

## Background

Children usually have the highest rates of infection during influenza epidemics. Seasonal influenza vaccination is recommended for prevention of infection. We report the result of the impact of influenza vaccination on the rates of influenza infection in children in Southern China.

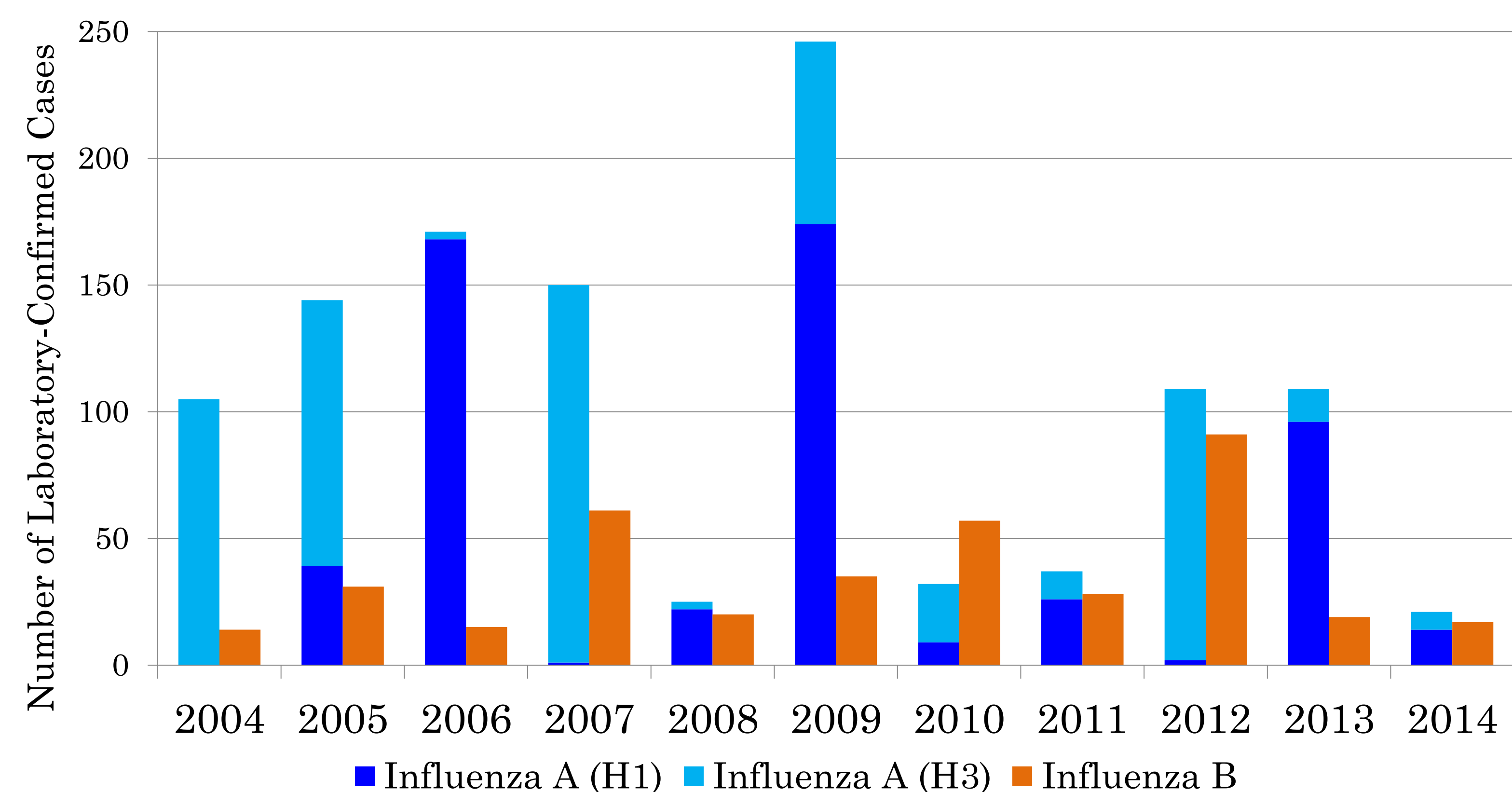
## Methods

Children presenting to the First Affiliated Hospital with febrile respiratory symptoms were enrolled upon consent of their guardians. Demographics, symptoms, and specific variables of interest were recorded and nasopharyngeal swab was taken. We use descriptive statistics and  $\chi^2$  goodness of fit to report preliminary descriptive results.

## Results

From April 2004 to March 2014, 13,677 children with acute respiratory symptoms were enrolled on the study; 13,206 were included for review, of which 1,538 (11.65%) had a laboratory confirmed diagnosis of influenza. Among them, 1,150 positive cases (74.77%) were Influenza A, with fairly equal distribution of H1 (47.9%) and H3 (52.1%) subtypes. The remaining 388 cases (25.23%) positively isolated Influenza B. Influenza A was consistently isolated greater than Influenza B, except in 2010. Infection with Influenza A peaked in 2009, with 247 cases isolated, a rate of 12.31% (Figure 1). Of the influenza-positive cases, 634 (41%) were female and 904 (59%) were male (Table 1).

**Figure 1: Distribution of Influenza Cases from April 2004 to March 2014 (n=1,538)**



**Table 1. Distribution of All Enrolled Participants by Gender, Age Group, and Vaccination (N=13,206)**

	Influenza			P-value
	Total n	Yes n (%)	No n (%)	
<b>Sex</b>				<i>P</i> = 0.8634
Female	5,470	634 (11.59)	4,836 (88.41)	
Male	7,734	904 (11.69)	6,830 (88.31)	
Missing	2	0 (0)	2 (100.00)	
<b>Age Group</b>				<i>P</i> < 0.0001
≤ 1 year	2,322	103 (4.44)	2,219 (95.56)	
2 to 5 years	6,799	545 (8.02)	6,254 (91.98)	
≥ 6 years	4,085	890 (21.79)	3,195 (78.21)	
<b>Vaccinated</b>				<i>P</i> = 0.0012
Yes	191	8 (4.19)	183 (95.81)	
No	13,105	1,530 (11.76)	11,485 (88.24)	
<b>Total</b>	13,206	1,538 (11.65)	11,668 (88.35)	

## Discussion

There was no significant difference between female and male children who tested positive for influenza. Of the positive isolations, 103 cases were children ≤1 year of age, 545 cases were children > 1 and ≤ 5 years of age, and 890 cases were among children > 5 and ≤ 18 years of age. The difference between groups was statistically significant (*P* < 0.0001). There was also a significant difference among children who received vaccination against the flu and those who did not (*P* = 0.0012); however, vaccination rates among enrolled participants was still very low, at only 1.45%.

Furthermore, when comparing type of influenza isolated, there was still no significant difference between groups female vs. male (*P* = 0.7256) (Table 2). However, differences in age were still significant (*P* < 0.0001) and Influenza A was much more common across all 3 groups than Influenza B, although Influenza B isolations rates rose as the age group increased (Figure 2). Furthermore, vaccination did not protect against specific influenza type (*P* = 0.1164).

## Conclusions

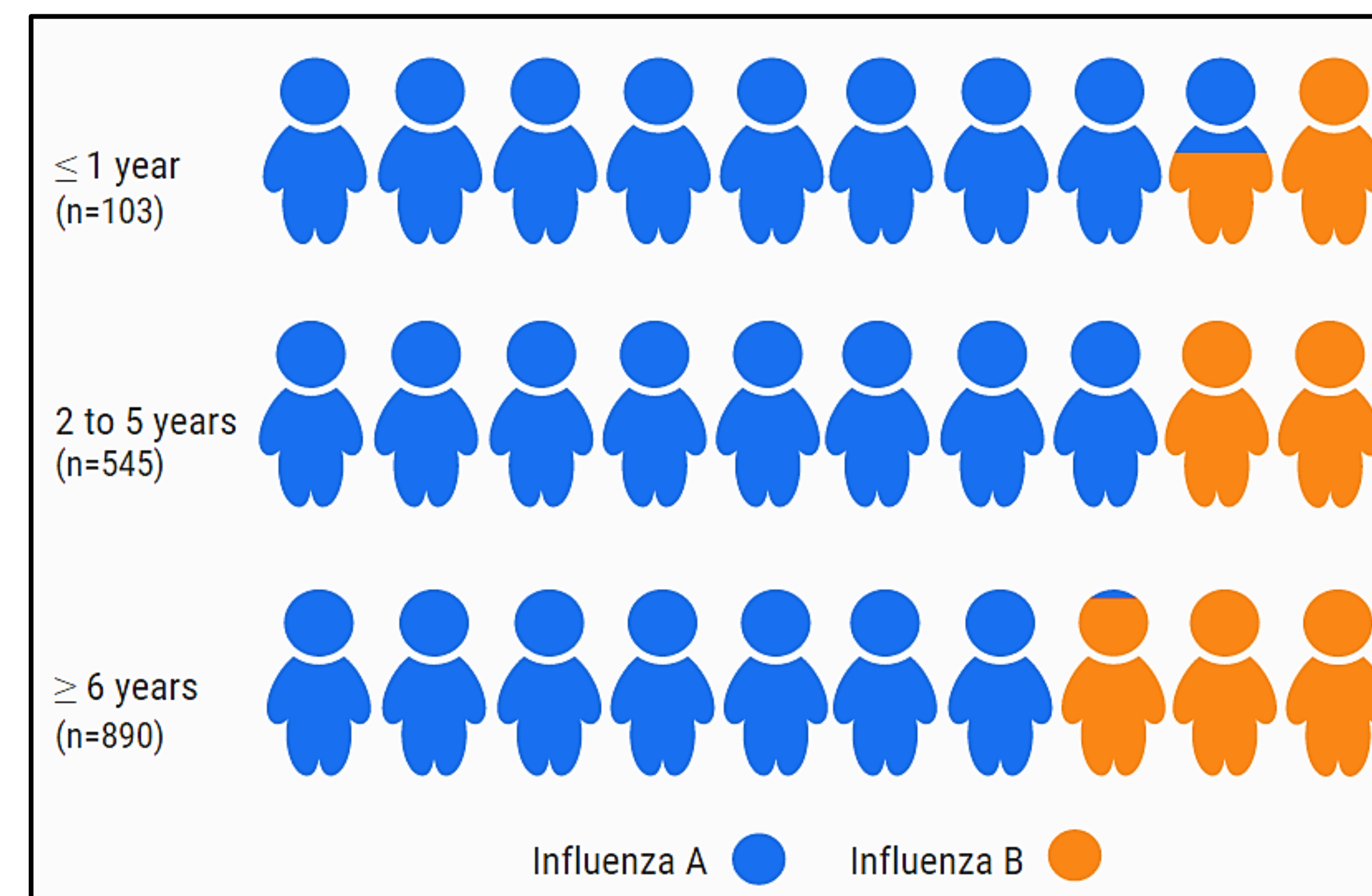
Vaccination was a significant protective factor for children presenting with influenza symptoms. Based on this study, greater influenza vaccination coverage for children in Southern China is recommended.

**Table 2. Distribution All Influenza Cases, by Gender, Age Group, and Vaccination (n=1,538)**

	Influenza		P-value
	A n (%)	B n (%)	
<b>Sex</b>			<i>P</i> = 0.7256
Female	477 (75.24)	157 (24.76)	
Male	673 (74.45)	231 (25.55)	
<b>Age Group</b>			<i>P</i> < 0.0001
≤ 1 year	88 (85.44)	15 (14.56)	
2 to 5 years	434 (79.63)	111 (20.37)	
≥ 6 years	628 (70.56)	262 (29.44)	
<b>Vaccinated</b>			<i>*P</i> = 0.1164
Yes	4 (50.00)	4 (50.00)	
No	1,146 (74.90)	384 (25.10)	
<b>Total</b>	1,150 (74.77)	388 (25.23)	

\*Note: Fisher's Exact Test was used to examine the association of Influenza types with having vaccination because some of the cells have expected counts less than five

**Figure 2: Percent Distribution of Influenza A and B, by Age Group (n=1,538)**



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