ACCESSIBILITY AND AVAILABILITY OF PHARMACEUTICAL CARE IN COMMUNITY PHARMACIES IN THE SLOVAK REPUBLIC. AN EVIDENCE-BASED STUDY FROM 1998 TO 2014

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Abstract: Community pharmacies are one of the parts of health care system and contribute to the public health and health promotion. Currently ongoing changes affect the functionality of the whole health care system. Current health care system is very sensitive to any change that might influence the wide range of parameters in the provision of pharmaceutical care. The number of pharmaceutical care providers particularly is a crucial parameter that should constantly be monitored and analyzed, especially in relation to demographic and geographic characteristics. The total number of community pharmacies, population to pharmacy ratio, and area to pharmacy ratio represent some of the parameters used for the evaluation of pharmaceutical care efficiency and are vulnerable to changes with powerful regulatory potential. In 1998, there were 952 community pharmacies in the Slovak Republic, the population to pharmacy ratio amounted to 5 552 and the area to pharmacy ratio amounted to 52.5. Gradually, the number of community pharmacies has increased and in some regions redoubled. This has resulted in a decline of population to pharmacy ratio and area to pharmacy ratio in all regions of the Slovak Republic ($p < 0.05$). The most meaningful change in the development trend of the selected ratios occurred in 2005 ($p < 0.05$). The number of community pharmacies culminated in 2012 (1612 community pharmacies; 3352 population to pharmacy ratio and 30.5 area to pharmacy ratio). In 2014, the Slovak Republic had 1598 community pharmacies, 3394 population to pharmacy ratio and 30.8 area to pharmacy ratio. The accessibility and availability expressed by the number, ratio and location of pharmacies in the Slovak Republic is perceived positively. The concerns regarding the economic stability of pharmacies and also long-term maintenance of the current accessibility and availability of pharmacies are presented.

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Introduction

Pharmaceutical care in the Slovak Republic is considered to be one of the main pillars of healthcare. It ensures availability of medicines, medical devices, dietetic food and supplementary products for a minimum of five days a week. Furthermore it provides expert consultation on the appropriate application of medicines (Clifford et al., 2006) and dietetic food, appropriate application of medical devices (Cain et al., 2001), efficient disease prevention (O'Loughlin et al., 1999), nourishment and a healthy way of life.

In all countries of Europe, the pharmaceutical care is provided either through regulated or deregulated systems. The character of the pharmaceutical care provider regulation influences community pharmacies in terms of accessibility, availability, quality and economic stability. Pharmaceutical care in a regulated system is characterized by governmental jurisdiction of the community pharmacy foundation that results in adequate accessibility and availability of pharmaceutical care. Moreover, the pharmaceutical care is evenly distributed between municipalities, particularly between urban and rural regions. Nordic countries, for example Norway, Sweden et cetera, have a deregulated system of pharmaceutical care. It has led to an escalation in the total number of community pharmacies and principally to their disproportionate allocation in the state territory (with a higher number of pharmacies located in the cities and a lower number of pharmacies in the countryside). The accessibility and availability of pharmaceutical care (especially the availability of medicines) have gotten worse especially in rural areas (Westerlud and Bjork, 2006).

The deregulated system of pharmaceutical care interferes with property rights via lack of ownership standards and creates structures of pharmaceutical care providers such as pharmacy networks and vertical integration; where large international companies own wholesale pharmacy chains that often control the pharmaceutical market (Vogler et al., 2012). This may affect the availability of medicines in pharmacies, and likewise the patients' overall satisfaction with provided pharmaceutical care. Accordingly, the existence of policies describing the availability of medicines in stock (FIP/WHO,

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2012) and the time necessary to acquire medicines (existing in Austria, Denmark, Finland, Norway, Spain and other countries) help prevent medicine shortages and shorten patient waiting times (Vogler et al., 2012).

Current legislation in the Slovak Republic, unlike in the past, does not restrict the acquisition of a license for provision of pharmaceutical care services to any demographic and geographic requirements and therefore the Slovak Republic belongs to countries with deregulated systems of pharmaceutical care providers.

The accessibility and availability of pharmaceutical care can be characterized not only by the number of community pharmacies but also by other derived parameters, such as the population to pharmacy ratio, area to pharmacy ratio, the number of pharmacists per 100 000 inhabitants (OECD, 2015) and others. However, the long-term evaluation of these data is rare in many countries. Similarly, the assessments of external factors on the development trend, and the most significant change in the development trend, are often not paid enough attention from the scientific community.

Data and methodology

Research Goal

The present study completes the limited data by the assessment of selected characteristics of community pharmacies in the time span of 17 years (1998-2014), focusing on the development trend type and the most significant change in the development trend.

Set of evaluated data

The set of evaluated data contained information about all community pharmacies providing pharmaceutical care services to the general public.

Date Set Source

The data on the number of community pharmacies, population and area surface during the years 1998-2014, were drawn from the "Datacube" database managed by the Statistical Office of the Slovak Republic.

Methods

For assessing the significance of the development trend non-parametric Mann-Kendall test and Fisher test for classical linear regression were used. For testing the most significant change in the development trend nonparametric Pettitt test was used. Subsequently, descriptive statistics was used to describe the results, which are presented in tables.

Processing software

The collected data were entered and edited in Microsoft Excel. Mann-Kendall's, Fisher's, and Pettitt's tests were performed using the R statistical software (R Core Team, 2015).

Outcomes of assessment

Outcomes of the assessment are presented as two ratios: the population to pharmacy ratio and the area to pharmacy ratio. The population to pharmacy ratio expresses the number of inhabitants per community pharmacy and the area to pharmacy ratio represents the area per community pharmacy in square kilometers.

For the purposes of the present study, provision of pharmaceutical care was narrowed to only public pharmacies and branches of community pharmacies. The common term "community pharmacy" is used to refer to both of the above-mentioned health care facilities.

Results

Descriptive characteristics of community pharmacies

The smallest number of community pharmacies (952) and the lowest population to pharmacy ratio (6154 inhabitants) were in the year 1998, the lowest area to pharmacy ratio in 2002 (78.5). The number of community pharmacies had increased gradually over the evaluated time period and reached the maximum of 1618 community pharmacies in 2012. Concurrently the population to pharmacy ratio decreased to its minimum of 3406 inhabitants and the area to pharmacy ratio to its minimum of 29.5 square kilometers in 2010.

The population to pharmacy ratio: 1998-2014

Development trend of the population to pharmacy ratio

Regional level

The population to pharmacy ratio on the regional level assessed by the Mann-Kendall's test and Fisher's test showed a statistically significant decreasing development trend in all eight regions of the Slovak Republic ($p < 0.05$) (Table 2).

State level

The population to pharmacy ratio assessed by the Mann-Kendall's test and Fisher's test showed a statistically significant downward development on the state level ($p < 0.05$).

Table 1: Number of community pharmacies, population to pharmacy ratio, area to pharmacy ratio in Slovak Republic in the time span 1998-2014

Characteristics / Years	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Number of community pharmacies	952	975	1010	1011	1024	1065	1220	1104	1302	1515	1306	1417	1567	1586	1618	1487	1598
Population to pharmacy ratio	6154	6103	5923	5880	6327	5963	4909	6277	4630	3892	3767	3519	3406	3603	3563	3698	3537
Area to pharmacy ratio	77.6	76.7	74.1	73.2	78.5	52.4	43.0	54.9	40.4	33.9	32.8	30.6	29.5	30.7	30.3	31.4	30.0

The highest and lowest values of the evaluated characteristics are shown in bold

Source: Author

Table 2: Development trend of the population to pharmacy ratio and the area to pharmacy ratio on the regional and state levels in the time span 1998-2014

Regions of Slovak Republic / characteristics	Population to pharmacy ratio		Area to pharmacy ratio	
	Mann-Kendall test	Fisher test	Mann-Kendall test	Fisher test
	Decreasing trend p-value *	Decreasing trend p-value *	Decreasing trend p-value *	Decreasing trend p-value *
Bratislava region	0.000045	0.000000	0.000045	0.000000
Trnava region	0.000032	0.000003	0.000010	0.000001
Trencin region	0.000007	0.000001	0.000015	0.000002
Nitria region	0.000065	0.000000	0.000149	0.000001
Zilina region	0.000010	0.000000	0.000010	0.000000
Banska Bystrica region	0.000032	0.000033	0.000031	0.000042
Presov region	0.000246	0.000003	0.000063	0.000001
Kosice region	0.000022	0.000000	0.000010	0.000000
Slovak Republic	0.000001	0.000000	0.000001	0.000000

* Significance on the level 5%

Source: Author

Table 3: Most significant development trend changes in the population to pharmacy ratio and the area to pharmacy ratio on regional and state levels

Regions of Slovak Republic / characteristics	Population to pharmacy ratio		Area to pharmacy ratio	
	Pettitt test			
	Year of the most significant change in development trend	p-value	Year of the most significant change in development trend	p-value
Bratislava region	2005	0.007023	2005	0.007023
Trnava region	2003	0.023741	2004	0.015299
Trencin region	2005	0.007023	2005	0.007023
Nitria region	2006	0.005062	2006	0.005062
Zilina region	2005	0.005062	2005	0.005062
Banska Bystrica region	2005	0.005062	2005	0.005062
Presov region	2005	0.005062	2005	0.005062
Kosice region	2005	0.005062	2005	0.005062
Slovak Republic	2005	0.005062	2005	0.005062

Source: Author

Change in the population to pharmacy ratio development trend

Regional level

The most significant changes in the development trend of population to pharmacy ratio assessed by the Pettitt's test at the regional level occurred predominantly in 2005; and in two regions in different years (2003 in Trnava region 2006 in Nitra region). In all regions, the change in development was statistically significant ($p < 0.05$) (Table 3).

State level

The most significant change in development trend of population to pharmacy ratio assessed by Pettitt's test state level occurred in 2005 ($p < 0.05$).

The area to pharmacy ratio in the time span 1998-2014

Development trend of the area to pharmacy ratio

Regional level

The area to pharmacy ratio at the regional level assessed by the Mann-Kendall's test and Fisher's test showed a statistically significant decreasing development trend in all eight regions of the Slovak Republic ($p < 0.05$).

State level

The area to pharmacy ratio assessed by the Mann-Kendall's test and Fisher's test showed a statistically significant downward development at the state level ($p < 0.05$).

Change in the area to pharmacy ratio development trend

Regional level

The most significant change in development trend of area to pharmacy ratio, assessed by the Pettitt's test, at the regional level occurred in 2005; in two regions in different years (2004 in Trnava region and 2006 in Nitra region). In all regions, the change in development was statistically significant ($p < 0.05$).

State level

The most significant change in the area to pharmacy ratio development trend at the state level, assessed by Pettitt's test, occurred in 2005 as well ($p < 0.05$).

Discussion

Since the regime change in 1989, the health care has passed several significant changes in numerous key areas. Among the most important are the regulations of ownership, demographic and geographic criteria of community pharmacies establishment, and price regulation, which significantly influenced the number of community pharmacies, as well as the availability and quality of pharmaceutical care services. The initial period characterized by a small number of pharmacies (952 in 1998), with a high number of inhabitants per community pharmacy (approximately 5454 inhabitants) and a large area per community pharmacy (approximately 52.1 square kilometres) has been replaced by the growth phase, during which the number of pharmacies almost doubled in some regions. At the same time, the number of inhabitants per community pharmacy and the area per community pharmacy has decreased in all regions of the Slovak Republic ($p < 0.05$). This development culminated in 2012 when the number of pharmacies peaked. According to the Statistical Office of the Slovak Republic, that year pharmaceutical care was being provided by 1618 community pharmacies (with a 3352 population to pharmacy ratio, and a 30.5 area to pharmacy ratio). In 2014, at the end of the assessed period, Slovak Republic had 1598 pharmacies, an average of 3394 inhabitants per community pharmacy and an average of 30.8 square kilometers area per community pharmacy.

In the Slovak Republic, similarly to other European countries without regulatory criteria, new community pharmacies have been established predominantly in larger cities (Wagner et al., 2009). According to the study of Martins et al. (2015), focusing on selected European countries, certain criteria for the establishment of a community pharmacy exist in 17 of the 19 European countries assessed. Nevertheless, despite the absence of these criteria in the Slovak Republic, the formation of new community pharmacies has been observed even in smaller towns and villages. Hence, the inhabitants have an accessible pharmacy available within a maximum of 25 minutes (Skybová and

Šterbová, 2014). In England, 89 % of the population has access to a pharmacy within 20 minutes (Todd et al., 2014).

The number of pharmacies differs from country to country. According to OECD, there is a significant difference in the number of pharmacies per 100 000 population between countries. Countries such as Spain and Japan have a high number of pharmacies per 100 000 population (47.2 resp. 45.0 pharmacies per 100 000 population), while in countries such as Israel and Denmark the number is very low (6.0 and 3.9 pharmacies per 100 000 inhabitants respectively) (OECD, 2015). The Slovak Republic reaches 36.8 pharmacies per 100 000 inhabitants, which places it between Ireland and Poland, and far above the average of 25 OECD countries (25.1 pharmacies per 100 000 population). Differences between countries in the number of pharmacies can be explained among other reasons by different regulatory criteria as well as more or less actively scheduled tasks of the government, compensation models used in the country, ways of medicines distribution and other factors. For instance, drugs can be issued to patients not only in community pharmacies but also through hospital pharmacies (permitted in the Slovak Republic), or directly by doctors (prohibited in the Slovak Republic). Currently, approximately a third of the European countries have access to medicines limited exclusively to community pharmacies (Todd et al., 2014).

Conclusions

Nowadays, the accessibility and availability (expressed by the number and location) of pharmacies in the Slovak Republic is rated positively. This is due to more even population distribution in comparison to some other countries. There are, however, present some concerns regarding the economic stability of pharmacies, and also long-term maintenance of the current accessibility and availability of pharmacies. In this context, the intention of the analyses of the current status and development of pharmacies is beneficial since it provides a wider and original view of the development of pharmacies from 1998 to 2014. Evaluation of similar character has not yet been published in the Slovak Republic. The assessed areas should be further monitored and evaluated, and the baseline analysis should be expanded and evaluated in greater depth. All analyses, their outcomes, subsequent follow-up and additional activities, however, should be aimed at maintaining and improving the accessibility and availability of pharmaceutical care services for patients.

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