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Individual and climate factors associated with acute respiratory infection in Colombian children

Factores individuales y climáticos asociados a la infección respiratoria aguda en niños colombianos

Fatores individuais e climáticos associados à infecção respiratória aguda em crianças colombianas

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Abstract

The objective of this study was to examine the association between acute respiratory infection recall (ARI-recall) and individual and environmental factors such as climate, precipitation, and altitude above sea level in Colombian children. A secondary analysis of 11,483 Colombian children, whose mothers were interviewed in the 2010 National Demographic and Health Survey, *was carried out. The outcome variable was the mother's or caregiver's ARI-recall. The independent variables were expressed at individual, cluster, and municipal levels. At the individual level, we considered health and individual characteristics of the children; at cluster level, we incorporated the altitude above sea level; and at the municipal level, we included precipitation and annual average climate. The association between ARI-recall and independent variables was assessed using a multilevel logistic regression model. ARI-recall was significantly associated with age (OR = 0.61; 95%CI: 0.48-0.79), belonging to an indigenous group (OR = 1.51; 95%CI: 1.16-1.96), and a medium or very poor wealth index (OR = 2.03; 95%CI: 1.25-3.30 and OR = 1.75; 95%CI: 1.08-2.84, respectively). We found interaction between acute child malnutrition and average annual precipitation. Children with acute malnutrition and from municipalities with high annual precipitation had significantly 3.6-fold increased risk of ARI-recall (OR = 3.6; 95%CI: 1.3-10.1). Individual conditions and precipitation are risk factors for ARI-recall in Colombian children. These results could be useful to understand ARI occurrence in children living in tropical countries with similar characteristics.*

Respiratory Tract Diseases; Preschool Child; Colombia, Multilevel Analysis

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Background

Acute respiratory infection (ARI) is a main cause of death in the population aged five years or less, especially in developing countries [1]. In 2011, the Colombian ARI mortality rate in children under five years old was 11.4 per 100,000 inhabitants, and it was even higher in departments (states) such as Guanía, Vaupés, Chocó, and Amazonas, with rates of 119.05, 117.25, 43.76, and 39.06 per 100,000 inhabitants, respectively [2]. Regarding morbidity, children aged under five years were the age group with higher number of ARI hospitalized cases in 2013, especially related with influenza A and respiratory syncytial virus [3].

Individual and environmental factors are associated with ARI occurrence in children. Younger children, with malnutrition, mothers with low educational level, and in poverty situation (evaluated by overcrowding and poor household conditions) have higher risk of ARI [4,5,6,7]. The literature also mentions factors like environmental pollution inside and outside their home and climatic factors such as the rainy season, humidity, and temperature. However, the latter aspects and the role of the altitude above sea level remain poorly documented and understood in tropical countries like Colombia [8,9].

International evidence indicates that the influenza A virus is significantly associated with climatic factors such as relative humidity, sunshine duration, and precipitation [8]. Regarding ARI and altitude above sea level, the results are contradictory: a study in Ecuadorian children showed that living in places located below 1,000 meters above sea level (masl) is associated with an increase of ARI likelihood, assessed by the recall of the event during two weeks prior to the interview [10]. In the other hand, evidence points to an association between higher altitude above sea level and hospitalization and death from respiratory illness in countries like the United States and Mexico [10,11,12]. Therefore, the aim of this study was to assess the association between ARI-recall (by the mother or caregiver) and individual and environmental factors, such as climate, precipitation and altitude above sea level, in Colombian children aged from one to five years.

Methods

Study design and sample

A secondary analysis of the information was carried out in 11,483 Colombian children aged 1-5 years, whose mothers were interviewed in the 2010 *National Demographic and Health Survey* (*Encuesta Nacional de Demografía y Salud* – ENDS) and reported living on-site for at least the previous year. This analysis included 88% of the children aged 1-5 years of the 2010 ENDS, who belong to 3,956 clusters and 254 municipalities of Colombia. Subjects with incomplete information in at least one of the variables included in this analysis were excluded. The included and excluded children were similar concerning ARI-recall status, sex, age, residence area, gestational weeks to birth, nutritional status, type of cooking fuel, and ARI circulation period. Differences among them included mother's education, ethnic group, affiliation to the health system, total breastfeeding time, wealth index, and climate conditions. In this sense, the sample used in this study did not include the Raizal ethnic population and had lower proportion of children whose mother had higher education, contributive affiliation to the health system, very rich and rich wealth index, and who lived in places located in altitudes above 2,000mals.

The 2010 ENDS was a representative survey nationwide at the departmental level, which used a multistage probability sample design. The selection process for each stage was completely random. Four stages were included in the sampling: municipalities, blocks or rural sections, segments or cluster (10 contiguous households), and individuals. Further details on the methodology and design of 2010 ENDS have been previously published [4].

Outcome variable

ARI in children aged 1-5 years was defined by the mother's or caregiver's recall of cough accompanied by rapid breathing and fever during the two weeks preceding the survey. It was evaluated at the individual level.

Independent variables

The independent variables included in this analysis were expressed at individual, cluster, and municipal levels. At the individual level, we considered: sex, age, residence area, mother's education, ethnicity, affiliation to the general health system, wealth index, breastfeeding duration, gestational weeks at birth, acute malnutrition, birth order, number of household members, type of cooking fuel, and ARI circulation period. ARI circulation period was defined as the month with higher cases of ARI and it was a proxy of viral circulation and ARI in the community, calculated from the Epidemiological Surveillance System (SIVIGILA) data. An epidemic curve was built with the monthly ARI unusual and sentinel cases for the years of 2009 and 2010 [13,14]. Months with highest number of reported cases were considered the highest viral circulation periods, assigned to each participant according to the date of the survey.

At the cluster level, altitude above sea level was included for each of the sample segments or cluster to which the child belonged. Altitude above the sea was categorized by cut-off points suggested by Eslava [15], less than or equal to 1,000 meters, greater than 1,000 to 2,000 meters, and greater than 2,000 meters. At the municipal level, precipitation and annual average climate were considered.

Information sources

Diverse data sources were included in the analysis. Information about the children and altitude above sea level was obtained from the 2010 ENDS [4]. Unusual and sentinel ARI cases were used to identify the circulation period of ARI, provided by the SIVIGILA [13], and data about the precipitation and climate were obtained from the National Weather Institute (*Instituto de Hidrología, Meteorología y Estudios Ambientales* – IDEAM) [16].

Statistical analysis

The description of individual and environment characteristics was performed by percentages for categorical variables and central tendency measures and dispersion for continuous variables. Bivariate analysis was carried out to compare the individual characteristics, altitude above sea level, precipitation, and climate according to presence or absence of ARI-recall. The chi-square and Student's t tests for these comparisons were employed taking into account the ENDS sample design.

Given the hierarchical organization of information, in which the children were grouped into cluster and municipalities, we first estimated the intraclass correlation coefficient (ICC) for the cluster and municipal levels in a first null model with random intercept [17]. ICC can be interpreted as the percentage of ARI-recall variance attributable to the cluster and municipal levels. This first estimation obtained was statistically different to zero, so we considered that multilevel analysis as the first approach.

Given the outcome was a dichotomous variable, the association between ARI-recall and independent variables was assessed from a multilevel logistic regression model with random intercept for cluster and municipality. This model was adjusted for those variables that had a p-value in the bivariate analysis of less than 0.25.

Three models were adjusted. Model 1, or null model, did not include independent variables and was used to explore the proportion of ARI-recall variance that could be explained by the cluster and municipal levels. Model 2 considered the independent variables at the individual level, while Model 3 was adjusted for individual variables, altitude above sea level expressed at the cluster level, precipitation and climate at the municipal level, and the resulting interactions between independent variables.

According to the modeling purposes and to obtain greater statistical power, the precipitation variable was re-categorized into three groups, as follows: less than 2,000mm; equal to or greater than 2,000mm and less than 3,000mm, and a third set equal to or greater than 3,000mm. Interaction was tested between precipitation and acute malnutrition. An alpha < 0.05 was regarded as statistically significant, except in interactions in which it was < 0.25. In the results, we applied an exponential function to convert them to odds ratios (OR). Enlistment and data analysis were performed using the Stata program version 12.0 (StataCorp LP, College Station, USA).

Ethical statement

We used ENDS and climate data available from national institutions. The ENDS was approved by the Profamilia's Ethics Committee. The information about the children and their families was obtained by a questionnaire answered by the mother or caregiver. The ENDS dataset contains a folio number for each individual, thus, personal information from children (such as name or identification) was unknown to the researchers. The mothers or caregivers signed the informed consent form and gave verbal assent. More details about ENDS processed may be reviewed in previous publications [4].

Results

4.4% of the population aged 1-5 years reported ARI-recall during the two weeks preceding the interview. The higher proportion of the children who participated in this study were aged between 20 and 40 months (42.1%), lived in urban areas (71.8%), had mothers with high school education (53.6%), from poor and very poor households (22.4% and 25.2%, respectively), and did not belong to ethnic minority groups (83.1%) (Table 1). The mean time of breastfeeding was 13.07 months (SD = 0.1), and mean quantity of household members was 5 (SD = 0.03).

Regarding individual characteristics and ARI-recall status, ARI-recall was present in higher proportion within males (54%), children from urban areas (73.9%), mothers with high school education (56.3%), children aged 20-40 months (50.5%), very poor (27%) and which did not belong to ethnic groups (76.6%). Some of these differences were statistically significant, as presented in Table 1.

Concerning climate characteristics, ARI-recall was more frequent in children belonging to clusters located at altitudes smaller or equal to 1,000masl (57.1%), and who lived in municipalities with annual average precipitation of less than 2,000mm and warm climates (Table 2).

Table 3 shows the results of multilevel logistic regression model with random intercept for cluster and municipality. In Model 1, we found that 5% of the variance in ARI-recall (ICC) could be attributed to cluster and municipality levels, respectively. This variability decreased slightly adjusting for individual, cluster, and municipal characteristics, as shown in Models 2 and 3 (Table 3).

In Model 2, significant higher OR of ARI-recall was found in children from families who defined themselves as indigenous (OR: = 1.52; 95%CI: 1.18-1.95) or Afro-Colombian (OR = 1.32; 95%CI: 1.00-1.74), with rich (OR = 1.68; 95%CI: 1.01-2.81), medium (OR = 2.05; 95%CI: 1.27-2.31), or very poor wealth (OR = 1.73; 95%CI: 1.08-2.77) indexes (compared to those in the very rich index range) (Table 3). Protective OR for ARI-recall was reported in children older than 40 months (OR = 0.61; 95%CI: 0.48-0.79) (Table 3). These associations remained after adjusting for climate conditions (Model 3, Table 3), except for the Afro-Colombian population and in the rich wealth index range.

Regarding climate factors, OR was higher for the population living above 1.000masl, but this association was not statistically significant (Model 3, Table 3). Additionally, we found interaction between acute child malnutrition and average annual precipitation at the municipality. Children with acute malnutrition and residing in municipalities with average annual precipitation equal to or greater than 3,000mm had significantly 3.6-fold increased risk of ARI, compared to children without malnutrition and living in municipalities with less than 2,000 mm precipitation (Figure 1).

Discussion

In this study, ARI-recall in children aged one to five years was significantly associated with individual characteristics such as age, belonging to an indigenous group, and medium or very poor wealth index, compared to very rich ones. Additionally, we found interaction between acute child malnutrition, and the average annual precipitation in the municipality where the children lived.

The finding that the ARI-recall and age present an inverse association is consistent with the literature that argues fewer cases of ARI as age increases [4,9]. It may be supported by the fact that older children have a better immune and respiratory endothelium system. On the other hand, the finding of increased ARI-recall in indigenous children compared to those who did not belong to ethnic groups is

Table 1

Individual characteristics and acute respiratory infection recall (ARI-recall). Colombian children aged 1-5 years, 2010 *.

Individual characteristics	All		ARI-recall (yes) [n = 535]		ARI-recall (no) [n = 10,948]		p-value **
	n	%	n	%	n	%	
Sex							0.258
Male	5,847	50.9	274	54.0	5,573	50.8	
Female	5,636	49.1	261	46.0	5,375	49.2	
Age (months)							< 0.001
≤ 20	2,120	18.4	119	20.4	2,001	18.3	
> 20 to ≤ 40	4,803	42.1	255	50.5	4,548	41.7	
> 40	4,560	39.5	161	29.1	4,399	40.0	
Residence area							0.403
Urban	7,277	71.8	342	73.9	6,935	71.7	
Rural	4,206	28.2	193	26.1	4,013	28.3	
Mother's education							0.645
Higher education	1,663	18.0	67	15.8	1,596	18.2	
High School	5,753	53.6	270	56.3	5,483	53.5	
Elementary School	3,725	26.4	180	26.1	3,545	26.4	
No education	342	2.0	18	1.8	324	1.9	
Ethnic groups							0.001
Does not belong	8,434	83.1	352	76.6	8,082	83.4	
Indigenous	1,746	5.2	111	8.2	1,635	5.0	
Black, Afro-descendent, Afro-Colombian	1,303	11.7	72	15.2	1,231	11.6	
Affiliation to Health and Social Security General System							0.714
Subsidized	7,154	52.7	333	50.5	6,821	52.8	
Contributive	2,905	35.0	133	36.8	2,772	34.9	
Special	273	2.0	15	2.6	258	2.0	
Non-affiliated	1,151	10.3	54	10.1	1,097	10.3	
Wealth index							0.046
Very rich	786	12.0	21	6.8	765	12.3	
Rich	1,382	18.2	60	18.2	1,322	18.2	
Medium	2,170	22.2	115	26.7	2,055	22.0	
Poor	2,897	22.4	117	21.3	2,780	22.4	
Very poor	4,248	25.2	222	27.0	4,026	25.1	
Gestational weeks to birth							0.900
On term (≥ 36)	10,961	95.2	510	95.4	10,451	95.2	
Preterm (< 36)	522	4.8	25	4.6	497	4.8	
Acute malnutrition							0.154
No acute malnutrition (weight for age ≥ -2 SD)	11,372	99.2	526	98.6	10,846	99.2	
Acute malnutrition (weight for age < -2 SD)	111	0.8	9	1.4	102	0.8	
Type of cooking fuel							0.353
Electricity	348	3.8	17	3.8	331	3.8	
Natural or propane gas	7,966	78.0	350	76.1	7,616	78.1	
Kerosene, oil, cocinol, diesel, gasoline, alcohol	54	0.2	3	0.1	51	0.2	
Firewood, charcoal, mineral coal	3,061	17.6	162	19.9	2,899	17.4	
Does not cook	54	0.4	3	0.1	51	0.5	
Circulation period of ARI							0.844
Low circulation of ARI	5,218	50.8	230	50.3	4,988	50.8	
High circulation of ARI	6,265	49.2	305	49.7	5,960	49.2	

SD: standard deviation.

* Frequencies correspond to individuals in the sample; percentages were weighted according to the ENDS (*National Demographic and Health Survey – Encuesta Nacional de Demografía y Salud*) sampling design;

** p-value: statistical significance of the Pearson chi-squared test to compare individual characteristics by ARI-recall status.

Table 2

Climate characteristics and acute respiratory infection recall (ARI-recall). Colombian children aged 1-5 years, 2010 *.

Environmental characteristics	All		ARI-recall (yes) [n = 535]		ARI-recall (no) [n = 10,948]		p-value **
	n	%	n	%	n	%	
Cluster level							
Altitude over sea level (masl)							0.049
≤ 1,000	7,802	50.0	385	57.1	7,417	49.7	
> 1,000 to ≤ 2,000	2,285	24.1	100	22.5	2,185	24.2	
> 2,000	1,396	25.9	50	20.4	1,346	26.1	
Municipal level							
Precipitation (mm)							0.173
< 500	189	0.9	16	1.6	173	0.9	
≥ 500 to < 1,000	1,863	30.7	78	28.1	1,785	30.7	
≥ 1,000 to < 1,500	2,793	29.8	142	33.3	2,651	29.6	
≥ 1,500 to < 2,000	1,074	12.4	33	11.4	1,041	12.5	
≥ 2,000 to < 2,500	1,317	8.7	62	8.3	1,255	8.8	
≥ 2,500 to < 3,000	1,639	8.4	69	7.2	1,570	8.5	
≥ 3,000 to < 4,000	1,746	3.8	93	4.1	1,653	3.8	
≥ 4,000 to < 5,000	355	2.4	9	1.5	346	2.5	
≥ 5,000 to < 7,000	413	2.5	24	3.8	389	2.4	
≥ 7,000 to < 9,000	94	0.32	9	0.7	85	0.3	
Climate							0.049
Warm desert, semi-arid, arid	3,292	32.8	181	41.2	3,111	32.4	
Warm-wet, damp, on-wet	4,545	17.8	213	18.5	4,332	17.8	
Temperate semi-arid, arid	185	2.1	5	1.4	180	2.1	
Temperate semi-humid, on-wet	1,849	19.0	77	16.7	1,772	19.2	
Cold semi-arid, arid	274	4.0	9	2.7	265	4.0	
Cold semi-moist, wet, on-wet	1,184	22.7	43	18.1	1,141	22.9	
Very cold semi-moist, wet, on-wet	154	1.6	7	1.4	147	1.6	

masl: meters above sea level.

* Frequencies correspond to individuals in the sample; percentages were weighted according to the ENDS (*National Demographic and Health Survey – Encuesta Nacional de Demografía y Salud*) sampling design;

** p-value: statistical significance of the Pearson chi-squared test to compare environmental characteristics by ARI-recall status.

relevant when considering that, in Colombia, 63% of the indigenous population lives in poverty and 70% of indigenous children have malnutrition [18]. Aspects that deal with cultural practices, such as rooming, could increase the risk of ARI due to the greater compromise of lower airways.

Although the association between wealth index and ARI-recall does not show a dose-response pattern, the results found among children from very poor households or with medium wealth index in terms of ARI compared to rich ones reveal differences in health between rich and poor children, and suggest the possibility of a socioeconomic disparity that has been described in the literature as the underlying condition of worse behaviors and health outcomes [19].

Findings regarding environmental characteristics indicate the role of climatic factors such as precipitation on ARI occurrence in tropical areas like Colombia. The findings here are consistent with the evidence that indicates more cases of influenza A as the climatic temperature decreases and relative humidity and precipitation increase [8]. Although the ARI etiologic agent was not considered in our analysis, in Colombia the largest proportion of reported ARI cases correspond to influenza A and syncytial respiratory virus [3]. Therefore, the results related to climatic factors may be comparable to the evidence available.

Table 3

Multilevel logistic regression models for acute respiratory infection recall (ARI-recall). Colombian children aged 1-5 years, 2010.

Individual and climate characteristics	ARI-recall		
	Model 1 (Null) OR (95%CI)	Model 2 * OR (95%CI)	Model 3 ** OR (95%CI)
Individual level			
Age (months)			
≤ 20		Reference	Reference
> 20 to ≤ 40		0.95 (0.75-1.19)	0.95 (0.75-1.19)
> 40		0.61 (0.48-0.79) ***	0.61 (0.48-0.79) ***
Ethnical groups			
Does not belong		Reference	Reference
Indigenous		1.52 (1.18-1.95) #	1.51 (1.16-1.96) #
Black, Afro-descendent, Afro-Colombian		1.32 (1.00-1.74) ##	1.23 (0.92-1.63)
Wealth index			
Very rich		Reference	Reference
Rich		1.68 (1.01-2.81) ##	1.67 (1.00-2.79)
Medium		2.05 (1.27-2.31) #	2.03 (1.25-3.30) #
Poor		1.48 (0.92-2.39)	1.49 (0.91-2.42)
Very poor		1.73 (1.08-2.77) ##	1.75 (1.08-2.84) ##
Cluster level			
Altitude over sea level (masl)			
≤ 1,000			Reference
> 1,000 to ≤ 2,000			1.17 (0.81-1.71)
> 2,000			1.05 (0.53-2.10)
Municipal level			
Climate			
Warm desert, semi-arid, arid			Reference
Warm-wet, damp, on-wet			0.78 (0.48-1.25)
Temperate semi-arid, arid			0.60 (0.23-1.54)
Temperate semi-humid, on-wet			0.66 (0.33-1.33)
Cold semi-arid, arid			0.80 (0.31-2.07)
Cold semi-moist, wet, on-wet			0.51 (0.20-1.21)
Very cold semi-moist, wet, on-wet			0.75 (0.44-1.27)
Random component			
Cluster level			
Variance (standard error)	0.16 (36.83)	0.16 (14.45)	0.14 (77.46)
ICC (%)	5	5	4
Municipal level			
Variance (standard error)	0.21 (36.83)	0.16 (14.45)	0.14 (77.46)
ICC (%)	5	4	4

95%CI: 95% confidence interval; ICC: intraclass correlation coefficient; masl: meters above sea level; OR: odds ratio.

* Model adjusted by acute malnutrition;

** Model adjusted by acute malnutrition and average annual precipitation;

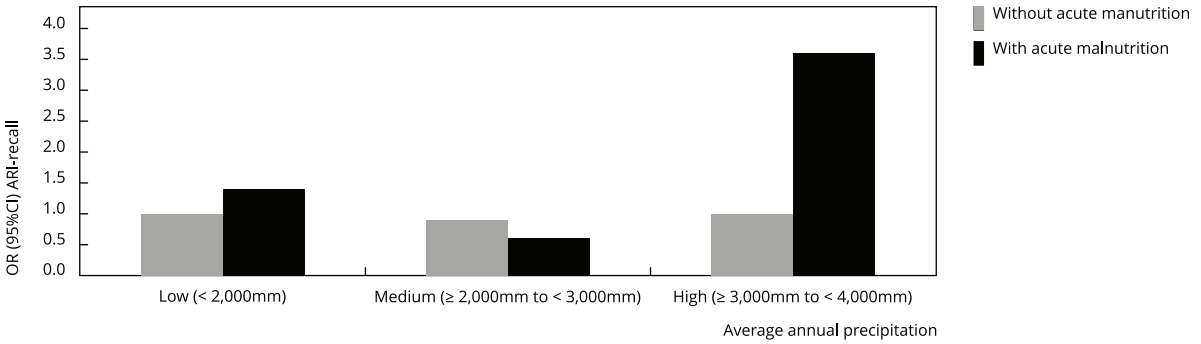
*** $p < 0.001$;

# $p < 0.01$;

$p < 0.05$.

Figure 1

Association between acute malnutrition and acute respiratory infection recall (ARI-recall) with average annual precipitation. Colombian children aged 1-5 years, 2010 *.



95%CI: 95% confidence interval; OR: odds ratio.

* Frequencies correspond to individuals in the sample; percentages were weighted according to the ENDS (*National Demographic and Health Survey – Encuesta Nacional de Demografía y Salud*) sampling design. Adjusted by age, ethnical group, wealth index, altitude over sea level and climate.

Additionally, the results presented here show that the effect of acute child malnutrition on ARI-recall is worsened by annual average precipitation. This finding is analogous to that found between environmental pollution and asthma, in which the effect is greater in malnourished children [7] and it indicates the need to reduce acute malnutrition prevalence in Colombian children, which could contribute to improve the epidemiological profile and decrease morbidity and mortality in this population.

Regarding the association between ARI and altitude above sea level, the results were not statistically significant but the direction of association is consistent with the literature [11,12], which have reported a higher altitude as a risk factor for hospitalization and mortality due to syncytial respiratory virus and H1N1 infection. This could be supported by physiological mechanisms that explain higher complication rates for respiratory diseases in people from higher altitudes in whom it has been observed less effective operation of the upper respiratory tract and higher desaturation [20,21].

Another important finding of this study was the low reduction of the ICC at cluster and municipality levels when adjusting for individual variables and their respective levels. This result indicates that important variables were not included in this analysis, which explain the variability of ARI-recall, such as those related to environmental pollution by particulate matter, nitrous oxide, tobacco smoke, and ozone concentration, according to national and international evidence associated with respiratory disease, especially in children, but not available at national level in Colombia [7,22]. Those variables need to be monitored as potential predictors of these events of interest to public health.

Concerning the strength of this study, we can mention the use of information from ENDS, which is considered representative of the national level, so it allowed us a global view of the ARI situation and of the underlying sociodemographic conditions. Also, in this study we incorporated climate, precipitation, and altitude variables, and we made an analysis through a multilevel model considering the hierarchical structure of the information at the cluster and municipality levels. However, this study had several limitations. First, the evaluation of the ARI through the recall of the mother or caregiver. The literature indicates that the identification of different ARI symptoms such as fever, cough and shortness of breath could be a difficult task for caregivers [23], something that could generate a non-differential measurement error and lead associations toward the null. Second, the analysis does not incorporate information about environmental indoor pollution and in the environment in which the child resides, although the ENDS asks about the type of cooking fuel used, which was no significantly

related to the presence of ARI-recall in Colombia. Further research is necessary on the role of different pollutants such as secondhand smoke, particulate matter, and nitrous oxide both at home and in the community, and their effects on the important health problems in children such as respiratory diseases. Third, the transversal design limits causal relationship, as there is no temporality between exposure and outcome. Finally, there were some differences between children included and excluded in this study regarding mother's education, ethnical group, affiliation to the Health System, time of breastfeeding, and wealth index. So, the obtained OR for wealth index and ARI-recall could underestimate the real association and all of the results should not be extrapolated to the Raizal ethnic group.

Conclusion

With this study, we showed that individual and climate conditions, as age, belonging to an indigenous group, wealth index, child malnutrition and average annual precipitation, were associated with ARI-recall in Colombian children. The results could be used to understand the ARI problematic in children who live in tropical countries with similar characteristics to Colombia. The importance of these findings for public health underlies the visibility of the need to work in structural conditions such as housing, health care in indigenous population and nutritional status of children aged under five years to impact ARI as a priority to reaching the third sustainable development goal. Addressing these structural conditions requires an inter-sectorial approach and a commitment by decision and policy makers, which is a challenge for health promotion in some Latin American countries.

Contributors

L. M. Cárdenas-Cárdenas, C. A. Castañeda-Orjuela and P. Chaparro-Narváez conceptualized the study, carried out the analyses and interpretation of data, drafted the manuscript, and approved the final manuscript. F. De la Hoz-Restrepo conceptualized the study, critically reviewed the manuscript, and approved the final manuscript.

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Resumen

El objetivo del estudio fue examinar la asociación entre el historial de infección respiratoria aguda (IRA) y factores individuales y ambientales, tales como clima, precipitación y altitud por encima del nivel del mar en niños colombianos. Se realizó un análisis secundario de datos de 11.483 niños colombianos, cuyas madres fueron entrevistadas por la Encuesta Nacional de Demografía y Salud de 2010*. La variable dependiente era el historial de IRA informado por la madre o cuidador(a). Las variables independientes se expresaron en el nivel individual, de clúster y municipal. En el nivel individual, consideramos las características individuales y de salud de los niños; en nivel de clúster, incorporamos la altitud sobre el nivel del mar y, en nivel municipal, incluimos la precipitación y el clima medio anual. La asociación entre el historial de IRA y las variables independientes se evaluaron con un modelo de regresión logística multinivel. El historial de IRA mostró una asociación significativa con la edad (OR = 0,61; IC95%: 0,48-0,79), pertenecer a un grupo indígena (OR = 1,51; IC95%: 1,16-1,96) y al estrato socioeconómico médio o muy bajo (OR = 2,03; IC95%: 1,25-3,30 y OR = 1,75; IC95%: 1,08-2,84, respectivamente). Identificamos una interacción entre la desnutrición infantil aguda y la precipitación anual promedio. Los niños con desnutrición aguda y aquellos de municipios con precipitaciones anuales altas mostraron un riesgo significativo 3,6 veces mayor de historial de IRA (OR = 3,6; IC95%: 1,3-10,1). Las condiciones individuales y la precipitación son factores de riesgo para el historial de IRA en niños colombianos. Los resultados pueden ser útiles para comprender la ocurrencia de IRA en niños que viven en países tropicales con características semejantes.*

Enfermedades Respiratorias; Preescolar; Análisis Multinivel

Resumo

O estudo teve como objetivo examinar a associação entre história de infecção respiratória aguda (IRA) e fatores individuais e ambientais tais como clima, precipitação e altura acima do nível do mar em crianças colombianas. Foi realizada uma análise secundária dos dados de 11.483 crianças colombianas cujas mães foram entrevistadas pela Pesquisa Nacional de Demografia e Saúde de 2010*. A variável dependente era história de IRA informada pela mãe ou cuidador(a). As variáveis independentes foram expressas em nível individual, de cluster e municipal. No nível individual, consideramos as características individuais e de saúde das crianças; em nível de cluster, incorporamos a altitude acima do nível do mar e em nível municipal, incluímos a precipitação e o clima médio anual. A associação entre história de IRA e variáveis independentes foi avaliada com um modelo de regressão logística multinível. A história de IRA mostrou associação significativa com idade (OR = 0,61; IC95%: 0,48-0,79), pertencer a grupo indígena (OR = 1,51; IC95%: 1,16-1,96) e estrato socioeconômico médio ou muito baixo (OR = 2,03; IC95%: 1,25-3,30 e OR = 1,75; IC95%: 1,08-2,84, respectivamente). Identificamos interação entre desnutrição infantil aguda e precipitação anual média. As crianças com desnutrição aguda e aquelas de municípios com precipitação anual alta mostraram um risco significativo 3,6 vezes maior de história de IRA (OR = 3,6; IC95%: 1,3-10,1). As condições individuais e a precipitação são fatores de risco para história de IRA em crianças colombianas. Os resultados podem ser úteis para compreender a ocorrência de IRA em crianças vivendo em países tropicais com características semelhantes.*

Doenças Respiratórias; Pré-escolar; Análise Multinível

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