ORIGINAL ARTICLE

Asthma consultations in emergency departments of Peruvian health facilities during the second year of the COVID-19 pandemic

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ABSTRACT

Objective: To describe the characteristics of asthma consultations provided in Peruvian emergency departments during 2021. **Materials and methods:** A descriptive study using secondary sources was conducted. The source of information was the open-access dataset "Morbilidad en Emergencia Hospitalaria" (Morbidity in Hospital Emergency Departments), prepared by the Ministry of Health (MINSA) and available on the Plataforma Nacional de Datos Abiertos (National Open Data Platform). A total of 4,338 consultations for patients with a definitive diagnosis of asthma treated in MINSA emergency departments were included. The evaluated characteristics were age, sex, diagnosis according to the International Classification of Diseases, Tenth Revision (ICD-10), level of care and month of consultation. In addition, patients with five or more consultations were identified to describe their emergency department use pattern, and the intensity of use for the entire sample was calculated. Descriptive statistics were performed using the free spreadsheet Jamovi 2.3.26, with absolute frequencies and percentages for the variables. **Results:** The consultations were predominantly concentrated in the 27–59 age group (56.71 %), female patients (61.80 %), the diagnosis "Unspecified asthma" (84.21 %) and level of care I (59.78 %). An upward trend was observed from February, resulting in 560 consultations by the end of the year in December. A total of 2,988 patients had one consultation, while 41 patients had five or more consultations, with the maximum number of consultations for a single patient reaching 32. The overall intensity of use accounted for 1.25. **Conclusions:** In 2021, starting in February, there was an increase in the number of consultations for patients with a definitive diagnosis of asthma in MINSA emergency departments. The highest concentration of consultations was observed in the 27–59 age group and among female patients.

Keywords: Emergency Medical Services; Asthma; Medical Care Statistics; Epidemiology, Descriptive; Peru (Source: MeSH NLM).

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INTRODUCTION

In 2019, according to data from the Global Burden of Disease Study, 262 million people across 204 countries and territories were living with asthma, and this condition accounted for 455,000 deaths [1]. In Peru, the Centro Nacional de Epidemiología, Prevención y Control de Enfermedades (CDC Perú – Center for Epidemiology, Disease Prevention and Control of Peru) recorded 22,094 episodes of bronchial obstruction/asthma in 2021. By September 2023, however, 81,108 episodes had already been reported, indicating a marked increase in incidence that year [2]. One factor that may explain this sharp rise is the impact of the COVID-19 pandemic on healthcare systems.

During the COVID-19 pandemic, emergency department consultations for asthma declined worldwide. This reduction may be attributed to multiple factors, including mask use—which limits exposure to inhaled particles such as air pollutants and allergens—alongside social restrictions and fear of contracting COVID-19 [3-5]. A study conducted in the United States reported a 31 % decrease in the mean number of weekly asthma-related visits between 2020 (31,374 visits/week) and the pre-pandemic period in 2019 (45,276 visits/week). Even by 2022, the number of weekly visits had not returned to pre-pandemic levels. Notably, the greatest reductions were observed among children aged 0–4 years (74 % decrease) and 5–11 years (66 % decrease) [3].

In Peru, data on consultations for asthma are primarily obtained from patient consultation records in health facilities. By contrast, epidemiological reports from the Ministry of Health (MINSA) do not provide detailed descriptions of the consultations or their characteristics, including the intensity of use [2]. Furthermore, most studies on the epidemiology and characteristics of asthma focus on pediatric populations and seldom address other age groups [6,7].

Evidence on the impact of social restrictions during the COVID-19 pandemic on healthcare-seeking behavior in Peru remains limited. One study found a 60.5 % decrease in visits to a pediatric emergency hospital in 2020 compared with 2019. This decline was observed in respiratory diseases, including asthma, with consultations decreasing from 10,488 in 2019 to 1,534 in 2020. Similarly, consultations for digestive system diseases declined from 9,725 in 2019 to 2,426 in 2020 [8].

Currently, there is no national-level information describing changes in consultations for asthma during the second year of the pandemic or the onset of the gradual return to normal life. In light of this gap, the aim of this study was to describe the characteristics of emergency department consultations for asthma in Peru during 2021.

MATERIALS AND METHODS

Study design and population

A descriptive study was conducted using the open-access dataset "Morbilidad en Emergencia Hospitalaria" (Morbidity in Hospital Emergency Departments), prepared by MINSA and available on the Plataforma Nacional de Datos Abiertos (National Open Data Platform) (https://www.datosabiertos.gob.pe/dataset/morbilidad-en-emergencia-hospitalaria). This dataset includes morbidity as a reason for consultations in the emergency departments of health facilities nationwide, including those under MINSA and private centers.

Variables and measurements

Data from January to December 2021 were used for this analysis, corresponding to the second year of the COVID-19 pandemic in Peru. The most relevant events related to the provision of health services during that year are listed chronologically as follows: on January 6, the technical health standard for adapting primary care services was published, aiming to reduce the health, social and economic impact of the COVID-19 pandemic [9]; on February 8, phase 1 of the national vaccination campaign commenced, including all health sector workers, Armed Forces and Police personnel, firefighters, security staff, municipal police (Serenazgo), health science students and members of electoral boards [10]; on April 14, the vaccination target population was gradually expanded to include all residents of Peru aged ≥ 18 years [11]; and on July 10, technical standards were approved and published to strengthen primary care for both COVID-19 and non-COVID-19 conditions nationwide [12]. These milestones provided the health policy context for service delivery in MINSA facilities.

Consultation records were included if they met the following criteria: (a) a diagnosis corresponding to the International Classification of Diseases, Tenth Revision (ICD-10) codes for predominantly allergic asthma (J45.0), nonallergic asthma (J45.1), mixed asthma (J45.8), unspecified asthma (J45.9) or status asthmaticus (J46); (b) a definitive diagnosis of one of these asthma categories; and (c) consultations provided between January 1 and December 31, 2021. Exclusion criteria were: (a) incomplete ICD-10 diagnostic data or (b) missing data such as age, sex, date of consultation or health facility code.

From a total of 2,370,157 consultations recorded in the dataset "Morbilidad en Emergencia Hospitalaria," 4,338 met the inclusion criteria and were analyzed.

Patient age was collected in years and subsequently categorized into the following groups: early childhood (0–5 years), childhood (6–11 years), adolescence (12–16 years), youth (17–26 years), adulthood (27–59 years) and late adulthood (≥ 60 years) [13]. Patient sex (male or female) and the month of consultation were also recorded.

The ICD-10 diagnosis code and the Instituciones Prestadoras de Servicios de Salud (IPRESS – Health Service Provider Institutions) identifier were extracted. This identifier was used to determine both the facility level of care and the department where consultation took place, by cross-referencing the "Listado de Instituciones Prestadoras de Salud" (List of Health Care Providers) [14] and the "Consulta por Código Único de IPRESS" (Consultation by Unique IPRESS Code) tool provided by the Superintendencia Nacional de Salud (Susalud – National Health Superintendency) [15]. Health facilities were classified into four levels of care: Uncategorized, Level I, Level II and Level III, with the latter representing the highest level.

Statistical analysis

The dataset was downloaded in .csv format and imported into the free spreadsheet Jamovi 2.3.26. A descriptive analysis was performed using absolute frequencies and percentages for categorical variables. For this study, consultations were considered the unit of analysis.

A contingency table was created to describe the distribution of asthma diagnoses according to ICD-10 codes across the different levels of care within the health facilities. The frequency of consultations per patient during the study period was determined using each patient's unique identifier. Patients with five or more consultations were identified, and the monthly frequency of consultations was tabulated. In addition, the intensity of use was defined as the mean number of consultations received per patient [16]. This measure was calculated by dividing the number of consultations for the specified service type (in this case, emergency department) by the number of individual patients treated during the study period [16].

Ethical considerations

The study protocol was approved by the Institutional Research Ethics Committee of Universidad de Piura. The dataset is publicly available on the Plataforma Nacional de Datos Abiertos website in anonymized form.

RESULTS

Characteristics of consultations

Among the 4,338 consultations, adults in the 27-59 age group represented 56.71 % (*n* = 2,460), and female patients comprised 61.80 % (*n* = 2,681) of cases. Regarding the month of consultation, a progressive increase was observed from February onward. Unspecified asthma accounted for 84.21 % (*n* = 3,653) of cases. By health facility, the Instituto Nacional de Salud del Niño (National Institute of Child Health) provided 22.03 % (*n* = 937) of all emergency department consultations for asthma in 2021. Level I facilities accounted for 59.78 % (*n* = 2,543) of the consultations (Table 1).

Frequency of consultations per patient

Regarding the frequency of consultations, 2,988 patients had a single visit, whereas 308 patients required two visits. The highest number of visits recorded for an individual patient was 32 (Figure 1). Overall, the intensity of use was 1.25 (4,338 consultations for 3,463 patients). By subgroup, this indicator was 1.32 among patients aged ≥ 60 years (1,055 consultations for 798 patients), 1.27 among males (1,657 consultations for 1,305 patients) and 1.28 in level I facilities (2,543 consultations for 1,994 patients).

Table 1. Characteristics of emergency department consultations for asthma in MINSA facilities

Characteristics	Absolute frequency	Percentage (%)
Total	4,338	100
Age (years)		
0-5	269	6.20
6-11	248	5.72
12-16	72	1.66
17-26	234	5.39
27-59	2,460	56.71
≥ 60	1,055	24.32
Sex		
Female	2,681	61.80
Male	1,657	38.20
Month of consultation		
January	282	6.50
February	190	4.38
March	241	5.56
April	254	5.86
May	283	6.52
June	303	6.98
July	412	9.50
August	427	9.84
September	415	9.57
October	488	11.25
November	483	11.13
December	560	12.91
Diagnosis		
Unspecified asthma	3,653	84.21
Asthma	453	10.44
Predominantly allergic asthma	104	2.40
Nonallergic asthma	77	1.78
Mixed asthma	51	1.18

Characteristics	Absolute frequency	Percentage (%)
Category [a]		
Level I	2,543	59.78
Level III	1,273	29.92
Level II	343	8.06
Uncategorized	95	2.23

[a] 84 missing data

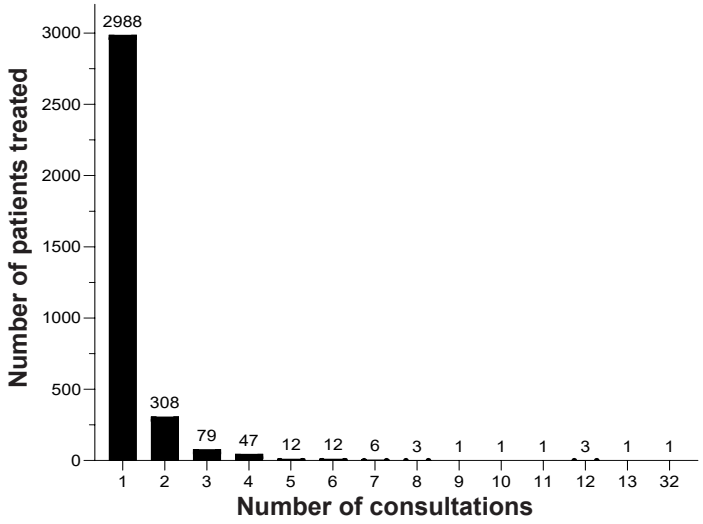

Figure 1. Frequency of emergency department consultations for asthma

Asthma diagnosis by level of care

At level III facilities, unspecified asthma accounted for 97.72 % (*n* = 1,244) of cases; at level I, 78.37 % (*n* = 87); at level II, 75.22 % (*n* = 258); and among uncategorized facilities, 91.58 % (*n* = 1,993) (Figure 2).

At level I facilities, asthma represented 15.30 % (*n* = 389) of all consultations. At level II, predominantly allergic asthma accounted for 4.66 % (*n* = 16) and nonallergic asthma for 5.54 % (*n* = 19).

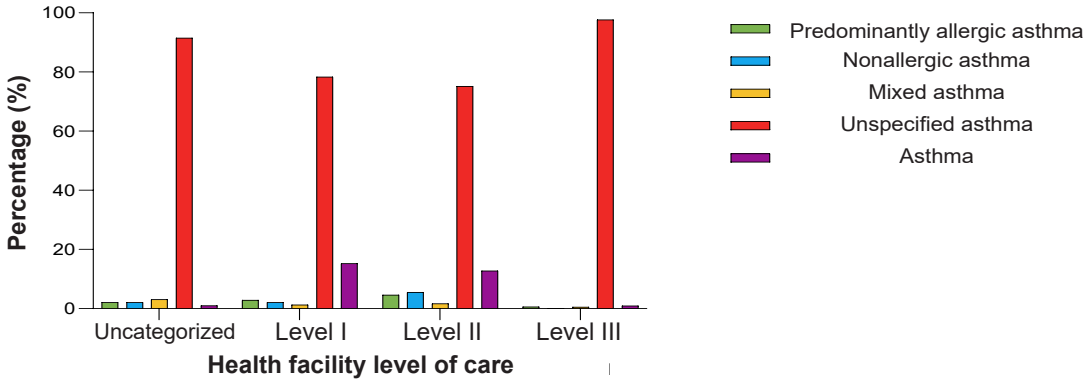

Figure 2. Distribution of asthma diagnoses across health facility levels of care

Patients with five or more consultations

A total of 41 patients had five or more emergency department consultations for asthma. The patient with the highest number of consultations (*n* = 32) experienced most recurrences between May and August. Overall, these 41 patients accounted for the highest concentration of visits between April and August (*n* = 151) (Table 2).

Table 2. Intensity of emergency department use for asthma in 2021, ranked from highest to lowest according to the number of consultations among the 41 patients with five or more consultations within the year

Patient	January	February	March	April	May	June	July	August	September	October	November	December	Total
1	2	4			7	9	6	4					32
2	1	2	1		4	2	1	1	1				13
3		2			2		4		1		2	1	12
4		1	2	1			4		1	2	1		12
5	2	1	1	1	1	2	2			1	1		12
6	2			1	2	1	2		1		1	1	11
7	1	2	3	4									10
8			1	1	1	1		1	1	1	1	1	9
9	1		1	1	2	1		1				1	8
10	2				1			3		1		1	8
11				1	2		1		1	1	1	1	8
12								3	1		2	1	7
13			1	1	1		1		1	1	1		7
14		1			1	2		1	1		1		7
15			2				2		3				7
,16		1					1	1			2	2	7
17					1		1	2	1	1	1		7
18	1									2	1	2	6
19		1	1			1			2	1			6
20								2		2	1	1	6
21				2				1	1			2	6
22					1			2		1	1	1	6
23				2	1		1					2	6
24							1			1	2	2	6
25	1	1							2		1	1	6
26							1	2	3				6
27					1	1	1	1		1		1	6
28				4		1	1						6
29				2			2	1	1				6
30		2		3									5
31				1				1		1	1	1	5
32	2		1	1				1					5
33												5	5
34		1		1	1			1	1				5
35	1	2					1				1		5
36						1	1			2	1		5
37								1	1	3			5
38			1		1		1	1				1	5
39							1	1			2	1	5
40					1		1		1	1	1		5
41							1	1		1	1	1	5
Total	16	21	15	27	31	22	38	33	25	24	27	30	277

1 consultation 2 consultations ≥ 3 consultations

Monthly distribution of consultations

An upward trend in consultations was observed over the course of the year. In January, 282 consultations were recorded, whereas December registered the highest number in 2021, with 560 consultations (Figure 3).

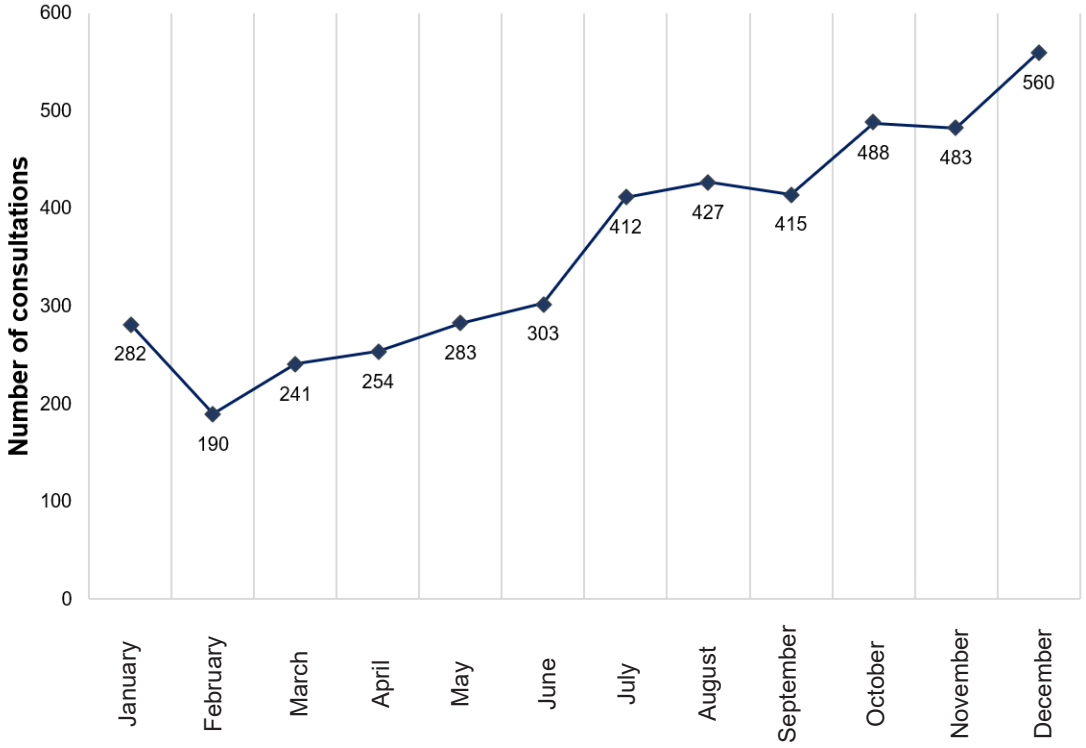

Figure 3. Frequency of emergency department consultations for asthma in MINSA facilities in 2021

January 6: First batch of 38 million Sinopharm vaccines purchased from China.
February 1–14: Mandatory 24-hour lockdown in Lima, Callao, Áncash, Pasco, Huánuco, Junín, Huancavelica, Ica and Apurímac.
February 9: Vaccination of healthcare workers begins.
April 16–20: Vaccination of older adults ≥ 80 years of age.
May 21: Vaccination of individuals aged 65–69.
July 12–31: Targeted lockdown announced in Lima and high-risk regions.

DISCUSSION

In 2021, the second year of the COVID-19 pandemic in Peru, over 4,000 consultations were provided to patients with a definitive diagnosis of asthma in MINSA facilities. Six out of ten consultations involved young adults, and most patients were women. This distribution is consistent with findings from a 2019 Brazilian study, which reported 729 emergency department consultations for asthma, with a mean patient age of 59.3 years (range: 20–89) and 73.6 % of cases occurring in women [17].

Throughout 2021, the number of consultations for asthma showed a progressive increase, peaking in December. This trend aligns with the evolution of bronchial obstruction/asthma episodes reported in the 2021 CDC-Peru epidemiological bulletin, which recorded 497 cases in week 1 and 1,198 in week 51 [18]. However, it should be noted that this comparison considers data from social security facilities, Armed Forces and Police health services, and private clinics, encompassing both emergency and outpatient consultations.

The observed trend likely reflects the dynamics of the social restrictions during the pandemic. In February 2021, a mandatory 24-hour lockdown was enforced for 14 days in several regions, including Pasco, Huánuco, Ica, among others [19]. A key milestone that may explain the subsequent rise in emergency consultations was the start of COVID-19 vaccination in February, initially targeting healthcare workers [20]. By April, vaccination was extended to the general population, beginning with older adults ≥ 80 years of age [21]. In July, lockdown was still focused on Lima and other regions [22]. Thereafter, restrictions on movement were progressively relaxed, including the reopening of international transport and expanded use of open spaces, which facilitated access to health services and increased healthcare-seeking behavior [23].

Between May and July, consultations for asthma increased compared with previous months, likely due to the growing number of vaccinated individuals. Vaccination began in May for the 65–69 age group, in June for those aged 60–64 and in July for individuals aged ≥ 50 [21]. This likely enhanced the perceived safety against COVID-19, prompting a gradual return to healthcare utilization and resulting in a marked rise in consultations from that period onward.

The phenomenon of reduced consultations during the pandemic was also reported in the United States, where pediatric emergency visits declined by 22 % in 2021 compared with the pre-pandemic period in 2019. This was attributed, among other factors, to the perceived risk by parents and caregivers, which led them to avoid seeking emergency care or medical attention. Nevertheless, the number of visits for neurodevelopmental disorders among children aged 0–4 years increased by 18 per week in 2021, a trend consistent with the findings of our study [24].

The analyzed data were drawn from multiple health facilities nationwide; however, the number of consultations was slightly higher than that reported by the Hospital de Emergencias José Casimiro Ulloa, where an annual average of 3,000 emergency consultations for asthma symptoms and wheezing is recorded [25]. These figures are consistent with those of the present study, as they reflect pre-pandemic data and include symptomatology, not only definitive diagnoses as in the present study.

The five institutions with the highest number of consultations are the Instituto Nacional de Salud del Niño and the Instituto Nacional de Enfermedades Neoplásicas (National Institute of Neoplastic Diseases), both located in Lima at near sea level. The remaining cases are distributed across the country at varying altitudes. This is consistent with research conducted in Mexico, which reported a higher incidence of asthma in low-altitude areas and a lower incidence at higher elevations [26]. Although the underlying cause of this phenomenon remains unclear, the existing literature consistently suggests that asthma symptoms tend to decrease at higher altitudes [26-28].

Unspecified asthma was the most frequently reported diagnosis across all three levels of care. A higher level of care is expected to yield more specific diagnoses; however, this is often not achieved due to the overcrowding of emergency departments and delays in obtaining auxiliary test results [29]. Furthermore, asthma diagnosis in the emergency setting is primarily clinical. Accurate classification would require additional tools—such as spirometry, sputum or blood eosinophil counts, allergy testing, among others [30]—which are generally unavailable during acute episodes. Consequently, consultation is often concluded with a general diagnosis once the emergency has been resolved.

Regarding the frequency of consultations, the intensity of emergency department use for asthma was 1.25. During the pandemic, most patients required a single emergency consultation; however, one patient accounted for 32 visits. A study conducted between July 2008 and January 2009 in 58 primary care centers in Spain reported an average of 3.12 primary care visits and 0.69 emergency visits among patients presenting with worsening symptoms [31]. In addition, the intensity of use was higher among patients aged ≥ 60 years and slightly higher among males.

This study has several limitations related to the dataset used for analysis. The dataset did not include consultations provided by other health systems in the country (EsSalud [Social Health Insurance], private clinics, Armed Forces health services). Additionally, the analysis was restricted to the variables included in the dataset, which limited the characterization of the consultations. Only cases with a definitive diagnosis of asthma treated in emergency services during a single year were included. Nevertheless, year 2021 encompassed key milestones that allowed us to describe how public health restrictions and measures influenced trends in emergency department consultations.

In conclusion, emergency department consultations for definitive diagnoses of asthma in 2021 were more frequent among patients aged 27–59 years and among women. Unspecified asthma was the predominant diagnosis across all levels of care, particularly at level III, the highest level of care. An upward trend in emergency visits was observed throughout the year.

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