JOURNAL OF
EMERGING INVESTIGATORS

Article

Country-level relationship of OTC medicine consumption and frequency of GP consultation

Mie Hirai[1], Alex Short[1]
[1]Senzoku Gakuen Junior & Senior High School, Kawasaki, Kanagawa, Japan

SUMMARY

The discussion surrounding self-medication with non-prescription medicines has gained significance in healthcare and public health, particularly given the global increase in consumption of non-prescription drugs. Currently, there is a lack of evidence regarding the relationship between people's propensity to seek medical consultation and consumption of over-the-counter (OTC) medicines. This study aimed to examine the association between the frequency of general practitioner (GP) consultations and the proportion of economic resources spent on OTC medicine. We conducted a correlation analysis between the mean number of GP consultations in a 4-week period and the ratio of non-prescription medicine market sales per capita to GDP per capita of 19 European countries. Additionally, universal health coverage (UHC) service coverage indices were used to contextualize healthcare provision in each country. Based on past studies, we hypothesized that GP consultations would negatively correlate with consumption of OTC medicine. We found a weakly positive Spearman's rank correlation coefficient, although this result was not statistically significant (r_s = 0.22, p = 0.37). The lack of statistically significant correlation may reflect differences in characteristics of health care provision across countries. Overall, this study points out the importance of considering diverse aspects of a country's healthcare landscape in making country-level comparisons to support healthcare policy.

INTRODUCTION

Consulting a medical professional can provide many health benefits. Consultations allow for preventive care, which can reduce susceptibility to diseases, disabilities, and mortality through early detection (1). Through consultations, health issues in people's lives can be revealed as early signs of serious medical conditions, such as cancer, increasing survival chances for patients (1, 2). Moreover, medical consultations allow patients to receive meaningful explanations about their medications which can be important to preventing potential harmful effects on the patient's health from misuse of medications (3).

By contrast, self-diagnosis and self-medication carry many risks. Today, a common form of self-medication is the use of over-the-counter (OTC) medicines, also known as non-prescription medicines, which can be bought directly by the public without a prescription. OTC medicines are used to treat a variety of illnesses and their symptoms, such as coughs, colds, fevers, and digestive problems, and to relieve pain and aches in different parts of the body (4). Despite the convenience and effectiveness of OTC medicines, misdiagnosis, misuse, polypharmacy, and addiction can cause serious dangers to human health (3).

In recent years, global consumption of OTC medicines has increased, and prior studies have examined reasons for self-medication with OTC medicines (5-8). Studies examining motives for OTC medication consumption revealed that a considerable number of respondents chose not to visit a doctor due to the idea that their condition did not require medical consultation or due to perceived time-efficiency (6-8). Additionally, one study found that people were using self-medication for its affordability over that of consulting health care services (7).

These studies suggested that people view OTC medicines as an alternative to medical consultation to resolve their symptoms. Consistent with this view, one study revealed that if confronted with the unavailability of an OTC solution to their conditions, a significant portion (52–70%) of respondents that consumed OTC medicines would seek medical consultation (9). Hence, people's OTC medicine consumption may depend on how frequently they consult doctors, particularly general practitioners (GPs) (10). Here, we aimed to explore the relationship between OTC medicine consumption and utilization of GP services.

Patient demographics also influence OTC medicine consumption. OTC medicine expenditure increases with income, level of educational attainment, and age (11-13). Gender and age also influence the frequency of use of OTC painkillers and anti-inflammatory medications, with women and older people using them more than men and younger people (12). In terms of socioeconomic status (SES), which includes factors like level of educational attainment, income, and occupation, studies have found that low-SES groups visit GPs with higher frequencies compared to high-SES groups (14, 15). However, this imbalance was not as prevalent or significant as the inequalities in utilization of specialist care, which favored high-SES groups (14-17).

Nevertheless, there is scarce evidence to directly link OTC medicine consumption with GP service utilization. This study aims to address this gap. We examined the association between the frequency of consulting GPs and the proportion of economic resources spent on OTC medicine consumption per capita in 19 European countries (Austria, Bulgaria, Croatia, Czechia, Finland, France, Germany, Greece, Hungary, Italy, Lithuania, Netherlands, Norway, Poland, Romania, Slovenia, Spain, Türkiye, United Kingdom). We hypothesized that the mean number of GP consultations in a 4-week period would decrease as the ratio of OTC medicine market sales to GDP increased in countries. However, we found that there was no

https://doi.org/10.59720/24-002

statistically significant correlation between the two variables. Hence, future research and policy-making efforts will need to consider additional complexity when seeking country-level comparisons between GP usage and OTC medicine consumption. This could trigger a review of healthcare policies by governments for effective public health interventions. Moreover, examining these variables across countries can help identify patterns and trends on a national level, which can be referenced in policy-making and future research, to identify best courses of action for a healthcare system with effective medical consultation among citizens and limited risks concerning self-medication.

RESULTS

We selected 19 European countries to study GP utilization and OTC medicine consumption (**Table 1**). We collected data on the mean number of consultations with GPs in a 4-week period as a representative of frequency of seeking GP consultation from the Eurostat database (18) (**Table 1**). Additionally, we collected data about the OTC medicine market sales to gross domestic product (GDP) ratios as an indicator for OTC consumption from the database of Association Européenne des Spécialités Pharmaceutiques Grand Public (AESGP) and the Eurostat database (19, 20) (**Table 1**). Then, we ranked each value with 1 corresponding to the highest value, and 19 corresponding to the lowest value, and we presented the ranks in parentheses beside the values (**Table 1**).

We first conducted a correlation analysis between the OCT medicine consumption and GP consultation (**Figure 1**).To understand each country's essential health services, we colored data points based on the country's universal health coverage (UHC) service coverage index computed by the World Health Organization (WHO) (21) (**Table 1, Figure 1**). The UHC service coverage index is the geometric mean of 14 tracer indicators representing the coverage of essential health services, which are reported on a scale of 0 to 100 on a unitless scale, and the index served as a comparable variable among countries, as intended by the WHO (21). The mean UHC service coverage index of the 19 data points was 80.8. This is slightly higher than the mean UHC service coverage index of all European countries, which was 79, but considerably higher than that of all 194 countries, areas, and territories the WHO analyzed, which was 65, in 2015 (21). The indices within the 19 data points ranged from 70 (Bulgaria, Lithuania) to 88 (Germany) (**Table 1**).

Upon calculating Spearman's rank correlation coefficient, we found no statistically significant correlation between the frequency of GP consultations and the ratio of OTC medicine market sales to GDP (r_s = 0.22, p = 0.37, **Table 1**).

In examining each country's UHC service coverage index in the context of its position on the scatter plot, we divided the

	Number of consultations (N)									Data collection period of N	
Country	N = 0 (%)	N = 1 (%)	N = 2 (%)	N ≧ 3 (%)	A: Mean of N(Rank)	OTC medicine market sales per capita(€)	GDP per capita(€)	B: Sales to GDP ratio (%) (Rank)	UHC Index	Start	End
Austria/AT	69.2	21.4	5.5	3.9	0.44 (11)	84.71	38981	0.217 (7)	84	09/2013	06/2015
Bulgaria/BG	62.3	28.9	6.3	2.6	0.49 (6)	21.18	5956	0.356 (3)	70	10/2014	01/2015
Croatia/HR	64.3	25.9	5.1	4.7	0.50 (4)	23.48	10401	0.226 (5)	78	04/2014	03/2015
Czechia/CZ	70.0	23.3	4.5	2.3	0.39 (13)	32.64	14994	0.218 (6)	82	06/2014	01/2015
Finland/FI	75.7	17.6	4.7	2.0	0.33 (18)	37.59	37883	0.099 (15)	86	11/2014	03/2015
France/FR	55.6	31.7	8.1	4.5	0.61 (3)	31.89	32419	0.098 (16)	84	01/2014	02/2015
Germany/DE	56.1	28.9	9.7	5.3	0.64 (2)	61.75	36149	0.171 (9)	88	11/2014	07/2015
Greece/GR	73.0	20.6	4.1	2.3	0.36 (16)	31.25	16272	0.192 (8)	78	10/2014	03/2015
Hungary/HU	60.6	31.7	5.1	2.5	0.49 (5)	39.24	10770	0.364 (2)	78	10/2014	12/2014
Italy/IT	51.8	29.9	11	7.4	0.74 (1)	29.17	26771	0.109 (13)	83	10/2015	12/2015
Lithuania/LT	63.2	29.4	4.9	2.5	0.47 (9)	19.42	12475	0.156 (11)	70	09/2014	11/2014
Netherlands/NL	73.3	19.2	4.7	2.8	0.37 (14)	39.74	39820	0.100 (14)	84	01/2014	12/2014
Norway/NO	74.7	19.6	3.6	2.1	0.33 (17)	26.11	73669	0.035 (18)	86	08/2015	12/2015
Poland/PL	64.0	27.7	5.6	2.7	0.47 (8)	56.55	10692	0.529 (1)	80	09/2014	12/2014
Romania/RO	78.0	20.6	1.1	0.3	0.24 (19)	20.22	7561	0.267 (4)	78	09/2014	11/2014
Slovenia/SI	67.9	21.6	5.3	5.3	0.48 (7)	30.66	18252	0.168 (10)	81	08/2014	12/2014
Spain/ES	71.0	23.1	3.9	2.0	0.37 (15)	19.79	22216	0.089 (17)	85	01/2014	01/2015
Türkiye/TR	72.1	17.1	5.2	5.6	0.44 (10)	1.21	9160	0.013 (19)	76	N/A	N/A
United Kingdom/GB	71.5	19.9	5.8	2.8	0.40 (12)	44.58	35774	0.125 (12)	85	04/2013	09/2014

Table 1: GP visits, OTC medicine market sales, and UHC index for the 19 countries analyzed. Self-reported consultations with general practitioners (GPs) in a 4-week period (N) and the percentages of the population that reported zero, one, two, or three or more were obtained from the European Health Interview Survey (EHIS) collected from 2013-2015 and were retrieved from the Eurostat database (18). From this, the mean numbers of consultations (A), which are conservative estimates, were computed. The starting month and ending month of which data of (N) was collected in were retrieved from the Eurostat database. The data collection period for Turkey was not reported to Eurostat. OTC medicine market sales refer to the total sales of OTC medicines purchased directly by consumers without the use of a medical prescription and were retrieved from the database of the Association of the European Self-Care Industry (AESGP) (19). Data on the GDP of each country was retrieved from the Eurostat database (20). From these, the ratio of OTC medicine market sales to GDP (B) was computed. For computations (A) and (B), the ranks of each country within the dataset were presented in parentheses beside the values, with 1 corresponding to the highest value, and 19 corresponding to the lowest value. "UHC index" refers to the universal health coverage (UHC) service coverage index computed by the WHO, which represents the level of universal health coverage achieved in essential health services, for each country (21).

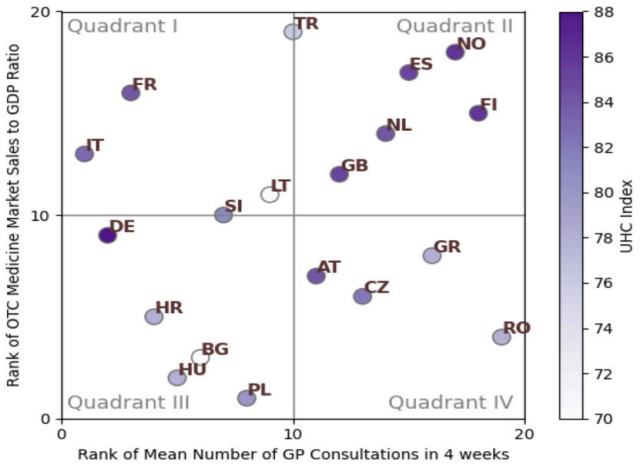

Figure 1: Scatter plot of rank of mean number of consultations in 4 weeks and rank of ratio of OTC medicine market sales per capita to GDP per capita, colored by UHC service coverage index. Data points are labeled with country codes (Table 1). Data points are colored based on the UHC service coverage index, with data points with higher indices colored darker and data points lower lighter. The scatter plot was divided into four sections, using a rank of 10 as the division point for each variable. Spearman's rank correlation coefficient, r_s = 0.22. Chi-squared test, p > 0.05.

https://doi.org/10.59720/24-002

scatter plot into four quadrants based on the mean number of GP consultations and self-mediation market sales (**Figure 1**).

The countries in Quadrant II (low GP consultations and low OTC medicine market sales to GDP ratios) had higher UHC service coverage indices (mean: 85.2), while most countries in Quadrant III (high GP consultations and high OTC medicine market sales to GDP ratios) had lower UHC service coverage indices (mean: 78.8, **Figure 1**). For data points in Quadrant I (mean: 80.5) and IV (mean: 79), UHC service coverage index varied too greatly to suggest a pattern (**Figure 1**). This indicated that countries with higher ranks (rank > 10) for both variables had higher UHC service coverage indices, while countries with lower ranks (rank < 10) for both variables had lower UHC service coverage indices, though there was an exception (Germany) in the latter case (**Figure 1**).

DISCUSSION

Our primary aim was to examine the relationship between the frequency of GP consultations and the ratio of OTC medicine market sales to GDP in countries. We also examined the UHC service coverage index of each country to examine whether healthcare coverage affected our variables.

The correlation coefficient and p-value indicated no statistically significant correlation between the mean number of GP consultations in a 4-week period and the ratio of OTC medicine market sales to GDP. This lack of correlation could reflect differences in healthcare systems and policies in each country. For instance, in countries that adopt a structure to health care provision called a gatekeeping system (Bulgaria, Finland, Hungary, Italy, Lithuania, the Netherlands, Norway, Poland, Romania, Slovenia, Spain, and the United Kingdom), patients can typically only access specialized care after visiting GPs first and receiving a referral to specialist services; as a result, the general population in these countries consult GPs for a broader range of symptoms systems (22-24). In countries without this design (Austria, Czechia, Germany, Greece, France, and Turkey), people can "self-refer" themselves directly to specialists without consulting a GP, and thus, self-referral upon by-passing GP services is common (22-25). GP utilization may vary considerably between these groups of countries for this reason. Specifically, the presence or absence of the system may account for the differences in GP visits among some countries: Italy, Hungary, Bulgaria, and Slovenia (which have gatekeeping systems) showed higher rates, while Austria, Greece, and Czechia (which do not have gatekeeping systems) showed lower rates (Table 1).

Regarding the UHC service coverage index, we observed that countries with lower frequencies of GP consultations and OTC medicine market sales to GDP tended to have higher UHC service coverage indices, and vice versa (Figure 1). A possible explanation for this is that the populations of countries with higher indices may have lower need for immediate medical help for health issues in the first place, due to better population health (26). This may have been one reason for the lower rates of GP visits. Another possible explanation may be that, in countries with higher UHC service coverage indices, a low ratio of OTC medicine market sales to GDP may be influenced by the affordability of OTC medicines in a country, and thus, the public may spend less economic resources on OTC consumption (27). This may suggest that these countries have healthcare as less of a financial burden to the population, which may also increase citizens' capability in financial resources to allocate to, for instance, preventive care, and hence, benefit population health (28, 29). These points potentially supports the beneficial effects of strengthening service coverage of primary health care, in that it may link with lessening domestic financial burden on the public, consequently improving health system efficiency, which is key to better health care provision (30, 31).

A key limitation for this study was the small sample size, resulting from the small number of countries with data of OTC medicine market sales of 2014 (available via the website of the Association Européenne des Spécialités Pharmaceutiques Grand Public (AESGP)) as well as data of GP consultation from the European Health Interview Survey (EHIS) (19, 31). As such, we were only able to draw conclusions from a small number of countries. This may have impaired our ability to find a correlation between our two variables of interest. Additionally, the mean numbers of GP consultations used in the analysis were calculated as conservative estimates. This limitation is due to the lack of data on the specific number of consultations in the "3 contacts or more" survey option, and the percentages of people that selected this option in the survey was on average 3.3% and ranged from 0.3% to 7.4% (Table 1). Knowing the exact number of GP visits could improve accuracy when ranking the frequency of GP visits in order among the countries. Also, this study did not explore whether a rank of OTC medicine market sales to GDP ratio was attributable to affordability of consumption or quantity of consumption. This may have posed a misalignment in what the ratio represented among countries in terms of OTC consumption. Another limitation of this study stems from the difference in the fieldwork period of the EHIS in collecting data about GP consultations across participating countries. While data from some countries (Austria, Croatia, France, the Netherlands, Spain, the United Kingdom) were collected during all seasons, reflecting seasonal variation in people's frequency in consulting GPs, data from other countries (Bulgaria, Finland, Hungary, Italy, Lithuania, Poland, Romania) were mainly collected in the autumn (September, October, November) and winter (December, January, February) seasons (32). As there are many seasonal infectious diseases which can impact both GP visits and OTC medication usage, this study may have oversimplified the nature of GP usage in each country (33, 34). Also, we did not consider the varying definition between countries regarding what constitutes an OTC medication. This may challenge the comparability of the OTC medicine market sales to GDP ratios (which are based on the total sales of medication consumed without a prescription) as a variable for OTC consumption.

Seeing this, these limitations may have affected the accuracy of our implications. Thus, future research can be conducted with larger sample sizes, data on GP usage representing the same time period for each country, data of affordability of OTC drugs consumption and quantity of OTC drugs consumption, and use a specific list of OTC drugs, in order to draw more effective conclusions on the relationship between the OTC medicine market and people's use of GP services.

In conclusion, although there was no statistically significant correlation between the frequency of GP usage and the ratio of OTC medicine market sales to GDP in countries, we observed that countries with lower frequencies of GP consultations and OTC medicine market sales to GDP tended to have higher

https://doi.org/10.59720/24-002

UHC service coverage indices, and vice versa. Yet, future research and further policy-making efforts should continue seeking country-level comparisons between GP usage and OTC medicine consumption with more precision, while paying attention to diverse aspects of healthcare provision, such as those listed above. This is because, as a result, it could help specify systematically and financially efficient public health interventions within countries for citizens to improve health in a way that is medically suitable and cost-effective in the long-term, hence pointing at best courses of action to achieve both optimal usage of GP services (primary care) and containment of risks entailing OTC drug usage.

MATERIALS AND METHODS

Data Collection

Data on GP consultation and GDPs were sourced from Eurostat (29, 30). The dataset on Eurostat's website was compiled from the European Health Interview Survey (EHIS), wherein participants age 15 or over self-reported the number of consultations with GPs by choosing from the following options: "No contacts", "1 contact", "2 contacts", "3 contacts or more" (31). In the EHIS, each participating country used stratification in sampling with the aim of obtaining nationally representative data, and the dataset originally included categories of 32 member nations of the EU (18, 31). However, upon statistical processing based on the EHIS methodology, Eurostat labeled data of Ireland and Sweden as unreliable, and thus, we excluded these countries from this study (18, 31). Additionally, data from Belgium and Serbia were unavailable, and data from Cyprus, Denmark, Estonia, Iceland, Latvia, Luxembourg, Malta, Portugal, and Slovakia lacked corresponding data on OTC medicine market sales in 2014 from the database of Association Européenne des Spécialités Pharmaceutiques Grand Public (AESGP), also known as the Association of the European Self-Care Industry, and thus, we also excluded these countries from this study (18, 19).

The data collection period of the EHIS regarding people's self-reported GP consultation varied between countries (Table 1). Regardless, in accordance with the Commission Regulation implementing EHIS, the data collection period lasted at least three months in all countries (35).

The term "OTC medicine market sales" in this study refers to the sales of OTC medicines purchased directly by consumers without the use of a medical prescription (19). Data on OTC medicine market sales were retrieved from the AESGP website and had been collected in collaboration with member associations, IMS Health, and national authorities (19). The populations for each country were retrieved from the World Bank and are from 2014 (36).

UHC service coverage indices were computed by the WHO as of the year 2015, and were accessed through the WHO database (21). UHC service coverage UHC service coverage indices were accessed through the WHO database (21).

The UHC service coverage index was employed as a proxy for each country's healthcare provision of essential health services, because it represented the progression of UHC in each country. This information was intended to provide context on the healthcare provision of each country and thus was applied to the scatterplot in analysis.

Procedures

The percentage of people that self-reported to have had zero, one, two, and three or more consultations with GPs in a 4-week period of the 19 countries were retrieved. The value 3 was assigned to the "3 or more" option. Although this method produces conservative estimates, this approach has been used in past public health research for measuring indicators for analysis (37-39). In the current study, this number was referred to as the "mean number of GP consultations." The mean values here were calculated by summing the products of each number of GP visits multiplied by the respective probability estimates provided in the EHIS.

OTC medicine market sales per capita were calculated by dividing each country's total OTC medicine market sales by its population in 2014. Ratios of OTC medicine market sales to GDP were calculated by dividing each country's OTC medicine market sales per capita by its GDP per capita.

Data points in the scatter plot were colored based on the UHC service coverage index, with data points with higher UHC service coverage index colored darker and data points with lower UHC service coverage index colored lighter. Additionally, the scatter plot was divided into four quadrants to assist in identifying trends between data points.

Statistical Analysis

Spearman's rank correlation coefficient was used to examine the strength and direction of the relationship between the two variables in this study. This statistical method was chosen for this analysis because of this study's small sample size, which makes outlier detection difficult, and the property that Spearman's rank correlation coefficient is robust to outliers (40, 41).

Using Google Sheets, we calculated Spearman's rank correlation coefficient and p-value with data of the mean number of GP consultations in 4 weeks and ratios of OTC medicine market sales to GDP, and we determined if the correlation was statistically significant with chi-square hypothesis testing, using $\alpha = 0.05$. he alpha level of significance was set to be 0.05. Thereby, a p-value below 0.05 rejected the null hypothesis, while a p-value above 0.05 did not reject the null hypothesis. We set the alpha value to 0.05 due to its conventional and typically recommended use in public health research as a standard and comparable threshold for discerning statistical significance

Received: December 29, 2023
Accepted: June 6, 2024
Published: December 9, 2024

REFERENCES

1. "Preventive Care." health.gov. health.gov/healthypeople/objectives-and-data/browse-objectives/preventive-care. Accessed 10 Dec. 2023.
2. Emery, Jon D, et al. "The role of primary care in early detection and follow-up of cancer." *Nat Rev Clin Oncol*, vol.11, no.1, 2014, pp.38-48. https://doi.org/10.1038/nrclinonc.2013.212
3. Ruiz, Maria. "Risks of Self-Medication Practices." *Current Drug Safety*, vol. 5, no. 4, 1 Oct. 2010, pp. 315-323. https://doi.org/10.2174/157488610792245966
4. "Over-the-Counter Medicines Drug Facts." *National Institute on Drug Abuse*. 17 Dec. 2017. nida.nih.gov/

https://doi.org/10.59720/24-002

publications/drugfacts/over-counter-medicines.
5. Mourya, Aluri, et al. "A Survey on Over The Counter Drug usage in the Community." J*ournal of Drug Delivery and Therapeutics*, vol. 9, no. 2-s, Apr. 2019, pp. 406-416.
6. Eichenberg, Christiane, et al. "Selbstmedikation: Eine bundesdeutsche Repräsentativbefragung zu Motiven, Anlässen und Informationsquellen für den Konsum rezeptfreier Medikamente." *Psychother Psychosom Med Psychol*, vol. 65, no. 8, Aug. 2015, pp. 304-310. https://doi.org/10.1055/s-0035-1545311
7. Tavares, Aida, et al. "Factors Contributing to Self-Medication and Consumption of Non-Prescribed Drugs in Portugal." *International journal of public health*, vol. 67, 7 Nov. 2022. https://doi.org/10.3389/ijph.2022.1604852
8. Rathod, Pragati, et al. "Prevalence, Pattern, and Reasons for Self-Medication: A Community-Based Cross-Sectional Study from Central India." *Cureus*, vol. 15, no. 1, 18 Jan. 2023. https://doi.org/10.7759/cureus.33917
9. Macquarie University. "The value of OTC medicines in Australia." *Macquarie University*, Mar. 2014, mq.edu.au/__data/assets/pdf_file/0005/518603/FINAL20WEB20COPY20ASMI_ValueStudy_A4.pdf.
10. "Primary Care." *World Health Organization*, who.int/teams/integrated-health-services/clinical-services-and-systems/primary-care. Accessed 19 Apr. 2024.
11. Sanwald, Alice and Engelbert Theurl. "Out-of-pocket expenditures for pharmaceuticals: lessons from the Austrian household budget survey." *The European Journal of Health Economics*, vol. 18, May 2017, pp. 435-447. https://doi.org/10.1007/s10198-016-0797-y
12. Turek, Artur and Aleksander Owczarek. "Determinants of Consumption Behavior of Over-the-Counter Medications-the Case of Painkillers and Anti-Inflammatory Medications." *Journal of Economics and Management*, vol. 15, 2014, pp. 25-29.
13. Otto, Monica, et al. "Variations in Non-Prescription Drug Consumption and Expenditure: Determinants and Policy Implications." *Health Policy*, vol. 122, no. 6, June 2018, pp. 614–620. https://doi.org/10.1016/j.healthpol.2018.01.012
14. Luckmann, Sara L., et al. "Socioeconomic inequalities in primary-care and specialist physician visits: A systematic review." *International Journal for Equity in Health*, vol. 20, no. 58, 10 Feb. 2021. https://doi.org/10.1186/s12939-020-01375-1
15. Doorslaer, Eddy van, et al. "Inequalities in access to medical care by income in developed countries." *Canadian Medical Association Journal*, vol. 174, no. 2, 17 Jan. 2006, pp. 177–183. https://doi.org/10.1503/cmaj.050584
16. Stirbu, Irina, et al. "Inequalities in utilisation of general practitioner and specialist services in 9 European countries." *BMC Health Services Research*, vol. 11, no. 288, 31 Oct. 2011. https://doi.org/10.1186/1472-6963-11-288
17. Fjær, Erlend L., et al. "Exploring the differences in general practitioner and health care specialist utilization according to education, occupation, income and social networks across Europe: Findings from the European Social Survey (2014) Special module on the Social Determinants of Health." *European Journal of Public Health*, vol. 27, no. suppl_1, Feb. 2017, pp. 73–81. https://doi.org/10.1093/eurpub/ckw255
18. "Self-reported consultations of a medical professional by sex, age and degree of urbanisation." *Eurostat*. ec.europa.eu/eurostat/databrowser/view/hlth_ehis_am2u__custom_11202979/default/table. Accessed 24 Oct. 2023.
19. "Self-Medication Market." *AESGP*. aesgp.eu/self-care-market. Accessed 3 Nov. 2023.
20. "GDP and main components (output, expenditure and income)." *Eurostat*. ec.europa.eu/eurostat/databrowser/view/nama_10_gdp/default/table. Accessed 7 Apr. 2024.
21. "UHC Service Coverage Index." *World Health Organization.* data.who.int/indicators/i/9A706FD. Accessed 20 Apr. 2024.
22. Kringos, Dionne S., et al. Building primary care in a changing Europe. *World Health Organization*, 2015.
23. OECD. "Strengthening primary care systems." *Health at a Glance: Europe 2016: State of Health in the EU Cycle*, 2016, https://doi.org/10.1787/health_glance_eur-2016-5-en
24. Jelovac. "Primary Care, Gatekeeping, and Incentives." *Encyclopedia of Health Economics*, 2014, pp. 142-145.
25. Rasoulinezhad, S.A. "Patient views for self-referral to specialists." *Iranian journal of public health*, vol. 36, no. 1, 2007, pp. 62-67.
26. Moreno-Serra, Rodrigo and Peter Smith. "Does progress towards universal health coverage improve population health?" *The Lancet*, vol. 380, no. 9845, 8 Sep. 2012, pp. 917-923. https://doi.org/10.1016/S0140-6736(12)61039-3
27. Shaltynov, Askhat, et al. "Inequalities in Out-of-Pocket Health Expenditure Measured Using Financing Incidence Analysis (FIA): A Systematic Review." *Healthcare*, vol. 12, no. 10, 20 May 2024, pp. 1051. https://doi.org/10.3390/healthcare12101051
28. Hadley, Jack. "Sicker and Poorer—The Consequences of Being Uninsured: A Review of the Research on the Relationship between Health Insurance, Medical Care Use, Health, Work, and Income." *Medical Care Research and Review*, vol. 60, no. 2, 2003, pp. 3S-75S. https://doi.org/10.1177/1077558703254101
29. Eze, Paul, et al. "Evaluating health systems' efficiency towards universal health coverage: A data envelopment analysis." I*NQUIRY: The Journal of Health Care Organization, Provision, and Financing*, vol. 61, 2024. https://doi.org/10.1177/00469580241235759
30. Garcia-Escribano, Mercedes et al. "Patterns and Drivers of Health Spending Efficiency." *International Monetary Fund*, 2022, pp. 6.
31. "European Health Interview Survey (EHIS)." *European Commission*. ec.europa.eu/eurostat/cache/metadata/en/hlth_det_esms.htm. Accessed 14 Apr. 2024.
32. European Commission, et al. Quality report of the second wave of the European Health Interview survey: 2018 edition. *Publication Office*, 2018, https://doi.org/10.2785/43982
33. Dowell, Scott F. "Seasonal variation in host susceptibility and cycles of certain infectious diseases." *Emerging infectious diseases*, vol. 7, no. 3, 2001, pp. 369-374. https://doi.org/10.3201/eid0703.010301
34. Martinez, Micaela Elvira. "The Calendar of Epidemics: Seasonal Cycles of Infectious Diseases." *PLOS Pathogens*, vol. 14, no. 11, 8 Nov. 2018. https://doi.org/10.1371/journal.ppat.1007327
35. European Commission, Eurostat. European Health Interview Survey (EHIS wave 2) - Methodological manual - 2013 edition. *Publications Office,* 2013, https://doi.

https://doi.org/10.59720/24-002

org/10.2785/43280
36. "Population, Total - World." *World Bank Open Data*, data.worldbank.org/indicator/SP.POP.TOTL. Accessed 14 Apr. 2024.
37. Spinks, Jean, et al. "Costs and Drivers of Complementary and Alternative Medicine (CAM) Use in People with Type 2 Diabetes or Cardiovascular Disease." *European Journal of Integrative Medicine*, vol. 5, no. 1, Feb. 2013, pp. 44–53. https://doi.org/10.1016/j.eujim.2012.08.003
38. Hurwitz, Eric L. and Lu-May Chiang. "A Comparative Analysis of Chiropractic and General Practitioner Patients in North America: Findings from the Joint Canada/United States Survey of Health, 2002–03." *BMC Health Services Research*, vol. 6, no. 49, Dec. 2006. https://doi.org/10.1186/1472-6963-6-49
39. Wardle, Heather, et al. British Gambling Prevalence Survey 2010. *The Gambling Commission*, 2011, assets.publishing.service.gov.uk/media/5a74974ae5274a44083b7e64/9780108509636.pdf
40. Shimizu, Yuho. "Multiple Desirable Methods in Outlier Detection of Univariate Data with R Source Codes." *Frontiers in Psychology,* vol. 12, 17 Jan. 2022. https://doi.org/10.3389/fpsyg.2021.819854
41. Mukaka, M M. "Statistics corner: A guide to appropriate use of correlation coefficient in medical research." *Malawi medical journal: the journal of Medical Association of Malawi*, vol. 24, no. 3, 2012, pp. 69-71.
42. Habibzadeh, Farrokh. "How to report the results of public health research." *Journal of Public Health and Emergency,* vol. 1, Dec. 2017. https://doi.org/10.21037/jphe.2017.12.02