



Socioeconomic background of students in Mashhad University of Medical Sciences: A comparative study

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Background: Various factors have been found to affect the medicine study and academic performance of medical students, among which the socioeconomic factors seem to have a major role in applicants' success when they enter medical schools. The purpose of this study was to investigate the socioeconomic status of medical students of Mashhad University of Medical Sciences and to compare it with those of surgical technology, occupational health, and environmental health students.

Methods: Data regarding demographic characteristics, parental education, occupation, income, number of siblings, marital status, and schooling of students were collected by using a questionnaire. Moreover, some data were checked with Students' Electronic Database of Mashhad University of Medical Sciences.

Results: Medical students have better socioeconomic status than other students ($p=0.029$). Specifically, they have more educated parents ($p\leq 0.05$) with more professional jobs ($p<0.039$), have fewer siblings ($p=0.006$) and encounter less economic challenges ($p<0.0001$). In addition, during their high school education, medical students attended more fee-paying schools than state schools ($p<0.0001$).

Conclusion: There are obvious socioeconomic differences between medical students and other students in this study. To decrease the inequalities in medical schools, it is important to address socioeconomic issues when considering potential applicants for medical education.

Keywords: Medical student, Medical education, Socioeconomic status

الخلفية الاجتماعية والاقتصادية لطلاب جامعة مشهد للعلوم الطبية: دراسة مقارنة

خلفية: من الواضح ان العوامل المؤثرة على قرار دراسة الطب والأداء الأكاديمي لطلاب الطب هي مختلفة و متنوعة. فيما بينها يبدو أن العوامل الاجتماعية والاقتصادية لها دور رئيسي في نجاح المتقدمين لدخول المدارس الطبية. كان الغرض من هذه الدراسة هو استكشاف الحالة الاجتماعية والاقتصادية لطلاب الطب في جامعة مشهد للعلوم الطبية ومقارنتها مع طلاب المرحلة الجامعية من التكنولوجيا الجراحية والصحة المهنية والصحة البيئية في نفس الجامعة.

الطريقة: تم جمع البيانات من خلال استبيان عن الخصائص الديموغرافية، والحالة التعليمية والمهنة والدخل للابوين، وعدد أطفال عائلة الأب، والحالة الزوجية، ونوع المدارس الثانوية قبل دخول الجامعة. بالإضافة إلى ذلك، تم تطابق البيانات مع المعلومات الموجودة في قاعدة بيانات طلاب الجامعات بشكل عام.

النتائج: يتمتع طلاب الطب بوضع اجتماعي اقتصادي أفضل من الطلاب الآخرين ($p=0.029$). على وجه التحديد، لديهم أبوين أكثر في الدرجة التعليمية ($p\leq 0.05$) مع وظائف أكثر احتمالاً ($p=0.039$)، ولديهم عدد أقل من الأخوة والاحوات ($p=0.006$) و يواجهون تحديات اقتصادية أقل ($p<0.0001$). بالإضافة إلى ذلك، كان عدد طلاب الطب الذين كانوا متعلمين في المدارس الثانوية غير الحكومي أعلى ($p<0.0001$).

الخلاصة: هناك اختلافات اجتماعية واقتصادية واضحة بين طلاب الطب والطلاب الآخرين في هذه الدراسة. لتقليل عدم المساواة في المدارس الطبية، من المهم النظر في الحالة الاجتماعية والاقتصادية للمتطوعين الذين يدخلون الجامعة والنظر في هذه الظروف.

الكلمات المفتاحية: طالب الطب، التعليم الطبي، الوضع الاجتماعي والاقتصادي

مطالعه مقایسه‌ای وضعیت زمینه‌ای اجتماعی اقتصادی دانشجویان دانشگاه علوم پزشکی مشهد

زمینه و هدف: عوامل مختلفی در تصمیم افراد برای تحصیل پزشکی و عملکرد آنها در طی دوران تحصیل پزشکی تأثیرگذار هستند. در بین این عوامل، به نظر می‌رسد که عوامل اجتماعی اقتصادی نقش مهمی در موفقیت داوطلبین برای ورود به دوره پزشکی داشته باشند. هدف از مطالعه حاضر بررسی وضعیت اجتماعی اقتصادی دانشجویان پزشکی دانشگاه علوم پزشکی مشهد و مقایسه آن با دانشجویان رشته‌های کارشناسی اتاق عمل، بهداشت حرفه‌ای و بهداشت محیط شاغل به تحصیل در این دانشگاه بوده است.

روش: داده‌ها در ارتباط با مشخصات دموگرافیک، وضع تحصیلی، شغل و درآمد والدین، تعداد فرزندان خانواده پدری، وضع تاهل و نوع دبیرستان دانشجویان رشته‌های مختلف از طریق پرسشنامه جمع آوری شد. علاوه بر آن، داده‌ها با اطلاعات موجود در بانک اطلاعاتی دانشجویان دانشگاه به طور کلی مطابقت داده شد.

یافته‌ها: دانشجویان پزشکی وضع اجتماعی اقتصادی بهتری از سایر دانشجویان داشتند ($p=0.029$). به طور خاص، دانشجویان پزشکی، والدین با تحصیلات عالی بیشتر ($p\leq 0.05$) با مشاغل حرفه‌ای‌تر ($p=0.039$) داشتند و تعداد خواهر و برادر کمتر ($p=0.006$) و چالش‌های اقتصادی محدودتری ($p<0.0001$) را گزارش کردند. علاوه بر این، تعداد دانشجویان پزشکی که در دبیرستانهای غیرانتفاعی تحصیل کرده بودند بیشتر بود ($p<0.0001$).

نتیجه‌گیری: تفاوت آشکاری در وضعیت اجتماعی اقتصادی دانشجویان پزشکی و سایر دانشجویان بررسی شده در این مطالعه وجود داشت. برای کاهش نابرابری در دانشکده‌های پزشکی، رسیدگی به وضع اجتماعی اقتصادی داوطلبین ورود به دانشگاه و در نظر گرفتن این شرایط حائز اهمیت است.

واژه‌های کلیدی: دانشجوی پزشکی، تحصیل پزشکی، وضع اجتماعی اقتصادی

مشهد یونیورسٹی آف میڈیکل سائنس میں میڈیکل طلباء کے سماجی اور اقتصادی بیک گراؤنڈ کا جائزہ

بیک گراؤنڈ: مختلف وجوہات کی بنا پر لوگ میڈیکل کالج میں داخلہ لیتے ہیں اور ان کی رفتار و گفتار ان کی تعلیم کے دوران ان کی شخصیت پر اثر انداز ہوتی ہے۔ ایسا لگتا ہے کہ سماجی اور اقتصادی عامل میڈیکل کالجوں میں داخلہ لینے کا سب سے اہم عامل ہے۔ اس تحقیق کا هدف مشهد یونیورسٹی آف میڈیکل سائنس میں تعلیم حاصل کرنے والے طلباء کے سماجی اور اقتصادی بیک گراؤنڈ کا جائزہ لینا اور آپریشن روم کے تکنیشن، پروفیشنل میڈیکل سروسز اور اسپتالوں اور طبی مراکز کی صفائی ستھرائی سے ان کا مقابلہ کرنا ہے۔

روش: تحقیق کے لئے ایک سوالنامہ بنایا گیا جس میں ڈیموگرافیک تفصیلات، پڑھائی کی صورتحال، والدین کا کام اور آمدنی جیسے مسائل پر سوالات پوچھے گئے تھے، اس کے علاوہ ڈیٹا کو یونیورسٹی میں موجود ڈیٹا بینک سے مکمل طرح سے مطابقت دی گئی۔

نتیجے: میڈیکل اسٹوڈنٹس دوسرے شعبوں میں تعلیم حاصل کرنے والے طلباء سے بہتر سماجی اور اقتصادی صورتحال کے حامل تھے۔ ان کے والدین نے اعلیٰ تعلیم حاصل کی تھی اور اپنے کام میں پیشہ ورانہ مہارت کے حامل تھے۔ ان کے کنبے میں زیادہ لوگ نجیب تھے اور انہیں اقتصادی مسائل کا بہت کم سامنا کرنا پڑتا تھا، میڈیکل طلباء میں ان لڑکوں کی تعداد زیادہ تھی جنہوں نے پرائیویٹ اسکولوں میں تعلیم حاصل کی تھی۔

سفرارشی: چونکہ میڈیکل طلباء کی اقتصادی اور سماجی صورتحال اور دیگر طبی شعبوں کے طلباء کی اقتصادی اور سماجی پوزیشن میں خاصہ فرق دیکھا گیا تھا لہذا اس خلیج کو پر کرنے کی کوشش کرنی چاہیے۔

کلیدی الفاظ: میڈیکل طلباء، میڈیکل تعلیم، سماجی اور اقتصادی

INTRODUCTION

Reducing inequalities in health services to underserved parts of community is a priority for health systems in developing countries. Policy makers should select what type of students should be recruited to their training units. Also they have to determine the needed curriculum and support mechanisms, so that their graduates commit to their missions and allocating strategies more efficiently and effectively (1).

In Iran, there is a nation-wide university 'Entrance Exam' for high school graduates. When being accepted, the medical students enter the medical education. Unlike US and Canada, there is no need for college or undergraduate trainings in Iran. This means that the decision to study medicine is made in a younger age and may be affected to a large extent by parental and environmental factors. While in many countries extensive researches performed and published on the familial and social context of medical students, such information is missing in Iran. Having these background data have twofold importance. In one hand, detailed information on medical students are needed for planning, especially when there is a mission to ask graduate to serve in rural or remote areas. On the other hand, decision makers have to focus their intervention on the most vulnerable areas because of the limited resources which are especially focused in developing countries.

This study was planned to provide basic data on socioeconomic status (SES) of medical and dentistry students to compare them with students of other fields with less competitive grades in Entrance Exam (namely surgical technology, occupational health and environmental health) in Mashhad University of Medical Sciences. The results could help in planning future researches and policy making.

METHODS

A cross-sectional study was performed on all students entered Mashhad University of Medical Sciences (MUMS) in the October 2011 in the following fields: Medicine, Dentistry, Surgical technology, Occupational health, and Environmental health. The field of studies were arbitrary selected (based on expert opinion) to include highly competitive ('doctorate degrees') and less competitive fields. Although not completely inclusive, this could approximately represent the two ends of the spectrum of MUMS' students. The study took place in 2011 / 2012 and was the M.Sc. thesis project of one of the authors approved by the School of Medical Education, Shahid Beheshti University of Medical Sciences. Participation in the study was voluntary and the study protocol was approved by the Ethical Committee of MUMS. The study adhered to the tenets of Declaration of Helsinki and all ethical codes were respected through the especial, high intentness of the anonymity of data. During the first week of entrance to the academic education, a questionnaire was provided to the students and after describing the aim and scope of the study, they were asked to fill it in a convenient time and handed it to the researcher or place it in a provided box. The students could return blank questionnaire or refuse to accept it in the first place. The questionnaire had a mixture of open ended, multiple-choice, and Likert type questions. The Likert type questions were used as an alternative to provide estimates of family income: participants could either provide approximate income or mark on a Likert scale how sufficient the family income for their expenses is. The validity and reliability of the questionnaire were evaluated and confirmed in a pilot phase and the socioeconomic aspects of the questions were validated for the Iranian nationality in a previous study (2,3). Weighting of different aspects of SES was done based on previous study (Table 1).

Table 1. Socioeconomic scoring scheme, used in this study

Variable	Variable Weight	Subgroups	Scores
Education	12 of 31	Illiterate	2
		Primary School	4
		Secondary School	6
		B.Sc.	9
		M.Sc. and Higher	12
Job	8 of 31	Farmer; Simple Worker	2
		Shopkeeper, Housekeeper	4
		Simple Governmental employer	6
		Higher governmental employer; Engineer; Physician	8
Residency	8 of 31	Tehran	8
		Province Capital City	6
		City	4
		Village	2
Number of Children	3 of 31	1-2	3
		3-4	2
		More than 5	1

Based on the level of skill and education needed for a job, the parents' occupations were roughly classified to low- and high- profile groups. Accordingly, low profile jobs were farmer, simple worker, shopkeeper, home keeper, and high-profile jobs included: simple governmental employer, higher governmental employer, engineer, and physician. According to this weighting scheme, the SES ranged between 7 and 31 for questionnaire-based data.

As an independent source of data, and after the approval of the authority of MUMS, some data in the questionnaire were gathered from the Students' Electronic Database of MUMS, governed by the Educational Office and used as a base for double-checking the data. However, this Data Bank included a larger number of students, because some students moved from other universities to MUMS or passed the 'Entrance Exam' in previous years, but attended the 2011-entered group; however, this reduced the purity of data. In addition, the databank lacked information on number of siblings and hence, the SES based on its data ranged between 6 and 28. Normal distribution of quantitative data was evaluated using Kolmogorov-Smirnov test and Shapiro Wilk test. Mann-Whitney U test was used to compare numerical data without normal distribution and independent sample students't-test was used to compare normally distributed numerical data. To compare categorical data, chi-square test was used. A

regression analysis was done to test the possible confounding effect of variables. The significance level was set at $p < 0.05$ level. All of statistical analyses were carried out using SPSS software (SPSS Science Inc., Chicago, Illinois, USA).

RESULTS

From 148 medical/ dentistry (Group A; doctorate degree) and 92 surgical technology, occupational health, and environmental health students (Group B; Lower than doctorate degree), 65 (43.9%) and 38 students (41.3%) responded to the questionnaire, respectively. There was no significant difference in response rate ($p = 0.792$). The data for a larger proportion of students were available in the Electronic Database of the University and they were analyzed separately. In both groups the female students were dominant: 59% and 62.8% in group A and B, respectively; however, the difference was not statistically significant ($p = 0.441$). Mean \pm standard deviation of students' age was 18.70 ± 1.24 (range: 16 – 27) and 21.88 ± 4.5 (range: 18 – 43) years in Group A and Group B, respectively; the difference was statistically significant ($p < 0.0001$).

The SES of students was studied based on their parents' education, job, income, number of siblings, type of housing, and geographic area of residence. These data are presented in Table 2.

Table 2. Comparison of different socioeconomic aspects of medical/ dentistry students (Group A) and surgical technique, occupational health and environmental health (Group B) in the study

Variable	Questionnaire			University Data Base		
	Group A	Group B	p Value	Group A	Group B	p Value
School Type	Non-fee paying	9 (13.8%)	28 (75.7%)	NA		NA
	Fee-paying	56 (86.2%)	9 (24.3%)	NA		NA
Father's Age	49.48 ± 5.45	50.85 ± 8.18	0.33	NA		NA
Mother's Age	43.13 ± 5.20	45.47 ± 6.73	0.05	NA		NA
Father's Education	Less than B.Sc.	29 (46.8%)	23 (67.6%)	106 (50%)	156 (87.2%)	<0.0001
	B.Sc. or Higher	33 (53.2%)	11 (32.4%)	106 (50%)	23 (12.8%)	
Mother's Education	Less than B.Sc.	34 (54.0%)	30 (85.7%)	128 (60.4%)	171 (95.5%)	<0.0001
	B.Sc. or Higher	29 (46%)	5 (14.3%)	84 (39.6%)	8 (4.5%)	
Father's Job	Low profile job	2 (3.2%)	5 (14.7%)	16 (7.6%)	56 (31.5%)	<0.0001
	High profile job	60 (96.8%)	29 (85.3%)	194 (92.4%)	122 (68.5%)	
Mother's Job	Low profile job	35 (55.6%)	27 (77.1%)	124 (58.5%)	159 (89.3%)	<0.0001
	High profile job	28 (44.4%)	8 (22.9%)	88 (41.5%)	19 (10.7%)	
Sufficiency of Parental Income	Yes	59 (90.8%)	23 (62.2%)	NA		NA
	No	6 (9.2%)	14 (37.8%)	NA		
Father's Income (Median [IQR]; x10,000 Rls)	NA		NA	700 [900]	300 [657.5]	<0.0001
Mother's Income (x10,000 Rls)	NA		NA	500 [640]	50 [495]	0.025
Number of Siblings	2.63 ± 1.30	3.49 ± 1.67	0.006			
Residence Area	Capital City	2 (3.3%)	1 (2.8%)	11 (5.2%)	5 (2.8%)	0.019
	Large City	25 (41.0%)	23 (63.9%)	111 (52.4%)	76 (42.5%)	
	Small City	29 (47.5%)	11 (30.6%)	77 (36.3%)	73 (40.8%)	
	Rural Area	5 (8.2%)	1 (2.8%)	13 (6.1%)	25 (14.0%)	
Overall SES score	20.03 ± 3.65	18.28 ± 3.58	0.029	17.87 ± 3.35	13.93 ± 3.53	<0.0001

Low profile jobs: Farmer, Simple worker, Shopkeeper, Home keeper; *High profile jobs:* Simple governmental employer, Higher governmental employer, Engineer, Physician; *IQR:* interquartile range; *NA:* not available or not applicable

8.1% of students' fathers in Group A and 2.8% of them in Group B were physicians. In addition, mothers of 3.2% of students in Group A were physicians, while the mothers of no students in group B were physicians. The difference in number of students with a physician parent was not statistically significant; however, the study had a limited power to detect such a difference. In a linear regression, the most significant differences between group A and group B were in high school type, father's age, residence area, number of siblings, and sufficiency of parental income (Table 3).

Table 3. Linear regression model with field of study as dependent variable in the model (medical/dentistry students (Group A) and surgical technique, occupational health and environmental health (Group B) in the study

Variable	Beta	P Value
Age	1.463	0.019
Father's age	-0.416	0.007
Father's education	-0.306	0.503
Father's job	0.644	0.226
Mother's age	-0.012	0.923
Mother's education	-0.321	0.517
Mother's job	0.687	0.168
Residence area	-1.870	0.049
Housing type	-1.094	0.467
Number of siblings	1.014	0.030
Income sufficiency	-3.837	0.007
Gender	-0.627	0.600
High school type	-1.636	0.004

DISCUSSION

In the present study, the socioeconomic status of students was evaluated and there was found a striking significant difference in socioeconomic status between medical/dentistry student and surgical technology, occupational health and environmental health students in MUMS, perhaps in other medical universities in Iran as well.

Sprinthall highlighted the cardinal role of parents in children learning through providing home educational materials (4). Obviously, highly educated parents could have a greater effect on their children learning and their school performance too. Moreover, favorable economic status of the households provides a more stable learning environment for the children.

Socioeconomic status of students could affect their preference for the future workplace. Karalliedde et al. demonstrated that 73% of medical students in Sri Lanka prefer to practice in their home town after graduation (5). In a study on Canadian medical students, Dhalla et al. reported a similar trend in medical students (6). They also reported that medical students were less likely than general Canadian population to be from rural area (10.8% vs. 22.4%; $p < 0.001$). Furthermore, medical students had a better

socioeconomic status as indicated by having parents with higher education, better jobs, and greater incomes. A total of 15.6% of medical students had a physician parent (6). This figure is highly similar to the findings of this study.

Heath et al. reported on socio-demographic characteristics and parental background of medical students in Otago, New Zealand (7). They reported that 55.2% of medical students had at least one parent with a professional occupation and 13.1% of students had at least a physician parent; however, parents of 63.2% of medical students had university education. These researchers concluded that medical students in New Zealand come from higher socioeconomic parts of the society. Also they reported that this condition remained relatively stable during 14 years of study (7). Fitzjohn et al. reported similar results in New Zealand medical students. They concluded that medical students are more likely to be socioeconomically advantaged especially from an urban community (8). These authors concluded that with regard to the shortage of practitioners in rural and lower socioeconomic areas of New Zealand, these differences are worrying (8). We found similar differences in medical students in Iran; the difference in socioeconomic background of medical students in Iran could affect their future workforce, therefore revising the current selection criteria of medical students and encouraging socioeconomically deprived students to participate in medical education seem to be necessary.

Woo and colleagues demonstrated that socioeconomic background of medical students affect their perceptions of medical conditions toward patients with different socioeconomic status. In their series, 52% of students had high SES, 18% had low SES and 30% had mid-level SES. Noticeably, medical students had negative perceptions of low SES patients. However, low SES students were more willing to accept low SES patients in their practice (9). This finding suggests that for practitioners to be effective in deprived area with poor socioeconomic condition, they should be selected from similar socioeconomic backgrounds. These findings suggest that for allocation of recently graduated physicians to social services and family physician programs in Iran, the policy makers should consider the socio-demographic background of medical students. Therefore, to have enough graduates to serve in rural area, this should be planned in the national entrance exam rather than on graduation.

Kwong et al. reported that there are several barriers for participation of students from rural areas in medical education (10). Canadian medical students who come from rural background face numerous financial barriers in obtaining a proper medical education and report a higher level of financial stress. The authors advised that medical schools should address barriers to admission of rural students and should direct more financial resources toward vulnerable groups financially (10). We believe that this is especially relevant to our country, since students from rural area with lower SES need greater financial and social supports when entering medical schools.

Hensel et al. demonstrated that medical students with rural backgrounds in Canada have the same academic performance with non-rural students. They proposed that

the differences in proportion of rural students in medical schools root in their lower application to study medicine (11). The authors concluded that to increase physician supply in rural areas, the students' concealed preferences which were established before their enrolment should be addressed. Particularly, medical schools should encourage more rural students to apply for medicine (11). Contrary to these findings, Yinusa and Basil reported that socioeconomic factors influence medical students' academic performance in Nigeria and suggested that proper funding of education by government, sensitization of parents towards their children education, and eradication of poverty are necessary steps for improvement of educational performance in their medical schools (12). Regarding the particular economic and social conditions in Iran, the results of both studies could potentially be applied to the Iranian medical students.

Fan et al. reported that socioeconomic factors have significant association with medical students' mental and physical health (1). These authors demonstrated that greater difference in parents' education is associated with more stress, hopelessness, and pessimism in the student. In addition, low maternal SES influences medical students' personal and professional development more negatively. These findings had special implications in providing proper support mechanisms for this group of students (1).

Ferguson et al. investigated predicting factors for applying to study medicine in UK and demonstrated that female, non-white, and higher socioeconomic students were more likely to apply to study medicine. However, in their applying to study medicine, the socio-demographic inequalities in entrance exam performance were reduced or abolished. These authors argued that early interventions are needed to increase applications for certain groups to reduce socio-demographic inequalities in medical school admissions (13). However, in a recent study done by Kumwenda et al., there was still significant bias toward higher SES in medical school entrance (14). To reduce this inequality in student selection and diversifying medical graduates, proper interventions have been proposed (15, 16). This suggests that intervening in decision making process for the field of study before

participation in National Entrance Exam could improve students' performances in Iran as well.

The present study had several limitations. Most importantly, there was a low response rate of the questionnaire. However, the independent data provided by the Students' Electronic Database of the University were used to check any bias in the responder and similar results with minor differences yielded by both set of data. Furthermore, the results were limited to students applying to MUMS. With respect to geographic distance of Mashhad with other locations in Iran, a specific subset of student might apply to MUMS and this could reduce the generalizability of data to other universities in Iran. We suggest a nation-wide study to investigate the SES of students in other medical universities in Iran.

In summary, to the best of our knowledge, this study demonstrated, for the first time, that there is a great socioeconomic difference between medical/ dentistry students and lower grade students in Mashhad University of Medical Sciences. This difference could affect their future work patterns and preferences. Policy makers in Ministry of Health should consider these differences while selecting the medical students.

Ethical considerations

Ethical issues (Including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, redundancy, etc.) have been completely observed by the authors.

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REFERENCES

1. Fan AP, Chen CH, Su TP, Shih WJ, Lee CH, Hou SM. The association between parental socioeconomic status (SES) and medical students' personal and professional development. *Annals of the Academy of Medicine, Singapore*. 2007;36(9):735-42.
2. Eslami Y, Amini H, Zarei R, Fakhraie G, Moghimi S, Mohammadi SF, et al. Socioeconomic Factors and Disease Severity at Glaucoma Presentation. *Iranian Journal of Ophthalmology*. 2011;23(2):19 - 26.
3. Garmarudi G, Moradi A. Development of a tool to measure socioeconomic status in Tehran. *Payesh*. 2010; 9 (2): 137-144. Persian.
4. Sprinthall E. *Educational Psychology. A Development Approach*. 2nd Edition. New York: Addeson Wesley; 1987.
5. Karalliedde LD, Premadasa IG. Socio-economic status and aspirations of Third World medical entrants: a Sri Lankan study. *Med Teach*. 1988;10(1):101-4.
6. Dhalla IA, Kwong JC, Streiner DL, Baddour RE, Waddell AE, Johnson IL. Characteristics of first-year students in Canadian medical schools. *CMAJ: Canadian Medical Association journal = journal de l'Association medicale canadienne*. 2002;166(8):1029-35.
7. Heath C, Stoddart C, Green H. Parental backgrounds of Otago medical students. *The New Zealand medical journal*. 2002;115(1165):U237.
8. Fitzjohn J, Wilkinson T, Gill D, Mulder R. The demographic characteristics of New Zealand medical students: the New Zealand Wellbeing, Intentions, Debt and Experiences (WIDE) Survey of Medical Students 2001 study. *The New Zealand medical journal*. 2003;116(1183):U626.
9. Woo JK, Ghorayeb SH, Lee CK, Sangha H, Richter S. Effect of patient socioeconomic status on perceptions of first- and second-year medical students. *CMAJ: Canadian Medical Association journal = journal de l'Association medicale canadienne*. 2004;170(13):1915-9.
10. Kwong JC, Dhalla IA, Streiner DL, Baddour RE, Waddell AE, Johnson IL. A comparison of Canadian medical students from rural and non-rural backgrounds. *Canadian journal of rural medicine: the official journal of the Society of Rural*

- Physicians of Canada = Journal canadien de la medecine rurale : le journal officiel de la Societe de medecine rurale du Canada. 2005;10(1):36-42.
11. Hensel JM, Shandling M, Redelmeier DA. Rural medical students at urban medical schools: Too few and far between? *Open Med.* 2007;1(1):e13-7.
12. Yinusa MA, Basil AO. Socio-Economic Factors Influencing Students Academic Performance in Nigeria: Some Explanation from a Local Survey. *Pakistan Journal of Social Sciences.* 2008;5(4):319 - 23.
13. Ferguson E, James D, Yates J, Lawrence C. Predicting who applies to study medicine: implication for diversity in UK medical schools. *Med Teach.* 2012;34(5):382-91.
14. Kumwenda B, Cleland J, Greatrix R, MacKenzie RK, Prescott G. Are efforts to attract graduate applicants to UK medical schools effective in increasing the participation of under-represented socioeconomic groups? A national cohort study. *BMJ Open.* 2018;8(2):e018946.
15. Kumwenda B, Cleland JA, Prescott GJ, Walker K, Johnston PW. Relationship between sociodemographic factors and selection into UK postgraduate medical training programmes: a national cohort study. *BMJ Open.* 2018;8(6):e021329.
16. Terregino CA1, Saguil A, Price-Johnson T, Anachebe NF, Goodell K. The Diversity and Success of Medical School Applicants with Scores in the Middle Third of the MCAT Score Scale. *Acad Med.* 2019 Aug 13. doi: 10.1097/ACM.0000000000002941.