

Incidence and lethality of adult pneumonia, bacteremia, or meningitis in Colombia from 2015 to 2022: a retrospective, database study.

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BACKGROUND

- Meningitis, bacteremia and pneumonia are diseases acquired within community settings, are prevalent across the world and can cause multi-organ failure. Important bacterial causal agents are *Neisseria meningitidis*, *Haemophilus influenzae*, and *Streptococcus pneumoniae*. In Colombia in 2019, there were 1,263 notified cases of bacterial meningitis, which represented an increase of 5.96% compared to the notifications made in 2018, a pre-COVID year¹.
- Comorbidities are the main risk factors, as well as other environmental aspects and behaviors. Among adults, the elderly have been identified to be at higher risk for acquiring disease because they have a debilitated immune system, and they usually have higher rates of comorbidities; consequently, vaccine efficacy is lower in elderly adults^{2,3}.
- Currently, there is a gap in information about the distribution and frequency of bacterial meningitis, bacteremia, and pneumonia in Colombia.

OBJECTIVE

- To measure the frequency and lethality of pneumonia, bacteremia, and meningitis in adults in Colombia from 2015 to 2022.

METHODS

- This is an observational, retrospective, descriptive study of adult patients based on structured data collection using the SURA Health Management Organization (HMO) databases, including but not limited to medical history records, claims records, laboratory, and diagnostic imaging records.
- A diagnosis was identified of the first episode of pneumonia, bacteremia, or meningitis, without a documented aetiology (10th revision of the International Classification of Diseases), between 2015 and 2022, and an index date was defined as being when the diagnosis was registered in the medical records.
- Inclusion criteria were patients older than 18 years that have diagnosis of pneumonia (J13 – J22), bacteremia (A49.2, A49.8, 49.9, A39.4, A39.9, B95.3, A40.3, A41.3, A41.5, A41.8, A41.9), or meningitis (G00, G03.9, A39.9).
- The relative frequency of events over the study period was estimated as the number of cases reported divided by the number of affiliates in the HMO in the same period. This estimation was also calculated per comorbidities as previously diagnosed in the medical records. The period of study was from 01 January of 2015 to 31 December of 2022. The study periods were split by year.
- The annual incidence of clinical events was calculated based on the number of events divided by the number of patients at risk for each year. Patients at risk were considering age, and comorbidities.

RESULTS

- The relative frequency of cases was 96.0% for pneumonia (107,675/112,205 patients identified), 6.2% for bacteraemia (7,006/112,205), and 0.37% for meningitis (412/112,205). These relative frequencies also include patients who presented with two or three diseases during the study period. These cases shows a higher proportion of Pneumonia.
- In 2022, the incidence of pneumonia was 402.1 cases per 100,000 persons. Between 2015 and 2022, annual incidence peaked in 2019, but there was a reduction after 2020 (Figure 1).
- The incidence increased by age group, and it was higher in females for each age group. Predominant comorbidities were chronic obstructive pulmonary disease, diabetes, cardiovascular diseases, cancer, and kidney disease (Table 1).
- In bacteremia, incidence gradually decreased from 43.1 cases per 100,000 persons in 2015, to 24.4 in 2020, and it was 26.9 in 2022. Meningitis annual incidence was around 1.0 case per 100,000 persons during the period of follow up, with steady values observed by year (Figure 1).
- Age is a risk factor for pneumonia (ambulatory or hospital), bacteremia, and meningitis. The incidence increased with patient age, especially in patients older than 70 years (Figure 2).

RESULTS (cont)

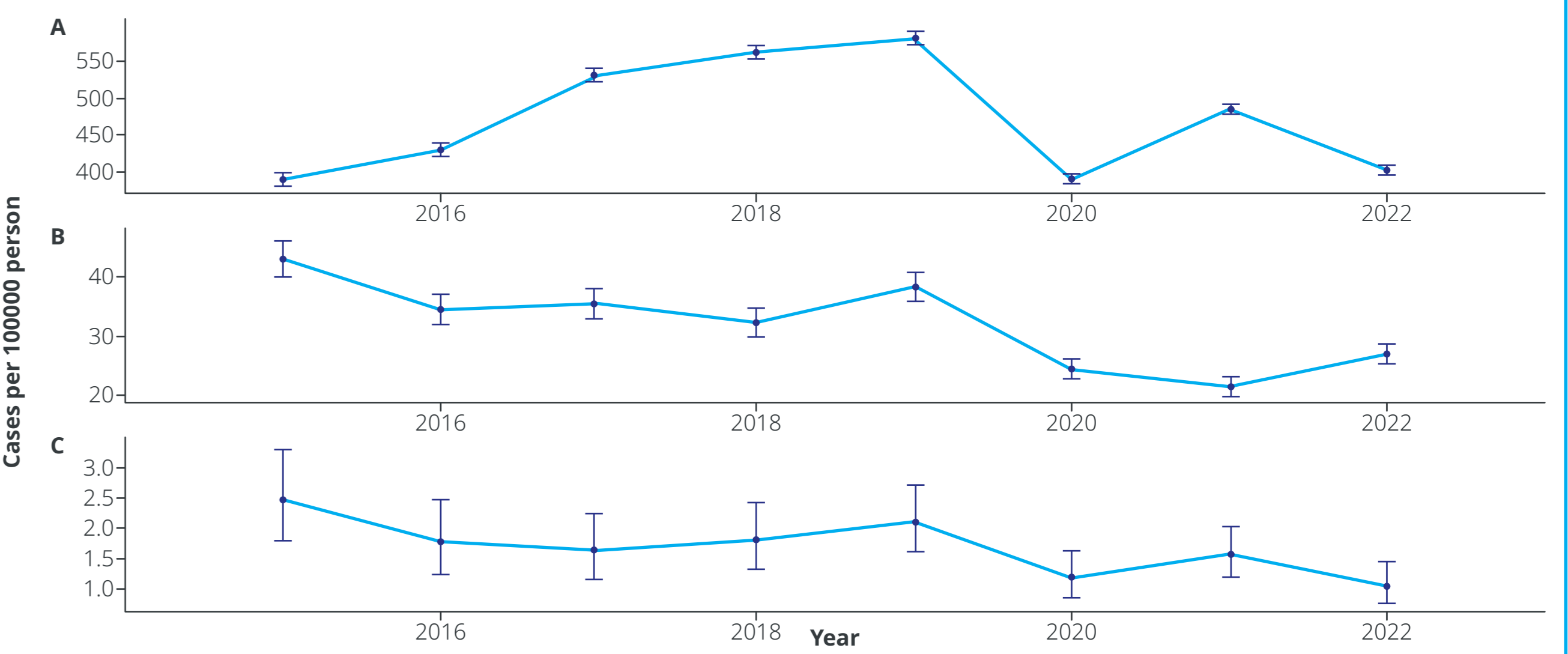
- While the incidence between 2021-2022 of pneumonia, bacteremia and meningitis in healthy patients were 174.1, 5.0, and 0.9 cases per 100,000 respectively, patients with any comorbidity had superior incidence in the same period (i.e. in 2021 the incidence for bacteremia patients between 18 and 50 years with chronic pulmonary diseases was 106.4 per 100,000). In both ambulatory pneumonia and hospital pneumonia, chronic pulmonary disease and peripheral vascular disease were the comorbidities with the highest incidence. While for bacteremia, it was kidney disease and peripheral disease and for meningitis, it was dementia and peripheral diseases (Figure 2).
- As the number of comorbidities per patient increased, the proportions of patients with bacteraemia, hospital, and ambulatory pneumonia were greater (Table 1).
- The lethality, mean value (standard deviation) during the study years for pneumonia, bacteremia, and meningitis was, respectively, 12.0% (2.0%), 33.5% (4.7%), and 13.8 % (5.2%).

Table 1. Demographic and clinical characteristics of patients diagnosed with pneumonia, meningitis and bacteremia

Variables	Pneumonia		Meningitis	Bacteremia
	Hospital	Ambulatory		
Number of cases	15196	92479	412	7006
Age mean (sd)	63,1 (19,7)	51,4 (19,5)	45,1 (18,7)	60,9 (20,2)
Age group (%)				
18-49	3739 (24,6)	438598 (47,1)	258 (62,6)	2001 (28,6)
50-59	2167 (14,3)	14541 (15,7)	52 (12,6)	1013 (14,5)
60-69	2686 (17,7)	16261 (17,6)	46 (11,2)	1227 (17,5)
70-79	2997 (19,7)	9807 (10,6)	37 (9,0)	1347 (19,2)
>80	3607 (23,7)	8271 (8,9)	19 (4,61)	1418 (20,2)
Female (%)	7981 (52,5)	54278 (58,7)	190 (46,1)	3830 (54,7)
ICU (%)	1817 (12,0)		14 (3,4)	485 (6,9)
Comorbidities (%)				
None	1811 (11,9)	27,909 (30,2)	133 (32,3)	1037 (14,8)
Hypertension	10299 (67,8)	43414 (46,9)	161 (32,3)	4708 (67,2)
Chronic obstructive pulmonary disease	8112 (53,4)	26994 (29,2)	64 (15,5)	2544 (36,6)
Diabetes	4680 (30,8)	17817 (19,3)	61 (14,8)	2345 (33,5)
Chronic kidney disease any stage	3495 (23,0)	9603 (10,4)	50 (12,1)	2155 (30,8)
Solid tumor	2903 (19,1)	12961 (14,0)	71 (17,2)	1577 (22,1)
Asthma	2532 (16,7)	14013 (15,2)	27 (6,6)	525 (7,5)
Dementia	2252 (14,8)	4996 (5,4)	40 (9,7)	1018 (14,5)
Diabetes with organ damage	1505 (9,9)	4243 (4,6)	19 (4,6)	937 (13,4)
Myocardial infarction	1286 (8,5)	3684 (4,0)	16 (3,9)	611 (8,7)
Connective tissue disease	1299 (8,5)	5906 (5,6)	35 (8,5)	608 (8,7)
Immunosuppressive treatment	1009 (6,6)	4206 (4,5)	26 (6,3)	471 (6,7)
Peripheral vascular disease	836 (5,5)	2883 (3,1)	13 (3,2)	429 (6,1)
Hepatic disease any stage	498 (3,3)	3212 (3,5)	13 (3,2)	352 (5,0)
HIV infection	422 (2,8)	2998 (3,2)	39 (9,5)	197 (2,8)
Congestive heart failure	416 (2,7)	1197 (1,3)	5 (1,2)	172 (2,5)
Stroke or cerebrovascular disease	359 (2,4)	942 (1,0)	14 (3,4)	168 (2,4)
Leukemia	323 (2,1)	554 (0,6)	9 (2,2)	186 (2,7)
Hemiplegia or paraplegia	240 (1,6)	577 (0,6)	16 (3,9)	212 (3,0)
Malignant lymphoma	244 (1,6)	701 (0,8)	7 (1,7)	137 (2,0)
Emphysema	180 (1,2)	552 (0,6)	1 (0,2)	39 (0,6)
Organ trasplant	93 (0,6)	264 (0,3)	3 (0,7)	58 (0,8)
Hepatic disease moderate/severe	34 (0,2)	129 (0,1)	0 (0,0)	30 (0,4)
Asplenia	4 (0,0)	8 (0,0)	0 (0,0)	2 (0,0)
Number of comorbidities (%)				
0	1811 (11,9)	27909 (30,2)	133 (32,3)	1037 (14,8)
1	2116 (13,9)	20707 (22,4)	97 (23,5)	925 (13,2)
2	2565 (16,9)	15503 (16,8)	62 (15,0)	1089 (15,5)
3	2636 (17,3)	11542 (12,5)	45 (10,9)	1127 (16,1)
>3	6068 (39,9)	16818 (18,2)	75 (18,2)	2828 (40,4)

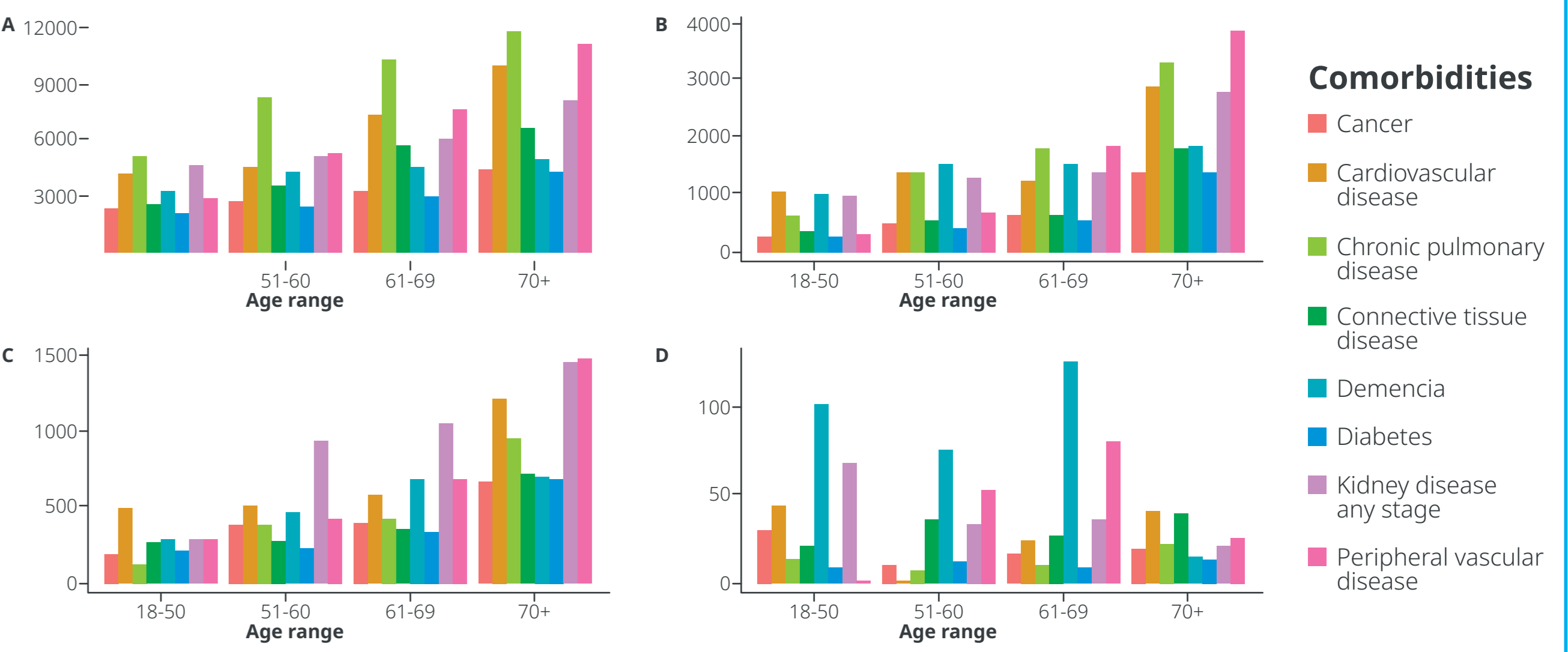
RESULTS (cont)

Figure 1. Incidence of pneumonia (A), bacteremia (B), and meningitis (C) based on structured data collection using the SURA Health Management Organization databases.



Note: The Y-axis represents the cases per 100 000 persons and does not begin at a lower limit of 0.

Figure 2. Incidence of Ambulatory pneumonia (A), hospital pneumonia (B), Bacteremia (C) and Meningitis (D).



Note: The Y-axis varies according to the incidence levels for each disease

CONCLUSION

The incidences in Colombian adult patients presenting with pneumonia, and bacteremia underwent a change in level after 2020, comparing the trend before 2018 to the change from 2019 forward. The pneumonia incidence was higher in females and for all diseases this indicator was affected by age -specially for cases over 60 years- and comorbidities, mainly for those with chronic pulmonary disease and peripheral vascular diseases. Bacteremia was more lethal.

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