



Research article

MEDICAL STUDENTS' MIGRATION INTENTIONS: RISK FACTOR AND CHALLENGE FOR THE HEALTHCARE SYSTEM IN KYRGYZSTAN

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Physician migration challenges healthcare systems in developing countries. The "Irish paradox" phenomenon, where doctor shortages persist despite numerous medical graduates, is emerging in Kyrgyzstan (KR). Limited research on this exists in Central Asia. The study explores medical students' migration intentions, offering insights for regional and global health authorities.

A cross-sectional study surveyed 526 final-year medical students in KR. We analyzed demographic characteristics, intentions to work abroad, future professional preferences, and "Pull and Push" factors for migrations that might influence students' decision to migrate.

86.1 % expressed willingness to emigrate. Intention to migrate was categorized by certainty of migration: 12.5 % "leave KR", 14.5 % "highly likely to leave KR", and 59.1 % "might leave KR". 13.9 % decided to stay in KR. The significant predictors of migration were marriage and rural living; the main migration destinations were Russia (41.5 %), Kazakhstan (18.8 %), and the EU (11.5 %). Pull and push factors significantly differed among groups. The main limitations of the study arose from the nature of the observational study.

The study results are alarming, uncovering the potential scale of physician migration in Central Asia. The majority of medical graduates in KR plan to migrate, posing a threat to healthcare sustainability. The presence of the "Irish paradox" amplifies the pressure on these processes in the country and should be considered in the development of migration policy. Monitoring students' intentions provides timely information for adjusting migration programs promptly, and the combined score of Pull and Push factors might serve as an express test to address the challenge more effectively. Migration programs should be developed jointly with the Russian Federation, as the main destination and give priority to professional development in the group with low migration intentions.

Keywords: healthcare workers, physician migration, risk factor, brain drain, medical students' intention to migrate, pull and push factors, Kyrgyzstan, Central Asia.

The disparity in the healthcare workforce distribution across various nations, particularly regarding physicians, is acknowledged by the United Nations and the World Health Organization (WHO). Given that human resources constitute the cornerstone of a healthcare system, the WHO underscores that the insufficiency of the healthcare workforce is a challenge for developing countries. This shortage significantly impacts the efficacy and efficiency of healthcare delivery systems and diminishes public satisfaction with the services provided [1, 2].

The migration of tertiary educated people from lower-middle-income countries (LMICs) has become an increasingly important issue in the time of the so-called "age of accelerations", turmoil, and the "post-COVID era". It is a challenge for LMICs to weigh the benefits and negative impacts of migration on economic, social, and political transformations. According to the Organization for Economic Cooperation and Development (OECD), the emigration of highly-skilled workers has been growing at a much faster rate than low-skilled workers recently

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[3, 4], and medicine is among the most mobile occupations [5, 6].

Physician migration from low to high-resource countries is a well-known process in the scientific literature with “two sides of the same coin”. One side is the internalization of medical education and collaboration in research that provides undeniable benefits or “brain gain” [6, 7]. Specialists with new skills and ideas return to developing countries from academic centers and leading universities of high-resource countries. Another side is the negative impact of the process or “brain-drain” when the migration of specialists leads to a lack of qualified and efficient workforce in the healthcare system of developing countries [6, 8]. This process poses a risk to the effective operation of public health systems in any nation and presents a significant challenge for policymakers in the realm of migration policy. Hence, comprehensive examination and monitoring of migration processes provide a current state of evidence and help to develop recommendations for evidence-based migration policies of health professionals.

Kyrgyz Republic (KR) is a land-locked LMIC country in Central Asia with one of the highest labor migrations in the region [9]. The healthcare system in KR has been undergoing several rounds of partially successful reforms, mainly because of political and financial instability. Currently, the physician-to-population ratio is the second lowest ratio in Central Asia (2.0 per 100,000 people), with enormous variations from 4.0 per 100,000 people in some cities to 0.7 per 100,000 people in some secluded regions of the country¹. The COVID-19 pandemic showed that one of the most common causes of health services disruption in KR was a problem with a lack of staffing [10, 11]. Health authorities announced that some health services in the biggest city had more than 25 % of vacant doctors' positions²,

despite the extensive number of medical graduates each year, equivalent to almost 20 % of all practicing physicians in KR¹.

Recently, new offers of medical study programs in English have attracted international students from India, Pakistan, and other countries in South Asia, doubling the number of medical students in KR. Most students complete their first degree in KR before moving home or to another country for internship and postgraduate specialty training. Thus, the healthcare system in the country encounters the phenomenon of the “Irish paradox” when healthcare institutions experience doctor shortages despite the high number of domestic and foreign medical graduates [12].

Analysis of physician migration is a multidimensional process, and one of the most significant aspects of this analysis is whether intentions to migrate could predict an actual future decision [13, 14]. Many scholars and our group believe that migration intention is crucial and a “trigger for real future migration” [15]. Comprehensive migration analysis cannot be done without this aspect because “migration intentions data holds advantages connected to both substantive and practical issues” of physician retention [16].

One of major drawbacks of recent scientific publications that examined medical students' and physicians' migration was attention to migration tunnels with the final destination countries such as the United States, the United Kingdom, and the European Union (EU) [5–7, 12–20]. Only the main “donor” countries for these destinations are well presented in the literature [17, 20]. Physician migration in some world regions, such as Central Asia, has not been explored yet. Another downside of research in the area is consideration of those who expressed willingness to migrate as a homogeneous group. Some studies examined and divided participants by preparation to migrate

¹ Zdorov'e naseleniya i deyatelnost' organizatsii zdravookhraneniya Kyrgyzskoi Respubliki za 2021 god: ezhegodnyi sbornik [Population health and work of healthcare organizations in the Kyrgyz Republic in 2021: annual digest]. Bishkek, The Ministry of Health of the Kyrgyz Republic, 2021. Available at: <https://bit.ly/3BHDjBL> (November 27, 2023) (in Russian).

² Mikhailichenko K. Skol'ko medikov ne khvataet v Bishkeke? Vitse-mer nazvala tsifry [How many healthcare workers does Bishkek lack for? Vice-mayor has given the figure]. *Sputnik Kyrgyzstan: multimedia press center*, 2021. Available at: <https://bit.ly/3fib7EI> (December 03, 2023) (in Russian).

level; however, principal analysis was still conducted using a binomial approach, that is, contrasting students who were willing to migrate and those who did not [17–20].

The “Irish Paradox” refers to the situation where despite having a surplus of medical graduates, there are still significant shortages of doctors [12]. This effect was well described in Ireland and Romania [12, 14, 15, 17, 21, 22], two high-income countries that also became “educational hubs” for international medical students. Similar conditions in low or middle-income countries have not been reported in the literature, and examining the same settings in KR provided valuable insight into understanding the paradox.

The main goal of our research group was to examine physician migration processes in KR. We did not find publications investigating this issue in KR or the Central Asian Region. We aimed to examine Kyrgyz medical students’ intention to migrate by exploring the heterogeneity of intentions, identifying the primary factors affecting a decision to migrate, and providing information to health authorities regionally and globally for future evidence-based migration policies.

Materials and methods. Study design. We conducted a cross-sectional study using survey data collected from 2 major universities of KR. The survey was conducted in 2021–2022 years. The study sample was 526 final-year medical students who studied medicine in Russian, the official language in KR. All students were interviewed in one university, and 74 % were interviewed in another because one student’s batch was on a clinical rotation. The response rate was 98 %.

The self-administered questionnaire collected information on sex, age, place of living, marital and financial status, intentions to work abroad, future professional preferences, Pull and Push factors for migration, and possible retention factors that might influence students’ decision to stay in Kyrgyzstan.

Family ties are powerful in Kyrgyzstan; most students live with their parents or are supported by them. Hence, we also collected some information about the parents of the participants.

The main structure and some questions of the questionnaire were adapted from a study with similar purposes that had been done in Romania [17]. However, this study was conducted in the Romanian language and examined migration by considering the current reality of the European Union. We translated and modified the questionnaire thereby adjusting it to Central Asia’s current situation. Each part of the restructured questionnaire was validated in small groups and tested in a pilot study.

Participation of students was voluntary, and the purpose of the study was fully explained to them before the questionnaire was distributed. The participants were free to choose either a paper or an electronic version of the questionnaire. The questionnaire was distributed by the end of a lecture, and completed copies were collected on the spot. Students did not receive any incentives to participate in the study. We did not collect any personal identification information.

Identification of students’ intentions to migrate. Students’ post-graduation migration intentions were assessed in two steps using a composite outcome variable with four groups / levels. The first group, “Stay in KR”, included those students who reported that they were “not going to leave” the country. The students who replied that they were going to leave the country after graduation were divided into three groups: those who “leave KR” with a definite plan to migrate; those who were “highly likely to leave KR” with a developed plan to leave the country; and those who “might leave KR” with a vague outline of migration.

The first step of identification was an answer to the following question: “Are you going to leave KR?” with five possible answers: “I do not have any plans to leave KR”, “I thought about leaving KR but do not have an exact plan “when” and “where” to go”, “I am going to leave the country after I earn my degree, finish internship and work for several years to gain some experience”, “I will leave KR right after I will get my diploma”, “I will leave the country after I earn a degree and finish my internship”.

At the second stage, commitment of students to migrate or development of migration plans was assessed using a series of questions that helped to verify students' intention to leave. Thus, participants who replied that they are leaving KR right after they will earn the degree or after internships were assigned to the group "Leave KR" if they answered that they chose a country to migrate to, involved in a conversation with representatives of a particular university or health care facility where they might conduct an internship or continue their study or have a place to work. Otherwise, students were assigned to the group "highly likely to leave KR" along with those who decided to leave after gaining some experience working as doctors in KR if students chose a country to migrate to, constantly conducted an internet search, and participated at least in one program or job fair for international health care professionals abroad. Other students who replied that they would leave the country were assigned to the group "Might leave KR".

Push and Pull factors. We created a list of possible motivating factors (Pull and Push factors) to migrate or to stay in KR based on self-actualization Maslow's pyramid, which consists of six blocks. The framework for this approach was described by Dohlman and others [23]. The blocks were tested in a small pilot study group, and seven push and five pull factors were chosen for the survey. Each factor was presented in the form of a question with five possible answers on a Likert scale: from 1, 'this definitely, not an important reason for my decision to migrate / stay in KR'; to 5, 'this is the main reason for my decision to migrate / stay in KR'.

Statistical analysis. Descriptive, χ^2 , and *t*-test statistics, along with logistic regression, were used to examine factors that might influence students' post-graduation migration intentions.

Missing values in almost every block of the questionnaire were less than 2 % and could not present any threats to our analysis. How-

ever, 11.2 % of participants refused to provide information about citizenship. We selected some participants from this group and conducted a personal interview. The results of the interview showed that the majority of these respondents applied for or received non-KR citizenship. As a part of sensitivity analysis, we also analyzed data considering these participants as those with non-KR citizenship.

We analyzed the answers to Pull and Push questions as interval-level data (between 1 and 5) and calculated the score that corresponds to each analyzed group of participants using mean and confidence intervals. The statistical difference was established using a *t*-test.

Logistic regression analyses independently examined the relationship between each variable and the main outcome using two approaches. The first approach explored migration intentions for those who stayed in KR and other participants who decided to migrate using binary outcomes. Another approach assessed the development of migration intentions using a cumulative logit model with an ordinary outcome³.

The level of statistical significance was determined as 0.05. The data analysis was conducted using SAS 9.04 software (SAS Institute).

This study was approved by the Ethics Committee of International Higher School of Medicine.

Results. The final analytical sample constituted 526 students with more females than males (64.5 % versus 35.4 %, respectively) and mean age 23.4 (+/- 0.1) (Table 1). The percentage of married participants or common-law partners was two times less than that of those who were single or divorced (74.0 % versus 36.0 %, respectively). The number of individuals in the sample that reported the household economic situation as living in precarious conditions was 1.1 %, 31.5 % of the students could not afford everything needed for a normal life, 54.5 % could afford everything needed for a normal life, and 4.2 %

³ Elkin E. PROC LOGISTIC to Model Ordinal and Nominal Dependent Variables. *Bitly Connections Platform*, 2012. Available at: <https://bit.ly/3r6lZII> (November 30, 2023).

Table 1

Socio-demographic characteristics and future occupational preferences of study participants by intention to migrate

	Study sample		Intention to migrate			
	Total N (col. %)	P-value	Leave KR N (row %)	Highly likely to leave KR N (row %)	Might leave KR N (row %)	Stay in KR N (row %)
Mean age of participants <i>Mean (SD)</i>	23.4 (1.17)		23.4 (0.4)	23.2 (0.1)	23.3 (0.4)	23.7 (0.2)
Sex						
Male	186 (35.4)		26 (13.9)	30 (16.1)	107 (57.6)	23 (12.4)
Female	339 (64.5)	<0.001	40 (11.8)	45 (13.3)	204 (60.2)	50 (14.8)
<i>Missing values N (%)</i>	1 (0.19)					
Place of living						
Living with parents	182 (34.6)		15 (8.2)	24 (13.2)	114 (62.6)	29 (16.0)
Living with relatives	51 (9.7)		3 (5.9)	4 (7.8)	35 (68.6)	9 (17.7)
Renting apartment or dormitory	186 (35.4)		35 (18.2)	35 (18.2)	98 (52.7)	18 (9.7)
Living in one's own apartment / house	107 (20.3)	<0.001	13 (12.2)	13 (12.2)	64 (59.7)	17 (15.9)
<i>Missing values N (%)</i>	0(0)					
Marital status						
Single	389 (74.0)		49 (12.6)	63 (16.2)	238 (61.2)	39 (10.0)
Married, no children	53 (10.1)		4 (7.6)	6 (11.3)	31 (58.5)	12 (22.6)
Married with children	57 (10.8)	<0.001	11 (19.3)	5 (8.8)	27 (47.4)	14 (24.6)
Cohabiting with a partner	27 (5.1)		2 (7.4)	2 (7.4)	15 (55.6)	8 (29.6)
<i>Missing values N (%)</i>	0 (0)					
Financial status						
Poor	6 (1.1)		1 (16.6)	1 (16.6)	3 (50.2)	1 (16.6)
Can't always afford the necessities	208 (39.5)		27 (13.0)	32 (15.4)	121 (58.2)	28 (13.5)
Can afford everything necessary	288 (54.8)	<0.001	35 (12.2)	40 (13.9)	177 (61.5)	36 (12.5)
Can afford anything without limitations	22 (4.2)		3 (13.6)	2 (9.1)	10 (45.5)	7 (31.8)
<i>Missing values N (%)</i>	2 (0.38)					
Future specialty						
Internal medicine	162 (30.8)		12 (7.4)	35 (21.6)	94 (58.0)	21 (13.0)
Surgery / gynecology	150(28.6)	0.026	23 (15.3)	23 (15.3)	80 (53.4)	24 (16.0)
Haven't decided yet	198 (37.7)		25 (12.7)	17 (8.6)	129 (65.1)	27 (13.6)
<i>Missing values N (%)</i>	16 (3.0)					
Out of those who haven't decided yet						
Will combine medicine with other non-medical activity	65(12.75)		12 (18.5)	6 (9.2)	37 (56.9)	10 (15.4)
Might not work at all	7 (1.4)		2 (28.5)	1 (14.3)	3 (42.9)	1 (14.3)
Citizenship						
KR	406 (77.2)		35(8.6)	45 (11.1)	256(63.1)	70 (17.2)
Not KR	61 (11.6)	<0.001	19 (31.5)	8 (13.1)	31 (50.8)	3(4.9)
<i>Missing values N (%)</i>	59 (11.2)		12(20.3)	23 (39.0)	24 (40.7)	0
Parents / family						
Parents' financial status						
Poor	5 (0.9)		2 (40.0)	0	1 (20.0)	2 (40.0)
Can't always afford the necessities	134 (25.5)		16 (11.9)	22 (16.4)	77 (57.5)	19 (14.2)
Can afford everything necessary	338 (64.3)	<0.001	39 (11.5)	48 (14.2)	209 (61.8)	42 (12.4)
Can afford anything without limitations	44 (8.4)		8 (18.2)	6 (13.6)	21 (47.7)	9 (20.5)
<i>Missing values N (%)</i>	5 (0.9)					
Brothers and sisters <i>Mean (SD)</i>	2.6 (1.33)		2.3 (0.2)	2.7 (0.2)	2.6 (0.1)	2.5 (0.2)

End of the Table 1

	Study sample		Intention to migrate			
	Total <i>N</i> (col. %)	<i>P</i> -value	Leave KR <i>N</i> (row %)	Highly likely to leave KR <i>N</i> (row %)	Might leave KR <i>N</i> (row %)	Stay in KR <i>N</i> (row %)
Parents' place of living						
Bishkek, the capital of KR	244 (46.4)		26 (10.7)	37 (15.2)	147 (60.3)	34 (19.3)
Other city	196 (37.3)		33 (16.8)	28 (14.3)	110 (56.1)	25 (12.8)
Urban settlement	79 (15.0)	<0.001	6 (7.6)	9 (11.4)	52 (65.8)	12 (15.2)
<i>Missing values N (%)</i>	7 (1.3)					
Parents' education						
Secondary school	39 (7.4)		5 (12.8)	4 (10.3)	23 (59.0)	7 (18.0)
Vocational education	146 (27.8)	<0.001	14 (9.6)	21 (14.4)	92 (63.0)	19 (13.0)
Higher education	336 (63.9)		47 (14.0)	51 (15.2)	192 (57.1)	46 (13.7)
<i>Missing values N (%)</i>	5 (0.9)					
Work in the healthcare system						
Yes	177 (33.7)		26 (14.7)	25 (14.1)	104 (58.8)	22 (12.4)
No	349 (66.3)	<0.001	40 (11.5)	51 (14.6)	207 (59.3)	51 (14.6)
<i>Missing values N (%)</i>	0 (0)					
Total (column / row %)	526 (100)		66 (12.5)	76 (14.5)	311 (59.1)	73 (13.9)

could afford anything without any restrictions. Most participants chose their future career path in internal medicine or surgery/gynecology (30.8 % versus 28.6 %, respectively). However, 198 (37.7 %) reported that they hadn't decided on a future career, and out of this number, 13.1 % would combine work in medicine with others unrelated to medicine work, and 1.5 % would possibly quit medicine.

Students with KR citizenship constituted 77.2 % of all students, and Non-KR citizenships 11.6 % (Table 1). Almost the same percentage (11.2 %) of students refused to answer this question. The following interview showed the majority of them were non-KR citizens or had double or applied for foreign citizenship.

Most respondents indicated their parents had higher education (63.9 %), 27.8 % of parents had more than secondary education, and 7.4 % had secondary or less than secondary education. The percentage of households with somebody working in health care was 33.7 %. The majority of the participants (72.6 %) described parents' household economic situation as "can afford everything needed for a normal life" and "can afford anything without any restrictions", and 26 % of households either live in precarious conditions or cannot afford everything needed for a normal life. The average

number of children in a family was 2.6 (+/-0.1). Eighty-three point seven percent of the students reported that their families live in urban areas and 15.0 % in rural areas.

Overall, 86.1 % of the participants expressed a desire to migrate out of KR (Table 1). The strength of intention to migrate showed that 12.5 %, along with 14.5 % of the participants, had strongly formed decisions and developed plans to migrate, more than half (59.1 %) of the participants had thoughts and made some preparation to migrate. Only 13.9 % decided to stay and practice in KR. Females had less likely developed plans to leave KR compared to males (11.8 % vs. 13.3 % and 13.3 % vs. 16.1 % who had developed plans to leave KR, correspondingly).

The least mobile group had the best economic situation: those students who "can afford anything without any restrictions" had the lowest percentage in all three groups except those that "stay in KR" (31.8 %). On the contrary, students who were renting apartments or living in a dormitory had the highest percentage in groups of "leaving KR" and "highly likely to leave" (18.2 % in both groups, correspondingly). We can observe the same situation among those who chose their career pass in surgery and gynecology (15.3 % in both

groups). Respondents who refused to provide information about citizenship were the most mobile group, with the highest percentage of all groups expressing willingness to migrate. This indirectly proved our interview findings with the group. Parents' financial status had almost the same pattern as the status of participants. The highest percentage of those staying in KR were in groups with the best and worst economic situations (20.55 and 40 %, correspondingly). Respondents who had parents with higher education had more developed plans to migrate compared to other groups (14.0 % and 15.2 %).

Table 2 presents push-and-pull or motivating and demotivating factors to migrate and stay in KR. The leading push factors were “the opportunity to get higher qualification abroad” (47 % put the highest score) and “better conditions to work as a physician abroad” (46.8 % put the highest score), with the highest mean score in all groups for these questions. Only 32.9 % indicated a better salary abroad as one of the leading factors for migration. The most important of all “pull” factors was family ties. Thirty-one point eight percent of the respondents indicated it as the main factor of motivation to stay in KR.

Table 2

Push-and-Pull factors of students with the intention to migrate

Factors	Leave KR (Mean/SE)	Highly likely to leave KR (Mean/SE)	Might leave KR (Mean/SE)	Total N (%) of students who put the highest grade (%)
Push factors				
There is a better salary abroad	4.3 (0.13)	3.8 (0.15)	3.8 (0.06)	149 (32.9)
There are more opportunities to get higher qualification	4.3 (0.13)	4.0 (0.13)	4.3 (0.06)	217 (47.9)
There are better conditions to work as a physician abroad	4.5 (0.10)	4.2 (0.12)	4.2 (0.06)	212 (46.8)
There are better opportunities to find a good place to work and be promoted abroad	4.2 (0.14)	3.9 (0.14)	3.9 (0.07)	165 (36.4)
My family is going to emigrate	3.3 (0.22)	1.9 (0.18)	2.0 (0.09)	62 (13.4)
I am not satisfied with the healthcare system in KR	4.0 (0.17)	3.7 (0.17)	3.7 (0.08)	163 (36.0)
I am not sure that I can find a decent position after an internship in KR	3.4 (0.20)	3.3 (0.18)	3.1 (0.09)	109 (24.1)
Pull factors				
My family and friends in KR	3.5 (0.19)	2.7 (0.23)	3.8 (0.09)	144 (31.8)
I do not have any means to go abroad	2.2 (0.17)	2.3 (0.2)	2.9 (0.08)	46 (10.2)
I am satisfied with healthcare in KR	1.6 (0.14)	1.8 (0.16)	1.9 (0.07)	12 (2.6)
I believe that healthcare reforms make the system better	2.0 (0.17)	1.9 (0.17)	2.4 (0.08)	32 (7.01)
I don't think I can find a better job abroad	1.7 (0.15)	1.7 (0.17)	2.2 (0.08)	15 (3.3)
Mean and SE for the combined score of Pull factors	26.27 (0.85)	22.70 (0.83)	21.71 (0.48)	
Mean and SE for the combined score of Push factors	7.48 (0.69)	7.89 (0.61)	10.08 (0.34)	
Mean and SE for the combined score of Pull and Push factors*	18.78 (0.92)	14.80 (0.90)	11.63 (0.49)	
Confidence interval for the combined score of Pull and Push factors	16.96; 20.62	13.02; 16.59	10.66; 12.60	

Note: *Combined score for Pull and Push factors was statistically significantly different in groups with different levels of intentions to migrate. Statistical significance was determined by using *t*-test.

Interestingly, the cumulative score of “pull” factors showed a bigger and statistically significant difference between groups of those who “leave KR” and “highly likely to leave,” but the cumulative score of “pull” factors presented this pattern between “might be possible” and “highly likely to leave” groups. However, the combined score of push and pull factors showed a statistically significant difference among all three groups (Table 2).

We examined relationships between the socio-demographic characteristics of the participants and their migration intentions (Table 3) using regression analysis. As a result, we identified only three statistically significant covariates that might predict intention to migrate after adjusting for citizenship. Thus, students who rent apartments or dormitories had a more than two times higher chance of intent to migrate compared to those who live with parents ($OR = 2.21$

(95 % CI : 1.38–3.52). Married participants had lower chance of being willing to migrate compared to single respondents ($OR = 0.43$ (95 % CI : 0.23–0.80) and $OR = 0.25$ (95 % CI : 0.11–0.58), respectively). As a part of our sensitivity analysis, we examined all covariates in different subgroups of our research sample. We restricted it to only those who were citizens of KR, those who “leave KR” vs. “stay in KR” and other combinations of subgroups by intention to migrate. Marital status was the most reliable and statistically significant predictor in all our analysis models. “Parents’ place of living” was another statistically significant factor in the full model. Participants who lived in a rural area had a 50 % lower chance of having an intention to migrate than those who lived in the capital city ($OR = 0.51$ (95 % CI : 0.3–0.89)) only after adjusting for citizenship and other statistically significant covariates in the model.

Table 3

Logistic regression analysis of the relationship between migration intentions and socio-demographic characteristics of participants

Analyzed factor	Odds Ratio and corresponding 95 % confidence interval	Adjusted Odds Ratio and 95 % confidence interval
Sex (males are a reference group)		
Females	0.787 (0.54–1.10)	
Place of living		
Living with parents	<i>reference group</i>	
Living with relatives	0.78 (0.42–1.45)	0.89 (0.46–1.73)
Renting apartment or dormitory	2.18 (1.44–3.29)	2.21 (1.38–3.52)
Living in one’s own apartment / house	1.14 (0.70–1.84)	1.65 (0.99–2.76)
Marital status		
Single	<i>reference group</i>	
Married, no children	0.42 (0.23–0.77)	0.43 (0.23–0.80)
Married with children	0.63 (0.35–1.13)	0.60 (0.34–1.07)
Cohabiting with a partner	0.29 (0.13–0.65)	0.25 (0.11–0.58)
Financial status		
Poor	2.22 (0.42–11.61)	
Can’t always afford the necessities	1.07 (0.76–1.54)	
Can afford everything necessary	<i>reference group</i>	
Can afford anything without limitations	0.50 (0.21–1.21)	
Future specialty		
Internal medicine	<i>reference group</i>	
Surgery / gynecology	1.05 (0.68–1.62)	
Haven’t decided yet	0.83 (0.55–1.24)	
Citizenship (KR citizenship is a reference group)		
Non-KR	4.06 (2.32–6.94)	4.85 (2.67–8.82)
Missing data	5.15 (3.01–8.80)	5.85 (3.25–10.5)
Parents’ place of living		

Analyzed factor	Odds Ratio and corresponding 95 % confidence interval	Adjusted Odds Ratio and 95 % confidence interval
Bishkek, the capital of KR	<i>reference group</i>	
Other city	1.36 (0.94–1.99)	0.66 (0.42–1.03)
Urban settlement	0.74 (0.45–1.23)	0.51 (0.3–0.89)
Parents’ financial status		
Poor	0.93 (0.16–5.29)	
Can’t always afford the necessities	1.07 (0.72–1.59)	
Can afford everything necessary	<i>reference group</i>	
Can afford anything without limitations	1.07 (0.58–1.98)	
Parents were born in Bishkek	<i>reference group</i>	
One parent was born in Bishkek	0.93 (0.37–2.31)	
Moved in Bishkek in the last 10 years	0.63 (0.28–1.43)	
Parents’ education		
Secondary school	0.94 (0.46–1.90)	
Vocational education	<i>reference group</i>	
Higher education	1.11 (0.76–1.63)	
Work in the healthcare system (YES is a reference group)		
No	0.87 (0.61–1.24)	

Note: Cumulative logit-model using an ordinal result (Leave KR event). The ultimate model was adjusted for statistically significant covariates in the first model.

The most frequent country destinations for migration were Commonwealth of Independent States (CIS) such as Russia and Kazakhstan (48.1 % and 18.8 % of participants, respectively) followed by countries of the European Union (11.5 % of respondents) (Table 4).

Table 4
Country destination of students’ migration intentions

Country destination	Students who decided to migrate, N (%)
Russian Federation	218 (48.1)
Kazakhstan	85 (18.8)
EU countries	52 (11.5)
North American countries	29 (6.4)
Turkey	22 (4.8)
Other countries	30 (6.6)
Missing N (%)	17 (3.8)
Total	453 (100)

Discussion. The prevalence of medical students’ intention to migrate varies dramatically in literature by geographical region, methodology used in a study, and time when the study was conducted. Our study sample’s percentage of students considering migration

abroad was 86.1 %. We did not find any other research that examined medical students of physician migration in Central Asia. A high percentage of students intended to migrate was reported in Romania (84.7 %) and Ireland (88 %) [17, 21]. Similar studies from this region provided the prevalence of migration intentions as 50 % among Polish students [24]. Two studies in Lithuania 15 years apart estimated that 60 % and 39 % of medical students intended to migrate, respectively [20, 25]. This difference might be attributed to changes in a policy or an economic situation in the country as well as to different methodological approaches in the studies. High prevalence of migration intentions was also identified in Africa, Egypt (89 %) [18], and Asia, Turkey (46.3 %) [26] and Pakistan (33 %) [27].

The current situation with healthcare and medical education in KR shows many similarities with Romania and Ireland. These countries have universal health coverage, exporting model of medical education, and physician shortages in healthcare systems despite the high number of domestic and foreign medical graduates [17, 21, 22]. However, Romania and

Ireland are high-income countries, and their main migration tunnels for medical students are EU, UK, and North American countries [17, 21]. On the contrary, KR is LMIC and the main migration destination is the Russian Federation.

Students' intention to migrate by a country destination in our sample was almost similar to those patterns in KR general population. However, migration to the Russian Federation represents almost 80 % of migration flow in KR general population⁴ but in our sample, only 48.1 % of participants intended to migrate. The third and fourth country destinations were the European Union and North American countries that jointly constituted about 17.9 % of our study sample, compared with 5 % of the KR general population⁴.

We did not find publications investigating physicians' or medical students' migration in the Central Asian Region. However, historical similarities in healthcare systems' development and nowadays reorganizations in the region might suggest similar processes in neighboring countries.

The majority of studies that examined medical students' intention to migrate considered research samples as those who expressed willingness to migrate and those who did not ignoring the difference in the strength of the intentions. However, participants' heterogeneity by the strength of the intentions to migrate is difficult to overestimate. It partially explains the main drawback of studies that examined the intention of migration, namely, the gap between the high percentage of those who expressed willingness to migrate and the actual number of migrants. Thus, two groups, "leave KR" and "highly likely to leave KR", constitute only 27 % of the participants. They might be considered as those with a high probability that their intentions will transform into an actual decision to migrate in the nearest future.

Introducing the heterogeneity by the strength of intentions, we also provide valu-

able information for health authorities for future evidence-based migration policies. 'Might leave KR' is the most important and the largest group in our research sample (59.1 % of the participants). This group should be the primary target for future retention interventions accounting for their socio-demographic characteristics and Push-and-Pull factors. Moreover, the set of Push-and-Pull factors could be used as an express test for monitoring students' migration intentions using a combined score of Pull and Push factors that showed a statistically significant difference in the groups.

Thus, lack of professional opportunities was the major stimulating migration factor. This indicates that incentive programs should focus on non-monetary factors such as better academic infrastructure and increasing opportunities for professional development. Financial satisfaction definitely contributes to migration decisions but is not the primary driver.

We did not find strong differences in participants' characteristics by level of intention in our regression analysis. This could be explained by the effects of a "generational cohort" and a university's "catchment area". Universities enrolled students of the same age and from the same socio-economic pull that might mask possible differences. Thus, the strongest and most reliable characteristic was marital status which, along with another statistically significant covariate, students' place of living, cannot be helpful for planning university retention interventions in students' enrolment policies. The most practical characteristic of this type of policy is parents living in rural areas, but it was a statistically significant covariate only in the full model in our research sample. The weak effect of this characteristic might be explained by urbanization and intensive internal migration in KR [28]. Many families changed their place of living while students were attending university. 'Generation' effects can be eliminated by analyzing another cohort of final-year medical students and in

⁴ Zdorov'e naseleniya i deyatelnost' organizatsii zdravookhraneniya Kyrgyzskoi Respubliki za 2021 god: ezhegodnyi sbornik [Population health and work of healthcare organizations in the Kyrgyz Republic in 2021: annual digest]. Bishkek, The Ministry of Health of the Kyrgyz Republic, 2021. Available at: <https://bit.ly/3BHDjBL> (November 27, 2023) (in Russian).

this case the combined Pull and Push score can be used as an express-test to monitor students' intentions to migrate since it was statistically significantly different in all analyzed groups.

Major limitations of the study arose from the nature of the survey. Our cross-sectional study collected self-reported data that were not validated against any records and were prone to response and social desirability biases. Another limitation was 11.2 % of participants that refused to provide information about citizenship. However, conducted interview of the group and sensitivity analysis showed that it could not present any threats to our study results.

Conclusion. Physician migration, like any complex phenomenon, encompasses both positive and negative aspects that can vary depending on the country is a risk factor that can compromise the sustainability of a country's healthcare system. Our study serves as a pioneering evaluation of physician migration processes in Central Asia. The historical parallels in healthcare systems' development suggest comparable migration processes among neighboring countries. The study's results shed light on the potential scale of medical students' migration, the driving forces behind migration, and the specific circumstances prevalent in the region. A thorough examination of migration processes is vital for the region to provide an up-to-date understanding and effectively manage migration flows.

Despite differences in socio-economic factors, migration patterns, and geographical attributes, the shared characteristics among countries experiencing the "Irish paradox" indicate the existence of common underlying forces driving this phenomenon. The presence of the paradox seemingly amplifies the pressure on migration processes within the health sector, necessitating careful consid-

eration when formulating countries' migration policies.

The study's primary findings are cause for concern regarding the future of the healthcare system in KR. A significant proportion of medical graduates have expressed intentions to migrate from the country. Developing evidence-based migration policies is of utmost importance, given the current state of healthcare. Continual monitoring of migration intentions among students from different generations is necessary to enhance retention programs. The combined score derived from our set of Pull and Push factors can serve as an express assessment tool for this purpose, aiding in decision-making and migration policy formulation.

Examining the migration intentions of medical graduates in Kyrgyzstan and formulating evidence-based decisions can effectively mitigate risks for the healthcare system associated with the shortage of qualified personnel and the outward flow of trained specialists from the country.

Retention programs targeting graduates should use strategies to enhance professional development and address pertinent concerns. Developing migration programs jointly with the Russian Federation as a primary destination for students offers an opportunity for mutual benefits and strategic alignment, ensuring the sustainability and effectiveness of healthcare systems while fostering international cooperation and exchange.

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References

1. Boniol M., Kunjumen T., Nair T.S., Siyam A., Campbell J., Diallo K. The global health workforce stock and distribution in 2020 and 2030: a threat to equity and 'universal' health coverage? *BMJ Glob. Health*, 2022, vol. 7, no. 6, pp. e009316. DOI: 10.1136/bmjgh-2022-009316
2. Campbell J., Dussault G., Buchan J.M., Pozo-Martin F., Guerra-Arias M., Leone C., Siyam A., Cometto G. A Universal Truth: No Health without a Workforce. *Global Health Workforce Alliance and World Health Organization*. Available at: https://www.who.int/publications/m/item/hrh_universal_truth (December 05, 2023).

3. D'Aiglepiere R., David A., Levionnois C., Spielvogel G., Tuccio M., Vickstrom E. A Global Profile of Emigrants to OECD Countries: Younger and More Skilled Migrants from More Diverse Countries. *OECD social, employment and migration working papers*, 2020, no. 239. Available at: <https://bit.ly/3BHsC99> (November 22, 2023).
4. Kerr S.P., Kerr W., Özden Ç., Parsons C. High-Skilled Migration and Agglomeration. *Annu. Rev. Econom.*, 2017, vol. 9, no. 1, pp. 201–234. DOI: 10.1146/annurev-economics-063016-103705
5. Becker R., Teney C. Understanding high-skilled intra-European migration patterns: the case of European physicians in Germany. *J. Ethn. Migr. Stud.*, 2020, vol. 46, no. 9, pp. 1737–1755. DOI: 10.1080/1369183X.2018.1561249
6. Teney C. Immigration of highly skilled European professionals to Germany: intra-EU brain gain or brain circulation? *Innov. Eur. J. Soc. Sci. Res.*, 2021, vol. 34, no. 1, pp. 69–92. DOI: 10.1080/13511610.2019.1578197
7. Andersson D.E. Brain Drain and Brain Gain: The Global Competition to Attract High-Skilled Migrants, edited by Tito Boeri, Herbert Brücker, Frédéric Docquier, and Hillel Rapoport. *J. Reg. Sci.*, 2013, vol. 53, no. 2, pp. 351–353. DOI: 10.1111/jors.12024_2
8. Adeniyi M.A., Efuntoye O., Popoola G., Adebayo O., Ekundayo O., Ibiyo M., Igbokwe M.C., Ogunsuji O. [et al.]. Profile and determinants of intention to migrate by early career doctors in Nigeria: A report from CHARTING study. *Int. J. Health Plann. Manage.*, 2022, vol. 37, no. 3, pp. 1512–1525. DOI: 10.1002/hpm.3422
9. Ryazantsev S.V., Ochirova G.N. The impact of Labour Migration on the Sustainable Development of Central Asia. *PONTE*, 2019, vol. 75, no. 7, pp. 86–99. DOI: 10.21506/j.ponte.2019.7.9
10. Dzushupov K., Lucero-Prisno D.E., Vishnyakov D., Lin X., Ahmadi A. COVID-19 in Kyrgyzstan: Navigating a way out. *J. Glob. Health*, 2021, vol. 11, pp. 03020. DOI: 10.7189/jogh.11.03020
11. Vishniakov D., Kasiev N., Abdrasulova F. Healthcare system efficiency and its drivers in pre- and COVID-19 pandemic settings. *Business, Manag. Econ. Eng.*, 2023, vol. 21, no. 2, pp. 293–310. DOI: 10.3846/bmee.2023.20409
12. OECD. Recent Trends in International Migration of Doctors, Nurses and Medical Students. Paris, OECD Publishing, 2019. DOI: 10.1787/5571ef48-en
13. van Dalen H.P., Henkens K. Emigration Intentions: Mere Words or True Plans? Explaining International Migration Intentions and Behavior. *SSRN*, 2008. DOI: 10.2139/ssrn.1153985
14. Cairns D., Growiec K., Smyth J. Spatial reflexivity and undergraduate transitions in the Republic of Ireland after the Celtic Tiger. *J. Youth Stud.*, 2012, vol. 15, no. 7, pp. 841–857. DOI: 10.1080/13676261.2012.683404
15. Plopeanu A.-P., Homocianu D., Mihăilă A., Crișan E., Bodea G., Bratu R.-D., Airinei D. Exploring the Influence of Personal Motivations, Beliefs and Attitudes on Students' Post-Graduation Migration Intentions: Evidence from Three Major Romanian Universities. *Appl. Sci.*, 2018, vol. 8, no. 11, pp. 2121. DOI: 10.3390/app8112121
16. Ivlevs A., King R.M. Family Migration Capital and Migration Intentions. *J. Fam. Econ. Iss.*, 2012, vol. 33, pp. 118–129. DOI: 10.1007/s10834-011-9269-9
17. Suciú Ş.M., Popescu C.A., Ciunageanu M.D., Buzoianu A.D. Physician migration at its roots: a study on the emigration preferences and plans among medical students in Romania. *Hum. Resour. Health*, 2017, vol. 15, pp. 6. DOI: 10.1186/s12960-017-0181-8
18. Kabbash I., El-Sallamy R., Zayed H., Alkhyate I., Omar A., Abdo S. The brain drain: why medical students and young physicians want to leave Egypt. *EMHJ*, 2021, vol. 27, no. 11, pp. 1102–1108. DOI: <https://doi.org/10.26719/emhj.19.049>
19. Hossain N., Shah N., Shah T., Lateef S.B. Physicians' Migration: Perceptions of Pakistani Medical Students. *J. Coll. Physicians Surg. Pak.*, 2016, vol. 26, no. 8, pp. 696–701.
20. Goštautaitė B., Bučiūnienė I., Milašauskienė Ž., Bareikis K., Bertašiūtė E., Mikėlionienė G. Migration intentions of Lithuanian physicians, nurses, residents and medical students. *Health Policy*, 2018, vol. 122, no. 10, pp. 1126–1131. DOI: 10.1016/j.healthpol.2018.07.001
21. Gouda P., Kitt K., Evans D.S., Goggin D., McGrath D., Last J., Hennessy M., Arnett R. [et al.]. Ireland's medical brain drain: migration intentions of Irish medical students. *Hum. Resour. Health*, 2015, vol. 13, pp. 11. DOI: 10.1186/s12960-015-0003-9

22. Miller I. Review of “Doctors for Export”: Medical Migration from Ireland, c.1860–1960, by Greta Jones. *Bull. Hist. Med.*, 2023, vol. 97, no. 1, pp. 163–165. DOI: 10.1353/bhm.2023.0014
23. Dohlman L., DiMeglio M., Hajj J., Laudanski K. Global Brain Drain: How Can the Maslow Theory of Motivation Improve Our Understanding of Physician Migration? *Int. J. Environ. Res. Public Health*, 2019, vol. 16, no. 7, pp. 1182. DOI: 10.3390/ijerph16071182
24. Krajewski-Siuda K., Szromek A., Romaniuk P., Gericke C.A., Szpak A., Kaczmarek K. Emigration preferences and plans among medical students in Poland. *Hum. Resour. Health*, 2012, vol. 10, pp. 8. DOI: 10.1186/1478-4491-10-8
25. Stankūnas M., Lovkytė L., Padaiga Ž. Lietuvos gydytojų ir rezidentų ketinimų dirbti Europos Sąjungos šalyse tyrimas [The survey of Lithuanian physicians and medical residents regarding possible migration to the European Union]. *Medicina (Kaunas)*, 2004, vol. 40, no. 1, pp. 68–74 (in Lithuanian).
26. Sancak B., Selek S.N., Sarı E. Depression, anxiety, stress levels and five-factor personality traits as predictors of clinical medical students’ migration intention: A cross-sectional study of brain drain. *Int. J. Health Plann. Manage.*, 2023, vol. 38, no. 4, pp. 1015–1031. DOI: 10.1002/hpm.3646
27. Nadir F., Sardar H., Ahmad H. Perceptions of medical students regarding brain drain and its effects on Pakistan’s socio-medical conditions: A cross-sectional study. *Pak. J. Med. Sci.*, 2023, vol. 39, no. 2, pp. 401–403. DOI: 10.12669/pjms.39.2.7139
28. Avdeev A.A., Troitskaya I.A. Features and factors of demographic dynamics in the Kyrgyz Republic. *Popul. Econ.*, 2021, vol. 5, no. 2, pp. 29–54. DOI: 10.3897/popecon.5.e67183

Kasiev N.K., Vishniakov D.V. Medical students’ migration intentions: risk factor and challenge for the healthcare system in Kyrgyzstan. Health Risk Analysis, 2024, no. 1, pp. 128–140. DOI: 10.21668/health.risk/2024.1.13.eng

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