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REGIONAL AND TEMPORAL VARIABILITY OF GP CONSULTATIONS DUE TO ASTHMA IN CHILDREN AGED 0-18 YEARS IN SILESIAN VOIVODESHIP

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ABSTRACT

The aim of this study was to analyze the spatial and temporal variability of the ratio describing outpatient medical visits due to asthma in children aged 0-18 years, living in Silesian voivodeship.

MATERIAL AND METHODS. Descriptive study was conducted, in which secondary epidemiological data concerning number of medical outpatient visits due to asthma of children in the age of 0-18 years, were analyzed. The required data from the period 2007-2010 were reported on the MZ-11 form. To assess the temporal or spatial variability in Silesian voivodeship the ArcGIS 9.2 Software was used.

RESULTS. Significant spatial and temporal variability of outpatient medical visits due to asthma in children have been discovered. The systematic increase of outpatient visits rate was observed (respectively 20.8 and 26.9% compared to the starting year). The largest values of the ratio concern the central region of the Silesian voivodeship. Most frequently outpatient medical visits due to asthma were related to children aged 5-14 years.

CONCLUSIONS. Systematic and detailed analysis of the data collected in the health care system can replace the routine reporting and may be used to identify needs for public health.

Key words: *childhood asthma, descriptive study, MZ-11 form*

INTRODUCTION

One of the routine document containing information of health problems is the annual report of activities and working in outpatient primary health care (MZ-11 form) (1). Necessary data are collected in regional offices and can be used for public health purposes, including observations of the dynamics of medical benefits related to childhood asthma. The documentation allows to determine the number of children and adolescents aged 0-18 years with the first-time recognized bronchial asthma (code J45 according to ICD-10) during a given period in those children who are patients of general practitioners (GP). Because bronchial asthma is one of the chronic disease with still growing frequency (2), it was crucial to determine the temporal and spatial variability of outpatient visits in particular aged groups of patients with recognized bronchial asthma. This knowledge may appear very useful in the prophylactics planning actions,

especially in those regions, in which the frequency of asthma is the highest. Well known scientific arguments suggest, that childhood asthma is related to ambient air pollution (2). Hence, it is worth considering to assess the relationship between registered outpatient visits due to childhood asthma with the quality of air and other determinants of health in particular regions.

The main goal of presented study was to assess the spatial and temporal variability of outpatient medical visits due to asthma in children and adolescent under 18 years, who were the GP patients in Silesian voivodeship, in years 2007-2010.

MATERIAL AND METHODS

The study was a descriptive epidemiological study. Data of outpatient medical visits due to bronchial asthma (code J45 according to ICD-10), including first-

time visits, in children and adolescent under 18 years was obtained from the Department of Medical Research and Statistics, Silesian Voivodeship Office in Katowice. Annual report (MZ-11 form) of the activities and working in outpatient primary health care (GP) concern the period 2007-2010 and describe the number of children aged 0-18 years consulted by GP in Silesian voivodeship, and separately for all counties in study region.

The subjects were children with recognized asthma in five age categories: 0-2; 3-4; 5-9; 10-14 and 15-18 years. Obtained data included also the total number of children in selected aged groups enrolled in PHC (primary health care) in particular counties of Silesian voivodeship. The study included two levels of administrative division in Silesian voivodeship: regional level (NTS 3) with the eight sub-regions such as Częstochowa, Bytom, Sosnowiec, Gliwice, Katowice, Rybnik, Tychy, Bielsko-Biała; and local level (NTS 4) with 17 counties and 19 cities with county status. NTS (Nomenclature of Territorial Units for Statistics) is an ordered list of the names of territorial units and their associated symbols used in the collection of statistics by the Central Statistical Office (3). Rates describing the number of children with outpatient medical visits due to asthma (including first-time visits) in particular years and particular counties were calculated. The final rates are presented as the value calculated per 10 000 children. The temporal trends of rates in the study period (years 2007-2010) were analyzed. Finally, its territorial variability in counties of Silesian voivodeship were presented as a value of rates averaged for studied period (4 years). Both, temporal and territorial variability in poviats of Silesian voivodeship, were illustrated by the ArcGIS 9.2 software (Fig.3. and 4.). In the statistical analysis methods available in the software Statistica 9.0.PL and procedures included in MS Excel 2007 were used.

RESULTS

The number of children with outpatient medical visits due to bronchial asthma (J45), patients of GPs located in Silesian voivodeship has steadily increased, the observed growth was 20,8% in the study period 2007-2010 (Tab I). It was mostly related to an increase of the first-time visits.

In 2010, 814 more than in 2007 children were registered, which means that the observed growth stands at 26.9% compared to the first year of study period. The ratio describing the number of children and adolescent aged 0-18 years with recognized bronchial asthma (J45), and simultaneously treated by a GP in 2007-2010 in Silesian voivodeship increased, also for the first-time-visits.

Table I. Number and rates (n/10 000) of outpatient medical visits due to asthma (J45) in children aged 0-18 years, GP patients in Silesian voivodeship.

Year	Number of medical visits due to asthma N	Number of first-time medical visits due to asthma N (%)	Rate of medical visits due to asthma (n/10 000)	Rate of first-time medical visits due to asthma (n/10 000)
2007	21596	3029 (14.0%)	249.6	35.0
2008	22126	2880 (13.0%)	268.7	35.0
2009	24517	3530 (14.4%)	289.9	41.7
2010	26096	3843 (14.7%)	321.0	47.3

The number of children with diagnosed asthma, patients of primary health care, increase in all aged groups, however the largest percentage of sick children was observed in the age group of 5-14 years, and the smallest – in children aged 0-2 years (Tab II).

This trend was also observed in the temporal and spatial terms, (Figure 1) except of the decreasing the number of children with outpatient visits in poviats of Tychy in 2010. Similarly, the systematic increase of the number of children with first-time outpatient visits was observed in most counties in Silesian voivodeship, excluding Częstochowa and Gliwice poviats (Figure 2).

There was an increase of outpatient medical visits rates in almost all counties of Silesian voivodeship (Table III), with the largest averaged ratio (mean value for the study period 2007-2010) in Tychy sub-region, and with the smallest – in Rybnik sub-region.

Figure 3 illustrates the values of the averaged ratio describing the number of children with asthma in PHC during the study period 2007-2010 years. It shows that

Table II. Number of outpatient medical visits due to asthma (J45) in children aged 0-18 years and the percentage of children treated in the particular age groups, Silesian voivodeship.

Year	Number of children N	Number and percentage of outpatient medical visits due to asthma in particular aged groups of children (N (%))				
		0-2 years	3-4 years	5-9 years	10-14 years	15-18 years
2007	21596	1272 (5.9%)	2875 (13.3%)	6587 (30.5%)	6539 (30.3%)	4323 (20.0%)
2008	22126	1589 (7.2%)	3263 (14.7%)	6541 (29.6%)	6420 (29.0%)	4313 (19.5%)
2009	24517	1909 (7.8%)	3586 (14.6%)	7397 (30.2%)	6958 (28.4%)	4667 (19.0%)
2010	26096	2249 (8.6%)	4084 (15.6%)	8069 (30.9%)	7032 (26.9%)	4662 (17.9%)

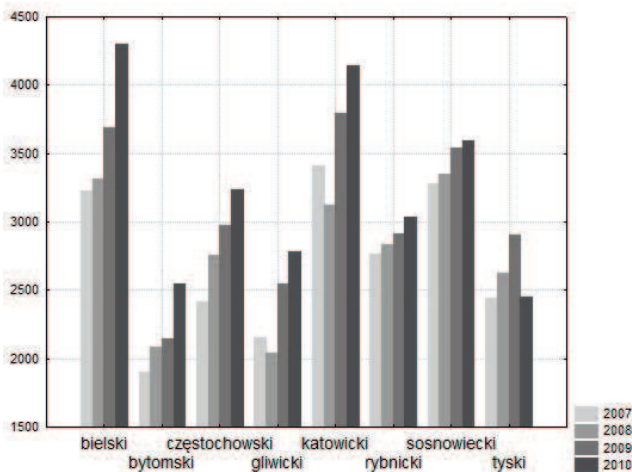


Fig. 1. Number of outpatient medical visits due to asthma (J45) in children aged 0-18 years in particular counties of Silesian voivodeship, study period 2007-2010.

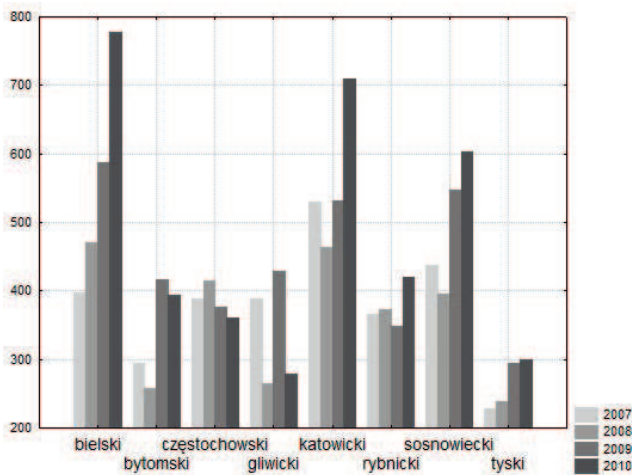


Fig. 2. Number of first outpatient medical visits due to asthma (J45) in children aged 0-18 years in particular counties of Silesian voivodeship, study period 2007-2010.

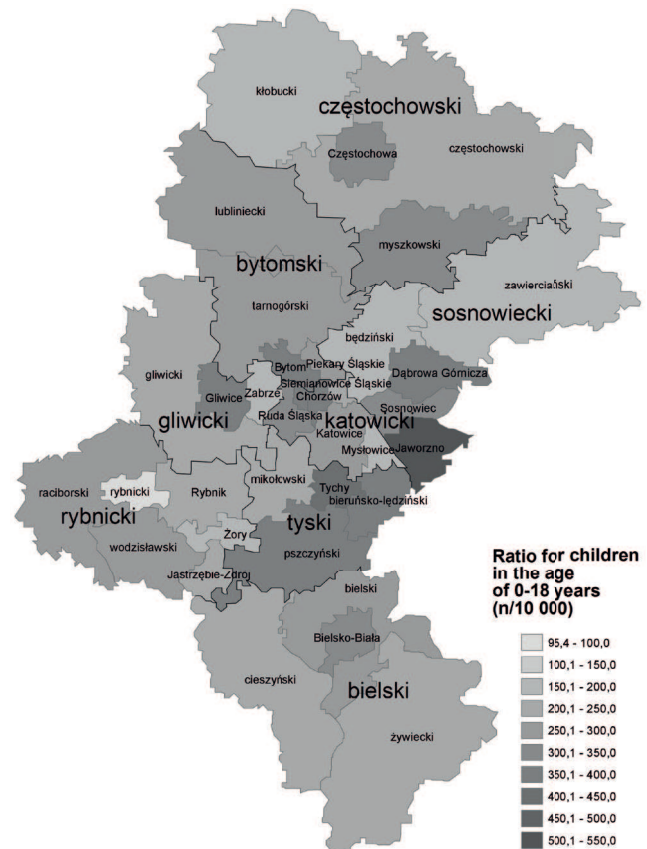


Fig. 3. Averaged ratio of the outpatient medical visits due to asthma (J45) in children aged 0-18 years (n/10 000), study period 2007-2010, Silesian voivodeship.

Rybnik powiat was the region with the smallest ratio (95.4/10 000 children under 18 years), and Jaworzno powiat had the largest value (537.7/10 000 children under 18 years). Similarly, the lowest averaged ratio describing the number of children with the first-time recognized asthma was observed in Rybnik powiat (14.7/10 000 of children under 18 years), and the larg-

Table III. The ratio describing total and first-time outpatient medical visits due to asthma in children aged 0-18 years in particular counties of the Silesian voivodeship (n/10 000).

Counties	Year	Outpatient medical visits per 10000 children				Ratio averaged for the period 2007-2010
		2007	2008	2009	2010	
bielski	total	223.5	238.0	273.8	345.0	270.1
	first-time visits	27.5	33.8	43.5	62.5	41.8
bytomski	total	246.5	306.4	306.4	353.4	303.2
	first-time visits	38.2	38.0	59.3	54.7	47.5
częstochowski	total	234.9	267.7	294.9	331.4	282.2
	first-time visits	37.8	40.3	37.3	36.9	38.1
gliwicki	total	231.3	251.7	289.5	329.9	275.6
	first-time visits	41.8	32.6	48.7	32.9	39.0
katowicki	total	258.7	253.2	297.0	342.5	287.8
	first-time visits	40.1	37.6	41.7	58.7	44.5
rybnicki	total	219.3	224.3	228.5	248.5	230.1
	first-time visits	29.0	29.5	27.4	34.4	30.1
sosnowiecki	total	293.1	310.4	297.1	308.3	302.2
	first-time visits	39.1	36.7	45.9	51.7	43.3
tyski	total	312.8	352.5	375.8	329.3	342.6
	first-time visits	29.2	32.1	38.0	40.2	34.9

est was noted in Świętochłowice powiat: 105.5/10 000 children in the age of 0-18 (Figure 4).

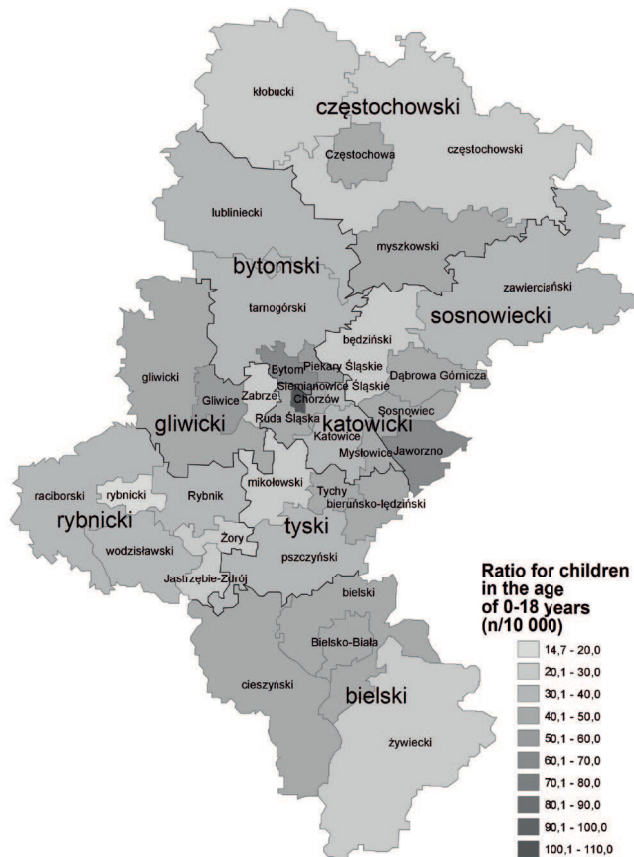


Fig. 4. Averaged ratio of first outpatient medical visits due to asthma (J45) in children aged 0-18 years (n/10 000), study period 2007-2010, Silesian voivodeship.

DISCUSSION

The obtained results show the significant temporal and spatial variability of the ratio describing the number of outpatient medical visits in PHC among children with recognized asthma. The systematic increase of ratio describing the number of children with recognized asthma, including first-time recognized disease was observed in the most of subregions in Silesian voivodeship (except the Częstochowa subregion). The largest percentage of the outpatient medical visits in PHC concern the age group of 5-14 years, and the lowest was observed in the youngest children, i.e. 0-2 years. This observation is coherent with data presented by ISAAC study (International Study of Asthma and Allergies in Childhood), in which the estimated frequency of asthma symptoms in Polish children was the highest in the aged group 13-14 years (about 10-20% children in Poznań) (4). It is worth noticing, that the number of the youngest children (i.e. 0-2 years) with diagnosed asthma and consulted by GP in PHC in Silesian voivodeship was doubled in the study

period, while the number of the oldest children (15-18 years) was stable. Systematic studies conducted by the Department of Epidemiology, Medical University of Silesia in Katowice, suggest the significant under-diagnosis of asthma in school-age children, which stand about 50% (5,6). The results of the current study (BUPAS) conducted by the Department among children aged 6-14 years suggest, that the frequency of ever diagnosed asthma or its symptoms were larger in cities than in rural areas in Silesian voivodeship (7). An increasing number of children with asthma, including the youngest children, could be an effect of growing parental awareness, as well as better diagnosis of childhood asthma. It is considered, that under-diagnosis of asthma by the GP in children aged 0-15 years during the first visit in PHC stands at 18.8% and is systematically decreasing during following visits (8). Existing data suggest that optimal control of the disease in children is possible only in case of close cooperation between children, their parents and the medical staff, especially GP (8,9). Presumably, the better primary health care for children with asthma in partnership with their parents is the likely cause of decline in the number of asthmatic patients hospitalized due to asthma in clinical hospitals in Japan (10) and the UK (11). Results of the other study confirm that the proper care of specialized nurse and/or GP in children aged 6-16 years with stable asthma is actually sufficient for the treatment (12).

An important observation is the location of the highest values of the two indicators (describing all visits due to childhood asthma and first-time visits) in the central part of Silesian voivodeship. Worth noting is that the largest averaged values of total rates were observed in Jaworzno county, and the largest averaged value of first-time medical visits were noted in Świętochłowice and Jaworzno counties. The lowest values of both rates were observed in Rybnik county. It is not excluded the impact of environmental exposure associated with the quality of ambient air; the available published data suggest, that the higher incidence of acute respiratory diseases (and hence higher number of outpatient medical visits) refers days with poorer air quality (13). Recent studies indicate significant relationship between incidence of childhood asthma and location of residence, disease occurs more frequently in children living near roads with heavy traffic (14,15,16). However, it is difficult to relate this knowledge to obtained results showing the territorial variability of rates describing number of children with asthma diagnosed by GP. The main limitation of the interpretation is secondary character of data used in the analysis. Recent data of average levels of air pollution obtained from monitoring stations in Silesian voivodeship show a similar air quality in regions with the highest and lowest values of outpatient medical visits (17). Perhaps, here reveals the impact of industrialization and the existing roads with heavy traffic in the various counties. However

definitive conclusions cannot be drawn without further study in the field of environmental epidemiology, with the use of direct assessment of exposure to environmental pollution, relevant to the pathogenesis of asthma.

Moreover, socio-economic conditions of child's families, including housing and lifestyle of parents (e.g. tobacco smoking) or availability of medical services also have an impact on the number of outpatient medical visits. Analogously, the clear requesting require some specific data. The applied model of study allowed to identify the variability of GP visits due to childhood asthma in particular counties of Silesian voivodeship. Such a population diagnosis meaningfully supports activities in the field of public health and it should be used in the planning of health benefits associated with the analyzed disease. Moreover, the obtained perspective proves that intensive study in the field of environmental epidemiology, aiming to explain the reasons of territorial differentiation of the prevalence of childhood asthma.

CONCLUSIONS

The systematic increase and spatial variability of rates describing the number of children and adolescents with diagnosed asthma consulted by GP were observed in Silesian voivodeship. Concluding the obtained results, the intentional analysis of routine data should be used in relation to needs of public health.

REFERENCES

1. Annual report on the activities and employment in the primary ambulatory health care (MZ-11 form); www.csioz.gov.pl/src/files/mz/MZ-11_2012.pdf; access: 25.09.2012 [In Polish].
2. CEHAP. The plan for the environment and the health of children. Diseases of the respiratory system and the quality of the air. www.cehap.pl/4-1-1/Diagnoza.html; access: 25.09.2012 [In Polish].
3. The Nomenclature of Territorial Units for Statistical Purposes (NTS). Central Statistical Office; www.stat.gov.pl/gus/5840_5955_PLK_HTML.htm (access: 25.09.2012) [In Polish].
4. The Global Asthma Report 2011. ISAAC. International Study of Asthma and Allergies in Childhood. Dostęp: www.theunion.org/images/stories/pressrelease/Global_asthma-report.pdf; cytowany 26.09.2012.
5. Brożek G, Zejda JE, Wypych A, Farnik M. Where are they? Underdiagnosis of childhood asthma in Poland. *Allergy* 2008; Vol.63; Suppl.88: 17th EAACI Congress of the European Academy of Allergology and Clinical Immunology. Barcelona [Spain], 7-11.06.2008. Abstr. p.177 [449].
6. Brożek G.M, Zejda J.E, Kowalska M, Gębuś M, Igielski M. Opposite trends of allergic disorders and respiratory symptoms for children over a period of large-scale ambient air pollution decline. *PJOES* 2010; 19(6):1133-38
7. Shpakou A, Brożek G, Stryzhak A, Neviartovich T, Zejda J. Allergic diseases and respiratory symptoms in urban and rural children in Grodno Region (Belarus). *Pediatr Allergy Immunol* 2012; 23: 339–346.
8. Guarnaccia S, Lombardi A, Gaffurini A, Chiarini M, Domenighini S, D'Agata E, Schumacher R.F, Spiazzi R, Notarangelo L.D. Application and implementation of the GINA asthma guidelines by specialist and primary care physicians: a longitudinal follow-up study on 264 children. *Prim Care Respir J* 2007;16(6):357-362
9. Moth G, Schiøtz P.O, Vedsted P. A Danish population-based kohort study of newly diagnosed asthmatic children's care pathway – adherence to guidelines. *BMC Health Servi Res* 2008;8:130-138
10. Maeda T, Horiba M, Furui H. Trends in asthma management over a ten-year period in Gifu Prefecture. *Aerugi* 2011;60(11):1550-59
11. Butland B.K, Strachan D.P, Crawley-Boevey E.E, Anderson H.R. Childhood asthma in south London: trends in prevalence and use of medical services 1991-2002. *Thorax* 2006;61:383-387
12. Kuethe M, Vaessen-Verberne A, Mulder P, Bindels P, van Aalderen W. Paediatric asthma outpatient care by asthma nurse, paediatrician or general practitioner: randomised controlled trial with two-year follow-up. *Prim Care Respir J* 2011;20(1):84-91
13. Biesiada M, Zejda JE, Skiba M. Air pollution and acute respiratory diseases for children: regression analysis of morbidity data. *Pol J Occup Med Environ Health* 2000; 13: 113-120.
14. Skrzypek M. Występowanie chorób i objawów ze strony układu oddechowego u dzieci a wielkość potencjalnego narażenia na komunikacyjne zanieczyszczenia powietrza atmosferycznego. Rozprawa doktorska SUM w Katowicach 2010; Promotor: prof. J.E.Zejda [In Polish].
15. Kasznia-Kocot J, Kowalska M, Górny RL, Niesler A, Wypych-Ślusarska A. Environmental risk factors for respiratory symptoms and childhood asthma. *Ann Agric Environ Med* 2010; 17: 221–229.
16. Gruzjeva O, Bergstrom A, Hulchiy O, Kull I, Lind T, Melen E, Moskalenko V, Pershagen G, Bellander T. Exposure to air pollution from traffic and childhood asthma until 12 years of age. *Epidemiology* 2013;24(1):54-61
17. Śląski monitoring powietrza. Państwowy Inspektorat Ochrony Środowiska w Katowicach; www.stacje.katowice.pios.gov.pl/monitoring/; access: 25.09.2012 [In Polish].

Received: 27.12.2012

Accepted for publication: 20.05.2013

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