified in areas within or surrounding large cities, about half of the laboratory-confirmed avian influenza A(H5N1) cases in China were identified in rural residents, which indicates that avian influenza viruses can reach backyard poultry flocks and pose a risk to human health. Influenza A(H7N9) virus does not appear to have spread to backyard flocks at this time, however. Most confirmed human cases have occurred in urban areas among persons who have reported recent exposure to live poultry in LPMs, although a smaller number of cases occurred in persons who have reported recent exposure to backyard poultry. However, if the circulation of influenza A(H7N9) virus in backyard poultry were to increase, the number of potential exposures could be substantial because almost half of rural residents report raising backyard poultry. The risk for influenza A(H5N1) virus infection among rural residents has been reduced through better education about the danger of close contact with, or consumption of, sick or dead backyard poultry. Unfortunately, this approach would not be effective for controlling spread of influenza A(H7N9) virus because infected chickens do not show signs of illness.

- Perception of risk for influenza A(H7N9) infection by respondents to our surveys was generally low, as might be expected given the small number of laboratory-confirmed cases in China. However, low perception of risk could pose...
difficulties for policy measures such as closure of LPMs. Indeed, we found generally low levels of public support for long-term closure of LPMs (Table 2), particularly in cities that had not been affected by influenza A(H7N9). Respondents in Guangzhou and Shanghai reported higher likelihood than residents of other cities that they would be worried if they showed signs and symptoms of ILI. This finding is unsurprising for Shanghai, but there had been no confirmed influenza A(H7N9) cases in Guangzhou at the time of our survey.

Our study has several limitations. First, the cross-sectional study design did not enable us to identify changes over time in risk perception or preventive behaviors. Having access to data on live poultry exposures before the identification of influenza A(H7N9) virus infections would have been helpful because the epidemic may have led to changes in exposure patterns by the time our survey was conducted. Second, because the survey was conducted by telephone in urban areas and face-to-face in rural areas, our results may have been affected by selection bias. We did attempt multiple calls to unanswered telephone numbers in an attempt to mitigate this bias, but the overall response rate for the telephone survey was low. Also, because the respondents self-reported their behaviors, the results might be affected by response biases (e.g., if respondents had incomplete recollection of past visits to LPMs). In particular, results could have been affected by social desirability bias if respondents felt uncomfortable reporting true patterns of poultry exposure or attitudes toward government interventions and preferred to report what they perceived to be ideal or most acceptable.

Third, our analyses did not explore in depth the social or psychological factors underlying behavioral responses to influenza A(H7N9), such as the effect of perceived risk or severity. This area might be productive for further investigation. Fourth, similar to other cross-sectional knowledge–attitude–behavior studies, our survey could only provide descriptive data on live poultry exposure, risk perception, and behavioral changes. Inferences on the associations between different psychobehavioral factors will require further study. Furthermore, we did not investigate seasonal variation in poultry-purchasing behaviors, which could also be studied in longitudinal surveys.

In conclusion, exposures to live poultry are common in many areas of China. If influenza A(H7N9) virus were to become more prevalent among poultry, the number of human exposures could be substantial in the absence of control measures. Our findings highlight possible problems in the structure of the live poultry trade in China and the potential for improved protection of human and animal health (8,24).

Acknowledgments

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L.W., B.J.C., P.W., G.M.L., and H.Y. designed the study; L.W., J.Y., F.L., and L.Z. collected data; L.W., B.J.C., P.W., and J.Y. analyzed data. L.W. and B.J.C. wrote the first draft of this article, and all authors contributed to review and revision of the report.

Dr Wang is a director of the Branch of General Affairs on Infectious Disease, Division of Infectious Disease, Key Laboratory of Surveillance and Early-warning on Infectious Disease, Chinese Center for Disease Control and Prevention. Her research interests include notifiable infectious diseases surveillance and related policy research.
References


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Human exposure to Live Poultry and Psychological and Behavioral Responses to Influenza A(H7N9), China

Technical Appendix

The following pages contain English and Chinese language versions of the questionnaire used for the telephone survey conducted in 5 cities in China to determine human exposure to poultry, risk perception, and psychological responses to influenza A(H7N9) outbreaks, preventive behaviors, and attitudes toward control measures, including closure of live poultry measures. At least 500 adult residents (age ≥18y) who had been living in the city for at least 1 year were interviewed. The telephone surveys were conducted using a Computer-Assisted Telephone Interviewing system, which enabled random generation of mobile telephone numbers and systematic data collection across each city. After explaining the study and obtaining verbal consent from respondents, they were recruited as study subjects and asked to complete the survey. If the respondents were busy at the time, a telephone call would be made later when the respondents were available to finish the questionnaire. Unanswered numbers were given 4 more follow-up calls, made at different hours and days of the week, before being classified as invalid.
H7N9 Avian Flu Survey in China
Version 1.0

Greetings: Hello, This is a national Tele-survey, conducted by Chinese Center for Disease Control and Prevention. We are collecting H7N9 Avian Flu-related information, which will be very important for the H7N9 control in China. It will take you around 10 minutes. Thank you for your cooperation, which will be highly appreciated.

SG1. Where do you live? *(Don’t ask, could be recorded automatically.)
① Beijing ② Shanghai
③ Shenyang ④ Wuhan
⑤ Guangzhou ⑥ Chengdu
⑦ Da’wa County, Panjin City ⑧ Nanzhang County, Xiangyang City
⑨ Pengsi County, Saining City ⑩ Zijin County, Heyuan City

SG2. How many years do you live here: ______ (excluded, if reside less than 1 year.)

SG3. Gender *(Don’t ask if obvious, must record)
① Female ② Male

SG4. What is your age?
   a) *(required) ______ years old
   b) ① 18-24 ② 25-34
   ③ 35-44 ④ 45-54
   ⑤ 55-64 ⑥ 65 or above
   ⑦ Refused

SG5. What is your occupation? *(required)
① Retired ② No job, unemployed, seeking job
③ Full-time students ④ Home makers
⑤ Professionals ⑥ Service workers and shop sales workers
⑦ Health care worker ⑧ Skilled agricultural and fishery workers;
    and occupations not classified
⑨ Farmer ⑩ Businessman selling live poultry or meat

Part 1 Self-Rated Health

PH1. How do you perceive your health in the past 1 week?
① Excellent ② Very good
③ Good ④ Fair
⑤ Poor

中国城市和农村人感染 H7N9 禽流感调查问卷

2013年5月24日 第1.14稿

开头语：您好，这里是疾控中心正在实施的全国性电话调查，以下问题将占用您约10分钟的时间，您的个人意见对于我国H7N9疫情的防控非常重要，谢谢您的配合！

（略） 开头语：喂，先生/女士您好，我姓***，我是北京益派市场咨询有限公司的访问员，我们受国家疾控中心的委托进行一项全国性的调查，想了解公众对于H7N9禽流感的认知。我会占用您几分钟的时间，请您放心。您的电话号码是由我们通过电脑随机抽取的。您提供的资料将绝对保密，并只会用作综合分析。为保障数据的准确性，我们的访问将会被录音，但只用作内部参考，并会在短期内销毁。

（访问员注意）如被访者对此次访问有任何疑问或查询，您可以拨打热线电话：****，或010-58900540（与有关专家联系）。

请问现在我们可以开始访问吗？可以，即开始；不可以，则结束。

SG1. 请问您是居住在XX吗？*(不必提问，CAT1自动记录)
① 北京 ② 上海
③ 沈阳 ④ 武汉
⑤ 广州 ⑥ 成都
⑦ 辽宁盛京市大洼县 ⑧ 湖北襄阳县南漳县
⑨ 四川遂宁市蓬溪县 ⑩ 广东河源市紫金县

SG2. 请问您在本地居住______年（少于1年则不满足调查条件）

SG2a. 您目前的居住状态：
① 与家人同住 ② 不与家人同住
SG3. 性别 *(如果已经很明显，不需再问，但请记录下来)
① 男性 ② 女性

请生成调查时间及访问员姓名，并纳入数据库
SM1. Have you had any of the following signs or symptoms in the past 2 weeks?  
   a. Fever ≥37.8°C (100°F) for 1 day or more  
      Yes  ☑  ☐  ☐  ☐
   b. Cough  
      ☑  ☐  ☐  ☐

SM2. If you had fever in the last 2 weeks (SM1a=yes), when did the fever start?  
   ① (dd-mm-yy)  ☐  ② Don’t know

AX1. A number of statements which people have used to describe themselves are given below; please tell how you feel to the statements right now:  
   a. I feel rested  
      Not at all  ☐  Sometimes  ☐  Moderately So  ☐  Very Much So  ☐  ③ ④
   b. I feel content  
      ☑  ☐  ☐  ☐  ③ ④
   c. I feel comfortable  
      ☑  ☐  ☐  ☐  ③ ④
   d. I am relaxed  
      ☑  ☐  ☐  ☐  ③ ④
   e. I feel pleasant  
      ☑  ☐  ☐  ☐  ③ ④
   f. I feel anxious  
      ☑  ☐  ☐  ☐  ③ ④
   g. I feel nervous  
      ☑  ☐  ☐  ☐  ③ ④
   h. I am jittery  
      ☑  ☐  ☐  ☐  ③ ④
   i. I feel “high strung”  
      ☑  ☐  ☐  ☐  ③ ④
   j. I feel over-excited and “rattled”  
      ☑  ☐  ☐  ☐  ③ ④

SG4. 您的年龄？  
   a) *（必填）___岁  
      ① 18-24  ② 25-34  ③ 35-44  ④ 45-54  ⑤ 55-64  ⑥ ６5以上
   b) 拒绝回答  

SG5. 您的职业 *（必填）  
   ① 退休  ② 没有工作、失业、找工作中  ③ 全日制学生  ④ 家庭主妇  ⑤ 专业人士  ⑥ 服务行业或商店工作人员  ⑦ 医务人员  ⑧ 农民  ⑨ 活禽饲养、贩卖人员或肉类销售人员  ⑩ 其他

第一部分 健康自我评估

PH1. 请问过去1周您感觉自己身体状况如何？  
   ① 非常好  ② 好  ③ 一般  ④ 差

SM1. 过去2周，您是否出现以下症状？  
   a. 持续1天或以上，摄氏37.8°C以上的高烧  
      ① ② ③
   b. 咳嗽  
      ① ② ③

SM2. 过去2周，如果您曾发烧（问题SM1a回答：有），那么，您是从哪天开始发烧的？  
   ① ___月___日  ② 不记得了

AX1. 下面是10个反映自我感觉的方面，请您分别回答最能表达您目前感觉的答案：  
   完全没有  有些  中等程度  非常明显
   a. 我感到安宁  ① ② ③ ④
   b. 我感到满意  ① ② ③ ④
   c. 我感到舒适  ① ② ③ ④
   d. 我是放松的  ① ② ③ ④
   e. 我感到愉快  ① ② ③ ④
   f. 我感到焦虑  ① ② ③ ④
   g. 我感到紧张不安  ① ② ③ ④
   h. 我现在神经过度  ① ② ③ ④
   i. 我感到十分敏感和容  ① ② ③ ④

Part 2 Exposure to live poultry markets (Only for the urban cities; go to EM7 directly for Beijing respondents)  

EM1. How often did you go to live poultry markets in last year?  
   (Live poultry markets mean the markets where public could buy the live chicken, ducks and pigeons, etc)  
   ① 1-2/year  ② 3-5/year  ③ 6-11/year  ④ 1-3/month  ⑤ 1-2/week  ⑥ 3-5/week  ⑦ Almost every day
EM1a. The latest time you went to a wet market was _______ (mm-dd), or _______ days ago.

EM1b. How far is the wet market away from your residence? _______ kilometers.

EM1c. Did you always used to go to the nearest wet market?
   ① Yes
   ② No, If no, how far is the wet market you went? _______ kilometers.

EM2. How many poultry did you buy in LPMs averageley in the whole year?
   ① 1-2/year
   ② 3-5/year
   ③ 6-11/year
   ④ 1-3/month
   ⑤ 1-2/week
   ⑥ 3-5/week
   ⑦ Almost every day
   ⑧ Almost not

EM3. Are you accustomed to pick up the poultry for examination before deciding to buy it?
   ① Yes
   ② No
   ③ Sometimes "yes", sometimes "no"

EM4. Where was the live poultry slaughtered when you bought it?
   ① Always in wet market
   ② Usually in wet market
   ③ Usually in my household
   ④ Always in my household
   ⑤ Other places, ________

EM5. Whether your habit of buying the live poultry was changed since the first human H7N9 case was released in March 2013?
   ① Yes, not buying since then
   ② No, still buying and eating live poultry
   ③ Still buying but less than before

EM6. How do you think about the closure of wet market in order to control the H7N9 epidemic?
   ① Strongly agree
   ② Agree
   ③ Not Agree

BF4b. If you can use 1-10 points to express your worry about H7N9, please score from 1 (little) to 10 (very). What is your score?

第二部分 活禽市场暴露情况（城市和农村调查内容不同）

（以下内容针对沈阳、北京、武汉、成都、上海和广州城市居民，其中北京居民直接跳过EM7部分）

EM1a. When was the last time you went to the wet market?
   (for live poultry: mainly refers to the wet markets that sell live poultry)
   ① every 1-2 times
   ② every 3-5 times
   ③ every 6-11 times
   ④ every 1-3 weeks
   ⑤ every 1-2 weeks
   ⑥ every 3-5 weeks
   ⑦ almost every day
   ⑧ almost not

EM1b. Have you ever visited a wet market? (circle one, directly go to the next part if you choose "No")

EM1c. When was the last time you went to the wet market?

EM2. How many live poultry have you bought in LPMs averageley in the whole year?
   ① 1-2/year
   ② 3-5/year
   ③ 6-11/year
   ④ 1-3/month
   ⑤ 1-2/week
   ⑥ 3-5/week
   ⑦ almost every day
   ⑧ almost not

EM3. Are you accustomed to pick up the poultry for examination before deciding to buy it?
   ① Yes
   ② No
   ③ Sometimes "yes", sometimes "no"

EM4. Where was the live poultry slaughtered when you bought it?
   ① Always in wet market
   ② Usually in wet market
   ③ Usually in my household
   ④ Always in my household
   ⑤ Other places, ________

EM5. Whether your habit of buying the live poultry was changed since the first human H7N9 case was released in March 2013?
   ① Yes, not buying since then
   ② No, still buying and eating live poultry
   ③ Still buying but less than before

EM6. How do you think about the closure of wet market in order to control the H7N9 epidemic?
   ① Strongly agree
   ② Agree
   ③ Not Agree

EM7. Directly go to the next part if you are a Beijing resident.

EM4. Where did you usually buy live poultry?
   ① Always in wet market
   ② Usually in wet market
   ③ Usually in my household
   ④ Always in my household
   ⑤ Other places, ________

EM5. Whether your habit of buying the live poultry was changed since the first human H7N9 case was released in March 2013?
   ① Yes, not buying since then
   ② No, still buying and eating live poultry
   ③ Still buying but less than before

EM6. How do you think about the closure of wet market in order to control the H7N9 epidemic?
   ① Strongly agree
   ② Agree
   ③ Not Agree
4. Strongly disagree
5. Don’t know

EM7. Has the closure of LPMs caused you any inconvenience in your life? (Only ask the respondents from Beijing/Shanghai that has closed the markets)
① Great inconvenience ② Some inconvenience
③ Inconvenience a bit ④ No inconvenience
⑤ No inconvenience at all

Raising the backyard poultry at home (Only for the 4 rural cites)
EM8. Do you raise backyard poultry in the past year?
① Yes
② No (go to Part 3.)

EM8.1. What type of backyard poultry do you raise at home? (Multiple choice questions)
① Chicken
② Ducks
③ Geese
④ Others ________________

EM8.2 How many backyard poultry do you have? (Including chicken, ducks, geese and others in total?) __________

Part 3  Health Services Utilization
HS1  Have you used any of the following health services in the past 2 weeks?
Yes No
a. Hospital (including 24-hour clinics/A&E services) □ _______times □
    b. Self- treatment (Drug/acupuncture) □ _______times □

Part 4  Contacts with Flu Cases
The following questions refer to the past 2 weeks:
CT1. Has anyone in your household had any flu symptoms in the past 2 weeks (e.g. fever, runny nose, cough, sore throat)?
  ① Yes, me (may include others) (please specify the ages of the members (oldest first): _______)
  ② Yes, others but not me (please specify the ages of the members (oldest first): _______)
  ③ No (go to Part 5 perception on H7N9 avian flu)

CT2. If yes, as a result of this did you personally take any preventive measures?
Yes No Don’t know
a. Wash hands more frequently ① ② ③

第三部分 医疗服务利用
HS1. 过去2周，您是否有过感冒或发烧的自我诊疗？

<table>
<thead>
<tr>
<th></th>
<th>有</th>
<th>没有</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>到医院门诊、急诊看病治疗</td>
<td>□</td>
</tr>
<tr>
<td>2.</td>
<td>到私人诊所看病</td>
<td>□</td>
</tr>
<tr>
<td>3.</td>
<td>自我医疗，如服药，理疗等</td>
<td>□</td>
</tr>
</tbody>
</table>
CT3. As a result of this did the sick family member take any preventive measures?

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
<th>Don’t know</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Wash hands more frequently</td>
<td>①</td>
<td>②</td>
<td>③</td>
</tr>
<tr>
<td>b. Wear face mask</td>
<td>①</td>
<td>②</td>
<td>③</td>
</tr>
<tr>
<td>c. Isolation</td>
<td>①</td>
<td>②</td>
<td>③</td>
</tr>
</tbody>
</table>

CT4. How many days, after the onset of the first flu symptom, did the sick family member (include you if you are sick) seek medical advice?

<table>
<thead>
<tr>
<th>Sick family members (oldest first)</th>
<th>Self</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>Additional</th>
</tr>
</thead>
<tbody>
<tr>
<td>Days</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Did not seek medical advice</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Don’t know</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Part 5 Perception on H7N9 Flu

BF1. How likely do you think it is that you will contract H7N9 avian flu over the next 1 month?

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
<th>Don’t know</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Never</td>
<td>①</td>
<td>②</td>
<td>③</td>
</tr>
<tr>
<td>b. Unlikely</td>
<td>①</td>
<td>②</td>
<td>③</td>
</tr>
<tr>
<td>c. Likely</td>
<td>①</td>
<td>②</td>
<td>③</td>
</tr>
<tr>
<td>d. Certain</td>
<td>①</td>
<td>②</td>
<td>③</td>
</tr>
</tbody>
</table>

BF2a. What do you think are your chances of getting H7N9 avian flu over the next 1 month compared to other people outside your family of a similar age?

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
<th>Don’t know</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Not at all</td>
<td>①</td>
<td>②</td>
<td>③</td>
</tr>
<tr>
<td>b. Less</td>
<td>①</td>
<td>②</td>
<td>③</td>
</tr>
<tr>
<td>c. More</td>
<td>①</td>
<td>②</td>
<td>③</td>
</tr>
<tr>
<td>d. Certain</td>
<td>①</td>
<td>②</td>
<td>③</td>
</tr>
</tbody>
</table>

BF3. Do you think H7N9 avian flu is spread by:

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
<th>Don’t know</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Droplets</td>
<td>①</td>
<td>②</td>
<td>③</td>
</tr>
<tr>
<td>b. Air</td>
<td>①</td>
<td>②</td>
<td>③</td>
</tr>
<tr>
<td>c. Direct hand contact (e.g. via handshake)</td>
<td>①</td>
<td>②</td>
<td>③</td>
</tr>
<tr>
<td>d. Indirect hand contact (e.g. via doorknob)</td>
<td>①</td>
<td>②</td>
<td>③</td>
</tr>
<tr>
<td>e. Oral-faecal</td>
<td>①</td>
<td>②</td>
<td>③</td>
</tr>
<tr>
<td>i. Cold weather</td>
<td>①</td>
<td>②</td>
<td>③</td>
</tr>
<tr>
<td>k. The air over long distances</td>
<td>①</td>
<td>②</td>
<td>③</td>
</tr>
</tbody>
</table>

第四部分 流感接触史（针对过去2周情况回答）

CT1. 过去2周中，您家中有没有人出现过流感症状（例如：发烧、咳嗽、流涕、喉咙痛）？（仅问与家人同住者）

① 有，是我（可包括其他家庭成员）（跳至CT2）
② 有，是其他家庭成员（跳至CT2）
③ 没有（直接跳至第五部分，对H7N9禽流感的认知）

CT1a. 过去2周中，您有没有出现过流感症状（例如：发烧、咳嗽、流涕、喉咙痛）？（仅问不与家人同住者）

① 有（跳至CT2，仅问CT2）
② 没有（直接跳至第五部分，对H7N9禽流感的认知）

CT2. 您是否采取了以下个人防护措施？

<table>
<thead>
<tr>
<th></th>
<th>是</th>
<th>否</th>
<th>不记得</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. 频繁洗手</td>
<td>①</td>
<td>②</td>
<td>③</td>
</tr>
<tr>
<td>b. 戴口罩</td>
<td>①</td>
<td>②</td>
<td>③</td>
</tr>
<tr>
<td>c. 自我隔离</td>
<td>①</td>
<td>②</td>
<td>③</td>
</tr>
<tr>
<td>d. 自行服用中药</td>
<td>①</td>
<td>②</td>
<td>③</td>
</tr>
</tbody>
</table>

CT3. 出现流感症状的家人是否采取了以下个人防护措施？

<table>
<thead>
<tr>
<th></th>
<th>是</th>
<th>否</th>
<th>不记得</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. 频繁洗手</td>
<td>①</td>
<td>②</td>
<td>③</td>
</tr>
<tr>
<td>b. 戴口罩</td>
<td>①</td>
<td>②</td>
<td>③</td>
</tr>
<tr>
<td>c. 自我隔离</td>
<td>①</td>
<td>②</td>
<td>③</td>
</tr>
<tr>
<td>d. 自行服用中药</td>
<td>①</td>
<td>②</td>
<td>③</td>
</tr>
</tbody>
</table>

CT4. 自出现流感症状当天算起，您或您的家人是在多长时间后去就诊的？（按照年龄顺序排列）

<table>
<thead>
<tr>
<th>患病家庭成员（年龄由大到小排列）</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>其他成员</th>
</tr>
</thead>
<tbody>
<tr>
<td>没去就诊</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>发病到就诊的间隔（天）</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>不记得</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

第五部分对H7N9禽流感认知

BF1. 您认为在接下来的1个月中，自己患上H7N9禽流感的可能性多大？

① 根本不可能
② 很不可能
③ 不可能
④ 说不好
⑤ 可能
⑥ 很可能
② 肯定会

BF2a. 与家庭以外的同龄人相比，您认为自己在接下来的1个月患上H7N9禽流感的机率会是？
① 肯定不会 ② 机率小很多 ③ 机率小 ④ 机率一样 ⑤ 机率大 ⑥ 机率大很多 ⑦ 肯定会

BF3. 您认为H7N9禽流感是通过哪些途径传播的，请分别作答：
<table>
<thead>
<tr>
<th>是</th>
<th>否</th>
<th>不知道</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. 飞沫</td>
<td>①</td>
<td>②</td>
</tr>
<tr>
<td>b. 空气</td>
<td>①</td>
<td>②</td>
</tr>
<tr>
<td>c. 手部直接接触（例如：握手）</td>
<td>①</td>
<td>②</td>
</tr>
<tr>
<td>d. 手部间接接触（例如：门把手）</td>
<td>①</td>
<td>②</td>
</tr>
<tr>
<td>e. 口-鼻-鼻传播</td>
<td>①</td>
<td>②</td>
</tr>
<tr>
<td>f. 天气冷</td>
<td>①</td>
<td>②</td>
</tr>
<tr>
<td>g. 远距离空气传播（例如：楼宇间）</td>
<td>①</td>
<td>②</td>
</tr>
<tr>
<td>h. 与H7N9禽流感病人有身体接触</td>
<td>①</td>
<td>②</td>
</tr>
<tr>
<td>i. 接触了被H7N9禽流感病毒污染的物体</td>
<td>①</td>
<td>②</td>
</tr>
<tr>
<td>j. 密切接触了活禽市场的鸡鸭</td>
<td>①</td>
<td>②</td>
</tr>
</tbody>
</table>

BF4. 如果这两天您突然出现了流感症状（例如：发烧、咳嗽、流涕、咽痛），您将？
① 完全不担心 ② 比平常担心少很多 ③ 比平常担心少 ④ 与平常一样 ⑤ 比平常担心多 ⑥ 比平常担心多很多 ⑦ 极度担心

BF4a. 过去1周内，您是否曾为患上H7N9禽流感担心过？
① 没有，从未考虑过 ② 考虑过，但不担心 ③ 有些担心 ④ 很担心 ⑤ 一直在担心

BF5a. 与普通流感相比，您认为H7N9禽流感严重程度是？
① 严重很多 ② 较严重 ③ 差不多 ④ 较轻微 ⑤ 轻微很多 ⑥ 不知道

BF5b. 与H5N1禽流感相比，您认为H7N9禽流感严重程度是？
① 严重很多 ② 较严重 ③ 差不多 ④ 较轻微 ⑤ 轻微很多 ⑥ 不知道

BF5c. 如您感到H7N9禽流感症状，请选择就医方式？（可选择1项或更多）
① Public clinics/A&E department consulting Western medical doctors ② Public clinics/A&E department consulting Traditional Chinese medicine ③ Self-treatment ④ Telephone to a medical professional, such as 12320 hot-line ⑤ Internet ⑥ Others (please specify): __________

Page 7 of 10
BF7. How would you evaluate the current performance of the national government in controlling H7N9 avian flu?
Effectiveness of prevention measures: _____ (0=extremely poor, 5=moderate, 10=excellent)

BF7a. How would you evaluate the current performance of the provincial/city government in controlling H7N9 avian flu?
Effectiveness of prevention measures: _____ (0=extremely poor, 5=moderate, 10=excellent)

Part 6 Preventive Measures

PM1. Did you receive the flu vaccine in the past 3 years?
① Yes  ② No  ③ Don’t know

The following questions refer to the past 3 days:

PM2. Did you cover your mouth when you sneeze or cough?
① Always  ② Usually  ③ Sometimes  ④ Never  ⑤ Don’t know

PM3. Did you wash your hands after sneezing, coughing or touching nose?
① Always  ② Usually  ③ Sometimes  ④ Never  ⑤ Don’t know

PM3a. Did you wash your hands after returning home?
① Always  ② Usually  ③ Sometimes  ④ Never  ⑤ Don’t know

PM4. Did you use liquid soap when washing your hands?
① Always  ② Usually  ③ Sometimes  ④ Never  ⑤ Don’t know

PM5. Did you wear face mask?
① Always  ② Usually  ③ Sometimes  ④ Never (go to PM6) ⑤ Don’t know (go to PM6)

PM5d. The reasons(s) for your wearing mask: * (can choose 1 item or more)

BF5c. 与非典(SARS)相比，您认为H7N9禽流感严重程度是？
① 严重很多  ② 重很多  ③ 一般多  ④ 比较轻微 ⑤ 不知道

BF6. 如果您得过这2天您突然出现了流感症状（例如，发烧、咳嗽、流涕、咽痛），您可能会（可多选）？
① 医院看病  ② 医院看中医  ③ 到私人诊所就医  ④ 自我医疗，如吃中药、理疗等 ⑤ 打专题热线电话咨询，例如，12320热线 ⑥ 上网查询有关信息 ⑦ 其他（请注明）：________

BF7. 对国家目前防控H7N9禽流感的成效，用0-10分进行评价，您会给出几分（0代表极差，5代表中等，10代表非常棒）？

BF7a. 对本地目前防控H7N9禽流感的成效，用0-10分进行评价，您会给出几分（0代表极差，5代表中等，10代表非常棒）？

下面还有几个问题，我们的访问就会结束。

第六部分 预防措施

PM1. 过去3年中您曾接种过流感疫苗吗？
① 有  ② 没有  ③ 不记得

请注意，以下问题是对过去3天的：

PM2. 过去3天中，当您打喷嚏或咳嗽的时候是否有遮掩的动作？
① 总是  ② 通常  ③ 有时  ④ 从不  ⑤ 不记得 (无打喷嚏或咳嗽)

PM3. 过去3天中，当您擦鼻涕、咳嗽和打喷嚏后是否洗手？
① 总是  ② 通常  ③ 有时  ④ 从不  ⑤ 不记得 (无擦鼻涕、咳嗽或打喷嚏)

PM3a. 过去3天内，您外出回家后是否马上洗手？
PM6. Did you use serving utensils when dining with others?
① Always  ② Usually  ③ Sometimes  ④ Never  ⑤ Don't know

PM7. In the past 7 days did you do: (please answer directly with “yes” or “no”), Note: if answered “yes”, interviewer should immediately inquire whether it is because of H7N9 flu.

<table>
<thead>
<tr>
<th>Activity</th>
<th>Yes, due to H7N9 flu</th>
<th>Yes, but not due to H7N9 flu</th>
<th>No</th>
<th>Don't know</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. avoid eating out?</td>
<td>①</td>
<td>②</td>
<td>③</td>
<td>④</td>
</tr>
<tr>
<td>b. avoid using public transport?</td>
<td>①</td>
<td>②</td>
<td>③</td>
<td>④</td>
</tr>
<tr>
<td>c. avoid going to crowded places?</td>
<td>①</td>
<td>②</td>
<td>③</td>
<td>④</td>
</tr>
<tr>
<td>d. keep good indoor ventilation?</td>
<td>①</td>
<td>②</td>
<td>③</td>
<td>④</td>
</tr>
<tr>
<td>e. reschedule travel plan?</td>
<td>①</td>
<td>②</td>
<td>③</td>
<td>④</td>
</tr>
<tr>
<td>f. clean or disinfect house more often?</td>
<td>①</td>
<td>②</td>
<td>③</td>
<td>④</td>
</tr>
</tbody>
</table>

PM8. If free H7N9 flu vaccine is available in the coming month, would you consider receiving it?
① Yes  ② No   ③ Not sure  ④ Don't know

PM4. 过去3天内，您洗手时是否有使用肥皂或洗手液？
① 总是  ② 通常  ③ 有时  ④ 从不  ⑤ 不记得了

PM5. 过去3天内，您戴过口罩吗？
① 总是  ② 通常  ③ 有时  ④ 从不（跳到PM6）
⑤ 不记得了

PM5d. 您戴口罩的原因是（可多选）？
① 保护自己  ② 保护他人  ③ 感到安全  ④ 其他人戴，所以我也戴  ⑤ 其他原因（请注明）：

PM6. 过去7天内，您是否出现以下情况？请分别作答：请用“是”或“否”进行回答。注意：（如果选择“是”，访问员要追问“是”“否”“因”因H7N9禽流感）

<table>
<thead>
<tr>
<th>情况说明</th>
<th>是</th>
<th>否</th>
<th>如“是”，是否因为H7N9禽流感</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>d.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>e.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>f.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

PM7. 如果政府下个月为市民免费接种H7N9流感疫苗，您是否考虑接种？
① 是  ② 否  ③ 不一定  ④ 不知道

下面我将再了解您的一些个人情况，我们的访问就结束了。
SG1. Did you travel to other province (or prefecture) in the past month?
   a) ① Yes ② No
   b) If “Yes”, please specify the destination of your last travel: ______________________
   c) When did you travel back: ___(month) ___(day) (or ___ days before)

SG1. Did you travel abroad in the past month?
   a) ① Yes ② No
   b) If “Yes”, please specify the country of your last travel: ______________________
   c) When did you travel back: ___(month) ___(day) (or ___ days before)

SG12. What is your household total income from employment?
   ① Less than 2,000          ② 2,001—4,000
   ③ 4,001—6,000          ④ 6,001—8,000
   ⑤ 8,001—10,000         ⑥ 10,001—15,000
   ⑦ 15,001—20,000        ⑧ 20,001—25,000
   ⑨ 25,001—30,000        ⑩ 30,001—40,000
   ⑪ 40,000 or more      ⑫ No income

SG13. Name (Chinese): ____________________(If refuse, please record the salutation)

SG14. Would it be possible to contact you again in a few weeks for a follow-up survey?
   ① Yes ② No ③ It depends

第七部分 人口资料

SG6. 您的婚姻状态？
   ① 单身          ② 已婚
   ③ 离异/分居     ④ 丧偶
   ⑤ 拒绝回答

SG7. 家庭/住处有多少人共同居住，包括保姆等： ___人

SG8. 您的教育程度？
   ① 从未接受过学校教育          ② 小学
   ③ 初中          ④ 高中
   ⑤ 大学及以上

SG9. 您或您的家人是否有在家饲养鸡、鸭或鸽子？（仅问6个城市的居民）
   ① 是          ② 否

SG10. 上个月您是否离开本地去过别的城市/省份？（根据访问的不同城市分别设置题面）
   a) ① 是          ② 否
   b) 如果选“是”，最近一次的目的地：____________________（国内问到地市，国外问到国家）
   c) 您何时返回：___月___日 （或者 ___天以前）

SG12. 您的家庭月均收入是多少人民币？（不与家人同住者，仅问个人的月均收入）
   ① 不足1,000          ② 1,001—2,000
   ③ 2,001—3,000        ④ 3,001—4,000
   ⑤ 4,001—6,000         ⑥ 6,001—8,000
   ⑦ 8,001—10,000        ⑧ 10,001—15,000
   ⑨ 15,001—20,000       ⑩ 20,001—30,000
   ⑪ 30,001 以上        ⑫ 无收入
   ⑬ 不清楚

SG14. 可以在未来几个星期内再次随访您吗？
   ① 可以          ② 不可以          ③ 看情况，在我方便时

SG13. 请问您贵姓（中文）： ________ 先生/女士

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