FACTORS INFLUENCING MEDICAL STUDENTS' KNOWLEDGE AND MOTIVATIONS RELATED TO THE PROFESSION OF FAMILY MEDICINE AND SPECIALITY CHOICE

Ph.D. Thesis

András Mohos, M.D.

Szeged

2023

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2023

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Total cumulative impact factor: **19.705**

LIST OF ABBREVIATIONS:

ANOVA – Analysis of Variance

DE – University of Debrecen

EU – European Union

EUR/€ – Euro

EURACT – European Academy of Teachers in General Practice/Family Medicine

FM – Family medicine

FMEC PG – Future of Medical Education in Canada Postgraduate

GP – General practitioner

HCSO/KSH – Hungarian Central Statistical Office/ Központi Statisztikai Hivatal [Hungarian]

HUF – Hungarian forint

MVA – Multivariate analysis

NEAK – National Health Insurance Fund of Hungary / Nemzeti Egészségbiztosítási Alapkezelő [Hungarian]

OR – Odds ratio

PTE – University of Pécs

SD – Standard deviation

SE – Semmelweis University

SZTE – University of Szeged

UK – United Kingdom

USA – Unites States of America

UVA – Univariate analysis

WHO – World Health Organization

WONCA – World Organization of National Colleges, Academies and Academic Associations of General Practitioners/Family Physicians (short name: World Organization of Family Doctors)

$\chi 2$ statistics - Chi-square statistics

INTRODUCTION:

1. General aspects of family medicine:

Family medicine is a well-defined clinical speciality with unique characteristics and its own educational and research content and clinical activity. It is "normally" the first contact point between the patient and the healthcare system. With its person-centred approach and with its family and community-based activity, family medicine either provides definitive care or coordinates further necessary services. This activity ensures, on the one hand, that patients receive the most appropriate service, and, on the other hand, the cost-effectiveness of the system. The specific communication techniques and consultation, and unique decision-making processes contribute to the entire healthcare activity spectrum from long term care to effective intervention regardless of the nature of the disease or patients' characteristics. [Figure 1.] [1]

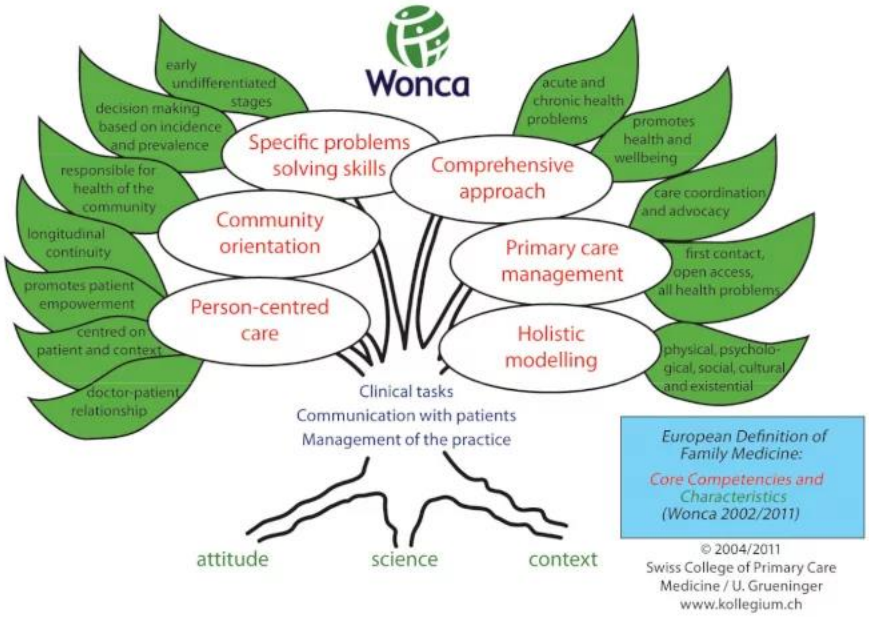


Figure 1. The WONCA tree [1]

In the Alma-Ata Declaration the International Conference on Primary Health Care established that primary care has a key role in protecting and promoting of the health of all people around the world. [2] The Astana Declaration in 2018 reinforced the prominent role of the primary healthcare system in the implementation of a sustainable global health system and universal health coverage. [3] Many epidemiological studies described better health outcomes, lower

mortality and cost-effectiveness in the case of strong primary care systems. [4-6] Access to the full range of essential health services is a basic human right but currently, there are great inequalities and rural communities often have a disadvantage in this field. Family medicine can reduce these problems. [3,7]

2. Rural family medicine:

Due to the growing rate of urbanization, the proportion of rural communities is becoming even smaller. Nowadays it is around 40%, but the absolute number of the rural population does not decrease; in 2022, about 3.4 billion people lived in rural areas. Special attention needs to be paid to this population because huge inequalities exist between urban and rural people in terms of access to different services, especially health services, and economical opportunities. The rural population is at a higher risk of deprivation, poor living conditions and worse health outcomes. According to the United Nations, "Globally 84 per cent of people experiencing multidimensional poverty live in rural areas. An estimated 2 billion people living in rural and remote areas across the world do not have adequate access to the essential health services they need within their communities." [8] The specific characteristics of 'Rural medicine' vary from country to country. But with geographic, environmental, economic, cultural, social and other characteristics, we can differentiate rural and urban medicine more or less accuratly. [9] There is an unequal distribution of healthcare professionals everywhere in the world: according to international studies, there are 2.9-11.4 times more healthcare professionals for the same number of inhabitants in urban areas than in rural ones. The strong connection between low numbers of human resources and lower quality of health services is widely known. The World Health Organization (WHO) has a strong recommendation to put more emphasis on rural topics and programs during the education of healthcare professionals. [10]

Strong primary care has a key role in providing universal health coverage and contributes to an equitable health care system. [4] With the development of healthcare and technology, more and more instruments and interventions are available. But at the same time, it is impossible to deliver these new methods everywhere due to the lack of equipment and human resources. Health services in close proximity to the community are essential to reach better health outcomes. To achieve this, a highly qualified family practice team with a broad range of skills is needed.

3. Human resource challenges in family medicine:

The primary healthcare system requires sufficient and well-qualified human resources but ensuring this is a considerable challenge worldwide. The shortage of family physicians causes a problem not only in low- and middle-income countries, but also in more developed countries like Germany, the UK or the USA. [11-14] In 2016, the National Health Service England and Health Education England announced a program to train an additional 5000 additional doctors working in general practice by 2020. The program has not been successfully implemented and the negative trend of physicians' shortage continues. [15-17] In Germany, 400 more family doctors retire each year than new entrants arrive. By 2017, there were already 2,600 vacant GP practices and according to estimates, this number can reach 20,000 by 2025. [18] The human resource problem of the developed countries also affects the less developed ones and deepens their local workforce crisis with the increase of the worker migration tendencies. Hungary participates in this process primarily as an exporter country. [19]

4. The Hungarian family practice system:

The family practice system in Hungary is organized at the national level and local governments are responsible for ensuring family medicine services are provided to the general population. Only few of the Hungarian family doctors are civil servants, most of them are self-employed. They have their own businesses which are in a contractual relationship with the National Health Insurance Fund (Nemzeti Egészségbiztosítási Alapkezelő – NEAK) and the local municipality. We can distinguish between three types of practices: paediatric practices, practices for adults and mixed practices where patients without any age restrictions can be found. According to the data of the National Health Insurance Fund of Hungary in February 2023 there were 6443 family practices in Hungary. [20] The average practice size is about 1500-1600 patients, but it can vary in a wide range (from 400 to more than 4000 patients). It depends on many factors, such as location and patients' age distribution. Apart from rare cases, primary health care services are covered by the National Health Insurance Fund of Hungary. There are some services that the patient has to pay for according to an officially regulated price (for example health fitness examinations before getting a driving licence) and the practices can offer some extra services foran additional fee (for example blood sampling), but these revenues are only a small portion of the overall income of the practices. There is a complex funding system mainly based on capitation, with additional

minor quality incentive elements, and, from 2021 onwards, age-related and GP cluster membership-related salary supplements. [21-23]

Almost all of the Hungarian practices are in single ownership. The typical family practice team consists of a family doctor and mostly one, sometimes two, or in very rare cases more nurses. In the last decade, the objective of achieving better health outcomes and economic necessity led to the introduction of new primary healthcare models based on teams and networks. The GP clusters, as multidisciplinary primary care teams, can provide a wider range of health services. These teams are built on the professional cooperation of the physicians and nurses of a region's practices (optimally 5-10 practices) supplemented by other healthcare professionals, like physiotherapists, dieticians, psychologists or public health coordinators. In 2013, several EU co-funded development programmes were initiated, followed by two state-funded development programmes; for example, a Swiss-Hungarian program. The long-term plan can be the introduction of a state-funded GP cluster structure in Hungarian primary health care. [24-26] Currently, the legislative background is more or less available, but real prevention-centred cluster-based work does not exist and the clusters do not receive extra financing for additional services or for employing apply additional professionals. At present we differentiate between "collegial" GP clusters, which are organized at the country level, and "tight" GP clusters, meaning the cooperation of 5-10 practices. According to the National Healthcare Service Center in August of 2022, 2487 practices were in "tight" GP clusters, 2876 were in collegial GP clusters and 403 family practices were not cluster members. [27-29]

5. Human resource situation in the Hungarian primary care system:

The Hungarian primary care system faces a severe shortage of family physicians. The trends of the last two decades are even more worrying than the current situation alone. The number of vacant practices increases every year. [Figure 2.] In February 2023, there were 691. [31] If we take a look at the age distribution of the active family physicians and take into account that their average age was 59 in December 2021, it is absolutely clear that without radical intervention the negative trend is unstoppable. [Figure 3.] The number of new entrants into the GP resident training programme is not sufficient to stop this trend. [23]

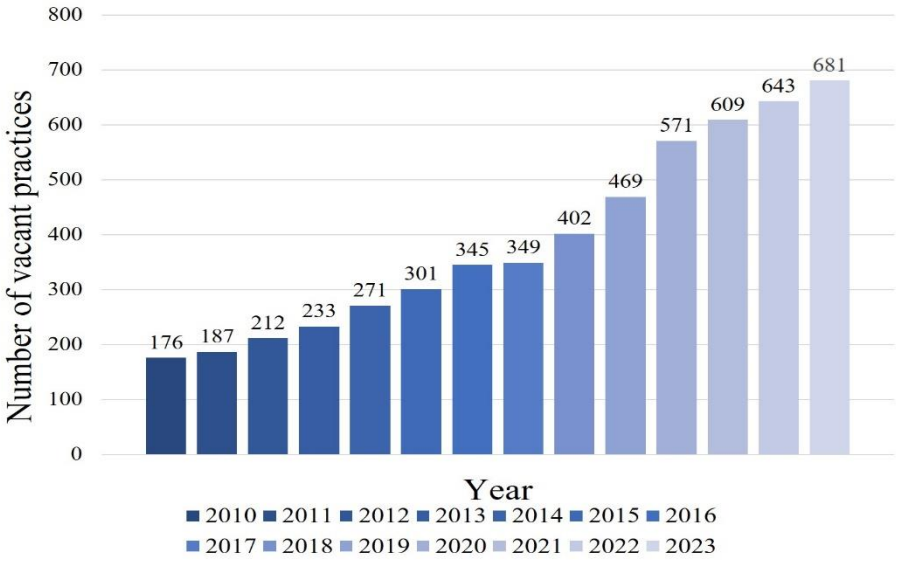


Figure 2. The number of vacant practices in Hungary from 2010 (Data from National Health Insurance Fund of Hungary [NEAK])

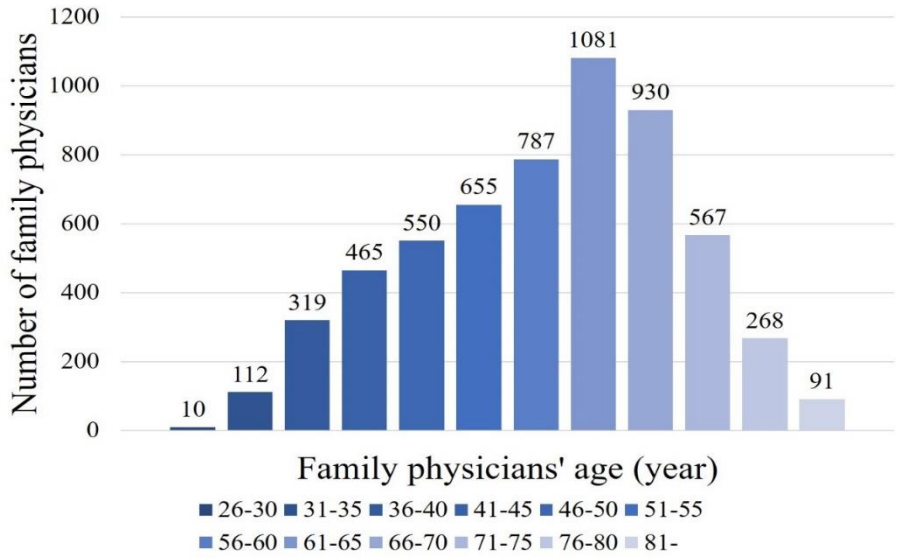


Figure 3. Hungarian family physicians' age distribution in December 2021 [30]

6. Rural family medicine in Hungary:

In Hungary, about 30% of the population lives in rural settings. [32] Hungary does not have geographically separated areas and a big territory (93.030 km2), so economic and financial aspects play a more important role in regional disparities. In February 2023, of the 6443 family practices 691 were not filled in (10.7%). 509 vacant practices (73.7% of the vacant practices) were situated in areas where the number of inhabitants is less than ten thousand. It

means that rural areas are mostly affected by the problem. Parallelly, this negative trend has also reached big cities: there are 61 vacant practices in the capital city, Budapest. [20] The number of vacant practices has been growing steadily in recent years. There is a strong association between the status of areas and unfilled practices. [23]

The movement of family physicians from more deprived areas to developed areas causes an unequal distribution of physicians. This process also exists between countries. Since 2004, when Hungary joined the European Union, the migration of healthcare professionals has become a problem. [19,33]

7. Physicians' earning opportunities in the Hungarian healthcare system:

In our research we focused on the public healthcare system only and did not include the private sector. The doctors in Hungarian secondary care mostly work as civil servants. In 2020, their monthly salary varied between 354,820 and 534,566 HUF (985-1485 EUR) depending on work hours and level of qualification. In connection with the passing of Act C of 2020 on the Employment Status of Health Workers and with the new employment status, there was a work experience-related salary raise. It was realized in three steps from 2021 to 2023. In the first year, the monthly gross pay was between 481,486 and 1,666,040 HUF, whereas in 2023, it is between 687,837 and 2,380,057 HUF. For ease of comparison, if we use the 2020 April central exchange rate (1 EUR=360 HUF) it would mean 1337-4627 EUR monthly gross salaries in 2021, and 1910-6611 EUR in 2023. It means that the salaries of residents has almost doubled in the last three years while the salary of a doctor at the end of his career has more than quadrupled. [22]

The situation of family physicians is different as only a few of them are civil servants. They are mostly self-employed, they have their own practices and a contract with the National Health Insurance Fund of Hungary. The practices have a corrected capitation type financing, and from this remuneration, the family doctor is able to calculate their employees' and their own salary. Therefore, we cannot calculate a unified salary for family physicians. Based on national financial data, we calculated €1000 as the average monthly salary for a family physician in our study. Most family physicians are not affected by the new health care service contracts. Family practices receive a salary compensation that the practice can only use for the healthcare professional's salary. The amount of the compensation is in line with the non-GPs' salary, but there is an extra requirement for this: if the practice is a member of a "tight" GP cluster, the GP receives the whole, but if the practice is a "collegial" GP cluster member, it

receives only 80%, while if the practice is not in any kind of cluster, it only receives 30% of the compensation. [22]

Based on the 162/2015 (VI. 30.) "Government decree about the higher-level specialized training system in health, the scholarships of the Resident Support Program, and the support for young specialists," the Government supports young physicians during their specialisation period with different scholarship opportunities. The Markusovszky Lajos Scholarship means 100,000 HUF extra monthly income and every resident doctor can apply for it. The Méhes Károly Scholarship is for paediatrics residents, the Gábor Aurél Scholarship is for emergency care residents. These latter mean 200,000 HUF monthly income. Moreover, the residents who choose a speciality which is affected by the shortage of professionals can apply for a 150,000 HUF monthly scholarship. The main condition of the scholarships is that, after specialisation, the applicant has to work in the public healthcare system for a period of time equal to the duration of the scholarship. [34]

We have to mention another element of physicians' income. Informal payment or "gratitude payment" refers to the practice when the patient gives some extra, unofficial sum of money to the caregivers. The motivation for this is very diverse, from the expression of gratitude to securing some "advantages," for example an earlier appointment, the choice of a physician or better services. The tradition of informal payment comes from the socialist times when it was a tacitly accepted way to complete the low official payment of the medical staff. The different specialities and the professionals on different levels in the hierarchy are affected to different degrees, but in general, we can state that there was a significant group of doctors for whom this kind of income played an important role. [35,36] At the time of our research, this practice was only an ethical issue but not illegal.

8. <u>Family medicine specialisation training system in Hungary:</u>

In Hungary, there are four universities with a medical faculty: Semmelweis University, Faculty of Medicine and Health Sciences in Budapest, University of Debrecen, Faculty of Medicine in Debrecen, University of Pécs, Medical School in Pécs and University of Szeged, Szent-Györgyi Albert Medical School in Szeged. Each of them has a family medicine department which is responsible for the teaching of family medicine to medical students, the organization of the family medicine specialization program for the resident doctors and the provision of continuous professional development opportunities for family doctors. The specialization training is centrally regulated at a legislative level, and apart from minor local

differences, it is essentially the same at the four medical universities. This harmonization could guarantee a uniform standard quality of specializations. The training is based on EMMI (Ministry of Human Capacities) ministerial Decree 22/2012 (IX.14.) on obtaining a specialist qualification in health and Government Decree 28/2022 (25 August) on the amendment of certain ministerial decrees related to the transformation of specialist medical training. [37,38]

The vocational training period of the family medicine specialization lasts 36 months. It is based on the relationship of one resident with one tutor. The residents carry out their family medicine training in the tutor's practice under his or her supervision and they continue to keep in touch even during the clinical exercises. The training period has two parts: in the first one, the resident has five months of family medicine practice, and in the other one, he works in different clinical fields in rotation. The training ends with a licensing exam, which can be taken after 8 months of individual but supervised work within a general practice.

The number of specialization exams are in a dynamic balance between the four family medicine departments. Since 2001, the annual number of newly qualified family medicine specialists has never reached 200. [Table 1.] From the point of view of sustainable human resource management in primary care, it is important to highlight that more than each year half of the newly qualified family medicine specialists were already older than 35, thus in their case, we can expect a shorter active family physician career. [23]

Year	Budapest	Debrecen	Pécs	Szeged	Total	Out of these failed
2000	126	58	31	21	236	1
2001	86	37	28	26	177	1
2002	103	33	25	32	193	1
2003	69	17	27	39	152	0
2004	81	41	33	32	187	0
2005	62	35	25	35	157	3
2006	34	12	23	38	107	0
2007	45	32	29	54	160	0
2008	54	40	29	61	184	3
2009	62	38	24	59	183	2
2010	56	46	33	58	193	2
2011	72	38	41	42	193	2
2012	34	32	20	45	131	2
2013	71	40	25	32	168	1
2014	65	29	28	31	153	0
2015	12	17	20	24	73	0

2016	25	26	31	26	108	3
2017	27	40	36	26	129	1
2018	37	35	35	20	127	0
2019	29	30	30	22	111	0
2020	20	21	41	19	101	1
2021	21	25	38	21	105	3
2022	24	24	34	19	101	1

Table 1. Number of specialization exams (National Directorate General for Hospitals National Exam Board)

The number of available family medicine residency positions was 137 in the last couple of years. It means that even a 100% application rate is not sufficient for a sustainable primary care system. [39] In the last two decades, the available positions were not fully filled in a single year. [Table 2.]

Year	**Budapest**	**Debrecen**	**Pécs**	**Szeged**	**Total**
2000		14	15	10	39*
2001		10	12	10	32*
2002		14	16	19	49*
2003	30	17	13	12	72
2004	34	20	18	23	95
2005	32	28	16	27	103
2006	29	28	14	26	97
2007	20	28	17	18	83
2008	28	22	12	24	86
2009	24	29	13	20	86
2010	29	21	12	18	80
2011	34	18	12	15	79
2012	29	18	12	15	74
2013	29	16	16	13	74
2014	28	15	14	11	68
2015	34	23	14	14	85
2016	44	24	11	15	94
2017	28	14	19	20	81
2018	19	24	18	14	75
2019	22	17	20	14	73
2020	47	19	24	13	103
2021	42	28	21	12	103

Table 2. Number of new entrants to the family medicine resident training program (*Data from the Family Medicine Departments. Data between 2000 and 2002 represent the year only partially)

9. Medical students' career choice and specialisation motivations:

Career choice is a multifactorial decision in medical students' lives. Although many studies examine the various factors influencing career choice, there is no clear evidence yet for the role they play. The reason for this could be that specialization choice can be examined from many different aspects and measured with many tools. The development of standardized and validated questionnaires for worldwide usage is really challenging not only because of the complexity of the issue but also because of cultural characteristics and national differences. There are many promising developments, for example, the student attitude change questionnaire prepared by the European Academy of Teachers in General Practice/Family Medicine (EURACT). With this, 93.5% of students' future career choices in family medicine could be predicted. A 14-item-long validated questionnaire for Chinese medical students was published in 2022 and may provide a suitable tool for exploring students' motivations. [40,41] Some of them are unchangeable, for example, personality, gender, origin, family role model, age, marital status, while other factors can be modified. Personality was examined as a potential influencing factor in career choice in many studies. [42-44] The role of gender and marital status is questionable and controversial based on available data. Very important influencing factors are students' motivations, and available information and attitudes towards the different specialities: professional characteristics of the specialities to begin with but also working conditions, expected salary, career opportunities or lifestyle. The expected salary or income (the two terms are used synonymously in the present paper) could also influence career plans and specialisation. [45,46] In 2019, a meta-analysis of 75 studies (with 882,209 participants) found 12 factors (Academic interests, Competencies, Controllable lifestyle or flexible work schedule, Patient service orientation, Medical teachers or mentors, Career opportunities, Workload or working hours, Income, Length of training, Prestige, Advice from others, Student debt), which were most influential among medical students in choosing speciality. [47] Medical education plays a significant role in medical students' lives not just through knowledge transfer but also through shaping their attitudes. Beyond the different lectures and practices, the hidden curriculum strongly influences students' career decisions. [48]

10. Family medicine in Hungarian medical education:

The four Hungarian universities have different curricula and family medicine is presented in a different ways and to different extent during medical education. [Table 3.]

Presence of family medicine	**Debrecen**	**Pécs**	**Budapest**	**Szeged*[2]**
Theory	V*.: 1 semester: seminar	IV.: 1 semester: lecture + seminar	IV.: 4 hours	IV.: 1 semester
Practice in a family practice	IV.: 1 week	VI.: 60 hours	IV.: 16 hours VI.: 1 week	VI.: 1 week
Thesis or research opportunity	yes	yes	yes	yes
Other	Elective subjects	• I.: Introduction to medical communication: 1 semester • Medical communication practice – 30 hours summer practice in family practice • Elective subjects	1. I.: Introduction to patient care seminar: 1 semester 2. VI.: 6 weeks elective practice in family practice 3. Elective subjects	IV.: Doctor – patient communication: half-day training and half day practice in family practice

Table 3. The presence of family medicine in Hungarian universities [30]

(*: year; *[2]: Compulsory family medicine lecture was introduced in 2022 in Szeged, as of the time of the data collection there was a 2-semester-long elective family medicine lecture.)

AIM OF THE RESEARCH:

This research aimed to investigate the factors influencing medical students' knowledge and motivations regarding speciality choice, especially towards family medicine. The goal was to explore medical students' willingness related to a rural medical career and the role of expected salary in speciality choice.

HYPOTHESES:

1. Few medical students think about family medicine as a career option.
2. Rural family medicine is not attractive to medical students as a career option.
3. The unpopularity of family medicine is not primarily related to financial reasons.
4. The prestige of family medicine is low according to medical students.
5. Medical students do not have enough information about a possible career in family medicine.

PARTICIPANTS AND METHODS:

1. Study design and participants:

The study used a cross-sectional design. Data collection was carried out with a self-administered paper-based questionnaire. Each of the four Hungarian medical universities (Semmelweis University - Budapest, University of Debrecen - Debrecen, University of Szeged - Szeged, and University of Pécs - Pécs) were represented by their fourth- and fifth-year medical students who attended face-to-face family medicine lectures at the time.

Participation was voluntary and anonymous. At the end of the family medicine lectures, the students received the questionnaire, filled it in and handed it in before leaving. Because the four universities have different curricula and family medicine is included in different years, we had to involve the appropriate years everywhere. Data collection was carried out from December 2019 to April 2020. After this time, it had to be stopped due to the COVID-19 pandemic. After receiving appropriate information about the study, 465 students decided to participate. Unfortunately because of the Covid-19 pandemic, we reached a lower response rate than we had initially expected. However, because of the nature of the limiting factor we can assume that the characteristic of the participant group of the students and the non-participant group of the students are not different. The gender ratio supports our assumption: it was 62.1% (288/464) in the participant group and 63.9% (379/593) in the non-participant group.

2. Questionnaire:

Data were collected with a self-developed questionnaire. [Annex 1: questionnaire in Hungarian; Annex 2: questionnaire in English] There were nine questions about sociodemographic data, such as gender, age, place of origin, family role model (in terms of higher education, medical degree or presence of a family physician in the family), previous studies and, finally, work experience. Seven questions concerned future living and career plans and preferred specialities. The likelihood of rural work among participants was assessed by the question "Do you consider it likely that you will work in a rural area in the future?" Answers to this question were assessed with a 5-point Likert scale (1: surely not, 2: probably not, 3: don't know, 4: probably yes, 5: surely yes). In the multivariate analysis, the categories were merged as follows: answers 1 and 2 became "no", answers 4 and 5 became "yes" and answer 3 was not used. Because of the heterogeneity of definitions of rural and urban, we did not use strict categories in the categorisation of the settlements. The capital city is Budapest, but when it came to the other categories (big city, small town, or rural area), the participants were free to choose the appropriate category. We assessed the effect of future income on the choice of specialisation: students' previous search for information about this topic, the influence of possible salary on career choice, estimation of current and ideal salaries, and students' self-rated confidence regarding their estimations. Students indicated their income estimates in Hungarian forint. We used the 2020 April central rate (1 EUR=360 HUF) to represent the data in Euros. We also asked students about their attitude towards informal payment. The scales and questions used to measure the impact of earning opportunities and informal payment have already been used in other studies in the international literature. [46,49] We examined the impact of 12 factors on career choice based on the findings of previous studies. [50] The intelligibility of the questionnaire was tested by a group of medical students who were doing their thesis at the Department of Family Medicine in Szeged.

3. Data analysis:

We used IBM SPSS Statistics 24 Software (IBM SPSS Statistics, IBM Corporation, Chicago, IL) for statistical analysis. Descriptive statistics were given in terms of counts and percentages, means and standard deviations (SD) in the case of continuous variables and as percentages in the case of categorical variables, respectively, complemented by medians and quartiles where appropriate. N's vary due to missing values. The data were analysed by univariate cross tabulation. The percentages were compared by chi-square ($\chi 2$) statistics. The one-way analysis of variance (ANOVA) test was used to compare means and to determine

whether there are any statistically significant differences between the independent groups. For further analysis of the categories, the Scheffé post hoc test was administered. Statistical significance was considered, as p-values derived from the statistical tests were below 0.05.

4. Ethics approval:

Ethics approval was received from the Medical Research Council, Hungary, reference number 51983-2/2019/EKU.

RESULTS:

1. Sociodemographic and general career choice results:

During the research period, 1,057 medical students were studying at the four universities in the 4th and 5th year. Out of them, 691 participated in mandatory or in elective (University of Szeged) family medicine courses in the given period, who had the opportunity to participate in this research. Out of the 691 students, 465 completed our questionnaire. The overall response rate was 44% (N=465/1057). Specially the response rate was 86.8% (n=145/167) in Debrecen, 23% (n=38/165) in Pécs, 25.2% (n=131/519) in Budapest and 73.3% (n=151/206) in Szeged. Socio-demographic characteristics of the sample are presented in Table 4.

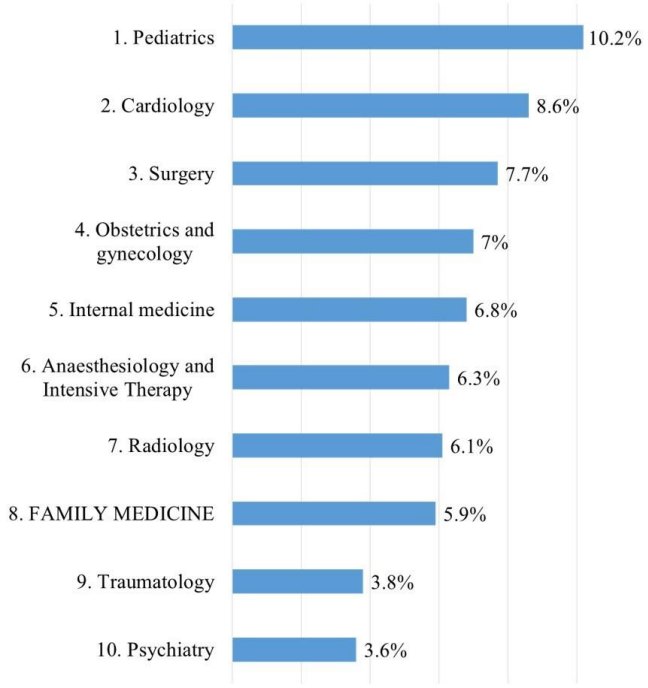
Variable		**Valid (N)**	**n (%)**	
Age [mean ± SD]		465	23.5 +- 2.1 years	
Female		464	288 (62.1)	
At least one parent with higher education degree		465	365 (79.0)	
Being a physician's child		465	85 (18.3)	
Family or friends working in general practice		462	121 (26.2)	
Family or friends working in the preferred speciality		458	81 (17.7)	
Come from…		457		
urban area	capital city		386 (84,4)	85 (18.6)
	big city			160 (35.0)
	small town			141 (30.8)
rural area			71 (15.5)	
University		465		

Debrecen		145 (31.2)
Pécs		38 (8.2)
Budapest		131 (28.2)
Szeged		151 (32.5)
Year	465	
Fourth		213 (45.8)
Fifth		252 (54.2)

Table 4. Sample characteristics

Only 5% of the respondents (n=23/462) plan to work as a family doctor in the future. 72% (n=333/462) of them have other speciality preferences and 23% (n=106/462) have not chosen their preferred speciality yet. We did not identify significant correlations between speciality choice and university (p=0.177), year (p=0.824) or gender (p=0.848).

As the first chosen speciality, paediatrics was the most popular among the students (10.2%) and family medicine was in eighth place (5.9%). [Figure 4.] As the second chosen speciality 4.7% of the respondents and as the third chosen speciality 8% of the respondents selected family medicine.



11. 2.9%	Gastroenterology
12. 2.7%	Endocrinology
13. 2.5%	Dermatology
14. 2.3%	Orthopedics
15. 2.1%	Emergency medicine, Neurology Ophtalmology
18. 1.8%	Pathology
19. 1.4%	Nephrology
20. 1.1%	Rheumatology, Pulmonology, Plastic surgery
23. 0.9%	Vascular surgery, Urology, Oto-rhino-laryngology, Gégészet, Haematology
26. 0.7%	Oncology, Pediatric traumatology, Neonatology, Primary care pediatrics, Forensic medicine, Pediatric psychiatry
31. 0.5%	Oral surgery, Infectology, Nuclear medicine
34. 0.2%	Sports medicine, Public health, Cardiac surgery, Clinical genetics, Neurosurgery, Clinical immunology, Allergology

Figure 4. First chosen speciality (N=465)

Most of the respondents (55.9%) committed themselves to the medical profession during their high school years. [Figure 5.] There was a significant positive association between early (before high school: 38%) commitment to medical faculty and family medicine preferences (p=0.004).

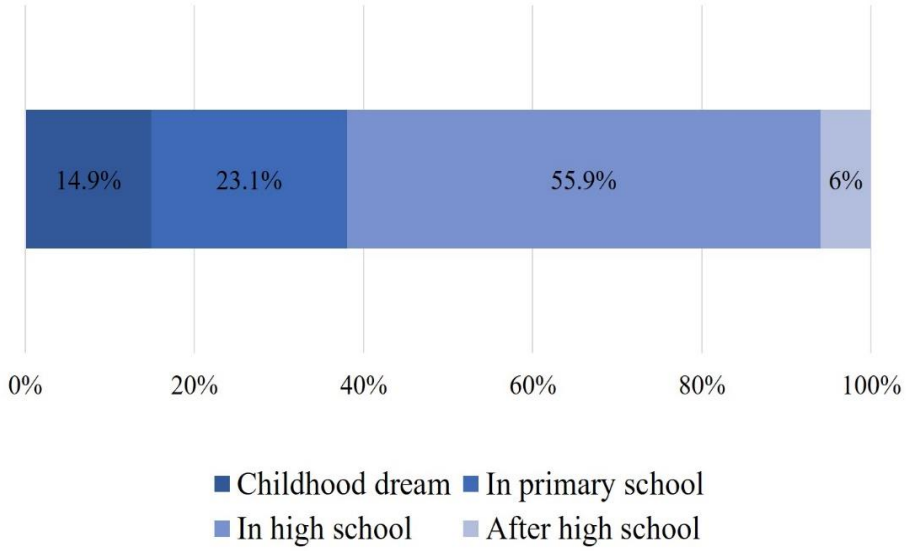


Figure 5. Time of commitment to the medical profession (N=463)

2.38% of the respondents (n=11/463) had a previous healthcare degree and 16.4% had healthcare work experience (n=76/463) before university. The majority of the students' parents (78.5%) have higher education degrees but only 18.3% of them are medical doctors. One-quarter of the students reported a family physician (26.2%) and 17.7% reported a doctor from the preferred speciality in the family or among their friends. None of the factors above influenced speciality choice or intentions to work in a rural setting. About two-thirds of the students (68.8%) considered the current situation of the Hungarian health care system rather bad (≤2 on a 5-point scale). About the situation expected in five years, 46.8% of them thought the same. [Figure 6.] Those who are interested in family medicine as a career option consider the current situation significantly better (p<0.01).

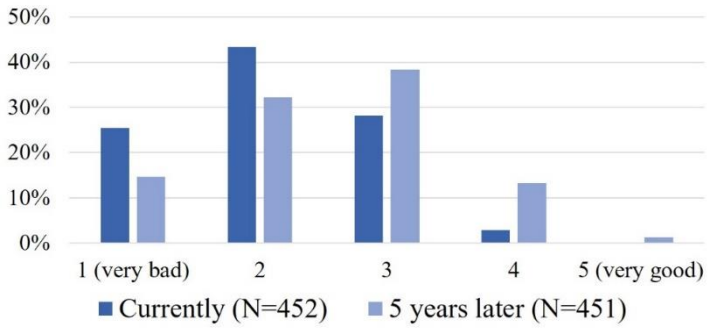


Figure 6. The situation of the Hungarian healthcare system according to the respondents

Out of the twelve influencing factors we examined, the three strongest were the inclinations before medical school, advice from others and previous job experience. According to the respondents working conditions, self-reporting of own skills and enthusiasm play a less important role in speciality choice. [Table 5.]

Inclinations before medical school	Advice from others	Experience of jobs so far	Availability of training places	Experience of chosen subject as student	Availability of career posts
3.1±1.4	2.6±1.1	2.4±1.4	2.3±1.3	2.2±1.2	2.1±1.1
Promotion/career prospects	Wanting a career that fits my domestic situation	Eventual financial prospects	Wanting a career with acceptable hours/ working conditions	Self-report of own skills/aptitudes	Enthusiasm/commitment : what I really want to do
1.9±1	1.8±1	1.7±0.8	1.7±0.9	1.6±0.8	1.5±0.8

Table 5. Factors affecting career choice (N=457)

2. Results related to the place of the future career:

Almost one-fifth of the respondents (18.6%; n=85/457) came from the capital city of Hungary, 35% (n=160/457) came from big cities and 30.8% (n=141/457) from small towns. Only 15.5% (n=71/457) of the students have a rural origin. The vast majority of the participants plan to live in urban environments and only the minority in rural ones. The ratio of the students who plan to work in rural settings is 5%. [Figure 7.]

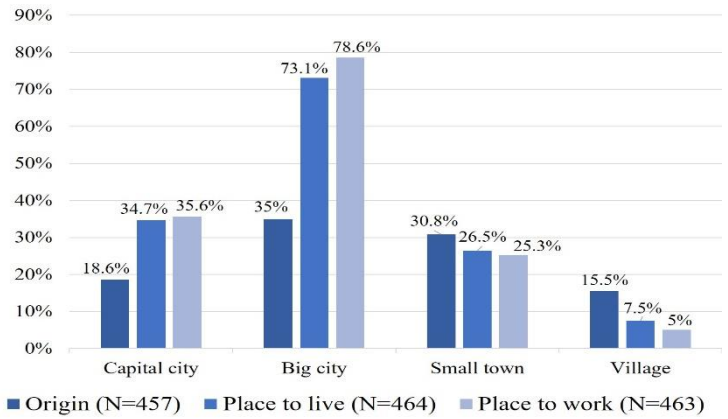


Figure 7. Medical students' origin and their plans for home and workplace

There was a significant positive relationship between rural origin and plans to work in a rural area (UVA: p=0.018; MVA: OR = 1.97; p=0.024). The plans to work in a rural area also had a significant correlation with family medicine as a first-choice speciality (UVA: p<0.001) and with plans to work in family practice in the future (UVA: p<0.001; MVA: OR = 4.9; p=0.014). 51.5% of the students plan to work abroad after their graduation and 22.2% of them plan to live abroad long-term. Plans to work abroad correlated significantly with the plan to work in a rural area (MVA: OR = 1.74; p=0.049). The goodness of fit was 0.2073. [Table 6.]

Variables	**Univariate analysis**							**Multivariate analysis (It contains all selected variables)**				
	Options	**Do you plan to work in a rural area in the future?**			**Do you consider it likely that you will work in a rural area in the future?**			Options	**Do you plan to work in a rural area in the future?** (Goodness of fit: 0.2073)		**Do you consider it likely that you will work in a rural area in the future?** (Goodness of fit: 0.1971)	
		No	Yes	p	No	Yes	p		OR	p	OR	p
University	Debrecen	110	35	0.141	126	19	0.284	Pécs/ Debrecen	1.86	0.165	2.01	0.190
	Pécs	26	11		26	7		Budapest/ Debrecen	0.93	0.848	1.90	0.111
	Budapest	106	25		107	22		Szeged/ Debrecen	1.50	0.187	2.36	**0.018**
	Szeged	104	46		118	32						
Gender	male	125	50	0.210	142	29	0.799	female/ male	0.69	0.124	0.93	0.788
	female	220	67		234	51						
Where did you grow up?	non-rural	295	90	**0.018**	323	57	**0.001**	rural/non-rural	1.97	**0.024**	3.24	**<0.001**
	rural	47	27		50	23						
Where do you plan to live in the future?	Hungary	264	85	0.278	278	67	0.094	Abroad/ Hungary	1.74	**0.049**	0.66	0.249
	abroad	71	30		87	12						
At the moment, I would like to be a(n)…	other	337	102	**<0.001**	362	71	**0.010**	family doctor / other	1.59	0.561	0.68	0.639
	family doctor	7	14		13	8						

Long-term, I plan to work in a(n)…	other	334	97	**<0.001**	357	68	**0.002**	family practice / other	4.90	**0.014**	4.99	**0.018**
	family practice	12	20		20	12						

Table 6. Results of the Univariate and of the Multivariate Analysis (UVA and MVA)

On a 5-point Likert scale, half of the participants answered that they would "surely not" or "probably not" (together: "no") choose rural medical work, while 17.5% answered "probably yes" or "surely yes" (together: "yes"). [Figure 8.]

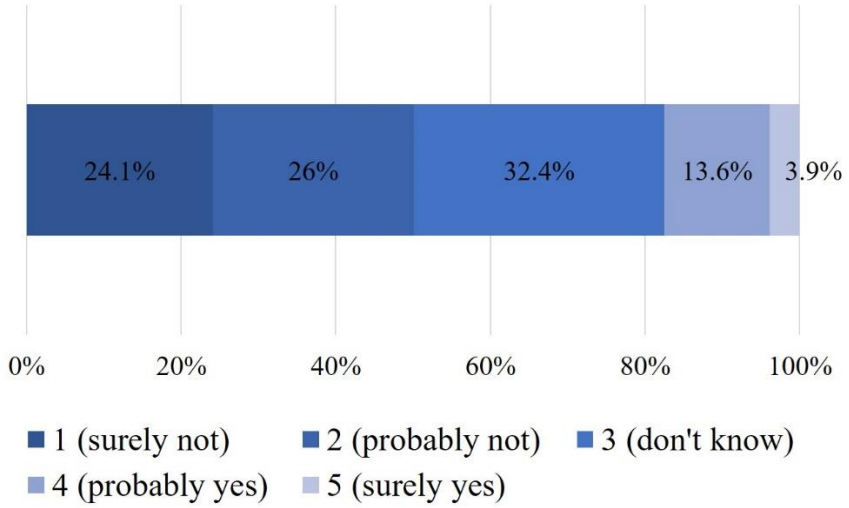


Figure 8. Probability of the medical students' rural work (N=457)

There was a significant correlation between the probability of rural work and rural origin (UVA: p=0.001; MVA: OR = 3.24; p<0.001), between the probability of rural work and family medicine as a first-choice speciality (UVA: p=0.001) and between the probability of rural work and plans to work in family practice in the future (UVA: p=0.002; OR = 4.99; MVA: p<0.018). The goodness of fit was 0.1971.

3. Results related to the role of possible future salary in career choice:

The vast majority of the students (91.9%; n=421/458) had already thought about their future income and 47.5% (n=218/459) had inquired about the exact data. The information sources of the medical students are presented in Figure 9.

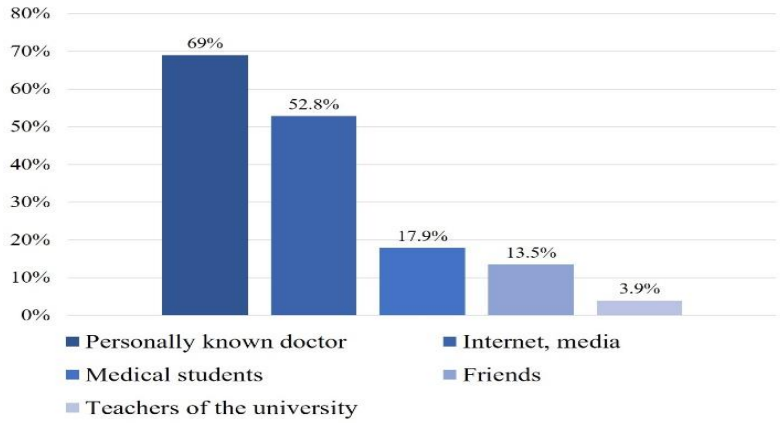


Figure 9. Source of information about possible future income (N=229)

On a 10-point Likert scale (1 = 'no influence', 10 = 'very big influence'), 76% (n=347/457) answered that the expected future income has a considerable (≥5) influence on their career choice. [Figure 10.] More than half of the students (n=238/447) would decide against a speciality with a lower expected salary.

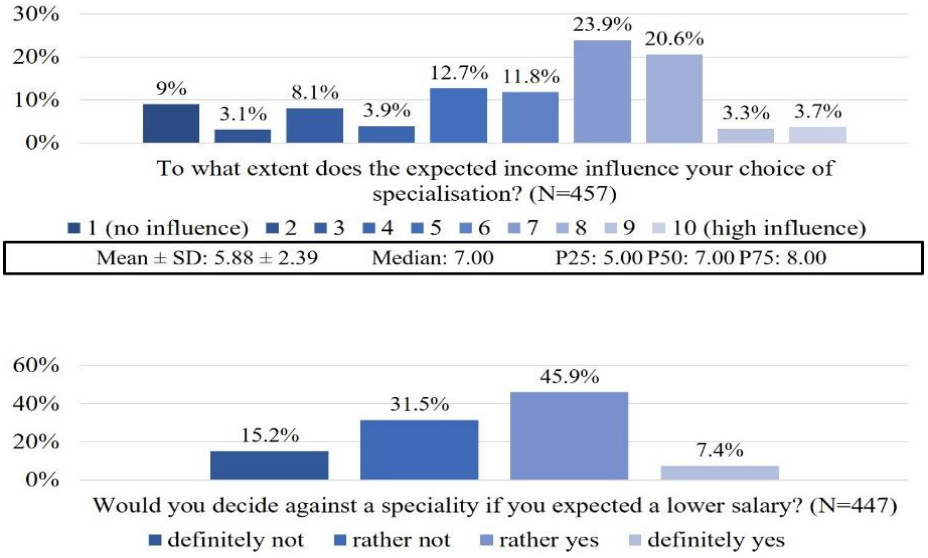


Figure 10. Possible effect of expected income on career choice

The mean of the ideal resident, family physician and other specialist monthly income was reported to be 415,598±233,302 HUF (P25: 300,000 HUF; P75: 500,000 HUF), 610,434±325,554 HUF (P25: 400,000 HUF; P75: 700,000 HUF) and 782,847±573,907 HUF (P25: 500,000 HUF; P75: 900,000 HUF). More than 85% of the respondents (n=378/443) reported that the ideal income for a resident doctor should be between 200,000-500,000 HUF

and 66.6% of the respondents (n=291/437) said that the ideal income for a family physician should be between 300,000-800,000 HUF. More than 95% of the respondents (n=405/425) said that the ideal income for a non-family physician specialist doctor should be at least 300,000 HUF. [Figure 11.]

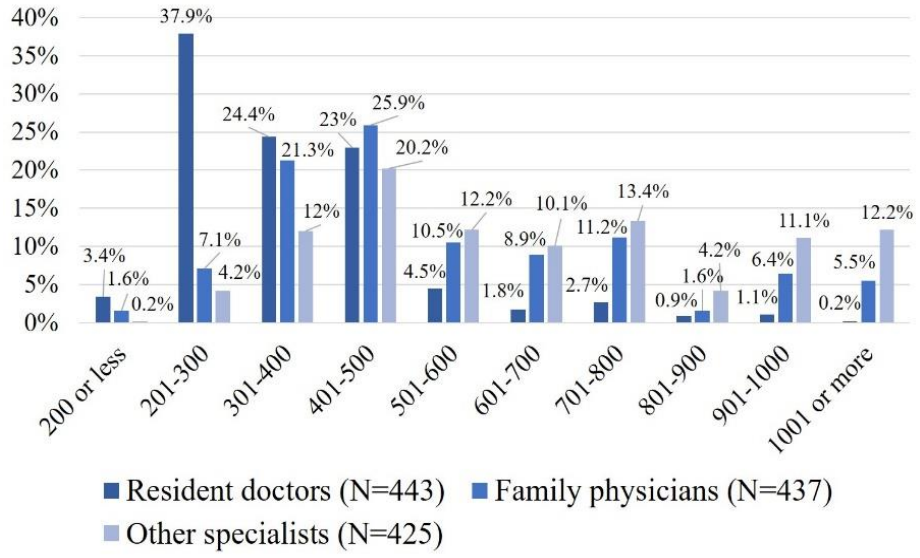


Figure 11. Ideal monthly incomes according to the students (in thousand Hungarian Forints)

The means of the estimated incomes for resident doctors were between 227,000-234,000 HUF depending on the location and chosen speciality. The mean of the estimated monthly income for a family physician was 410,406 HUF in rural and 403,947 HUF in urban settings; for other specialists 389,348 HUF and 420,039 HUF, respectively. [Table 7]

	Mean +- SD	**P25**	**P75**
Rural FM residents	230011±84462	175000	280000
Urban FM residents	227344±77622	180000	250000
Rural family physicians	410406±284446	267500	500000
Urban family physicians	403947±191651	300000	500000
Other rural residents	228042±86744	180000	260000
Other urban residents	234164±99784	180000	267500
Other rural specialists	389348±155509	300000	450000
Other urban specialists	420039±194180	300000	500000

Table 7. Estimated incomes (HUF)

Only the minority of participants were “very certain” (1.1-8.1%) or at least “rather certain” (18-34.8%) in their estimations. [Table 8.] In every category the males estimated higher salaries and their estimates were more certain ($p<0.001$-0.05). Students reported that the ideal income of a non-family physician specialist should be significantly higher than that of a family doctor. [Table 9.]

	Very uncertain (%)	**Rather uncertain (%)**	**Rather certain (%)**	**Very certain (%)**
Rural FM residents (N=429)	24	45	27.3	3.7
Urban FM residents (N=431)	21.8	38.1	34.8	5.3
Rural family physicians (N=415)	30.6	48.2	19	1.9
Urban family physicians (N=416)	30	46.6	20.9	2.4
Other rural residents (N=376)	28.7	39.1	26.1	6.1
Other urban residents (N=383)	26.6	36.3	29	8.1
Other rural specialists (N=366)	34.2	46.7	18	1.1
Other urban specialists (N=368)	33.4	44	20.4	2.2

Table 8. Certainty of salary estimates

	Estimated	**Ideal**	**Real**
Rural FM residents	230011±84462	415598 ± 233302	169800
Urban FM residents	227344±77622	415598 ± 233302	169800
Rural family physicians	410406±284446	610434 ± 325554	360000
Urban family physicians	403947±191651	610434 ± 325554	360000
Other rural residents	228042±86744	415598 ± 233302	169800-174110
Other urban residents	234164±99784	415598 ± 233302	169800-174110
Other rural specialists	389348±155509	782847 ± 573907	310800-421986
Other urban specialists	420039±194180	782847 ± 573907	310800-421986

Table 9. The comparison of the estimated, ideal and real* incomes (HUF) (Mean+-SD) * In case of the non-GP specialists, the real incomes are based on legal regulations, while the family physicians’ average “real income” was estimated based on data from the Central Statistical Office (KSH). [51,52]

More than four-fifths of the respondents (n=375/453) theoretically reject informal payment. [Figure 12] We found significant correlations between students' attitudes towards informal payment and inquiry about future payment (p=0.03), gender (p<0.01) and influence of the expected income (p<0.01). [Table 10]

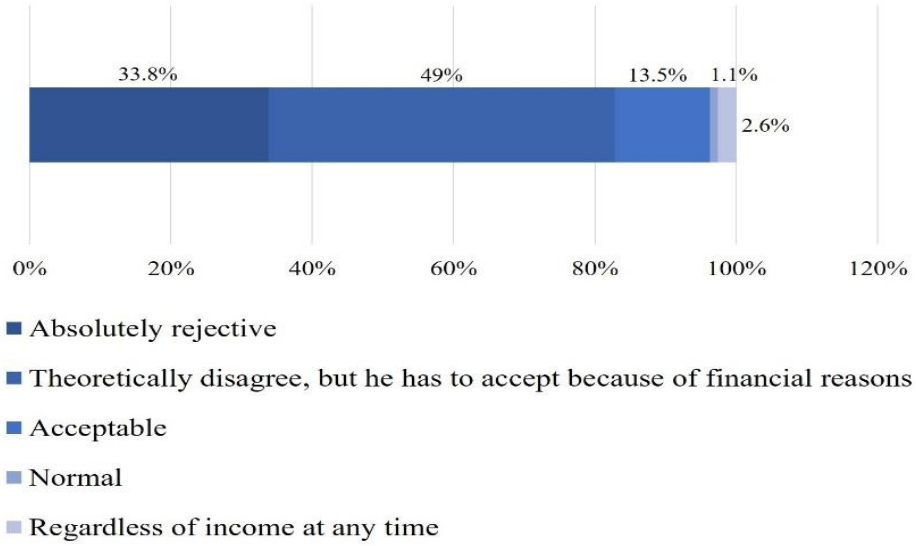


Figure 12. Students' attitude towards informal payment (N=453)

	Has already inquired about his future income		**Gender**		**Influence of the expected income on choice of speciality**	
	Yes	No	Men	Women	1-5	6-10
Absolutely rejective	55	94	48	104	80	68
Theoretically disagree…*	120	102	79	143	57	164
Acceptable	28	31	30	31	21	38
Normal	1	4	4	1	1	4
Acceptable…*[2]	9	3	11	1	2	10

Table 10. The influencing factors of the students' attitude towards informal payment

* "Theoretically disagree, but he has to accept because of financial reasons"

*[2] "Acceptable regardless of income at any time"

4. Results related to medical students' opinion about family medicine profession:

According to the respondents, the prestige of the profession of family medicine in general was average or rather high (mean: 3.13; median: 3; mode: 3), but among other specialists, it was rather low (mean: 2.39; median: 2; mode: 2). [Figure 13.] We did not find a significant correlation between the level of prestige and speciality choice preferences (p=0.102; p=0.61).

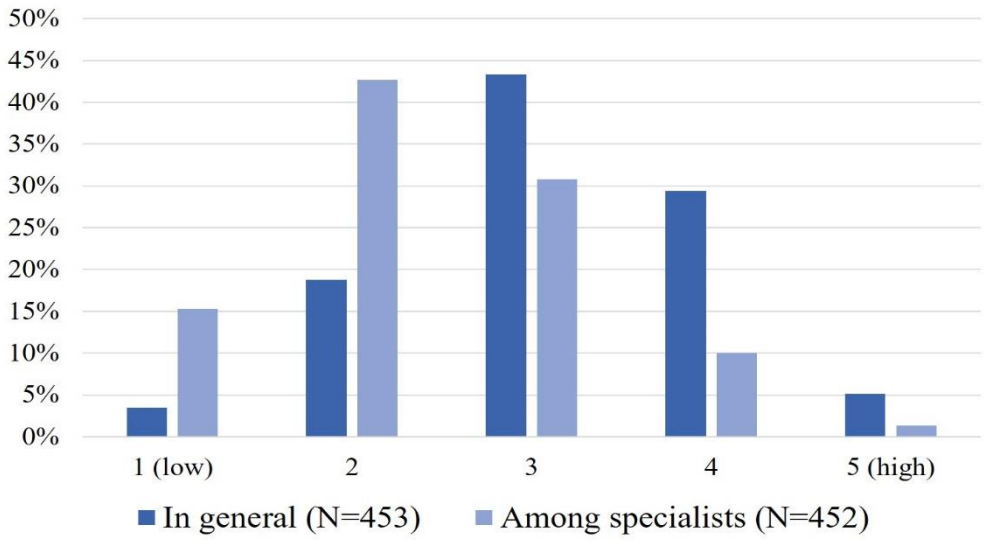


Figure 13. The prestige of family medicine profession in general and among other specialists according to the medical students

The most common negative opinions about the family medicine profession were because of low prestige (44.3%), too much administration (41.9%) and low salary (21%). [Figure 14]

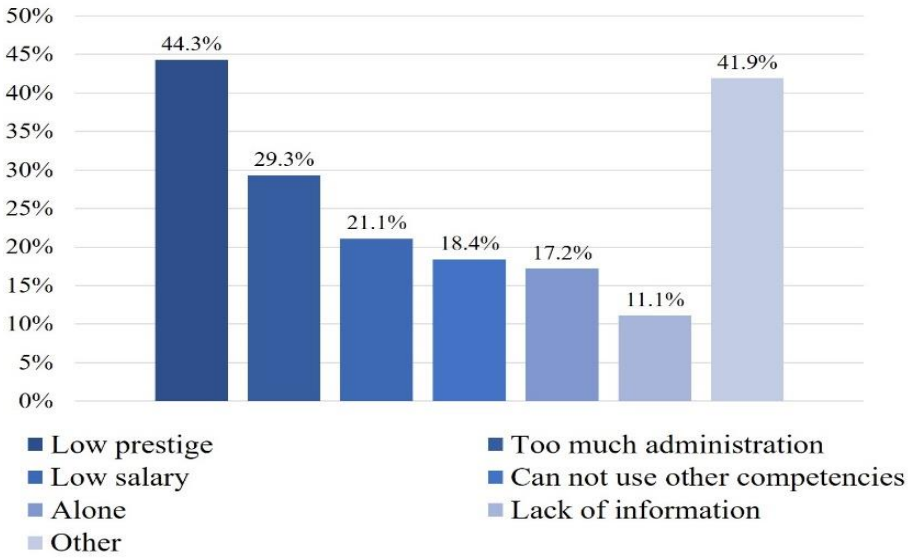


Figure 14. Negative opinions about family medicine profession (N=413)

Among the respondents who are interested in other specialities, 35% think that their preferred speciality is more exciting and interesting, while 32.9% think that their particular speciality is more complex and needs more knowledge than family medicine. [Figure 15.]

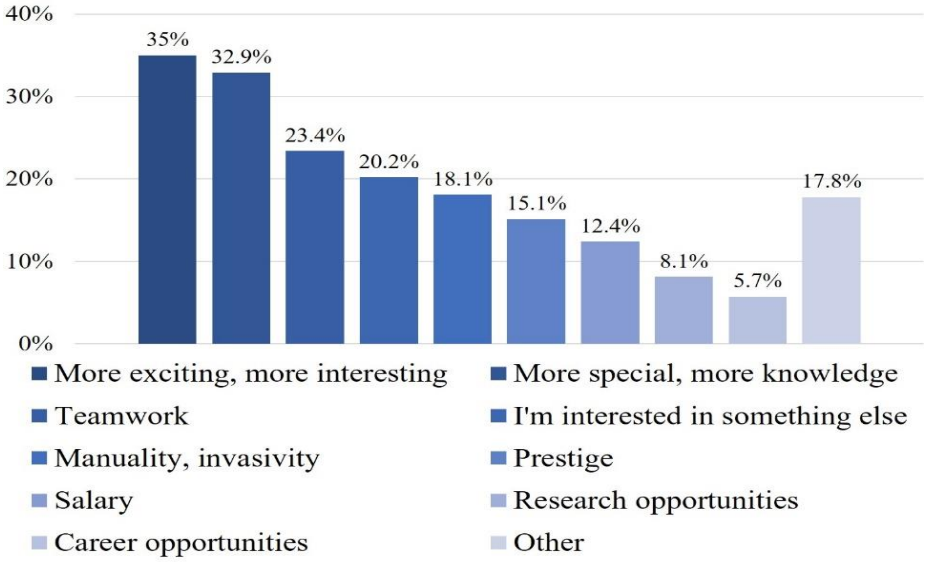


Figure 15. Why is your chosen speciality more attractive as family medicine? (N= 371)

The most common suggestions to increase the attractiveness of family medicine speciality were the opportunity to work in other fields part-time (56.7%), “higher prestige” (48.1%) and “higher salary” (47.4%). [Figure 16]

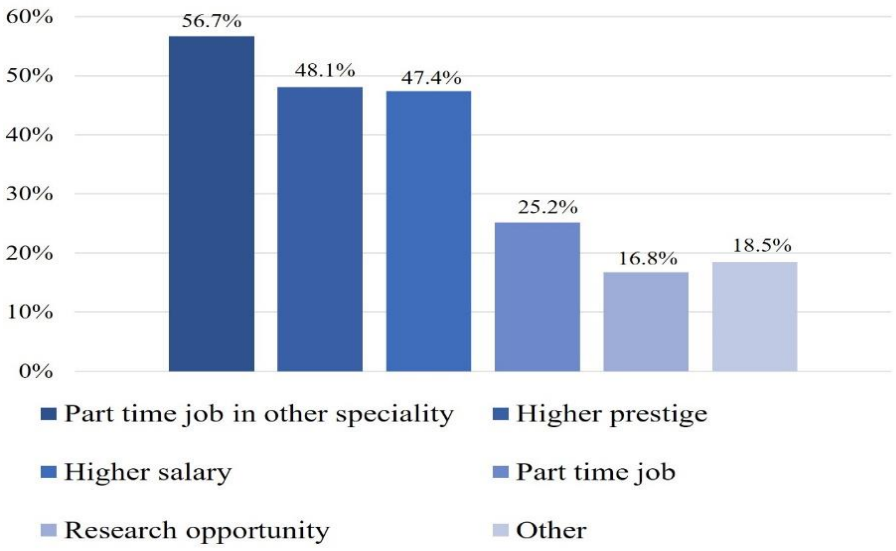


Figure 16. Suggestions to increase the attractiveness of family medicine (N=416)

DISCUSSION:

1. Speciality choice – family medicine:

Most of the students decided to choose the medical profession during their high school years as suggested by previous Hungarian research. Several research papers have examined the motivations and the time of students' commitment towards the medical profession, but we did not find any publications about the role of the time of commitment in speciality choice. In our study, there was a significant positive correlation between early commitment to the medical profession and family medicine preference. The explanation of this novel finding requires further investigation. [53] Students' opinion about the situation of the Hungarian healthcare system is quite devastating, although they do look into the future with moderate optimism. Compared to our previous study, it was a novel finding that the students who are interested in family medicine evaluate the current situation more favourably. Further examinations are necessary to explain this. [54] In general, this negative atmosphere could endanger recruitment in every field of medicine. The examination of the 12 career choice influencing factors highlighted the importance of pre-university impressions and advice from others. The role of the university seems to be less important, and interestingly, students' own will (working conditions, enthusiasm, skills) was the least important. This last finding could be problematic because for a long-term, successful career, it is important to find a speciality which suits and satisfies us. In this process, improving self-knowledge is at least as important as external impulses.

According to the data of the Central Statistical Office in 2023, there were 4,859 family physicians in Hungary. The 1489 general practitioner paediatricians are not included because of the different specialization training process. At the time of specialization, the minimum age of a doctor is 28 years. If we define the retirement age at 65, it yields 37 active years for a family physician in an ideal scenario. In case of a consistent age distribution, 131 newly qualified family physicians would be needed annually for replacement. [55]

Although most of the family physicians are still active after 65 years of age there are many factors which determine a shorter active period. More than half of the residents are older than 35 years when they become a specialist. Change to another speciality or profession, migration, pregnancy or unexpected health problems can also lead to a shorter GP career.

In 2021, 14.75% (4473/30318) of the doctors with a valid license worked as family doctors. [56,57] It means that more than 15% of the students should choose family medicine in case of

an ideal age distribution for a sustainable system. The problem is that the age distribution of Hungarian general practitioners is far from ideal: more than 60% are older than 60 and 19% are older than 70. Based on these data, system has to be adapted to replace more than half of the active family physicians in the next few years. In case of every fifth GP, the danger of finishing their career from one day to the next is real. In “The Concept of the strengthening of primary care”" published by the Hungarian Ministry of Human Resources in 2015, it is claimed that 3,500-4,000 family physicians will exit the system naturally in the next 10 years. [58]

In view of this, our finding that only 5% of the students plan to be a family physician is rather worrying. If we count all the students who are interested in family medicine, but not necessarily as a first career option, the ratio is 18.6%. It would be more or less sufficient to conserve the human resource situation in the short run, but it could not solve it in the long run. Additionally, we cannot realistically plan with this option. Based on the above data, our first hypothesis was confirmed: only a minority of the medical students think about family medicine as a viable career option. In our previous studies in 2016 and 2017, 0-3.85% of the students reported to have planned to be primarily a family physician and 12.1-19.2% of them considered family medicine as an optional career. The unpopularity of family medicine among Hungarian medical students is a sad but not new phenomenon. Váriné et al. reported in 1981 that less than 10% of the students planned to be a family physician while Bánlaky et al. found that 15% of the respondents were interested in a family medicine career in the same year. [59,60] Ensuring the availability of sufficient human resources in primary care and motivating medical students to choose this speciality is not only challenging in Hungary but everywhere in the world. The attractiveness of family medicine varies in a wide range from country to country. As far as the international literature is concerned, the proportion of medical students who are interested in a career in family medicine is between less than 1% and 36%. Longitudinal studies suggest that the popularity of family medicine increases during university years. [Table 11.]

Our fifth hypothesis was that medical students do not have enough information about family medicine as a career. Our results support this and it is notable because in our opinion, more information about specializing in family medicine could increase the attractiveness of the speciality. A little bit more than 10% of the students answered “lack of information” as a negative characteristic of family medicine.

Country	Proportion of the respondents who are interested in family medicine as a career option (%)	Date of publication
Bosnia and Herzegovina	31	2020
Germany	8.7	2020
Greece	4.1	2007
Hungary	plan: 5 first+second+third option: 18.6	Own result
Israel	19	2018
Japan	32.3	2018
Pakistan	24.1	2018
Poland	1st year: 14.6 6th year: 25.7	2015
Scotland	17.6	2012
Slovenia	31.7-36	2017
Switzerland	30	2022
Switzerland	3rd year: 12.8 6th year: 24	2022
United Arab Emirates	8.9	2016
International systematic review	male: 2.16-8.65 female: 4.28-13.3	2020

Table 11. International comparison of the attractiveness of family medicine [46,61-72]

But among the negative opinions about family medicine and among the disadvantages compared to other specialities, there were many stereotypical characteristics (“less diverse”, “less challenging”) and the answers indicated a lack of accurate information. These negative stereotypes also appear in international studies. A Bosnian study found that the two most common stereotypes were “Boring. Always the same patients” and “only write referrals”. [67] In addition, the students had many real insights. Too much administration and working alone as a doctor both have a significant deterring effect on family medicine, while the desire for practice-oriented practice and teamwork drives them to other specialities. The most common suggestion to increase attractiveness was the opportunity of a part time job in another speciality. This shows that, according to the students, it would be important to widen the competences of family physicians. Based on our study, it is not clear whether students know what family physicians’ competencies really are, but they consider these insufficient or they

simply do not have the exact information about their real competencies. Nonetheless, the two options are present at the same time, parallelly.

2. Prestige of family medicine:

The prestige of the profession of family medicine, in general was average, but among other specialists, it achieved a rather low status according to the students. Family medicine preference was not a significant influencing factor in this question. The low prestige of family medicine is not unique to Hungary, it is a worldwide phenomenon. This may be due to the traditional, secondary care oriented medical education and its appearance in the "hidden curriculum." Previous German studies found similar prestige levels and did not find differences between family medicine oriented and other students' opinions. 63% of the respondents from the Oxford Medical University perceived that family medicine has a lower status than other clinical specialities. [73-76] The most common negative opinion was the "low prestige" about family medicine, and the second most common suggestion to increase the attractiveness was "higher prestige." These findings suggest that the suspected lower prestige among those who do not practice family medicine has greater importance for the students than the higher prestige among the patients. The unpopularity of family medicine may be indirectly related to the low prestige of the speciality. These results confirm our fourth hypothesis according to which the prestige of family medicine is low according to medical students.

3. Rural medical work:

Rural work was not attractive for students as only 5% of them think about a rural medical career. About one-quarter of the students would not work in rural areas in any case. Based on these findings, our second hypothesis was confirmed: rural family medicine is not attractive for medical students as a career option, but half of the students were uncertain or showed more or less willingness to work in a rural setting. The job is to focus on this group, give them opportunities to understand the characteristics of rural medical work better and motivate them to choose this career. Undergraduate education has a key role in this process. Girasek et al. found in 2008, that only 0.8% of Hungarian resident doctors planned to work in places where the number of inhabitants is less than ten thousand. [77] In our previous research in 2016 in Szeged, students with primary care orientation were more likely to work in rural areas than the students who would have liked to work in secondary care (28.2% vs. 1%). [54]

Comparison with international results is limited because of the different approaches to rural medicine and because of varying study designs. Most literature in this field refers to countries quite different from Hungary, like Australia or Canada. Nevertheless, we can claim that the interest of Hungarian medical students in a rural medical career seems to be low compared to other nations' students. [Table 12.]

Country	**Proportion of the respondents who are interested in rural medical career (%)**	**Date of publication**
Argentina	21	2015
Australia	42	2012
Canada	1st year: 11.9 residents: 5.7	2018
China	26.6	2016
Germany	44.2 (can imagine)	2021
Hungary	plan: 5 "probably" + "surely": 17.5	Own result
India	44	2016
Serbia	1st year: 1.9 6th year: 1.7	2019

Table 12. International comparison of the attractiveness of rural career [78-84]

As a significant correlation was found, the present work confirmed the role of rural origins in intentions of pursuing work in rural settings. The same findings exists in the international literature: rural background is a strong predictor of a career in rural medicine after graduation. A WHO study found that students who had a rural background were more likely (RR 3.9, CI 2.7–5.7, $p < 0.001$) to work in rural or remote areas in the future. An Australian study found that students with a socioeconomic disadvantage were twice as likely to work in a socioeconomically disadvantaged community. [85] Based on this fact, there are many universities where different selection and application processes are used for students with rural or remote backgrounds and evidence shows that these students perform at an appropriate level and can reach the expected standards. [86-89]

Based on this logic, it is worth looking into the origins of medical students and we found that only the minority of them came from rural areas. The reason of this inequality is out of the scope of this research but when we create a recruitment strategy, we will have to consider the fact that currently most medical students come from urban environments.

4. Migration intentions:

Family physicians' migration is a strong influencing factor in the human resource situation. Developed countries see this mostly as an opportunity while in the case of less developed and developing countries, it aggravates the problem. Hungary is in the second category as mainly an exporter country. According to a previous Hungarian study, family medicine was in the top five affected specialities. [33]

In our study, half of the students planned to work abroad. Győrffy et al. found that in 2016 almost 40% of the participating fifth and sixth-year medical students planned to work as a doctor abroad. Based on these, we can state that the tendency did not change significantly. [19] The former Eastern bloc and post-Soviet countries face a similar, challenging situation as it is not only a healthcare-related but also a financial and social issue, and other professions are also affected. [Table 13.]

Country	**Proportion of the respondents who are interested in working abroad (%)**	**Date of publication**
Croatia	53	2015
Czech Republic	45 (physicians)	2015
Hungary	51.5	Own result
Lithuania	39 (medical students)	2018
Poland	34 (physicians)	2019
Romania	option: 84.7 (medical students) plan: 53%	2017

Table 13. International comparison of the migration intentions of the respondents [90-94]

5. Earning opportunities and informal payment as influencing factors in the choice of speciality by medical students:

The expected salary is a significant but not the most important factor in the career choice of most students. Almost every student had already thought about their future income, but only less than half of them had inquired about the exact data. We found that the most significant information sources are the doctors around them, and the university plays only a marginal role in this question. University lectures seem to provide an excellent opportunity for high quality professional training, but they are not suitable to inform the students about the working and living conditions associated with each speciality. In line with international literature, we found

that males have higher salary expectations, and in their cases, the financial questions have a more prominent impact on career choice. [95-98]

Most students were uncertain in their estimates, especially about specialists' incomes (specialists' income: 76.6-78.8% vs residents' income: 59.9-67.8%), and only the minority of participants were "very certain" (1.1-8.1%). Preferred speciality and motivation to work in rural settings or abroad did not significantly influence the estimations.

According to the students, the ideal income should be highest for non-FM specialists, and for resident doctors should be the lowest; family physicians are between the two groups. This difference between the non-FM specialists' and family physicians' ideal salary may be in line with the lower prestige of family medicine among medical students. [99] In case of the estimates of real incomes, residents' values stayed the lowest, but the difference between family physicians and non-FM specialists disappeared, and we did not find significant differences between the amounts associated with urban and rural settings. The estimated incomes were close to real ones and significantly less than the ideal ones in every category. The estimated resident salaries were higher than real ones. This could be explained by the fact that there are different scholarships available for residents and young specialist doctors and they mean 100,000-200,000 HUF additional income. In our own previous study, 84% of the students, and in another previous study, most of the students underestimated the expected salary. [49,54] Students appear to be even more informed about the financial conditions of their future work.

The role of expected salary in the choice of family medicine as a future career seems to be controversial in our research. Less than one-fifth of the students mentioned low salary as a negative aspect of family medicine, and only a little more than 10% highlighted higher salary as a positive factor of the other chosen speciality. Previous international studies also found that expected salary is an important factor, but previous experiences and professional aspects have a bigger impact on career choice. [45,46] Nonetheless, almost half of the students stated that higher salaries could increase the attractiveness of family medicine.

There was not a uniform attitude towards informal payment among participants. Most of them rejected it, but others, even if they rejected it in theory, felt obligated to accept it because of financial reasons. Only the minority of respondents considered it normal or acceptable. Although many doctors and a considerable part of society are against the practice of informal payments, changes on systematic and social levels are required to eliminate it. [35,36] Overall,

these findings support our third hypothesis according to which the unpopularity of family medicine has primarily non-financial reasons.

6. Proposed solutions:

Based on our results and the summary of the relevant literature, we tried to give an insightful and professional overview of the current situation in the field of medical students' career choice motivations and attitudes towards family medicine. It is a fundamental step but not sufficient alone. If we would like some favourable changes, we should give suggestions to resolve the issue. In this chapter, I will summarize these proposals for solutions.

- Medical education:

Naturally, students should know their career choice options, but it is also essential for them to be aware of their own personalities, strengths, weaknesses and objectives. The medical schools play a vital role in initiating this process of self-knowledge.

Although there are successful projects which are based on taking students' origins into account, I agree with the suggestion "don't select medical students - convince them." Therefore, we should focus primarily on those factors which we can actually influence. [100] A meta-analysis found that medical students who participated in family medicine practice were more likely to choose family medicine (OR: 1.62-2.04), and longer practices (4-11 weeks) had a stronger impact (OR: 3.15) than the shorter ones (25-40 hours). [101] A German study found that family medicine clerkship changed medical students' interest in family medicine in more than 50% of the cases and underlined the relevance of the quality of these practices because only well-designed ones can increase the attractiveness of family medicine. [102] Medical schools have a key role in providing accurate, authentic information about family medicine and in creating the opportunity for medical students to participate in family practice trainings and practices, and gain as much personal experience as possible about the profession of family medicine. According to the European Academy of Teachers in General Practice/Family Medicine (EURACT), family practice training should ideally last for at least three months in a family practice, with a teaching family physician, while the recommended minimum period for practice is set for only four weeks. [103] The expected minimum period of practice in a family practice is not achieved at any Hungarian university, although at the Semmelweis University the students can participate in an elective 6-week-long family medicine practice from 2021. This is a crucial area for improvement.

The role of the university should not only be the professional training of medical students but also to provide insight into the working conditions and other aspects, such as the financial conditions of a speciality. If the students become more informed about the financial opportunities in family medicine, they could make a more informed decision and the attractiveness of family medicine could increase. [104] Providing accessible, accurate and clear information about the earning opportunities in family medicine is fundamental in medical education. There are many programs supporting specialisation decision-making in the world, which are integrated into the curriculum and go beyond professional training. In the Canadian 'FMEC PG Implementation Project,' career counselling and specialist selection support programs are carried out on the basis of uniform, elaborate protocols throughout the country during the training of medical students. [105] In the USA, it is a requirement during the accreditation of medical schools to provide programs that support career choice. [106] The local adaptation of these examples should be considered in order to help the orientation of medical students. The government, the media and medical organisations are also responsible for communicating authentic information.

- Residency program:

If we would like to have more family physician specialists, we need more family physician residents. The first step should be to fill the existing positions. After that, participation in the family medicine training program should be widened which could be a partial solution to the human resource crisis. [17] The decrease in quality could be a threat parallel with the increase in participant numbers. [107] However, if the enrolled residents participate in the same program and have to follow the same standards, quality could be maintained. [108] In the United States, in order to handle the severe shortage of family physicians, the plan is to increase the proportion of medical students entering to the family medicine training program form the current 12.6% to 25% by 2030. [109] By increasing the attractiveness of family medicine among medical students, we can ensure more inflow to the family resident training program.

- Rural medicine:

There was a strong correlation between rural career plans and willingness to work in family practice. A recent study has similar findings: almost half of the Czech GP residents plan to work in rural areas. They consider not only financial aspects but also lifestyle factors have an important role in their decision. [110] It seems to be worthwhile to handle the challenges of

the rural human resource crisis and human resource recruitment in family medicine together. The solutions proposed for the two areas can also have a positive effect on each other. Training more general practitioners could be an important step in addressing the shortage of rural doctors. A 2022 review highlighted four categories of interventions to increase the popularity of a career in rural and underserved areas: considering rural background and commitment during the selection process, medical school interventions, postgraduate interventions and financial incentives. [111] In our study, rural origin was the only positive, unchangeable predictor of interest towards family medicine. This suggests that it would be beneficial to put more emphasis on background during the selection process and education. The role of this as an influencing factor is questionable in the international literature. [112,113] A meta-analysis from 2020 states that rural exposure during medical education increases the likelihood of future rural practice more than four times on average. [114] In the case of complex educational programs, the background of medical students, their interactions with rural communities and many other factors also play a major role. The rural, community-based medical education program in Thailand and the many Australian rural education programs are successful examples of initiatives to solve the rural human resource crisis. These programs result not only in more physicians who choose a rural career but they are also more likely to stay in their rural practice long-term than their colleagues with less rural exposure during their education. [115-117] In Hungary, we cannot examine the potential effect of a rural medical school for the specialisation because all medical universities are in large cities. It is essential to put more emphasis on rural medicine and rural training programs during the medical education. Postgraduate medical training does not familiarise students with the work of rural family medicine practices, during the 3-year residency training, students only spend 2 months in rural practice. It would be beneficial to increase the length of rural practice, and it would be important to create suitable conditions for this. The Hungarian government supports employment in vacant practices with different bidding opportunities, but this does not seem to be motivating enough; neither for doctors nor for medical students. Improving these tenders and optimizing the conditions could be considered, for example, with extension to the medical students.

- Structural and regulatory solutions:

Due to the central regulation of the available resident training positions, the distribution of newly graduated doctors could also be influenced. The new model of the primary care system with GP clusters can play a role in solving this problem not only through the redistribution

and regulation of the current resources but also by offering a more attractive career opportunity. In a GP cluster, the desired teamwork can be realized with other physicians and with other healthcare professionals in everyday work. Appropriate human resource opportunities and the infrastructure of the GP cluster could contribute to the reduction of administrative burdens. Another important step to improve patient care and to increase the attractiveness of the speciality is to widen the competencies and primary care services of family physicians. [24-26]

7. Changes in the legal framework of the Hungarian healthcare system:

Our study was carried out in a really turbulent period of the Hungarian healthcare system. Partly the COVID-19 pandemic, partly the longstanding lack of renewal of the system forced many structural and regulatory changes. The data collection in our research had been finished before the passing of Act C of 2020 on the Employment Status of Health Workers, which was a milestone in the regulation of the Hungarian healthcare system. Two changes resulting from this regulation should be highlighted in connection with our research: firstly, a significant, age-related salary increase for doctors and secondly, the criminalization of informal payment. In connection with the new employment status, the resident salaries have almost doubled in the last three years while the salary of a doctor at the end of his career has more than quadrupled. The family practices receive a salary compensation that the practice can use only for the healthcare professional's salary. Despite the inflation and taxes, it means a significant growth for family physicians and non-FM specialists as well. Based on the fact that in countries with significantly different financial conditions the role of the salary was similar in career choice, we think that our findings are still current and useable regardless of the positive changes in salaries. The criminalization of informal payment puts our findings in this field into a different light. The medical students who shared their opinions about informal payment are already doctors and now it is not only an ethical but also a legal question to which they have to adapt. [27,118,119] The laws and decrees of the 2022 Health Act will cause fundamental changes in both primary and secondary care. At the moment of the finishing of the thesis, we cannot accurately assess the consequences of the changes, but we must mention that these are surrounded by a significant professional debate. [27,120-122]

8. Strengths and limitations:

As far as we know, this was the first study which examined career choice with a family medicine focus with such comprehensive depth and breadth among medical students at all four Hungarian medical universities. It provides current and relevant data on the topic of career choice and family medicine specialisation, especially regarding medical students' rural career plans and financial expectations. The number of participants and the acceptable response rate allowed us to draw general conclusions.

The limitations of our research could be divided into two groups: some of them originate from the study design itself while others come from factors which are independent of us and we could not influence them. As a limitation, we have to mention that participants involved in our study included medical students from different stages of their medical education with possibly different experiences and perceptions. The reason for this selection criteria was that we involved medical students who were having family medicine lectures and the universities have different curricula. The cross-sectional study design is also a limiting factor. Cross-sectional data cannot be used to infer causality, and we are not able to evaluate whether the perceptions and motivations persist in graduates. Due to the COVID-19 pandemic, we reached a lower response rate than we had planned. Although this was a limiting factor, due to its nature, it did not influence the sample characteristics. It is underlined by the fact we did not find significant differences in the gender ratio between the participants. In the rapidly changing legal and regulatory environment, some of our findings should be interpreted in a different way. Only a few medical students are interested in family medicine as a future speciality, therefore we could not describe the special characteristics of this group. Our study was carried out before the passing of Act C of 2020 on the Employment Status of Health Workers, which limits the use of our findings about salary expectations and informal payment.

CONCLUSION:

The Hungarian primary healthcare system is facing a major human resource crisis.

Rural and remote areas are especially affected by the shortage of physicians.

The current family physician recruitment is not sufficient to stop these negative trends.

Family medicine is not a popular career option among medical students.

Most medical students do not have the intention to work in rural areas.

Among medical students, financial aspects are not the most important barrier to choosing family medicine as a career, but they have to receive appropriate information about it.

Higher prestige of family medicine would increase the attractiveness of the specialty.

It would be important to give more accurate and authentic information about the profession of family medicine to medical students and familiarize them with primary care and rural medical work.

It is essential to increase the role of practice-based family medicine training in medical education.

Medical universities should provide accessible, accurate and clear information about earning opportunities and working conditions in family medicine.

It is essential to strengthen the participation in the family medicine training program.

Training more general practitioners could be an important step in addressing the shortage of rural doctors.

The medical universities should put more emphasis on rural medicine and rural training programs during the medical education.

The extension of the effectively and appropriately financed operation of GP clusters could increase the attractiveness of a family medicine career.

GP clusters could play an important role in solving the human resource challenges of primary care.

ACKNOWLEDGEMENT:

I would like to thank everybody who has helped me during my doctoral study.

I would like to express my deepest gratitude to my supervisor Prof. dr. Péter Torzsa for his time, personal support and guidance.

I am grateful to Prof. dr. Ferenc Hajnal and to Prof. dr. Albert Varga, the former and current heads of the Department of Family Medicine, University of Szeged for the opportunity to participate in this multicentric work.

I would like to extend my thanks to dr. László Kolozsvári, dr. József Rinfel, dr. Mária Markó-Kucsera for their advice, assistance and contribution.

I am particularly grateful to dr. Lajos Mester, my GP Tutor, who encouraged me from the beginning to develop my scientific skills and to dr. Katalin Barabás, the former head of the Department of Behavioral Sciences, University of Szeged for her infinite motivation.

Above all, special thanks to my wife, dr. Andrea Mohosné Bábity. Had it not been for her support, patience, love and efforts to create a happy background, this thesis could not have been possible.

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ANNEX: **Questionnaire**

Kérdőív - Orvostanhallgatók hivatástudattal és pályaválasztással kapcsolatos attitűd és motiváció vizsgálata

Kedves Orvostanhallgató,
Kérjük, a kérdőív kitöltésével segítse vizsgálatunkat, melyben az orvostanhallgatók pályaválasztással és hivatástudattal kapcsolatos attitűdjét és motivációit vizsgáljuk. A kérdőív kitöltése önkéntes és anonim módon történik. Az Ön személyes adatait kizárólag a vizsgálatért felelős személyek, kizárólag a vizsgálat céljából kezelik, egyéb célra nem használják fel, harmadik fél részére nem adják át.
Bármilyen kérdés esetén, az alábbi elérhetőségen állunk rendelkezésre:
Kapcsolattartó: Dr. András Mohos (mohosandris@gmail.com)
Köszönjük az együttműködését!

Személyes adatok:

Életkor: __ __ év Nem: Férfi Nő
Legalább az egyik szülőjének felsőfokú végzettsége van? Igen Nem
Legalább az egyik szülője orvos? Igen Nem
Van háziorvos a szűkebb családi vagy baráti körében? Igen Nem
A jelenleg preferált (Ön által most választandó) szakterületen dolgozó orvos található-e a szűkebb családi vagy baráti körében? Igen Nem
Még nincs választott/elképzelt szakterület
Hol nőtt fel? Főváros Nagyváros Kisváros Falu
Van már végzettsége egészségügyi területen? Igen, mégpedig:_____
Nem
Dolgozott már egészségügyi/szociális területen? Igen, mégpedig:_____
Nem
Elképzelése szerint a jövőben hosszútávon hol fog élni? Magyarországon Külföldön
Elképzelése szerint a jövőben hosszútávon milyen településen fog élni? (Több válasz is lehetséges) Főváros Nagyváros Kisváros Falu
Elképzelése szerint a jövőben hosszútávon milyen településen fog dolgozni? (Több válasz is lehetséges) Főváros Nagyváros Kisváros Falu

Szakirány választása:

Mikor döntötte el, hogy az orvosi pályát választja? Gyermekkori álmom volt
Általános iskolában Középiskolában Középiskolát követően
Jelenleg ilyen szakorvos szeretnék lenni: Háziorvos
Más szakorvos:_____
Még nem tudom
Hosszú távon itt dolgoznék: Háziorvosi praxis Kórház/klinika
Nem gyógyító területen Még nem tudom
Mennyire tartja elképzelhetőnek, hogy tartósan vidéki (kisváros, falu) munkahelyen dolgozzon? (1: egyáltalán nem valószínű, 5: biztos) 1 2 3 4 5
Sok orvostanhallgató még nem hozott végleges döntést, hogy milyen szakorvos szeretne lenni, még több választási lehetőséget mérlegel.
Kérem, rangsorolja valószínűség szerint csökkenő sorrendben az Ön által választandó, lehetséges szakirányokat (max. 4 szakirány)!

Első választás:_____ szakorvos szeretnék lenni
Második választás:_____ szakorvos szeretnék lenni
Harmadik választás:_____ szakorvos szeretnék lenni
Negyedik választás:_____ szakorvos szeretnék lenni

A várható jövedelem hatása a szakirány választására:

Elgondolkodott-e már azon, hogy a jövőben mennyi lesz a keresete? Igen Nem
Tájékozódott-e már arról, hogy a jövőben pontosan mennyi lesz majd az Ön keresete? Igen Nem
Ha igen: Honnan szerezte az információit? *(pl.: internetes oldalak, ismerős orvostól, évfolyamtársak, egyetemi előadás, újságok stb.)*

_____
_____

Az Ön számára mekkora a hatása a várható jövedelemnek a szakirány kiválasztására?(1: nincs hatás, 10: nagy hatás) 1 2 3 4 5 6 7 8 9 10

Döntene-e egy bizonyos szakirány választása ellen, ha az várhatóan alacsonyabb jövedelemmel járna? Biztosan nem Talán nem Talán igen Biztosan igen
Ön szerint mennyi lenne az ideális (nettó* HUF/ hónap) jövedelme egy…
rezidens orvosnak?_____
háziorvosnak?_____
az Ön által elsőként választott szakirány orvosának?_____
*Nettó jövedelem: minden adó és járulék levonása után „kézhez kapott” összeg.

Jövedelem becslése:

Kérem, becsülje meg az alábbi teljes munkaidős orvosok havi jövedelmét (nettó HUF / hónap) és jelölje meg, hogy mennyire biztos a becslésében! (1: Nagyon bizonytalan, 4: Nagyon biztos)

Háziorvos rezidens fizetése:				
Nagyváros:_____	1	2	3	4
Kisváros/ vidék:_____	1	2	3	4
Háziorvos szakorvos fizetése:				
Nagyváros:_____	1	2	3	4
Kisváros/ vidék:_____	1	2	3	4
Az Ön által elsőként választandó szakterületen, azaz_____ dolgozó rezidens fizetése: (*Ha a háziorvostan a választandó szakirány, akkor ezt nem kell kitölteni)*				
Nagyváros:_____	1	2	3	4
Kisváros/ vidék:_____	1	2	3	4
Az Ön által elsőként választandó szakterületen dolgozó szakorvos fizetése: (*Ha a háziorvostan a választandó szakirány, akkor ezt nem kell kitölteni)*				
Nagyváros:_____	1	2	3	4
Kisváros/ vidék:_____	1	2	3	4
Szakorvosjelöltek ösztöndíjai:				
Markusovszky Lajos ösztöndíj:_____	1	2	3	4
Méhes Károly ösztöndíj:_____	1	2	3	4
Gábor Aurél ösztöndíj:_____	1	2	3	4
Hiányszakmás ösztöndíj:_____	1	2	3	4

Ha nem szeretne családorvos lenni, akkor mi ennek az oka? (Több válasz is lehetséges)

1. Nincs sok ismeretem erről a szakmáról

2. Alacsony a háziorvosok fizetése
3. Alacsony a szakma presztízse
4. Nem tudom alkalmazni egyéb szakképesítésemet, licensz vizsgámat
5. Túl sok adminisztráció
6. Önállóan kell
7. Egyéb ok:_____

Minek kellene megváltozni, hogy a családorvosi szakma is vonzó legyen Önnek? (Több válasz is lehetséges)

1. Jobb legyen a szakma presztízse
2. Magasabb legyen a családorvosok fizetése
3. Lehessen részmunkaidőben dolgozni
4. Lehessen részmunkaidőben más szakterületen is dolgozni
5. Végezhessek kutatómunkát
6. Egyéb:_____

Miért tartja jobbnak az Ön által preferált szakterületet a családorvosi szakmánál?

1. _____
2. _____
3. _____

Ön szerint napjainkban milyen a családorvosok általános erkölcsi elismerése?

1 (Rossz) 2 3 4 5 (Kiváló)

Ön szerint napjainkban milyen a családorvosok általános erkölcsi elismerése más szakorvosok által? 1 (Rossz) 2 3 4 5 (Kiváló)

Ön szerint a családorvosi hivatásra melyik a legjellemzőbb?

Bérmunka Művészet Szolgálat Szolgáltatás

Kérjük, osztályozza 1-5-ig (1: nagyon rossz, 5: nagyon jó), hogy milyennek ítéli a magyar egészségügy jelenlegi helyzetét: _____

Kérjük, osztályozza 1-5-ig (1: sokkal rosszabb lesz, 5: sokkal jobb lesz), véleménye szerint hogyan fog változni az elkövetkezendő öt évben a magyar egészségügy helyzete: _____

Tervez-e külföldi munkavállalást az elkövetkezendő 3-5 évben? Igen Nem

Ha igen, akkor mi(k) ennek az oka(i)?

_____

_____

Összességében Önnek mi a véleménye a hálapénz rendszerről?

1. Teljes mértékben elutasítom
2. A jelenlegi egészségügyi helyzet miatt kénytelen leszek elfogadni, de elviekben nem értek egyet ezzel a finanszírozási móddal
3. Elfogadhatónak tartom
4. Természetesnek tartom
5. Jövedelemtől függetlenül bármikor elfogadnám

Kérjük, jelölje meg, mennyire ért egyet azzal, hogy az alábbi állítások befolyásolják a karrierválasztást! (1. teljesen egyetértek 2. egyetértek 3. semleges 4. nem értek egyet 5. egyáltalán nem értek egyet 0. nem tudom)	
Magánélettel összeegyeztethető karrier	_____
Elfogadható munkakörülmények/munkaidő	_____
Hosszú távú pénzügyi kilátások	_____
Karrier/Előrelépési lehetőségek	_____
Saját készségeink/viszonyulásaink értékelése önmagunk által	_____
Másoktól kapott tanácsok	_____
Diákként szerzett tapasztalat a választott területen	_____
Orvosi egyetem előtti elképzelések	_____
Elkötelezettség, lelkesedés: amit igazán szeretnék csinálni	_____
Korábbi munkatapasztalat	_____
Elérhető gyakorlati helyek	_____
Elérhető álláshelyek	_____

Köszönjük a válaszadást!