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Typical Household Elasticity of Demand for Pharmaceuticals Across European States

Abstract: According to the World Health Organisation (WHO), almost a billion people worldwide are at risk of falling into poverty due to out-of-pocket health spending, and pharmaceuticals are an integral part of this growing problem. The presented study aims to assess the price and income elasticity of demand for pharmaceuticals across European states over the period 2009–2019. The subject of the analysis is a typical household in each state. The analysis focuses on evaluating interactions in the light of economic growth, thus the results are cross-referenced with the countries' development groups to pinpoint any similarities and contrasts within and between clusters. The results indicate that households in underprivileged regions have a higher responsiveness to economic stimuli than in prosperous states. Both the income and price elasticities indicate the existence of unmet need for pharmaceuticals due to insufficient financial resources. Moreover, households' responsiveness to income and price changes varies across time, states and affluence development groups.

Keywords: health economics, out-of-pocket pharmaceutical expenditures, income elasticity of demand, price elasticity of demand, regional studies

JEL: I14, I15, G59, C22

1. Introduction

Healthcare consists of three main branches: inpatient hospital care, outpatient medical services and pharmaceuticals (Glied, Smith, 2013: 13–14). In Europe, which is the focus of this paper, the majority of expenditures in the two former categories are covered by public or private indirect sources, through taxes as well as social and obligatory private insurance (Xu et al., 2018: 21–26). In the case of pharmaceutical commodities, inpatient care medicine is totally or partially paid for via the healthcare system. However, outpatient needs are financed by private direct (or out-of-pocket) expenses. This form of spending tends to burden a household's budget the most, especially due to its uncertainty and variability. Pharmaceuticals become competitive goods alongside other basic commodities such as food and housing. This may lead to decreasing consumption of essential, lifesaving or long-term medicine and, as a result, to a deterioration of health and declining quality of life (WHO, n.d., *Essential medicines*; WHO, n.d., *Global Essential...*; WHO, 2018: xi, 1).

Globally, while the reliance on out-of-pocket expenditures (as a percentage of total health spending), including pharmaceutical expenses, is slowly declining in most World Health Organisation (WHO) regions, it continues to remain at a very high level (above 40% in low- and middle-income countries, and above 30% in Europe) (WHO, n.d., *Global Health...*; WHO, n.d., *Global Health Expenditure Database. Health Expenditure...*). Additionally, the absolute and per capita values of private direct expenditures are systematically increasing (WHO, n.d., *European Region...*; WHO, 2019: 5–45; WHO, 2020: 1–18). As estimated by the WHO, almost a billion people worldwide are at risk of falling into poverty due to out-of-pocket health spending, and pharmaceutical goods are an integral part of this growing problem (WHO, 2021b).

Pharmaceutical commodities are a wide spectrum of drugs defined by the WHO as specific preparations, both of modern and traditional medicine, intended to prevent and treat diseases, and protect public health (WHO, n.d., *Pharmaceutical products*). They save and prolong life, and elevate quality of life, benefiting a wide range of society (O'Brien et al., 2020a: 1–6). From the procedural perspective, we can distinguish between prescription drugs, for which a doctor order (prescription) is required to purchase legally, and over-the-counter (OTC) medicine, for which no prescription or oversight is necessary. From an economic point of view, the demand sensitivity to price and income changes may significantly differ between these two categories (Siminski, 2011: 4835–4844; Matin et al., 2015: 1470–1474; Sanwald, Theurl, 2017: 437–445; McClellan et al., 2019: 4–10; Murphy et al., 2019: 764–771).

In statistical and economic research, including the empirical study in this paper, a more general drug category of 'pharmaceuticals and other medical non-durables' is often used. This encompasses: medicinal preparations, original and generic medicines,

patent medicines, serums, vaccines, vitamins, minerals, and oral contraceptives (Eurostat, n.d., *Health care...*; OECD, 2003). Therefore, besides the main two groups of prescription drugs and OTC medicine, dietary supplements are included, despite often being officially classified as a food group and not as medicine. However, supplements, similarly to OTC drugs, are widely available without a medical specialist's supervision in pharmacies and other stores, as well as advertised as health-beneficial. Consumers may not have enough knowledge to differentiate between OTC drugs and supplements. Hence, these two groups of products are key elements of a healthcare self-treatment process called self-medication, which can be defined as the use of medicine, herbs and supplements to treat self-diagnosed, chronic and acute, illnesses and symptoms. It is a common worldwide practice that, for the most part, is accepted as an element of the healthcare system – recognising a person's responsibility for their own health and saving healthcare service resources in the case of minor ailments (WHO, 2000a: 4–28; Alghanim, 2011: 410). However, without professional oversight, self-medication can lead to overuse of drugs or inappropriate self-medication (using products contrary to the packaged instructions). A recent study in Poland proved that over 70% of respondents engaged in at least one behaviour associated with inappropriate self-medication in their lifetime (Makowska et al., 2020: 1–16). Overall, self-medication, both proper and inappropriate, is an integral part of the pharmaceutical market, hence it impacts the demand for pharmaceuticals and households' out-of-pocket pharmaceutical expenditures. Studies show that self-medication is the most prevalent source of direct private expenses (Du et al., 2019: 1–12).

From a medical perspective, health – and, therefore, the need and demand for as well as the consumption of healthcare – are determined mostly by hereditary, environmental, behavioural, and random aspects (Glied, Smith, 2013: 79–81). From a psychological point of view, other key factors are subjective quality of life and self-perceived state of health (Olsen, 2017: 1–6). In health economics, financial, market and systemic elements are integrated into most studies. From an individual perspective, the demand for healthcare, unlike for other goods, is highly uncertain and variable. Out-of-pocket expenses, including those on pharmaceuticals, can be unexpected and high, which may limit the affordability of healthcare goods and services, negatively impacting the health of individuals and populations (WHO, n.d., *Health budget*; Bhattacharya, Hyde, Tu, 2013: 2–3). Hence, a person's income strongly influences their health through budgetary constraints restricting the affordability of medical goods and services.

From a macroeconomic perspective, individual and population health is impacted by regional affluence (economic growth or development), the healthcare system and policies, as well as the market. Economic growth leads to higher healthcare spending, increased household income, a bigger supply of public healthcare and greater opportunities to consume healthcare goods and services (WHO, n.d. *European Region...*; Guinness, Wiseman,

2011: 24–26; Glied, Smith, 2013: 15–16, 78; Olsen, 2017: 98; Xu et al., 2018: 1–56; WHO, 2019: 5–45; 2020: 1–18). Healthcare, and therefore also health, are strongly influenced by the distribution of health-related goods (such as pharmaceutical products), services and resources, thus socioeconomic inequalities in access to them are of high importance (Olsen, 2017: 66).

Prices, determined by the free market and national price regulations, are yet another significant economic factor impacting the demand for healthcare. According to Bhattacharya, Hyde and Tu (2013), a core question underlying health economics and health policies is: Is the demand for healthcare sensitive to price changes or price-insensitive? If the former is true, then people facing different charges or having a different willingness to pay receive different quantity of care. In consequence, they may end up with different health outcomes. On the other hand, if the demand is price-inelastic because people consider healthcare to be so valuable that any economic trade-off is acceptable, how does it coincide with budget constraints (Bhattacharya, Hyde, Tu, 2013: 8–9; Sloan, Hsieh, 2017: 52)? Increasing prices and a fixed level of demand for healthcare, *ceteris paribus*, may raise overall private expenditures, leading to an increase in the financial burden of households, which may even exceed the value of income for less-affluent subpopulations. This issue applies in particular to pharmaceutical goods.

Therefore, at times, the state needs to intervene to limit the drug market risks to the most vulnerable subpopulations. National and international policies are the main tool of institutional interventions. An example of the latter is the WHO list of essential medicines, that is those that meet the population's priority health needs, selected based on efficacy, safety, cost, local availability, etc. (WHO, n.d., *Global Essential Medicines*). The aim is to provide access to quality-assured affordable drugs and limit the financial burden of households, as in many countries, people pay for drugs mostly out-of-pocket. In particular, due to the rising prevalence of non-communicable diseases (NCDs) (i.e. cardiovascular and respiratory diseases, neoplasms), many of which are chronic conditions requiring long-term treatment, it becomes crucial to undertake action preventing low- and middle-income households from becoming overburdened with private direct expenses on pharmaceuticals. This should prevent a decrease in access to necessary medicine which could result in declining health and quality of life (WHO, n.d., *Global Essential...; WHO, 2013*). High out-of-pocket expenses, including co-payments for refunded drugs, pose the risk of reducing consumption of needed drugs (WHO, 2018: xi, 1). Some studies indicate that there is no optimal co-payment fee from consumers' perspective, though many doctors and policy-makers see a need for shared costs of medicine and outpatient care to improve the rational use of resources (O'Brien et al., 2020b: 411–417).

Focusing on a relatively small and homogenous European region, we can see that a key element of every drug policy at a national level is outpatient drug reimbursement, which varies from state to state. A common factor is a reimbursement list that specifies

pharmaceuticals selected for coverage (positive list) or excluded from reimbursement (negative list). This tool is designed to ensure the affordability of treatment for illnesses that the national legislators consider a priority. There are a few types of refund regulations. In some regions, e.g. the Baltic states, the reimbursement eligibility is disease-based, while in others, there are population-group-specific schemes (e.g. Cyprus, Ireland). In some Scandinavian countries, the refunds are consumption-based (patients pay for drugs out-of-pocket up to a defined threshold, after which they share payments with the public purse). Only in a few countries is the cost of reimbursable pharmaceuticals fully covered by public sources (e.g. Austria, Croatia, Germany, Ireland, Italy, the Netherlands, and the UK), as most regions require a form of co-payment that may be changeable or fixed (i.e. Estonia, France, Poland) (WHO, 2018: xii–xiii). Another element of drug policies is price control. This refers to the national government regulator overseeing the maximal charges for commercially sold pharmaceuticals, as well as pharmaceutical companies' differential pricing (i.e. setting different prices for different markets depending on local purchasing power) (WHO, 2001). It stands to reason that these mechanisms should lower the financial burden of households, as that is their purpose. However, some studies suggest that there may not be any meaningful global relation between pharmaceutical policies (price regulation and reimbursement mechanisms) and healthcare expenditures (Ben-Aharon, Shavit, Magnezi, 2017: 859–866). This may indicate that the savings resulting from the expenditures not incurred by a household are transferred to other pharmaceutical products for other purposes. This may be due to the existence of a potential or unrealised demand for drugs that is not satisfied because of insufficient income. Other research points out that any potential benefit in reducing households' expenses through drug price control on the supply side is far outweighed by the resulting social loss of hindered new medicine development (Santerre, Vemont, 2006: 233–244).

Overall, income and price as well as economic development and drug policies undeniably influence the accessibility and affordability, quality and quantity of healthcare, which strongly impacts the health of a person and the whole population. A US study has shown that an increase in daily out-of-pocket expenses on an opioid painkiller results in a significant decrease in consumption (Dunphy, 2021: 1–4). On the other hand, some research indicates that due to the essentiality of pharmaceuticals, households' demand for them may be price- and income-inelastic, at least for some subpopulations (Siminski, 2011: 4835–4844; Matin et al., 2015: 1470–1474; McClellan et al., 2019: 4–10).

As reasoned above, the problem of households' out-of-pocket expenditures on pharmaceuticals is very complex due to the multidisciplinary and multidimensional nature of its determinants. Nevertheless, it is essential to understand the economic interactions as they allow for improving health policies, relieving households' financial burden and reducing health and healthcare inequalities (WHO, n.d. *Health accounts*). Most

studies researching the difficult-to-grasp economic determinants of health (price and income) focus on micro-level interactions. The results are often ambiguous, most likely due to the heterogeneity of the individual data.

Therefore, this study aims to assess the price and income elasticity of demand for pharmaceuticals across European states over the period 2009–2019. The subject of the analysis is an average or typical household in each state, which allows for eliminating the heterogeneity of the economic relationships in question within the population. The focus of the study is to evaluate the impact of price and income on the demand for medicines in the light of economic growth. The distribution of pharmaceutical expenditures and their burden on households' income, as well as elasticities of demand, are cross-referenced with the countries' development groups to pinpoint any similarities and contrasts within and between the affluence clusters of European countries.

This paper is structured as follows. In section 2, the methodology of arc and point elasticity of demand is presented. Moreover, affluence development country groups in Europe are introduced. Section 3 presents data and the basic descriptive statistics. The results of the research are included in Section 4, where paragraph 4.1 is dedicated to the analysis of income elasticity and 4.2 to the price elasticity of demand for pharmaceuticals in typical households across Europe. The final section highlights the conclusions.

2. Methodology

To realise the assumed aim, the concept of elasticity of demand is used. In general, elasticity reflects a percentage change of one variable in reaction to a 1% increase of another. Hence, in the case of demand, it quantifies the responsiveness or sensitivity of demand to a given factor. In this study, the distribution of households' out-of-pocket pharmaceutical expenditures in association with its two key determinants is analysed across European countries. These expenses are the representation of realised demand for pharmaceuticals, i.e. the value of goods people were willing to buy and could afford. The amount or value of the commodities consumers desired to buy but their budget constraints did not allow for is considered an unrealised or potential demand (Dwivedi, 2002: 34–35). The two main determinants of demand are: income (from the demand side) and price (from the supply side). Both of them are incorporated in this study.

Firstly, the income elasticity of demand (*IED*) measures the responsiveness of the quantity or value of a purchased good or service to a change in consumers' income. In this analysis, the demand not for a single good is researched but for a group of commodities – pharmaceuticals. Moreover, the study is carried out not on a microeconomic level but for countries, so average expenditures (or demand value) per inhabitant constitute

the representation of demand, and income is measured by median income in the working population. The value of income elasticity, its strength and sign, allows for a classification of goods. A negative value of IED indicating an increase in income causing a decrease in demand, possibly due to switching to more luxurious substitutes, characterises inferior goods. Conversely, $IED > 0$ describes normal goods, for which additional income translates into a rise in realised demand. Among these commodities, we distinguish necessary goods or essential consumer goods with a less than proportional incline in demand resulting from a 1% increase of income ($0 \leq IED < 1$) and luxury (superior or prestige) goods with a more than proportional incline of demand ($IED > 1$). IED equal to 0 suggests that income does not influence demand in a significant way (Dwivedi, 2002: 40–41, 67, 86–87; OECD, 2003; Besanko, Braeutigam, 2013: 53).

Secondly, the price elasticity of demand (PED) quantifies the reaction of demand caused by a change in price, *ceteris paribus*. Analogically, this analysis incorporates aggregated, macro-level information on prices, not for a single commodity but a whole set of commodities. The value of PED gives precise information about a given good. The law of demand indicates that a decrease in price entails an increase in demand ($PED < 0$). There are, however, some exceptions:

$PED = 0$ means a perfectly inelastic demand (price does not influence demand), characterising necessary goods;

$PED > 1$ indicates a positive relationship between price and demand, which usually reflects a paradox: Veblen or luxury goods (the more expensive, the more desirable), Giffen or essential goods (cheaper substitutes for another commodity), and speculative paradox (expecting further increases of prices in the future).

Moreover, the strength of elasticity (the absolute value of PED) distinguishes between: perfectly inelastic demand ($PED = 0$), inelastic demand ($|PED| < 1$), and strong elasticity of demand ($|PED| > 1$) (Dwivedi, 2002: 34–38; OECD, 2003; Besanko, Braeutigam, 2013: 46–47).

There are two mathematical approaches to measuring elasticity: point and arc. The arc elasticity is measured between two finite points on a demand curve (hence the ‘arc’). In this study, for each country, there is a time series, so the arc elasticity is measured as a relative change of demand to a relative change of either income or price in relation to the previous year. The formulas for IED and PED are as follows:

$$IED_t^r = \frac{\frac{D_t^r - D_{t-1}^r}{D_{t-1}^r}}{\frac{I_t^r - I_{t-1}^r}{I_{t-1}^r}} \quad (1)$$

and

$$PED_t^r = \frac{\frac{D_t^r - D_{t-1}^r}{D_{t-1}^r}}{\frac{P_t^r - P_{t-1}^r}{P_{t-1}^r}}, \quad (2)$$

where IED_t^r is the arc income elasticity of demand and PED_t^r is the arc price elasticity of demand in the year t ($t = 2010, \dots, 2019$) for the r -th country ($r = 1, \dots, 29$); analogical D_t^r is the demand for pharmaceuticals measured by households' out-of-pocket expenditures per inhabitant, I_t^r is the median income and P_t^r is the price level. There are no data on price levels for pharmaceutical products, but an annual average index of price changes is available, which corresponds with the dominator of formula (2) (Dwivedi, 2002: 68–76; Besanko, Braeutigam, 2013: 47).

The arc elasticity has limited applicability as its value is different between every two time points. A more universal and reliable approach is the point elasticity, which quantifies the sensitivity of demand in a given point on the demand curve based on the demand function. The elasticity may not be constant for all points, but it is predictable. In this research, a power function is utilised to assess countries' income elasticity of demand. The power function specification is:

$$D_t^r = \alpha_0^r \cdot I_t^{r\alpha_1^r} \cdot \varepsilon_t^r, \quad (3)$$

where parameter α_1^r is the point IED for the r -th state, α_0^r is the constant, and ε_t^r is the random term of the model. The advantage of a power function over, for instance, a more common liner function is that the parameter connected with the exogenous variable represents the point elasticity constant for all points. The model (3) is estimated using the robust ordinary least squares method. An analogical approach is not possible for the PED as information on prices is not available, only the price change (Dwivedi, 2002: 68–76; Besanko, Braeutigam, 2013: 47–49).

It is important to note that the classification of goods based on IED and PED is not fixed. Knowledge of the value of elasticity, based on given data, determines the type of commodity limited to the frame of the study (e.g. time, space, subpopulations). Therefore, it is necessary to carry out elasticity research to learn whether or not pharmaceuticals are inferior or normal goods and abide by the law of demand.

All calculations on point and arc IED and arc PED are carried out independently for each of the 29 states. However, one of the points of this study is to compare elasticity across the countries and highlight any patterns. Especially interesting is the relation of responsiveness of demand for pharmaceuticals and economic development. To enable this, the states are categorised into three sets according to their development level. The classification presented in Table 1 and Figure 1 is based on the annual gross domestic

product (*GDP*) per capita values for the period 2009–2019. The final ranking is based on the average ranking position achieved in each of the years. The top ten countries constitute the most affluent development group (DG–1), the next ten states form a middle-level set (DG–2), while the bottom nine regions fall into the underdeveloped cluster (DG–3). All outcomes are presented and analysed according to development group division and rank. This classification should allow for pinpointing patterns concerning the distribution of the demand for pharmaceuticals and its sensitivity to economic stimuli within and between the economic growth clusters.

Table 1. State classification by development group and rank based on average *GDP* per inhabitant (PPS euro) in 2009–2019

Country	Rank	Development group
Luxembourg	1	DG–1
Norway	2	
Switzerland	3	
Ireland	4	
Netherlands	5	
Austria	6	
Denmark	7	
Iceland	8	
Sweden	9	
Germany	10	
Belgium	11	DG–2
Finland	12	
United Kingdom	13	
France	14	
Italy	15	
Spain	16	
Cyprus	17	
Czechia	18	
Portugal	19	
Estonia	20	

Country	Rank	Development group
Slovakia	21	DG-3
Lithuania	22	
Greece	23	
Poland	24	
Hungary	25	
Latvia	26	
Croatia	27	
Romania	28	
Bulgaria	29	

Source: own computation in MS Excel

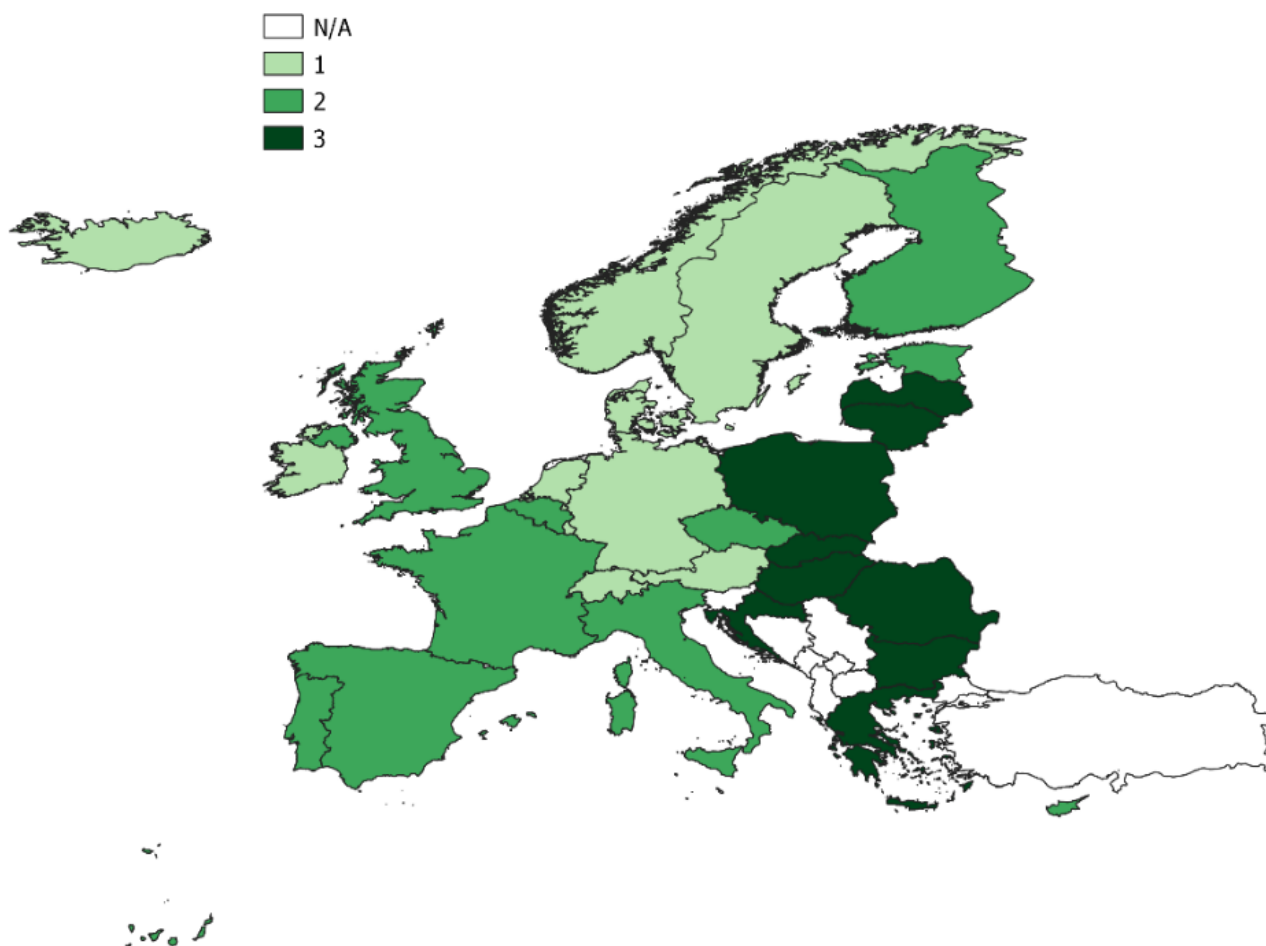


Figure 1. State classification by development group (1-3) based on average *GDP* per inhabitant (PPS euro) rank in the years 2009-2019

Source: own computation in QGIS

The spatial distribution of the development groups, which constitutes the frame for the main study concerning the pharmaceutical studies, is presented in Figure 1. The most affluent DG-1 states encompass the majority of Scandinavian states (except for Finland, in DG-2) and parts of Western Europe (Luxemburg, the Netherlands, Germany, Austria, Switzerland, and Ireland). The middle development group consists of the remaining Western countries, Southern regions (without Greece), Czechia (or the Czech Republic), and Estonia. In the low-level GDP group, the main cluster includes the majority of Central and Eastern Europe with the Balkans and the remaining two Baltic states as well as Greece.

In the study, STATA 16 is used for econometric and statistical analysis, MS Excel 2016 is applied for some statistical analysis and visualisation, while QGIS 3.12 is employed for the choropleth maps.

3. Data

All variables used in the study are taken from the Eurostat Database, and they cover 29 states for the years 2009–2019, as no newer data are available as of June 24, 2022. The measure of demand is annual household out-of-pocket expenditures for pharmaceuticals and other medical non-durable goods per inhabitant, expressed in purchasing power standard (PPS) euro constant prices of the year 2015 (referred to as ‘pharmaceuticals’ or ‘pharmaceutical goods/commodities/products’ for convenience). Income is defined as annual median equivalised net income in PPS euro constant prices (2015). Since some values were missing, they were extrapolated using linear trends and average change rates. It was possible to include 29 countries in the final set. Both the pharmaceuticals expenditures and income are calculated as national mean values; hence they characterise an average (typical) household in each country, which is the subject of this study. Thus, the relations analysed in the study are averaged over the household’s health status and demographic structure, income, price level and its change, as well as the demand structure (types of pharmaceuticals, their necessity, purpose, and appropriateness of use).

In Eurostat, there is no information on prices of pharmaceutical goods, which makes it impossible to apply the point price elasticity of demand methodology. However, an annual average rate of change of pharmaceutical product prices is available. It is defined as a ratio of a 12-month mean of the monthly price indices in the year t to an analogical value in the previous year (Eurostat, n.d., *Harmonised Indices...*). This variable is used as the proxy of the price change rate in the denominator of formula (2) to calculate the arc *PED*.

Lastly, using the data on gross domestic product (at market prices expressed in current prices million PPS euro) and the population on 1 January, the value of *GDP* per capita was calculated for the period 2009–2019. It was used to sort countries by a decreasing level of economic development independently for each year (hence it was unnecessary to calculate constant price values) and to obtain the averaged rank as well as the classification into three categories (DG-1, DG-2, DG-3).

Table 2 presents basic statistics on pharmaceutical expenditures per capita, income and their ratio in the years 2009 and 2019 by development group. Figure 2 illustrates the spatial distribution of these three variables. In the case of typical household income, its regional pattern is very similar to the DG classifications. In 2009, the highest incomes were observed in Luxemburg (first in the DG ranking), Switzerland, Austria, and Scandinavia. The lowest values characterised Eastern and Central Europe as well as the Baltic states. Bulgaria ranks bottom for both *GDP* and income. Over the period 2009 to 2019, the values of median net income rose the most in the poorer states, with the highest percentage changes in Romania (63%), Poland (44%) and Estonia (36% – bottom-ranked in DG-2), with Lithuania, Latvia, Croatia and Bulgaria having an increase of above 30%. The smallest increases in DG-3 were recorded in Hungary (only 7%) and Slovakia (15%). Some states experienced a decline in income – Greece (28%), and the UK, Norway and Luxemburg of at least 10%, as well as some other states in DG-1 and DG-2. Overall, the distribution did not alter notably over the decade, and the division into more affluent Western and Northern states versus less prosperous Central and Eastern regions remained unchanged. Generally, the higher the *GDP* group, the higher the income. Conversely, the dispersion (measured by relative standard deviation) rises with the lowering level of income and *GDP* group.

The distribution of pharmaceutical expenditures was different from the ones of DG classification and income. In 2009, typical households in Bulgaria and some other DG-3 states (Poland, Lithuania, Hungary) spent the most. However, so did some countries in DG-1 (Iceland, Switzerland, Sweden) and DG-2 (Belgium, Cyprus, Finland). The lowest expenses were noted in Croatia, Luxemburg and other states spread across the top 18 states according to the *GDP* ranking. The largest rises in pharmaceutical expenditures from 2009 to 2019 were observed in Luxemburg (91%), Latvia (78%) and Greece (53%), while major decreases happened in Slovakia (28%), France (25%), Belgium and Iceland (19%). This did not greatly influence the spatial distribution in the final year of the study. There does not seem to be any clear relation between the DG classification and the value of pharmaceutical expenditures; however, overall, mean expenses rose with the subsequent affluence group – the average spending in DG-3 was 19% higher than in DG-1.

To assess households' financial burden due to out-of-pocket pharmaceutical expenses, a ratio of spending to income was calculated. In the whole analysed period, the highest shares of expenses in income were observed in the DG-3 cluster, especially in Bulgaria

(approx. 4%) and Romania (2–3%), with an average of 2.15% in 2009 and, slightly lower, 2% in 2019 for the whole group. The lowest burden was in DG-1, with a mean ratio of 0.6% (the lowest was Luxemburg with 0.2–0.4%). Over the decade, no major changes were observed. The highest rises were for Greece (1.2 percentage points – pp.) and Latvia (0.5 pp.), while the largest decreases happened in Romania (1 pp.), Slovakia (0.7 pp.) and Poland (0.5 pp.). Overall, the spatial pattern is very clear and constant over time – the lower the development level (DG classification and *GDP* value rank), the bigger the household budget burden due to pharmaceutical expenditures and the higher the variance states in the cluster. Therefore, it is essential to carry out extended studies concerning pharmaceutical expenditures and their determinants in association with regional affluence.

Table 2. Basic statistics for pharmaceutical expenditures, income and their ratio by development group in the years 2009 and 2019

Variable	Year	Statistics	Development group			Total (29 states)
			DG-1	DG-2	DG-3	
Pharmaceutical expenditures per capita [euro PPP, prices 2015]	2009	MV	131.18	133.78	156.36	139.89
		RSD [%]	42.46	27.98	38.64	36.58
	2019	MV	135.93	137.84	183.83	151.45
		RSD [%]	28.4	23.76	39.19	34.91
Median income [euro PPP, prices 2015]	2009	MV	22,562.9	16,206.94	7,980.32	15,845.56
		RSD [%]	18.15	26.42	30.41	44.18
	2019	MV	22,752.64	16,475.89	9,509.14	16,478.19
		RSD [%]	12.59	19.63	15.87	36.57
Pharmaceutical expenditures per capita to median income ratio [%]	2009	MV	0.59	0.88	2.15	1.18
		RSD [%]	38.53	38.45	52.42	79.53
	2019	MV	0.6	0.88	2	1.13
		RSD [%]	26.91	33.3	45.76	70.86

MV – mean value, RSD – relative standard deviation.

Source: own computation in STATA and MS Excel

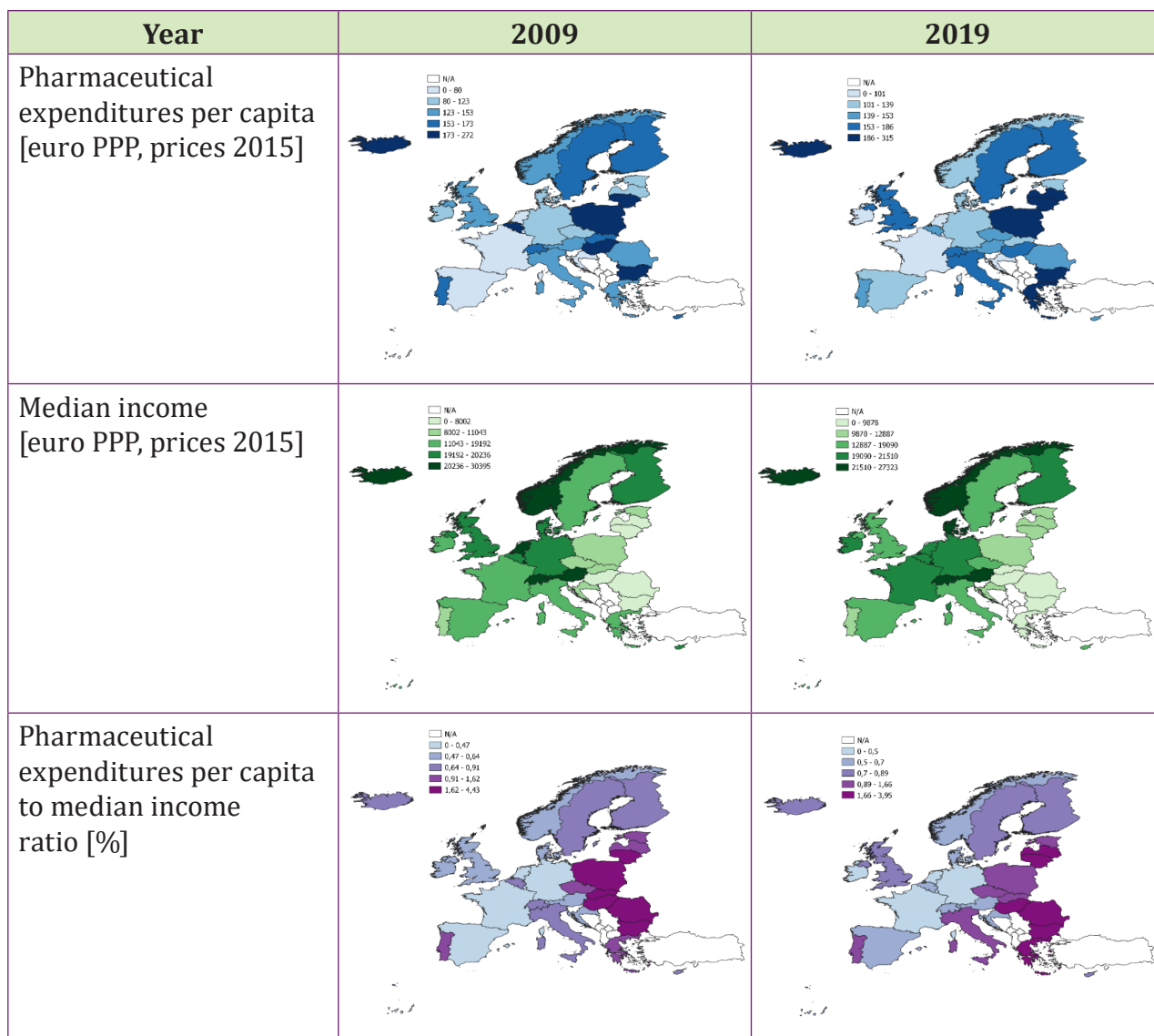


Figure 2. Spatial distribution of pharmaceutical expenditures, income and their ratio, European states, years 2009 and 2019

Source: own computation in QGIS

4. Results

4.1. Income elasticity of demand – point and arc

In order to assess the impact of income on households’ demand for pharmaceutical products, both the arc and point elasticity are used. Firstly, the former was calculated annually (2010–2019) for every state according to formula (1), and the results are presented in Table 3.

It can be observed that for none of the countries or years does the elasticity consistently indicate that pharmaceuticals remained a fixed type of good. For most states, the dominating values were positive ($IED > 0$), suggesting that for typical households, pharmaceutical commodities were normal goods for which demand was stimulated by rising income. In the case of Switzerland, 9 out of 10 values were above zero, while for Poland and Latvia, it was 8 out of 10. It is also interesting to look for values indicating a luxury good ($IED > 1$). In all states, at least in one year, the income elasticity was above 1 and the pharmaceuticals could have been perceived as prestigious commodities. Especially for Germany and Italy, pharmaceutical products tended to behave as luxury commodities. On the other hand, for average households in Iceland and most DG-3 states, pharmaceutical products were necessity goods ($0 < IED < 1$).

In Slovakia, only for two years was a positive sign of elasticity observed, and for four years in Luxemburg, Iceland and Bulgaria. In these four states, pharmaceuticals seemed to be inferior goods, and increasing income correlated with declining expenditures. The theory of economics suggests that this is due to switching the demand to substitutes. There are no direct equivalents for pharmaceutical products; however, healthy lifestyle and medical treatment may be considered substitutes considering the determinants of health and functioning of healthcare.

Analysing the temporal distribution of arc elasticity, it can be observed that for 19 of the 29 states the IED was negative in the year 2011, and was also so in 2013 for 17 states. This corresponds with the period of approximately 2010–2013 when income tended to decline, or at least a stagnation was observed for many states. On the other hand, in the year 2015, 26 states, and in the year 2017, 21 of them, had a positive value of elasticity. This indicates that the economic situation in a given year influences not only the value of income and pharmaceutical expenditures but also the strength and direction of the relationship between them. Therefore, for a typical household, macroeconomic fluctuations impact these categories disproportionately.

Table 3. Arc income elasticity of demand for pharmaceuticals in European states, 2010–2019, by development group [%]

DG	Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
	Country										
1	Luxembourg	1.19	1.41	-70.87	-1.16	-33.63	-1.87	0.19	-0.72	0.05	-4.13
	Norway	0.03	-0.05	-0.06	-0.16	1.58	-2.73	0.65	-0.69	1.34	1.99
	Switzerland	-0.47	0.32	0.58	0.06	74.34	1.94	0.53	2.53	4.20	2.22
	Ireland	0.54	0.38	1.19	-1.48	1.94	0.37	-0.32	2.31	-0.84	1.68
	Netherlands	0.74	-1.40	-2.09	-8.47	0.67	2.24	-0.19	1.43	8.28	-5.20
	Austria	-1.59	-0.64	-0.77	2.44	0.83	6.37	-0.81	1.92	0.10	-0.84
	Denmark	-0.49	-0.26	0.08	-1.26	0.88	2.41	-0.73	0.61	0.92	4.28
	Iceland	0.11	-0.32	0.78	-1.87	-2.54	1.69	-1.52	-0.08	-0.09	0.69
	Sweden	0.96	-1.07	2.82	-0.23	-2.56	2.37	-3.12	1.30	-1.72	1.05
	Germany	-2.47	-0.40	1.65	14.98	1.60	1.16	1.07	-0.32	4.45	1.16
2	Belgium	0.84	-1.21	5.30	0.90	2.69	2.53	-1.49	0.94	17.21	-0.37
	Finland	0.46	-6.33	-3.63	4.77	6.84	3.56	0.88	1.72	4.27	-1.68
	United Kingdom	-0.27	-0.48	1.77	-4.36	-2.35	0.05	0.86	3.68	-24.84	5.55
	France	2.01	6.70	-3.73	-2.29	263.63	0.88	-1.34	2.48	2.31	-6.80
	Italy	-0.78	1.90	-0.27	1.13	4.03	6.71	-0.45	10.65	-186.04	3.09
	Spain	0.77	-1.11	-3.88	-6.37	24.85	4.39	1.05	7.74	0.25	-3.69
	Cyprus	0.24	-3.85	0.71	0.04	-0.98	-26.76	1.11	0.77	1.66	-7.26
	Czechia	-0.78	3.38	-11.71	0.21	3.50	1.26	0.02	-3.56	1.24	0.20
	Portugal	-5.93	-1.86	1.75	44.15	0.80	3.88	-0.30	3.49	-1.40	0.94
	Estonia	-0.39	1.40	3.32	-0.37	0.41	0.57	0.06	-2.73	1.33	-1.17
3	Slovakia	-0.57	-1.04	-0.62	-0.22	-6.97	1.62	-2.98	0.15	-1.98	-0.67
	Lithuania	-0.24	-1.85	2.38	-0.47	2.04	0.70	0.30	-14.09	-1.44	0.31
	Greece	0.36	0.07	-0.25	-2.76	-5.24	2.53	-0.38	1.09	-1.55	0.68
	Poland	13.03	0.18	8.39	0.20	-0.31	1.34	0.18	-8.17	0.57	0.21
	Hungary	-0.90	4.10	-2.30	1.22	0.99	0.23	-0.43	4.08	-8.59	0.44
	Latvia	-0.36	-2.02	16.82	1.05	0.83	1.59	0.68	2.22	0.15	0.84
	Croatia	1.04	-0.60	-0.68	-1.74	-2.11	1.08	1.32	1.86	-0.99	0.35
	Romania	-0.30	-0.36	4.42	-1.19	-0.02	0.61	0.14	0.55	0.31	-0.03
Bulgaria	-2.19	-0.36	-0.33	-5.83	0.84	4.71	-15.79	0.20	0.94	-0.13	

DG – development group.

Source: own computation in MS Excel

In the next step, an econometric approach – formula (3) – was used to assess the point elasticity of demand. Table 4 and Figure 3 present the summary of estimation of the power function model for each state (period 2009–2019). While the goodness-of-fit measure (determinant coefficient) is given, it is of little interest. Since the model is not utilised

to calculate the value of expenditures based on the value of income, but to quantify the strength and direction of their relationship, only the estimate of α_1^r coefficient (i.e. elasticity parameter) and its significance (based on p -value) are considered.

Out of the 29 estimations, 14 states did not have a significant elasticity based on the power function ($p > 0.1$):

- 6 out of 10 states in DG-1: Luxembourg, Norway, Netherlands, Austria, Denmark, and Iceland;
- 6 out of 10 states in DG-2: Finland, the United Kingdom, Italy, Spain, Cyprus, and Portugal;
- 2 out of 9 states in DG-3: Lithuania and Hungary.

In these states, income did not impact the demand for pharmaceutical products in an average household in any significant way. There may be various explanations for this. Firstly, in more affluent regions, the full potential demand might have been met at a relatively low level of income and, therefore, any changes in it did not stimulate expenditures. Secondly, more developed states tend to have more available and efficient healthcare (early screening, diagnosis and treatment) as well as less hazardous levels of health-related risk factors (tobacco use, unhealthy diet and obesity, physical inactivity and harmful use of alcohol). This is especially significant in respect of the two main causes of death: neoplasms and cardiovascular diseases. In effect, the demand for pharmaceuticals might have decreased due to better health and substituting medicine with a healthier diet and lifestyle (WHO, 2020b: 13–35; 2021a; *Colorectal cancer burden...*, 2021: 1–2). Thirdly, countries' drug refunding or reimbursement policies may impact the demand-income relationship. If national procedures allow for minimising consumers' co-payment for a wide range of pharmaceuticals, income stops being the key constraint of demand.

In the case of the remaining 15 states, elasticity was statistically significant. In a third of these countries, the *IED* was negative:

- DG-1: Ireland (-0.6);
- DG-2: Belgium (-1.3), France (-1.95);
- DG-3: Slovakia (-1.49), Greece (-1.09).

This indicates that in some more prosperous states, including the top 2 richest DG-3 regions, pharmaceuticals were inferior goods. As stated before, the cause was likely a substitution effect related to a healthier diet and lifestyle as well as decreasing demand due to better health.

In five of the least affluent states (DG-3: Poland, Latvia, Croatia, Romania, and Bulgaria) as well as in Estonia (the poorest of the DG-2 regions), pharmaceuticals were necessity goods as $IED \in (0,1)$. Moreover, the outcomes indicate that a typical household in these states had some unrealised demand for medicines, and additional income would have been partly directed at satisfying a need for them.

Finally, in three of the wealthier states, pharmaceuticals were perceived as a luxury commodity (Sweden – 1.25, Germany – 1.19, Czechia – 1.33). This aligns with the arc elasticity analysis above (Table 3).

Table 4. Point income elasticity of demand for pharmaceuticals in European states, 2009–2019, by development group – estimation results of power function regression

Development group	Country	Elasticity parameter [%]	Elasticity p-value	Confidence interval of elasticity (95%) [%]	Determination coefficient R^2 [%]
DG-1	Luxembourg	-5.01	0.160	(-12.42, 2.40)	20.64
	Norway	0.07	0.472	(-0.14, 0.28)	5.89
	Switzerland	0.62	0.001	(0.34, 0.89)	73.83
	Ireland	-0.60	0.042	(-1.18, -0.03)	38.3
	Netherlands	-0.08	0.905	(-1.59, 1.42)	0.17
	Austria	0.17	0.599	(-0.53, 0.87)	3.19
	Denmark	0.29	0.289	(-0.29, 0.86)	12.37
	Iceland	-0.12	0.696	(-0.79, 0.55)	1.77
	Sweden	1.25	0.008	(0.41, 2.08)	55.97
	Germany	1.19	0.001	(0.61, 1.77)	70.86
DG-2	Belgium	-1.30	0.044	(-2.55, -0.041)	37.75
	Finland	0.05	0.945	(-1.49, 1.58)	0.06
	United Kingdom	-0.62	0.307	(-1.91, 0.67)	11.52
	France	-1.95	0.098	(-4.35, 0.44)	27.42
	Italy	0.41	0.304	(-0.44, 1.26)	11.68
	Spain	-0.9	0.310	(-2.80, 0.99)	11.40
	Cyprus	-0.95	0.202	(-2.52, 0.61)	17.38
	Czechia	1.33	< 0.001	(0.82, 1.84)	79.53
	Portugal	0.14	0.73	(-0.74, 1.01)	1.39
	Estonia	0.25	0.001	(0.14, 0.36)	73.81

Development group	Country	Elasticity parameter [%]	Elasticity p-value	Confidence interval of elasticity (95%) [%]	Determination coefficient R^2 [%]
DG-3	Slovakia	-1.49	0.039	(-2.89, -0.09)	39.22
	Lithuania	0.19	0.431	(-0.34, 0.73)	7.01
	Greece	-1.09	0.002	(-1.65, -0.52)	67.61
	Poland	0.28	< 0.001	(0.20, 0.36)	87.64
	Hungary	-0.49	0.178	(-1.26, 0.27)	19.19
	Latvia	0.99	0.001	(0.52, 1.45)	72.12
	Croatia	0.8	0.001	(0.43, 1.17)	72.6
	Romania	0.26	0.001	(0.15, 0.37)	75.63
	Bulgaria	0.73	0.011	(0.21, 1.24)	52.92

Source: own computation in STATA and MS Excel

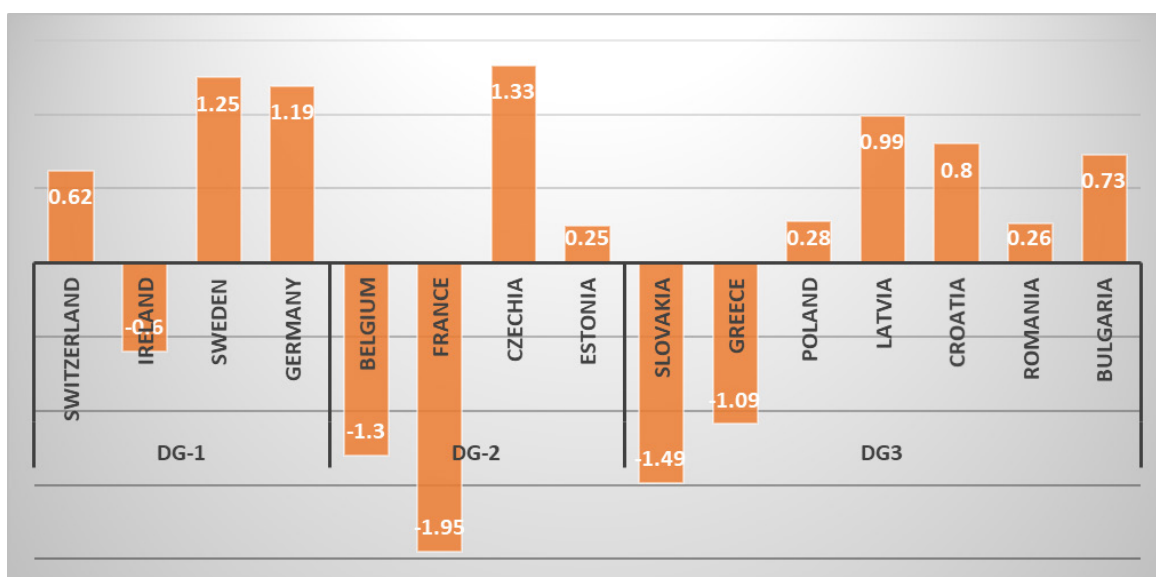


Figure 3. Arc income elasticity of demand for pharmaceuticals in European states, 2009–2019, by development group (DG1–3) (statistically significant outcomes only)

Source: own computation in STATA and MS Excel (only statistically significant outcomes are presented)

Overall, the economically, socially and culturally homogeneous region consisting of selected EU and neighbouring states presents a wide range of pharmaceutical *IED* values. Both the direction and strength of demand–income relation vary in time and space. For a typical household, pharmaceuticals are inferior goods in some states and normal goods in others. Interestingly, in the least developed countries, pharmaceuticals are necessity goods, while there is no significant influence of income in many affluent states.

4.2. Price elasticity of demand – arc

Subsequently, an arc price elasticity of demand was calculated, and the outcomes are presented in Table 5. As with arc *IED*, there is no clear pattern for any state or any year. In the case of *PED*, the main goal is to verify the realisation of the law of demand. For typical households in 11 countries, at least half of the annual elasticities had a negative sign, of which five (out of nine) were located in DG-3. In these states, it can be concluded that, for the most part, an increase in prices resulted in a decline in pharmaceutical expenditures, which aligns with the law of demand. In other regions, especially Finland, the UK and Czechia in DG-2, as well as Lithuania and Poland in DG-3, each with a negative value of elasticity in a single year over the period 2009–2019, a rise in prices coincided with a growth in out-of-pocket expenses. This goes against the law of demand.

It is probable that the Giffen or essential goods paradox occurred in some less-affluent regions. Firstly, certain pharmaceuticals are lifesaving or prescribed to treat chronic diseases. Thus, consumers cannot easily decide to reduce demand, as these are truly 'essential' commodities, despite rising prices. Furthermore, in many states, these drugs are totally or partly refunded or reimbursed, so the market price may not fully impact demand. The remaining pharmaceuticals (i.e. OTC, supplements) may not be as crucial, but even they increase quality of life. As mentioned before, for the *IED* analysis, pharmaceuticals do not have any perfect substitutes, so they are not a cheaper substitute for another commodity. However, from a health state perspective, increases in medicine prices may be relatively smaller than for some medical procedures or a healthy lifestyle. On the other hand, the speculative paradox is also a viable option. During the research period, the prices of pharmaceutical products tended to increase in almost all countries in most years. Hence, consumers could have predicted a continuous future incline, and instead of limiting demand, decided to increase it.

Interestingly, the most consistent patterns of price-expenditure relation, whether confirming or negating the law of demand, were observed in the poorest group of states. This implies that price changes in more affluent regions do not limit the affordability of medicines for an average household. Hence, sensitivity to pharmaceutical prices is much weaker than in less-affluent countries.

Taking into consideration the macroeconomic background, in the years 2013 and 2015, almost half of the regions abided by the law of demand, while only seven did so in 2010 and 2017. As with *IED*, there seems to be a visible impact of the economic situation in some years on the relationship between price and demand for pharmaceuticals.

Table 5. Arc price elasticity of demand for pharmaceuticals in European states, 2010–2019, by development group [%]

DG	Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
	Country										
1	Luxembourg	-50.83	3.91	-170.55	6.13	3.93	5.98	0.85	4.27	0.36	35.42
	Norway	-0.04	-0.11	-0.19	-0.37	1.71	0.84	-1.18	3.62	-3.14	-0.63
	Switzerland	-0.16	-0.17	-1.31	-0.08	-0.73	-3.22	-8.23	69.9	1.75	-0.30
	Ireland	0.25	-1.69	2.44	-0.44	2.49	-2.03	14.13	15.93	1.53	-1.18
	Netherlands	11.34	2.49	0.38	-20.64	3.33	64.52	-0.94	N/A	-0.18	0.59
	Austria	1.09	-0.28	0.36	-0.40	1.18	1.56	-1.28	-0.91	-0.10	-0.22
	Denmark	0.31	-0.12	0.08	1.70	0.43	-42.95	1.74	2.26	-3.96	3.77
	Iceland	-0.44	3.37	-5.53	3.03	2.07	-2.59	2.77	0.03	-5.16	0.70
	Sweden	-3.45	N/A	-12.93	0.94	-6.87	-4.89	2.13	7.48	-9.83	-5.95
	Germany	4.77	-0.66	3.11	-1.89	-0.86	1.73	1.54	0.10	2.58	1.15
2	Belgium	2.65	3.33	6.20	-1.97	0.35	-1.90	9.73	-1.87	-4.05	1.36
	Finland	0.29	2.13	0.72	2.38	-6.29	13.02	11.12	9.59	0.11	0.33
	United Kingdom	11.73	0.90	1.23	2.13	0.76	0.16	-1.62	2.76	3.11	1.07
	France	9.93	-10.13	-11.08	1.12	2.97	-0.95	1.89	5.98	2.71	-0.16
	Italy	0.62	0.28	0.62	-1.26	-1.61	2.51	-1.41	1.96	10.09	4.12
	Spain	0.85	-1.12	0.95	0.49	-4.67	-55.48	6.80	-8.25	0.63	-0.56
	Cyprus	-7.55	-1.95	N/A	0.21	-38.96	-16.10	-25.59	27.98	-4.41	18.54
	Czechia	0.45	1.59	0.45	0.22	3.44	-1.24	0.06	0.99	1.01	0.21
	Portugal	5.94	1.07	0.26	-1.70	1.38	5.39	2.05	-1.86	0.81	5.12
	Estonia	6.02	27.36	-1.16	-1.37	1.42	4.53	-0.80	4.21	1.92	-47.72
3	Slovakia	-0.73	-0.88	-0.31	0.23	-22.2	37.12	-4.55	-0.45	1.76	-2.34
	Lithuania	4.51	14.64	8.81	-1.74	6.89	2.84	2.39	8.18	5.32	0.37
	Greece	0.18	0.07	-0.47	-17.16	0.83	-4.11	-0.34	0.32	-1.58	0.84
	Poland	0.43	0.23	0.34	0.93	1.20	3.07	-0.57	9.82	1.28	0.33
	Hungary	1.05	2.92	-0.45	-1.85	2.01	0.47	-0.76	-2.27	-1.08	1.21
	Latvia	2.47	-1.23	-59.22	3.70	-21.28	10.91	3.26	-2.23	0.55	7.4
	Croatia	0.75	1.84	0.84	2.30	-29.25	3.91	5.71	4.35	-1.81	-1.06
	Romania	0.15	0.46	-32.98	-2.98	-0.09	-3.23	-0.66	N/A	13.76	-0.17
	Bulgaria	0.44	1.50	-5.01	5.13	-8.59	-6.14	-22.86	N/A	-62.23	-1.31

DG – development group.

Source: own computation in MS Excel

5. Conclusions

Pharmaceuticals and other medical non-durables are a vast group of products with a relatively homogenous purpose – improving individuals' and populations' health and quality of life. Nevertheless, as this study has shown, the economic relationships concerning the demand for medicine are extremely diverse. Hence, in Europe, over the period 2009–2019, pharmaceuticals were found to be inferior, necessity, or luxury goods that followed or went against the law of demand, depending on the circumstances.

First and foremost, as indicated by the outcomes, the macroeconomic situation is an underestimated determinant of a household's demand for pharmaceuticals. It impacts not only the value of researched categories and their distribution but also the strength, direction and significance of association between them. This is predominantly observed by the differences in results across the development groups. The affluence of the state in which the household is located becomes an exogenous and uncontrollable factor in the creation of demand for pharmaceuticals.

Overall, households in less developed regions have a higher responsiveness to economic stimuli than those in more affluent ones, which implies that current healthcare policies concerning price regulation and reimbursement mechanisms are insufficient to ensure fair access to healthcare. In many of the lower-prosperity states, income and price are proven to be the main determinants of realised demand. Additionally, in this study, an unmet need for pharmaceuticals has been indirectly observed. Budget constraints limit affordability, hence the arising problem of unrealised potential demand for medicines. Since the most common income-demand relationship is less than proportional, households probably also have an unrealised demand for other goods and services competitive to pharmaceuticals (i.e. food, housing, entertainment). This may result in people being forced to make some difficult choices about prioritising some needs over others because of the insufficiency of their financial resources. Conversely, in more affluent countries, households are able to realise their full demand for medicine at a relatively low level of income. Thus, demand for pharmaceuticals is more likely to be insensitive to income and/or price changes.

Additionally, the temporal dimension of the research highlighted another aspect of the macroeconomic influence on households' demand: market fluctuations. In some years, for the majority of states, pharmaceuticals were found to be an inferior good, while in other years, this was the case in only very few states (19 in 2011 vs 3 in 2015). In relation to the law of demand in selected years, the association between price and demand was negative in half of the regions (2013, 2016) and at times only in 1 in 4 (2010, 2017).

Overall, the existence of both affluence-specific and time-specific factors in the demand for medicines have been established. Since this research focused on the macro-level patterns, it stands to reason that the diversity and complexity of the economic aspects

of demand should be even greater for less aggregated relationships within populations and across pharmaceutical types. Economic growth and health policies probably influence income, expenditures and prices, as well as the strength and direction of relationships between them, unevenly over time, affluence groups and subpopulations. It can be expected that this diversity will widen any pre-existing health and healthcare inequalities. Some studies show that assuring equal opportunities and accessibility to healthcare and pharmaceuticals can be challenging. As highlighted by the feminist economics, women tend to suffer from the lower-wages-for-the-equal-work issue, which by default impacts negatively their budget for buying medicine (MacDonald, 1995: 159–176). On the other hand, as proven by the statistical data, women have higher overall life expectancy, but a lower number of healthy life years than men (Eurostat Database, n.d.). This suggests that women are more likely to consult medical professionals and get early diagnosis and treatment, which may impact their demand for related drugs. Other studies show significant gender, race, and age bias in the accessibility and quality of healthcare, including the types and amounts of prescribed pharmaceuticals (Gazaway et al., 2021: 148–153). Furthermore, as stated in the Introduction, health policies will also impact the demand for pharmaceuticals. Other public policies, including family, health and safety at workplace, illness prevention, and advertisement of drugs policies, are bound to affect the demand or its elasticity, most likely in a nonhomogeneous manner.

The variability of values and associations observed in this study indicate that forming effective socioeconomic policies aimed at increasing the affordability and equality of healthcare is very difficult. More effort should be made at diversifying the approach based on the economic status of households, the economic growth of the region and market fluctuations. Otherwise, the financial burden of out-of-pocket expenses will continue to grow, and access to medicine will decrease as health and healthcare inequalities expand.

Specifically, in Poland, since the financial burden of pharmaceuticals is high, it could be prudent to include the households' socio-economics status (based, e.g. on the tax return) in the process of refunding prescribed drugs. Furthermore, expanding permissions and access to patient medical history for pharmacists could result in more reliable advice while purchasing OTCs and limiting unnecessary expeditors. In the long run, it would be advisable to redirect the health policy in Poland towards targeted treatment, based on medical consults and diagnostics, which would limit the demand for drugs and related expenses. This ideal approach is unfortunately currently impossible due to low supply of public healthcare resources.

Since affluence-specific and time-specific factors related to demand have been confirmed, the foundations for generalising the results of any study concerning the economic aspects of pharmaceuticals are restricted. This enforces a need for replication of research over time, states and socioeconomic development clusters, as well as, if possible, explicitly addressing the issue of heterogeneity derived from economic growth.

In further research with more recent data, it would be beneficial to endogenously take into account the relationship between the change in economic growth and the elasticity of drug demand. In addition, it would be prudent to examine the impact of the COVID-19 pandemic, the war in Ukraine, and their economic consequences (including high inflation) on drug demand and willingness to pay.

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Elastyczność popytu na farmaceutyki typowego gospodarstwa domowego w krajach europejskich

Streszczenie: Według Światowej Organizacji Zdrowia (WHO) prawie miliard ludzi na całym świecie jest zagrożonych popadnięciem w ubóstwo z powodu wydatków na zdrowie, a farmaceutyki są integralną częścią rosnącego problemu. Niniejsze badanie ma na celu ocenę elastyczności cenowej i dochodowej popytu na leki w państwach europejskich w latach 2009–2019. Przedmiotem analizy jest typowe gospodarstwo domowe w każdym kraju. Analiza koncentruje się na ocenie problemu w świetle wzrostu gospodarczego. W związku z tym wyniki są porównywane według grup rozwoju krajów, aby wskazać wszelkie podobieństwa i różnice wewnątrz klastrów i między nimi. Wyniki wskazują, że gospodarstwa domowe w regionach biedniejszych są bardziej wrażliwe na bodźce ekonomiczne niż w krajach zaможnych. Zarówno elastyczność dochodowa, jak i cenowa wskazują na niezaspokojone zapotrzebowanie na leki z powodu niewystarczających zasobów finansowych. Co więcej, reakcja gospodarstw domowych na zmiany dochodów i cen różni się w zależności od czasu, kraju i klastrów.

Słowa kluczowe: ekonomia zdrowia, bezpośrednie prywatne wydatki farmaceutyczne, dochodowa elastyczność popytu, cenowa elastyczność popytu, analizy regionalne

JEL: I14, I15, G59, C22

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