

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

Summary of Ph.D. Thesis

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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 – United 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) χ^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. The International Conference on Primary Health Care in the Alma-Ata Declaration established that primary care has a key role in protecting and promoting of the health of all people around the world. 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.

2. Rural family medicine:

In 2022, about 3.4 billion people lived in rural areas. Special attention needs to be paid to this population because the rural population is at a higher risk of deprivation, poor living conditions and worse health outcomes. 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 accurately. There are 2.9-11.4 times more healthcare professionals for the same number of inhabitants in urban areas as in rural ones. The World Health Organization (WHO) has a strong recommendation to put more emphasis on rural topics and programs during the education of healthcare professionals. Strong primary care has a key role in providing universal health coverage and contribute to an equitable health care system. Health services in close proximity to the community are essential to reach better health outcomes.

3. Human resource challenges in family medicine:

The primary healthcare system requires sufficient and well-qualified human resources but ensuring this is a significant 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. 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.

4. The Hungarian family practice system:

The family practice system in Hungary is organized at a national level and local governments are responsible for ensuring family medicine services are provided to the general population. Most of the Hungarian family doctors 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: pediatric 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 practices in Hungary. 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. 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. The long-term plan can be the introduction of a state-funded GP-cluster structure in Hungarian primary health care. 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 cluster, 2876 were in collegial GP cluster and 403 family practice were not cluster members.

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

The Hungarian primary care system faces a severe shortage of family physicians. The number of vacant practices increases every year. In February 2023, there were 691. If we take a look at the age distribution of the active family physicians and consider that their average age was 59 in December 2021, it is absolutely clear that without radical intervention, the negative trend is unstoppable. The number of new entrants into the GP resident training programme isn't sufficient to stop this trend.

6. Rural family medicine in Hungary:

In Hungary, about 30% of the population lives in rural settings. 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. The number of vacant practices has been growing steadily in recent years. Since 2004, when Hungary joined the European Union, the migration of healthcare professionals has become a problem.

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. The salaries of residents has almost doubled in the last three years while the salary of a doctor at the end of their career has more than quadrupled. The family physicians' situation is different. 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 determine a unified salary for family physicians. Based on national financial data, we determined €1000 as the average monthly salary for a family physician in our study. Most family physicians do not fall under the purview of the new health care service contracts. Family practices get 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 it is differentiated in terms of GP-cluster membership. The Government supports young physicians during their specialisation period with different scholarship opportunities. The different scholarships have some special conditions and mean 100,000-200,000 HUF extra monthly income. Informal payment or "gratitude payment" refers to the practice when the patient gives an extra, unofficial sum of money to the caregivers. The different specialities and the professionals on different levels in the hierarchy are affected to different degrees. At the time of our research this practice was only an ethical issue but not illegal.

8. Family medicine specialisation training system in Hungary:

In Hungary, there are four universities with a medical faculty: in Budapest, in Debrecen, in Pécs and 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 of continuous professional development opportunities for family doctors. The specialization training is centrally regulated at the legislative level, and apart from minor local differences, it is essentially the

same at the four medical universities. The vocational training period of the family medicine specialization is 36 months. It is based on the relationship of one resident with one tutor. Since 2001, the annual number of newly qualified family medicine specialists has never reached 200, and each year more than half of the newly qualified family medicine specialists were already older than 35. The number of available family medicine residency positions was 137 in the last years. In last two decades the number of filled positions varied from 72 to 103.

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. Some of them are unchangeable, for example personality, gender, origin, family role model, age, marital status, while other factors can be modified. Very important influencing factors are students' motivations, available information and attitudes towards the different specialities. Not only the professional characteristics of the specialities but also the 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. In 2019, a meta-analysis of 75 studies (with 882,209 participants) found twelve 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 a speciality. Medical education plays a significant role in medical students' lives not just through knowledge transfer but also through shaping their attitudes.

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 the medical education. At the time of our study, family medicine was a compulsory subject in Budapest, in Debrecen and in Pécs. In Szeged, it was an elective lecture in 2020. Every university had a compulsory one- or two-week long practice in a family practice in the 6th year. Compulsory family medicine lecture was introduced in 2022 in Szeged.

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. The data collection was carried out with a self-administered paper-based questionnaire. Each of the four Hungarian medical universities were represented by their fourth- and fifth-year medical students who attended face-to-face family medicine lectures at the time. Data collection was carried out from December 2019 to April 2020. After this time, it had to be cancelled due to the COVID-19 pandemic. After receiving appropriate information about the study, 465 students decided to participate.

2. Questionnaire:

Data were collected with a self-developed questionnaire. There were nine questions about sociodemographic data, such as gender, age, place of origin, family role model (higher education, medical degree or presence of a family physician in the family), previous studies and work experience. Seven questions concerned future living and career plans and preferred specialities. The likelihood of rural work among participants was assessed. "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. 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. We also asked

students about their attitude towards informal payment. We examined the impact of twelve factors on career choice based on the findings of previous studies.

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 (χ^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 family medicine courses in the given period. 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. 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, pediatrics was the most popular among the students (10.2%) and family medicine was in eighth place (5.9%). As the second chosen speciality 4.7% of the respondents and as the third chosen speciality 8% of the respondents selected family medicine. Most of the respondents (55.9%) committed themselves to the medical profession during their high school years. There was a significant positive association between early commitment (before high school: 38%) to

medical faculty and family medicine preferences ($p=0.004$). 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 expected situation in five years, 46.8% of them thought the same. Those who are interested in family medicine as a career option consider the current situation significantly better ($p<0.01$). The three strongest out of the twelve examined influencing factors were the inclinations before medical school (3.1 ± 1.4), advice from others (2.6 ± 1.1) and previous job experience (2.4 ± 1.4). According to the respondents working conditions (1.7 ± 0.9), self-appraisal of own skills (1.6 ± 0.8) and enthusiasm (1.5 ± 0.8) play a less important role in speciality choice.

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%. 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. 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”). 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 most important information sources of the medical students are doctors they know (69%) and internet and media (52.8%). 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. The mean of the ideal resident, family physician and other specialist monthly income was reported to be 415,598 \pm 233,302 HUF, 610,434 \pm 325,554 HUF and 782,847 \pm 573,907 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. 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. Only the minority of participants were “very certain” (1.1-8.1%) or at least “rather certain” (18-34.8%) in their estimations. 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 (782,847 vs. 610,434 HUF). 33.8% of the respondents absolutely reject informal payment, 49% theoretically reject informal payment and 2.6% of the students would accept it regardless of income at any time. 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 ($p < 0.01$).

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

According to the respondents the prestige of family medicine profession in general was average (mean: 3.13; median: 3; mode: 3), but among other specialists, it was rather low (mean: 2.39; median: 2; mode: 2). We did not find a significant correlation between the level of prestige and speciality choice preferences ($p = 0.102$; $p = 0.61$). The most common negative opinions about the family medicine profession were low prestige (44.3%), too much administration (41.9%) and low salary (21%). Among the respondents who are interested in other specialities, 35% think that their preferred speciality is more exciting and interesting, 32.9% think that their particular speciality is more complex and needs more knowledge than family medicine. The most common suggestions to increase the attractiveness of family medicine speciality were the opportunity to work in other fields in part-time (56.7%), “higher prestige” (48.1%) and “higher salary” (47.4%).

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. 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. Compared to our previous study, it was a novel finding that the students who are interested in family medicine evaluate the current situation of the health care system more favourably. 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. According to the data of the Central Statistical Office in 2023, there were 4,859 family physicians in Hungary (without general practitioner pediatricians). If we define the retirement age at 65, in case of consistent age distribution, 131 newly qualified family physicians would be needed annually for replacement. In 2021, 14.75% (4,473/30,318) of the doctors with a valid license worked as family doctors. 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 years and 19% are older than 70 years. 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. In view of this, our finding as only 5% of the students plan to be a family physician is rather worrying. If we count all of the students who are interested in family medicine, but not only 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 these, our first hypothesis was confirmed: only few of the medical students think about family medicine as a career option. 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. As far as the international research is concerned, the proportion of medical students who are interested in a career in family medicine is between less than 1% and 36%. 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 specialising 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. 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. 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 procedure-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 competencies of family physicians.

2. Prestige of FM:

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”. 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. These results confirm our fourth hypothesis, according to which the prestige of family medicine is low according to medical students.

3. Rural medical work:

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. 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. 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 exist in the international literature: rural background is a strong predictor of a career in rural medicine after graduation. Based on this fact, there are many universities where different selection and application processes are used for students with rural or remote backgrounds. Based on this logic, it is worth looking into the origins of medical students. 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:

Developed countries interpret the migration of family physicians mostly as an opportunity while in the case of less developed and developing countries it aggravates the human resource 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. In our study, half of the students planned to work abroad; this tendency did not change significantly in recent years. 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.

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. 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 the 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. Most students were uncertain in their estimates, especially about specialists' incomes 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 higher for non-FM specialists than for family physicians. This difference may be in line with the lower prestige of family medicine among

medical students. In case of the estimates of real incomes, the difference between family physicians and non-FM specialists disappeared and we didn't 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. 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 the higher salary as a positive factor of the other chosen speciality. 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 in their daily routine. Only the minority of respondents consider 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. 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 for the solution. In this chapter I will summarize these solution proposals.

- 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. We should focus primarily on those factors which we can actually influence. 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 (25-40 hours) ones. Medical schools have a key role in providing accurate, authentic information about family medicine and create the opportunity for the 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), the family practice training should ideally last 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. 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.

- Residency program:

If we would like 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 for the human resource crisis. By increasing of the attractiveness of family medicine among medical students, we can ensure more inflow to the family resident training program.

- Rural medicine:

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 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. 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. 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. 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 the suitable conditions for this.

- 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. Another important step would be the widening of the family physicians' competencies and primary care services.

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. 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 is more than quadrupled. The family practices receive a salary compensation that the practice can now use only for the healthcare professionals' salary. The criminalization of informal payment puts our findings in this field into a different light. The laws and decrees of the 2022 Health Act will cause fundamental changes in both primary and secondary care.

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 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 couldn't 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, maybe with 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. 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 of the 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 participation in the family medicine training program. Training more general practitioners could be an important step in addressing the shortage of rural doctors. Medical universities should put more emphasis on rural medicine and rural training programs during 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.

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