

# Determinants of medicines consumption in Poland

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The aim of the paper is to present the most important factors of medicines consumption in Poland. The paper is based on primary research conducted on a sample of 428 respondents in March and April 2020 in Poland using an online questionnaire survey. An algorithm of classification trees was applied to identify classes of respondents who consumed prescription medicines and non-prescription medicines (over-the-counter - OTC). In addition, a logistic regression was proposed to assess relationship between medicines consumption and health status, pro-health behaviors, selected preferences in dietary choices, and demographic characteristics.

In the paper lifestyle-related factors that determine the level of medicines consumption were identified. The authors argue that women aged 55 and over significantly increase consumption of both prescription and OTC medicines to maintain health and active lifestyle. What's more they perform regularly preventive laboratory tests and read carefully information on the food labels before buying food products. In this cross-sectional survey we argue that women take more medications, are more critical of their health and take more care about active ageing. Even if they don't indicate health problems, 50% of them still consume medicines. Among men, 68% do not indicate health complaints and in this group more than 30% consume medicines. It seems that men in less extent combine medicines consumption with active ageing. The survey identifies classes of respondents who consume prescription medicines. These are patients who have health problems and use preventive health care, performing regular medical examinations. The more often medical examinations are performed, the

more medicines are consumed. A group of people who often consume non-prescription medicines carefully read information on food labels before purchase, and perform systematically preventive laboratory tests. In general, consumption of both prescription medicines and OTC medicines in Poland increases with age of respondents. Health problems determine consumption of prescription medicines while gender is the most significant factor of non-prescription medicines consumption.

**Keywords:** consumer behavior, self-medication, over-the-counter, prescription medicines, medicine market.

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## Introduction

The consumption of medicines is associated with the desire to maintain good health and active ageing. In result increasing medicalization of modern society has been observed. Medicines consumption is determined by different psychographic factors. Older people tend to consume more medicines than young not only because they have more chronic medical disorders but also due to the propensity to self-medicate. Jerez-Roig and *et al.* argue that for the elderly significant variables that affect self-treatment are the following: female gender, propensity to make purchases including pharmacy, depression, functional dependence, recent hospitalization, activity limitation or physical inactivity. On the other hand, such psychographic factors as propensity to use health services, satisfaction with living conditions, propensity to purchase private health insurance, significantly reduce self-treatment [1].

In turn, a study conducted on a population of French seniors found that an increase in the consumption of medications (including OTC medicines) was significantly influenced by such variables as advanced age, female gender, frequency of medical visits, feelings of loneliness and primary education [2]. The detailed studies regarding the influence of psychographic characteristics on the behavior of patients with certain diseases (including diabetes and venous disease) were conducted by Dehdari and Dehdari [3] and Uber [4]. However, their results vary widely due to the specifics of the disease entity.

Carrasco-Garrido and *et al.* demonstrated the utility of using psychographic and health variables to study the frequency of parental medicines use in children aged 0–15 years. Using a multivariate regression method, they showed that during the 10-year analyzed period, the consumption of medications, including over-the-counter medications for ailments such as runny nose, sore throat,

or fever, also increased, as did the consumption of painkillers and antiallergy medications, as well as antibiotics. The purpose of the aforementioned study was to determine whether the consumption patterns singled out, reflect the rational use of medicines by the study population. The released results became the argument of campaigns sensitizing the public to the need for careful use of medicines. The authors also drew attention to the relatively new trend of using self-medication as a possible way to improve lifestyle [5].

Significant results, with the potential to shape future health policy, were obtained by researchers concerned with identifying factors associated with self-treatment medicines consumption in conjunction with gender identification. In this case, the independent variables were psychographic, lifestyle and health-related factors, and self-treatment was the dependent variable. It turned out that the propensity to self-treatment was higher among women than among men. For women, a self-treatment was related with age, alcohol consumption and smoking habit. Meanwhile, for men, it was associated with nationality (immigrants were more likely to use self-treatment), income and alcohol consumption [6]. The above results partially confirm publications by other authors. For instance, Carrera-Lasfuentes and *et al.* showed that medicines consumption was higher for women, the elderly and those with poor self-rated health. Paradoxically, although consumers with low education were more likely to consume medicines, self-consumption was more common among those with higher education [7]. Also repeatedly mentioned, self-consumption is subjected to analysis using health and lifestyle psychographic factors – an important consideration in this category of research because, as Ruiz notes, self-treatment is not entirely safe, and the potential risks associated with it include misdiagnosis, delaying a medical visit, numerous, often serious side effects, dangerous medicines interactions, inappropriate administration and/or dosage, inappropriate choice of therapy, masking a serious illness, and the risk of addiction [8].

A separate and extremely large group in the world literature includes publications that show relationships between psychographic variables, lifestyle, medicines consumption and mental health [9]. Comprehensive research in this area is being conducted by Maestre-Miquel and *et al.* [10]. Increasingly, research findings using psychographic factors to analyze the purchasing decisions of consumers of controversial alternative medicine as niche markets determined by a specific, so-called postmodern lifestyle are also being discussed in the public discourse [11].

The above review of the available literature on the subject indicates that although this problem has been addressed in the literature relatively often and in different contexts, there is a noticeable deficit of current research in this area, which is all the more important because the behavior of medicines buyers has changed fundamentally in recent years – both under the influence of changing values, social norms, access to knowledge and factors related to the experience of the COVID-19 pandemic. In this context the analysis of the impact of demographic and psychographic determinants on medicines consumption, is an important contribution to the current research on the behavior of buyers in the pharmaceutical market. Therefore, the aim of the paper is to present the most important factors of medicines consumption in Poland.

## Materials and Methods

### Legal considerations

Due to the nature of the research, it is necessary to analyze the concept of a medical product (the medicine) and selected categories of medical products under Polish pharmaceutical law. The main legal act regulating issues related to medical products in Poland is the Act of September 6, 2001 – Pharmaceutical Law [12]. According to Article 2(32) of the Act, a medical product is "a substance or mixture of substances, presented as having properties for the prevention or treatment of diseases occurring in humans or animals, or administered for the purpose of making a diagnosis, or for the purpose of restoring, improving or modifying physiological functions of the body through pharmacological, immunological or metabolic action". It can be said that the statutory definition refers to the Community Code relating to medical products for human use in terms of how the medical product is defined through the binary definition, as well as in terms of the nomenclature relating to the subject matter. The word "medicine" that appeared in Polish legislation before 2001 [13] has been replaced by the expression of the "medicinal product".

It is also worth noting that the marketing of medical products is strictly controlled. According to Article 3(1) of the Pharmaceutical Law, (...) medical products that have obtained a marketing authorization issued by the President of the Office of Medical Products, Medical Devices and Biocidal Products are authorized for marketing. This also applies to medical products that have obtained an authorization issued by the Council of the European Union or the European Commission (Art.3(2)). The legal basis for the issuance of licenses in the EU procedure (the so-called centralized

procedure) is Regulation No. 726/2004 [14]. The relevant solutions of the Pharmaceutical Law Act, on the other hand, are an expression of the implementation of Directive 2001/83/EC.

Exceptionally, the following are admitted to the market without the need to obtain a license: prescription medicines; pharmacy medicines; radiopharmaceutical products prepared at the time of use in authorized medical entities, from authorized generators, kits, radionuclides and precursors; immunological veterinary medical products manufactured from pathogens or antigens derived from animals on the farm and intended to treat animals occurring on the same farm; advanced therapy medical products – hospital exceptions (Article 3(4) of the Pharmaceutical Law).

### Methods

The source of empirical data in the analysis presented here are the selected results of a pilot questionnaire survey conducted in March and April 2020 on a sample of 428 respondents – Polish residents aged 18 years and more. The survey was conducted electronically, using an online form. Participation in the survey was voluntary and anonymous.

The questionnaire consisted of 38 questions grouped thematically (health status, lifestyle, nutrition, self-destructive consumption, medicines consumption). However, in this paper we used only the following variables: consumption of prescription medicines (the average number of different types of medicines per month prescribed by a doctor) and non-prescription medicines (the average number of different types of OTC medicines consumed per month), selected aspects of health status, health-seeking behavior, and preferences in dietary choices.

To measure opinions, attitudes and behavior of the respondents we used the following scale: self-assessment of health status (very bad health/ bad/ neither bad nor good/ good/ very good), long-term health problems (definitely not/ rather not/ hard to say/ rather yes/ definitely yes), overweight and obesity (no/ yes), addictions of any kind (no/ yes), physical activity in any form (no/ yes), preventive laboratory tests (basic profile) performed regularly (no/ yes), reading the information on food labels carefully before buying food (definitely no/ rather not/ very occasionally/ yes/ definitely yes), consumption of meat/ of fruit/ sweets and cakes (no consumption/ sporadically/ every few days/ once a day/ several times a day).

To test the dependence of consumption of medicines ( $Y_1$  – prescription medicines,  $Y_2$  – OTC medicines) on respondent's age group ( $X_1$ ), gender

( $X_2$ ), variables related to health status ( $X_3$  – self-assessment of health status,  $X_4$  – long-term health problems,  $X_5$  – overweight and obesity), health-seeking behavior ( $X_6$  – lack of addictions,  $X_7$  – laboratory preventive tests (basic profile) performed systematically,  $X_8$  – physical activity, and  $X_9$  – reading the information on food labels carefully before buying food), and selected preferences in dietary choices ( $X_{10}$  – consumption of meat less than once a day,  $X_{11}$  – consumption of fruit at least once a day, and  $X_{12}$  – consumption of sweets and cakes less than once a day), we built appropriate contingency tables and used the Pearson chi-square independence test. We decided whether to reject on the basis of the probability value  $p$  ( $p$ -value) calculated for the value of the test statistic chi-square based on the data from the sample. If the  $p$ -value was less than or equal to the significance level  $\alpha = 0.05$ , we rejected the hypothesis of independence.

The authors also proposed a logistic regression to assess how these characteristics of respondents affect medicines consumption (for dependent binary variables  $Y_{b1}$  – prescription medicines,  $Y_{b2}$  – OTC medicines with value 0 – no consumption, 1 – medicines consumption).

To estimate the value of logistic-regression coefficients, we used the maximum-likelihood method and to determine the significance of regression coefficients, we used Wald's chi-square statistic.

In addition, it was proposed to build a classification tree to determine homogeneous classes of respondents in terms of medicines consumption (separately for consumption of prescription medicines and non-prescription medicines). Its use in discriminant and regression analysis was initiated by Breiman and *et al.* [15]. Currently, this method is more and more often used in many different

research fields, not only in the field of statistics and econometrics but also in medicine or economics [16, 17]. In the study presented, the classification tree algorithm was used to analyze the relationship of each explanatory variable ( $X_i$ ,  $i=1,.. 12$ ) with the dependent variable ( $Y_{b1}$  or  $Y_{b2}$ ). The variables which describe the division of the surveyed population in the appropriate nodes of the tree and profile the relevant subsets (classes) of respondents are variables determining the consumption of medicines. In order to arrive at a relatively simple tree, we stopped the procedure of recursive group division before the segments and classes became fully homogeneous. For this purpose, we applied the FACT's (fast algorithm for classification trees) direct-stop rule for 5 percent of the population.

### Statistical analysis: Results

70% of women and 30% of men took part in the survey; 74% of respondents were under the age of 55, and 26% were 55 and older. Those with higher education accounted for 60% of the total respondents, those with post-secondary, secondary vocational and general education accounted for 36%, and those with junior high school education; primary completed and no education accounted for 3%. There were 75% of respondents residing in cities over 20,000 and 25% living in rural areas and cities up to 20,000 residents.

In light of the information obtained 19% of respondents rated their health as very good, and 55% as good (a total of 74%). Among the rest of the respondents, a small share were those with very poor or poor health (table 1).

In the group of respondents aged 55 and more, the percentage of those declaring good or very good health accounted for 57%, while in the group

**Table 1.** Structure of respondents according to the assessment of health status, health-seeking behavior, and preferences in dietary choices.

Specification	Number of respondents	% of total respondents
Self-assessment of health status (very good or good health condition)	318	74.3
Health problems lasting at least one month	169	39.5
Overweight and obesity are present	150	35.0
No addictions of any kind	249	58.2
Preventive laboratory tests (basic profile) performed regularly	272	63.6
Physical activity in any form	400	93.5
Reading the information on food labels carefully before buying food products	263	61.4
Consumption of meat (including cold cuts) less than once a day or no meat consumption	169	39.5
Consumption of fruit at least once a day	278	65.0
Consumption of sweets and cakes less than once a day	242	56.5

Source: own elaboration.

**Table 2.** Monthly consumption of different types of medicines by gender.

Specification	Prescription medicines (Y <sub>1</sub> ) in %		Non-prescription medicines (Y <sub>2</sub> ) in %	
	women	men	women	men
No medicines consumption	34.9	52.1	11.4	29.8
Depending on the need	18.9	22.3	24.1	16.5
1-2 medicines	34.2	14.9	48.2	36.4
3 medicines and more	12.1	10.7	16.3	17.4
Total	100.0	100.0	100.0	100.0

Source: own elaboration.

**Table 3.** The results of the chi-square independence test for monthly consumption of prescription medicines (Y<sub>1</sub>), monthly consumption of non-prescription medicines (Y<sub>2</sub>) and the gender and age.

Variable X <sub>i</sub>	Variable Y <sub>1</sub>		Variable Y <sub>2</sub>	
	Value $\chi^2$	p-value	Value $\chi^2$	p-value
Gender (X <sub>1</sub> )	20.35	p = 0.001*	25.93	p = 0.000*
Age (X <sub>2</sub> )	65.34	p = 0.000*	15.41	p = 0.008*

\* The test result is statistically significant (significant relationship between X<sub>i</sub> and Y<sub>1</sub> or Y<sub>2</sub>).

Source: own elaboration.

of respondents under 55 it was 80%. Women were more likely to report health problems (58% of respondents) than men (32% of respondents).

During the period of the questionnaire survey, 60% of respondents declared consumption of prescription medicines, while far more respondents, nearly 83%, declared consumption of non-prescription medicines. The quantitative structure of consumed medicines varied between prescription and non-prescription ones. 29% of respondents consumed one or two prescription medicines per month while 45% of respondents consumed one or two OTC medicines. Moreover, 9% of respondents declared consumption of three to five prescription medicines, and 3% of respondents consumed six or more medicines (compared to 15% and 2%, respectively, in the case of OTC medicines). The significance of differences in the structure of consumption of prescription medicines (Y<sub>1</sub>) and consumption of non-prescription medicines (Y<sub>2</sub>) confirmed also by the chi-square test ( $\chi^2 = 84,84$ ; p = 0.000).

There is a disparity in medicines consumption (both prescription and OTC) among women and men. Women were significantly more likely to take medicines than men. 65% of surveyed women consumed prescription medicines and 89% of them consumed OTC medicines, while 48% and 70% of men reported consuming prescription and OTC medicines, respectively (table 2).

The significance of differences in the structure of medicines consumption by gender is confirmed also by the chi-square test, with a greater disparity

in the behavior of men and women occurred in the case of non-prescription medicines (as evidenced, among other things, by the value of the  $\chi^2$  test, table 3).

77% of respondents aged 55 and more reported consuming at least one prescription medicine per month while 87% consumed at least one non-prescription medicine. Generally, above the age of 24, the older the age group of respondents, the greater the consumption of medicines, especially prescription ones (figure 1).

The significance of differences in the structure of respondents by level of medicines consumption and by age is also confirmed by the chi-square test (table 3). The values of this test indicate that there is a greater disproportion between the group of people under the age of 55 and the group aged 55 and more in the structure of consumption of prescription medicines than in the case of over-the-counter medicines.

Among respondents who declared the presence of long-term health problems, 80.5% took prescription medicines, and among those who did not declare long-term health problems 47% still consumed prescription medicines. It is worth noting that 4% of those who hadn't got serious health problems consumed at least 3 prescribed medicines per month. A higher level of medicines consumption occurred for OTC medicines, regardless of the presence of health problems (table 4).

There are large differences in the consumption of prescription medicines according to the presence of health problems both among age groups

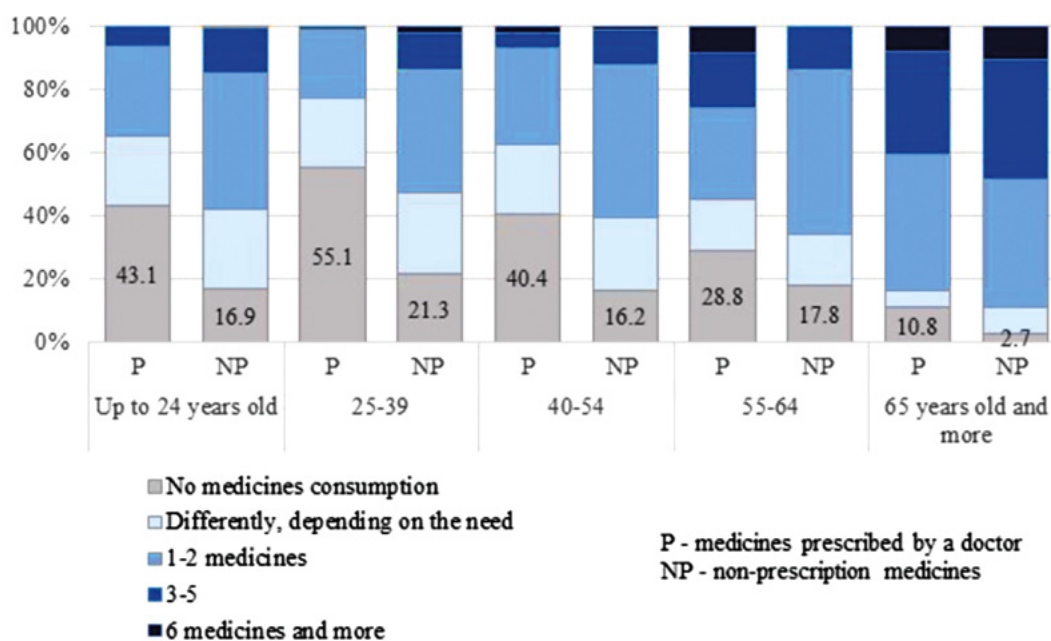


Figure 1. Structure of respondents by volume of monthly medicines consumption and age groups.

Source: own elaboration.

Table 4. Monthly consumption of different types of medicines by the presence of long-term health problems.

Specification	Prescription medicines consumption ( $Y_1$ )		Non-prescription medicines consumption ( $Y_2$ )	
	health problems	no health problems	health problems	no health problems
No medicines consumption	19.5	52.9	11.8	19.7
Depending on the need	17.8	21.2	17.2	25.1
1-2 medicines	39.6	21.6	45.6	44.4
3 medicines and more	23.1	4.2	25.4	10.8
Total	100.0	100.0	100.0	100.0

Source: own elaboration.

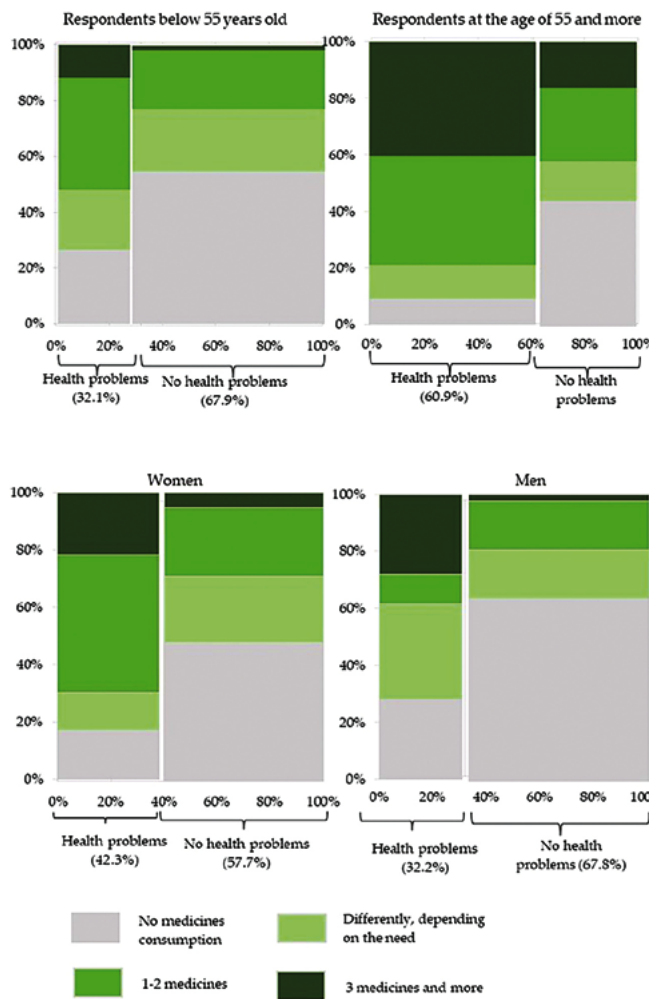
(including significantly greater among those aged 55 and more) and among men and women. It is worth noting that women showed higher consumption of prescription medicines, even if they had no long-term health problems (figure 2). The data presented in figure 3 for over-the-counter medicines show smaller disparities in the structure of medicines consumption according to the presence of health problems by age group and by gender (including smaller among women than among men).

Respondents consumed often medicines, despite their good health status and lack of the performance of systematic preventive examinations. Monthly prescription medicines consumption at the level of at least one of any medicines was indicated by 34% of respondents with very good or good health while 57% of respondents who perceived their health as very good or good consumed at least one of OTC medicines per month.

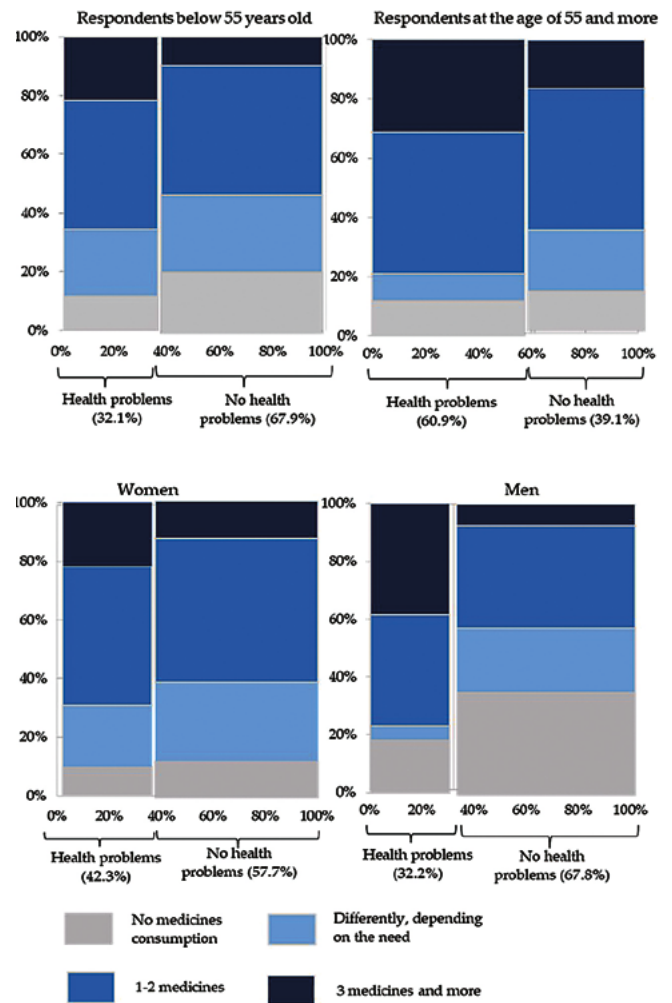
Non-prescription medicines consumptions was high among respondents who didn't systematically perform preventive laboratory examinations. Despite a lack of the laboratory examinations results a half of respondents consumed at least one non-prescription medicine per month.

The results of the chi-square independence test for monthly consumption of prescription medicines (variable  $Y_1$ ) and variables related to health status ( $X_3, X_4, X_5$ ), health-seeking behavior and preferences in dietary choices ( $X_6, \dots, X_{12}$ ) and control variables ( $X_1, X_2$ ) are presented in table 3 and table 5.

The highest values of the test statistic were recorded for pairs of variables: monthly consumption of prescription medicines and the following variables: self-assessment of health status, prevalence of health problems, laboratory preventive tests performed systematically, age, gender, and the presence of overweight and obesity. In the



**Figure 2.** Monthly consumption of prescription medicines by age group, gender and incidence of health problems among respondents.  
Source: own elaboration.



**Figure 3.** Monthly consumption of non-prescription medicines by age group, gender and incidence of health problems among respondents.  
Source: own elaboration.

**Table 5.** The results of the chi-square independence test for monthly consumption of prescription medicines ( $Y_1$ ), monthly consumption of non-prescription medicines ( $Y_2$ ) and the selected explanatory variable  $X_i$ .

Variable $X_i$	Variable $Y_1$		Variable $Y_2$	
	Value $\chi^2$	p-value	Value $\chi^2$	p-value
Self-assessment of health status ( $X_3$ )	43.01	p = 0.000*	16.58	p = 0.005*
Health problems ( $X_4$ )	73.19	p = 0.000*	22.65	p = 0.000*
Overweight, obesity ( $X_5$ )	13.64	p = 0.018*	4.52	p = 0.477
No addictions ( $X_6$ )	5.69	p = 0.338	10.02	p = 0.075
Preventive laboratory tests (basic profile) performed regularly ( $X_7$ )	29.04	p = 0.000*	23.22	p = 0.000*
Physical activity ( $X_8$ )	4.22	p = 0.519	4.65	p = 0.460
Reading the information on food labels carefully before buying food ( $X_9$ )	2.21	p = 0.819	12.98	p = 0.024*
Consumption of meat less than once a day ( $X_{10}$ )	4.39	p = 0.494	16.34	p = 0.006*
Consumption of fruit at least once a day ( $X_{11}$ )	3.46	p = 0.630	2.37	p = 0.795
Consumption of sweets and cakes less than once a day ( $X_{12}$ )	3.25	p = 0.662	6.04	p = 0.302

\* The test result is statistically significant (significant relationship between  $X_i$  and  $Y_1$  or  $Y_2$ ).

Source: own elaboration.

case of other variables concerning health-seeking behavior too low values of the test statistic did not indicate a significant relationship between them and monthly consumption of prescription medicines.

When considering monthly consumption of OTC medications (variable  $Y_2$ ), the highest values of the test statistic were recorded for the variables: occurrence of health problems, preventive laboratory tests performed systematically, gender, self-assessment of health, consumption of meat less than once a day, and age (table 3, table 5).

In accordance with the adopted methodology, a logistic regression was proposed to assess how the selected set of variables affects medicines consumption ( $Y_{b1}$  – prescription medicines or  $Y_{b2}$  – OTC medicines), i.e. the transition from the state – no consumption to the state – medicines

consumption. The variables that are significantly associated (significance level  $\alpha = 0.05$ ) with monthly prescription medicines consumption were the presence of health problems, performing regular preventive laboratory tests, gender, and age. If there are long-term health problems, the likelihood of consuming prescription medicines increases more than 3 times compared to when there are no such problems. If regular preventive laboratory tests are performed, the probability of consuming prescription medicines increases more than 2 times. Moreover, the probability of consuming prescription medicines is 89% higher in group of women than in men, and is 79% higher in those aged 55 and more compared to those in the younger age group. The probability of OTC medicines consumption increases more than 3 times for women compared to men. If regular preventive laboratory tests are performed, the probability

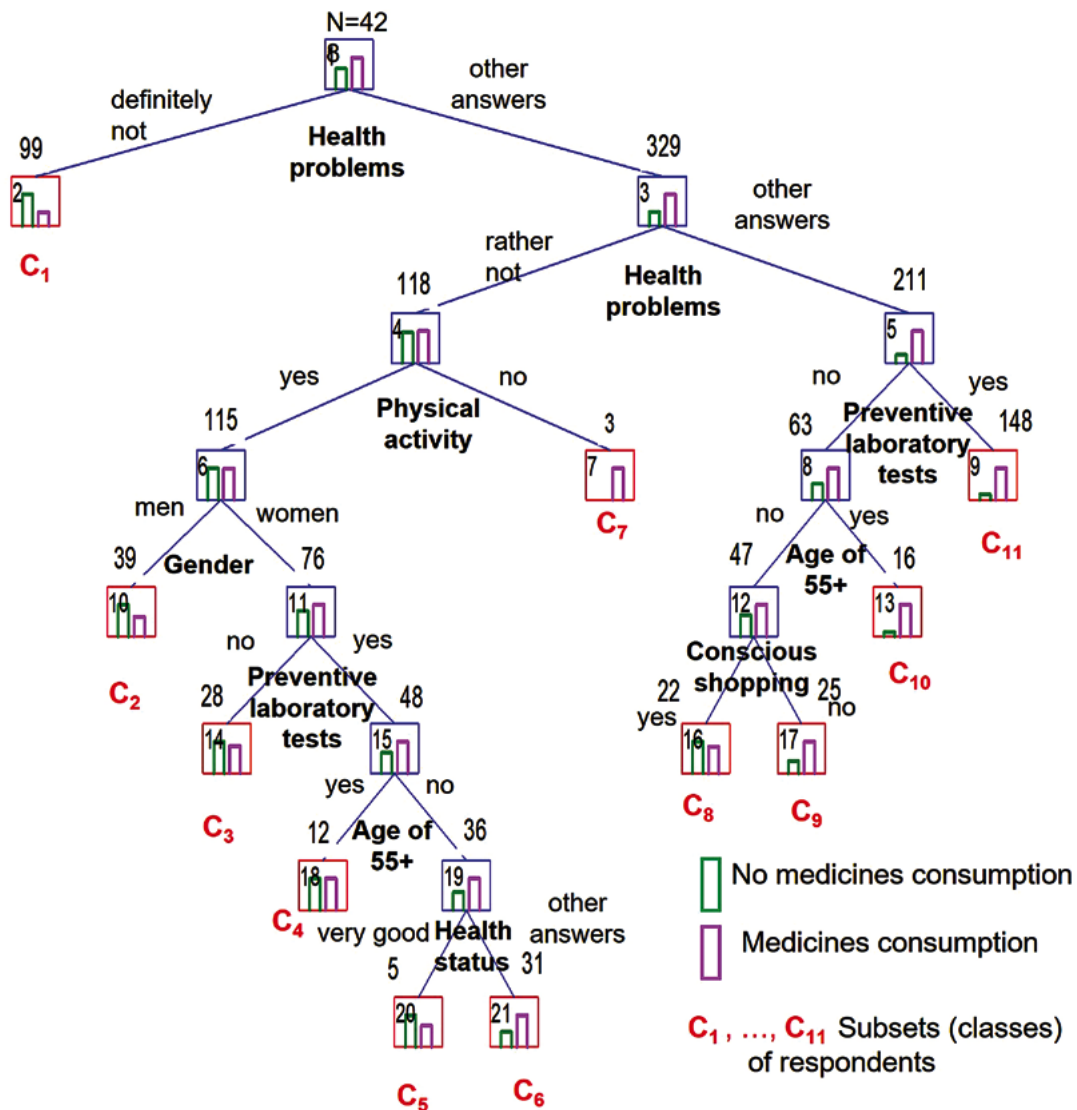


Figure 4. Consumption of prescription medicines. Source: own elaboration.



of consuming OTC medicines increases by more than 2 times.

The construction of a classification tree (separately for prescription and OTC medicines consumption) was additionally proposed to verify not only those variables which mostly differentiate subsets of respondents from the point of view of medicines consumption, but also to distinguish relatively homogeneous classes of respondents in terms of medicines consumption, based on measurements of explanatory variables ( $X_i, i = 1, \dots, 12$ , i.e. relating to health status, health-seeking behavior, etc.). The model obtained during the construction of the classification tree for monthly consumption of prescription medicines is presented in figure 4, and for monthly consumption of OTC medicines in figure 5.

In the obtained models, at the lowest level of the final division of respondents into disjoint classes

( $C_i$ ), there are terminal nodes, the so-called a list containing information on: the number of respondents assigned to particular classes, histograms of frequency distribution of variable Y (medicines consumption) and the share of people who declared consumption of medicines.

As a result of the procedure carried out, with the use of appropriate quality measures of the division of the analyzed population of respondents due to the evaluation of health status, 11 classes of respondents ( $C_1, \dots, C_{11}$ ) were identified. In total, seven variables were included in the construction of the classification tree for prescription medicines consumption.

The presence of health problems was the basis of the first division of the respondent community in the classification tree model for prescription medicines consumption. Already at the first division of respondents, a class without further division ( $C_i$ )

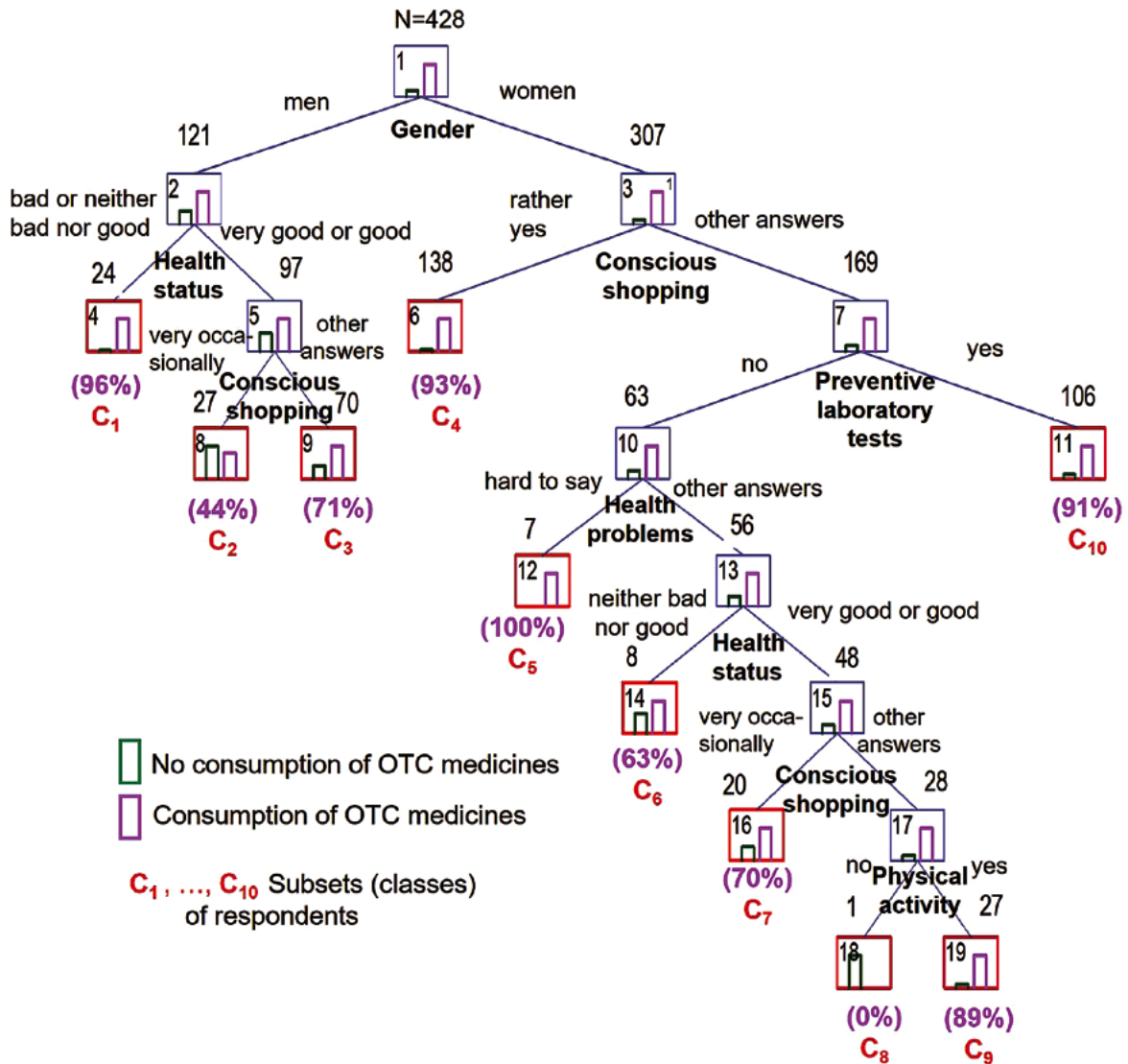


Figure 5. Consumption of OTC medicines. Source: own elaboration.

was identified. It included 99 people who declared that they had no health problems that persisted for more than a month. 70% of the total number of people in this class did not consume prescription medicines. In the case of the remaining subset of respondents, the variable with the greatest classification power in terms of medicines consumption was also the occurrence of health problems. Among those who answered “rather not” to the question about health problems, 51% declared the consumption of prescription medicines. On the other hand, in the group of respondents with health problems 80% declared the consumption of prescription medicines.

Other important variables which were used to further division of the respondents’ collective were:

- for those who answered “rather not” to the question about health problems - physical activity, gender, performing systematic preventive laboratory tests, age, and self-assessment of health;
- for those with health problems - performing systematic preventive laboratory tests, age, and reading carefully the information on food labels before buying them.

To construct the classification tree for OTC medicines consumption, six significant variables were selected from the set of explanatory variables. The model (**figure 5**) is significantly different from the model for prescription drugs, built on the basis of the similar set of variables.

In the case of OTC medicines consumption gender was the most important variable that differentiated the surveyed population (89% of women consumed OTC medicines, while 70% of men). For men, an important variable determining the consumption of OTC medicines were health status following by reading carefully the information contained on the labels of food products before buying them. For women, the important variables determining the consumption of OTC medicines were: carefully reading the information contained on the labels of food products before buying them, performing systematic preventive examinations, health problems, health status and physical activity.

The variable age, which was present in the model for prescription medicines, had too little discriminatory power and was not included in the model for OTC medicines. Besides, in both models (prescription and OTC medicines), overweight and obesity, incidence of addiction, meat consumption, fruit consumption and consumption of sweets and cakes proved to be insignificant variables that were not included in the construction of the classification trees.

## Discussion

The percentage of those consuming prescription medicines increases with age. By far a large percentage in all age groups consume non-prescription medicines. The older the respondents the more OTC medicines they consume. Our results are opposing to those achieved in Spain where consumption of non-prescription medicines decreases as the age of respondents increases [18].

We found that an important factor influencing prescription medicines consumption is age while gender first of all affects OTC medicines consumption. About 30% of surveyed men and only 11.4% of women did not consume non-prescription medicines. Similar results to the Polish ones were achieved in Spain; higher consumption of OTC medicines was shown by women [19].

More than a half of respondents who rated their health as very good and good took at least one OTC medicines per month in Poland. A patient who assesses their health status as good and very good while declaring consumption of both prescription and OTC medicines is a person focused on health, worried about losing it, or a person whose medical needs have not been adequately recognized or met [20]. However, educational campaigns are needed to guide people with the proper use of non-prescription medicines [21] specially when the out-of-pharmacy sale of OTC medicines has steadily been increasing in Poland [22].

We observed that there is a strong relationship between regular preventive laboratory tests and the amount of medicines consumed (the more frequent the laboratory tests, the higher the amount of medicines consumed). In case of long-term health problems, the likelihood of consuming prescription medicines increases in Poland more than 3 times compared to the situation when there are no such problems. If systematic preventive laboratory tests are performed, the probability of consuming prescription medicines increases more than 2 times. The present results are consistent with those recorded in South Korea [23].

Our studies had some limitations. Firstly, there was no qualitative measurement, no triangulation of surveys that could deepen the findings, with a particular focus on consumption motives. Secondly, it is worth enlarging the sample to 1,000 respondents to reduce the statistical error to 3%. It is also worth expanding the present study and doing a comparative study of Poland and other countries.

It would be worthwhile in the future to do a cross-sectional study to compare the psychographic profiles of at least two countries with different medicines consumption and relate them to

life expectancy in health. The results could identify the effectiveness of medical therapies.

## Conclusions

In this cross-sectional survey we argue that women take more medications and are more critical of their health. Even if they don't indicate health problems, 50% of them still consume medicines. Among men, 68% do not indicate health complaints and in this group more than 30% consume medicines.

The survey identifies classes of respondents who consume prescription medicines. These are people who have health problems and use preventive health care, performing regular medical examinations. The more often medical examinations are performed, the more medicines are consumed.

Gender and selected psychographic variables were significant in OTC medicines consumption. A group of people who often consume non-prescription medicines carefully read information on food labels before purchase, and perform systematically preventive laboratory tests.

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