

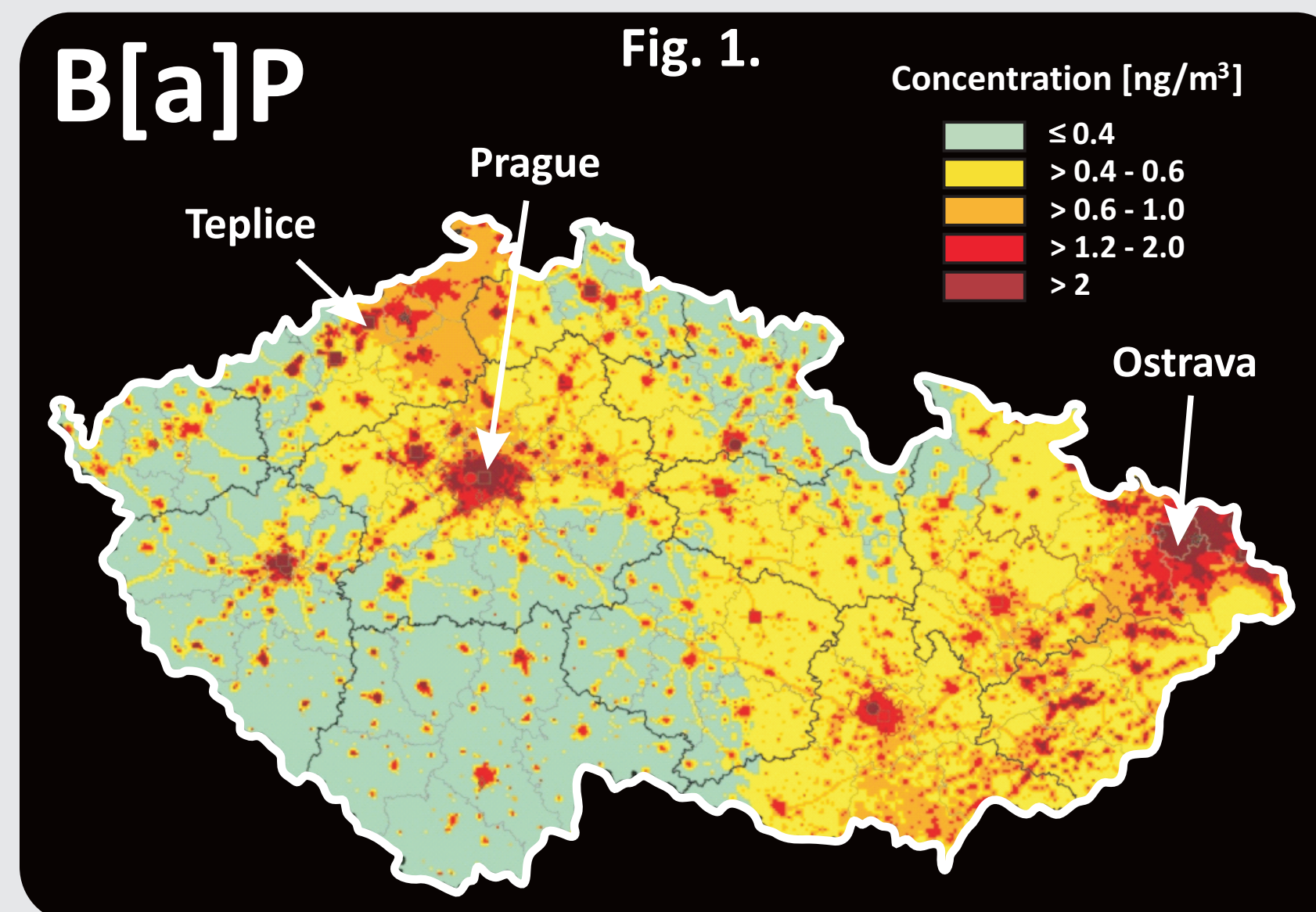
A high morbidity of preschool children in the Ostrava hot spot of PM10 pollution



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Introduction

Ostrava is the third largest city and the second largest urban agglomeration in the Czech Republic. At present it is one of the most polluted regions in European Union by particulate matter and carcinogenic polycyclic aromatic hydrocarbons. The highest annual values of PM10 have been reported from the monitoring station in Ostrava city district of Radvanice and Bartovice (R&B). We aimed at assessing morbidity of preschool children living in R&B. The study is a part of a project comparing morbidity of children living in different parts of the city of Ostrava and has been approved by the Ethical committee of IEM AS CR.



Material and methods

The data on morbidity since birth to 6 years of age were available for 101 children born in 2001/2002 and registered with the pediatric office in R&B. Out of them, 99 children were of the Czech ethnicum and 88 children were born and living all the time in R&B or in a close neighborhood. After obtaining an informed consent of parents, the pediatrician and nurse in the pediatric office in R&B abstracted the children's medical records to get the list of all illnesses of each child, including hospitalizations, in ICD-10 codes. Some codes were collected into broader groups of illnesses. The data on allergic diseases include examinations at allergy clinics. The cumulative incidences/child were evaluated for two age stages: 0 to 2 years and 2 to 6 years. Morbidity of children in R&B was compared with morbidity of 544 children born (1994-1998) and living in the industrial district of Teplice. This cohort was derived from births enrolled in the larger Pregnancy Outcome Study, which consisted of almost all deliveries in the districts of Teplice and Prachatic from May 1994 through March 1999 (Dejmek et al. 1999). In approximately 20% of deliveries maternal blood and umbilical cord blood were sampled. From this subset of 1492 deliveries, 1133 children (born 1994-1998) were followed up at the age of 3 or 4.5 years and for the second time in 2005, i.e. at the age 6-10 years. All pediatricians in the district took part in the study (for details see Hertz-Picciotto et al. 2007).

Results

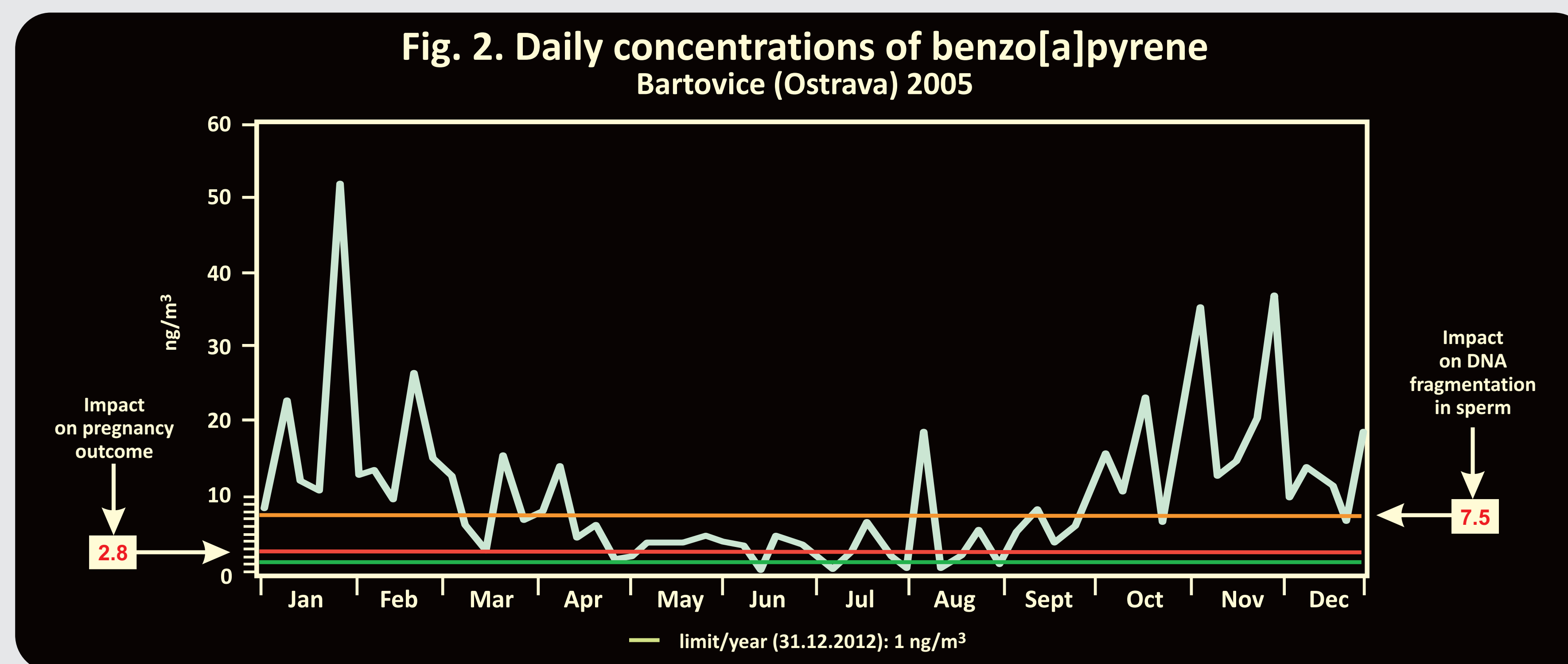
Daily means of benzo[a]pyrene (B[a]P), Bartovice 2005 - Fig. 2) as well as quarterly concentrations of PM10 in the period of the study in R&B (Table 1.) demonstrate high levels of air pollution. Quarterly concentrations of PM10 recorded in the town of Teplice were lower (Table 1.) as were monthly means of B[a]P. In 2005, the annual means of B[a]P were 1.0 ng/m³ in Teplice and 10.3 ng/m³ in R&B.

Upper respiratory infections (URI - pharyngitis, sinusitis and nasopharyngitis) had the highest cumulative incidence both

in the younger and older age stage (Table 2). During the first year of life 53 children suffered from URI more than twice (Fig. 3). In the older age the mean frequency of URI remained in the range 1.3 - 2.0/child/year (Fig. 4).

With exception of bronchitis, laryngitis/tracheitis and influenza, the cumulative incidences of acute illnesses were higher in R&B than in the district of Teplice (Fig. 5). Moreover, the diagnosis of virosis (B34), that was rather frequent in R&B, was seldom used by pediatricians in the district of Teplice.

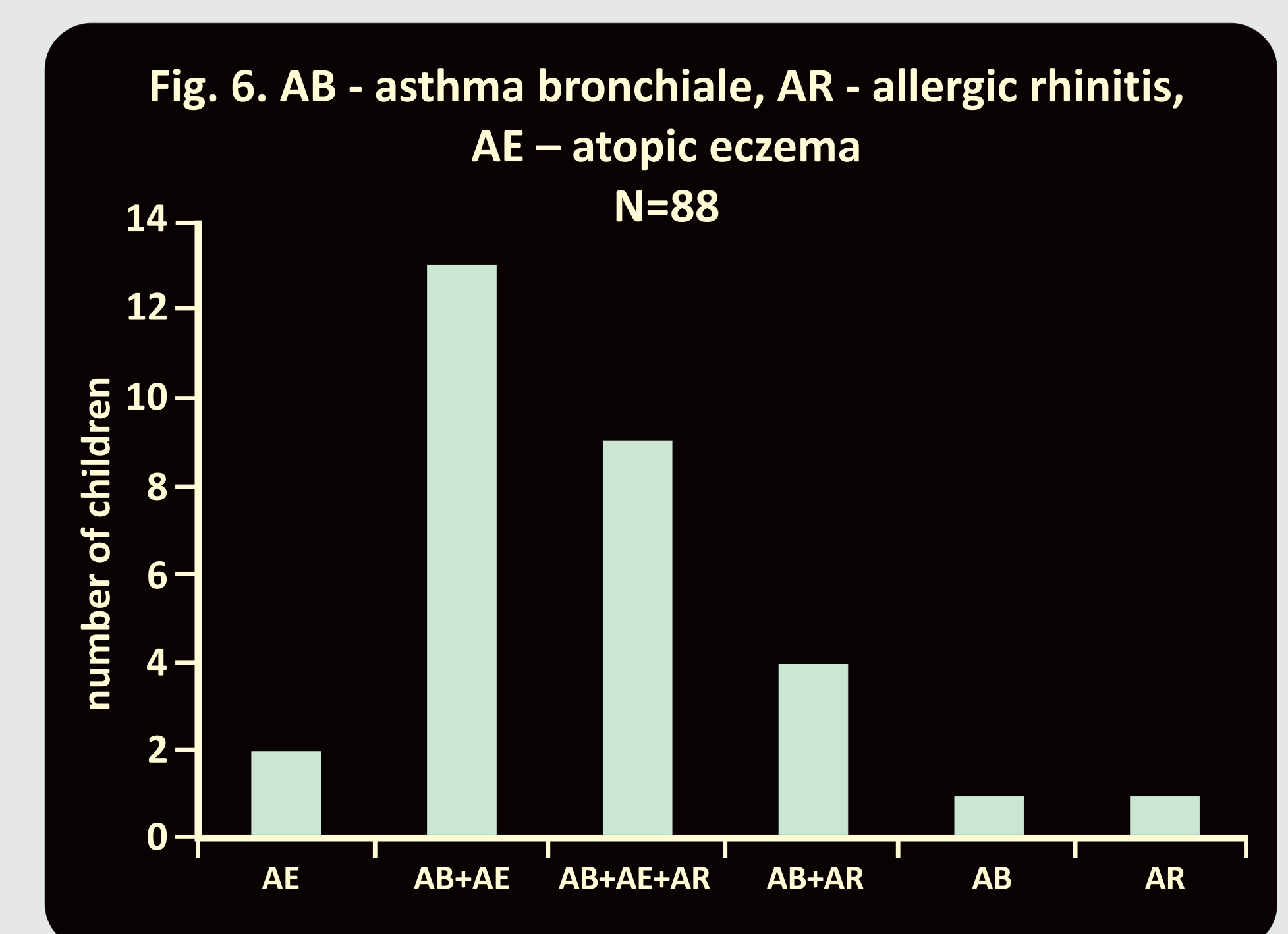
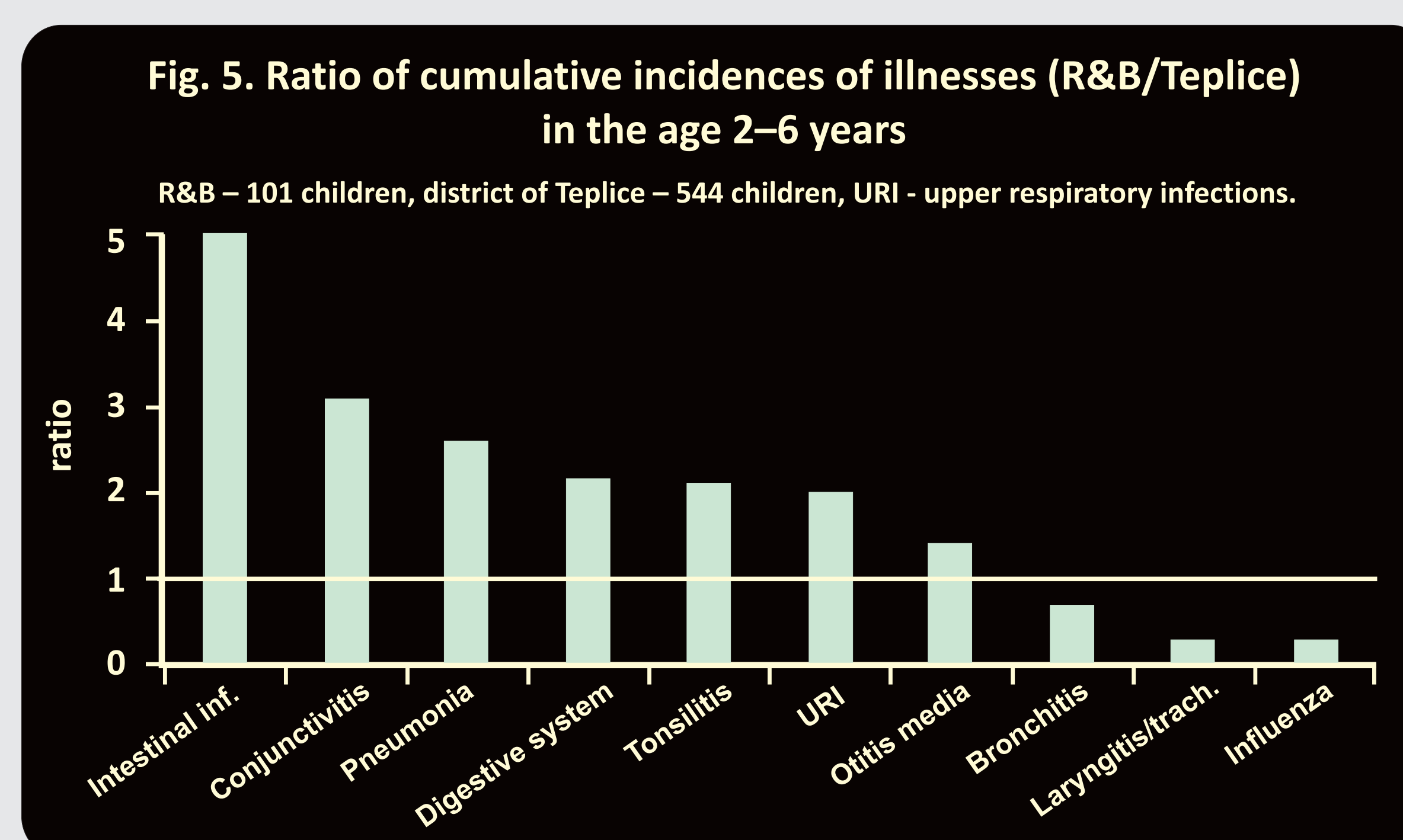
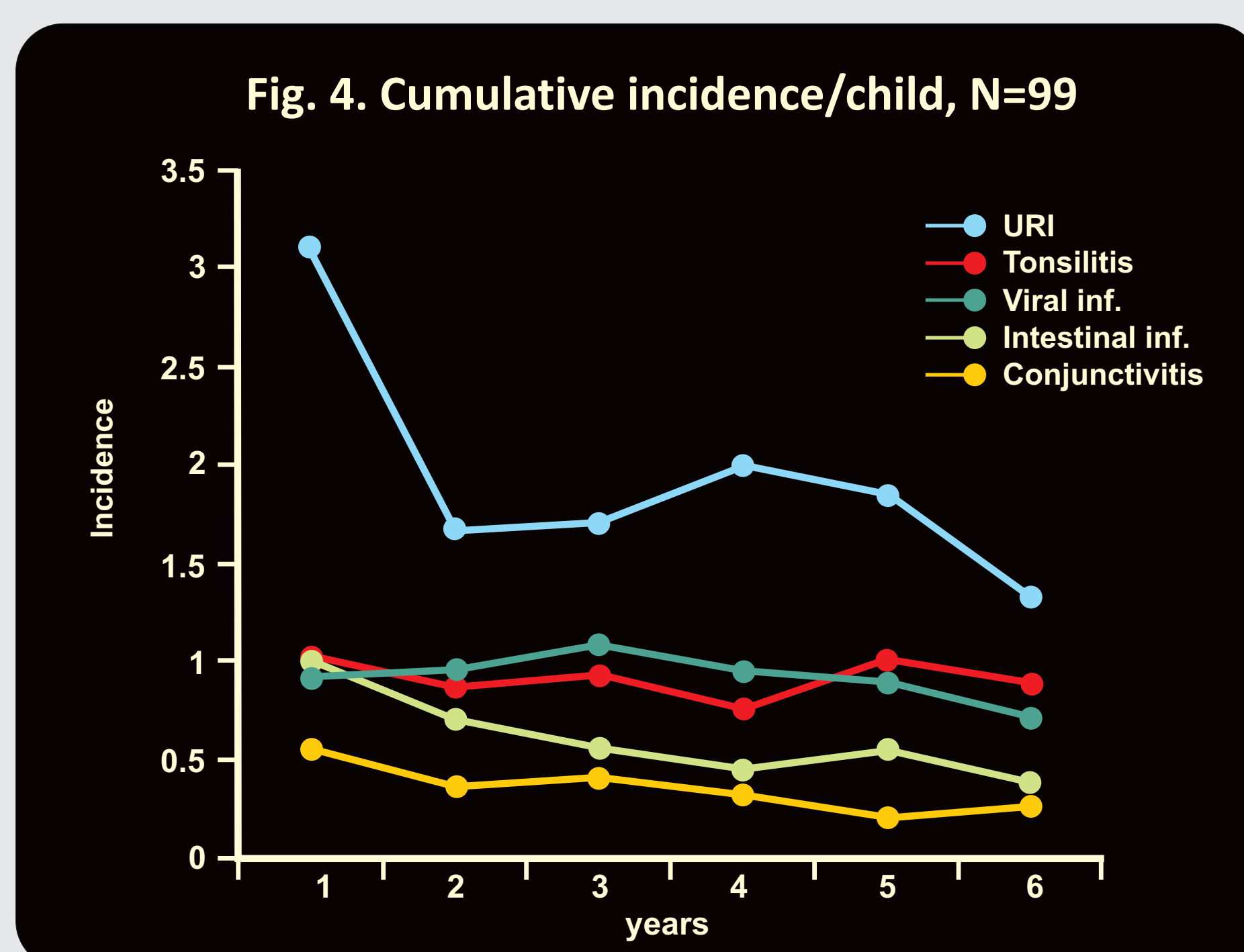
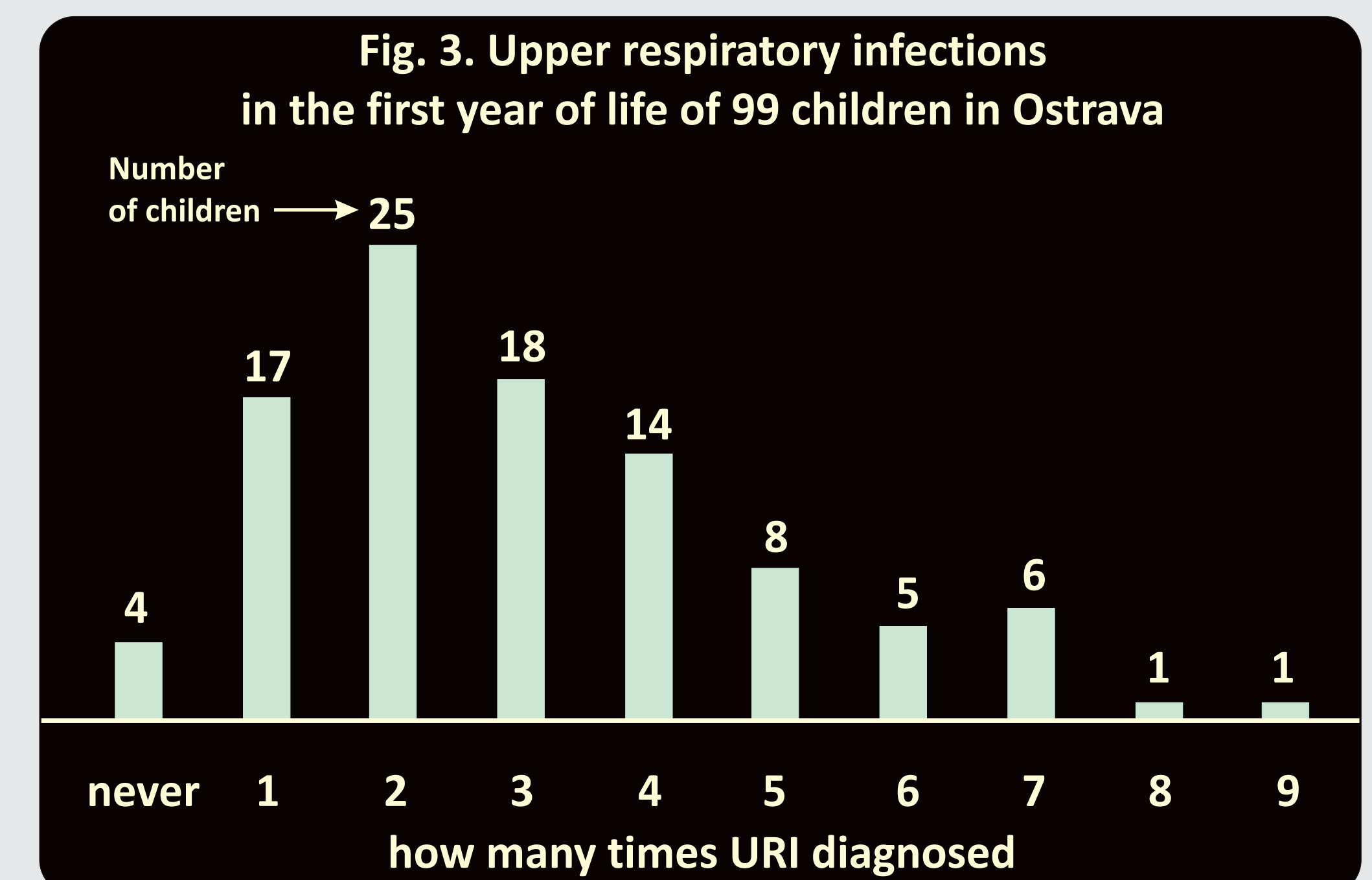
The prevalence of asthma bronchiale diagnosed by the pediatrician and allergist up to the age of 6 years was 31% (27 children out of 88 - Fig. 6). Skin tests with indoor allergens and pollen were positive in 1 child with asthma bronchiale without allergic rhinitis (N=14) and in all 13 children with asthma bronchiale combined with allergic rhinitis. The prevalence of asthma bronchiale in the Teplice cohort of 466 children of the Czech ethnicum was 8.8%.



2001		2002		2003		2004		2005		2006*		2007*	
Q1	Q4	Q1	Q4	Q1	Q4	Q1	Q4	Q1	Q4	Q1	Q4	Q1	Q4
69.9	55	52.7	75.3	88.7	45.1	51.7	41.4	56.8	x	90.9	74.6	73.7	87.9

1997		1998		1999		2000		2001		2002		2003	
Q1	Q4	Q1	Q4	Q1	Q4	Q1	Q4	Q1	Q4	Q1	Q4	Q1	Q4
69.7	43.7	52.7	39.7	40	30.3	32	29	46.5	39.7	45	35.4	65.7	48.9

Upper respiratory infections	J00-J02, J06	0 - 2 y.	2 - 6 y.
Tonsillitis	J03	1.88	3.47
Viral infections	B34	1.86	3.64
Intestinal infections	A08	1.69	1.92
D. of digestive system	R10, R14	1.38	0.44
Conjunctivitis	H10	0.91	1.09
Bronchitis	J20	0.47	1.03
Dermatitis	L22-L50	0.47	0.22
Laryngitis and tracheitis	J04	0.42	0.49
Pneumonia	J12	0.33	0.27
Otitis media	H65	0.14	0.65
Skin	L01, L04	0.14	0.21
Influenza	J11	0.13	0.41
Urinary system	N30, N39	0.02	0.14



Conclusions

- ➔ Incidences of most illnesses were higher in children living in R&B than in the district of Teplice.
- ➔ The prevalence of pediatrician/allergist diagnosed asthma bronchiale was 31%.
- ➔ Absence of sensitization to aeroallergens in 50% of children with diagnosed asthma may suggest that pediatric asthma in R&B is triggered by air pollutants.