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*).

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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-

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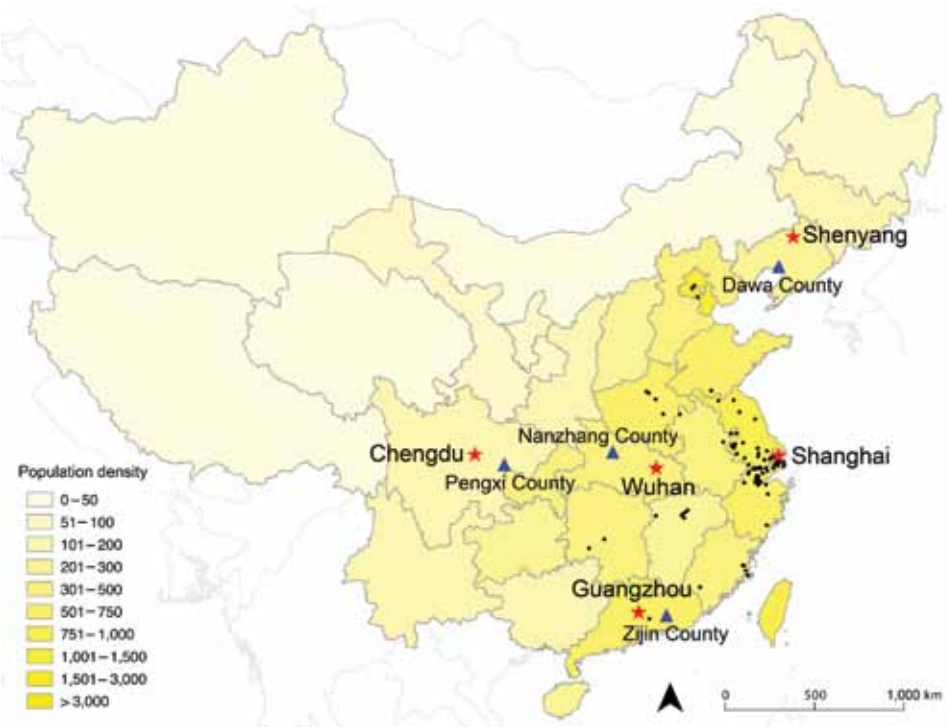

Figure 1. Geographic distribution of urban locations (red stars) and rural locations (blue triangles) selected for population survey to determine human exposure to live poultry and attitudes and behavior toward influenza A(H7N9) in China, 2013. Black dots indicate geographic locations of laboratory-confirmed cases of H7N9 through October 31, 2013. Shading indicates population density (persons per square kilometer). The 5 selected urban locations were Chengdu, capital of Sichuan Province in western China, population 10 million; Guangzhou, capital of Guangdong Province in southern China, population 13 million; Shanghai, a municipality in eastern China, population 23 million; Shenyang, capital of Liaoning Province in northeastern China, population 8 million; and Wuhan, capital of Hubei Province in central China, population 10 million. The 4 rural areas were 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).

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) for the study (Figure 1). At time of the survey, none of these counties had laboratory-confirmed human infections with avian influenza A(H7N9) virus.

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 χ^2 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.

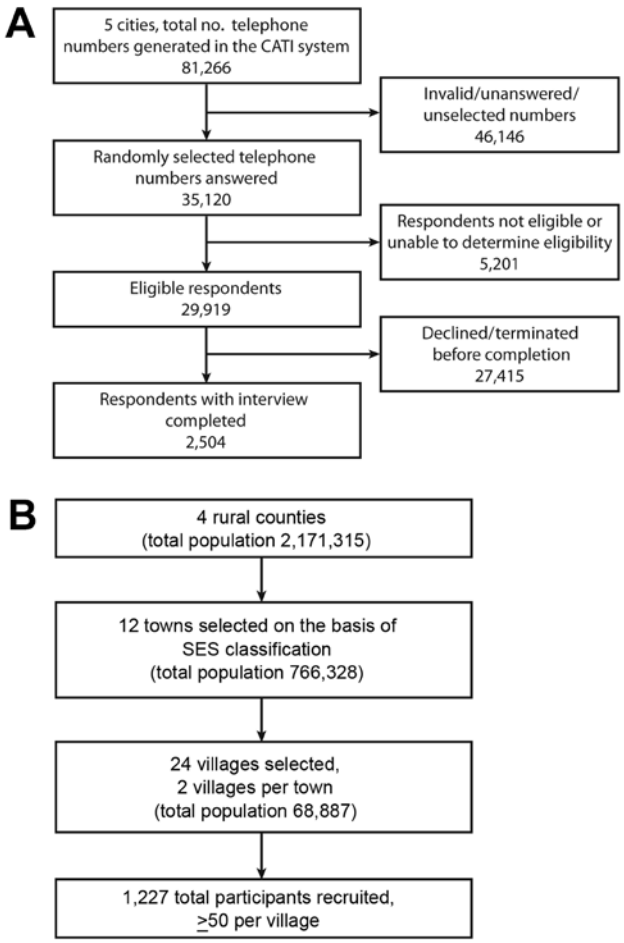

Figure 2. Flow charts for recruitment of participants for telephone surveys and face-to-face interviews to determine human exposure to live poultry and attitudes and behavior toward influenza A(H7N9) in China, 2013. A) Flowchart for telephone surveys conducted in 5 urban areas: Chengdu (capital of Sichuan Province), Guangzhou (capital of Guangdong Province), Shanghai municipality, Shenyang (capital of Liaoning Province), and Wuhan (capital of Hubei Province). B) Flowchart for face-to-face interviews conducted in 3 rural areas: 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). CATI, computer-assisted telephone interview; SES, socioeconomic status.

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*

Characteristic	No. (%) persons	
	Urban, n = 2,504	Rural, n = 1,227
Male sex	1,288 (51.4)	626 (51.0)
Age group, y		
18–44	1,938 (77.5)	685 (55.8)
45–64	415 (16.6)	405 (33.0)
≥65	147 (5.9)	137 (11.2)
Educational attainment		
No formal education	38 (1.5)	86 (7.0)
Primary school	191 (7.6)	259 (21.1)
Middle school	391 (15.6)	464 (37.9)
High school	593 (23.7)	268 (21.9)
College and above	1,291 (51.6)	148 (12.1)
Occupation		
Service workers and shop sales workers	601 (24.0)	164 (13.4)
Professionals	504 (20.1)	66 (5.4)
Retired	293 (11.7)	61 (5.0)
Unemployed	678 (27.1)	195 (15.9)
Full-time students	232 (9.3)	111 (9.0)
Homemakers	96 (3.8)	86 (7.0)
Agricultural and fishery workers	100 (4.0)	544 (44.3)
Marital status		
Single	941 (38.1)	269 (22.0)
Married	1,458 (59.0)	923 (75.4)
Divorced/separated	35 (1.4)	12 (1.0)
Widowed	36 (1.5)	20 (1.6)
Average household income, in renminbi*		
No income	65 (3.0)	83 (6.8)
<3,000	368 (17.0)	748 (61.2)
3,001–6,000	627 (28.9)	264 (21.6)
6,001–10,000	408 (18.8)	80 (6.5)
10,001–50,000	396 (18.2)	28 (2.3)
Not sure	307 (14.1)	20 (1.6)
Recent history of travel away from home		
Yes	479 (19.1)	117 (9.6)

*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*

Exposure	No. (%) persons					p value
	Chengdu, n = 500	Guangzhou, n = 500	Shanghai, n = 500	Shenyang, n = 504	Wuhan, n = 500	
Frequency of LPM visits in the previous year						<0.001
≥1	183 (36.6)	237 (47.4)	161 (32.2)	97 (19.2)	151 (30.2)	
No. live poultry bought in the previous year†						<0.001
1–2/y	33 (18.0)	32 (13.5)	25 (15.5)	35 (36.1)	25 (16.6)	
3–5/y	31 (16.9)	27 (11.4)	30 (18.6)	23 (23.7)	28 (18.5)	
6–11/y	27 (14.8)	25 (10.5)	23 (14.3)	4 (4.1)	23 (15.2)	
1–3/mo	33 (18.0)	56 (23.6)	32 (19.9)	10 (10.3)	29 (19.2)	
1–2/wk	19 (10.4)	49 (20.7)	20 (12.4)	2 (2.1)	19 (12.6)	
3–5/wk	2 (1.1)	8 (3.4)	2 (1.2)	0	2 (1.3)	
Almost every day	2 (1.1)	4 (1.7)	2 (1.2)	0	2 (1.3)	
Almost none	36 (19.7)	36 (15.2)	27 (16.8)	23 (23.7)	23 (15.2)	
Pick up live poultry before buying‡						<0.001
Yes	120 (81.6)	136 (67.7)	94 (69.6)	38 (51.4)	97 (75.8)	
Where did you slaughter the live poultry?§						0.601
In LPM	123 (83.7)	175 (87.1)	119 (88.1)	66 (89.2)	113 (88.3)	
In household	22 (15.0)	23 (11.4)	15 (11.1)	6 (8.1)	13 (10.2)	
Other places	2 (1.4)	3 (1.5)	1 (0.7)	2 (2.7)	2 (1.6)	
Not buying or buying less since March 2013¶						<0.001
Yes	101 (68.7)	139 (69.2)	123 (91.1)	59 (79.7)	104 (81.3)	
Views toward closure of LPMs#						0.06
Agree	37 (25.2)	54 (26.9)	53 (39.3)	25 (33.8)	35 (27.3)	
Closure caused any inconvenience**						
More inconvenient	NA	NA	45 (31.5)	NA	NA	
Distance of nearest LPM from home, km						<0.001
≤0.50	12 (13.3)	39 (31.0)	21 (18.9)	5 (13.5)	6 (15.0)	
0.51–1.00	23 (25.6)	42 (33.3)	32 (28.8)	4 (10.8)	10 (25.0)	
1.01–2.00	16 (17.8)	20 (15.9)	16 (14.4)	6 (16.2)	7 (17.5)	
>2.00	39 (43.3)	25 (19.8)	42 (37.8)	22 (59.5)	17 (42.5)	
Backyard poultry exposure	73 (14.6)	76 (15.2)	34 (6.8)	37 (7.3)	54 (10.8)	<0.001

*LPM, live poultry market; NA, not applicable.
†Respondents who bought live poultry ≥1/year were further asked about the number of live 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 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).

In rural areas, as in urban areas, the mean State Trait Anxiety Inventory was low to moderate (Table 4). A total of 48% of respondents reported that they raised ≥1 type of

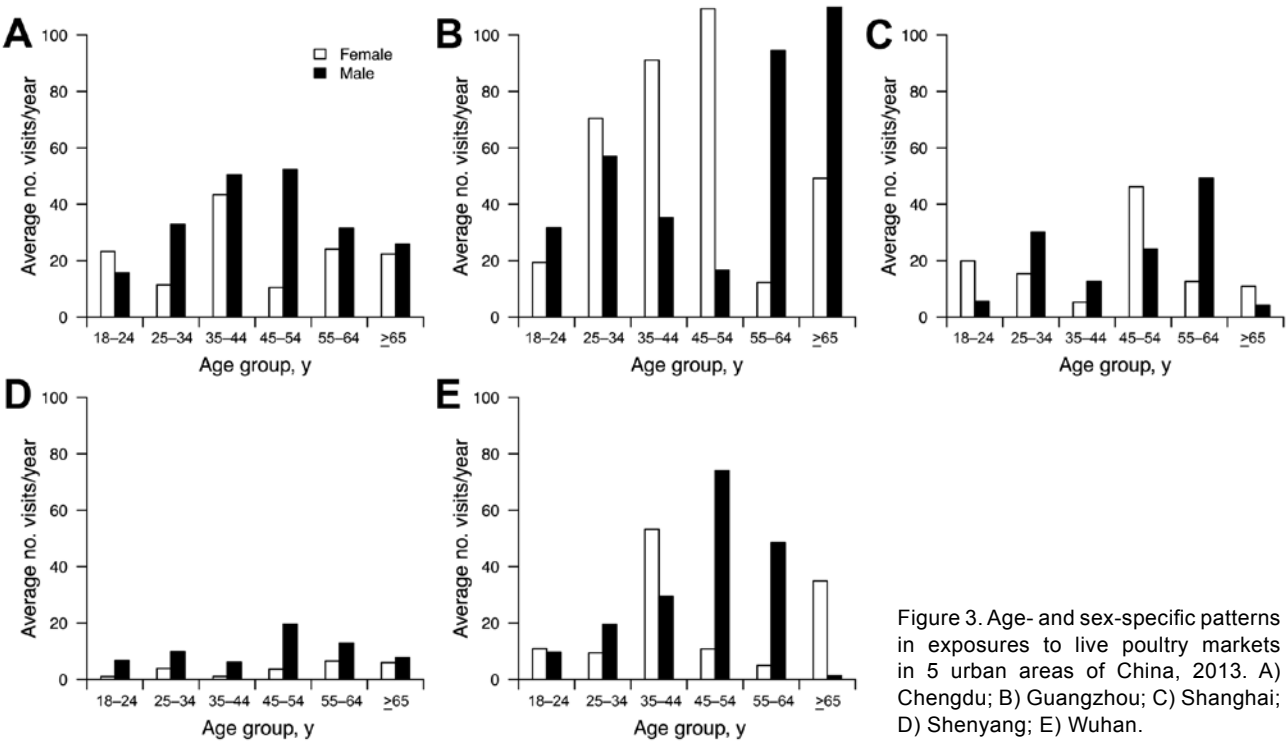

Figure 3. Age- and sex-specific patterns in exposures to live poultry markets in 5 urban areas of China, 2013. A) Chengdu; B) Guangzhou; C) Shanghai; D) Shenyang; E) Wuhan.

poultry at home. 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). Most respondents who purchased poultry in LPMs reported close contact with live poultry before slaughter. It is likely that the number of laboratory-confirmed cases of influenza A(H7N9) virus infection is lower than the actual number of human infections to date (*8*), and our results show that a broad cross-section of urban residents could be exposed to influenza A(H7N9) virus if it were prevalent among poultry in LPMs. In the spring 2013 outbreak, some evidence pointed to high prevalence of influenza A(H7N9)

Table 3.Risk perception related to influenza A(H7N9) among participants recruited for surveys in urban areas, by area, China, 2013*

Characteristic	Chengdu, n = 500	Guangzhou, n = 500	Shanghai, n = 500	Shenyang, n = 504	Wuhan, n = 500	p value
Mean STAI scores (95% CI)	1.89 (1.85–1.94)	1.80 (1.75–1.84)	1.82 (1.78–1.86)	1.73 (1.69–1.77)	1.74 (1.71–1.78)	<0.001†
Self-perceived susceptibility to influenza A(H7N9)‡						<0.001
High	13 (2.6)	9 (1.8)	14 (2.8)	1 (0.2)	5 (1.0)	
Even	61 (12.2)	98 (19.6)	61 (12.2)	54 (10.7)	90 (18.0)	
Low	426 (85.2)	393 (78.6)	425 (85.0)	449 (89.1)	405 (81.0)	
Perceived susceptibility to influenza A(H7N9) compared with others§						0.431
High	5 (1.0)	5 (1.0)	9 (1.8)	4 (0.8)	7 (1.4)	
Even	40 (8.0)	52 (10.4)	39 (7.8)	32 (6.3)	50 (10.0)	
Low	455 (91.0)	443 (88.6)	452 (90.4)	468 (92.9)	443 (88.6)	
ILI symptoms induced worry¶						<0.001
More	105 (21.0)	151 (30.2)	140 (28.0)	113 (22.4)	107 (21.4)	
Same as usual	197 (39.4)	198 (39.6)	192 (38.4)	165 (32.7)	233 (46.6)	
Less	198 (39.6)	151 (30.2)	168 (33.6)	226 (44.8)	160 (32.0)	
Infection with influenza A(H7N9) in next week#						0.004
Worry	64 (12.8)	68 (13.6)	68 (13.6)	49 (9.7)	53 (10.6)	
Think about it but no worry	77 (15.4)	57 (11.4)	104 (20.8)	92 (18.3)	78 (15.6)	
Never think about it	359 (71.8)	375 (75.0)	328 (65.6)	363 (72.0)	369 (73.8)	
Relative severity of influenza A(H7N9) compared with**						
Seasonal influenza	313 (62.6)	319 (63.8)	290 (58.0)	361 (71.6)	312 (62.4)	<0.001
Avian influenza A(H5N1)	159 (31.8)	163 (32.6)	170 (34.0)	203 (40.3)	156 (31.2)	0.028
SARS	52 (10.4)	57 (11.4)	54 (10.8)	45 (8.9)	51 (10.2)	0.779
Distance, km††	804	383	–	601	233	

*Values are no. (%) persons except as indicated. STAI, State Trait Anxiety Inventory; ILI, influenza-like illness; SARS, severe acute respiratory syndrome.
†Differences between groups was examined with the Kruskal Wallis Test (assuming nonhomogeneous variances).
‡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.
††Distance between the survey location and the nearest area in which influenza A(H7N9) case(s) were reported.

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

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*

Characteristic	Dawa, n = 310	Zijin, n = 308	Nanzhang, n = 308	Pengxi, n = 301	p value
Mean STAI scores (95% CI)	1.52 (1.47–1.57)	1.85 (1.80–1.90)	1.66 (1.62–1.70)	1.54 (1.48–1.61)	<0.001†
Self-perceived susceptibility to influenza A(H7N9)‡					<0.001
Higher	2 (0.6)	1 (0.3)	1 (0.3)	9 (3.0)	
Even	29 (9.4)	41 (13.3)	21 (6.8)	31 (10.3)	
Lower	279 (90.0)	266 (86.4)	286 (92.9)	261 (86.7)	
Perceived susceptibility to influenza A(H7N9) compared with others§					<0.001
Higher	0	1 (0.3)	2 (0.6)	8 (2.7)	
Even	10 (3.2)	25 (8.1)	3 (1.0)	36 (12.0)	
Lower	300 (96.8)	282 (91.6)	303 (98.4)	257 (85.4)	
Worry induced by ILI symptoms¶					<0.001
More	69 (22.3)	79 (25.6)	118 (38.4)	49 (16.3)	
Same as usual	73 (23.5)	113 (36.7)	118 (38.4)	113 (37.5)	
Less	168 (54.2)	116 (37.7)	71 (23.1)	139 (46.2)	
Infection with influenza A(H7N9) in next week#					<0.001
Worry	32 (10.3)	75 (24.4)	71 (23.1)	51 (16.9)	
Think about it but no worry	51 (16.5)	42 (13.7)	20 (6.5)	33 (11.0)	
Never think about it	227 (73.2)	190 (61.9)	217 (70.5)	217 (72.1)	
Severity of influenza A(H7N9) compared with**					
Seasonal influenza	201 (64.8)	181 (58.8)	224 (72.7)	182 (60.5)	0.001
Avian influenza A(H5N1)	105 (33.9)	112 (36.4)	67 (21.8)	92 (30.6)	<0.001
SARS	51 (16.5)	63 (20.5)	30 (9.7)	44 (14.6)	0.003
Distance, km††	482	2448	351	665	
Raising backyard poultry	141 (45.5)	135 (43.8)	166 (53.9)	168 (49.7)	0.067
Type of backyard poultry raised					
Chicken	120 (38.7)	134 (43.5)	162 (52.6)	161 (53.5)	<0.001
Ducks	49 (15.8)	45 (14.6)	20 (6.5)	65 (21.6)	<0.001
Geese	34 (11.0)	17 (5.5)	2 (0.6)	43 (14.3)	<0.001
Median no. live poultry raised	6	20	13	12	<0.001†

*Values are no. (%) persons except as indicated. STAI, State Trait Anxiety Inventory; ILI, influenza-like illness; SARS, severe acute respiratory syndrome.
†Differences between groups were examined with the Kruskal-Wallis Test (assuming nonhomogeneous variances).
‡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.
††Distance between the survey location and the nearest area in which influenza A(H7N9) case(s) were reported.

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 (*20*,*21*) and have been proposed in some areas of China (*8*).

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 (*3*). 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 (*3*). 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 (*22*,*23*). 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

Table 5. Factors associated with attitudes and behavior toward influenza A(H7N9) among survey respondents from urban areas who had visited a live poultry market during the previous year, China, 2013*

Characteristic	Odds ratio (95% CI)	
	Support closure of LPMs	Change purchase behavior
Sex		
F	1.19 (0.84–1.68)	**2.42 (1.61–3.63)**
M	Referent	Referent
Age group, y		
18–24	0.73 (0.37–1.45)	0.70 (0.36–1.36)
25–34	1.36 (0.85–2.17)	0.81 (0.49–1.34)
35–44	Referent	Referent
45–54	1.43 (0.72–2.83)	0.62 (0.3–1.26)
55–64	**3.28 (1.71–6.29)**	0.86 (0.39–1.9)
≥65	**2.36 (1.04–5.32)**	1.42 (0.51–3.97)
Educational attainment		
Primary or below	Referent	Referent
Secondary	1.80 (0.92–3.50)	**1.95 (1.01–3.76)**
Tertiary or above	1.78 (0.90–3.53)	1.79 (0.91–3.51)
Urban sites		
Chengdu	Referent	Referent
Guangzhou	1.13 (0.69–1.85)	0.99 (0.62–1.60)
Shanghai	**1.77 (1.05–2.99)**	**4.89 (2.42–9.89)**
Shenyang	1.40 (0.74–2.64)	1.95 (0.97–3.95)
Wuhan	1.07 (0.62–1.86)	**2.05 (1.15–3.65)**

*Odds ratios were estimated by adjustment for all variables shown. Boldface indicates significance (p<0.05).

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*).

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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 Pengxi County, Suining 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
⑪ Others

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[1]

2013 年 5 月 24 日 第 1.14 稿

开头语：您好，这里是中国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！

（备留）。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，我只会占用您几分钟时间，请您放心。您的电话号码是由我们通过电脑随机抽中的，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：如被访者对这次访问有任何疑问或查询，访问员可说："如果您对今天的访问有任何疑问或查询，您可以拨打热线电话：****，或 010-58900546，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，CATI 自动记录)

① 北京 ② 上海
③ 沈阳 ④ 武汉
⑤ 广州 ⑥ 成都
⑦ 辽宁盘锦市大洼县 ⑧ 湖北襄阳市南漳县
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

[1]请自动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?

		Yes	No	Don't know
a.	Fever ≥37.8℃(100℉) for 1 day or more	①	②	③
b.	Cough	①	②	③

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:

		Not at all	Sometimes	Moderately So	Very Much So
a.	I feel rested	①	②	③	④
b.	I feel content	①	②	③	④
c.	I feel comfortable	①	②	③	④
d.	I am relaxed	①	②	③	④
e.	I feel pleasant	①	②	③	④
f.	I feel anxious	①	②	③	④
g.	I feel nervous	①	②	③	④
h.	I am jittery	①	②	③	④
i.	I feel "high strung"	①	②	③	④
j.	I feel over-excited and "rattled"	①	②	③	④

BF4b. Please rate the current level of your worry towards H7N9 avian flu, 1 being very mild to 10 being very severe (1 = Very Mild, 10 = Very Severe) : _____.

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

SG4. 您的年龄?

a) *(必填) _____岁

b) ① 18-24 ② 25-34
③ 35-44 ④ 45-54
⑤ 55-64 ⑥ 65 以上
⑦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 农业和渔业技工（不含禽类饲养）
⑨ 农民 ⑩ 活禽饲养、贩卖人员或肉类销售人员
⑪ 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 很好
③ 好 ④ 一般
⑤ 差

SM1. 过去 2 周，您是否出现以下症状?

		有	没有	不记得了
a.	持续 1 天或以上，摄氏 37.8℃以上的高烧	①	②	③
b.	咳嗽	①	②	③

SM2. 过去 2 周，如果您曾发过烧 (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.	我现在神经过敏	①	②	③	④
i.	我感到十分敏感和容	①	②	③	④

⑧ Almost not **(go to part 3)**

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 averagely 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 **(go to part 3)**

EM3. Are you accustomed to pick up the poultry for examination before deciding to buy it?

① Yes

② No

③ Sometime "yes", sometime "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 Mar 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

易激动

j. 我感到过于激动和慌张 ① ② ③ ④

BF4b. 如果可以用 1—10 分来表达您对 H7N9 禽流感的担心程度，1 表示很少担心，10 表示非常担心，您目前担心程度是_____分.

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 EM7 题）

EM1. 在过去一年中，您多久去一次活禽市场？

(活禽市场：主要是指公众去购买活禽活鸭等的市场)

① 每年 1-2 次

② 每年 3-5 次

③ 每年 6-11 次

④ 每月 1-3 次

⑤ 每周 1-2 次

⑥ 每周 3-5 次

⑦ 几乎每天

⑧ 不去（如果选择⑧，直接跳至第三部分）

EM1a. 您最近一次去活禽市场的时间是：___月___日 （或者 ___天以前）

EM1b. 您最近一次去的活禽市场距离您家有多远？_____公里

EM1c. 您总是去距离最近的活禽市场吗？

① 是 ② 不一定，您常去的活禽市场距离您家多远？_____公里

EM2. 一年里平均在活禽市场购买多少活禽？

① 每年 1-2 只

② 每年 3-5 只

③ 每年 6-11 只

④ 每月 1-3 只

⑤ 每周 1-2 只

⑥ 每周 3-5 只

⑦ 基本每天 1 只

⑧ 没买过（如果选择⑧，直接跳至第三部分）

EM3.在决定购买活禽前，您会自己挑选接触活禽吗？

①总是

②有时

③从不

EM4. 当您购买活禽后，会在哪里进行宰杀？

① 一直在活禽市场

② 通常在活禽市场

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

③ 通常在家中宰杀

④ 一直在家中宰杀

⑤ 其它地方

EM5. 2013 年 3 月底国家公布首例人感染 H7N9 禽流感病例以来，您家购买活禽的生活习惯是否有变？

①是，不购买了

②是，但还会买，只是比以前买的少一些

③否，仍然和以往一样的购买习惯

EM6. 为了控制 H7N9 禽流感疫情而永久关闭活禽市场，您如何看？

① 坚决支持

② 支持

③ 不支持

④ 坚决反对

⑤ 无所谓

EM7. 关闭活禽市场对您的日常生活带来不便吗？（仅询问北京、上海的市民）

① 极不方便 ② 有些不便

③ 稍微有点不便 ④ 几乎没有不方便

⑤ 完全没有不方便

（以下内容仅针对 4 个县的农村居民）

EM8. 在过去一年中，您家饲养鸡/鸭/鹅吗？ ①是 ②否（直接跳至第三部分）

EM8.1 您家饲养的家禽是？ ①鸡 ②鸭 ③鹅 ④其他_____

EM8.2 总共饲养多少只（含鸡/鸭/鹅/其它）？ _____

下面将问您医疗服务使用的问题。

第三部分 医疗服务利用

HS1. 过去 2 周，您是否看过病或进行自我医疗？

		有		没有
1.	到医院门、急诊看病治疗	☐	_____次数	☐
2.	到私人小诊所看病	☐	_____次数	☐
3.	自我医疗，如服药，理疗等	☐	_____次数	☐

b. Wear face mask	①	②	③
c. Isolation	①	②	③

CT3. As a result of this did the sick family member take any preventive measures?

	Yes	No	Don't know
a. Wash hands more frequently	①	②	③
b. Wear face mask	①	②	③
c. Isolation	①	②	③

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?

Sick family members (oldest first)	Self	1	2	3	4	Additional
Days						
Did not seek medical advice						
Don't know						

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?

① Never ② Very unlikely
③ Unlikely ④ Evens
⑤ Likely ⑥ Very likely
⑦ Certain

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?

① Not at all ② Much less
③ Less ④ Evens
⑤ More ⑥ Much more
⑦ Certain

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

	Yes	No	Don't Know
a. Droplets	①	②	③
b. Air	①	②	③
c. Direct hand contact（e.g. via handshake）	①	②	③
d. Indirect hand contact (e.g. via doorhandle)	①	②	③
e. Oral-faecal	①	②	③
i. Cold weather	①	②	③
k. The air over long distances	①	②	③

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、咽痛）？（仅问与家人同住者）

①有，是我（可包括其他家庭成员）（跳至 CT2），
请填写出现流感症状者的年龄（年龄由大到小顺序：_____ _____ _____ _____ ____）
②有，是其他家庭成员（跳至 CT2）
请填写出现流感症状者的年龄（年龄由大到小顺序：_____ _____ _____ _____ ____）
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、咽痛）？（仅问不与家人同住者）

①有（跳至 CT2，仅问 CT2）
③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？

	是	否	不记得
a. 频繁洗手	①	②	③
b. 戴口罩	①	②	③
c. 自我隔离	①	②	③
d. 自行服用中药	①	②	③

CT3. 出现流感症状的家人是否采取了以下个人防护措施？

	是	否	不记得
a. 频繁洗手	①	②	③
b. 戴口罩	①	②	③
c. 隔离	①	②	③
d. 自行服用中药	①	②	③

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）

患病家庭成员（年龄由大到小排列）	1	2	3	4	5	其他成员
没去就诊						
发病到就诊的间隔（天）						
不记得了						

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

(e.g. from one building to another one)

l.	Body contact with patients	①	②	③
m.	Touching objects that have been contaminated by the virus	①	②	③
n.	Close contact with chickens in a wet market	①	②	③

BF4. If you were to develop flu-like symptoms tomorrow, would you be

① Not at all worried ② Much less worried than normal
③ Worried less than normal ④ About same
⑤ Worried more than normal ⑥ Worried much more than normal
⑦ Extremely worried

BF4a. In the past one week, have you ever worried about catching H7N9 avian flu?

① No, never think about it ② Think about it but it doesn't worry me
③ Worries me a bit ④ Worries me a lot
⑤ Worry about it all the time

BF5a. How does H7N9 avian flu compare with seasonal flu in terms of seriousness?

① Much higher ② A little higher
③ Same ④ A little lower
⑤ Much lower

BF5d. How does H7N9 avian flu compare with H5N1 avian flu in terms of seriousness?

① Much higher ② A little higher
③ Same ④ A little lower
⑤ Much lower

BF5c. How does H7N9 avian flu compare with SARS in terms of seriousness?

① Much higher ② A little higher
③ Same ④ A little lower
⑤ Much lower

BF6. If you were to develop flu-like symptoms tomorrow, where would you seek medical consultation? (can choose 1 item or more)

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): _____

⑦ 肯定会

BF2a. 与家庭外的同龄人相比，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 机率较小 ④ 机率一样
⑤ 机率较大 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：

		是	否	不知道
a.	飞沫	①	②	③
b.	空气	①	②	③
c.	手部直接接触（例如：握手）	①	②	③
d.	手部间接接触（例如：门把手）	①	②	③
e.	口-粪便传播	①	②	③
i.	天气冷	①	②	③
k.	远距离空气传播（例如：楼宇间）	①	②	③
l.	与 H7N9 禽流感病人有身体接触	①	②	③
m.	接触了被 H7N9 禽流感病毒污染的物体	①	②	③
n.	密切接触了活禽市场的鸡鸭	①	②	③

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 一直都在担心

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

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 flu vaccine in the past 3 years?

①Yes ②No 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 reason(s) of 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 较严重
③ 差不多 ④ 较轻微
⑤ 轻微很多 ⑥ 不知道

BF6. 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），您可能会（可多选）？

① 医院看西医
② 医院看中医
③ 到私人小诊所就医
④ 自我医疗, 如服中药、理疗等
⑤ 打专业热线电话咨询， 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_____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_____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，以下问题是针对过去 3 天：

PM2. 过去 3 天内，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 不记得了 ⑥ 不适用（无打喷嚏或咳嗽）

PM3. 过去 3 天内，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 不记得了 ⑥ 不适用（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？

① Protect myself ② Protect others
③ Feel secure ④ Other people are wearing masks
⑤ Others: _____

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：(please answer directly with "yes" or "no"), Note: If answered "yes", interviewer should immediately inquiry whether it is because of H7N9 flu.

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

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

Part7 Demographics

SG6. What is your marital status?
① Single ② Married
③ Divorced /separated ④ Widowed
⑤ Refuse to answer

SG7. How many people live in your household, including yourself and domestic helper(s)? ___

SG8. What is your education level?
① primary school and illiteracy ② Middle school
③ High school ④ College and above

SG9. Do you or your family members have the hobbies to raise chicken, duck or homing pigeon in your home?
① Yes ② No

① 总是 ② 通常
③ 有时 ④ 从不
⑤ 不记得了 ⑥ 不适用（无外出）

PM4. 过去 3 天内，您洗手时是否使用肥皂或洗手液？
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（跳到 PM6）

PM5d. 您戴口罩的原因是（可多选）?
① 保护自己 ② 保护他人
③ 感觉安全 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"不是"进行回答。注意，(如果选择"是"，访问员要追问"是""否"因为 H7N9 禽流感)

情况说明		是	否	如"是"，是否因为 H7N9 禽流感	
				"是"	"否"
a.	避免外出用餐?	☐	☐	☐	☐
b.	避免乘坐公共交通工具?	☐	☐	☐	☐
c.	避免到拥挤的公共场所?	☐	☐	☐	☐
d.	保持室内空气流通?	☐	☐	☐	☐
e.	调整了出行计划?	☐	☐	☐	☐
f.	更频繁打扫或消毒房间?	☐	☐	☐	☐

PM7.如果政府下个月为市民免费接种 H7N9 禽流感疫苗，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点个人情况，我们的访问就结束了。

SG10. 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)

SG11. 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	40,001or 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.家里/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地市/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	14	拒答

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