

# ESTIMATION OF THE IMPACT OF MIGRAINE ON SELF-RATED HEALTH: A CROSS-SECTIONAL STUDY IN SLOVENIA

## OCENA VPLIVA MIGRENE NA SAMOOCENO ZDRAVJA: SLOVENSKA PRESEČNA ŠTUDIJA

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Received: Jun 19, 2020

Accepted: Nov 20, 2020

Original scientific article

### ABSTRACT

#### Keywords:

migraine, self-rated health, European Health Interview Survey, Slovenia

**Aim:** With the aim of providing a foundation for evidence-based public health actions, as well as the more individualised clinical treatment of migraine in Slovenia, the objective of our study was to assess the association between poor self-rated health (PSRH) and migraine, adjusted for selected comorbidity and socioeconomic factors.

**Methods:** The survey, conducted between August and December 2014, involved included 6,262 adults aged 15 years and over. Binary logistic regression was used in univariate as well as multivariate analysis. Three multivariate models were defined: MODEL 1 (migraine and comorbidities related to the physical dimension of health); MODEL 2 (comorbidities related to the mental dimension of health); MODEL 3 (demographic and socioeconomic factors).

**Results:** In univariate as well as all three multivariate models, the odds of PSRH were statistically significantly higher in migraine sufferers in comparison to non-sufferers (univariate model: ORmigraine=yes vs. migraine=no=2.22 ( $p<0.001$ ); MODEL 1: ORmigraine=yes vs. migraine=no=2.27 ( $p<0.001$ ); MODEL 2: ORmigraine=yes vs. migraine=no=1.51 ( $p=0.002$ ); MODEL 3: ORmigraine=yes vs. migraine=no=1.56 ( $p=0.001$ )).

**Conclusion:** Migraine is an important PSRH-related factor. Comorbidities related to the physical dimension of health do not reduce the power of association between migraine and PRSH, while comorbidities related to the mental dimension reduce the power of association of migraine and other health conditions. The power of the association between migraine and PRSH is also independent of demographic/socioeconomic factors. We can also conclude that migraine seems to be a phenomenon that is in a bi-directional relationship with mental states (thus having an impact on PSRH) and is itself a stressor.

### IZVLEČEK

#### Ključne besede:

migrena, samoocenjeno zdravje, evropska raziskava o zdravju EHIS, Slovenija

**Namen:** Z namenom, da bi priskrbeli dokaze na eni strani za dokazi podprte ukrepe za obvladovanje migrene kot velikega javnozdravstvenega problema, na drugi pa bolj individualizirano zdravljenje bolnikov z migreno na klinični ravni, smo si zadali za cilj proučiti povezanost med migreno in samooceno zdravja kot slabega, prilagojeno na izbrane zdravstvene sopoljave in socio-ekonomske dejavnike.

**Metode:** V presečno raziskavo, izvedeno med avgustom in decembrom 2014, je bilo vključenih 6.262 odraslih, starejših od 15 let. Tako v univariatni kot tudi multivariatni analizi smo kot analitično metodo uporabili logistično regresijo. Opredelili smo tri multivariatne modele - v MODEL 1 smo vključili poleg migrene še izbrane zdravstvene sopoljave, povezane s telesno dimenzijo zdravja, v MODEL 2 še zdravstvene sopoljave, povezane z duševno dimenzijo zdravja, v MODEL 3 pa še demografske in socio-ekonomske dejavnike.

**Rezultati:** Obeti za samooceno zdravja kot slabega so bili pri bolnikih z migreno v primerjavi z udeleženci raziskave, ki o migreni niso poročali, statistično značilno višji v vseh modelih (univariatni model: ORmigrena = da vs. migrena = ne = 2,22 ( $p < 0,001$ ); MODEL 1: ORmigrena = da vs. migrena = ne = 2,27 ( $p < 0,001$ ); MODEL 2: ORmigrena = da vs. migrena = ne = 1,51 ( $p = 0,002$ ); MODEL 3: ORmigrena = da vs. migrena = ne = 1,56 ( $p = 0,001$ )).

**Zaključek:** Kot kaže, je migrena pomemben dejavnik v samooceni zdravja kot slabega. Njenega pomena ne zmanjšujejo zdravstveni sopoljavi, povezani s telesno dimenzijo zdravja, ga pa zmanjšujejo sopoljavi, povezani z duševno dimenzijo zdravja. Prav tako njenega pomena ne zmanjšujejo demografski in socio-ekonomski dejavniki. Zaključimo lahko tudi, da je migrena pojav, ki je povezan z duševnimi stanji, istočasno pa ima tudi samostojen vpliv na samooceno zdravja.

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## 1 INTRODUCTION

Human health is a complex concept with multiple dimensions (1). While the physical dimension is undoubtedly extremely important, the mental and social dimensions are important as well. At any particular moment, a person perceives all the dimensions that are important to them. Consequently, self-rated health (SRH) has become an important indicator for obtaining a rough assessment of health at both individual and population levels (2). Despite initial scepticism, SRH is today known as a valid and reliable measure among patients without cognitive impairment. Moreover, it is a strong predictor of health-care seeking, morbidity, mortality and frequent use of hospital services (3). Especially poor SRH (PSRH) showed a strong association with an increased risk of mortality, even after adjustment for covariates such as comorbidity (4).

The recent Global Burden of Disease (GBD) 2019 study confirmed that, among neurological disorders, migraine in particular is a major public health problem, especially in young and middle-aged women (5). It is still unclear whether migraine is independently related to SRH, and particularly to PSRH. While few studies have so far shown the relationship between migraine and PSRH, they were not systematically controlled for comorbidity and socioeconomic factors. For example, Kroll et al. reported the association of PSRH with migraine, controlled only for education (6), while Molarius et al. reported this association, controlled for symptoms of musculoskeletal pain and psychosomatic symptoms (7). In order to clarify the impact of migraine on SRH, it is therefore essential to consider accompanying factors such as comorbidity (including stroke, coronary heart disease, hypertension, psychiatric diseases and asthma) that affect SRH (8). Moreover, it is well-known that PSRH is associated with socioeconomic factors (9).

Among neurological disorders, migraine accounts for a significant part of the overall burden of disease in Slovenia. As measured by the YLD (Years Lived with Disability) indicator in the GBD 2019 study, it was even ranked first, accounting for 3.95% of the total YLDs, in Slovenia (5). Moreover, a recent study on productivity losses due to migraine in Slovenia highlights the problem from another perspective (10). Consequently, the data shows that public health action is imperative.

With the aim of providing a foundation for evidence-based public health actions, as well as the more individualised clinical treatment of migraine in Slovenia, the objective of our study was to assess the association between PSRH and migraine, adjusted for selected comorbidity and socioeconomic factors. We hypothesise that migraine is independently associated with PSRH, and that the association could be changed along with an adjustment to physical and mental comorbidities and socioeconomic factors.

## 2 METHODS

### 2.1 Study design

The data was collected as part of the second wave of the European Health Interview Survey (EHIS) (11), conducted in Slovenia from August to December 2014 (12) by the Slovenian National Institute of Public Health (NIJZ).

The cross-sectional study was carried out on a representative sample (two-stage random sampling) of inhabitants of Slovenia aged 15 and over residing in private households (12). The initial sample consisted of 11,000 units, while the final sample consisted of 10,005 units (with 995 units unsuitable) (12).

### 2.2 Data collection procedure and study instrument

Data was collected by means of online and personal surveys at the addresses of selected individuals using computer-assisted personal interviewing (CAPI) (12). The study instrument was a questionnaire harmonised at the European level (11), containing questions about health status, risk factors and healthcare, with some additions made in the Slovenian version (13).

### 2.3 Observed outcome

The outcome phenomenon of interest to the study was SRH, measured through a single question: "How is your health in general? Is it..." (1=very good, 2=good, 3=fair, 4=bad, 5=very bad). For the needs of this study, a new variable (PSRH) was designed by combining participants who rated their health as bad/very bad into a common group (no, yes).

### 2.4 Explanatory factor and comorbidities

The main explanatory factor was migraine. Individuals were classified as migraine sufferers if they responded "yes" to the question: "During the past 12 months, have you had any of the following diseases or conditions? ... heavy headache, migraine" (no, yes).

Comorbidities that could be related to PSRH and were collected as part of the EHIS study were selected from two groups of questions. The first group consisted of medical conditions that had affected the participants during the last 12 months ("During the past 12 months, have you had any of the following diseases or conditions? ..." (no, yes). For the purpose of the analysis, some of them were combined. The final selection was as follows: asthma (asthma and/or allergies), chronic obstructive pulmonary disease, ischemic heart disease (acute myocardial infarction and/or coronary disease/angina pectoris), arterial hypertension, stroke, diabetes mellitus, arthrosis, spinal pain (back pain and/or neck pain), liver cirrhosis, cancer, urinary tract diseases (urinary bladder problems and/or kidney problems), and mood disorders (depression and/or anxiety) (no, yes in all of them). The

second group consisted of selected problems that had affected participants over the last two weeks ("Over the last two weeks, how often have you been bothered by any of the following problems? ..." (1=not at all, 2=several days, 3=more than half the days, 4=nearly every day)). Poor sleep was selected for insertion into the analysis (more than half the days or nearly every day: no, yes). For the purpose of analysis, comorbidities were regrouped into the following two groups: those related to the physical dimension of health and those related to the mental dimension of health.

## 2.5 Confounding factors

Confounding factors consisted of demographic and socioeconomic factors: gender (male, female), age ( $\leq 65$  years,  $>65$  years), marital status: married (no, yes), education level: low (no, yes) and employment status: unemployed (no, yes).

## 2.6 Methods of analysis

The association between PSRH as observed outcome and migraine as explanatory factor was assessed univariately and multivariately by using logistic regression. Three models were defined in the multivariate analysis. MODEL 1 (migraine and comorbidities related to the physical dimension of health); MODEL 2 (comorbidities related to the mental dimension of health); MODEL 3 (demographic and socioeconomic factors). In all statistical tests, a p-value of  $\leq 0.05$  was considered significant. IBM SPSS for Windows Version 21.0 (SPSS Inc., Chicago, IL., USA) was used for the statistical analysis.

## 3 RESULTS

### 3.1 Description of the study group

The invitation to participate in the survey was accepted by 6,262/10,005 persons (response rate 62.6%). Their characteristics are presented in Table 1.

### 3.2 Results of analysis of association between poor self-rated health and migraine

PSRH was reported by 488 respondents (7.8%). Its prevalence within categories of different factors, including migraine, is presented in Table 1.

The results of the univariate analysis showed that migraine sufferers were more likely than non-sufferers to rate their health as poor. However, migraine was not one of the most important factors for perceiving PSRH in the univariate analysis (Table 1). The picture changed considerably in the multivariate analysis, where most of comorbidities lost much of their power of association, while with migraine the power decreased the least (Table 2).

**Table 1.** Prevalence of poor self-rated health (PSRH) within categories of selected factors, with the results of the univariate analysis of the relationship between PSRH and these factors in the European Health Interview Survey, Slovenia 2014.

Risk factor	Category	N <sub>tot</sub>	N <sub>det</sub> /N <sub>cat</sub> (%)	OR (95% CI limits for OR)	p
Migraine	No	6,213	350/5262 (6.7%)	1.00	<0.001
	Yes		139/951 (13.7%)	2.22 (1.79-2.75)	
<b>MIGRAINE COMORBIDITIES RELATED TO PHYSICAL DIMENSION OF HEALTH</b>					
Asthma/allergy	No	6,226	363/5007 (7.2%)	1.00	0.001
	Yes		122/1219 (10.0%)	1.41 (1.14-1.76)	
COPD	No	6,239	408/5982 (6.8%)	1.00	<0.001
	Yes		78/257 (30.4%)	5.90 (4.44-7.85)	
Ischemic heart disease	No	6,220	388/5964 (6.5%)	1.00	<0.001
	Yes		96/256 (37.5%)	8.57 (6.52-11.26)	
Stroke	No	6,239	447/6145 (7.3%)	1.00	<0.001
	Yes		37/94 (39.4%)	8.33 (5.45-12.73)	
Arterial hypertension	No	6,236	209/4690 (4.5%)	1.00	<0.001
	Yes		275/1546 (17.8%)	4.63 (3.82-5.60)	
Diabetes mellitus	No	6,217	376/5790 (6.5%)	1.00	<0.001
	Yes		110/427 (25.8%)	4.99 (3.92-6.35)	

Risk factor	Category	N <sub>tot</sub>	N <sub>det</sub> /N <sub>cat</sub> (%)	OR (95% CI limits for OR)	p
Arthrosis	No	6,218	405/5940 (6.8%)	1.00	
	Yes		79/278 (28.4%)	5.40 (4.08-7.14)	<0.001
Liver cirrhosis	No	6,219	467/6185 (7.6%)	1.00	
	Yes		15/34 (44.1%)	9.40 (4.72-18.72)	<0.001
Cancer	No	6,209	444/6071 (7.3%)	1.00	
	Yes		39/138 (29.3%)	4.95 (3.37-7.26)	<0.001
Urinary tract diseases	No	6,241	325/5494 (5.9%)	1.00	
	Yes		161/747 (21.6%)	4.36 (3.54-5.37)	<0.001
<b>MIGRAINE COMORBIDITIES RELATED TO MENTAL DIMENSION OF HEALTH</b>					
Mood disorders	No	6,209	312/5345 (5.8%)	1.00	
	Yes		172/864 (19.9%)	4.00 (3.26-4.90)	<0.001
Poor sleep	No	6,262	284/5487 (5.2%)	1.00	
	Yes		204/776 (26.3%)	6.54 (5.36-7.99)	<0.001
Spinal pain	No	6,234	104/3568 (2.9%)	1.00	
	Yes		383/2666 (14.4%)	5.60 (4.48-7.00)	<0.001
<b>DEMOGRAPHIC AND SOCIOECONOMIC FACTORS</b>					
Gender	Male	6,262	207/3082 (6.7%)	1.00	
	Female		280/3180 (8.8%)	1.34 (1.11-1.61)	0.002
Married	No	6,255	249/3115 (8.0%)	1.00	
	Yes		239/3148 (7.6%)	0.94 (0.78-1.13)	0.538
Low education level	No	6,201	147/3616 (4.1%)	1.00	
	Yes		338/2585 (13.1%)	3.54 (2.90-4.33)	<0.001
Unemployed	No	6,262	93/2889 (3.2%)	1.00	
	Yes		394/3321 (11.9%)	4.05 (3.21-5.11)	<0.001
Age	≤65 years	6,262	5054/245 (4.8%)	1.00	
	>65 years		243/1208 (20.1%)	4.94 (4.08-5.98)	<0.001

Legend: N<sub>tot</sub>=total number of observations, N<sub>det</sub>=number of patients with PSRH; N<sub>cat</sub>=number of patients within the category; OR=odds ratio; CI=confidence interval; COPD=chronic obstructive pulmonary disease

**Table 2.** Results of multivariate analysis of relationship between poor self-rated health (PSRH) and migraine adjusted for accompanying health conditions and demographic and socioeconomic factors in the European Health Interview Survey, Slovenia 2014 (Model 1: n=6042; Model 2: n=6015; Model 3: n=5946).

Risk factor	Category	Model 1		Model 2		Model 3	
		OR (95% CI limits for OR)	p	OR (95% CI limits for OR)	p	OR (95% CI limits for OR)	p
Migraine	No	1.00		1.00		1.00	
	Yes	2.27 (1.77-2.91)	<0.001	1.51 (1.16-1.96)	0.002	1.56 (1.18-2.05)	0.001
<b>MIGRAINE COMORBIDITIES RELATED TO PHYSICAL DIMENSION OF HEALTH</b>							
Asthma/allergy	No	1.00		1.00		1.00	
	Yes	1.03 (0.80-1.33)	0.792	0.86 (0.65-1.12)	0.273	0.89 (0.68-1.17)	0.431
COPD	No	1.00		1.00		1.00	
	Yes	4.24 (3.03-5.9)	<0.001	3.57 (2.52-5.05)	<0.001	3.41 (2.40-4.86)	<0.001
Ischemic heart disease	No	1.00		1.00		1.00	
	Yes	3.89 (2.82-5.38)	<0.001	3.32 (2.37-4.64)	<0.001	2.77 (1.97-3.92)	<0.001
Arterial hypertension	No	1.00		1.00		1.00	
	Yes	2.55 (2.04-3.18)	<0.001	2.08 (1.65-2.61)	<0.001	1.63 (1.28-2.08)	<0.001
Stroke	No	1.00		1.00		1.00	
	Yes	2.30 (1.35-3.91)	0.002	2.60 (1.50-4.50)	0.001	2.31 (1.34-4.01)	0.003
Diabetes mellitus	No	1.00		1.00		1.00	
	Yes	2.66 (1.98-3.57)	<0.001	2.60 (1.92-3.53)	<0.001	2.37 (1.74-3.22)	<0.001

Risk factor	Category	Model 1		Model 2		Model 3	
		OR (95% CI limits for OR)	p	OR (95% CI limits for OR)	p	OR (95% CI limits for OR)	p
Arthrosis	No	1.00		1.00		1.00	
	Yes	2.11 (1.49-2.99)	<0.001	1.46 (1.02-2.09)	0.039	1.32 (0.92-1.91)	0.130
Liver cirrhosis	No	1.00		1.00		1.00	
	Yes	6.78 (3.00-15.31)	<0.001	4.63 (2.08-10.30)	<0.001	4.04 (1.81-9.01)	0.001
Cancer	No	1.00		1.00		1.00	
	Yes	2.57 (1.60-4.11)	<0.001	2.78 (1.72-4.49)	<0.001	2.75 (1.71-4.43)	<0.001
Urinary tract diseases	No	1.00		1.00		1.00	
	Yes	2.15 (1.67-2.76)	<0.001	1.60 (1.23-2.08)	<0.001	1.31 (1.00-1.72)	0.045
<b>MIGRAINE COMORBIDITIES RELATED TO MENTAL DIMENSION OF HEALTH</b>							
Spinal pain	No			1.00		1.00	
	Yes			3.18 (2.46-4.11)	<0.001	3.02 (2.32-3.91)	<0.001
Mood disorders	No			1.00		1.00	
	Yes			1.39 (1.07-1.80)	0.011	1.43 (1.09-1.84)	0.008
Poor sleep	No			1.00		1.00	
	Yes			3.77 (2.97-4.80)	<0.001	3.63 (2.84-4.63)	<0.001
<b>DEMOGRAPHIC AND SOCIOECONOMIC FACTORS</b>							
Gender	Male					1.00	
	Female					0.95 (0.75-1.21)	0.711
Age	≤65 years					1.00	
	>65 years					1.64 (1.25-2.51)	<0.001
Married	No					1.00	
	Yes					0.77 (0.61-0.97)	0.029
Low education level	No					1.00	
	Yes					1.84 (1.45-2.35)	<0.001
Unemployed	No					1.00	
	Yes					1.36 (1.01-1.84)	0.037

Legend:  $N_{tot}$ =total number of observations,  $N_{det}$ =number of patients with PSRH;  $N_{cat}$ =number of patients within the category; OR=odds ratio; CI=confidence interval; COPD=chronic obstructive pulmonary disease

#### 4 DISCUSSION

The results indicate that migraine is an important PSRH-related factor and that the comorbidities related to the physical dimension of health do not reduce the power of migraine association with PRSH. On the other hand, comorbidities related to the mental dimension of health reduce the power of both migraine and other health conditions. The power of the association between migraine and PRSH is also independent of demographic and socioeconomic factors. This is a relatively new finding since, up to now, we have not had extensive data available on this issue.

The lack of studies with a similar approach to analysis makes it almost impossible to compare our results. The greatest similarities are with the studies produced by Kroll et al. (6) and Molarius et al. (7). However, both studies were significantly less detailed. In the former study, there was a significant association between PSRH and the coexistence of migraine, tension-type headaches and neck pain, but it was controlled for education attainment only. In the

latter study, where migraine in multivariate models was controlled for age, gender, spinal pain and psychological symptoms, there was a significant association between PSRH, recurrent headaches and migraine. Comparison is also difficult because, in our study, we tried to place the relationship between PSRH and migraine within a new health concept, taking into account the multidimensionality of health. This multidimensionality is also reflected in the counter-concept of health, which can be characterised as an illness, disease or sickness (14). This concept was followed by the design of multivariate models in our study. It was interesting to note from the neurological perspective that, in MODEL 1, migraine retained all its power of its relationship to PSRH in comparison with the univariate model, while the other disease phenomena appeared to be mutually competitive and could also lose a considerable portion of their power, because nowadays migraine is recognised as a physical, biological state, related to calcitonin gene-related peptide (CGRP) aetiology (15). However, patients' perception of the impact of migraine on health, which is the focus of

our study, offers a completely different perspective on the issue. Peters et al. showed that headache sufferers perceived headaches as less serious than other illnesses, and gave low priority to headaches as a health problem (16). In the same study, participants rated the importance of other diseases related to the physical dimension of health more highly, but with different priorities. On the other hand, in MODEL 2 the power of migraine's relationship to PSRH dropped substantially in comparison to the previous model, although it was still statistically significant, thereby indicating an important interaction between migraine and comorbidities related to the mental dimension of health. This is not surprising, since it is well-known that mental conditions, including mood disorders, poor sleep and widespread pain, are comorbidities, especially in frequent episodic and chronic migraine (17). This suggests that sensitisation phenomena may be an issue of both migraine and mental disorders, and may be a connection mechanism between them. However, there is another point common to migraine and mental disorders: stress (18-20). Frequent or chronic distress can lead to permanent sensitisation of the nervous system, which lowers the migraine threshold and increases the frequency of migraine episodes. Migraine can be regarded as a phenomenon that is in a bidirectional relationship with mental states (thus having an impact on PSRH) and is itself a stressor. Finally, in MODEL 3, migraine retained its power of relationship to PSRH in comparison with the previous model, and was not influenced by socioeconomic or demographic factors, which may indicate that, in our society, migraine appears to be quite well-accepted illness.

This study has some limitations. First, the validity of the questions included in the survey for classifying individuals as migraine sufferers has not been evaluated, and migraine diagnosis was not confirmed by a neurologist. Expert opinions on this issue are controversial. While the use of a single question to determine the presence of migraine is supported (21), some experts recommend that in order to estimate migraine prevalence, confirmation of the migraine diagnosis by a neurologist is required (22). While headache-specific questionnaires do exist (e.g. the HARSHIP questionnaire (23)), their length makes them less feasible for use in a survey such as ours. It is certainly important to be aware that in the case of migraine, both under- and over-reporting by subjects should be expected when interpreting patient-reported outcome measures. On the one hand, the self-reporting of health conditions generally generates higher values of prevalence than reporting by physicians (20); on the other, migraine could even be under-reported, as it is a health phenomenon that may still be perceived by some patients as stigmatising (24), especially in relation to the workplace (25). In our study, we understand this problem as minor, as it was designed to be a study for the rough estimation of possible interactions between the phenomena observed. In addition, data from

the GBD study shows that there is no significant difference in the estimate of prevalence between our study and the GBD study (5). Second, information obtained from the interviews is subjective and may contain recall errors, or a tendency by subjects to give socially desirable responses in the interviews, particularly those regarding their lifestyle habits. Furthermore, while one could argue that the response rate is relatively low, there is no agreed-upon standard for acceptable response rates (26). According to Babbie, cited by Draugalis et al., 50% is regarded as an acceptable response rate in social research surveys (26). Consequently, we assumed that the response rate achieved in our study still was high enough for reliable conclusions. One could also argue that the data underlying this study is relatively old. Unfortunately, consolidated data from the third wave of the EHIS survey in Slovenia in 2019 was not yet available at the time of this study. This meant that we could not use the very latest data. However, nothing happened in Slovenia between the second and the third wave of the EHIS survey that would have substantially affected the field of migraine-related research. Finally, one can argue that only binary logistic regression with a dichotomised observed outcome (PSRH yes vs. no) was applied, rather than multinomial logistic regression with trichotomised SHR (poor/very poor, fair and good/very good). However, our starting point was that it was necessary above all to find new approaches to help migraine sufferers who assess their health as poor or very poor, as they do not have appropriate mechanisms for managing and accepting their disease. Therefore, in the initial phase of the research, we only dichotomised the observed outcome. Nevertheless, this survey is important because it provides valuable information related to migraine and not available from other sources of information. The EHIS survey has also been used by other authors in different countries, which makes the data internationally comparable, and the present study's findings provide additional insights into the demographic aspects of migraine in the Slovenian population (there is little information on this at the level of the general population). The strength of this study in comparison with previous similar studies also lies in the fact that the results have been adjusted for various factors, including several diseases, functional symptoms and socio-economic factors.

The study is important from several different perspectives. On the one hand, it is important for the public health profession because it clearly indicates a relationship between migraine and PSRH. The group of headaches that fall under the rubric of neurological disorders is therefore receiving evidence-based confirmation of its public health significance in Slovenia and elsewhere, and the study is also important for neurology as a clinical discipline. Knowing that comorbidities from the mental health dimension group are in interaction with migraine in perceiving one's own health can make it easier to

plan a more individualised approach to the treatment of migraine sufferers.

Further research should first be extended to multinomial logistic regression with trichotomised SRH. This would be important for assessing the consistency of the present study's findings. As it continues, the research should focus on exploring the relationship between migraine and the use of healthcare services. As part of such a study, it would be interesting to explore in depth the healthcare utilisation behaviour of those migraine sufferers who assess their own health as poor. It would be even more interesting to use the knowledge gained from this study to design an intervention similar to e-healthcare for diabetes mellitus type 2 patients in Slovenia, which would be evaluated through an intervention study (27).

## 5 CONCLUSION

While migraine is undeniably an important factor in perceiving one's own health as poor, we could have expected it to be even more important than the results of our study suggest. The reason for this certainly lies in the fact that, on average, migraine sufferers possess good coping mechanisms and can manage their disease relatively well. One result of the study is that comorbidities related to the physical dimension of health do not reduce the power of migraine association with PSRH, while those related to the mental dimension of health do reduce the power of migraine and other health conditions.

## CONFLICTS OF INTEREST

The authors declare no conflicts of interest.

## FUNDING

The study was performed in the frame of regular tasks of NIPH.

## ETHICAL CONSIDERATIONS

European Union Regulations (EC) No 1338/2008 and (EU) No 141/2013 provide the legal basis for EHIS data collection. These documents also encompass ethical considerations.

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