ORIGINAL ARTICLE

Influenza-like illnesses in the Peruvian health system

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ABSTRACT

Objective: To determine the behavior and healthcare trends of influenza-like illnesses (ILIs) in the Peruvian health system from 2018 to 2022.
Materials and methods: An observational, descriptive, retrospective study which analyzed the behavior of healthcare visits for ILIs in Peru, using the open database of Superintendencia Nacional de Salud (SUSALUD – National Superintendency of Health). The variables included diagnoses compatible with ILIs according to the International Classification of Diseases, 10th Revision (ICD-10), age groups, sex, location and period of care. The statistical analysis was performed using Microsoft Excel 365 and Stata 18.
Results: Between 2018 and 2022, ILIs generated an average of 2,576,325 outpatient visits per year (range: 1,790,821–3,710,299), which accounted for 4.9 % of all outpatient visits in the Peruvian health system. Fifty percent of outpatient visits for ILIs occurred at the Ministry of Health (MINSA) services; in contrast, 51 % of emergency department visits for ILIs occurred at the Seguro Social de Salud (EsSalud – Social Security Health Insurance) services. Emergency services recorded 1,077,584 visits annually (range: 312,306–1,644,758), coded according to ICD-10, which accounted for 15 % of all causes treated in these services. Meanwhile, hospitalization services reported 56,587 hospitalizations per year (range: 46,338–67,233), representing 2.9 % of all hospitalizations in the Peruvian health system, where 60.6 % of ILI-related hospitalizations were in MINSA's services.
Conclusions: In the Peruvian health system, ILIs pose a recurrent healthcare problem each year, with the health services of MINSA and EsSalud being the most in demand.

Keywords: Influenza, Human; Respiratory Tract Infections; Health Systems; Global Burden of Disease (Source: MeSH NLM).

INTRODUCTION

ILIs pose a significant socioeconomic and morbidity-mortality burden worldwide. It is estimated that between three and five million cases will occur, with many patients experiencing a severe episode [1]. In addition, ILIs are of particular concern among vulnerable populations, as they can lead to epidemic outbreaks and are a common cause of hospitalization and death [2].

Estimates regarding outpatient visits, emergency department visits and hospitalizations for ILIs are very limited in low- and middle-income countries such as Peru. Accurate influenza and ILI disease burden estimates are crucial for informed public health decision-making, as they help national and local decision-makers in monitoring epidemiological trends, planning, allocating resources and promoting influenza vaccination [3].

Influenza and ILIs activities decreased due to public health and social measures implemented in response to COVID-19 [4]. However, a rebound in influenza virus activity is anticipated, given the relaxation of these public health and social measures and the low population immunity against influenza [5]. Therefore, monitoring influenza and ILIs activity remains critical in the post-COVID-19 era [6].

The Peruvian health system is characterized by fragmentation across financing, insurance and healthcare delivery. The State plays a guiding role through the Ministry of Health (MINSA) [7].

This study aims to describe the epidemiology of ILIs within the Peruvian health system from 2018 to 2022. The findings will provide valuable insights into the impact of ILIs on the Peruvian health system and offer clues for decision-making regarding their prevention and mitigation.

MATERIALS AND METHODS

Study design and population

An observational and retrospective study was conducted using secondary data, with the aim of characterizing the behavior of ILIs in Peru from January 1, 2018 to December 31, 2022. The database employed in the study was collected from monthly reports submitted by Instituciones

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Prestadoras de Servicios de Salud (IPRESS – Peruvian Health Service Provider Institutions) to Superintendencia Nacional de Salud (SUSALUD – National Superintendency of Health). The information was accessible via the SUSALUD website [8], which includes data reported by institutions affiliated with Sistema Nacional Coordinado y Descentralizado de Salud (SNCDS – National Coordinated and Decentralized Health System), such as the health services from MINSA, Dirección Regional de Salud (DIRESA - Regional Health Directorate), Seguro Social de Salud (EsSalud – Social Security Health Insurance), the Armed Forces and Police Forces medical services, private centers and others.

SUSALUD's open databases include information on diagnoses, coded according to the International Classification of Diseases, 10th Revision (ICD-10) [9]. These databases also provide data on the total number of patients seen per month, the type of IPRESS, the location of the healthcare provider (by department, province and district), the period of care (by year and month), and the age and sex of patients treated in outpatient, emergency and hospitalization services.

The study included all registered cases with ICD-10 diagnoses compatible with ILIs, according to MINSA's standards [10].

Variables and measurements

ILIs are defined based on ICD-10 diagnoses of any event documented in hospitalization, emergency and outpatient records, in accordance with the criteria established in Health Directive No. 061-MINSA [10]. The conditions were categorized into two groups: upper respiratory infections and pneumonias. These conditions were analyzed according to the following variables: sex (male or female), age (according to SUSALUD classification), the health subsystem in which the cases were treated (MINSA, EsSalud, Armed Forces medical services, private centers and others) and the year of care (2018, 2022). The location (department) where care was administered was used to estimate the cumulative incidence rates.

Statistical analysis

The statistical analysis was performed using Stata 18 for Windows (StataCorp, College Station, TX, USA) and Excel 365 (Microsoft, WA, USA).

A descriptive analysis was conducted, with the variables represented in frequency tables showing both absolute and relative percentages. For the inferential analysis, a chi-square test was performed, with a significance level set at $p < 0.05$.

Ethical considerations

Since secondary data (open data) were used and were publicly available on the SUSALUD website, the study was not submitted for review by an ethics committee.

RESULTS

Outpatient visits

ILIs in the Peruvian health system generated an average of 2,576,325 outpatient visits per year (range: 1,790,821–3,710,299), which accounted for 4.98 % (range: 2.11 %–7.03 %) of all outpatient visits in SUSALUD over the five-year evaluation period. The years with the lowest number of visits were the COVID-19 pandemic years, i.e., 2020 and 2021, representing 2.11 % and 4.48 % of the total outpatient visits, respectively. Differences were found in rates across departments and years of care ($p = 0.01$), with the lowest rate recorded in Lambayeque (380 cases per 100,000 inhabitants) and the highest in Cajamarca (48,382 cases per 100,000 inhabitants) (Table 1). The female sex accounted for 55.3 %. Children under five years of age accounted for 30 % of ILI cases, while individuals over 65 years of age accounted for 8.25 % (Table 4). Pneumonia was diagnosed in 1.3 % of ILI cases, and 50.45 % were treated in MINSA's services. The estimated annual rates of ILIs by region showed significant differences between the coast, highlands and jungle ($p = 0.01$), with the lowest rate of outpatient visits for ILIs on the coast (2,949 cases per 100,000 inhabitants) in 2020, and the highest rate in the highlands (14,112 cases per 100,000 inhabitants) in 2019 (Table 5).

Table 1. Number of visits and rates of ILIs in outpatient services across departments and years of care

Period	Outpatient visits									
	2018		2019		2020		2021		2022	
	n	Rate	*n*	Rate	*n*	Rate	*n*	Rate	*n*	Rate
Peru	3,603,533	11,417	3,710,299	11,547	1,790,821	5,489	1,481,894	4,486	2,295,081	6,872
Amazonas	25,182	5,998	19,638	4,633	3,027	709	3,642	850	9,026	2,102
Ancash	222,348	19,243	230,581	19,716	60,544	5,128	69,493	5,848	108,496	9,086
Apurímac	43,857	10,263	33,294	7,750	9,390	2,180	6,868	1,595	16,535	3,848
Arequipa	414,454	29,009	455,724	31,115	180,014	12,021	214,461	14,048	347,932	22,390
Ayacucho	83,907	12,731	110,971	16,700	56,738	8,491	63,138	9,424	110,247	16,441
Cajamarca	257,043	17,871	287,622	19,865	703,339	48,382	93,596	6,432	181,014	12,448
Callao	190,124	17,624	192,502	17,413	25,621	2,268	10,004	869	16,796	1,434
Cusco	135,378	10,252	144,756	10,799	58,162	4,286	109,531	7,995	154,939	11,223
Huancavelica	50,441	13,403	76,367	20,570	15,423	4,222	21,087	5,884	30,154	8,595
Huánuco	136,455	18,015	121,659	16,011	53,452	7,031	39,640	5,227	45,291	5,997
Ica	129,512	14,029	188,683	19,859	44,082	4,520	80,242	8,039	97,661	9,574
Junín	181,811	13,617	241,027	17,854	122,228	8,978	256,018	18,701	233,466	16,989
La Libertad	164,095	8,465	168,023	8,486	65,643	3,255	81,720	3,989	142,998	6,884
Lambayeque	16,548	1,303	20,439	1,582	4,975	380	6,469	488	13,427	1,003
Lima	1,125,927	11,059	982,614	9,434	212,703	2,001	258,268	2,388	455,361	4,145
Loreto	40,727	4,071	38,627	3,805	10,027	976	16,478	1,589	21,932	2,099
Madre de Dios	7,335	4,547	8,255	4,923	2,378	1,368	1,077	599	744	401
Moquegua	47,381	25,423	40,574	21,379	4,264	2,212	3,842	1,968	9,722	4,927
Pasco	35,105	12,920	37,620	13,823	8,134	2,991	9,492	3,505	15,116	5,613
Piura	67,520	3,420	88,266	4,384	21,083	1,029	32,729	1,576	59,980	2,852
Puno	92,551	7,483	58,000	4,681	23,634	1,909	16,801	1,362	35,999	2,935
San Martín	35,682	4,116	44,801	5,066	50,402	5,602	63,870	6,998	126,049	13,636
Tacna	22,933	6,466	29,366	8,085	11,502	3,100	9,822	2,599	17,246	4,489
Tumbes	29,844	12,367	46,395	18,806	6,655	2,646	3,436	1,344	6,999	2,697
Ucayali	47,373	8,478	44,495	7,745	37,401	6,349	10,170	1,688	37,951	6,171

Emergency department visits

An average of 1,077,584 emergency department visits for ILIs were recorded each year (range: 312,306–1,644,758), representing 15 % of all emergency visits. Pneumonia was diagnosed in 5.5 % of ILI cases, and 51 % of the patients were female. Children under five years of age accounted for 32.67 % of ILI cases, while individuals over 65 years of age accounted for 7.93 % (Table 4). A total of 51.32 % of emergency department visits for ILIs were registered in services affiliated with EsSalud. Differences were found in rates across departments and years of care ($p = 0.01$), with the lowest rate recorded in Lambayeque (164 cases per 100,000 inhabitants) and the highest in Moquegua (14,347

cases per 100,000 inhabitants) (Table 2). The estimated annual rates of emergency department visits for ILIs by region showed significant differences between the coast, highlands and jungle (p = 0.01). The highlands recorded the lowest rate of emergency department visits for ILIs in 2020, with 610 cases per 100,000 inhabitants, whereas the coast reported the highest rate in 2018, with 6,883 cases per 100,000 inhabitants. These results are presented in Table 5.

Table 2. Number of visits and rates of ILIs in emergency services across departments and years of care

Period	Emergency department visits									
	2018		2019		2020		2021		2022	
	n	Rate	*n*	Rate	*n*	Rate	*n*	Rate	*n*	Rate
Peru	1,708,727	5,414	1,306,793	4,067	354,187	1,086	797,265	2,413	1,538,493	4,607
Amazonas	5,989	1,427	3,758	887	1,539	361	3,810	889	7,800	1,816
Ancash	60,775	5,260	52,284	4,471	18,494	1,566	32,162	2,706	56,612	4,741
Apurímac	9,831	2,301	6,507	1,515	3,147	731	4,788	1,112	12,777	2,973
Arequipa	169,030	11,831	106,687	7,284	35,239	2,353	64,341	4,214	144,909	9,325
Ayacucho	19,589	2,972	12,522	1,884	2,315	346	13,291	1,984	24,535	3,659
Cajamarca	30,570	2,125	28,740	1,985	2,597	179	7,126	490	11,615	799
Callao	108,084	10,019	84,855	7,676	23,731	2,100	59,836	5,196	119,137	10,168
Cusco	48,448	3,669	45,078	3,363	7,304	538	11,183	816	37,634	2,726
Huancavelica	3,846	1,022	3,911	1,053	1,236	338	3,838	1,071	7,015	1,999
Huánuco	23,673	3,125	15,830	2,083	5,288	696	10,417	1,374	16,954	2,245
Ica	98,427	10,662	75,097	7,904	8,687	891	33,259	3,332	69,677	6,831
Junín	33,542	2,512	27,029	2,002	12,795	940	26,526	1,938	46,498	3,384
La Libertad	73,438	3,788	45,974	2,322	9,111	452	19,557	955	33,871	1,630
Lambayeque	26,334	2,073	12,719	984	2,149	164	3,162	238	13,879	1,037
Lima	792,920	7,789	634,822	6,095	159,134	1,497	314,106	2,905	706,663	6,432
Loreto	37,103	3,709	36,129	3,559	12,145	1,182	35,407	3,414	33,319	3,189
Madre de Dios	4,205	2,607	3,121	1,861	1,779	1,024	5,132	2,856	8,638	4,657
Moquegua	26,738	14,347	18,010	9,490	6,848	3,553	8,632	4,422	16,225	8,222
Pasco	9,476	3,488	5,692	2,091	4,256	1,565	5,875	2,169	9,205	3,418
Piura	31,591	1,600	20,242	1,005	5,872	287	13,248	638	21,896	1,041
Puno	24,852	2,009	15,990	1,291	9,299	751	15,666	1,270	28,372	2,314
San Martín	20,385	2,352	15,904	1,799	7,522	836	70,981	7,777	37,070	4,010
Tacna	27,584	7,778	21,019	5,787	4,098	1,105	7,829	2,072	35,876	9,337
Tumbes	12,055	4,995	7,203	2,920	4,502	1,790	15,042	5,882	13,465	5,188
Ucayali	10,242	1,833	7,670	1,335	5,100	866	12,051	2,000	24,851	4,041

Hospitalizations

In the Peruvian health system, an average of 56,587 hospitalizations for ILIs were recorded each year (range: 46,338–67,233), representing 2.9 % of all causes of hospitalization. Pneumonia was diagnosed in 79.8 % of ILI cases, and 55 % of the patients were male. Children under five years of age accounted for 23.7 % of hospitalized patients, while individuals over 65 years of age accounted for 32 % (Table 4). A total of 60.6 % of patients hospitalized for ILIs were treated in services affiliated with MINSA. Differences were found in rates across departments and years of care (p = 0.01), with the lowest rate recorded in Tacna (8 cases per 100,000 inhabitants) and the highest in Ica (495 cases per 100,000 inhabitants) (Table 3). The estimated annual rates of hospitalizations for ILIs by region showed significant differences between the coast, highlands and jungle (p = 0.01). The jungle recorded the lowest rate of hospitalizations for ILIs in 2019, with 14 cases per 100,000 inhabitants, whereas the coast reported the highest rate in 2018, with 244 cases per 100,000 inhabitants. These results are presented in Table 5.

Table 3. Number of visits and rates of ILIs in hospitalization services across departments and years of care

Period	Hospitalizations									
	2018		2019		2020		2021		2022	
	n	Rate	*n*	Rate	*n*	Rate	*n*	Rate	*n*	Rate
Peru	67,233	213	7,411	23	46,338	142	65,051	197	47,733	143
Amazonas	1,122	267	58	14	473	111	754	176	538	125
Ancash	1,780	154	175	15	1,866	158	3,434	289	1,463	123
Apurímac	929	217	120	28	696	162	1,295	301	804	187
Arequipa	3,577	250	285	19	2,276	152	2,750	180	2,237	144
Ayacucho	938	142	120	18	809	121	1,660	248	933	139
Cajamarca	1,711	119	244	17	718	49	1,636	112	1,306	90
Callao	2,331	216	406	37	1,454	129	1,525	132	1,359	116
Cusco	2,938	222	280	21	1,199	88	2,722	199	3,313	240
Huancavelica	375	100	61	16	224	61	618	172	525	150
Huánuco	865	114	76	10	769	101	1,412	186	443	59
Ica	2,569	278	759	80	2,504	257	4,939	495	2,621	257
Junín	1,937	145	269	20	1,124	83	1,414	103	1,496	109
La Libertad	3,469	179	480	24	2,112	105	2,270	111	1,869	90
Lambayeque	1,485	117	517	40	794	61	804	61	932	70
Lima	32,209	316	2,441	23	22,882	215	25,737	238	19,124	174
Loreto	894	89	164	16	531	52	1,400	135	1,055	101
Madre de Dios	367	227	41	24	311	179	273	152	339	183
Moquegua	502	269	56	30	375	195	245	126	274	139
Pasco	533	196	73	27	256	94	441	163	240	89
Piura	1,999	101	221	11	1,310	64	1,575	76	1,346	64
Puno	2,206	178	333	27	1,271	103	3,352	272	2,835	231
San Martín	1,131	130	82	9	1,635	182	3,510	385	1,926	208
Tacna	326	92	30	8	63	17	192	51	159	41
Tumbes	281	116	51	21	219	87	364	142	262	101
Ucayali	759	136	69	12	467	79	729	121	334	54

Table 4. Annual range of visits and rates of ILIs across age groups (2018–2022)

Age group	ILI cases		Outpatient services				Emergency services				Hospitalization services			
			Outpatient visits		Rate per 100,000 inhabitants		Emergency visits		Rate per 100,000 inhabitants		Hospitalizations		Rate per 100,000 inhabitants	
0 to 4 years	1,770,159	559,876	1,160,632	400,418	42,146	14,338	589,199	74,813	21,396	2,683	24,343	3,116	884	113
5 to 9 years	719,715	137,863	502,754	111,094	17,176	4,280	252,528	25,551	9,566	984	4,975	631	170	22
10 to 14 years	349,340	130,494	291,450	91,563	10,637	3,376	101,160	14,900	3,780	544	1,585	256	57	9
15 to 19 years	193,190	60,929	143,519	50,278	5,350	2,039	55,057	10,280	2,052	417	1,106	113	43	4
20 to 24 years	170,762	69,433	121,996	53,569	4,588	1,990	54,533	15,280	2,051	568	1,400	157	53	6
25 to 29 years	210,783	89,614	143,888	65,325	6,013	2,408	75,964	23,259	2,962	858	1,919	142	70	6
30 to 34 years	233,744	96,549	164,322	69,132	7,379	2,678	81,746	25,867	3,394	1,002	2,958	180	113	8
35 to 39 years	247,512	97,303	167,259	68,736	8,129	2,806	80,369	26,481	3,906	1,081	3,655	137	147	7
40 to 44 years	235,927	91,221	160,657	63,399	8,471	2,824	74,215	25,230	3,913	1,124	4,436	135	194	7
45 to 49 years	211,794	85,890	145,689	59,294	8,662	3,060	65,391	23,679	3,888	1,222	4,786	168	240	10
50 to 54 years	301,214	108,189	277,022	65,451	15,741	3,645	60,726	20,705	4,165	1,176	5,345	161	298	11
55 to 59 years	183,017	72,178	130,228	50,343	10,760	3,318	53,031	18,007	4,382	1,187	5,875	186	376	15
60 to 64 years	160,602	59,594	117,209	41,008	11,571	3,391	46,559	14,577	4,596	1,205	5,574	185	444	18
65 years and older	493,502	162,755	344,292	111,040	15,345	3,788	145,629	35,558	6,491	1,213	22,363	1,844	997	82

Table 5. Number of visits and rates of ILIs in outpatient, emergency and hospitalization services across regions (coast, highlands and jungle) and years of care

	Period				
	2018	2019	2020	2021	2022
Outpatient visits					
Coast					
n	2,430,686	2,443,167	637,086	770,486	1,276,618
Rate	11,724	11,529	2,949	3,509	5,728
Highlands					
n	1,016,548	1,111,316	1,050,500	616,171	822,761
Rate	12,995	14,112	13,286	7,784	10,400
Jungle					
n	156,299	155,816	103,235	95,237	195,702
Rate	5,198	5,083	3,312	3,014	6,117
Emergency department visits					
Coast					
n	1,426,976	1,078,912	277,865	571,174	1,232,210
Rate	6,883	5,091	1,286	2,601	5,529
Highlands					
n	203,827	161,299	48,237	98,710	194,605
Rate	2,606	2,048	610	1,247	2,460
Jungle					
n	77,924	66,582	28,085	127,381	111,678
Rate	2,591	2,172	901	4,031	3,491
Hospitalizations					
Coast					
n	50,528	5,421	35,855	43,835	31,646
Rate	244	26	166	200	142
Highlands					
n	12,432	1,576	7,066	14,550	11,895
Rate	159	20	89	184	150
Jungle					
n	4,273	414	3,417	6,666	4,192
Rate	142	14	110	211	131

DISCUSSION

This study aims to estimate ILI disease burden within the Peruvian health system. Over the past five years, ILIs have resulted in 7,714 outpatient visits, 3,227 emergency department visits and 169 hospitalizations per 100,000 inhabitants. The highest ILI burden was observed in children under five years of age, aligning with the international literature [5,11]. However, comparisons should be made cautiously, as case definitions varied across studies, and in some cases the results from some hospitals were extrapolated to provincial or national levels [12,13]. In emergency departments, ILIs accounted for 15 % of all visits.

ILIs [14-16] are highly infectious diseases, estimated to cause three to five million severe cases and 290,000 to 650,000 deaths worldwide each year [17]. Annual estimates highlight the continuous evolution of influenza and its seasonal variability, underscoring the importance of using ranges to more accurately reflect its annual burden [18,19].

ILI burden estimates the number of individuals who fall ill and seek care through outpatient, emergency and hospitalization services, or die within a given period [20]. The variability of ILIs makes it difficult to assess their overall impact on the health system [21]. This study evaluated five years of data, including three years within the COVID-19 pandemic, though these were not considered in our study.

The present study seeks to estimate ILI burden within the Peruvian health system, providing disease-specific burden estimates over the five-year evaluation period. The limitations identified are as follows:

Estimates of visits for ILIs rely on administrative data reported to SUSALUD [22], making them susceptible to biases such as diagnostic coding errors or underreporting, which could affect burden estimates [23].

Healthcare-seeking patterns [24] changed with the onset of the COVID-19 pandemic and its overlap with ILIs, as well as due to the implementation of preventive public health measures such as social distancing and mask use [25] and school closures during the pandemic. These factors likely influenced the dynamics of ILIs.

Another limitation is that ILIs can be caused by various pathogens, both viral and bacterial, while influenza infections can lead to illnesses that do not meet the ILI definition [26-28]. This proportion has exceeded 50 % during peak influenza transmission [29].

Despite its limitations, the study provides a straightforward and timely assessment of ILI burden, offering valuable insights into economic and social costs and contributing to public health decision-making [30].

In conclusion, the results of this study demonstrate that ILIs represent a considerable burden for the Peruvian health system. Estimating the annual burden can enhance surveillance efforts for ILIs, assess vaccination impact, improve epidemiological understanding, and strengthen preparedness for future influenza pandemics.

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