Perceptions and Reactions with Regard to Pneumonic Plague

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We assessed perceptions and likely reactions of 1,005 UK adults to a hypothetical terrorist attack involving pneumonic plague. Likely compliance with official recommendations ranged from good (98% would take antimicrobial drugs) to poor (76% would visit a treatment center). Perceptions about plague were associated with these intentions.

Y*ersinia pestis*, the bacterium that causes plague, is a high-priority bioterrorism agent (*1*). The pneumonic form of plague is of particular concern because it can be transmitted from person to person and is fatal if untreated (*2*). However, interventions such as isolating case-patients, identifying contacts, and providing prophylactic antimicrobial drugs may halt the spread of an outbreak (*3,4*). The success of such interventions relies on public cooperation, which should not be taken for granted (*5*). Indeed, various commentators have suggested that future plague outbreaks could result in widespread panic (*2*), mass public fear and civil disruption (*1*), and rioting (*6*).

We used a telephone survey of a sample of the adult population of Great Britain to assess their intended behavioral responses in the event of an outbreak of pneumonic plague. We also assessed their perceptions of pneumonic plague and tested whether perceptions were associated with intentions.

The Study

During September 14–24, 2007, a UK market research company, Ipsos MORI, conducted a random-digit–dial telephone survey. Members of the British population ≥16 years of age were selected by using proportional quota sampling to ensure that the eventual sample of 1,005 participants was representative of the British public (*7*). King's College London's Research Ethics Committee approved the study.

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The full interview (including several questions not analyzed for this article) and results are in online Technical Appendix 1 (available from www.cdc.gov/EID/content/16/1/120-Techapp1.pdf). The survey was conducted in 4 stages. In stage 1, we asked 7 questions concerning perceptions about pneumonic plague. In stage 2, we asked participants to imagine that 3 persons from their area had received a diagnosis of pneumonic plague. To test whether the origin of an outbreak affects responses, 502 participants were also told that police suspected bioterrorism. This manipulation had no effect on most responses. In stage 3, we informed participants that it was now several days later, that the source of the outbreak had been discovered to be a container deliberately hidden at a train station, and that >100 persons had received a diagnosis of plague. In stage 4, we told participants about a specific public health strategy that was being introduced. We informed 502 randomly selected participants about the setting up of mass treatment centers for persons who had been at the train station and told the other 503 that persons who had been at the train station were being asked to stay home for 7 days and to phone a help line if symptoms developed.

In stages 2 and 3, we asked participants whether they intended to undertake specific spontaneous precautionary behavior (questions 12–19 in online Technical Appendix 1). An extra item in stage 2 asked whether participants would be willing to take prophylactic antimicrobial drugs if asked to (question 25 in online Technical Appendix 1). In stage 4, we asked participants how likely they would be to comply with advice relating to the public health interventions (questions 41–46 in online Technical Appendix 1). Before analysis, all responses were weighted according to participant age, sex, work status, region, and social grade.

As expected, precautionary behavior was more likely to be taken in the stage 3 scenario (Tables 1, 2). In terms of likely compliance with official recommendations, 983 (97.8%) participants reported being very or fairly likely to take antimicrobial drugs if asked to. When asked to imagine that they had been to the affected train station, 379 (75.5%) participants reported that they would visit the treatment center immediately if asymptomatic; slightly fewer (331, 65.9%) reported that they would go immediately if they also had influenza-like symptoms. This decrease appeared to be because participants reported that they would likely first consult a primary care physician, hospital, or medical helpline if they had symptoms. In addition, 88 (9.2%) reported being likely to visit the center even if they had not been at the train station, and 141 (28.1%) said that they were likely to visit if they had not been at the train station but had developed influenza-like symptoms. For participants who had been advised to stay home, 459 (91.3%) reported that they would be likely to comply.

Table 1. Perceptions of and precautionary behavioral responses to a hypothetical pneumonic plague outbreak affecting 3 persons, United Kingdom, September 2007*

Predictor	Variable level, no. responses		Association, adjusted odds ratio (95% confidence interval)				
	Very or fairly likely	Not very or not at all likely (reference)	Stock up on food, n = 673 (67.2%)†	Leave the area, n = 132 (13.3%)†	Avoid others, n = 746 (74.2%)†	Seek medical advice, n = 667 (66.4%)†	Try to obtain antimicrobial drugs, n = 591 (59.4%)†
If someone catches pneumonic plague, they would feel unwell within 24 h							
	690	149	**1.7 (1.2–2.5)**	1.3 (0.7–2.3)	1.4 (0.9–2.1)	**1.6 (1.2–2.4)**	**1.7 (1.2–2.5)**
There have been cases of pneumonic plague in Britain in the past 10 y							
	228	687	0.9 (0.6–1.2)	0.8 (0.5–1.3)	0.8 (0.6–1.2)	1.1 (0.8–1.6)	0.8 (0.6–1.1)
If you come within 6 feet of someone who had pneumonic plague and was clearly ill, you would probably catch the disease							
	735	237	**2.8 (2.0–3.8)**	1.4 (0.8–2.3)	**2.1 (1.5–2.9)**	**2.1 (1.5–2.9)**	**1.9 (1.4–2.6)**
If you come within 6 feet of someone who had pneumonic plague but who had not yet developed any signs of illness, you would probably catch the disease							
	623	333	**2.0 (1.5–2.7)**	**2.0 (1.3–3.2)**	**2.2 (1.6–3.0)**	**2.1 (1.5–2.8)**	**1.9 (1.4–2.5)**
Unless they receive immediate treatment, then most people who catch pneumonic plague will die from it							
	767	169	**1.9 (1.3–2.7)**	**2.7 (1.4–5.4)**	**1.9 (1.3–2.7)**	**2.1 (1.4–3.0)**	**1.6 (1.1–2.3)**
If antibiotics are administered immediately after a person has been infected, they would probably survive							
	880	69	**0.5 (0.3–1.0)**	0.5 (0.3–1.0)	0.7 (0.4–1.4)	0.7 (0.4–1.3)	0.7 (0.4–1.3)
If someone with plague has been in a room, how long would it take after they leave before it is safe to enter the room?							
<1 d		372	**0.6 (0.4–0.8)**	**0.4 (0.2–0.7)**	**0.4 (0.2–0.6)**	**0.6 (0.4–0.8)**	**0.6 (0.4–0.9)**
1–2 d		226	1.0 (0.6–1.5)	**0.6 (0.4–1.0)**	**0.5 (0.3–0.8)**	0.8 (0.5–1.2)	1.0 (0.7–1.5)
>3 d		237	Reference	Reference	Reference	Reference	Reference

*All odds ratios adjusted for home ownership, ethnicity, sex, age, working status, number of years of education, and social grade. Survey stage 2.
Boldface indicates significance (p<0.05).
†Very or fairly likely to perform that behavior.

The associations between demographic variables and precautionary behavior are shown in Tables 1 and 2 of online Technical Appendix 2 (available from www.cdc.gov/EID/content/16/1/120-Techapp2.pdf). Associations between perceptions and precautionary behavior were ad-justed for relevant demographic variables (Tables 1, 2). In general, participants who perceived pneumonic plague to be more severe, easier to catch, or more persistent in the environment were more likely to engage in precautionary behavior (Tables 1, 2). Table 3 in online Technical Appendix

Table 2. Perceptions of and precautionary behavioral responses to a hypothetical pneumonic plague outbreak affecting >100 persons, United Kingdom, September 2007*

Predictor	Variable level, no. responses		Association, adjusted odds ratio (95% confidence interval)				
	Very or fairly likely	Not very or not at all likely (reference)	Stock up on food, n = 798 (79.8%)†	Leave the area, n = 223 (22.4%)†	Avoid others, n = 850 (84.6%)†	Seek medical advice, n = 792 (79.4%)†	Try to obtain antimicrobial drugs, n = 724 (72.5%)†
If someone catches pneumonic plague, they would feel unwell within 24 h							
	690	149	**1.8 (1.1–2.7)**	1.6 (1.0–2.5)	1.3 (0.8–2.1)	1.5 (1.0–2.4)	**1.9 (1.2–2.8)**
There have been cases of pneumonic plague in Britain in the past 10 y							
	228	687	1.1 (0.8–1.7)	0.9 (0.6–1.4)	1.0 (0.6–1.5)	1.4 (0.9–2.1)	0.8 (0.5–1.1)
If you come within 6 feet of someone who had pneumonic plague and was clearly ill, you would probably catch the disease							
	735	237	**2.5 (1.8–3.6)**	**1.8 (1.2–2.7)**	**1.8 (1.2–2.6)**	**2.2 (1.5–3.1)**	**2.0 (1.4–2.8)**
If you come within 6 feet of someone who had pneumonic plague but who had not yet developed any signs of illness, you would probably catch the disease							
	623	333	**2.2 (1.6–3.2)**	1.4 (1.0–2.0)	1.5 (1.0–2.1)	**2.0 (1.5–2.9)**	**1.5 (1.1–2.1)**
Unless they receive immediate treatment, then most people who catch pneumonic plague will die from it							
	767	169	**2.1 (1.4–3.1)**	**2.8 (1.7–4.7)**	**1.8 (1.1–2.8)**	**2.3 (1.5–3.4)**	**2.2 (1.5–3.2)**
If antibiotics are administered immediately after a person has been infected, they would probably survive							
	880	69	0.6 (0.3–1.2)	0.7 (0.4–1.3)	1.1 (0.6–2.2)	0.4 (0.2–1.0)	1.0 (0.6–1.8)
If someone with plague has been in a room, how long would it take after they leave before it is safe to enter the room?							
<1 d		372	**0.6 (0.4–0.9)**	**0.5 (0.4–0.8)**	**0.4 (0.2–0.7)**	**0.6 (0.4–0.9)**	**0.6 (0.4–0.9)**
1–2 d		226	1.3 (0.7–2.1)	**0.6 (0.4–0.9)**	0.6 (0.3–1.0)	0.7 (0.4–1.2)	1.0 (0.6–1.6)
>3 d		237	Reference	Reference	Reference	Reference	Reference

*All odds ratios adjusted for home ownership, ethnicity, sex, age, working status, number of years in education, social grade, number of people at home and parental status. Survey stage 3. **Boldface** indicates significance (p<0.05).
†Very or fairly likely to perform that behavior.

2 shows the associations between demographic characteristics and the likelihood of not complying with public health recommendations. Table 4 in online Technical Appendix 2 shows the equivalent associations for perceptions about plague, after adjustment for relevant demographic variables. Only unnecessary visits to a treatment center were associated with perceptions; participants who felt that there had been cases of plague in the United Kingdom in the past 10 years (odds ratio [OR] 2.3, 95% confidence interval [CI] 1.3–4.0) or who felt that asymptomatic persons might be contagious (OR 2.8, 95% CI 1.5–5.3) were more likely to report that they would visit the treatment center if they had not been to the affected train station, and participants who believed that antimicrobial drugs are an effective treatment for plague were less likely to report that they would visit (OR 0.3, 95% CI 0.2–0.6).

Conclusions

Our survey indicates that should an outbreak of pneumonic plague occur, the inclination of the British public would be to adopt a range of spontaneous precautionary behaviors. Intended compliance with possible public health recommendations ranged from excellent (taking prophylactic antimicrobial drugs) to poor (visiting treatment centers). Some intended behavior we identified might complicate management of an outbreak. In particular, ≈25% of potentially exposed persons would not visit a treatment center, yet ≈10% of unexposed persons would. Given that specific perceptions about pneumonic plague were associated with being likely to engage in precautionary behavior, explicitly, clearly, and repeatedly addressing misperceptions during the early stages of an outbreak might help reduce public anxiety and help with decision making (8). However, perceptions showed few associations with willingness to comply with explicit public health advice.

Several caveats should be considered with regard to our methods. First, the large number of statistical tests that we conducted and the wide confidence intervals for some of our results make type 1 and type 2 errors likely. Second, our sample probably underrepresented groups who might be more vulnerable in the context of an outbreak, e.g., those who do not have access to a telephone or do not speak English. Our sample also consisted solely of persons who complied with a request to participate in a survey and who might therefore be more likely to comply with official advice during an outbreak. Our results may therefore overestimate likely compliance during an outbreak. Finally, respondents' difficulty in predicting how they would react to this hypothetical scenario also creates difficulty in assessing validity of results. We therefore caution readers to treat our results as suggestive of the broad level of compliance and precautionary behavior that might occur during an outbreak of pneumonic plague, not as precise predictions.

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Pneumonic Plague Survey
King's College London
TOPLINE RESULTS 26 September 2007

- Results are based on sample of 1,005 respondents aged 16+, interviewed by telephone.
- Fieldwork was conducted between 14th – 24th September 2007
- Quotas have been set on age, gender, work status, region and social grade
- Data is weighted to the known profile of the population
- Where figures do not add up to 100, this is due to multiple coding or computer rounding
- An asterisk (*) denotes any value of less then half of one per cent, but more than zero
- Responses are based on all interviews unless otherwise specified
- Where base sizes are smaller than 50, number of responses rather than percentages are used

Q1.   **How is your health in general? Would you say it was…**

	%
Very good	39
Good	41
Fair	15
Poor	3
Very poor	2
Don't know	*

Q2.   **Do you have any long-standing illness, disability or infirmity? By long-standing I mean anything that has troubled you over a period of time, or that is likely to affect you over a period of time.**

	%
Yes	24
No	75
Don't know	*

One of the things we are interested in is how people would cope if a disease appeared. In particular, we are thinking of a disease called <u>pneumonic plague</u>. This is a virus similar to the plagues that occurred in Britain in mediaeval times. It can be lethal, and is passed between people by coughing or sneezing. The best known treatment for plague is to give the patient high doses of antibiotics as quickly as possible.

Q3-Q8 **We would now like to find out what you currently think about pneumonic plague. For each please tell me how likely or unlikely you think each statement is. We do not expect that you will know all the answers, but are just interested in what you have heard about the topic.**

		Very likely %	Fairly likely %	Not very likely %	Not at all likely %	Don't know %
Q3.	**If someone catches pneumonic plague they would feel unwell within 24 hours of catching it**	36	33	12	2	17
Q4.	**There have been cases of pneumonic plague in Britain within the past 10 years**	7	16	39	29	9
Q5.	**If you were to come within six feet of somebody who had pneumonic plague and who was clearly ill, you would probably catch the disease from them**	34	39	20	4	3
Q6.	**If you were to come within six feet of somebody who had pneumonic plague but who had n<u>ot yet developed any signs of illness</u>, you would probably catch the disease from them**	21	41	28	6	5
Q7.	**Unless they receive immediate treatment, then most people who catch pneumonic plague will die from it.**	42	34	15	2	7
Q8.	**If antibiotics were administered immediately after a person had been infected with pneumonic plague, they would probably survive**	41	47	6	1	5

Q9. **If somebody with pneumonic plague has been in a room, after they leave, how long do you think it would take before it is safe for someone else to enter that room and not become ill?**

	%
Immediately / right away	7
Less than 6 hours	14
More than six hours but less than one day	16
1-2 days	23
3-7 days	8
1-2 weeks	7
3-4 weeks	1
Up to 1 month	2
More than a month	3
Never	2
Don't know	17

I'd now like to present a hypothetical situation in which there has been an outbreak of pneumonic plague in Britain. Please imagine that you hear on the news that three people from your local area – within a few miles of you – have been diagnosed as having pneumonic plague. They had been taken to hospital suffering from flu-like symptoms.

Experts are trying to identify the source of the outbreak. They are also trying to trace anybody who has been in close contact with the affected people in order to give them antibiotics as a precaution. They are advising that other people should continue on with their daily lives as normal and that anybody who is concerned about their own health should call NHS Direct, the NHS' telephone helpline.

SPLIT SAMPLE: VERSION A (n=492) AND VERSION B (n=513)

FOR ALL IN VERSION A READ OUT: **Police say they are concerned that the outbreak may be the work of terrorists.**

Q10.   **If this situation occurred, how worried, if at all, would you be about catching pneumonic plague yourself?**

	Version A %	Version B %
Very worried	33	23
Fairly worried	36	35
Not very worried	22	33
Not at all worried	7	9
Don't know	1	0

Q11.   **If this situation occurred, how worried, if at all, would you be about your close family or loved ones catching pneumonic plague?**

	Version A %	Version B %
Very worried	43	41
Fairly worried	34	34
Not very worried	19	18
Not at all worried	4	6
Don't know	1	1

VERSION A
Q12.-Q19.   **And how likely, if at all, would you be to do each of the following actions I am going to read out?**

VERSION A	Very likely %	Fairly likely %	Not very likely %	Not at all likely %	Don't know %	Not applicable (option for Q15 ONLY) %
Q12. **Make sure your home was stocked up with food and supplies**	49	23	19	8	*	N/A
Q13. **Carry on as normal**	46	31	15	7	*	N/A
Q14. **Leave the area**	6	9	38	47	*	N/A
Q15. **Avoid going to work or college if applicable**	19	12	28	21	3	17
Q16. **Avoid crowded areas such as public transport, supermarkets or pubs**	44	29	15	11	1	N/A
Q17. **Avoid leaving your home if at all possible**	21	18	33	27	1	N/A
Q18. **Seek medical advice**	45	24	20	12	*	N/A
Q19. **Try to obtain a supply of antibiotics for yourself or your family/household**	39	19	26	14	1	N/A

VERSION B

Q12.-Q19. **And how likely, if at all, would you be to do each of the following actions I am going to read out?**

	VERSION B	Very likely %	Fairly likely %	Not very likely %	Not at all likely %	Don't know %	Not applicable (option for Q15 ONLY) %
Q12.	**Make sure your home was stocked up with food and supplies**	39	22	29	10	*	N/A
Q13.	**Carry on as normal**	51	33	11	5	0	N/A
Q14.	**Leave the area**	6	6	37	49	1	N/A
Q15.	**Avoid going to work or college if applicable**	18	10	26	24	4	18
Q16.	**Avoid crowded areas such as public transport, supermarkets or pubs**	44	26	19	11	1	N/A
Q17.	**Avoid leaving your home if at all possible**	20	16	36	28	*	N/A
Q18.	**Seek medical advice**	46	20	22	13	0	N/A
Q19.	**Try to obtain a supply of antibiotics for yourself or your family/household**	40	19	27	14	1	N/A

Q20. **You said you would be likely to leave the area. Where do you think would you go to?**
Base: All likely to leave the area (VERSION A = 73; VERSION B = 64)

	Version A %	Version B %
Elsewhere in the UK, but within my region of the country	21	13
Elsewhere in the UK, but outside my region of the country	42	49
Elsewhere in Europe but outside the UK	14	11
Outside of Europe	16	16
Don't know	8	11

Q21. **You said you would be likely to see medical advice. Where would you seek medical advice?**
Base: All likely to seek medical advice (VERSION A = 337; VERSION B = 335)

	Version A %	Version B %
GP	73	75
NHS Direct	32	32
Local hospital	19	19
Internet	18	16
Media like newspapers, television or radio	6	6
Medically qualified friend or relative	4	6
Pharmacy	2	3
Another friend or relative (not medically qualified)	*	2
Emergency services	*	1
Other	5	6

Q22. **You said you would be likely to try to obtain a supply of antibiotics. Where would you try to obtain antibiotics from?**

Base: All likely to obtain antibiotics (VERSION A = 289; VERSION B = 300)

	Version A %	Version B %
GP	74	73
Pharmacy	23	26
Local hospital	20	12
Internet	6	7
NHS direct	4	2
Health clinic	2	1
Medically qualified friend or relative	1	2
Another friend or relative (not medically qualified)	1	2
Black market	1	1
Other	4	5
Don't know	1	3

Q23. **Do you have any children under the age of 18 living with you?** PROMPT AS NECESSARY: **And do any of them go to school or nursery?**

	Version A %	Version B %
Yes – but no children are in school or nursery	5	4
Yes – I have one or more children in school or nursery	29	27
No – I have no children / no children living with me	65	69
Refused	0	*

Q24. **How likely or unlikely is it that you would keep your children home from school or nursery?**

Base: All with children in school or nursery (VERSION A = 143; VERSION B = 136)

	Version A %	Version B %
Very likely	37	30
Fairly likely	18	16
Not very likely	31	34
Not at all likely	11	16
Don't know	3	4

Q25. **Please now think back to the situation I just described where there has been an outbreak of pneumonic plague in your area. If you had come into contact with one of the three people known to have pneumonic plague and were asked by doctors to take a course of antibiotics as a precautionary measure, how likely or unlikely is it that you would take them? The antibiotics would be provided for free.**

	Version A %	Version B %
Very likely	92	93
Fairly likely	5	5
Not very likely	1	1
Not at all likely	1	1
Don't know	*	*

Q26. **Why do you say you are unlikely to take the antibiotics?**

Base: All unlikely to take antibiotics (VERSION A = 11; VERSION B = 9)

	Version A N	Version B N
I would not be worried about catching plague	0	1
I am allergic to antibiotics	1	1
I would be worried about side effects of the antibiotics	0	1
I do not take medicines in general	1	3
I would not want to take antibiotics until I was sure I had the disease	7	2
I would be concerned about becoming immune to antibiotics	0	0
I would not want to pay for the antibiotics	0	0
Other	2	1

BASE = ALL (1,005)

Now carrying this hypothetical situation further, I would now like you to imagine that it is several days since the three people in your area have been diagnosed with pneumonic plague. The police have located the source of the plague outbreak. This was a canister of toxic material hidden at a busy train station. The police have confirmed this was left there deliberately by terrorists. Over a hundred people across the region have now been diagnosed with plague and a number of them have died.

Q27. **If this situation occurred, how worried, if at all, would you be about catching pneumonic plague yourself?**

Q28. **If this situation occurred, how worried, if at all, would you be about your close family or loved ones catching pneumonic plague?**

	Q27 %	Q28 %
Very worried	52	65
Fairly worried	31	23
Not very worried	12	8
Not at all worried	4	3
Don't know	*	*

Q29.-Q36. **And how likely, if at all, would you be to do each of the following actions I am going to read out?**

		Very likely %	Fairly likely %	Not very likely %	Not at all likely %	Don't know %	Not applicable (Q32 ONLY) %
Q29.	**Make sure your home was stocked up with food and supplies**	59	20	14	7	*	N/A
Q30.	**Carry on as normal**	36	29	23	12	*	N/A
Q31.	**Leave the area**	11	12	37	40	1	N/A
Q32.	**Avoid going to work or college if applicable**	28	15	21	16	0	20
Q33.	**Avoid crowded areas such as public transport, supermarkets or pubs**	62	21	10	6	1	N/A
Q34.	**Avoid leaving your home if at all possible**	35	20	27	18	1	N/A
Q35.	**Seek medical advice**	59	20	13	8	1	N/A
Q36.	**Try to obtain a supply of antibiotics for yourself or your family/household**	56	15	17	10	1	N/A

Q37. **You said you would be likely to leave the area. Where do you think would you go to?**

Base: All likely to leave the area (228)

	%
Elsewhere in the UK, but within my region of the country	12
Elsewhere in the UK, outside my region of the country	56
Elsewhere in Europe but outside the UK	17
Outside of Europe	12
Don't know	3

Q38. **You said you would be likely to see medical advice. Where would you seek medical advice?**

Base: All likely to see medical advice (793)

	%
GP	80
NHS Direct	28
Internet	16
Hospital	16
Media like newspapers, television or radio	6
Pharmacy	5
Medically qualified friend or relative	5
Health clinic	1
Another friend or relative (not medically qualified)	1
Government	1
Police	*
Other	4
Don't know	*

Q39. **You said you would be likely to try to obtain a supply of antibiotics. Where would you try to obtain antibiotics from?**

Base: All likely to try to obtain antibiotics (793)

	%
GP	77
Pharmacy	24
Local hospital	21
Internet	6
NHS direct	3
Health centre	2
Medically qualified friend or relative	1
Hospital	1
Government	1
Black market	1
Another friend or relative (not medically qualified)	1
Police	*
Other	3
Don't know	2

Q40. **How likely or unlikely is it that you would keep your children home from school or nursery?**

Base: All with children in school or nursery (329)

	%
Very likely	47
Fairly likely	15
Not very likely	14
Not at all likely	7
Don't know	2

SPLIT SAMPLE: VERSION A AND VERSION B.

VERSION A (n = 492)

This is the final element to the hypothetical situation: Health officials are saying that anyone who was at the train station where the canister of toxic material was found should go to a local mass treatment centre. When people arrive at the centre, they will be assessed by a team of specialists and may be given antibiotics as a precautionary measure.

Q41. **Assuming that you had been to the affected train station, which of the following would you do <u>first</u>?**

	%
Go to the treatment centre as soon as possible	75
Visit your GP	11
Speak to NHS Direct (CLARIFY IF NECESSARY: the NHS' telephone advice service)	6
Go to the treatment centre at some point when it was convenient, but not immediately	4
Go to your local hospital	2
Look for more information elsewhere (ALWAYS LAST)	3
Do nothing	*
Don't know	*

Q42. **Why would you not go the treatment centre as soon as possible?**
Base: All who would not go to the centre as soon as possible (125)

	%
I would be worried about catching plague at the treatment centre	37
I would want more information first	15
I would prefer to obtain medical advice elsewhere	11
Too crowded/Busy	9
Depends on distance/Which was closer	6
Wouldn't be worried about it	4
I would not want to leave my house or risk any type of travel	4
Wouldn't want to infect anybody else	3
Prefer to see my GP/Trust my GP	2
Mobility problems/I have problems getting around	2
Would need to be at work	1
I am responsible for children or other dependents, and would not want to bring them along to the centre in case they caught the disease	1
I would not want to take antibiotics	1
I would be worried about not being allowed to leave the treatment centre	1
I would not believe the specialist medical staff at the centre would be expert enough	0
Other	9
Don't know	7

Q43. **And again assuming you had been to the affected train station, and now assuming you had soon after developed flu-like symptoms, which if any of the following would you do first?**

	%
Go to the treatment centre as soon as possible	66
Visit your GP	15
Speak to NHS Direct (CLARIFY IF NECESSARY: the NHS' telephone advice service)	9
Go to your local hospital	7
Go to the treatment centre at some point when it was convenient, but not immediately	1
Other	*
Look for more information elsewhere (ALWAYS LAST)	*
Do nothing	*
None of these	*
Don't know	1

Q44. **And if you had not been to the affected train station, how likely would you be to go to the treatment centre anyway?**

	%
Very likely	9
Fairly likely	9
Not very likely	46
Not at all likely	36
Don't know	*

Q45. **Why would you go to the treatment centre?**

Base: All who would go to the treatment centre (88)

	%
To get a medical check-up	55
To obtain information	25
To obtain antibiotics	12
As a precaution/To be on the safe side/Reassurance	9
To take a household member, child or dependent if they had been exposed	3
Other	6
Don't know	1

Q46. **And finally, if you had <u>not</u> been to the affected train station, but <u>had</u> developed flu-like symptoms, which of the following would you do first?**

	%
Visit your GP	40
Go to the treatment centre as soon as possible	29
Speak to NHS Direct (CLARIFY IF NECESSARY: the NHS' telephone advice service)	20
Go to your local hospital	5
Look for more information elsewhere	3
Go to the treatment centre at some point when it was convenient, but not immediately	2
Do nothing	1
Other	*

VERSION B (n = 513)

If somebody had been at the train station, health officials would ask them to stay at home for up to 7 days. They would be asked to monitor themselves for any signs of illness, to take their temperature regularly and to call a special phone number if they developed a high temperature or any flu-like symptoms. People asked to stay at home would not be allowed to come into direct contact with anybody from outside their home.

Q41. **From a practical standpoint, how easy or difficult for you would it be for you to keep yourself at home for seven days and not leave the house? You would be allowed to interact with family and household members living with you, but you would not be allowed to leave your home.**

	%
Very easy	43
Fairly easy	31
Fairly difficult	13
Very difficult	12
Don't know	1

Q42. **If you had been at the affected train station, how likely or unlikely is it that you would actually keep yourself at home for seven days?**

	%
Very likely	70
Fairly likely	22
Not very likely	5
Not at all likely	3
Don't know	1

Q43. **Please imagine that you have been asked to stay at home because you had been exposed to the disease. I am going to read out some things that might persuade you to stay in your home for seven days.**

Please tell me which two or three, if any, of these would be the <u>most</u> likely to persuade you to stay indoors. Please assume that you are provided with food and water at your home for the duration of the seven days.

	%
Being telephoned daily by a medical expert who checked on your health	56
Being fully compensated for any financial losses as a result of staying at home	39
A trusted friend or relative, or a social worker if you prefer, looking after your children or other dependents, so that they did not have to stay at home with you	30
Being provided with a mobile phone with internet access with which to make free telephone calls and go online while at home	27
If you could be prosecuted for not staying at home	24
Your employer or college helping you to work from home, if applicable	20
Being provided with free computer games, books or other activities to help pass the time while you were at home	17
None of these	6
Don't know	1

DEMOGRAPHICS
Based on All respondents (1,005)

QD1. **Is the home you are living in …?**
READ OUT

		%
A	Being bought on a mortgage	41
B	Owned outright	34
C	Rented (private)	9
D	Rented (Local Authority/Council)	8
E	Rented (Housing association/Trust)	5
	Other	1
	Refused	2

QD2. **And is your dwelling…?**
PROMPT AS NECESSARY

	%
Detached villa	24
Semi-detached villa	30
Bungalow	6
Semi-detached bungalow	3
Terraced house	21
Four-in-a-block	2
Tenement flat	3
Multi-storey flat	2
Maisonette	1
Modern apartment/loft apartment/studio / other flat	2
Other	4
Don't know	1

QD3. **Which of the following ethnic backgrounds describes you the best?**

	%
White	
British	88
Irish	2
Other	3
Mixed	
White and black Caribbean	1
White and Asian	*
Other	1
Black or black British -	
Caribbean	1
African	1
Other	0
Asian or Asian British	
Indian	1
Pakistani	1
Bangladeshi	0
Other	1
Chinese or ethnic group – Chinese	*
Other ethnic background	*
Refused	1

QD4. **Now I would like to ask you a question about faith and religion. What is your religion, if any?** IF ANSWER 'CHRISTIAN' PLEASE ASK QD4B. SINGLE CODE ONLY QD4B) ASK IF CHRISTIAN **What denomination are you?** SINGLE CODE ONLY

	%
Christian	60
Muslim	1
Hindu	1
Sikh	*
Orthodox Greek/Russian	0
Buddhist	*
Jewish	*
Other	4
None	31
Don't know	*
Refused	2

QD4B **What denomination are you?** SINGLE CODE ONLY

Base: All who say they are Christian (606)

	%
Church of England	66
Roman Catholic	16
Church of Scotland	5
Free Church/Non-Conformist (Methodist, Baptist etc)	9
Other Protestant	4

QD5. **Into which of the following categories would you place your annual total household income from all sources before tax and any other deductions?** READ OUT. SINGLE CODE ONLY

	%
Under £10,000	13
Over £10,000 but less than £20,000	18
Over £20,000 but less than £30,000	19
Over £30,000 but less than £40,000	13
Over £40,000	24
Refused	8
Don't know	6

IF REFUSE – PLEASE ADD BANDS
QD6. **Gender**

	%
Male	48
Female	52

QD7. **What was your age at your last birthday, if I may ask?** INTERVIEWER: CODE EXACT AGE.

	%
16-24	14
25-34	16
35-44	19
45-54	16
55-64	14
65+	20

QD8. **And are you, yourself…?** PROMPT AS NECESSARY. SINGLE CODE

	%
Working full time (30hrs/wk+)	45
Working part time (8–29 hrs/wk)	14
Not working (ie under 8 hrs) – housewife	4
Not working (ie under 8 hrs) – unemployed (registered)	1
Not working (ie under 8 hrs) – unemployed (not registered but looking for work)	1
Not working (ie under 8 hrs) – retired	24
Not working (ie under 8 hrs) – student	6
Not working (ie under 8 hrs) – other (inc. disabled)	4
Don't know	*
Refused	*

QD9. **How many years of full-time education have you had?**

	%
1-9	6
10-12	35
13-15	27
16-18	23
19+	7
Don't know	1
Refused	1

QD10. **Including yourself, how many people do you live with?**

	%
1	29
2	49
3	14
4	8
5	2
6+	1
Refused	0

QD11. **How many cars or light vans are there in your household?** SINGLE CODE ONLY

	%
1 car or light van	41
2 cars or light vans	33
3+ cars or light vans	9
None	16
Refused	1

QD12. **Do you have access to the internet at home?**

	%
Yes	76
No	23
Refused	1

Perceptions and Reactions with Regard to Pneumonic Plague

Technical Appendix 2

Table 1. Odds ratios (95% confidence interval) between demographic variables and precautionary behavioral responses to a hypothetical pneumonic plague outbreak affecting three people (stage 2); significant results ($p<0.05$) are in **boldface**

		Stocking up on food	Leaving the area	Avoiding others	Seeking medical advice	Trying to obtain antibiotics
	Number (%) reporting being "very" or "fairly" likely to perform that behaviour	673 (67.2)	132 (13.3)	746 (74.2)	667 (66.4)	591 (59.4)
Predictor variable	**Variable levels (n)**					
Home ownership	Non-owner (228)	1.0 (0.7 to 1.4)	**1.9 (1.2 to 2.8)**	0.7 (0.5 to 1.0)	**1.4 (1.0 to 2.0)**	**1.4 (1.0 to 1.9)**
	Owner (752)	Reference	Reference	Reference	Reference	Reference
Ethnicity	Non-white (69)	1.3 (0.7 to 2.2)	1.8 (1.0 to 3.3)	1.1 (0.6 to 1.9)	**2.1 (1.1 to 3.8)**	**2.2 (1.3 to 3.9)**
	White (936)	Reference	Reference	Reference	Reference	Reference
Sex	Female (562)	**1.5 (1.2 to 2.0)**	1.0 (0.7 to 1.5)	1.0 (0.8 to 1.4)	1.1 (0.9 to 1.5)	1.1 (0.9 to 1.5)
	Male (443)	Reference	Reference	Reference	Reference	Reference
Age	16 to 34 (265)	**0.7 (0.5 to 1.0)**	**2.1 (1.3 to 3.3)**	**0.6 (0.4 to 0.9)**	0.8 (0.6 to 1.2)	0.8 (0.5 to 1.0)
	35 to 54 (376)	**0.7 (0.5 to 0.9)**	1.3 (0.8 to 2.0)	0.8 (0.6 to 1.1)	0.9 (0.6 to 1.2)	0.8 (0.6 to 1.0)
	55 or over (364)	Reference	Reference	Reference	Reference	Reference
Working status	Not in work (397)	**1.6 (1.2 to 2.2)**	1.4 (0.9 to 2.0)	**1.7 (1.2 to 2.2)**	**1.5 (1.1 to 2.0)**	**1.4 (1.1 to 1.8)**
	Working (602)	Reference	Reference	Reference	Reference	Reference
Number of	1 to 12 years (416)	**1.6 (1.1 to 2.1)**	**1.7 (1.1 to 2.7)**	0.9 (0.7 to 1.3)	**2.2 (1.6 to 3.0)**	**2.2 (1.6 to 3.0)**

years in education						
	13 to 15 years (259)	**2.0 (1.4 to 2.8)**	1.4 (0.8 to 2.4)	1.0 (0.7 to 1.5)	**1.7 (1.2 to 2.4)**	**1.7 (1.2 to 2.4)**
	16 or more (307)	Reference	Reference	Reference	Reference	Reference
Social grade	C2DE (427)	**1.6 (1.2 to 2.1)**	**1.7 (1.2 to 2.5)**	1.1 (0.8 to 1.5)	**1.8 (1.4 to 2.4)**	**1.9 (1.5 to 2.5)**
	ABC1 (578)	Reference	Reference	Reference	Reference	Reference
Number of people living at home	1 (243)	1.2 (0.9 to 1.7)	0.9 (0.6 to 1.4)	0.9 (0.6 to 1.2)	0.8 (0.6 to 1.1)	0.9 (0.6 to 1.2)
	2 (332)	1.1 (0.8 to 1.5)	0.5 (0.3 to 0.8)	1.1 (0.8 to 1.5)	0.9 (0.7 to 1.2)	0.9 (0.7 to 1.2)
	3 or more (424)	Reference	Reference	Reference	Reference	Reference
Parental status	Children at home (336)	1.0 (0.8 to 1.3)	1.2 (0.8 to 1.8)	1.1 (0.8 to 1.4)	1.3 (1.0 to 1.7)	1.1 (0.8 to 1.4)
	No children at home (668)	Reference	Reference	Reference	Reference	Reference
Long standing illness or disability	Illness present (246)	1.1 (0.8 to 1.6)	1.1 (0.8 to 1.7)	1.0 (0.8 to 1.5)	1.4 (1.0 to 1.9)	1.1 (0.8 to 1.5)
	No illness (757)	Reference	Reference	Reference	Reference	Reference

Table 2. Odds ratios (95% confidence intervals) between demographic variables and precautionary behavioral responses to a hypothetical pneumonic plague outbreak affecting 100 people (stage 3); significant results (p<0.05) are in **boldface**

		Stocking up on food	Leaving the area	Avoiding others	Seeking medical advice	Trying to obtain antibiotics
	Number (%) reporting being "very" or "fairly" likely to perform that behaviour	798 (79.8%)	223 (22.4%)	850 (84.6%)	792 (79.4%)	724 (72.5%)
Predictor variable	**Variable levels (n)**					
Home ownership	Non-owner (228)	0.9 (0.6 to 1.3)	**1.8 (1.3 to 2.6)**	0.9 (0.6 to 1.3)	**1.6 (1.1 to 2.4)**	1.4 (1.0 to 2.0)
	Owner (752)	Reference	Reference	Reference	Reference	Reference
Ethnicity	Other (69)	1.1 (0.6 to 2.0)	**1.8 (1.1 to 3.1)**	1.1 (0.5 to 2.2)	1.2 (0.7 to 2.4)	1.9 (1.0 to 3.5)
	White (936)	Reference	Reference	Reference	Reference	Reference
Sex	Female (562)	**2.1 (1.5 to 2.9)**	**1.5 (1.1 to 2.0)**	1.3 (0.9 to 1.8)	**1.7 (1.2 to 2.3)**	**1.5 (1.1 to 2.0)**
	Male (443)	Reference	Reference	Reference	Reference	Reference
Age	16 to 34 (265)	1.0 (0.7 to 1.5)	**2.9 (1.9 to 4.2)**	1.2 (0.8 to 1.8)	**1.6 (1.1 to 2.4)**	1.0 (0.7 to 1.5)
	35 to 54 (376)	1.0 (0.7 to 1.5)	**2.0 (1.3 to 2.9)**	1.2 (0.8 to 1.7)	1.2 (0.8 to 1.7)	0.9 (0.7 to 1.3)
	55 or over (364)	Reference	Reference	Reference	Reference	Reference
Working status	Not in work (397)	**1.7 (1.2 to 2.3)**	1.1 (0.8 to 1.4)	1.1 (0.8 to 1.6)	1.2 (0.9 to 1.7)	**1.4 (1.1 to 1.9)**
	Working (602)	Reference	Reference	Reference	Reference	Reference
Number of years in education	1 to 12 years (416)	1.4 (1.0 to 2.0)	1.0 (0.7 to 1.5)	0.7 (0.5 to 1.1)	**2.0 (1.4 to 2.9)**	**2.1 (1.5 to 3.0)**
	13 to 15 years (259)	1.5 (1.0 to 2.3)	1.0 (0.7 to 1.5)	1.0 (0.6 to 1.6)	**1.8 (1.2 to 2.7)**	**1.7 (1.2 to 2.5)**
	16 or more (307)	Reference	Reference	Reference	Reference	Reference
Social grade	C2DE (427)	1.4 (1.0 to 1.9)	1.2 (0.9 to 1.6)	1.2 (0.8 to 1.7)	**1.5 (1.1 to 2.1)**	**1.6 (1.2 to 2.2)**
	ABC1 (578)	Reference	Reference	Reference	Reference	Reference
Number of people living at home	1 (243)	1.1 (0.8 to 1.7)	**0.6 (0.5 to 0.9)**	0.7 (0.5 to 1.1)	0.7 (0.5 to 1.1)	0.8 (0.6 to 1.2)
	2 (332)	1.2 (0.8 to 1.7)	**0.4 (0.3 to 0.6)**	0.8 (0.5 to 1.2)	0.8 (0.6 to 1.2)	0.9 (0.6 to 1.2)

	3 or more (424)	Reference	Reference	Reference	Reference	Reference
Parental status	Children at home (336)	1.1 (0.8 to 1.6)	**1.6 (1.2 to 2.2)**	1.4 (0.9 to 2.0)	**1.7 (1.2 to 2.5)**	1.2 (0.9 to 1.6)
	No children at home (668)	Reference	Reference	Reference	Reference	Reference
Long standing illness or disability	Illness present (246)	1.3 (0.9 to 1.9)	1.0 (0.7 to 1.4)	1.0 (0.7 to 1.6)	1.3 (0.9 to 1.9)	1.3 (0.9 to 1.8)
	No illness (757)	Reference	Reference	Reference	Reference	Reference

Table 3. Odds ratios (95% confidence interval) between demographic variables and likely compliance with official recommendations during a hypothetical pneumonic plague outbreak; significant results (p<0.05) are in **boldface**

	Recommended action:	Attending mass treatment centre if potentially at risk	Not attending mass treatment centre if not potentially at risk	Remaining indoors at home for 7 days if requested
	Number (%) reporting being <u>unlikely</u> to comply with the recommended behaviour	107 (21.3%)	88 (17.6%)	40 (8%)
Predictor variable	**Variable levels**			
Home ownership	Non-owner	0.7 (0.4 to 1.2)	**2.1 (1.2 to 3.5)**	1.6 (0.8 to 3.2)
	Owner	Reference	Reference	Reference
Ethnicity	Non-white	**2.3 (1.0 to 4.9)**	1.5 (0.6 to 3.5)	1.8 (0.7 to 5.0)
	White	Reference	Reference	Reference
Sex	Female	0.7 (0.5 to 1.1)	1.5 (1.0 to 2.5)	**0.4 (0.2 to 0.8)**
	Male	Reference	Reference	Reference
Age	16 to 34	**0.4 (0.2 to 0.7)**	1.5 (0.8 to 2.7)	1.0 (0.4 to 2.2)
	35 to 54	**0.6 (0.3 to 0.9)**	0.9 (0.5 to 1.6)	1.2 (0.6 to 2.5)
	55 or over	Reference	Reference	Reference
Working status	Not in work	**2.3 (1.5 to 3.5)**	1.1 (0.7 to 1.8)	0.9 (0.4 to 1.7)
	Working	Reference	Reference	Reference
Number of years in education	1 to 12 years	1.1 (0.6 to 1.7)	**2.0 (1.1 to 3.7)**	1.0 (0.4 to 2.2)
	13 to 15 years	0.7 (0.4 to 1.3)	1.7 (0.9 to 3.3)	1.3 (0.6 to 3.1)
	16 or more	Reference	Reference	Reference
Social grade	C2DE	**1.5 (1.0 to 2.4)**	**2.0 (1.3 to 3.3)**	1.2 (0.6 to 2.2)
	ABC1	Reference	Reference	Reference
Number of people living at home	1	**2.3 (1.4 to 4.0)**	1.2 (0.7 to 2.2)	0.6 (0.3 to 1.5)
	2	1.4 (0.8 to 2.4)	1.2 (0.7 to 2.1)	0.8 (0.4 to 1.4)
	3 or more	Reference	Reference	Reference
Parental status	Children at home	**0.6 (0.3 to 0.9)**	1.0 (0.6 to 1.6)	1.1 (0.5 to 2.1)
	No children at home	Reference	Reference	Reference

Long standing illness or disability	Illness present	1.2 (0.7 to 1.9)	0.8 (0.5 to 1.4)	1.4 (0.7 to 2.9)
	No illness	Reference	Reference	Reference

Table 4. Adjusted odds ratios (95% confidence interval) between perceptions relating to pneumonic plague and compliance with official recommendations during a hypothetical pneumonic plague outbreak. All odds ratios adjust for home ownership, ethnicity, sex, age, working status, number of years in education ,social grade, number of people living at home, and parental status; significant results ($p<0.05$) are in **boldface**

	Recommended action:	Attending mass treatment centre if potentially at risk	Not attending mass treatment centre if not potentially at risk	Remaining indoors at home for 7 days if requested
	Number (%) reporting being <u>unlikely</u> to comply with the recommended behaviour	107 (21.3%)	88 (17.6%)	40 (8%)
Predictor variable	**Variable levels**			
If someone catches pneumonic plague they would feel unwell within 24hrs	Very or fairly likely	2.0 (0.9 to 4.2)	1.4 (0.7 to 2.7)	1.0 (0.4 to 2.8)
	Not very or not at all likely	Reference	Reference	Reference
There have been cases of pneumonic plague in Britain in the past 10 years	Very or fairly likely	1.0 (0.5 to 1.8)	**2.3 (1.3 to 4.0)**	0.8 (0.3 to 1.9)
	Not very or not at all likely	Reference	Reference	Reference
If you come within 6 feet of someone who had pneumonic plague and was clearly ill, you would probably catch the disease	Very or fairly likely	1.0 (0.6 to 1.8)	1.0 (0.5 to 1.8)	1.3 (0.6 to 2.9)
	Not very / not at all likely	Reference	Reference	Reference
If you come within 6 feet of someone who had pneumonic plague but who had not yet developed any signs of illness, you would probably catch the disease	Very or fairly likely	0.8 (0.5 to 1.4)	**2.8 (1.5 to 5.3)**	0.7 (0.3 to 1.4)
	Not very or not at all likely	Reference	Reference	Reference
Unless they receive immediate treatment, then most people who catch pneumonic plague will die from it	Very or fairly likely	0.7 (0.4 to 1.4)	1.7 (0.8 to 3.9)	1.1 (0.4 to 2.7)

	Not very or not at all likely	Reference	Reference	Reference
If antibiotics are administered immediately after a person has been infected, they would probably survive	Very or fairly likely	1.0 (0.4 to 2.5)	**0.3 (0.2 to 0.6)**	0.6 (0.2 to 2.1)
	Not very or not at all likely	Reference	Reference	Reference
If someone with plague has been in a room, how long would it take after they leave before it is safe to enter the room	Less than 1 day	0.8 (0.4 to 1.6)	0.7 (0.4 to 1.4)	1.1 (0.4 to 2.8)
	1 to 2 days	1.0 (0.5 to 1.9)	0.8 (0.4 to 1.5)	1.3 (0.5 to 3.5)
	3 days or more	Reference	Reference	Reference