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Epidemiology of asthma in Poland in urban and rural areas, based on provided health care services

Epidemiologia astmy w Polsce z podziałem na regiony wiejskie i miejskie na podstawie danych dotyczących udzielanych świadczeń zdrowotnych

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Abstract

Introduction: Asthma is a serious health and social problem, also in Poland. The epidemiological data indicate that the problem of asthma concerns approximately 4 million people in Poland, whereas almost approximately 70% of them have no diagnosis and are not aware of their illness, and on the other hand in 39% of persons who declared the diagnosis of asthma in a survey the diagnosis was negatively verified (overdiagnosis of asthma). So far, no detailed comparative studies for asthma incidence rate in urban and rural areas were conducted in Poland.

The aim of the study was to analyze patients with asthma in Poland in the years 2008—2012, with regard to province and type of commune (rural/urban).

Material and methods: The study used data from National Health Fund (NFZ) — reported by health care providers regarding the patients diagnosed with asthma. Using structured query language (SQL) a set of patients was selected and created, for whom at the same time ICD-10 code: J45.X-bronchial asthma was reported. In order to estimate the number of patients with asthma we used the PESEL social security number as a unique identifier of the patient. Code of the patient's commune of residence in conjunction with the Central Statistical Office data formed the basis for the division of municipalities into urban and rural areas. The analysis of asthma incidence trends in Poland was performed on the basis of health services provided to patients. The analysis was performed by using the Statistica 10 software using a negative binomial regression model.

Results: In 2009 a significant increase in the number of patients with asthma was observed compared with the previous year, whereas after 2009 the number of patients diagnosed with asthma remained relatively constant. A significant increase of predominance of women among asthma patients in recent years can be noticed: from 107% in 2008 to almost 115% in 2012 (F:M ratio). Regardless of the analyzed year and the diagnosis the incidence rate remained constant: approximately 55—57% for urban areas and about 43—45% in rural areas.

Conclusions: The average prevalence rate for rural areas is significantly lower than for urban areas. The use of adjusted incidence rate leads to the conclusion that the number of sufferers in urban areas is higher (about 10%) of the number of sufferers in the rural areas. The results of the analysis are consistent with information from previous studies in Poland and in the world.

Key words: asthma, prevalence, epidemiology of asthma

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Streszczenie

Wstęp: Astma jest ważnym problemem zdrowotnym i socjalnym na świecie oraz w Polsce. Dostępne dane epidemiologiczne wskazują, że problem astmy dotyczy prawie 4 mln osób w Polsce, podczas gdy około 70% z nich nie ma postawionej diagnozy i nie są świadomi swojej choroby. Jednocześnie około 39% chorych z postawioną diagnozą astmy jest następnie negatywnie weryfikowana (nadrozpoznawalność astmy). Do tej pory brakuje szczegółowych badań porównawczych astmy w regionach wiejskich i miejskich.

Celem badania była analiza danych chorych na astmę w Polsce w latach w latach 2008—2012 w odniesieniu do województw oraz typu gminy (wiejskie/miejskie).

Materiał i metody: W badaniu zastosowano analizę danych NFZ — sprawozdawanych przez świadczeniodawców — pacjentów ze zdiagnozowaną astmę. Przy zastosowaniu SQl (*structured query language*) wyodrębniono i utworzono zbiory pacjentów dla których sprawozdano kod ICD-10: J45.X- dychawica oskrzelowa. W celu oszacowania liczby pacjentów wykorzystano numer PESEL, jako unikalny identyfikator pacjenta. Kod gminy miejsca zamieszkania w połączeniu z danymi Głównego Urzędu Statystycznego był podstawą podziału gmin na regiony miejskie i wiejskie. Analizę trendu zachorowalności na astmę w Polsce wyliczono na podstawie udzielonych pacjentom świadczeń zdrowotnych. Analizę przeprowadzono za pomocą narzędzia Statistica 10, korzystając z modelu ujemnej regresji binominalnej.

Wyniki: W 2009 roku obserwowano istotne zwiększenie liczby chorych na astmę w porównaniu z rokiem poprzednim, natomiast po 2009 roku liczba pacjentów z rozpoznaniem astmy pozostawała na względnie st ałym poziomie. Zwraca uwagę istotny wzrost w ostatnich latach przewagi kobiet wśród chorych na astmę: ze 107% w 2008 roku do prawie 115% w 2012 roku (stosunek K:M). Niezależnie od badanego roku i rozpoznania utrzymuje się stały współczynnik zachorowalności: około 55—57% dla regionów miejskich i około 43—45% dla regionów wiejskich.

Wnioski: Średni wskaźnik chorobowości dla regionów wiejskich jest istotnie niższy niż dla regionów miejskich. Zastosowanie skorygowanego współczynnika zachorowalności pozwala na stwierdzenie, że liczba chorujących w regionach miejskich jest większa (o około 10%) od liczby chorujących w regionach wiejskich. Wyniki analizy są zbieżne z informacjami z wcześniejszych badań w Polsce i na świecie.

Słowa kluczowe: astma, chorobowość, epidemiologia astmy

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Introduction

Asthma is a chronic inflammatory disease of the respiratory tract. This illness is a significant social and economical problem due to its symptoms, which significantly impact the quality of life, and frequently also the life expectancy of patients, but also due to its prevalence: in accordance with epidemiological data up to 10% of Polish population suffers from asthma (*ECAP study). The definition of asthma, which was first published in the GINA document in 1993 is constantly modified as the knowledge on the complex pathogenesis and phenotypes of the illness is being complemented. The definition currently in force describes asthma as: "heterogeneous disease, usually characterized by chronic airway inflammation".

It is defined by the history of respiratory symptoms such as wheeze, shortness of breath, chest tightness, and cough that vary over time and in intensity, together with variable expiratory airflow limitation" (*GINA2014).

This definition shows clearly that the diagnosis of asthma is a clinical diagnosis, in practice not based on objective criteria. This results in the diagnostics of this illness being difficult and highly dependent on the experience and knowledge of the medical practitioner [1, 2]. Additionally the complicated pathogenesis of the disease, the variation of its symptoms, the geographic diversification of its occurrence, the impact of age, method of disease treatment (disease control) and co-existing diseases result in a frequently inaccurate epidemiological assessment, resulting from either overdiagnosing or, as frequently, underdiagnosing the incidence of disease.

Health services in Poland are financed by the National Health Fund (NFZ), pursuant to the Act [3] and the Regulation of the Minister of Health resulting thereof [4]. Treatment of respiratory tract diseases is performed within a framework of a health services provision contract. The rules of organisation, financing and settling of the services are in accordance with the NFZ President's Regulations [5]. Due to the organisation of health care in Poland, asthma is most frequently diagnosed by primary health care physicians and by pulmonary pulmonary medicine or allergology specialists. Most frequently these diagnoses are treated as initial and requiring confirmation, established as observation for asthma.

Epidemiology of asthma

It is estimated that over 300 million people suffer from asthma worldwide — depending on the study the data indicate the presence of the disease among 1–18% of the general population [6–11]. It is estimated that solely in Europe approx. 30 million people are treated for asthma [8]. Most frequently the course of asthma is mild or moderate. This means that full control is obtained with the use of small or moderate doses of drugs which modify the course of the disease. However in approximately 5% of patients heavy asthma is present, which requires the use of high doses of drugs. This is frequently connected to occurrence of adverse effects (frequently serious), while not always leading to the management of symptoms. This results in significant increase of treatment costs, resulting from the increase of the number of unplanned visits, emergency (ER) visits, hospitalisations, and also from the feeling of being sick, absenteeism at work and many other indirect costs. It is estimated that almost 95% of all resources assigned to asthma therapy is used for the treatment of this group (5% of patients).

Reaching further into pharmacoeconomic data it is estimated that the treatment of asthma accounts for 1% to 2% of expenses for the treatment of chronic diseases and 15 million of DALYs (disability-adjusted life years). Although in developed countries the incidence rate has reached a plateau, in countries where these indicators where on a low level so far a significant increase of incidence rate can be observed currently [12, 13].

Asthma is a serious health and social problem, also in Poland. The epidemiological data indicate that the problem of asthma concerns approximately 4 million people in Poland, whereas almost 70% of them have no diagnosis and are not aware of their illness, and on the other hand in 39% of persons who declared the diagnosis of asthma in a survey the diagnosis was negatively verified (overdiagnosis of asthma) [14]. At the same time in the group of allergic diseases asthma is first in the ranking of absence caused by disease, of hospitalisation, disability and death [9]. Approximately 1500 patients die annually in Poland due to asthma complications. The character of the disease, that is, the chronic or recurrent symptoms of airway limitation mean that asthma has a significant impact also on factors such as quality of life, efficiency in work, absences caused by disease, frequency of hospitalisation or social activity. This results in high economic and social costs, the assessment of which is difficult. Although the assessment of costs performed as a part of epidemiological studies is accurate, it is also expensive and possible to be conducted only as a part of a certain section of population. The high costs of these studies prevent them from being repeated in intervals which would enable the assessment of trends over time. For this reason attempts at using secondary sources of information, such as disease registries, data on temporary inability to work, hospital statistics or outpatient treatment statistics for the studies of direct and indirect costs of asthma have been made. Although these data have some error resulting from the inaccuracy of diagnoses, incompleteness of data or difficulty in establishing the population exposed to risk, they do enable a much wider assessment: it is possible not only to assess the full population which inhabits the given area, but also to observe changes and trends over time, on which the aforementioned error should have no significant impact. Thus one may assume that the use of data sources concerning the use of reimbursed medical products, the use of health care services, such as medical consultation, ER visits or hospitalisations and information concerning social costs of asthma (medical leave — ZUS social security databases) may enable more complete assessment of treated population, and as a consequence the monitoring of asthma incidence rate. Complex multivariate analysis should also enable establishing the dynamics of asthma incidence rate and establishing the factors which may influence the occurrence of the disease, its clinical picture (phenotype) and its course.

So far only few studies were carried out on the epidemiology of asthma in Poland. One of them — PMSEAD (acronym The **P**olish **M**ulticentre **S**tudy of **E**pidemiology of **A**llergic **D**iseases) (22), was designed to obtain estimates representative of the entire Polish population to assess asthma prevalence and risk factors. It was conducted in 11 regions of Poland, each of which was divided to three parts and one part was a rural area. In another big epidemiological study named ECAP a single rural area (2055 surveyed persons) was compared with eight urban areas (cities with population exceeding 100,000 — 15,562 surveyed persons). Significant disparity between the study population and the population residing in Poland (rural population is approximately 40% of the population of Poland) may be a source of significant error in both studies, just like a relatively small cohort compared to the country population.

Table 1. Number of asthma patients divided according to sex, in 2008–2012

Tabela 1. Liczba pacjentów z astmą w podziale na płeć w latach 2008–2012

	2008	2009	2010	2011	2012
Women	467,126	592,534	604,274	618,334	623,079
Men	437,141	554,913	561,871	562,297	543,239
No data	1857	2184	1923	2131	2353
Final total	906,124	1 149,631	1,168,068	1,182,762	1,168,671
W/M ratio	106.86%	106.78%	107.55%	109.97%	114.70%

Currently the data concerning the health care services performed for patients which are delivered by the service providers to the National Health Fund province Departments and collected by the National Health Fund enable the collective analysis of the population of asthma patients in Poland.

The work has described the results of asthma patients' data analysis in the years 2008–2012. The following were estimated:

1. Number of asthma patients, depending on whether the area is urban or rural.
2. Prevalence indicator (per 10,000 inhabitants), taking into account the type of commune, divided by province.
3. Prevalence indicator (per 10,000 inhabitants), taking into account the type of commune.
4. Prevalence indicator (per 10,000 inhabitants), divided by province.

Material and methods

The asthma prevalence database was constructed based on the data reported to NFZ by the service providers. The data of patients for whom ICD-10: J45.X — asthma code was reported was selected from the IT systems which store the information on patients reported in settlement reports. The study used the following data from the data reported in statistical reports:

a) unique patient identifier (PESEL number),
b) diagnosis (ICD-10 code) and
c) residence identifier (commune code).

PESEL number and the diagnosis code enable rather accurate estimation of the number of asthma patients. The place of residence in turn enables identification of the type of commune. The lack of data applies to cases where services were provided to homeless people, for example. In the studied period the share of unidentified data was small and statistically insignificant and amounted to an average of 0.28% (respectively: 2008 — 0.25%; 2009 — 0.30%; 2010 — 0.27%; 2011 — 0.29% and 2012 — 0.31%). The data was collected from the databases using SQL tools, using a filter in accordance with the accepted scope of ICD-10 diagnoses. The analysis was conducted using Excel and Statistica 10 tools, using a negative binomial regression model. The demographic data was collected from the Central Statistical Office website [15].

The analysis of the asthma incidence rate trends in Poland calculated based on the health services provided to the patients was compared to the results of obtained studies, in which the following protocols were used: International Study of Asthma and Allergies in Childhood (ISAAC) and European Community Respiratory Health Survey (ECRHS).

Results

The population of asthma patients in Poland during the years 2008–2012 depending on sex was established in Table 1.

In the year 2009 a significant increase of the number of patients with asthma was observed compared to the previous years, whereas after 2009 the number of patients with a diagnosis of asthma remained at a relatively constant level. A significant increase of the predominance of women among asthma patients during the last years can be noticed: from 107% in 2008 to almost 115% in 2012 (the F:M ratio).

The population of asthma patients in Poland during the years 2008-2012 depending on the place of residence, with an additional division into asthma diagnosis subgroups: J45.0 — predominantly allergic asthma, J45.1 — nonallergic asthma, J45.8 — mixed asthma and J45.9 — unspecified asthma was established in Table 2. Since approximately 40% of the population inhabits rural areas and 60% — urban areas,

Table 2. Number of patients divided into asthma diagnosis subgroups in Poland in urban and rural areas in the years 2008–2012

Tabela 2. Liczba pacjentów w podziale na rozpoznania w obszarach miejskich i wiejskich w Polsce w latach 2008–2012

Diagnosis	2008	2009	2010	2011	2012
J45	831,676	1,073,920	1,088,891	1,077,175	987,106
urban (60% of population)	544,618	692,631	701,030	693,429	635,114
Corrected prevalence (%)	56%	55%	55%	55%	55%
rural (40% of population)	285,050	378,839	385,663	381,444	349,710
Corrected prevalence (%)	44%	45%	45%	45%	45%
J45.0	75,594	83,562	81,336	133,390	179,108
urban	49,880	54,746	53,641	87,632	117,212
Corrected prevalence (%)	56%	56%	56%	56%	56%
rural	25,524	28,640	27,543	45,543	61,601
Corrected prevalence (%)	44%	44%	44%	44%	44%
J45.1	11,432	13,640	13,900	25,251	38,675
urban	8,203	9,787	9,988	17,831	27,406
Corrected prevalence (%)	63%	63%	63%	61%	62%
rural	3,210	3,828	3,889	7,398	11,202
Corrected prevalence (%)	37%	37%	37%	39%	38%
J45.8	11,720	13,705	13,743	23,212	35,710
urban	8,023	9,097	9,069	15,013	23,277
Corrected prevalence (%)	59%	57%	56%	55%	55%
rural	3,663	4,585	4,635	8,172	12,394
Corrected prevalence (%)	41%	43%	44%	45%	45%
J45.9	29,497	40,762	43,361	73,553	119,355
urban	18,804	26,261	27,802	47,069	76,981
Corrected prevalence (%)	54%	55%	54%	54%	55%
rural	10,566	14,330	15,402	26,274	42,100
Corrected prevalence (%)	46%	45%	46%	46%	45%
TOTAL:	959,919	1,225,589	1,241,231	1,332,581	1,359,954

a corrected percentage value of asthma incidence rate for the inhabitants of rural and urban areas was calculated using the following formula:

If UI = inhabitants of urban areas, and RI = inhabitants of rural areas, then

$$\text{Corrected prevalence indicator in rural areas} = \frac{1.25\ \text{RI}}{1.25\ \text{RI} + 0.83\ \text{UI}} \times 100\%$$

$$\text{Corrected prevalence indicator in urban areas} = \frac{0.83\ \text{UI}}{1.25\ \text{RI} + 0.83\ \text{UI}} \times 100\%$$

Similarly to the previous chart a significant increase of the number of asthma patients compared to the previous year could be observed in 2009. A higher precision in the provision of asthma aetiology information can be noticed since 2011: the number of J.45 diagnoses is decreased compared to J.45.x (unspecified, mixed, nonallergic or predominantly allergic asthma). The observation that regardless of the studied year and diagnosis the incidence rate remains constant: approximately 55–57% for urban areas and approximately 43–45% for rural areas is rather interesting. The nonallergic asthma, which is much more frequently diagnosed in cities than in rural areas: 63:37 is a single exception. The use of a corrected incidence rate enables stating that the number of patients in urban areas is higher (by approximately 10%) from the number of patients in rural areas (Table 3).

The province with the highest prevalence indicator is the Świętokrzyskie province (13) (years 2008–2011) and Wielkopolskie province (15) in 2012. The lowest indicator was noted in the Podlaskie province (10) in all the years included in the study. The marked trend line

Table 3. Asthma morbidity indicator (with a J45.X diagnosis) per 10,000 inhabitants divided by province and region in the years 2008–2012

Tabela 3. Wskaźnik chorobowości astmy (z rozpoznaniem J45.X) na 10 000 mieszkańców w podziale na województwa i regiony miejskie/wiejskie w latach 2008–2012

Province/region	2008	2009	2010	2011	2012
Dolnośląskie	190.97	273.50	265.88	253.81	251.17
urban	203.67	289.39	280.51	271.01	269.00
rural	157.95	233.70	229.43	212.54	208.35
Kujawsko-Pomorskie	266.26	300.79	308.16	307.93	303.59
urban	272.45	312.57	321.37	323.80	318.53
rural	178.46	280.79	285.96	281.57	278.54
Lubelskie	271.51	318.28	317.48	318.40	300.66
urban	316.45	363.03	359.43	359.29	340.33
rural	230.73	278.42	279.97	282.00	265.21
Lubuskie	173.68	265.59	259.81	251.80	252.85
urban	187.53	280.58	273.99	267.51	267.58
rural	148.13	237.73	233.64	223.49	225.47
Łódzkie	174.28	273.85	282.10	294.47	304.53
urban	196.52	301.53	308.43	321.78	336.21
rural	132.66	222.46	233.74	245.26	247.81
Małopolskie	276.64	337.45	338.25	327.04	321.60
urban	304.91	363.53	361.06	350.81	350.31
rural	247.61	310.47	314.58	302.94	292.87
Mazowieckie	223.81	263.75	274.35	279.37	269.51
urban	231.01	270.82	284.31	290.76	282.30
rural	208.38	248.39	254.12	256.23	244.37
Opolskie	172.50	252.15	261.29	262.70	264.99
urban	206.28	294.19	305.62	308.09	302.60
rural	132.85	202.82	209.19	208.66	219.04
Podkarpackie	216.26	301.20	313.21	315.07	340.97
urban	265.63	338.98	350.16	353.65	384.53
rural	181.31	273.83	286.43	286.89	309.47
Podlaskie	164.78	213.64	224.10	229.61	248.62
urban	182.45	234.06	245.61	248.43	271.21
rural	138.04	181.70	189.97	199.83	212.64
Pomorskie	270.43	331.28	337.13	344.66	326.77
urban	290.18	349.95	350.62	360.47	341.86
rural	229.66	293.05	308.68	311.92	295.07
Śląskie	274.15	324.82	335.19	342.81	319.70
urban	275.79	325.65	338.46	346.67	324.22
rural	264.91	318.06	320.56	326.25	300.32
Świętokrzyskie	287.56	360.24	373.36	371.93	329.48
urban	350.52	415.13	421.46	416.97	373.27
rural	234.81	313.73	332.72	333.87	292.21
Warmińsko-mazurskie	251.31	290.87	259.13	256.68	269.43
urban	269.54	311.28	275.65	275.33	289.09
rural	222.71	258.88	233.28	228.35	239.38
Wielkopolskie	244.12	335.70	347.39	349.35	363.14
urban	263.96	360.98	375.68	383.76	398.33
rural	217.50	302.14	309.93	304.83	317.12
Zachodniopomorskie	251.36	316.31	312.86	309.71	317.72
urban	273.85	344.41	338.65	335.23	343.24
rural	200.40	251.70	253.80	251.07	258.25

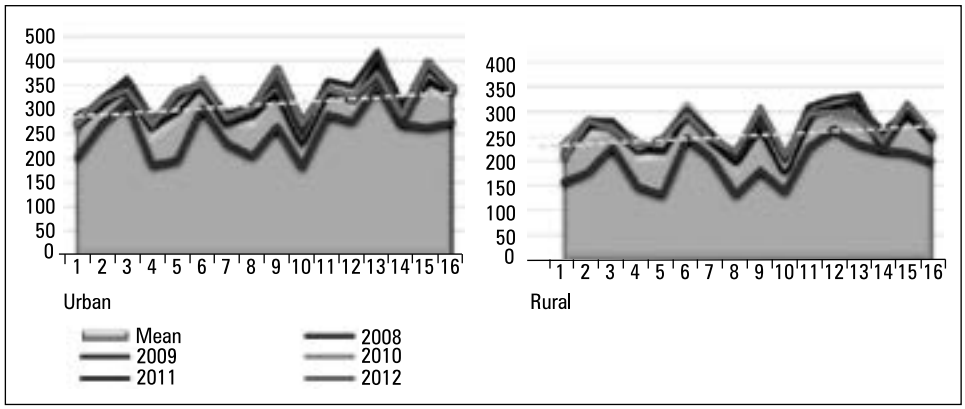

Figure 1. Asthma prevalence indicator per 10,000 inhabitants, on the left side — urban areas, on the right side — rural areas (1–16 — numbers of the fund branches), dotted line shows the trend (which is similar in both regions)

Rycina 1. Wskaźnik częstości występowania astmy na 10 000 mieszkańców województwa, z lewej strony obszary miejskie, z prawej strony obszary wiejskie (1–16 — liczba oddziału funduszu), przerywana linia pokazuje trend (podobny w obu regionach)

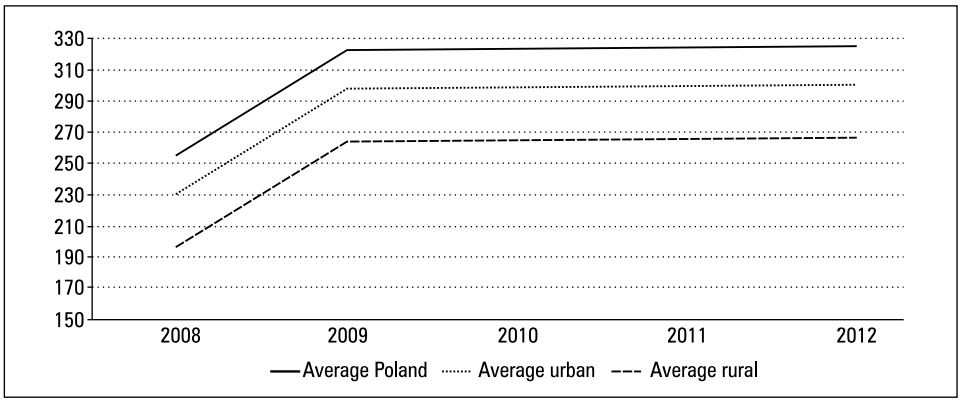

Figure 2. Value of the prevalence indicator per 10,000 inhabitants divided by regions, compared to the average for Poland in the years 2008–2012

Rycina 2. Wartość wskaźnika zachorowalności na 10 000 mieszkańców województwa w podziale na regiony w odniesieniu do średniej dla Polski w latach 2008–2012

indicates a similar behaviour of the incidence rate regardless of the region (similar gradient of the trend curve).

The diagram presented on Figures 2 demonstrate that the average value of prevalence indicator for rural areas is significantly lower than for urban areas, which corresponds to the results obtained by other studies. This situation may be caused by the way of living of the urban inhabitants, that is more sterile living conditions, exaggerated hygiene or higher environmental pollution in urban areas.

The highest average value of prevalence in urban areas occurs in the Świętokrzyskie province, which was demonstrated in Table 2. The lowest values are the Podlaskie and Lubuskie provinces. For the rural areas the largest indicator was noted in the following provinces: Świętokrzyskie, Wielkopolskie, Śląskie and Małopolskie, and the lowest one in Podlaskie province (Fig. 3).

Discussion and conclusions

The second half of the 20th century is the period of significant increase of incidence of allergic diseases, which are currently one of the largest public health problems [16]. Asthma is an important allergic disease, due to, among others, generation of relatively high social costs. This is why epidemiological studies concerning asthma incidence are so important. Conducting them is difficult, however, due to the aforementioned problems with asthma diagnosis, varying course or different phenotypes of the disease. Epidemiological studies of this disease may use different sources of data listed below:

1. Self-reported data questionnaires, where the patient enters information on key symptoms of asthma. These questionnaires are usually prepared for widely conducted clinical

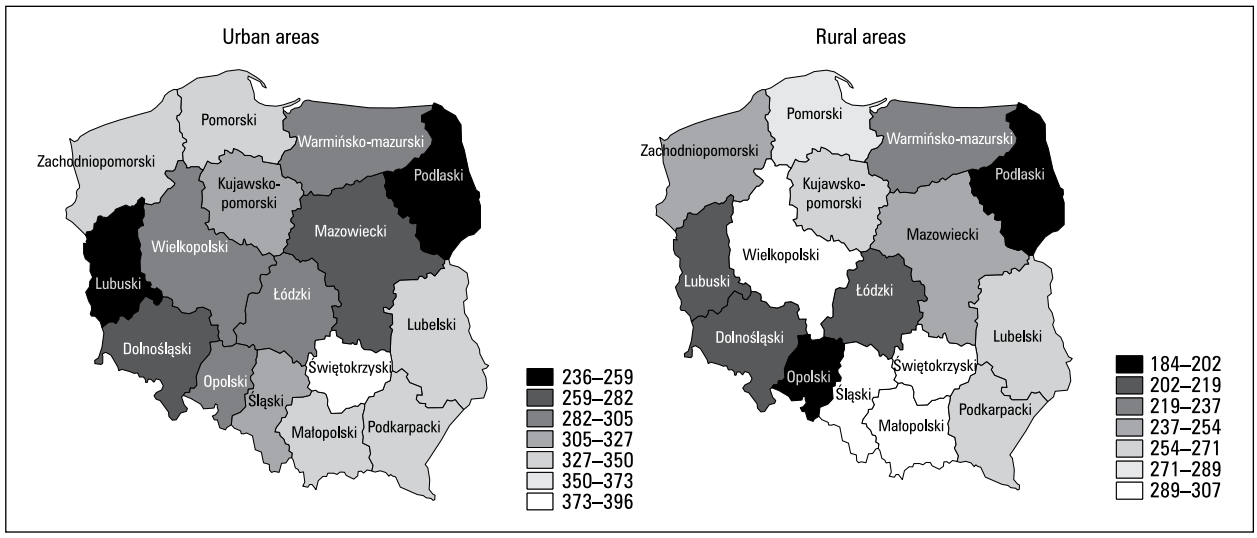

Figure 3. Average value of the prevalence indicator per 10,000 inhabitants of the province for the years 2008–2012 divided by provinces

Rycina 3. Średnia wartość wskaźnika zachorowalności na 10 000 mieszkańców województwa dla lat 2008–2012

studies of asthma. Their advantage is a low price, which enables studying a relatively high population, and their disadvantage is the problems patient has with recalling symptoms, as well as individual perception of ailments.

2. Data on hospitalisation for asthma.
3. Data resulting from the anti-asthma drug prescriptions.

Depending on the used source of information data on asthma prevalence differ significantly. In a prospective study conducted on a group of children in Denmark, which has compared the 3 assessment methods listed above, prevalence was estimated at 32% based on prescription data, self-reported data questionnaires enabled the diagnosis of the disease in 12% of the population, whereas hospitalisation registries diagnosed asthma in only 6.6%. Moreover, the combination of the three methods enabled the averaging of the prevalence on a level of only 3.6%, which means that the groups established using various methods mostly do not overlap: it was established that these methods are significantly different, as confirmed by a low kappa coefficient (0.21–0.38) [17]. It seems that the method of formulating the questions in the questionnaires may have an impact on these differences. The questions in the ISAAC study turned out to be more efficient. They concentrated not on a previous diagnosis, but on the symptoms and events, such as, e.g. previous hospitalisation for asthma (in the Denmark study one of the questions was: "did a doctor diagnose the child with asthma at any time previously?").

Our data coming from disease registries are also subject to errors mainly associated with inaccuracy of diagnoses: population diagnosed with asthma may involve not only asthma but also ACOS (Asthma/COPD Overlap symptom), COPD (Chronic Obturatory Pulmonary Disease) and some other disorders. Other problems include incompleteness of data or difficulty in establishing the population exposed to risk.

Key role in the epidemiology of asthma was played by two study projects: International Study of Asthma and Allergies in Childhood (ISAAC) and European Community Respiratory Health Survey (ECRHS). The data obtained from them not only supplemented the knowledge on the causes of asthma and other allergic diseases, but became the initial point for further epidemiological studies thereof. The ISAAC study has established asthma incidence differences of up to 15 times between various centres. The ECRHS study (concerning persons aged between 20 and 44 and conducted in 48 centres from 22 countries) also demonstrated the existence of geographical differences in the frequency of occurrence of asthma. It was most rarely diagnosed in Greece and Estonia (2%), and most frequently in Great Britain (8.4%) [18].

The first epidemiological study of asthma in Poland involving rural areas was PMSEAD published as early as in 2007 (22). The main advantage of this study, as compared to those conducted according to the ISAAC or ECRHS protocols, is that it was based on a sample of population living in different parts of the country. Particular emphasis was placed on proper diagnosis and

selection of a wide range of patients aged 3 to 80 years from both urban and rural environment. It was the first epidemiological study confirming the existence of a strong relationship between increased prevalence of asthma and living in areas with higher black smoke pollution. However study cohort was relatively small due to the study design (19,000). In 2003 Samoliński's team conducted the pilot studies in Poland which indicated that the problem of allergic diseases applies to approximately 25% of Poles.

The same team of experts has implemented in the years 2006−2008 a cross-sectional epidemiological study, ECAP (Epidemiology of Allergic Diseases in Poland). It's results indicate that the symptoms of asthma are present in 19.3% of children in the age of 6−7 years, in 10.2% children in the age of 13−14 years and in 12.4% of adults in the age of 20−44 years (average of 13.6%). At the same time a significant difference could be observed in the frequency of occurrence of asthma between urban centres (on average 14%) and rural areas (on average 9.1%). The declared asthma (based on a survey study) was diagnosed in 4.4% of children in the age of 6−7 years, 6.2% of children in the age of 13−14 years and in 4% of adults (on average 4.6%, that is 1.7 million persons). Here also significant differences between urban areas (average 4.8%) and rural areas (average 2.9%). Similar conclusions were obtained by Kulus in his study, which estimates asthma to be twice more frequently present in Warsaw than in Polish villages (22% compared to 11.4%) [19]. Also Kuna, referring to the results of studies conducted by Kupryś-Lipińska et al. within the area of Łódzkie province indicated that asthma is present in 18.4 percent of urban children and 6 percent of children living in rural areas. Similar proportions are present in the adult population: 13.2% of asthmatics in urban areas and 4.2% in rural areas [20, 21].

In addition, in 2008 NFZ introduced funding of benefits associated with the diagnosis of the disease. This introduction of Diagnosis-Related Group (DRG) system resulted in improving the quality of data transmitted by hospitals. After the initial period of the increase in the number of reported patients in a specific group of diagnoses reporting of data has been stabilizing.

To summarise epidemiological observations it should be emphasised that there is a significant difference in asthma prevalence depending on the region: urban vs rural. The average indicator of prevalence per 10,000 inhabitants for urban areas in the years 2008−2012 amounted to 306.8 patients, with a prevalence for rural areas at a level of 250.9 patients. This indicates that for the studied period the average ratio of urban areas/rural areas prevalence indicators is 1.22. The highest difference occurred in 2008 (urban/rural = 1.31), reaching a stable value of 1.23 in the next years. Analysing the prevalence value divided by regions the highest prevalence for urban regions occurs in the Świętokrzyskie province (indicator = 395.47; Fig. 3), and this value is stable over the entire studied period. Only for 2012 a similarly high value is present in the Wielkopolskie province (indicator = 398.33). In case of rural areas a high value of averaged value of the morbidity indicator is present in multiple provinces: Świętokrzyskie (indicator = 301.4); Śląskie (indicator = 306.02); Małopolskie (indicator = 293.69); Wielkopolskie (indicator = 290.30).

Conclusions

The results of analysis conducted on data concerning the health services provided to asthma patients overlap with the data from previous studies conducted in Poland and worldwide. Thus it seems that this data may be confirmed in the future for epidemiological studies of asthma.

Conflict of interest

The authors declare no conflict of interest.

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