

1 **Title page**

2 Estimating Risks of Inapparent Avian Exposure for Human Infection: Avian Influenza
3 Virus A (H7N9) in Zhejiang Province, China

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13 **Supplementary Tables**

14 Table S1 Ordinal category of the shortest distances to inland waters and average poultry
 15 densities across multiple spatial scales
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17	Category	Range		
	<u>Shortest distance</u>	<u>River(km)</u>	<u>Lake(km)</u>	
Inland Water	shortest	0 - 23.16	0 - 93.82	
	short	23.17 - 58.49	90.83 - 207.56	
	middle	58.50-223.97	207.57-336.95	
	long	112.97-207.17	336.96-516.87	
	very long	207.17-401.81	516.88-909.64	
	<u>Poultry density</u>	<u>Chicken (/km²)</u>	<u>Duck (/km²)</u>	<u>Goose (/km²)</u>
Neighbourhood ≤1km	very low	0-1.35	0-1.17	0-0.25
	low	1.36-2.68	1.18-2.38	0.25-1.14
	average	2.69-2.99	2.39-2.60	1.15-1.41
	high	3-3.19	2.61-2.77	1.42 - 1.59
	very high	3.20-3.44	2.78-3.05	1.60-1.92
Community 1-3km	very low	0-1.79	0-1.09	0-0.57
	low	1.80-2.70	1.10-2.28	0.58-1.14
	average	1.15-1.38	2.29-2.55	2.71-2.97
	high	1.39-1.55	2.56-2.74	2.98-3.17
	very high	1.54-1.82	2.75-3.01	3.18-3.44
District 3-5km	very low	0-1.52	0-1.23	0-0.64
	low	0.65-1.15	-	1.53-2.66
	average	1.16-1.38	1.24-2.56	2.67-2.94
	high	1.39-1.55	-	2.94-3.15
	very high	1.55-180	2.57-2.98	3.16-3.43
City 5-8km	very low	0-1.38	0-1.17	0-0.24
	low	0.25-1.13	1.18-2.38	1.39-2.7
	average	1.13-1.36	2.39-2.60	2.71-2.96
	high	1.37-1.54	2.61-2.77	2.97-3.16
	very high	1.55-1.79	2.78-3.05	3.17-3.42

18 Table S2 Interaction between shortest distances to inland waters and poultry densities in introducing H7N9 infection at
19 community, district, and city levels
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Scale	Interaction detector $C = A \cap B$		Linear combination $A+B$	Graphical representation	Interpretation
Community (1-3 km)	river $\cap$ chicken=0.076	>	0.046=river(0.014)+chicken(0.032)	$C > A+B$	$\uparrow\uparrow$
	river $\cap$ goose=0.077	>	0.064=river(0.014)+goose(0.05)	$C > A+B$	$\uparrow\uparrow$
	river $\cap$ duck=0.052	>	0.029=river(0.014)+duck(0.015)	$C > A+B$	$\uparrow\uparrow$
	lake $\cap$ chicken=0.086	>	0.082=lake(0.050)+chicken(0.032)	$C > A+B$	$\uparrow\uparrow$
	lake $\cap$ goose=0.086	<	0.1=lake(0.050)+goose(0.050)	$C > A, B; C < A+B$	$\uparrow$
	lake $\cap$ duck=0.072	>	0.065=lake(0.050)+duck(0.015)	$C > A+B$	$\uparrow\uparrow$
District (3-5 km)	river $\cap$ chicken=0.076	>	0.046=river(0.014)+chicken(0.032)	$C > A+B$	$\uparrow\uparrow$
	river $\cap$ goose=0.077	>	0.073=river(0.014)+goose(0.059)	$C > A+B$	$\uparrow\uparrow$
	river $\cap$ duck=0.041	>	0.031=river(0.014)+duck(0.017)	$C > A+B$	$\uparrow\uparrow$
	lake $\cap$ chicken=0.086	>	0.082=lake(0.050)+chicken(0.032)	$C > A+B$	$\uparrow\uparrow$
	lake $\cap$ goose=0.076	<	0.109=lake(0.050)+goose(0.059)	$C > A, B; C < A+B$	$\uparrow$
	lake $\cap$ duck=0.073	>	0.067=lake(0.050)+duck(0.017)	$C > A+B$	$\uparrow\uparrow$
City (5-8 km)	river $\cap$ chicken=0.084	>	0.072=river(0.014)+chicken(0.058)	$C > A+B$	$\uparrow\uparrow$
	river $\cap$ goose=0.057	>	0.05=river(0.014)+goose(0.036)	$C > A+B$	$\uparrow\uparrow$
	river $\cap$ duck=0.058	>	0.044=river(0.014)+duck(0.030)	$C > A+B$	$\uparrow\uparrow$
	lake $\cap$ chicken=0.101	<	0.108=lake(0.050)+chicken(0.058)	$C > A, B; C < A+B$	$\uparrow$
	lake $\cap$ goose=0.073	<	0.086=lake(0.050)+goose(0.036)	$C > A, B; C < A+B$	$\uparrow$
	lake $\cap$ duck=0.093	>	0.080=lake(0.050)+duck(0.030)	$C > A+B$	$\uparrow\uparrow$

Note: A and B indicate inland waters and poultry densities respectively; $A \uparrow\uparrow B$ denotes nonlinear enhancement of A and B when $C > A+B$; $A \uparrow B$ denotes A and B enhance each other when $C > A, B$.

21 Table S3 Estimated risks (matched Odds Ratio; 95% Confidence Intervals) of H7N9 infection associated with poultry species and
 22 densities at community, district, and city levels
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Variable	All population		Gender		Age (years old)		Occupation		
	142 cases		Male	Female	15-59	≥60	Farmer	Worker	Others
	599 controls		93 cases	49 cases	73 cases	66 cases	59 cases	15 cases	68 cases
			369 controls	190 controls	281 controls	261 controls	235 controls	96 controls	228 controls
Community (1-3 km)	Chicken Cluster*	2.9(1.4,6.2) 1.2(1.1,1.3)	4.2(1.6,12.8) 1.2(1.1,1.3)	1.6(0.6,5.3) 1.1(1.0,1.3)	1.7(1.0,4.3) 1.2(1.0,1.4)	10.4(2.6,47.2) 1.2(1.1,1.3)	2.48(1.0,7.4) 1.8(1.2,2.8)	1.5(0.1,28.1) 1.2(1.0,1.5)	4.3(1.2,19.9) 1.2(1.1, 1.3)
	Duck Cluster*	1.2(0.6,2.3) 1.2(1.1,1.3)	1.4(0.6,4.2) 1.2(1.1,1.4)	0.8(0.3,2.0) 1.1(1.0,1.3)	0.8(0.4,1.7) 1.2(1.1,1.4)	1.2(0.6,3.4) 1.3(1.1,1.4)	1.2(0.5,3.1) 1.9(1.3,2.9)	0.7(0.1,14.9) 1.2(1.0,1.5)	1.2(0.5,3.7) 1.2(1.1,1.3)
	Goose Cluster*	5.0(1.8,3.5) 1.2(1.1,1.3)	7.4(2.0,31.5) 1.2(1.1,1.3)	1.7(0.4,8.5) 1.1(1.0,1.3)	2.0(0.7,7.2) 1.2(1.1,1.3)	19.9(3.6,138.3) 1.2(1.1,1.3)	8.3(2.1,38.6) 1.6(1.1,2.5)	0.5(0.0,28.1) 1.2(1.0,1.5)	2.8(0.6,17.4) 1.06(1.02,1.1)
	Chicken Cluster*	3.5(1.6,7.7) 1.1(1.0,1.1)	4.9(1.8,15.0) 1.1(1.05,1.5)	1.8(0.6,6.4) 1.03(1.0,1.1)	1.7(0.7,4.7) 1.06(1.0,1.4)	13.1(3.3,59.7) 1.09(1.04,1.15)	2.9(1.0,9.4) 1.4(1.1,9.4)	1.8(0.2,36.8) 1.08(1.0,1.5)	4.8(1.3,21.7) 1.08(1.03,1.1)
	Duck Cluster*	1.1(0.5,2.2) 1.1(1.0,1.1)	1.4(0.5,4.7) 1.1(1.05,1.16)	0.7(0.3,1.8) 1.03(1.0,1.1)	0.7(0.3,1.5) 1.06(1.0,1.13)	5.2(1.1,29.3) 1.1(1.06,1.2)	1.0(0.4,2.9) 1.5(1.1,1.9)	0.8(0.1,25.2) 1.08(1.0,1.2)	0.9(0.3,3.4) 1.07(1.02,1.12)
	Goose Cluster*	5.9(2.0,17.7) 1.1(1.0,1.1)	8.6(2.2,38.4) 1.08(1.04,1.14)	2.0(0.5,10.7) 1.03(1.0,1.1)	2.1(0.6,8.2) 1.06(1.0,1.1)	25.9(4.4,188.4) 1.07(1.02,1.1)	9.1(2.1,44.6) 1.3(1.0,1.7)	0.8(0.2,48.6) 1.1(1.0,1.2)	3.4(0.6,23.8) 1.2(1.1,1.3)
City (5-8 km)	Chicken Cluster*	3.3(1.5,7.3) 1.06(1.02,1.09)	4.4(1.6,13.1) 1.07(1.04,1.1)	1.8(0.6,6.9) 1.02(1.0,1.1)	1.9(1.0,5.2) 1.06(1.02,1.1)	9.4(2.5,39.9) 1.06(1.02,1.1)	2.4(1.0,7.9) 1.3(1.1,1.5)	3.3(0.3,77.1) 1.1(1.0,1.2)	3.5(1.0,14.9) 1.05(1.01,1.08)
	Duck Cluster*	1.1(0.5,2.4) 1.06(1.03,1.09)	1.7(0.6,6.1) 1.08(1.05,1.12)	0.7(0.3,1.8) 1.01(1.0,1.1)	0.8(0.4,1.7) 1.06(1.01,1.1)	4.9(1.0,29.5) 1.08(1.04,1.1)	1.0(0.4,2.7) 1.3(1.1,1.5)	3.2(0.1,57.7) 1.1(1.0,1.2)	0.8(0.3,2.8) 1.04(1.01,1.08)
	Goose Cluster*	5.8(1.9,17.9) 1.05(1.02,1.08)	7.5(1.9,33.8) 1.06(1.03,1.1)	2.4(0.5,13.7) 1.01(1.0,1.07)	2.2(0.6,8.9) 1.05(1.0,1.1)	22.6(3.9,161.8) 1.05(1.0,1.1)	7.1(1.7,35.2) 1.6(1.1,2.5)	1.7(0.1,135.5) 1.1(1.0,1.2)	2.9(0.5,20.4) 1.04(1.0,1.1)

* The local K-function estimates for the spatial clusters of H7N9 cases.