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Ten-year retrospective comparative analysis of inpatient and outpatient care utilization patterns in Polish healthcare

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ABSTRACT

Introduction and purpose: Ambulatory healthcare plays a crucial role in the overall healthcare system, providing a range of services that are designed to be delivered on an outpatient basis. Offering preventive care, health education, managing chronic diseases and non-life-threatening urgent situations may alleviate the burden on hospitals and provide high-quality, time- and cost-effective healthcare system. In this study authors conduct a retrospective comparative analysis of inpatient and outpatient healthcare trends based on data provided by the Central Statistics Office of Poland for a ten-year period between 2012 and 2022.

Material and methods: This retrospective study was conducted using publicly available healthcare data sourced from databases provided by the Central Statistics Office of Poland.

Results: The analysis revealed a significant increase in the average annual number of outpatient visits per person (6.69 ± 0.39 vs. 7.70 ± 0.56 ; $p < 0.001$) and a decrease in annual hospitalizations per person (0.20 ± 0.02 vs. 0.18 ± 0.02 ; $p < 0.001$) during the past decade. In addition, significant increase in the annual number of visits per person to both specialists (2.66 ± 0.36 vs. 2.99 ± 0.55 ; $p < 0.001$) and general practitioners (4.04 ± 0.26 vs. 4.71 ± 0.34 ; $p < 0.001$) were noted. Noteworthy, in Mazowieckie Province data revealed a distinct healthcare service utilization pattern with more frequent specialist care and less frequent primary care outpatient visits in comparison with other Polish provinces. During the COVID-19 pandemic, a substantial decrease in both hospitalization rates (0.19 ± 0.02 vs. 0.15 ± 0.01 ; $p < 0.001$) and outpatient visits (4.57 ± 0.25 vs. 4.13 ± 0.26 ; $p < 0.001$) per person has been noted across whole country.

Conclusions: This study indicates a significant shift in healthcare utilization patterns towards outpatient services, and a corresponding decline in hospitalization rates during the past ten years across Poland.

Keywords: public health; ambulatory healthcare; healthcare utilization pattern; Polish healthcare

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Introduction

Ambulatory healthcare plays a crucial role in the overall healthcare system, providing a range of services that are designed to be delivered on an outpatient basis. By promoting regular visits and preventive measures, ambulatory care aims to identify and address health issues before they become more severe [1]. Offering preventive care, such as screenings and vaccinations [2, 3] and managing chronic diseases in order to better control symptoms, increase life quality and avoid disease exacerbation, may alleviate the

burden on hospitals [4], allowing them to focus on more acute cases, and minimize number of unnecessary hospitalizations. Moreover, outpatient care is crucial for follow-up visits and rehabilitation services [5], ensuring continuity of care and recovery support after a patient has been discharged from a hospital [6]. Furthermore, it equips patients with health education and enhances their comprehension of their conditions. Facilitating patient understanding of their health status and fostering self-management practices are essential for the effective control of chronic diseases [7]. By engaging with local populations, and offering accessible services,

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ambulatory care facilities contribute to the overall improvement of community health and well-being [8], and significantly lower healthcare costs [9]. Outpatient clinics also play a major role in emergency situations where urgent care services for non-life-threatening conditions require immediate attention, but do not require a visit to the emergency department, which helps alleviate pressure on hospitals and provides a more cost-effective [10], and timelier alternative for certain medical needs. In this study, the authors conducted a retrospective comparative analysis of inpatient and outpatient healthcare utilization patterns based on data provided by the Central Statistics Office of Poland for a ten-year period between 2012 and 2022 [11].

Materials and methods

Study design

This retrospective study was conducted using publicly available healthcare data sourced from national databases provided by the Central Statistics Office of Poland. The authors analyzed number of hospitalizations, outpatient visits, including primary and specialist care, and population size across various provinces of Poland between years 2012 and 2022. Healthcare service were classified into three distinct groups: hospital admissions, primary care outpatient consultations with general practitioners, and specialist outpatient consultations. Primary care and specialist consultations were also presented collectively as ambulatory care.

Statistical analysis

Continuous variables are presented using mean with standard deviation. To allow comparison between regions, the annual number of hospitalizations and ambulatory visits per person in each province is presented. Data is also presented as the annual ratio of outpatient visits versus hospitalizations per person and annual ratio of primary care versus specialist care per person. For comparison of continuous variables, one-sample, two-sample or relative Student's t-test were used. A p-value of less than 0.05 was considered statistically significant. All statistical analyses were conducted using Python 3 (with NymPy, Pandas, SciPy libraries).

Results

The analysis reveals a notable trend in Polish healthcare utilization patterns. Specifically, in ten-year period (2012–2022), there has been a statistically significant increase in the average number of outpatient visits per person (6.69 ± 0.39 vs. 7.70 ± 0.56 ; $p < 0.001$). Conversely, the data showed a significant decrease in hospitalizations per person during this period (0.20 ± 0.02 vs. 0.18 ± 0.02 ; $p < 0.001$) (Table 1 and 2; Figure 1, 2 and 3). In addition, to the general trends over the past decade, our study also revealed a significant increase in visits to both specialists (2.66 ± 0.36 vs. 2.99 ± 0.55 ; $p < 0.001$) and general practitioners (4.04 ± 0.26 vs. 4.71 ± 0.34 ; $p < 0.001$), with a more pronounced rise in visits to general practitioners

Table 1. Comparison of annual numbers of hospitalizations, outpatient visits, primary care visits and specialist care visits per capita over the ten-year period between 2012 and 2022. Data is presented as mean and standard deviation

	2012	2022	p-value
Annual no. Hospitalizations per Capita	0.20 ± 0.02	0.18 ± 0.02	< 0.001
Annual no. Outpatient Visits per capita	6.69 ± 0.39	7.70 ± 0.56	< 0.001
Annual no. Primary Care Visits per Capita	4.04 ± 0.26	4.71 ± 0.34	< 0.001
Annual no. Specialized Care Visits per capita	2.66 ± 0.36	2.99 ± 0.55	< 0.001

Table 2. Comparison of the annual primary to specialist care outpatient visits ratio per capita, and the annual outpatients visits to hospitalization ratio per capita. Data is presented as mean and standard deviation

	2012	2022	p-value
Annual ratio of primary to specialist care outpatients visits per capita	1.55 ± 0.22	1.62 ± 0.29	0.03
Annual ratio of outpatients visits to hospitalizations per capita	33.57 ± 3.22	42.58 ± 4.32	< 0.001

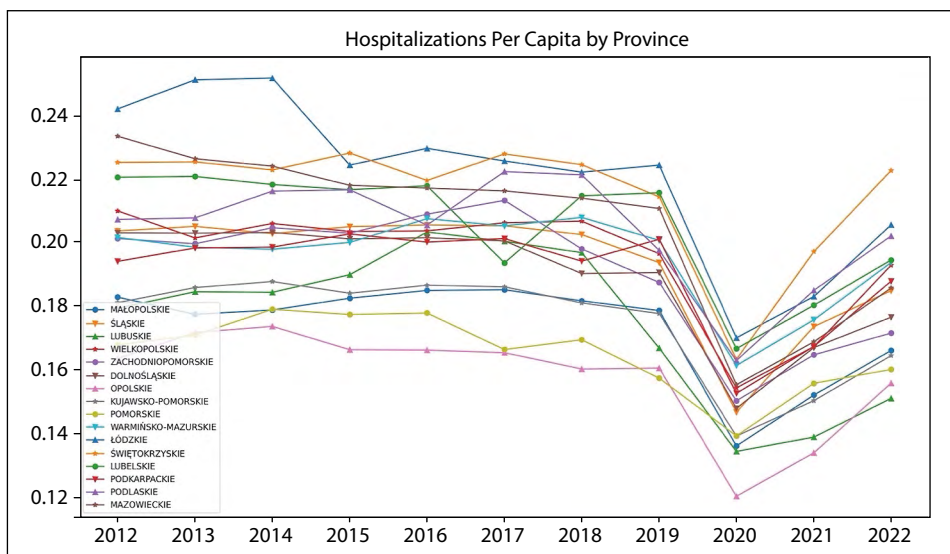


Figure 1. Hospitalizations per capita by province. The x-axis represents the years, while the y-axis shows the annual number of hospitalizations per capita for each province

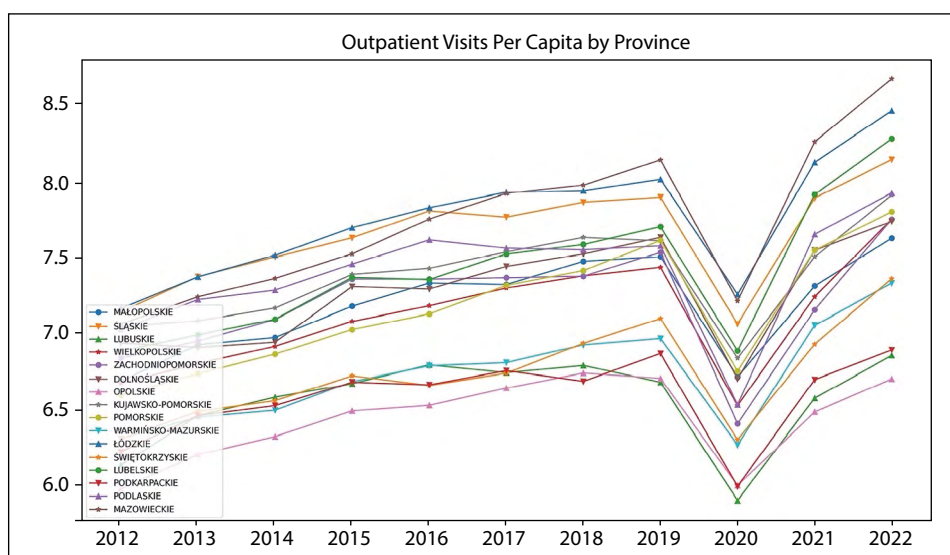


Figure 2. Outpatient visits per capita by province. The x-axis represents the years, while the y-axis shows the annual number of outpatient visits per capita for each province

presented as the ratio of primary care to specialist care outpatients visits per capita (1.55 ± 0.22 vs. 1.62 ± 0.29 ; $p = 0.03$) (Table 1 and 2, Figures 4–6). Noteworthy, in the Mazowieckie Province in 2022, the analysis indicated a statistically higher frequency of specialist visits per person compared to other Polish provinces (4.48 vs. 2.89 ± 0.39 ; $p < 0.001$). Conversely, the rate of primary care physician visits in this region was significantly lower than the national average across the other provinces (4.19 vs. 4.74 ± 0.33 ; $p < 0.001$). As

shown on Figure 4 and 5, this tendency was also true in previous years over last decade. It suggests a distinct healthcare service utilization pattern within this province (Table 3). Moreover, in 2020 during the COVID-19 pandemic, substantial decrease in both hospitalization rates (0.19 ± 0.02 vs. 0.15 ± 0.01 ; $p < 0.001$) and outpatient visits (4.57 ± 0.25 vs. 4.13 ± 0.26 ; $p < 0.001$) per person were noted across the country (Table 4).

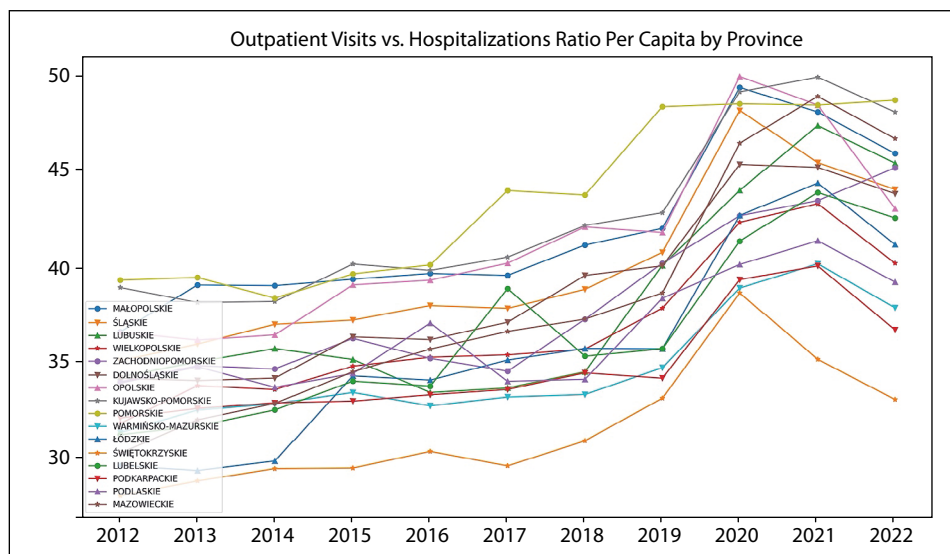


Figure 3. Outpatient visits vs. hospitalizations ratio per capita by province. The x-axis represents the years, while the y-axis represents the annual ratio of outpatient visits to hospitalizations per capita for each province

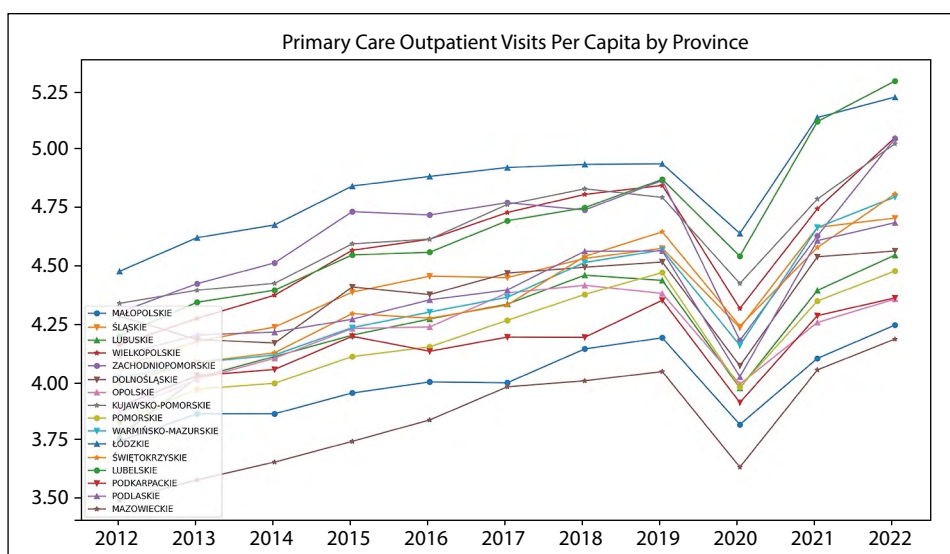


Figure 4. Primary care outpatient visits per capita by province. The x-axis represents the years, while the y-axis represents the annual number of primary care outpatient visits per capita for each province

Discussion

The results of our study reflect significant shifts in healthcare utilization patterns over the past decade, characterized by an increase in outpatient visits and a decrease in hospitalization rates per person. The incidence of admissions to hospitals for ambulatory care sensitive conditions (ACSC) may be a metric for evaluating the quality and accessibility of primary care services [12, 13]. ACSC hospital admissions can

potentially be mitigated through efficient management and treatment within ambulatory settings. Thus, the observed correlation may suggest improvements in early intervention and management of health conditions through outpatient care. It highlights the importance of robust outpatient care systems to reducing the overall burden on hospitals [14]. The significant rise in visits to both specialists and general practitioners, and this latter in particular, highlights the increasing role of primary care in health management. This trend suggests

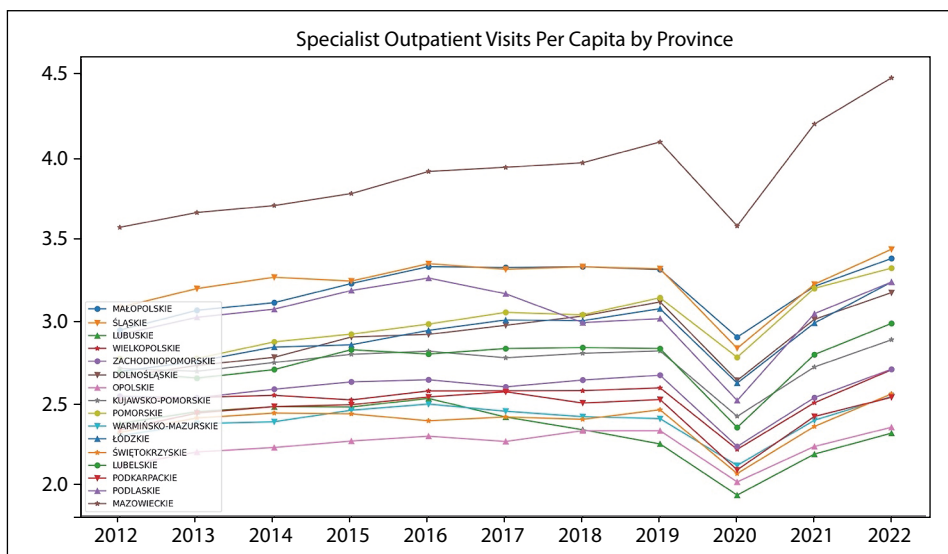


Figure 5. Specialist outpatient visits per capita by province. The x-axis represents the years, while the y-axis represents the annual number of visits per capita for each province

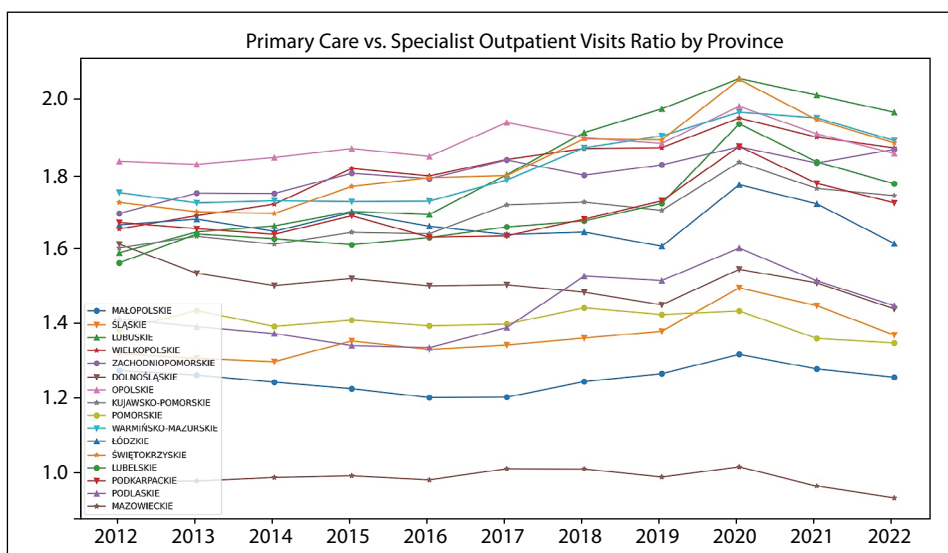


Figure 6. Primary care vs. specialist outpatient visits ratio by province. The x-axis represents the years, while the y-axis represents the annual ratio of primary to specialist care outpatient visits per capita for each province

a growing emphasis on preventive care and early intervention, potentially facilitated by advancements in knowledge derived from subsequent medical studies and changes in healthcare policy. By grounding clinical decisions in rigorously vetted research findings, evidence-based medicine has been demonstrated to reduce healthcare costs and minimize the occurrence of unnecessary procedures, ensure more efficient utilization of healthcare resources and enhance the quality of patient care [15]. The COVID-19 pandemic

period, marked by a decrease in both hospitalization rates and outpatient visits, underscores the impact of extraordinary events on healthcare systems, and is a great example of complex interplay between factors influencing healthcare utilization, including systemic changes in healthcare delivery, patient behavior, and external events [16, 17].

Technological advancements and innovations in surgical methodologies have facilitated a rise in the prevalence of elective procedures that can be

Table 3. Comparison of the number of specialist visits per capita and primary care visits per capita in the Mazowieckie Province to other Polish provinces in 2022. Data is presented as number of outpatient visits per capita in Mazowieckie Province, and mean ± standard deviation

	Mazowieckie Province	No. visits in Poland per capita	p-value
No. specialist outpatient visits per capita	4.48	2.89 ± 0.39	< 0.001
No. primary care outpatient visits per capita	4.19	4.74 ± 0.33	< 0.001

Table 4. Comparison of the annual number of hospitalizations and outpatient visits per capita before the outbreak of the COVID-19 pandemic (2019) and during the COVID-19 pandemic (2020). Data is presented as mean and standard deviation

	2019	2020	p-value
Annual no. hospitalizations per capita	0.19 ± 0.02	0.15 ± 0.01	< 0.001
Annual no. outpatient visits per capita	4.57 ± 0.25	4.13 ± 0.26	< 0.001

conducted without necessitating an overnight hospital stay. Notably, fields such as interventional radiology [18], interventional cardiology [19], and ambulatory surgery [20–22] have emerged as pivotal areas where such advancements have been particularly impactful. These developments not only enhance the efficiency of healthcare delivery but also minimize the logistical and economic burden associated with extended hospital stays. The correlation between the extent of healthcare resources utilized and the resultant overall population health is not always positive [23], indicating that increased resource allocation does not invariably improve health outcomes. Consequently, there is a pressing need to optimize healthcare resources and strategically implement their use [24]. Emphasizing the integration of emerging technologies such as medical data digitalization, artificial intelligence [25], telemedicine [26], and telemonitoring [27, 28] is essential. These advancements hold significant potential to enhance patient safety and improve treatment outcomes, representing a pivotal direction for future healthcare strategies. However, empirical research substantiates the notion that not all hospital admissions are preventable, particularly in the context of chronic diseases such as chronic obstructive pulmonary disease, congestive heart failure or mental diseases [29, 30]. The complexity and progressive nature of such chronic illnesses often necessitate acute hospital care for exacerbations that cannot be adequately managed by ambulatory services alone. Especially patients with multiple chronic conditions are more likely to require

hospitalization [31]. Analyzing data at the national level might provide a robust and comprehensive approach designed to cover a wide demographic spectrum and various healthcare utilization patterns, albeit with certain limitations, including potential biases, and regional disparities. These findings may have implications for healthcare planning and resource allocation, emphasizing the need for a resilient and adaptable healthcare system.

Limitations

This is a retrospective study, subject to potential biases and inaccuracies in historical data records, issues with data granularity, and regional disparities, all of which may impact the robustness of the findings. Furthermore, caution should be exercised when extrapolating these findings to populations in other world regions.

Conclusions

In conclusion, the observed data from our study indicate a significant shift in healthcare utilization towards outpatient services and a corresponding decline in hospitalization rates across Poland. Furthermore, the increased frequency of visits to general practitioners and specialists, particularly pronounced in primary care, underscores the evolving role of these providers in healthcare delivery.

Article information

Data availability statement: *The data utilized in this study can be accessed at the Central Statistical Office's official database: <https://bdl.stat.gov.pl/bdl/start>.*

Ethics statement: *This study was conducted using publicly available summary data, and did not involve any direct participants.*

Author contributions: *Conceptualization and methodology [AZ]; check [AZ], [IM], [KK], [ZM], [MD]; formal analysis [IM], [ZM], [MD]; investigation [AZ], [IM]; writing-rough preparation [AZ], [IM], [KK]; writing - review and editing; [AZ], [IM], [KK], [ZM], [MD]; visualization [AZ]; All authors have read and agreed with the published version of the manuscript.*

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Supplementary material: *Not applicable*

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