



Determining Factors Influencing Specialty Preferences of Iranian Medical Doctors: A Qualitative Study

Yaser Sarikhani¹, PhD;  Sulmaz Ghahramani², MD; Mohsen Bayati³, PhD, Farhad Lotfi³, PhD; Peivand Bastani³, PhD 

¹Department of Health Care Management and Health Economics, School of Health Management and Medical Informatics, Shiraz University of Medical Sciences, Shiraz, Iran;

²Health Policy Research Center, Institute of Health, Shiraz University of Medical Sciences, Shiraz, Iran;

³Health Human Resources Research Center, School of Health Management and Medical Informatics, Shiraz University of Medical Sciences, Shiraz, Iran

Correspondence:

Peivand Bastani, PhD;
School of Health Management and Medical Informatics, Diamond Building, 29th Alley, Ghasrodassht st., Postal code: 71336-54361, Shiraz, Iran

Tel: +98 71 32340774-8

Fax: +98 71 32340039

Email: bastanip@sums.ac.ir

Received: 31 January 2021

Revised: 21 April 2021

Accepted: 08 July 2021

What's Known

- Medical specialty choices directly affect the healthcare system, community wellbeing, and the professional life of physicians.
- Country-specific social and cultural characteristics influence medical specialty preferences.

What's New

- Factors influencing the specialty preferences of Iranian medical doctors are personal determinants, career-related factors, and interpersonal influences.
- Personal interests, income, and prestige are the key factors in choosing a particular field of specialty.

Introduction

In recent years, there has been an increasing interest among medical graduates to choose the most appropriate field of specialty as a

Abstract

Background: The medical specialty choice of physicians directly affects the healthcare system, community wellbeing, and their own professional life. It is therefore important to identify its underlying factors to predict such medical career choices and to draw up a comprehensive evidence-based public health policy and health human resources planning. The present qualitative study aimed to identify these determinants of career choices through semi-structured interviews with medical doctors in the context of country-specific social and cultural characteristics.

Methods: The present qualitative study was carried out in 2019-2020 at Shiraz University of Medical Sciences (Shiraz, Iran). The target population was medical students, junior doctors, and medical residents. The purposive sampling method was used to recruit the participants and sampling continued until data saturation, i.e., no new information could be extracted. Data were collected through individual, face-to-face, semi-structured interviews and analyzed using the conventional content analysis method. Inductive thematic analysis was used to interpret the data based on which a thematic map was developed illustrating the factors influencing medical specialty preferences in Iran. Data trustworthiness was assessed according to the criteria proposed by Guba and Lincoln.

Results: Analysis of the interview data resulted in three main themes and fourteen sub-themes. The main themes were “Personal determinants”, “Career-related factors”, and “Interpersonal influences”. The most important sub-themes were personal interests, income, and prestige.

Conclusion: The determinants influencing the specialty preferences of Iranian medical doctors are identified. Our findings will facilitate the development of a comprehensive evidence-based public health policy, health human resources planning, and appropriate medical education policy.

Please cite this article as: Sarikhani Y, Ghahramani S, Bayati M, Lotfi F, Bastani P. Determining Factors Influencing Specialty Preferences of Iranian Medical Doctors: A Qualitative Study. Iran J Med Sci. doi: 10.30476/ijms.2021.89938.2071.

Keywords • Physicians • Career choice • Education • Medical Graduate • Iran

career.¹ Detailed understanding of their specialty preferences is essential, as it shapes potential challenges faced by the healthcare system in the future.² For example, career preferences in favor of a specific medical specialty may result in

the shortage of medical expertise in other fields, health care disparities between different regions of a country, and widening the gap between services provided by the public and private sectors.³ In addition, the tendency to opt for a specialty in non-primary care leads to a shortage of primary care physicians, particularly in rural and remote areas.⁴ It also results in a mismatch between community health needs and the composition of the physician workforce. Above all, it increases health care costs and negatively affects equitable access to health services.^{5, 6} Resolving these challenges is of particular importance in the low- and middle-income countries.⁷

The process of choosing a medical specialty should not be taken lightly, as it is a complex and dynamic process.⁸ Previous studies have highlighted various contributing factors influencing the choices made by medical graduates. Among these are financial interests,⁵ personality characteristics,⁹ educational and academic factors,¹⁰ sociocultural attitudes and values,¹¹ personal and lifestyle preferences, and demographic variables.¹² Their choices not only affect their professional life, but also the healthcare system and community wellbeing.¹³ It is therefore important to identify the underlying factors to predict such medical career choices and to draw up a comprehensive evidence-based public health policy, health human resources planning, and appropriate medical education policy,^{5, 6} particularly in countries facing an imbalance in the health workforce. Addressing these factors will improve career planning and create harmony between different fields of specialty and the preferences of medical graduates, which in turn avoids wasting time and financial resources, declining performance, and even termination of health careers.¹⁴

Factors influencing medical specialty preferences should be considered in the context of country-specific social and cultural characteristics.¹⁵ It has been reported that Iran, as a low-income developing country, is faced with challenges associated with the quantity and distribution of medical specialists. A report by Iranian officials in 2019 stated that the number of general practitioners and specialists in the country was 85,853 and 41,301, respectively.¹⁶ Furthermore, in 2020, the World Bank Group reported the physician-to-population ratio in Iran was at 1.6 per 1000; well below the minimum standard of 2.5 proposed by the World Health Organization.¹⁷ These official statistics were supported by a national study indicating the shortage of physicians in various fields of specialty and an imbalance in the geographical distribution of physicians across the country.¹⁸

To the best of our knowledge, only a few studies in Iran have investigated factors influencing medical specialty preferences. However, these studies used a questionnaire-based quantitative approach or focused on a specific group of medical doctors and specialties. Such an approach limits an in-depth understanding of the problem,¹⁹ and undermines an overall perspective of the factors influencing specialty preferences. Hence, the present qualitative study aimed to comprehensively identify these factors through semi-structured interviews with medical students, junior doctors, and medical residents.

Participants and Methods

The present qualitative study was carried out from November 2019 to January 2020 at Shiraz University of Medical Sciences (Shiraz, Iran). The target population was three groups of individuals in the medical profession, namely medical students, junior doctors, and medical residents. Medical students in the 6th or 7th year of medical school were targeted because of their experience with clinical rotations as a contributing factor in shaping their medical specialty preferences. Junior doctors preparing to take medical residency examinations were selected among those, who recently graduated from medical school. The first-year medical residents were targeted because of their recent experience in the selection and admission process associated with a particular specialty field. The purposive sampling method was used to recruit the participants and sampling continued until data saturation, i.e., no new information could be extracted. The participants were selected using maximum variation sampling to ensure the highest variability in the primary data and to obtain a comprehensive perspective of the participants on their specialty preferences.

A complete list of individuals of each group, categorized according to sex, was obtained from the Department of Educational Affairs of the University. The inclusion criteria were being a 6th or 7th year medical student, junior doctor, or first-year medical resident and willingness to take part in the study. Accordingly, a total of 41 individuals were recruited, including medical students (n=12), junior doctors (n=11), and medical residents (n=18). To ensure anonymity, each participant was assigned a unique code. The characteristics of the participants are presented in table 1.

Data Collection

A total of 41 individual, face-to-face,

Table 1: Characteristics of the participants

Participants	Sex (n, %)		Age	Living Location N (%)	
	Male	Female	Mean (range)	Major cities	Minor cities/villages
Medical student	7 (58)	5 (42)	24.0 (23-27)	8 (66.7)	4 (33.3)
Junior doctor	5 (45)	6 (55)	27.8 (27-30)	9 (81)	2 (19)
Medical resident	10 (56)	8 (44)	28.5 (28-33)	11 (61)	7 (39)

Table 2: The interview guide

1. Have you ever thought about the type of specialty you want to choose? (Medical students and junior doctors)
2. Were there any specific reasons for you to choose this field of specialty? Please expand. (Medical residents)
3. What were the most important factors affecting your decision? (All participants)
4. How has the advice and encouragement from other people influenced your opinion? (All participants)
5. What was the effect of educational opportunities on your choice? (All participants)
6. How did job characteristics influence your choice of medical specialty? (All participants)
7. Which personal determinants influenced your choice the most? (All participants)
8. To what extent have lifestyle preferences influenced your choice? Please expand. (All participants)

semi-structured interviews were conducted using an interview guide (table 2). Two pilot interviews, also included in the analysis, were performed to fine-tune and align the questions in the interview guide. Two of the authors (YS and MB), trained in qualitative data collection methods, conducted the Interviews. The interviews were held at the participants' most convenient time and place. Each interview lasted for approximately 40 minutes. With prior permission of the participants, audio recordings of the interviews were made and transcribed verbatim. All transcripts were verified by one of the authors (FL) to minimize bias. Data saturation was achieved at the 12th, 9th, and 11th interviews with the medical students, junior doctors, and medical residents, respectively. However, as we aimed to approach all enrolled specialties from the university, 18 medical residents were interviewed.

Data Analysis

Inductive thematic analysis (conventional content analysis) was used to summarize and interpret the data using the six steps proposed by Graneheim and Lundman.²⁰ The steps include data familiarization, initial coding, searching for themes, reviewing themes, defining themes, and producing reports. After completing the thematic analysis, a conceptual map was developed for a better understanding of the factors influencing the specialty preferences of the participants. Finally, selective quotations were used to identify sub-themes and the main themes. In this approach, we identified the themes from the data rather than from a preconceived coding scheme.^{21, 22} This approach is used when there are limited existing theories or research literature on a phenomenon. After each interview, the audio recording was transcribed verbatim and read thoroughly by the

research team to achieve data immersion. The data were analyzed concurrently with the data collection to use primary findings in the next interview. Because of the low number of initial codes, no specific qualitative data management analysis software was used. Microsoft Visio 2003 (Microsoft Corporation, WA, USA) was used to design the model.

Trustworthiness and Rigor

Data trustworthiness was assessed according to the criteria proposed by Guba and Lincoln, namely credibility, dependability, transferability, and confirmability.²³ The credibility criterion was achieved through prolonged engagement with the data, member checking during the data analysis process, and peer debriefing as an external check of the information. The dependability criterion was fulfilled by four colleagues documenting the research process in detail and creating an audit trail of the entire process of the study. A detailed description of the study process was provided to confirm transferability. To enhance confirmability, we requested two external experts familiar with the methodology of qualitative research to verify the accuracy of the study process and data encoding. In addition, the research team wrote a reflexive study journal, including daily memos about methodological decisions, and their preconceptions, values, and concerns.

As data triangulation, the peer-check technique was used. All transcripts were independently analyzed by two researchers (PB and SG) and then were compared to approve common findings and to resolve discrepancies. All members of the research team held a joint discussion meeting to review and refine themes and associated sub-themes. Furthermore, two external colleagues with expertise in qualitative

research methodology were requested to audit the process and the results of data analysis. Finally, our findings were iteratively reviewed with some participants to validate themes, obtain additional details, and explore contradicting information. At each stage of the study, using the bracketing method, the researchers wrote memos to minimize the effect of preconception bias that could undermine the research process.

Ethical Considerations

The study was approved by the Ethics Committee of Shiraz University of Medical Sciences, Shiraz, Iran (IR.SUMS.REC.1398.940). The participants were informed about the research goals and procedures, voluntary participation, and the right to withdraw from the study was emphasized. Written informed consent was obtained from the participants.

Results

Analysis of the interview data resulted in three main themes and fourteen sub-themes. The main themes were “Personal determinants”, “Career-related factors”, and “Interpersonal influences” (table 3).

A thematic map that emerged from the interview data is portrayed in figure 1. It includes the themes and sub-themes as well as interrelationships between various factors. Overall, it shows that job requirements (career-related factors), internal factors (personal determinants), and extrinsic motivations (interpersonal influences) significantly affected the specialty preferences of the Iranian medical doctors.

Personal Determinants

The sub-themes associated with personal determinants were personal interest, personal

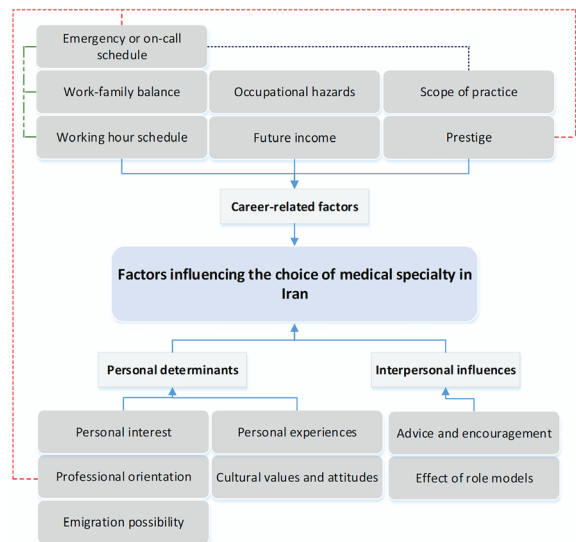


Figure 1: The thematic map portraying factors influencing medical specialty preferences in Iran.

experiences, professional orientation, cultural values and attitudes, and emigration possibility.

Personal Interest: From the perspective of the participants, personal interest encompassed parameters perceived to bring benefits and fulfill their desires as an intrinsic driving force. Most of the participants indicated personal interest as a determining factor in choosing a medical specialty. Some participants showed an interest in the content, while others were more interested in the academic research potential of a specific medical specialty. Two participants stated:

“Besides all other factors that influenced my decision, the subject of specialty and its content motivated me the most. I believe my field of specialty is the most fascinating subject in medical science.” [Medical resident #7]

“I am basically interested in medical research. I made some inquiries and concluded that this specific specialty has a lot of research potential

Table 3: Extracted themes, sub-themes, and categories from the interview data		
Themes and sub-themes		Categories
Personal determinants	Personal interest	Interest in the field; Interest in research; Interest in academic teaching
	Personal experiences	Clinical rotation experiences; Educational and research experiences
	Professional orientation	Treatment/patient orientation; Interest in procedural practices; Prevention/ community health orientation
	Cultural values and attitudes	Altruism; Social accountability
	Emigration possibility	International job/education prospects
Career-related factors	Future income	Expected income; Financial remuneration
	Prestige	Career prestige; Social status; Fame
	Work schedules	Workload; Predictable/controllable working hours
	Occupational hazards	Burnout; Stress
	Work-family balance	Compatibility with family life; Feasibility of starting a family
	Scope of practice	Diversity of patients; Variety in skill and task
	Emergency or on-call schedules	Absence of on-call schedules; Reasonable on-call duties/high-acuity patients
Interpersonal influences	Advice and encouragement	Advice from family members; Advice from lecturers
	Effect of role models	Family members as role models; Lecturers as role models

and is what I have always been looking for." [Medical student #3]

Personal Experiences: Some participants expressed the positive effect of educational courses, clinical rotations, and involvement in research projects in making the right decision. A participant stated:

"At first, I was not particularly interested in internal medicine as a field of specialty. However, as time went on, I became more and more convinced that I should consider this field as a viable option." [Junior doctor #2]

Professional Orientation: This sub-theme was mentioned by the participants as one of the main determining factors. Some participants preferred to be in direct contact with patients and their treatments, while some others were more interested in health promotion and disease prevention. Two participants stated:

"I am a result-oriented person. Treating patients interests me the most, as I see the outcome of my decisions in a short time." [Junior doctor #11]

"I prefer the field of surgery, as it allows me to follow various surgical procedures. It also allows me to improve my skill set." [Medical resident #3]

Cultural Values and Attitudes: Cultural values are a set of beliefs and attitudes that shape our response to events and phenomena. Some participants extended the concept of cultural values to include social accountability. It seemed that for some of our participants, cultural values overrode their personal interests in opting for a specific field of specialty. Two participants stated:

"I have no hesitation in opting for a specific field of specialty, if it is apparent that there is an immediate need for it in the community." [Medical student #2]

"Concepts such as helping others, solving community issues, and generosity are rooted in our culture. I will certainly opt for a field of specialty required in the region I come from. I see this as my moral duty." [Medical student #6]

Emigration Possibility: A limited number of participants expressed an interest in immigration to developed countries. A participant stated:

"For a better professional and personal life, I am seriously considering immigration to a developed country. I specifically opted for this field of specialty to increase my chances of getting a job abroad." [Medical resident #8]

Career-related Factors

Future Income: The majority of the participants were of the opinion that a higher income was one of the main contributing factors in choosing a field of specialty. A participant stated:

"Obviously, a better quality of life is directly related to high income. If you are a general practitioner, you should not expect to earn good money. One needs to become a specialist these days to ensure having a high income." [Junior doctor #1]

Prestige: Prestige is respect and admiration felt for someone, usually because of a reputation for high quality, success, or social influence. The majority of the participants indicated that prestige is the key factor that motivates them to opt for a particular field of specialty. A participant stated:

"One simply needs to look at all professions in our community. Surgeons clearly stand out by having the highest prestige and fame. It is too simplistic to ignore such a social attitude." [Junior doctor #1]

Work Schedules: Flexible time schedules and manageable hours were critical factors for most of the participants. The participants emphasized that their specialty preferences should be in line with their lifestyle preferences. A participant stated:

"Irregular hours negatively impact one's lifestyle and quality of life. I learned the importance of work schedules during clinical rotations as a medical student. That experience shaped my choice for a field of medical specialty." [Medical resident #18]

Occupational Hazards: Some participants indicated that occupational hazard was a parameter that influenced their specialty preferences. They viewed occupational hazards in terms of long- and short-term risks associated with work conditions and the workplace. A participant stated:

"I had good contact with my lecturer at the university, and we discussed various topics. I recall her complaining about work-related stress leading to burnout, and how it negatively affected her life." [Junior doctor #7]

Work-family Balance: This category is related to a balance between work and personal life. Some participants, particularly women, were concerned about the impact their choice of specialty would have on their personal life. This made them think carefully before choosing a field of specialty. A female participant stated:

"I deeply believe that family life is more important than career development. I am aware that specialty training is an important step for any junior doctor, but I consciously chose a path that is more aligned with my family life." [Junior doctor #9]

Scope of Practice: Most health care professionals aim to broaden their scope of practice by treating different types of patients and

accepting a variety of duties, thereby enhancing their knowledge, skills, and experience. Our participants also expressed their interest in choosing a specialty that allows them to broaden their scope of practice. A participant stated:

“Upon graduation, I intend to study internal medicine. This field of specialty deals with a variety of patients and various diseases. This job never becomes boring.” [Medical student #12]

Emergency or On-call Schedules: This category is associated with the drawbacks of emergency or on-call duty, namely unstable and unpredictable schedules that may generate a sense of social isolation leading to burnout and depression. Some participants stated that these drawbacks negatively affected their choice of specialty training. A participant stated:

“I cannot cope with on-call schedules. I do not feel comfortable with such emergencies, as they are often high-risk cases. It makes me lose control over my life.” [Medical student #7]

Interpersonal Influences

This theme is related to the effect of interpersonal relationships on decisions made by individuals. It could be in the form of providing advice and encouragement or the creation of role models that influenced the aspirations of an individual.

Advice and Encouragement: Some participants stated that advice and encouragement from others (family, lecturers) influenced their decision in opting for a particular field of specialty. A participant stated:

“I primarily choose radiology as a field of specialty because of recommendations from a relative, who was a radiologist himself.” [Junior doctor #10]

Effect of Role Models: The participants stated that their role models were mainly family members or university lecturers, who indirectly affected their self-perceptions. A participant stated:

“My supervising doctor was my role model. He was always kind, thoughtful, and polite to patients and trainees. Everybody respected him. I used to put myself in his place and imagine myself being him.” [Medical resident #6]

Discussion

Analysis of interviews with senior medical students, junior doctors, and medical residents resulted in the development of three main themes affecting the specialty preferences of our participants. The main themes were personal determinants, career-related factors, and interpersonal influences. Overall, with

minor differences, were our findings in line with previous studies.

We identified six sub-themes associated with personal determinants. Other studies also reported similar factors affecting specialty preferences, namely personal interest,²⁴ educational experiences,²⁵ cultural values,¹² and emigration possibility.²⁶ However, some other factors were not identified through our interviews. For example, factors such as the role of academic institutions,⁶ heavy workloads, and mentally demanding specialty courses,^{1, 24} and difficulties associated with lifestyle during residency.²⁷ In comparison with our study, these quantitative studies were designed based on predetermined criteria and focused on educational aspects, whereas we purely relied on the interview data without any preconceptions.

Altruistic behavior and social accountability were the two cultural values stated by the participants. Other studies have reported additional cultural values, such as empathy, care,²⁸ and gender-related preferences.²⁹ Cultural values shape our response to various phenomena and behavior to different events. However, these values should be considered in a broader context by including medical ethics and philosophy. Considering limited studies on these concepts, further investigations are recommended. In addition, specialty preference may vary in different settings and thus should be considered in a country-specific socio-cultural context.

Some participants stated that the possibility of immigration to developed countries was a contributing factor in choosing a specific field of medical specialty. This topic is not comprehensively studied and further research is recommended.²⁶ Physician migration from underdeveloped countries is a common phenomenon and a challenge to human resources and healthcare policy and planning.³⁰ Moreover, it has a negative impact on economic prosperity, gross domestic product per capita, and human resource development of a country.³¹ Physician migration from Iran to high-income countries has adversely affected the Iranian medical education system, healthcare system, and geographic health service coverage. It is therefore essential to understand the reasons behind such migrations to instigate evidence-informed interventions.

The thematic analysis resulted in seven career-related factors that contributed to specialty preferences. Other studies also reported similar findings, namely prestige,^{6, 10} future income,³² career risks,²⁹ work schedules,³³ work-family balance,^{25, 27} and emergency or on-call schedules.^{10, 12, 29} Although we identified

occupational hazards as one of the career-related factors, unlike other studies, factors such as other job-related pressures²⁹ and risk of infection³⁴ were not extracted from our interview data. This could be due to differences in work conditions and country-specific socio-cultural context between the studies. It has been reported that poor work conditions can negatively affect the mental and emotional health of the workers.³⁵ Although our participants did not explicitly express this as a significant contributing factor, further studies on this topic are recommended.

Some participants stated that the drawbacks of emergency and on-call duties have negatively influenced their specialty choice. A previous study also reported such findings;¹⁰ however, other studies have reported the interest of their participants in emergency medicine.^{12, 29} The difference in the findings can be attributed to gender preferences,³⁶ lifestyle preferences,²⁸ and specific personality traits such as novelty seeking.³⁷ Gender can also be considered as a factor that affects the work-life balance. In Iran, a traditional country, family is an important factor, and women play a central role in the family. It is therefore logical to expect that the Iranian female physicians choose a field of medical specialty that involves regular schedules and fewer weekly working hours.

In line with a previous study,³⁸ our participants also stated that advice from family and university lecturers as well as choosing them as role models influenced their decisions in opting for a particular field of specialty. However, the role of friends and senior students as in other studies^{38, 39} was not mentioned by our participants.

The thematic map that emerged from the interview data showed that some of the factors were interrelated. These interrelationships were established only through statements of the participants, and the researcher's biases were not involved because of bracketing. Based on the thematic map, three factors (work schedules, work-family balance, and emergency or on-call schedules) were interrelated, but the relationship between these sub-themes was not necessarily linear. According to our participants, certain medical specialties have a broader scope of practice and fewer on-call duties (e.g., primary health care), whereas other types such as neurosurgery have a limited scope of practice and deal with more on-call duties and high-acuity patients. Evidently, to a large extent, the work-family balance is related to working hours, which is also dependent on an emergency or on-call schedules. Likewise, professional orientation is interrelated with other factors such as emergency or on-call schedules and prestige.

It has been reported that fields of specialty with more procedural practices, such as surgery, are associated with high social status and prestige.⁴⁰ Interestingly, surgical specialties involve more emergency cases, while on-call schedules are related to the scope of practice, i.e., specialties with a broader scope of activity are more likely to have more emergency cases. Although we did not intend to examine the interrelationship between these factors, the above-mentioned interrelationships were unintentionally revealed during data analysis. To facilitate evidence-based human resource policy, it is recommended to further explore the interrelationship between these factors using specific methods such as structural modeling.

As the strength of the study, for the first time in Iran, we used an in-depth qualitative method to comprehensively describe factors influencing specialty preferences. The main limitation of the study, despite using maximum variation sampling, was the recruitment of the participants from a single center, which undermines the generalizability of our findings. Further studies are required with more participants from different medical universities across the country.

Conclusion

Three main themes influencing specialty preferences of Iranian medical doctors were identified, namely personal determinants, career-related factors, and interpersonal influences. Our findings will facilitate the development of a comprehensive evidence-based public health policy, health human resources planning, and appropriate medical education policy.

Acknowledgment

This article was extracted from the qualitative phase of a PhD dissertation written by Yaser Sarikhani in the field of Health Services Management. The study was approved and financed by Shiraz University of Medical Sciences, Shiraz, Iran (grant number: 98.01.07.20054). The authors are grateful to the interviewees for their participation in the study.

Conflict of Interest: None declared.

References

- 1 Kaliyadan F, Amin TT, Qureshi H, Al Wadani F. Specialty preferences of 1(st) year medical students in a Saudi Medical School - Factors affecting these choices and the influence of gender. *Avicenna J Med.* 2015;5:134-9.

- doi: 10.4103/2231-0770.165120. PubMed PMID: 26629470; PubMed Central PMCID: PMCPMC4637952.
- 2 Querido S, van den Broek S, de Rond M, Wigtersma L, Ten Cate O. Factors affecting senior medical students' career choice. *Int J Med Educ.* 2018;9:332-9. doi: 10.5116/ijme.5c14.de75. PubMed PMID: 30594907; PubMed Central PMCID: PMCPMC6387763.
 - 3 Cleland J, Johnston PW, French FH, Needham G. Associations between medical school and career preferences in Year 1 medical students in Scotland. *Med Educ.* 2012;46:473-84. doi: 10.1111/j.1365-2923.2012.04218.x. PubMed PMID: 22515755.
 - 4 Pfarrwaller E, Sommer J, Chung C, Maisonneuve H, Nendaz M, Junod Perron N, et al. Impact of Interventions to Increase the Proportion of Medical Students Choosing a Primary Care Career: A Systematic Review. *J Gen Intern Med.* 2015;30:1349-58. doi: 10.1007/s11606-015-3372-9. PubMed PMID: 26173529; PubMed Central PMCID: PMCPMC4539313.
 - 5 Sivey P, Scott A, Witt J, Joyce C, Humphreys J. Junior doctors' preferences for specialty choice. *J Health Econ.* 2012;31:813-23. doi: 10.1016/j.jhealeco.2012.07.001. PubMed PMID: 22940638.
 - 6 Takeda Y, Morio K, Snell L, Otaki J, Takahashi M, Kai I. Characteristic profiles among students and junior doctors with specific career preferences. *BMC Med Educ.* 2013;13:125. doi: 10.1186/1472-6920-13-125. PubMed PMID: 24028298; PubMed Central PMCID: PMCPMC3847686.
 - 7 Al-Shamsi M. Addressing the physicians' shortage in developing countries by accelerating and reforming the medical education: Is it possible? *J Adv Med Educ Prof.* 2017;5:210-9. PubMed PMID: 28979916; PubMed Central PMCID: PMCPMC5611431.
 - 8 Kwon OY, Park SY. Specialty choice preference of medical students according to personality traits by Five-Factor Model. *Korean J Med Educ.* 2016;28:95-102. doi: 10.3946/kjme.2016.14. PubMed PMID: 26838573; PubMed Central PMCID: PMCPMC4926941.
 - 9 Mullola S, Hakulinen C, Presseau J, Gimeno Ruiz de Porras D, Jokela M, Hintsala T, et al. Personality traits and career choices among physicians in Finland: employment sector, clinical patient contact, specialty and change of specialty. *BMC Med Educ.* 2018;18:52. doi: 10.1186/s12909-018-1155-9. PubMed PMID: 29587722; PubMed Central PMCID: PMCPMC5870817.
 - 10 Alawad AA, Khan WS, Abdelrazig YM, Elzain YI, Khalil HO, Ahmed OB, et al. Factors considered by undergraduate medical students when selecting specialty of their future careers. *Pan Afr Med J.* 2015;20:102. doi: 10.11604/pamj.2015.20.102.4715. PubMed PMID: 26090050; PubMed Central PMCID: PMCPMC4458322.
 - 11 Dehn P, Eika B. Who's choosing whom? A sociological study of the specialty choices in a Danish context. *International Journal of Medical Education.* 2011;2:36-43. doi: 10.5116/ijme.4dad.c33f. PubMed PMID: PMC4205518.
 - 12 Al-Fouzan R, Al-Ajlan S, Marwan Y, Al-Saleh M. Factors affecting future specialty choice among medical students in Kuwait. *Med Educ Online.* 2012;17:19587. doi: 10.3402/meo.v17i0.19587. PubMed PMID: 28165921.
 - 13 Correia Lima de Souza L, Mendonca VR, Garcia GB, Brandao EC, Barral-Netto M. Medical Specialty Choice and Related Factors of Brazilian Medical Students and Recent Doctors. *PLoS One.* 2015;10:e0133585. doi: 10.1371/journal.pone.0133585. PubMed PMID: 26208007; PubMed Central PMCID: PMCPMC4514603.
 - 14 Al-Ansari SS, Khafagy MA. Factors affecting the choice of health specialty by medical graduates. *J Family Community Med.* 2006;13:119-23. PubMed PMID: 23012131; PubMed Central PMCID: PMCPMC3410059.
 - 15 Abdulrahman M, Makki M, Shaaban S, Al Shamsi M, Venkatramana M, Sulaiman N, et al. Specialty preferences and motivating factors: A national survey on medical students from five uae medical schools. *Educ Health (Abingdon).* 2016;29:231-43. doi: 10.4103/1357-6283.204225. PubMed PMID: 28406108.
 - 16 Alef-News-Group [Internet]. Statistics of the number of general practitioners, specialists and specialists in the country. Iran: ALef News Group. c2019 [Cited 2 September 2020]. Available from: <https://www.alef.ir/news/3980515114.html>. Persian.
 - 17 The World Bank Data [Internet]. Physicians (per 1,000 people) - Iran, Islamic Rep. [Cited 11 March 2021]. Available from: <https://data.worldbank.org/indicator/SH.MED.PHYS.ZS?locations=IR>
 - 18 Bayat M, Shokri A, Mirbahaeddin E, Khalilnezhjad R, Khatibi SR, Fattahi H, et al. Geographic Distribution of Active Medical Specialists in Iran: A Three-Source Capture-Recapture Analysis. *Arch Iran Med.* 2020;23:15-22. PubMed PMID: 31910630.
 - 19 Queirós A, Faria D, Almeida F. Strengths and limitations of qualitative and quantitative

- research methods. *European journal of education studies*. 2017;3:369-87. doi: 10.46827/ejes.v0i0.1017.
- 20 Graneheim UH, Lundman B. Qualitative content analysis in nursing research: concepts, procedures and measures to achieve trustworthiness. *Nurse Educ Today*. 2004;24:105-12. doi: 10.1016/j.nedt.2003.10.001. PubMed PMID: 14769454.
 - 21 Wainwright D, Harris M, Wainwright E. How does 'banter' influence trainee doctors' choice of career? A qualitative study. *BMC Med Educ*. 2019;19:104. doi: 10.1186/s12909-019-1531-0. PubMed PMID: 30975136; PubMed Central PMCID: PMC6460642.
 - 22 Hsieh HF, Shannon SE. Three approaches to qualitative content analysis. *Qual Health Res*. 2005;15:1277-88. doi: 10.1177/1049732305276687. PubMed PMID: 16204405.
 - 23 Guba EG, Lincoln YS. Competing paradigms in qualitative research. *Handbook of qualitative research*. 1994;2:105.
 - 24 Alshahrani M, Dhafery B, Al Mulhim M, Alkhadra F, Al Bagshi D, Bukhamsin N. Factors influencing Saudi medical students and interns' choice of future specialty: a self-administered questionnaire. *Adv Med Educ Pract*. 2014;5:397-402. doi: 10.2147/AMEP.S69152. PubMed PMID: 25368542; PubMed Central PMCID: PMC4216024.
 - 25 Anand R, Sankaran PS. Factors influencing the career preferences of medical students and interns: a cross-sectional, questionnaire-based survey from India. *J Educ Eval Health Prof*. 2019;16:12. doi: 10.3352/jeehp.2019.16.12. PubMed PMID: 31117329; PubMed Central PMCID: PMC6609296.
 - 26 Guraya SY, Almaramhy HH. Mapping the factors that influence the career specialty preferences by the undergraduate medical students. *Saudi J Biol Sci*. 2018;25:1096-101. doi: 10.1016/j.sjbs.2017.03.019. PubMed PMID: 30174508; PubMed Central PMCID: PMC6117166.
 - 27 Gutierrez-Cirlos C, Naveja JJ, Garcia-Minjares M, Martinez-Gonzalez A, Sanchez-Mendiola M. Specialty choice determinants among Mexican medical students: a cross-sectional study. *BMC Med Educ*. 2019;19:420. doi: 10.1186/s12909-019-1830-5. PubMed PMID: 31727026; PubMed Central PMCID: PMC6854711.
 - 28 Kristoffersson E, Diderichsen S, Verdonk P, Lagro-Janssen T, Hamberg K, Andersson J. To select or be selected - gendered experiences in clinical training affect medical students' specialty preferences. *BMC Med Educ*. 2018;18:268. doi: 10.1186/s12909-018-1361-5. PubMed PMID: 30453953; PubMed Central PMCID: PMC6245780.
 - 29 Alsubaie N, Aldhofaian HS, Alhuwaimel L, Ruxshan N, Alghamdi F, Shamia A, et al. Specialty Preferences and the Factors Influencing Them Among Pre-Clerkship Medical Students: The First Study from Alfaisal University-College of Medicine, Saudi Arabia. *Cureus*. 2016;8:e894. doi: 10.7759/cureus.894. PubMed PMID: 28018764; PubMed Central PMCID: PMC5179192.
 - 30 Sheikh A, Naqvi SH, Sheikh K, Naqvi SH, Bandukda MY. Physician migration at its roots: a study on the factors contributing towards a career choice abroad among students at a medical school in Pakistan. *Global Health*. 2012;8:43. doi: 10.1186/1744-8603-8-43. PubMed PMID: 23241435; PubMed Central PMCID: PMC3542032.
 - 31 Asongu SA. The impact of health worker migration on development dynamics: evidence of wealth effects from Africa. *Eur J Health Econ*. 2014;15:187-201. doi: 10.1007/s10198-013-0465-4. PubMed PMID: 23460479.
 - 32 Rehman A, Rehman T, Shaikh MA, Yasmin H, Asif A, Kafil H. Pakistani medical students' specialty preference and the influencing factors. *J Pak Med Assoc*. 2011;61:713-8. PubMed PMID: 22204259.
 - 33 Adnan S, Khaliq H, Irfan M. A cross sectional study on the choices of female medical students in selection of their future specialties. *Journal of Postgraduate Medical Institute*. 2016;30:230-4.
 - 34 Wang KI, Chang PY, Hung CY, Huang YH. Analysis of senior medical students' preferences in specialty choice a survey in a medical school in northern Taiwan. *Chang Gung Med J*. 2007;30:339-53. PubMed PMID: 17939264.
 - 35 Koinis A, Giannou V, Drantaki V, Angelaina S, Stratou E, Saridi M. The Impact of Healthcare Workers Job Environment on Their Mental-emotional Health. *Coping Strategies: The Case of a Local General Hospital*. *Health Psychol Res*. 2015;3:1984. doi: 10.4081/hpr.2015.1984. PubMed PMID: 26973958; PubMed Central PMCID: PMC4768542.
 - 36 Hamid S, Ali Inam SH, Jamil H, Zeb R. Specialty preference with respect to gender among medical students of Pakistan. *J Pak Med Assoc*. 2019;69:1190-3. PubMed PMID: 31431778.
 - 37 Sievert M, Zwir I, Cloninger KM, Lester N, Rozsa S, Cloninger CR. The influence of temperament and character profiles on specialty choice and well-being in medical

- residents. PeerJ. 2016;4:e2319. doi: 10.7717/peerj.2319. PubMed PMID: 27651982; PubMed Central PMCID: PMC5018665.
- 38 Onyemaechi N, Bisi-Onyemaechi AI, Omoke NI, Odetunde OI, Okwesili IC, Okwara BO. Specialty choices: Patterns and determinants among medical undergraduates in Enugu Southeast Nigeria. Niger J Clin Pract. 2017;20:1474-80. doi: 10.4103/njcp.njcp_382_16. PubMed PMID: 29303135.
- 39 Khader Y, Al-Zoubi D, Amarin Z, Alkafagei A, Khasawneh M, Burgan S, et al. Factors affecting medical students in formulating their specialty preferences in Jordan. BMC Med Educ. 2008;8:32. doi: 10.1186/1472-6920-8-32. PubMed PMID: 18501004; PubMed Central PMCID: PMC2423351.
- 40 Ali A, Rasheed A, Hussain Zaidi SM, Ashraf Jahangeer Alsaani SM, Naim H, Hamid H, et al. Recent Trend in Specialty Choices of Medical Students and House Officers from Public Sector Medical Universities, Karachi. J Pak Med Assoc. 2019;69:489-94. PubMed PMID: 31000850.