BURDEN OF DISEASE FROM ACUTE RESPIRATORY INFECTIONS DUE TO RESPIRATORY SYNCYTIAL VIRUS (RSV) IN COLOMBIA: A LOW-AND MIDDLE-INCOME COUNTRY WITH UNIVERSAL HEALTH COVERAGE

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BACKGROUND

- RSV infection is a leading cause of respiratory hospitalization in infants and is increasingly being recognized as a common cause of acute respiratory illness in older adults[1].
- Obtaining accurate incidence and disease burden estimates for RSV is challenging due to limited active surveillance, even if data is available, low- and middle-income countries (LMIC) are frequently underrepresented[2].
- In Colombia few studies have been conducted to estimate the economic burden of RSV, and those that have covered it have concentrated on the pediatric population, focused on hospital events and with data from few centers located in a specific municipality[3-5].
- Baseline understanding of the epidemiologic and economic burden of RSV infection will be critical for policy decision-makers to assess the value and cost-effectiveness of different prevention strategies among those at risk for severe outcomes due to age and/or underlying comorbidities.

OBJECTIVE

- This study aims to estimate the RSV-related disease burden in Colombia from 2017 to 2019.

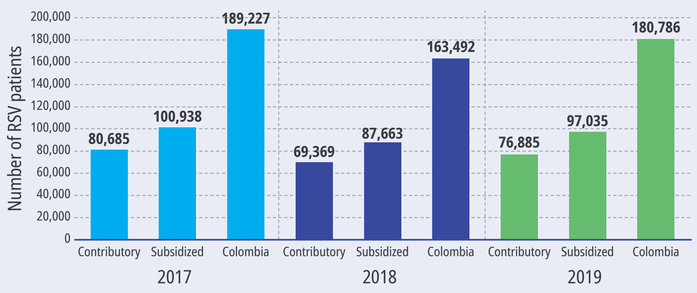
METHODS

- We conducted a disease burden study using a "bottom-up" approach. Using information from 4 sentinel centers, we estimated the proportion of medically attended acute respiratory infection (MA-ARI) whose etiology was respiratory syncytial virus (RSV).
- Subsequently, using a national health claims database, we estimated the proportion of individuals in Colombia who seek healthcare services (including outpatient, emergency department, and hospitalization) under suspicion of ARI. The distribution by age strata, sex, and affiliation or insurance regime (contributory/ subsidized regime) was assessed.
- We estimated the number for patients diagnosed with ARI due to RSV at sentinel centers from the healthcare system perspective and the associated mortality, this estimate was extrapolated to the ARI population in the national databases. From there the probable number of all ARI cases due to RSV, incidence per 1,000 inhabitants, case fatality associated with RSV hospitalization, and the associated for the healthcare system were estimated. The denominators came from the population at risk at the national level.
- Costs were based on the Capitation Payment Unit Database. This database contains patient-level data on the consumption of healthcare services and includes the costs borne by the healthcare system, and they were adjusted considering the time adjustment according to the Consumer Price Index and are presented in 2024 dollars, the exchange rate used was COP 4,117.9 =1 USD.

RESULTS

- From 2017 to 2019, an estimated 533,505 cases of RSV required healthcare services in Colombia. Most of them came from the subsidized regime (53.5%) and a slightly larger proportion occurred during 2017 (35.5%) (**Figure 1**)

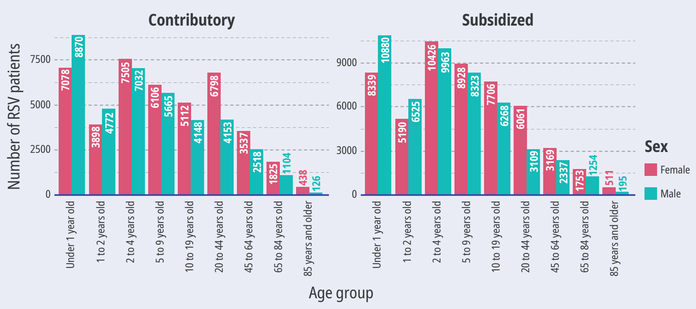
Figure 1. Number of RSV patients who consulted health care services by affiliation regime*, 2017-2019



* In Colombia there are 3 affiliation regimes, the contributory (where the employees are mainly located), the subsidized (in which people with no income or without formal jobs are located) and a small special benefit regime (for armed forces, teachers and workers from a state-owned petroleum company). Over 90% of the population is in the first two regimes[6].

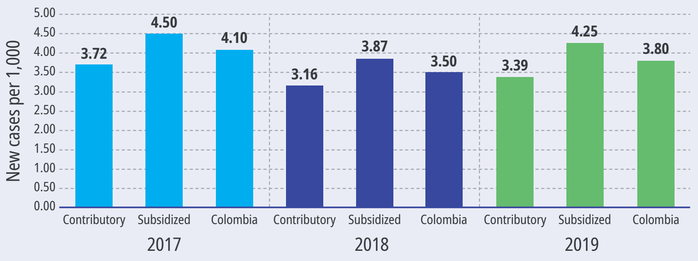
- For 2017, 19.24% of these were from patients under 1 year old, where most cases came from male patients. However, this trend reversed for cases of 2 or more years, where females represented most cases (**Figure 2**).

Figure 2. Number of RSV patients who consulted health care services by affiliation regime, 2017



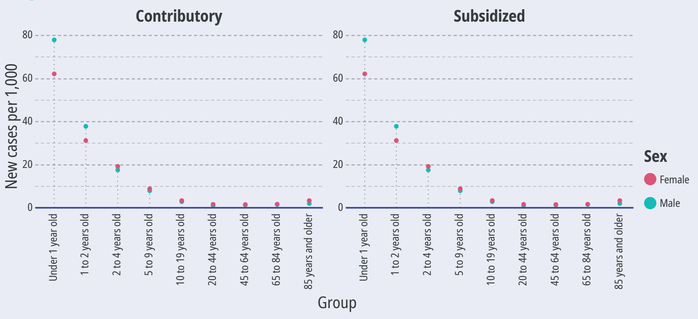
- Between 2017 and 2019, the estimated incidence of RSV patients who consulted the healthcare services for the entire population in the Colombian health system ranged from 4.10 per 1,000 inhabitant-year (in 2017) to 3.80 per 1,000 inhabitant-year (in 2019). Nevertheless, this varied according to the affiliation regime, with the incidence in the subsidized regime being between 1.2 and 1.3 times higher than in the contributory regime (**Figure 3**).

Figure 3. Incidence rate of RSV patients who consulted the healthcare services by affiliation regime, 2017-2019



- In 2017, the behavior of this incidence rate by age groups shows that rates under 1 year old presents the highest figures (70.01 cases per 1,000 inhabitant-year), being 17.1 times higher than the overall incidence rate for that year.
- Although the pattern previously shown is maintained (women have a higher participation for older cases), the incidences reveal large gaps in cases under 1 year old according to sex, which tend to close in the other age groups, except for those over 85 years old where the gap widens slightly (**Figure 4**).

Figure 4. Lollipop chart of incidence rates per 1,000 of RSV patients who consulted the healthcare services by age groups, sex and affiliation regime, 2017



- Cumulative mortality of RSV in 2017 was 3.19 per 100,000, with minor differences among sex. However, stratification showed that two groups had exacerbated risk are observed: cases of under 1 year old, who have a risk of 14.4 times more than the general accumulated risk (a mortality of 45.96 per 100,000), and the population of 75 years and older, who have a risk of 13.4 times more than the general total (a mortality of 42.84 per 100,000). In addition, the female cases present a higher mortality in younger ages while male cases have a higher mortality in older cases.

Table 1. Cumulative mortality of RSV by sex and age groups, 2017

Age group	Male	Female	Total
Under 1 year old	45.25	46.29	45.96
Between 1 to 4 years old	3.32	3.46	3.35

Age group	Male	Female	Total
Between 5 to 14 years old	0.45	0.47	0.42
Between 15 to 49 years old	0.37	0.34	0.30
Between 50 to 74 years old	3.20	2.83	2.69
75 years and older	44.34	33.97	42.84
Total	**3.20**	**3.03**	**3.19**

- The total cost of RSV patients between 2017 and 2019 was USD$1,083.83 million (USD$379.9 in 2017, USD$333.7 in 2018, USD$370.2 in 2019; USD$170.87 for patients under 1 year old, and USD$440.18 for adults [20 years or older]).
- For 2017, the health system cost were about USD 379.9 million (CI 95% 187.1 - 572.7) and about the 16% came from the under 1 year old population, which cost USD 60.93 million (**Table 2**).

Table 2. Health system costs of 2017 cases (USD millions by 2024)

Age group	Colombia	
	Total Cost	CI 95%
Under 1 year old	60.93	51.9 - 69.9
Between 1 to 19 years old	170.67	89 - 252.3
20 years and older	148.31	46.2 - 250.4
Total	**379.90**	**187.1 - 572.7**

- Detailing the cases under one year of age, it can be observed that the hospitalization it's the most expensive setting, with a cost per patient over 1.3 thousand dollars. Followed by the outpatient costs ranging from 83 to 170 dollars and finally the cost at the emergency department, ranged between 26 and 48 dollars (**Table 3**).
- Newborns were characterized as being the cases with the highest cost. Hospitalization in under 1 month old were 16.2 times higher its outpatient cost (2,770.15 vs. 170.87), and for those between 1 and under 2 months hospitalization were 21.3 times higher than its outpatient cost.

Table 3. Cost per patient under 12 months of RSV by setting (US Dollars)

Age group	Hospitalization	Emergency Department	Outpatient
< 1 month	$ 2,770.15	$ 35.85	$ 170.87
1 - < 2 months	$ 1,768.24	$ 48.13	$ 83.17
2 - <6 months	$ 1,363.69	$ 33.67	$ 139.73
6 - <12 months	$ 1,367.74	$ 26.84	$ 92.48

LIMITATIONS

- While this study has the ability to project the cases at the national level, it has important limitations, for example the presence of a diagnosis code on a medical claim is not a positive presence of disease, as the diagnosis code may be incorrectly coded or included as rule-out criteria rather than actual disease, in addition some codes may been omitted which may also occur in the case of claims for procedures or medications. To date, most of the information is disaggregated for 2017, the year in which the most cases of RSV were estimated.

CONCLUSION

- RSV significantly strains the Colombian healthcare system with a high number of cases, fatality, and associated costs. RSV predominantly affects infants but also poses a risk to older adults. This study highlights the urgent need for targeted interventions and enhanced surveillance to mitigate RSV's impact on public health in Colombia.

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