Published in final edited form as:

BMJ Public Health. 2023 ; 1(1): . doi:10.1136/bmjph-2023-000069.

Did children's symptoms and infections decline during the COVID-19 pandemic? A comparison of parental reports before and during the pandemic from a birth cohort study in New Hampshire, USA

Janet L Peacock[1], **Susana Diaz-Coto**[1], **Vicki Sayarath**[1], **Juliette Madan**[1,2], **Margaret Karagas**[1]

[1]Department of Epidemiology, Geisel School of Medicine at Dartmouth, Lebanon, New Hampshire, USA

[2]Department of Pediatrics & Psychiatry, Children's Hospital at Dartmouth, Dartmouth Health, Lebanon, New Hampshire, USA

Abstract

Background—Restrictive measures were widely introduced at the start of the COVID-19 pandemic to reduce the spread of the virus. These restrictions have been linked to reductions in laboratory-diagnosed infections and hospitalisations. It is unclear if the observed decreases reflect a reduction in health-seeking behaviour or results from fewer infections per se.

Methods—We have explored trends in caregiver reports of respiratory infections and symptoms needing a doctor visit in children aged 0–11 years using data from the New Hampshire Birth Cohort Study in 2011–2021, comparing the prepandemic and pandemic periods. Generalized

Correspondence to Professor Janet L Peacock; Janet. L.Peacock@dartmouth.edu, Twitter Janet L Peacock @peacockjanet.
JLP and SD-C contributed equally.

Contributors Conceived and designed the analysis: MK, JLP and SD-C. Collected the data: MK, JM and VS. Performed the analysis: SD-C and JLP. Wrote the paper: SDC and JLP. Contributed to drafting/editing of entire paper: All authors. JLP is the guarantor for this paper.

Competing interests None declared.

Patient and public involvement Patients and/or the public were not involved in the design, or conduct, or reporting, or dissemination plans of this research.

Patient consent for publication Not applicable.

Ethics approval This study involves human participants and was approved by Trustees of Dartmouth College Committee For The Protection Of Human Subjects #STUDY00020844. Participants gave informed consent to participate in the study before taking part.

Provenance and peer review Not commissioned; externally peer reviewed.

Additional supplemental material is published online only. To view, please visit the journal online (http://dx.doi.org/10.1136/bmjph-2023-000069) VS is deceased.

Estimating Equations were used to model pandemic/prepandemic risk ratios (RRs) with adjustment for maternal and child characteristics.

Results—The overall probability of a report of an upper respiratory tract infection (RTI) needing a doctor visit in children aged 0–11 years was 16.7%. There was strong evidence of a decline during the pandemic: 17.9% pre pandemic versus 8.19% in the pandemic period, adjusted RR 0.51 (95% CI: 0.42 to 0.64). Similar trends were seen for any lower RTI, any respiratory symptom and any other acute symptom with overall probabilities of 4.33%, 24.8% and 13.8%, respectively, and adjusted rate ratios 0.61 (0.41 to 0.91), 0.59 (0.51 to 0.68) and 0.72 (0.59 to 0.87), respectively. In contrast, respiratory syncytial virus and bronchiolitis remained steady.

Conclusions—The steep decline in caregiver-reported infections and symptoms mirrored trends reported in laboratory-diagnosed infections and hospitalisations and suggests a real decrease in prevalence. Longer follow-up is needed to determine later consequences of the reduction in childhood infections.

INTRODUCTION

The WHO declared a COVID-19 pandemic on 11 March 2020[1] and many countries implemented stringent policies to minimise social contact and reduce the spread of the virus. Recent reports have consistently suggested that those measures impacted the occurrence of other respiratory infections. In South Korea, there was a decrease in weekly positivity rates for several respiratory viruses comparing the same weeks in 2010–2019 and 2020.[2] An association was reported between a shelter-in-place order and decreased rates of seasonal viruses in Northern California.[3] A reduction of enterovirus, rhinovirus and adenovirus was observed in Singapore[4] in the lockdown period, and in Germany there was a decrease in all respiratory viruses.[5] Reductions and/or absence of seasonal respiratory viruses were reported in Canada.[6]

Studies in children have also explored the effect of the restrictive measures: lockdown in Finland impacted the incidence of respiratory pathogens[7]; an overall reduction in respiratory infections occurred in Massachusetts[8] and New York[9] early in the pandemic. The largest decrease in weekly condition-specific hospitalisations for US children was for respiratory failure and occurred in spring.[10]

All of these studies used health services contact data and/or laboratory-confirmed infections to define the respiratory outcomes, and thus underestimate the burden of illness in the community. The New Hampshire Birth Cohort Study (NHBCS) is an ongoing prospective cohort that has been investigating the effects of environmental exposures on maternal and child health outcomes since 2009.[11 12] This study therefore provided the opportunity to investigate trends before and during the pandemic in respiratory symptoms and infections reported by caregivers among children aged 0–11 years. Our hypothesis was that children would have a lower prevalence of reported symptoms and infections during the most severe restrictions compared with before the pandemic.

METHODS

The NHBCS obtained detailed health outcome data on children from their caregiver using telephone interview. These took place at aged 4, 8 and 12 months, every 6 months from age 1 to 5 and annually thereafter. Questions covered a wide range of health problems including upper respiratory tract infections (RTIs) (conjunctivitis, otitis media, laryngitis), lower RTIs (respiratory syncytial virus (RSV), pertussis, bronchitis, bronchiolitis, pneumonia), respiratory symptoms (runny nose, cough, difficulty in breathing, wheeze, sore throat) and other acute symptoms (diarrhoea, fever). The caregiver was asked if their child had experienced any of the range of health problems (yes/no) since the last interview and then asked whether a doctor visit was required and if medication was prescribed. In this paper, we report briefly on all outcomes described and then focus on reported infections and symptoms involving a doctor visit.

The NHBCS recruits participants from prenatal clinics in New Hampshire, USA, where non-essential mass gatherings were banned by state executive order on 16 March 2020.[13] We therefore chose this date as the start of COVID-19 restrictions and included children whose caregiver provided responses between 16 March 2011 and 15 March 2021, comparing health outcomes in two periods: before 16 March 2020 (pre pandemic) versus from 16 March 2020 to 15 March 2021 (pandemic). Whole years were included to provide seasonal balance.

We compared the probabilities of a positive response to the health outcomes in the prepandemic and pandemic periods. The following covariates were included in the models based on a priori evidence: mother's age at enrolment, educational level, smoking status during pregnancy, parity, sex of infant, gestational age, birth weight, breast feeding and child daycare attendance.

Each respiratory infection or symptom was treated as a repeated measure over all timepoints. The overall probabilities of occurrence summarised the respiratory infections and symptoms outcomes. Pre-pandemic and pandemic period probabilities were calculated with unadjusted and adjusted time-period risk ratios (RRs) with 95% bootstrapped CIs.

Generalized Estimating Equations (GEE) models for Poisson-distributed outcomes were used with an exchangeable correlation matrix to account for non-independence of repeated events within individuals[14] and robust error variance.[15] Unadjusted models accounted for the elapsed time from the last interview date and the season when the interview took place. Adjusted models in addition included age of the child at reporting and the previously described covariates. Analyses included participants with complete covariate data and a category for missing data for breast feeding and daycare attendance. Sensitivity analyses used multiple imputation for missing covariates. We also computed the probabilities of responses reported quarterly since spring 2011 for the composite outcomes of any upper/lower RTIs and any respiratory and acute symptoms. Trends over time were plotted and included raw data and a smoothed trend line using a three-period moving average. Models were fitted for all children and also stratified by age: <5 years, 5–11 years. Further details of the NHBCS and modelling strategy are presented in the online supplemental M1–M4.

RESULTS

Overall, 1481 caregiver/child pairs were included and their characteristics are shown in table 1. The data flow and a comparison of those with and without complete data are in the supplement (online supplemental figure S1 and table S1, respectively). The overall prevalence of respiratory infections shows similar patterns according to caregiver report, whether a doctor visit was needed and whether medicine was prescribed from 16 March 2011 to 15 March 2021 (figure 1). In total, there were at least 1650 upper RTIs and 430 lower RTIs that included a doctor visit (table 2). The overall probability of any report of an upper RTI requiring a doctor visit in children aged 0–11 years was 16.7%. There was strong evidence of a decline during the pandemic: 17.9% in the pre-pandemic and 8.19% in the pandemic period with adjusted RR 0.51 (95% CI: 0.42 to 0.64) (table 2). Similar patterns were seen for any lower RTI, any respiratory symptom and any other acute symptom with overall probabilities of 4.33%, 24.8% and 13.8%, respectively, and adjusted rate ratios 0.61 (0.41 to 0.91), 0.59 (0.51 to 0.68) and 0.72 (0.59 to 0.87), respectively. Most individual health outcomes showed a reduction in probabilities during the pandemic. Exceptions were RSV, bronchitis, bronchiolitis, difficulty in breathing, diarrhoea where there was little evidence for any change in the pandemic period. RRs for RSV and bronchiolitis were very close to null.

The time trends from 2011 to 2021 are shown graphically for the composite health outcomes, upper RTIs, lower RTIs, any respiratory infections and any other acute symptoms (figure 2). This graphical depiction reveals the expected seasonal fluctuations in infections and symptoms with an otherwise flat trend prior to the pandemic followed by a steep decline starting in March 2020. The common seasonal pattern was not seen during the pandemic for upper RTIs and although there was a small uptick for lower RTIs and symptoms, these did not reach the pre-pandemic levels.

Age-stratified analyses showed very similar patterns to those described for the combined data with no remarkable differences by age (online supplemental tables S2a,b). Sensitivity analyses using multiple imputation generally agreed with complete-case analyses (online supplemental table S3). We also analysed any report of health outcomes overall without requiring a doctor's visit by time period and observed similar trends to those described above (data not shown).

DISCUSSION

In this prospective cohort study, caregiver reports of most infections and symptoms requiring a doctor visit fell sharply from the pre-pandemic to the pandemic periods with the exception of RSV and bronchiolitis. These findings agree with prior studies in the USA that have used health provider data such as hospitalisations and laboratory-confirmed diagnoses in adults[3–5] and in children.[8 9] The agreement between health provider usage data across a range of settings and children's caregiver reports of infections and symptoms involving a doctor's visit as described here, suggests that the decline in infections in children during the pandemic is not fully explained by a reduction in health-seeking behaviour but arises from reduced exposure to other viruses.[16] However, we cannot rule out a reluctance among

caregivers to seek medical care during the pandemic due to a fear of increasing their exposure to the virus. We are unable to assess this with the current data. The NHBCS data described here included a wide range of upper and lower respiratory symptoms, respiratory and acute infections for 9 years prior to the pandemic, allowing us to rule out a prepandemic downward temporal trend.

Limitations of this work include first, that the data are caregiver reports, and so potentially subject to bias, perhaps less so during the pandemic period. But to minimise reporting bias, we used the more objective outcome that 'required a doctor visit'. Second, restrictions were eased during the pandemic period studied, March 2020 to March 2021, with daycare reopening mid-June 2020 and school attendance resuming late August 2020, full or partially in-person, with children clustered in 'bubble' rooms but otherwise socially distanced and wearing masks. Thus, restrictions were not fully lifted and social interactions remained limited. However, this period was not truly uniform in restrictions, which our modelling ignored by estimating a single rate ratio, that is, assuming a continuous decline. The true decline in the stay-at-home period therefore may have been even steeper. A longer series of data is needed to allow the pandemic-period trend to be more precisely modelled.

The ultimate consequences of the reduction in infections and symptoms observed in children during the pandemic is as yet unknown as insufficient time has elapsed to assess any impact. It is possible that one of the longer-term effects of the pandemic will be 'immune debt' whereby children who are not exposed to infections due to COVID-19 restrictions, experience less immune stimulation and so are more vulnerable to later infections as hypothesised by Cohen *et al.*[17] It is unclear why the downward trend was not seen for RSV and bronchiolitis. However, high prevalence of RSV and Streptomycin A infections in children have been observed in 2022–23 in the USA (preprint)[18] and Europe[19] with a joint statement by WHO reporting sharp rises in RSV in 20 countries. Future prospective data with extended follow-up are needed to help understand ongoing trends and to determine the longer-term consequences of COVID-19 restrictions on children's health.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Funding

Research reported in this publication was supported in part by the National Institutes of Health, Award Numbers UH3OD023275, P01 ES022832 and US EPA RD83544201. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health.

REFERENCES

1. Cucinotta D, Vanelli M. WHO declares COVID-19 a pandemic. Acta Biomed 2020;91:157–60. [PubMed: 32191675]
2. Yum S, Hong K, Sohn S, et al. Trends in viral respiratory infections during COVID-19 pandemic, South Korea. Emerg Infect Dis 2021;27:1685–8. [PubMed: 34013875]
3. Partridge E, McCleery E, Cheema R, et al. Evaluation of seasonal respiratory virus activity before and after the statewide COVID-19 shelter-in-place order in northern California. JAMA Netw Open 2021;4:e2035281. [PubMed: 33492377]

4. Wan WY, Thoon KC, Loo LH, et al. Trends in respiratory virus infections during the COVID-19 pandemic in Singapore, 2020. JAMA Netw Open 2021;4:e2115973. [PubMed: 34181015]
5. Oh D-Y, Buda S, Biere B, et al. Trends in respiratory virus circulation following COVID-19-targeted nonpharmaceutical interventions in Germany, January - September 2020: analysis of national surveillance data. Lancet Reg Health Eur 2021;6:100112. [PubMed: 34124707]
6. Groves HE, Piché-Renaud P-P, Peci A, et al. The impact of the COVID-19 pandemic on influenza, respiratory syncytial virus, and other seasonal respiratory virus circulation in Canada: a population-based study. Lancet Reg Health Am 2021;1:100015. [PubMed: 34386788]
7. Haapanen M, Renko M, Artama M, et al. The impact of the Lockdown and the re-opening of schools and day cares on the epidemiology of SARS-CoV-2 and other respiratory infections in children – A nationwide register study in Finland. EClinicalMedicine 2021;34:100807. [PubMed: 33817612]
8. Hatoun J, Correa ET, Donahue SMA, et al. Social distancing for COVID-19 and diagnoses of other infectious diseases in children. Pediatrics 2020;146:e2020006460. [PubMed: 32879032]
9. Kaur R, Schulz S, Fuji N, et al. COVID-19 pandemic impact on respiratory infectious diseases in primary care practice in children. Front Pediatr 2021;9:722483. [PubMed: 34589455]
10. Gill PJ, Mahant S, Hall M, et al. Reasons for admissions to US children's hospitals during the COVID-19 pandemic. JAMA 2021;325:1676–9. [PubMed: 33904877]
11. Farzan SF, Li Z, Korrick SA, et al. Infant infections and respiratory symptoms in relation to in utero arsenic exposure in a U.S. cohort. Environ Health Perspect 2016;124:840–7. [PubMed: 26359651]
12. Gilbert-Diamond D, Cottingham KL, Gruber JF, et al. Rice consumption contributes to arsenic exposure in US women. Proc Natl Acad Sci U S A 2011;108:20656–60. [PubMed: 22143778]
13. State of New Hampshire. Executive order 2020–4. an order declaring a state of emergency due to novel Coronavirus (COVID-19). Available: https://www.governor.nh.gov/sites/g/files/ehbemt336/files/documents/2020-04.pdf [Accessed 23 Jan 2023].
14. Liang K-Y, Zeger SL. Longitudinal data analysis using generalized linear models. Biometrika 1986;73:13–22.
15. Zou G A modified Poisson regression approach to prospective studies with binary data. Am J Epidemiol 2004;159:702–6. [PubMed: 15033648]
16. Quandelacy TM, Adams LE, Munoz J, et al. Reduced spread of influenza and other respiratory viral infections during the COVID-19 pandemic in Southern Puerto Rico. PLoS ONE 2022;17:e0266095. [PubMed: 35476785]
17. Cohen R, Ashman M, Taha M-K, et al. Pediatric infectious disease group (GPIP) position paper on the immune debt of the COVID-19 pandemic in childhood, how can we fill the immunity gap? Infect Dis Now 2021;51:418–23. [PubMed: 33991720]
18. Wang L, Davis PB, Berger NA, et al. Disruption in seasonality, patient characteristics and disparities of respiratory syncytial virus infection among young children in the US during and before the COVID-19 pandemic: 2010–2022. Infectious Diseases (except HIV/AIDS) [Preprint].
19. World Health Organization. Joint statement - influenza season epidemic kicks off early in Europe as concerns over RSV rise and COVID-19 is still a threat. 2022. Available: https://www.who.int/europe/news/item/01-12-2022-joint-statement---influenza-season-epidemic-kicks-off-early-in-europe-as-concerns-over-rsv-rise-and-covid-19-is-still-a-threat#:~:text=The%202022%2D2023%20influenza%20(flu,circulation%20of%20influenza%20and%20RSV [Accessed 28 Jan 2023].

WHAT IS ALREADY KNOWN ON THIS TOPIC

⇒ Laboratory diagnosed infections and hospitalisations declined during the pandemic, but it is unclear if this represents a reduction in healthcare attendance or a real reduction in these health problems.

WHAT THIS STUDY ADDS

⇒ This study presents over 10 years of population-based prospective data before and during the pandemic from caregiver reports in a birth cohort in the USA. This showed a steep decline in reported symptoms and infections during the pandemic.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

⇒ The restrictive public health measures introduced during COVID-19 are associated with a reduction in childhood infections, which may hold implications for children's response to later infections. Long-term follow-up is needed to understand this.

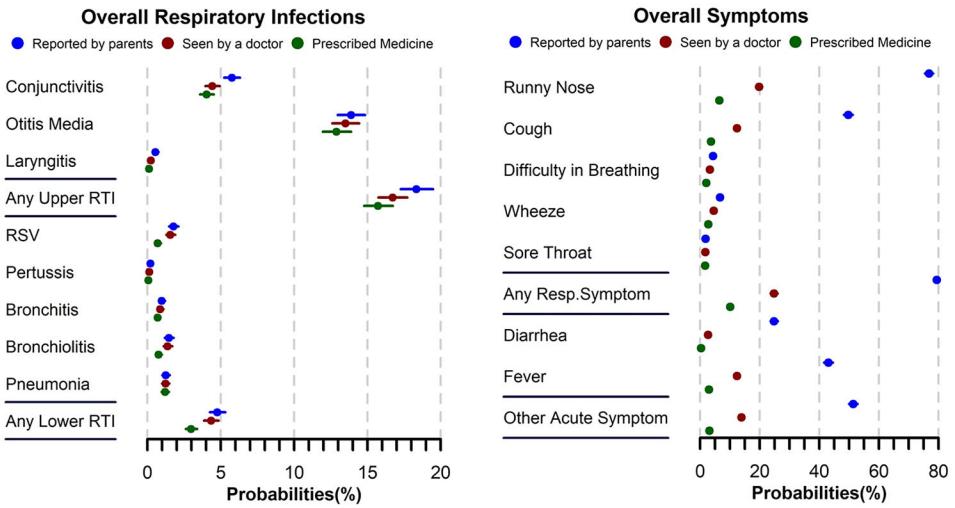

Figure 1.

Caregiver-reported respiratory infections and symptoms in children aged 0–11 years before and during the COVID-19 pandemic for children of all ages 16 March 2011 to 15 March 2021: Probability of event and 95% CI according to overall parental report, seen by a doctor and prescribed medication. RTI, respiratory tract infection.

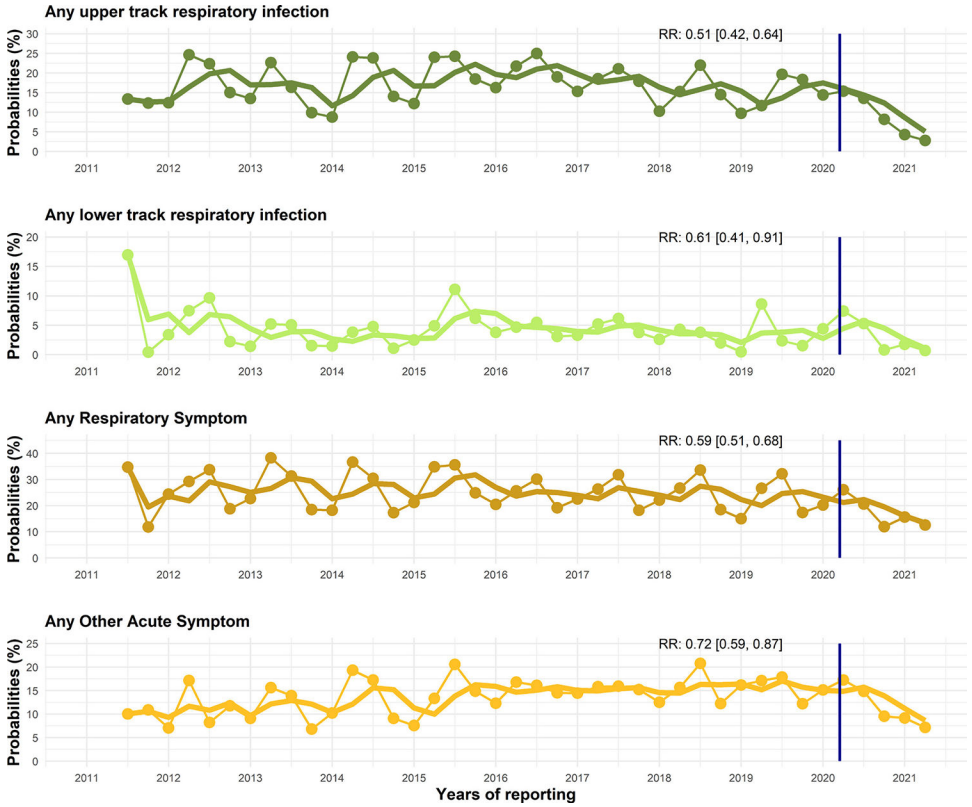

Figure 2.

Temporal trends in caregiver-reported infections and symptoms requiring a doctor visit from 16 March 2011 to 15 March 2021. Solid dots: 3-monthly probabilities; smoothed line is 3-month moving average. Solid blue line: start date for stay-at-home order in New Hampshire. Risk ratios (RRs) are the adjusted RR (95% CI) comparing probabilities pre-pandemic and pandemic periods.

Table 1

Demographic characteristics of the caregiver/child pairs (N=1481)

	Mean (SD) or N (%)
Maternal characteristics	
Age of enrolment (years)	31.6 (4.7)
Smoking status during pregnancy:	
No	1392 (94%)
Yes	89 (6.0%)
Maternal education:	
Less than 11th grade	10 (0.7%)
High school graduate or equivalent	160 (11%)
Junior college graduate	251 (17%)
College graduate	586 (40%)
Any postgraduate schooling	474 (32%)
Parity	
0	649 (44%)
1	548 (37%)
≥2	284 (19%)
Child characteristics	
Sex	
Boys	730 (49%)
Girls	751 (51%)
Gestational age (weeks)	39.3 (1.6)
Birth weight (g)	3447 (512)

BMJ Public Health. Author manuscript; available in PMC 2024 June 21.

Table 2

Caregiver reported respiratory infections and symptoms requiring a doctor visit in children aged 0–11 years before and during the COVID-19 pandemic

Outcome	Overall events, n, (%[*])	Overall probabilities[†] (%) (95% CI)	Events before pandemic, n,[‡] (%)	Probabilities before pandemic (%) (95% CI)	Events during pandemic, n,[§] (%)	Probabilities during pandemic (%) (95% CI)	Unadjusted RR (95% CI)	P value	Adj. RR[¶] (95% CI)	P value
Any upper RTI	1650 (17.2)	**16.7** (15.7 to 17.7)	1524 (18.39)	**17.9** (16.8 to 19.0)	126 (9.47)	**8.19** (6.93 to 9.67)	**0.46** (0.39 to 0.54)	<0.001	**0.51** (0.42 to 0.64)	**<0.001**
Any lower RTI	430 (4.48)	**4.33** (3.86 to 4.84)	391 (4.73)	**4.59** (4.09 to 5.15)	39 (2.96)	**2.37** (1.72 to 3.26)	**0.52** (0.37 to 0.71)	**<0.001**	**0.61** (0.41 to 0.91)	**0.016**
Any respiratory symptom	2412 (25.2)	**24.8** (23.6 to 26.0)	2183 (26.42)	**26.0** (24.7 to 27.3)	229 (17.51)	**15.6** (13.8 to 17.6)	**0.60** (0.53 to 0.68)	**<0.001**	**0.59** (0.51 to 0.68)	**<0.001**
Any other acute symptom	1369 (14.3)	**13.8** (12.9 to 14.8)	1212 (14.67)	**14.3** (13.4 to 15.3)	157 (11.93)	**10.2** (8.78 to 11.9)	**0.71** (0.61 to 0.83)	**<0.001**	**0.72** (0.59 to 0.87)	**0.001**
Conjunctivitis	438 (4.55)	**4.41** (3.95 to 4.92)	406 (4.90)	**4.73** (4.24 to 5.27)	32 (2.39)	1.99 (1.41 to 2.80)	**0.42** (0.30 to 0.59)	**<0.001**	**0.44** (0.29 to 0.67)	**0.001**
Otitis media	1347 (14.0)	**13.5** (12.6 to 14.4)	1244 (15.01)	**14.5** (13.5 to 15.6)	103 (7.65)	**6.39** (5.27 to 7.75)	**0.44** (0.36 to 0.54)	**<0.001**	**0.51** (0.40 to 0.65)	**<0.001**
Laryngitis	21 (0.22)	**0.23** (0.15 to 0.27)	19 (0.23)	**0.24** (−)	2 (0.15)	**0.19** (−)	0.78 (0.21 to 2.89)	0.707	NA	
Respiratory syncytial virus	136 (1.41)	**1.55** (1.28 to 1.88)	122 (1.47)	**1.57** (1.29 to 1.93)	14 (1.05)	**1.33** (0.77 to 2.31)	**0.85** (0.47 to 1.51)	0.570	**1.05** (0.55 to 2.01)	0.883
Pertussis	15 (0.16)	**0.12** (0.07 to 0.23)	14 (0.17)	**0.14** (−)	1 (0.07)	**0.03** (−)	**0.22** (0.03 to 1.78)	0.150	NA	
Bronchitis	93 (0.96)	**0.86** (0.68 to 1.08)	85 (1.02)	**0.92** (0.71 to 1.20)	8 (0.59)	**0.38** (0.16 to 0.87)	**0.41** (0.18 to 0.94)	**0.015**	**0.54** (0.24 to 1.25)	0.150
Bronchiolitis	119 (1.24)	**1.36** (1.10 to 1.68)	108 (1.30)	**1.39** (1.13 to 1.72)	11 (0.82)	**1.09** (0.58 to 2.05)	0.78 (0.41 to 1.52)	0.469	**1.11** (0.49 to 2.51)	0.794
Pneumonia	136 (1.41)	**1.22** (1.00 to 1.48)	125 (1.51)	**1.33** (1.08 to 1.63)	11 (0.82)	**0.46** (0.24 to 0.85)	**0.34** (0.18 to 0.64)	**<0.001**	**0.29** (0.14 to 0.58)	**0.001**
Runny nose	1849 (19.2)	**19.7** (18.6 to 20.8)	1725 (20.84)	**21.1** (20.0 to 22.3)	124 (9.32)	**9.09** (7.53 to 11.0)	**0.43** (0.36 to 0.52)	**<0.001**	**0.54** (0.45 to 0.65)	**<0.001**
Cough	1173 (12.2)	**12.3** (11.4 to 13.2)	1048 (12.66)	**12.7** (11.8 to 13.7)	125 (9.32)	**9.02** (7.48 to 10.9)	**0.71** (0.59 to 0.85)	**<0.001**	**0.74** (0.60 to 0.92)	**0.007**
Difficulty in breathing	311 (3.23)	**3.25** (2.83 to 3.74)	288 (3.47)	**3.47** (3.01 to 4.00)	23 (1.71)	**1.64** (1.05 to 2.50)	**0.47** (0.31 to 0.73)	**<0.001**	**0.64** (0.39 to 1.05)	0.077
Wheeze	432 (4.49)	**4.53** (3.99 to 5.14)	401 (4.84)	**4.86** (4.28 to 5.52)	31 (2.31)	2.14 (1.51 to 3.04)	**0.44** (0.31 to 0.63)	**<0.001**	**0.46** (0.32 to 0.67)	**<0.001**
Sore throat	224 (2.33)	**1.73** (1.48 to 2.02)	167 (2.01)	**1.68** (1.42 to 1.97)	57 (4.25)	**2.09** (1.53 to 2.86)	**1.25** (0.89 to 1.75)	0.170	**0.47** (0.31 to 0.70)	**<0.001**

Outcome	Overall events, n, (%*)	Overall probabilities† (%) (95% CI)	Events before pandemic, n,‡ (%)	Probabilities before pandemic (%) (95% CI)	Events during pandemic, n,§ (%)	Probabilities during pandemic (%) (95% CI)	Unadjusted RR (95% CI)	P value	Adj. RR¶ (95% CI)	P value
Diarrhoea	251 (2.64)	**2.64** (2.28 to 3.05)	229 (2.76)	**2.78** (2.40 to 3.21)	22 (1.65)	**1.58** (0.95 to 2.63)	**0.57** (0.34 to 0.95)	**0.021**	**0.71** (0.40 to 1.26)	0.244
Fever	1230 (12.8)	**12.3** (11.5 to 13.2)	1084 (13.11)	**12.8** (11.9 to 13.7)	146 (10.98)	**9.31** (7.94 to 10.9)	**0.73** (0.62 to 0.86)	**<0.001**	**0.71(0.58 to 0.87)**	**0.001**

Bold font indicates statistically significant RRs.

*(%) relative frequency of the events reported.

†Probability the event is reported.

‡16 March 2011 to 15 March 2020.

§16 March 2020 to 15 March 2021.

¶Ratio of probabilities adjusted for maternal/child characteristics, season, time interval between interviews and age of the children at reporting. Where the number of events was low, 95% CIs could not be computed (‘–’) and adjusted models would not converge (‘NA’).