Table 2 Risk factors for hospitalization due to influenza-associated severe acute respiratory infection among 1323 positive cases and controls, 2014–2019 seasons, Morocco

Variable	Influenza-associated SARI (*n* = 552)		Influenza-associated ILI (*n* = 771)		Univariate analysis			Multivariate analysis		
	No.	%	No.	%	Crude OR	95% CI	*P*-value	Adjusted OR	95% CI	*P*-value
Sex										
Female	282	51.1	423	54.9	0.86	0.69–1.07	0.17			
Male	270	48.9	348	45.1						
Age (years)[a,b]										
< 2	122	24.4	49	6.5	4.81	3.33–66.96	< 0.001	7.08	4.72–10.63	< 0.001
2–14	70	14.0	230	30.6	0.59	0.43–0.80	< 0.001	0.92	0.65–1.29	0.62
15–64	222	44.4	429	57.1	1			1		
≥ 65	86	17.2	43	5.7	3.86	2.59–5.77	< 0.001	3.59	2.29–5.67	< 0.001
Season										
2014/2015	39	7.8	42	5.6	1					
2015/2016	66	13.2	99	13.2	0.72	0.42–1.23	0.22			
2016/2017	34	6.8	101	13.4	0.36	0.20–0.65	< 0.001			
2017/2018	96	19.2	146	19.4	0.71	0.43–1.17	0.18			
2018/2019	265	53.0	363	48.3	0.79	0.49–1.25	0.31			
Flu vaccination during current season										
Yes	8	1.4	12	1.6	0.93	0.38–2.29	0.87			
No	544	98.6	759	98.4						
Existence of cases in the surrounding area										
Yes	51	9.2	260	33.7	0.20	0.14–0.28	< 0.001	0.22	0.15–0.31	< 0.001
No	501	90.8	511	66.3						
Diabetes										
Yes	60	10.9	30	3.9	3.01	1.92–4.74	< 0.001	1.98	1.13–3.49	0.017
No	492	89.1	741	96.1						
Obesity										
Yes	24	4.3	8	1.0	4.34	1.93–9.72	< 0.001	2.94	1.08–7.99	0.034
No	528	95.7	763	99.0						
Asthma or chronic respiratory disease										
Yes	80	14.5	26	3.4	4.86	3.07–7.67	< 0.001	4.99	2.97–8.38	< 0.001
No	472	85.5	745	96.6						
Chronic heart disease										
Yes	41	7.4	19	2.5	3.18	1.82–5.53	< 0.001			
No	511	92.6	752	97.5						

Table 2 Risk factors for hospitalization due to influenza-associated severe acute respiratory infection among 1323 positive cases and controls, 2014–2019 seasons, Morocco *(concluded)*

~~Variable~~	~~Influenza-associated SARI~~ (*n* = 552)		Influenza-associated ILI (*n* = 771)		Univariate analysis			Multivariate analysis		
	No.	%	No.	%	Crude OR	95% CI	*P*-value	Adjusted OR	95% CI	*P*-value
Chronic renal failure										
Yes	18	3.3	5	0.6	5.16	1.91–13.99	< 0.001	4.74	1.59–14.04	0.005
No	534	96.7	766	99.4						
Chronic neurological disease										
Yes	10	1.8	1	0.1	14.21	1.81–111.31	0.001[c]	10.48	1.24–88.58	10.03
No	542	98.2	770	99.9						
Chronic haematologic disease										
Yes	12	2.2	0	0.0	Undefined	Undefined	< 0.001[c]			
No	540	97.8	771	100.0						
Pregnancy[d]										
Yes	41	14.5	11	2.6	6.37	3.21–12.63	< 0.001	7.49	3.58–15.69	< 0.001
No	241	85.5	412	97.4						
Influenza virus type and subtype[e]										
A (H1N1)	319	58.7	332	43.1	1.89	1.51–2.35	< 0.001	1.82	1.39–2.38	< 0.001
A(H3N2)/B	224	41.3	439	56.9						

[a] *Missing values excluded from data analysis.*
[b] $\chi^2 = 152.43$, $df = 3$.
[c] *Fisher's exact test.*
[d] *Only female cases.*
[e] *A not subtyped cases excluded.*

considerable importance from a clinical and public health perspective, considering its implications for influenza patient management, population vaccination, communication and preparedness for a seasonal epidemic. Indeed, the severity of an influenza season varies from year to year depending on factors such as vaccination efficacy, early administration of antiviral drugs and the circulating influenza strain.

~~This hypothesis has been examined in~~ several studies, however, these were not comparable in terms of study setting and design, populations studied, sample size, clinical presentation, influenza viruses compared, and consideration for potential confounders. The 2009 H1N1 pandemic suggested that influenza A/H1Npdm09 (A/H1) may have more severe clinical impacts than other seasonal influenzas and was more severe in the younger age group (*18*). This evidence has been the subject of critical discussion in the post-pandemic years as study findings on the severity of epidemics by type and subtype of influenza virus have varied widely. Some studies have suggested that influenza A(H1N1)pdm09 led to relatively more severe outcomes compared to other types and subtypes (*19,20*). Others have reported no statistically significant differences in case-fatality rates and other markers of severity by type and subtype (*21,22*) or have shown that the risk for serious outcomes was increased in hospitalized patients infected with influenza A(H3N2) (*23,24*).

In Morocco, this question was of great concern during the 2018/2019 season, where influenza A(H1N1)pdm09 predominated, as was the case in many parts of the world. Following the death of an A(H1N1)pdm09 infected pregnant woman, a fierce social media campaign ensued around the theme of the severity of the circulating A(H1N1)pdm09 subtype and resulted in general panic among the Moroccan population leading to an overload of both hospital and ambulatory health services. In this context, the country's health authorities were required to provide answers to incessant questions around the severity of the influenza season through the social, political and parliamentary organizations.

Our findings, based on the analysis of data provided by the Morocco sentinel ~~virological influenza surveillance system~~