



# Receptivity to eHealth Services in the Hungarian Population of Mureş County, Romania

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**Abstract.** One of the most dynamically evolving sectors of our days is eHealth. More and more applications, software, devices, etc. are launched that make healthcare segments accessible not only for professionals but for laics, too. This study examines to what extent the adult Hungarian population of Mureş County is ready to become eHealth participative, i.e. an active agent of its own healthcare attendance, in order to make use of the advantages offered by modern technologies that provide information and help understand our diseases, their prevention, and health maintenance. The probability of eHealth usage is approximated by the frequency of Internet usage. Social determinants of info-communication tool usage are assessed, controlling for covariates. Age has the strongest impact upon the frequency of Internet usage. The younger is the respondent, the more likely he/she is to be a frequent user, and, apart from this, only the educational level determines Internet use, higher education implying more frequent usage.

**Keywords:** eHealth, info-communication tool usage, digital inequalities

## Introduction

The context in which patients consume health information has changed dramatically with the electronization of healthcare, that is, with the diffusion of the Internet, advances in telemedicine, and changes in media health coverage (Hesse et al. 2005). The term eHealth, often referred to as digital health, encompasses a wide range of activities and technologies directed at delivering healthcare. From the patient's side, these services entail the followings: getting information from providers and from websites, online discussion fora and apps, sharing experiences of health and illness, those with chronic illnesses engaging

in self-care, self-monitoring devices with digital biosensors, personal emergency response systems to alert professionals in case of emergency, patient education tools, etc. (Lupton 2018).

eHealth is one means of patient empowerment, of reducing the hierarchical distance between health services and the patients and determining the patient to become more responsible for his/her healthcare. The most popular way for empowerment is patient education, followed by enhancing the commodity of patients by reducing the complexity of daily tasks such as the patient–doctor communication (e.g. e-mail or instant messaging), online access to administrative services, and tele-diagnosis. Self-care is also increasingly contributing to patient empowerment (Calvillo et al. 2013).

This paper seeks to answer the questions as to what extent the Hungarian population of Mureş County, Romania, is empowered in this sense, how it is prepared to become an active part of its own healthcare provision in order to make use of those advantages offered by modern technologies that provide information and help understand their illnesses, the changes in their lifestyle, and in maintaining their health.

In order to create more efficient, transparent, and better-reacting public services, the European Union’s leaders raised the political claim to disseminate information policies and raise awareness about them. In 1999, in the light of this endeavor, the European Union started within its action plan the program called “eEurope = Information Society for Everyone” and aimed to create the information society. Later on, in its program entitled “eEurope 2005 – Information Society for Everyone” the aim was to build broadband infrastructures to lay the foundations for the future information society. One of the four basic activities included in the priority action programs was the health system. This subprogram recommended three action types within e-health: developments regarding the electronic health card, creating health information networks, and spreading online health services. Later on, the program evolved into another project, the “i2010: European Information Society Growth and Development”, wherein info-communication tool usage was identified as an important avenue in social integration and quality of life enhancement (COM 2005). Within the “Europe 2020” strategy (COM 2010a), one of the most important facets is the European Digital Plan, which contains several eHealth activities and aims (COM 2010b).

On the healthcare provider’s side, in spite of general practitioners’ positive attitude towards ITC use in healthcare, the use of computers and the Internet for patient consultation is still inadequate in Romania (Farcaş 2007), and integrated health services informational systems for patient monitoring are inexistent (Farcaş 2007, Sitar-Tăut et al. 2011). Most recently, a number of eHealth projects have been implemented in Romania; however, they mostly meet local needs and are inadequate for larger consumer populations, and thus remain at the level of pilot

projects (Banciu & Alexandru 2009). On the other hand, electronic health record keeping has evolved dramatically, personal health records (cards) were issued in 2014 (Imbrișcă & Neațu 2015) and uniformly used countrywide ever since.

Our study focuses on the patients' side, trying to track the receptivity of a population segment towards eHealth services in order to promote and maintain their health and to actively engage with health issues through web-based activities. Our findings originate from Mureș County, which has a specific place in the Romanian health service sector, being one of the few medical centers in the Central Region. Its state-owned and private hospitals are providing care for large population groups often arriving from far away within the country. Further, the town of Târgu Mureș is a teaching and training center with a medical university, being the only one in the country providing tertiary healthcare education programs in Hungarian language for ethnic minority Hungarians. Taken into consideration, this special situation of Mureș County's health service units, their patients' receptivity for technical innovation is even more interesting and important to study. However, our study was only carried out among Hungarian-speaking adults and solely in Mureș County, and so our results have a limited reach.

In order for modern info-communication tools and applications to become part of our everyday lives, the population should be eHealth literate, that is, it should have the necessary skills and devices to make use of these technologies. In this study, we are curious to find out which demographic variables impact on the frequency of Internet usage. Who represent those categories whose digital competences can be relied upon in future eHealth innovations?

A clear limitation of this study is that no typology of Internet usage can be created from existing data. The questionnaire only contained questions on the frequency of Internet usage; so, this measure is used as a proxy for the eventual eHealth service usage since frequent Internet usage increases the chance to engage in web-based patient activities.

Individuals' self-assessment of eHealth skills revealed a 62% of total Romanian population claiming to know how to navigate the Internet to find health information, further 33% tend to agree with the statement, and only 6% disagree. This dispersion puts Romania slightly above the middle rank among the 28 European countries (Vicente & Madden 2017).

To date, according to a review of international literature on eHealth literacy, lower age and higher education predict eHealth literacy, while higher education and being a female is associated with a high usage of Web 2.0 for retrieving health information. Women and teenagers with a chronic disease are more active in engaging and participating in health-enhancing behaviors online than the general population, and social media showed to be a promising tool for empowering patient engagement. However, so far, social media is being mostly used by patients with cancer to retrieve information (Cordoș et al. 2017).

Empirical evidence has shown that eHealth skills are primarily linked to socio-economic profiles, with younger and more educated population having better skills. Further and most importantly, eHealth skills are positively correlated with other abilities, such as computer and information skills (Vicente & Madden 2017), which justifies the approximation of eHealth literacy with ICT use as done in this paper. The recent study of Vicente and Madden (2017) assessed the individual's self-perceived and differentiated eHealth skills in the adult European population, asking about the ease to find, evaluate, and apply electronic health information to health problems. The analysis revealed that for a thorough study eHealth skills should rather be assessed separately than as one comprehensive skill as far as only one socio-demographic factor is statistically significant across all skills. The more frequently people seek health information online, the more likely they report themselves as high-skilled.

Based on the Health Information National Trends Survey, scholars found that as much as individuals perceived their communication with providers to be less patient-centered, they are more likely to engage in various types of online health activities (Hou & Shim 2010). Typical activities include using websites for healthy lifestyles, searching for healthcare providers, and seeking health information. Trust in online health information was also found to be a significant predictor for online health activities.

Secondary literature analysis concluded that among the multitude of eHealth services, web services and communication networks are the most used technologies, easing remote communication and access to health information and services. Besides them, both personal health record and electronic health record approaches share outstanding positions (Calvillo et al. 2013).

## **Data and methods**

Our research was conducted on a representative sample of Mureş County's Hungarian population (N=383), the sample making up 0.19% of the total population of the respective county.<sup>1</sup> The primary aim of the research was to assess the state of health and the quality of life with the adapted version of the standardized questionnaire of Hungarostudy 2013. One block of questions (no 7) assessed the media usage and the extent of using different communication channels (personal, postal, chat, social media).

Our analysis reveals the electronic device usage of Mureş County's Hungarian population. In descriptive analysis, device usage was grouped in three categories, recoded from the original variables: frequent users, rare users, and no users (Fromann & Susánszky 2014). In the descriptive statistics, frequent usage is

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1 Data was collected between September 2015 and March 2016.

mostly considered in the analysis as one can only expect from digitally literate people to benefit from eHealth services.

In the explanatory model (linear regression), the dependent variable is the initial ordinal variable for Internet use with nine (9) values: never uses Internet, uses Internet once a year, a few times a year, every 2–3 months, every month, every 2–3 weeks, once a week, more times a week, and daily.

We were curious to find out the socio-demographic profile of frequent users, that is, what increases Internet usage. Regression measures the impact of predictors on their own, adjusted to the effect of covariates. Our linear regression model includes scale, ordinal and nominal level predictors, that is, variables such as age, perceived socioeconomic status, highest level of education, gender, or partnership status (is living alone – is living with a partner). These latter dichotomous variables were recoded into values of 0 and 1, 0 always denoting the supposedly unfavorable situation, i.e. women, village, and living alone.

In regression analysis, we aimed to find the best fitting and most parsimonious causal model, using the variable selection procedure. Following Kleinbaum et al. (2007), the model was at first simplified, leaving out the non-significant interaction effects one by one. Thereafter, an automated variable selection algorithm was used. Apart from gender and age, the remaining variables were allowed to be sorted out by the algorithm. A stepwise selection was used, setting the threshold at 5% for inclusion and at 10% for exclusion. The final model was subjected to multicollinearity diagnostics, monitoring the VIF and Tolerance indicators.

## Results

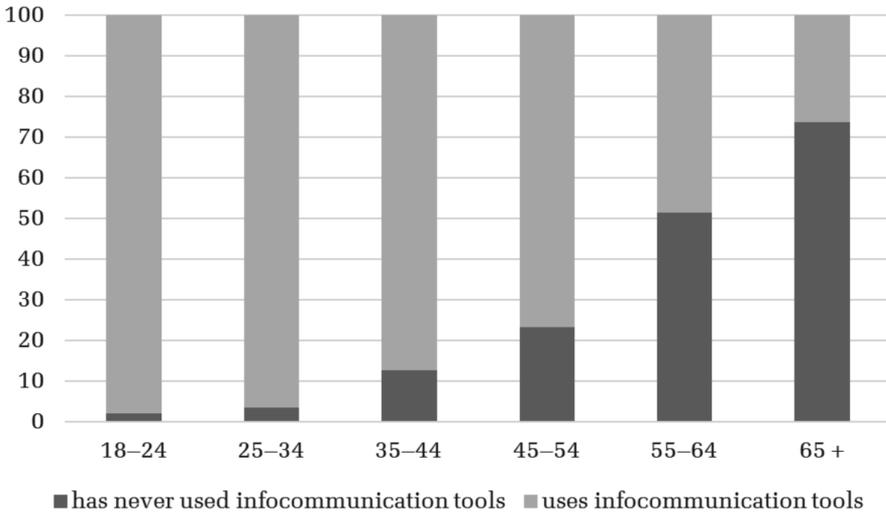
Descriptive results show that almost every respondent (92%) has his/her own mobile phone. The provision with info-communication tools is worse, with only 70% of respondents having a PC and Internet connection.

There was revealed a difference regarding residence within the population. 70% of town and city inhabitants use their PC and Internet regularly, whereas only 52% of village inhabitants do so. In much the same way, respondents living in larger settlements use PCs more often ( $\chi^2 = 13.672, p = 0.001$ ) and communicate through the Internet on more occasions ( $\chi^2 = 8.380, p = 0.015$ ) than do people living in smaller settlements.

Comparing the computer usage of the population of Mureş County and of Romania according to their residence, there is the same difference between town and village inhabitants. The proportion of users living in towns in Romania is 1.4 times higher, while in Mureş County this is 1.3 times higher than that of users living in villages (INS 2015).

When PC and Internet usage is assessed by age-groups, the rate of users decreases with age. When splitting the population into age-groups, we followed the standard division of the Romanian National Statistical Office (INS). Daily usage is dominant within the young generations, and the rate decreases with age ( $r = -0.625$ ,  $p < 0.01$ ). A similar correlation was revealed in the case of Internet usage, too ( $r = -0.704$ ,  $p < 0.01$ ).

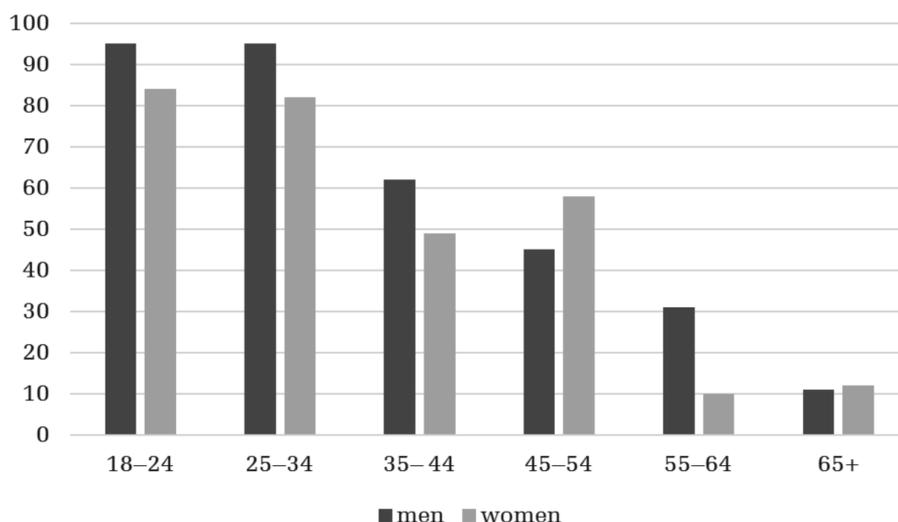
The most intensive info-communication tool usage (98.1%) is traced among the youngest adults (aged 18–24), the rate of users decreasing with age, until it is reduced to 26.3% among those aged 65 and above (*Graph 1*).



**Graph 1.** *PC and Internet usage by age-groups (%)*

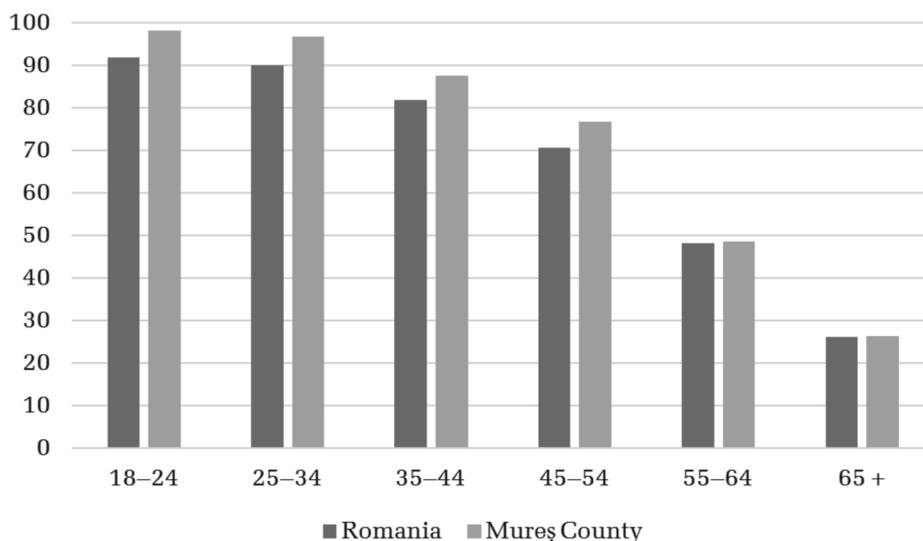
Data analysis by gender reveals no significant difference between men and women either in PC or in Internet usage. The proportion of male and female PC users who use computers daily or less frequently is almost the same: in our sample, 70.3% of men and 68.9% of women use a PC. To compare, the proportion of adult male PC users is slightly higher in Romania than that of the adult female users (72.1% and 68.2% respectively) (INS 2015).

However, in a three-dimensional analysis differentiated across gender and age-groups, the data show (*Graph 2*) that frequent PC usage is more typical for young men aged 18–34 than for women of the similar age-group (95% compared to 84%). In different age-groups, the proportion of genders differs: the advantage of men is higher in the age-groups 34–44 and 55–64 (62% vs. 49% and 31% vs. 10% ( $\chi^2 = 2.331$ ,  $p = 0.012$ ), whereas among those aged 45–54 ( $\chi^2 = 4.008$ ,  $p = 0.045$ ) and 65 and older the rate of digitally literate women is higher than that of men (45% vs. 58% and 11% vs. 12% respectively).



**Graph 2.** Frequency of PC usage by gender and age-groups (%)

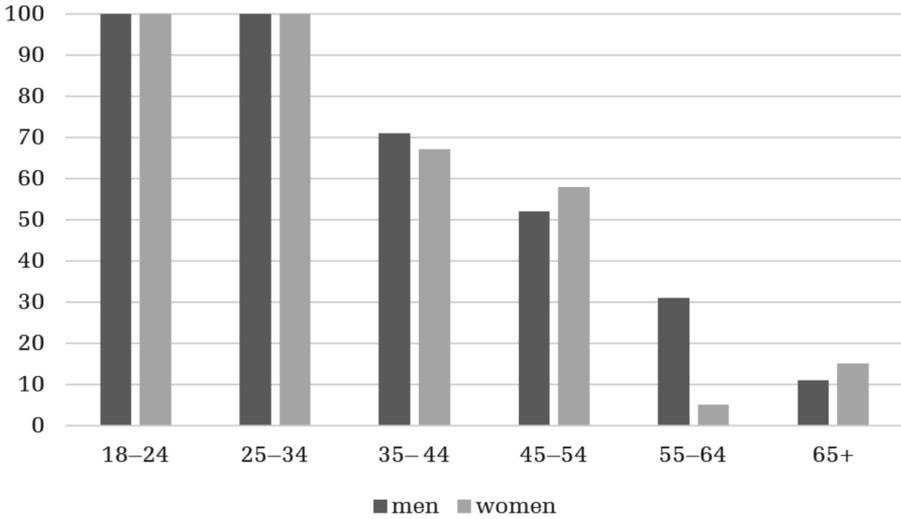
At national level, the proportion of PC users shows a decreasing trend according to age-group assessment. Young people aged 16–24 use PC the most (91.8%), and the proportion decreases with age. The proportion of usage among the age-group of 56–74 is only 26.1% (INS 2015). *Graph 3* below shows the PC usage of the Hungarian population of Romania and Mureş County by age-groups.



**Graph 3.** Frequency of PC usage: Mureş County vs. Romania (%)

Internet usage rates are similar to PC usage rates. Gender differences are only revealed in the older age-groups as young people’s (18–34 years) daily Internet usage is almost as high as 100%.

There is a significant difference in the age-group of 55 to 64 ( $\chi^2 = 4.667, p = 0.031$ ), 31% of men and 5% of women having claimed to be daily Internet users (Graph 4). Daily users are less numerous in the older generation, their rate decreasing by 20% with the advancement of age.



**Graph 4.** Frequency of Internet usage by gender and age-groups (%)

When analyzing the data for Romania, the proportions are similar. The proportion of Internet users in the adult population is 68.5%, whereas 65.7% of users use the device daily or almost daily. The proportion of men using the Internet is slightly higher than that of women: 74.8% vs. 72.1%. By age-groups, the proportion of Internet users also shows a decreasing tendency. The age-group of 16–34 uses the Internet intensively, while with the advancement of age this proportion is significantly reduced. The proportion of frequent users aged 55–74 is only 44%. There is a gender difference in the age-group of 35–44, where 57.7% of men use the Internet on a daily or almost on a daily basis compared to 61.6% of women of the same age (INS 2015).

Further, it can be stated that PC and Internet usage is significantly correlated with education level: the digitally most literate are also highly educated ( $r_{PC} = 0.588, r_{internet} = 0.570$ ); the correlation coefficients indicate strong relationships in both cases.

This trend is also characteristic at the national level. Only 67.6% of those graduating from trade schools or those who graduated only 8 classes or less are

PC and Internet users, whereas 83.9% of high school graduates, 85.7% of college graduates, and 85.7% of university graduates use PC and the Internet (INS 2015).

Descriptive results reveal that age and gender are significant predictors for Internet use, thus for possible eHealth service usage. Below, a linear regression model is being called upon to study the controlled effects of socio-demographic determinants upon the frequency of Internet usage and to assess their impact (Table 1).

**Table 1.** *The determinants of Internet usage*

Predictors of frequent Internet usage	Standardized $\beta$	t-value	p
Age	-0.579	-11.815	0.000
Highest level of education	0.219	4.485	0.000
Settlement type (village – town/city)	-0.093	-2.228	0.067
Perceived socio-economic status	0.045	1.057	0.291
Gender	-0.029	-0.698	0.486
Partnership status	-0.012	-0.300	0.765
Constant	9.879	5.038	0.000
<b>Adjusted <math>R^2 = 0.53</math>, <math>F = 55.53</math>, <math>p = 0.000</math></b>			

Linear regression (N=383)

Taken altogether, the regression model is significant. Predictors explain 53% of the variance of Internet use frequency (adjusted  $R^2 = 0.53$ ), which, according to our experience, is a rarely strong explanatory power in social sciences research. This means that the important social and demographic determinants of Internet use were identified, the frequent user profile can be drawn, and the differences in Internet use among different population groups are revealed.

Among the predicting variables, age has the most powerful impact (standardized  $b = -0.579$ ). Age negatively correlates with the frequency of Internet usage, people are less likely to use the Internet with advancing age. Education level has the second strongest effect (standardized  $b = 0.219$ ). With the increase of education level, the frequency of usage also increases, although, as previously revealed by descriptive statistics, the settlement type does not influence Internet usage. If all other predictors are being controlled for, town and city inhabitants do not use the Internet more often than the village population. Perceived socio-economic status in itself does not influence the frequency of Internet usage. Further, when adjusted to age and all other covariates, no gender difference was revealed by our data. By a similar socio-demographic profile, men are no oftener users than women, nor does partnership status influence Internet usage frequency.

## Discussion

Our data mostly echo the results of neighboring countries, Hungary, for instance (Fromann & Susánszky 2014). Digital literacy is relatively high, and according to recent data it rapidly increases in Romania, by about 6% per year (INS 2015). Our descriptive data reveal an immense digital generation gap: the youngest age-group's usage is 70 times as intensive as that of the oldest age-groups. Linear regression statistics show that with advancing age the frequency of usage decreases. Both PC and Internet usage strongly correlate with age.

In the present, the rate of those young Transylvanian Hungarians aged 15–29 who never use the Internet is as low as 4% (Kiss & Barna 2013). Young people born and raised in a digital environment, i.e. the so-called digital natives, are often characterized in terms of the activity-passivity dimension: compared to older people, the so-called television generations, described as rather passive consumers of media content, “Net Geners” typically have an active attitude towards media content. Tapscott lists among the features of this generation scrutiny and speed, the search for immediate solutions (Tapscott 2009). With respect to health, this involves the fact that this generation is treating classic medical authority with a grain of salt, is checking up their health problems and disease symptoms on the Internet first (this can be done earlier than getting an appointment with the doctor), or at least supplements information obtained from the doctor with information from the Internet. As opposed to this behavior, older adults are rather distrustful towards health information obtained/obtainable from the Internet and also avoid Internet usage for such purposes (Zulman et al. 2011). Older respondents usually report comparatively fewer eHealth skills, have difficulty in navigating the Internet and determining information quality. Notwithstanding, they do not score low in all eHealth skills: they claim to be able to better understand health terminology (Vicente & Madden 2017).

Above all, the eHealth literacy of people aged 65 and above, the most populous target group of healthcare services, is rather low, and, at the same time, they distrust health information from the Internet, and this mistrust is also typical for educated old people as the relationship between age and mistrust does not disappear when controlled for the level of education. However, the age effect is slightly attenuated when controlled for experience with the Internet and technical difficulties encountered during its usage. Many adults of older age find the Internet confusing because it provides “too much information,” and lack awareness about the source providing online health information. These respondents typically show lower willingness to search for health-related information on the Internet and manifest also lower rates of trust in such information (Zulman et al. 2011). In order to increase eHealth literacy and Internet usage for health-related purposes among older adults, it is recommended that websites' design and content features

clearly identify the source and credibility of information and minimize confusion. In this way, the utility of the Internet could increase as a health resource for the population.

Nevertheless, even if technology is there, it cannot be benefited from it if the population does not have the necessary information technology devices or the digital competences needed for the use of such technologies. The World Health Organization aims at enhancing equity in the eHealth literacy of the population since health gains among highly eHealth-literate people have created new inequalities in digital health information, and groups with low eHealth literacy are also at higher risk of poor health (Kickbusch et al. 2013).

Within the Transylvanian Hungarian population, PC and Internet usage increases with educational level. This result underscores the results of previous research with respect to PC usage (Márton 2012); however, this study is the first one to also assess a linear increase of Internet usage with education level. As for the eHealth skills of Europeans in general, the least educated experience difficulty in Internet navigation, determining information quality, and understanding health terminology. However, the ability to find reliable health-related information online does not differ by education level. This result draws attention once again upon the need to differentiate across eHealth skills in future research.

When controlled for other covariates, settlement type in itself does not influence the frequency of new media usage. Village inhabitants of a specific social stratum use the Internet with the same intensity than their fellow city-dwellers with a similar social background. Nor does gender in itself have impact upon the frequency of Internet usage. Nevertheless, as revealed by descriptive data, there are significantly less women among regular users in the active age-groups, which later, over 65, turns into its opposite. The reason of women's disadvantage is reflecting, most probably, the traditional gender role division of the Transylvanian Hungarian society, namely that care and household activities are predominantly done by women. In our region, women spend about three times more than men on doing household activities (INS 2013). The largest gender differences with respect to household and care activities appear in the age-groups of 25–44 and 45–64, exactly where the largest digital disadvantage of women is detected. In the European adult population, a gender gap was revealed for three eHealth skills. While women were less likely to know how to surf the Web for health information, they were more willing to report that they understand the terminology and know how to make use of the information found on the Internet (Vicente & Madden 2017).

To some extent, our results echo the findings of eHealth research in other countries, while, on the other hand, regional specificities are also being revealed. In the US, for instance, those with lower socio-economic status and older adults are less likely to engage in a number of eHealth activities compared to their

counterparts (Kontos et al. 2014). There, however, the gender gap in eHealth participation is unfavorable for men, whereas in our sample, by similar socio-economic conditions, no gender difference was assessed.

## **Conclusions**

Traditional provider–patient healthcare is in some cases disentangled by modern info-communication solutions so that much time and energy can be saved both by doctor and patient with the use of these. However, in order for modern info-communication tools and, together with them, eHealth to become part of our everyday lives, population should own the skills and devices needed for their usage.

Within the eHealth reform process of the European Union, priority is given to the following patient-centered actions: to ensure the access of patients to health-related data stored electronically, receive consultation results in the shortest time to those concerned, and promote teleconsultation and electronic patient referral (Csákó 2015). All these priorities assume patients that are receptive to digital health services.

Our study aimed at identifying the receptivity to eHealth services within a specific population segment, that of Hungarians of Mureș County, Romania. We assessed the socio-demographic determinants of Internet users in order to approximate the groups of potential eHealth users in this population segment. According to a review of international studies, eHealth literacy is an attribute for relatively young and educated female populations (Cordoş et al. 2017). In our research, digital engagement was also typical of the young and educated; however – unlike in the recent eHealth literacy study on European adults –, no gender gap was revealed in this respect. Our results echo the recent European findings, according to which, on the whole, the most vulnerable groups with respect to eHealth literacy are the least educated and the eldest (Vicente & Madden 2017).

Enhancing eHealth could positively impact economy, labor market, and the quality of life in general. However, in implementing the reform, it is highly important that the population use info-communication tools and take advantage of it. Echoing the results of international surveys, our study clearly points out that Internet usage in our region strongly correlates with age and educational level: the younger and more educated a person, the more he/she takes advantage of info-communication tools. Social inequalities manifest themselves in digital inequalities, too.

Digital engagement of Transylvanian Hungarian adults differs across social groups. Providers of future eHealth services should acknowledge differential Internet usage in order to better address communication inequalities and health disparities.

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