

Original Article

Factors Influencing Medical Students' Choice of Future Specialization in Medical Sciences: A Cross-Sectional Questionnaire Survey from Medical Schools in China, Malaysia and Regions of South Asian Association for Regional Cooperation

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Abstract

Background: In future, increase in the number of healthcare professionals is dependent on the career interest among present undergraduate medical students. Based on their interest to pursue their specialty, the availability of medical doctors in each specialty could be done. **Aims:** This study was to find out future career interest and factors that influence undergraduate medical students to choose their future specialization. **Materials and Methods:** The study was carried out among first-year medical students from five countries. The students were asked to complete an 8-item questionnaire. Two thousand one hundred fifty three participants were enrolled in the study. Data were analyzed in Microsoft-Excel and Statistical Package for the Social Sciences. **Results:** Of the 2153 participants, only 1470 responded. Among the 1470 participants, 169 participants were excluded due to the ambiguity in responses, finally making it to 1301 participants. Among them, Anatomy (49.3%) followed by Biochemistry (26.7%) and Physiology (24%) were the most preferred subjects. **Conclusions:** Anatomy was the most preferred basic science subject among the other subjects and the students were interested to pursuing surgery in future. Furthermore, the most preferred future specialties were surgery, internal medicine and pediatrics with gender variations; males preferring surgery and females in obstetrics and gynecology.

Keywords: China, First year medical students, Malaysia, Medical Education, Post-Graduation, SAARC country

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Introduction

The projection for future health professionals can be met based on the career interest of the present undergraduate medical students who are pursuing their MBBS degree.^[1] Based on the students' interest in pursuing their specialty and super-specialty subjects, the availability of medical

professionals could be projected in each specialty. If the factors which influence the medical students to choose specific specialty are identified during their training period of the pre- and para-clinical modules, can be modified to stimulate interest in choices that are not preferred by them.^[2] The major motive of most of the medical students is to choose specialty which would be lucrative in future.^[3] Career options for medical students in choosing postgraduate (PG) subjects of choice are wide due to the availability of more PG seats in private medical colleges. Also the financial status of their parents and educational loans from banks do not create any financial burden, which is required to pay up high fees for their postgraduate specialties.^[4] In most cases, it is observed that students never wishes to take up basic science specialty, as their knowledge and skills

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become limited to teaching and learning activities and is very restricted.^[5] To suffice the needs of basic medical science teachers, medical colleges have started master and doctorate programs in medical streams especially in Anatomy, Physiology, Biochemistry, Microbiology, and Pharmacology. These programs have fulfilled the need of basic science teachers to some extent in medical colleges.

There is need to find out what motivates the students to take up certain specialty of their choice so that the balance in medical doctors among various specialties is maintained. Research studies conducted in India observed that educational loans and life style factors may be the determining factors for the choice of specialty by the students.^[6] Similarly, in Malaysia and China, government sanctions scholarship to those students who are interested to pursue MBBS based on their merits. Based on the above facts, our objectives of undertaken study was to understand, the possibilities of variable backgrounds in opting their future specialization. Also, the results generated from the current study would help the medical councils of the respective countries to modify and plan an alternative to increase the medical doctors in the various specialties including basic sciences.

Materials and Methods

Study design and the participants

The study was carried out among the first year medical students from five countries, namely China, Sri Lanka, Nepal, India and Malaysia during the month of March 2011-April 2012. A total of 2153 participants took part in the study. In the initial stage of the study, the questionnaire was pre-tested among ten medical students of first and second semesters from each medical school of five countries and the data generated were not included in the study. Initially, we distributed the questionnaires to 2153 medical students of which only 1470 responded to the questionnaires. Non-respondents were excluded in the first stage. We found an ambiguity in their responses of 169 students among the 1470 students, since they marked more than one choice and hence we excluded 169 responded from the study. Thus of the 2153 medical students, only 1301 medical students were selected and those data were analyzed.

Questionnaire design

The students were asked to complete 8-item questionnaire, which consisted of three parts. The first part collected demographic and other relevant information about the medical students. The sex and nationality, the parents' qualifications and professions were also included in the questionnaire. The questionnaire used in the study is shown in the Appendix-I. The questionnaire was pre-

Appendix-I

Questionnaire of Medical student's perspective towards Post graduate studies

Item 1:	Age:	Sex:
Item 2:	Location:	
Item 3:	Father's Qualifications and Profession:	
Please tick (√):	Illiterate / Xth standard/ Intermediate / BSc / MSc/ PhD/ others	
	Specify: degree	
	Profession: general physician	
Item 4:	Mother's Qualifications and Profession:	
Please tick (√):	Illiterate / Xth standard/ Intermediate / BSc / MSc/ PhD/ others	
	Specify: degree	
	Profession: dentist	
Item 5:	Which subject you would like to take for Post Graduate?	
Please tick (√):	Medicine / Surgery / OBG / Pediatrics / General Practice / Social Medicine / Public Health / Basic Medical Sciences/ others-specify	
Item 6:	Why you consider taking this subject for Post Graduate?	
Please tick (√):	Interesting disease / Patient's contact / Good Income and Quality of life / Intellectual Challenges / Early experience and knowledge / Status and Reputation / Prestige, Power and Influence	
Item 7:	Which subject was of your interest in Year I MBBS?	
Please tick (√):	Anatomy/ Physiology/Biochemistry/ Pharmacology/Microbiology/ Pathology/ Community Medicine	
Item 8:	Which Methodology of teaching suits you?	
Please tick (√):	Black Board teaching / Power Point Slides / Animations/ Any other	
	Specify:	
	
	<i>(Thank you for your valuable inputs)</i>	

tested in ten medical students from each institution but their data was not taken up for further analysis.

The second part of the questionnaire consisted of 2-item question, which questions about their interest in pursuing post-graduate studies and why. The third part of the questionnaire was also a 2-item question, which enquired about the opinions of the students regarding the teaching and learning interest during their embarkation of the MBBS program, and the methodology of teaching they liked the most. They were also asked to give two suggestions to improve the teaching and learning. These were analyzed and the most frequently made suggestions were noted down to obtain an idea about emerging trends.

Data collection

The data were collected and entered in MS Excel for further analysis.

Sample size calculation

For 95% confidence interval and, significance level $\alpha = 1\%$, $P = 70\%$, $Q = 30\%$, allowable error = 10%, required sample size was 218. $P =$ percentage of students selected their PG as medicine and surgery from the pilot study of 10 students from each country.

Outcome variables

Outcome variables were Medicine, Surgery, Pediatrics, General Practice, Basic Medical Sciences, and OBG.

Explanatory variables

The demographic characteristics and reason for opting factors were defined at individual level. Factors at individual level were age, country (China, India, Malaysia, Nepal and Sri Lanka), gender (Male, Female), location (Rural, Urban), father's and mother's professions and qualification (Medical, Non-Medical), interesting subjects (physiology, biochemistry and anatomy) and reasons for opting future post-graduation studies (intellectual, interests, good quality of life and early experience).

Ethical committee approval

Prior to the study, ethical committee approval was taken from the concerned Institute, where the study was conducted among the medical schools of Malaysia, China and some of the SAARC countries. The ethical approval numbers of the concerned Institute were DERC/11/34, NSMRC/10/22, MERC/3/45, IMSERC/22/13, and NSFERC/11/21.

Statistical analysis

Descriptive statistics and testing of hypothesis were used for the analysis. The data collected was analyzed using Statistical Package for the Social Sciences (SPSS)

for Windows Version16.0 (SPSS Inc; Chicago, IL, USA) and EPI Info 3.5.1 Windows Version. The associations between the different variables were tested using the Chi-square test. A P value less than 0.05 were considered statistically significant.

Results

Response rates and demographic characteristics

One thousand three hundred one respondents were analyzed for the study. Median age of the students was 21 years (inter quartile range 20, 22 years). Surgery was the most opted subject for post-graduation (37.1%) and least was pediatrics (1.1%) [Table 1]. Analysis based on country-wise response of participants in the study observed that medical students from Malaysia mostly opted for surgery (242 of 497) in their post-graduation followed by China (58 of 182), Nepal (67 of 217), Sri Lanka (58 of 194) and India (58 of 211). Obstetrics and gynecology were the most preferred post-graduate subjects (70 of 211) amongst Indian medical students and it was least opted among Malaysians (80 of 497). Of all the medical students, the inclination to choose basic medical science subjects were very minimal when compared to choosing clinical subjects [Table 1].

Gender-wise analysis revealed that males had their career choice in internal medicine (122 of 441) and surgery (319 of 441), whereas females opted for obstetrics and gynecology (313 of 860) followed by surgery (164 of 860), general practice (157 of 860) and internal medicine (156 of 860) [Table 2]. The study observed that the career choice for basic medical science subjects were minimal (56 of 860) for females of all the choices and none of the male medical students opted for it.

Table 1: Overall representation of five countries in choosing post-graduate subjects and its analysis

Characteristics	Participants n (%)	Internal medicine n (%) (95% CI)	Surgery n (%) (95% CI)	Pediatrics n (%) (95% CI)	General practice n (%) (95% CI)	Basic medical sciences n (%) (95% CI)	OBG n (%) (95% CI)	P-value
Overall	1301	277 (21.4) (19.2, 23.7)	483 (37) (34.5, 39.8)	14 (1.1) (0.6, 1.8)	157 (12.1) (10.4, 14.0)	57 (4.3) (3.3, 5.6)	313 (24) (21.8, 26.5)	
Country wise								
China	182 (14)	46 (25.8) (19.6, 32.8)	58 (31.9) (25.2, 39.2)	0	18 (9.9) (6, 15.2)	15 (7.7) (4.3, 12.6)	45 (24.7) (18.6, 31.7)	<0.001
Srilanka	194 (14.9)	49 (25.3) (19.3, 32)	58 (29.9) (23.5, 36.9)	0	18 (9.3) (5.6, 14.3)	14 (7.2) (4.0, 11.8)	55 (28.4) (22.1, 35.2)	
India	211 (16.2)	50 (23.7) (18.1, 30)	58 (27.5) (21.6, 34)	0	19 (9) (5.5, 13.7)	14 (6.6) (3.7, 10.9)	70 (33.2) (26.9, 40)	
Nepal	217 (16.7)	52 (24) (18.4, 30.2)	67 (30.9) (24.8, 37.5)	0	21 (9.7) (6.1, 14.4)	14 (6.5) (3.6, 10.6)	63 (29) (23.1, 35.6)	
Malaysia	497 (38.2)	80 (16.1) (13.0, 19.7)	242 (48.7) (44.2, 53.2)	14(2.8) (1.6, 4.8)	81 (16.3) (13.2, 19.9)	0	80 (16) (13, 19.7)	

Applied Chi-square test, statistically significance at the level of P -value 0.05

Analysis based on geographical location of the medical students revealed that most of the participants were from urban areas (1239 of 1301) and only (62 of 1301) participants were from rural areas [Table 3]. Among the students who were from urban area, the majority opted subject for post-graduate study in surgery (478 of 1239) followed by obstetrics and gynecology (282 of 1239), internal medicine (256 of 1239) and general practice (157 of 1239). Among the students who hailed from rural areas, obstetrics and gynecology were their major preference (30 of 62) followed by internal medicine (22 of 62) [Table 3]. It was observed that the preference of choosing basic science subjects were very minimal (5 of 62; 58 of 1239) among both the groups of medical students [Table 3].

The influence of family background was analyzed taking into consideration that students whose parents were from medical profession would also opt for

medicine as a career of choice, but the current study revealed more medical students from parents of non-medical profession. Surgery and general practice were the most opted postgraduate subjects (157 of 363; 148 of 159) among the medical students in case of medical professional parents, whereas in case of non-medical professional parents, surgery (326 of 938; 473 of 1142) was the most opted subject for post-graduation [Table 4].

The current study also analyzed whether there is any influence of basic science subjects in choosing specialty in clinical sciences. The study observed that the first-year students mostly preferring anatomy are (642 of 1301) participants, followed by biochemistry (347 of 1301) and physiology (312 of 1301). Of those medical students, whose interest lies in anatomy preferred to choose surgery (321 of 1301), followed by obstetrics and gynecology (312 of 1301) [Table 5]. Those who had

Table 2: Gender-wise analysis in choosing subjects in Post-Graduation

Characteristics	Participants n (%)	Internal medicine n (%) (95% CI)	Surgery n (%) (95% CI)	Pediatrics n (%) (95% CI)	General practice n (%) (95% CI)	Basic medical sciences n (%) (95% CI)	OBG n (%) (95% CI)	P-value
Male	441 (33.9)	122 (27.7) (23.6, 32.1)	319 (72.3) (67.9, 76.4)	0	0	0	0	<0.001
Female	860 (66.1)	156 (18.1) (15.7, 20.9)	164 (19.1) (16.5, 21.9)	14 (1.6) (0.9, 2.8)	157 (18.3) (15.8, 21)	56 (6.5) (5.0, 8.4)	313 (36.4) (33.2, 39.7)	

Applied Chi-square test, statistically significance at the level of P-value 0.05

Table 3: Geographical location of medical students and their preference in choosing subjects in Post-Graduation

Characteristics	Participants n (%)	Internal medicine n (%) (95% CI)	Surgery n (%) (95% CI)	Pediatrics n (%) (95% CI)	General practice n (%) (95% CI)	Basic medical sciences n (%) (95% CI)	OBG n (%) (95% CI)	P-value
Rural	62 (4.8)	22 (35.5) (23.7, 48.7)	5 (8.1) (2.7, 17.8)	0	0	5 (8.1) (2.7, 17.8)	30 (48.4) (35.5, 61.4)	<0.001
Urban	1239 (95.2)	256 (20.7) (18.5, 23)	478 (38.6) (35.9, 41.4)	14 (1.1) (0.6, 1.9)	157 (12.7) (10.9, 14.7)	52 (4.2) (3.1, 5.4)	282 (22.8) (20.6, 25.3)	

Applied Chi-square test, statistically significance at the level of P-value 0.05

Table 4: Association of parents qualification in choosing subjects in Post-Graduation

Characteristics	Participants n (%)	Internal medicine n (%) (95% CI)	Surgery n (%) (95% CI)	Pediatrics n (%) (95% CI)	General practice n (%) (95% CI)	Basic medical sciences n (%) (95% CI)	OBG n (%) (95% CI)	P-value
Father Profession and Qualification								<0.001
Medical	363 (27.9)	1 (0.3) (0, 1.8)	157 (43.3) (38.1, 48.5)	0	143 (39.4) (34.4, 44.6)	0	62 (17.1) (13.4, 21.4)	
Non medical	938 (72.1)	277 (29.5) (26.6, 32.6)	326 (34.8) (31.7, 37.9)	14 (1.5) (0.9, 2.6)	14 (1.5) (0.9, 2.6)	56 (6.0) (4.6, 7.7)	251 (26.8) (24, 29.7)	
Mother profession and qualification								
Medical	159 (12.2)	0	10 (6.3) (3.1, 11.3)	0	148 (93.1) (88, 96.5)	0	1 (0.6) (0, 3.5)	
Non medical	1142 (87.8)	278 (24.3) (21.9, 27)	473 (41.4) (38.6, 44.3)	14 (1.2) (0.7, 2.1)	9 (0.8) (0.4, 1.5)	56 (4.9) (3.8, 6.4)	312 (27.3) (24.8, 30)	

Applied Chi-square test, statistically significance at the level of P-value 0.05

interest in biochemistry had future choice of general practice and those who had interest in physiology, preferred to take Internal medicine (156 of 312) as a career choice in future. Further, it was noticed that only those medical students who liked biochemistry in their first year had preferred post-graduate in basic medical sciences (156 of 347) [Table 5].

The study also intended to know the reason for choosing various post-graduate specialties from respondents. Off all the respondents, most of them (750 of 1301) chose their specialty for early experience in medicine [Table 6]. Surgery was opted (155 of 1301) for good quality of life in future whereas obstetrics and gynecology (159 of 1301) was of the choice of medical students, as they found it interesting and focused on intellectuality [Table 6].

Discussion

The current study was conducted across five countries and the participants included in the study were pursuing their first year of MBBS degree program.

Country wise analysis

Among the countries, the maximum participants were from Malaysia (497 of 1301) and least was from China (182 of 1301). Off all the students selected from

different countries, surgery was the most preferred post-graduate specialty (483 of 1301) followed by obstetrics and gynecology (OBG) (313 of 1301). The medical students from China, Sri Lanka, Malaysia and Nepal mostly preferred surgery for the post-graduation but Indian medical students opted for OBG. Only 14 of 1301 respondents opted pediatrics from Malaysia. The reasons for not opting for pediatrics from other countries need to be unrevealed. Off all the medical students, we observed Basic Medical Science subjects were least preferred (57 of 1301) among the students of all the countries. The reasons could be due to limited opportunities in basic sciences, which are restricted to teachings, research and diagnostic laboratories [Table 1]. It could be possible that students, who choose these subjects, are out of compulsion even though they may not have much passion for, or commitment to the subject, resulting in mediocrity and frustration. Career choices are dynamic and likely to change overtime as the students understand better as they move from first to final semester; however, if the disinclination towards these subjects persists, there is likely to be a scarcity of teachers in pre- and para-clinical departments. Moreover, the number of private medical schools across the globe is on the rise and those students who cannot secure seats in government medical schools have no other choice than to take up MBBS program in private sector. It is obvious that the high demand of medical seats makes an avenue for the private

Table 5: Association of first year basic sciences subjects in choosing subjects in Post-Graduation

Interesting subjects in first year	Interesting subject n (%)	Future interest						P-value
		Internal medicine n (%) (95% CI)	Surgery n (%) (95% CI)	Pediatrics n (%) (95% CI)	General practice n (%) (95% CI)	Basic medical sciences n (%) (95% CI)	OBG n (%) (95% CI)	
Physiology	312 (24)	156 (50) (44.3, 55.7)	153 (49) (43.4, 54.7)	2 (0.6) (0.1, 2.6)	1 (0.3) (0, 2.1)	0	0	<0.001
Biochemistry	347 (26.7)	114 (32.9) (28, 38.1)	9 (2.6) (1.3, 5)	11 (3.2) (1.7, 5.8)	156 (45) (39.7, 50.4)	56 (16.1) (12.5, 20.5)	1 (0.3) (0, 1.9)	
Anatomy	642 (49.3)	8 (1.2) (0.6, 2.5)	321 (50) (46.1, 53.9)	1 (0.2) (0, 1)	0	0	312 (48.6) (44.7, 52.5)	

Applied Chi-square test, statistically significance at the level of P-value 0.05

Table 6: Reasons for Opting Post-Graduation in various specialties

Characteristics	Participants n (%)	Internal medicine n (%) (95% CI)	Surgery n (%) (95% CI)	Pediatrics n (%) (95% CI)	General practice n (%) (95% CI)	Basic medical sciences n (%) (95% CI)	OBG n (%) (95% CI)	P-value
Intellectual	163 (12.5)	0	9 (5.5) (2.6, 10.2)	0	0	0	154 (94.5) (89.8, 97.4)	<0.001
Interesting	176 (13.5)	8 (4.5) (2, 8.8)	9 (5.1) (2.4, 9.5)	0	0	0	159 (90.3) (85, 94.3)	
Good quality of life	212 (16.3)	0	155 (73.1) (67, 79.3)	0	0	57 (26.9) (20.7, 33)	0	
Early experience	750 (57.6)	269 (35.9) (32.5, 39.5)	310 (41.3) (37.7, 44.9)	14 (1.9) (1.1, 3.2)	157 (20.9) (18.1, 24)	0	0	

Applied Chi-square test, statistically significance at the level of P-value 0.05

medical school to take heavy capitation fees to embark in medicine. Several banks provide loan for higher and professional studies.^[7] Due to high fees structure for MBBS program, the medical students develop a tendency to earn money^[8-10], which becomes a matter of preference for clinical science subjects in post-graduate and earn more through private practice and repay back the loan for which they are indebted.^[11] Study conducted by Bhat *et al.*^[12] reported that the career of choice for most of the medical undergraduate students (95.3%, $n = 250$) was of clinical specialty with the most preferred ones were medicine, surgery, OBG and pediatrics.

Gender wise analysis

Study conducted in Israel reported both male and female medical students opted for clinical subjects as they specialty and none opted for basic medical sciences.^[13] Another study that reported from India,^[12] observed male medical students choosing internal medicine and surgery as their specialization, compared to females choosing OBG and pediatrics. Earlier study conducted by Subba *et al.*^[14] showed that male medical students opt for surgery and females opt for OBG and internal medicine which concurred with our study.

From the above findings, there is a continued decline in the number of students intending to pursue a post-graduate career in basic science subjects and this calls for more proactive steps to address this as shown by the example of Kathmandu University, the first private University in Nepal, that have started enrolling Bachelor of Dental Surgery graduates for MD program in basic science subjects. The study observed that the career choice for basic medical sciences subjects were minimal (56 of 860) for females, it is possible that shorter work time, flexibility etc could have been responsible for the choice of females in the basic sciences bearing in mind the family commitments.

Association of geographical location

The current study observed more urban participants compared to rural. Of the total number of students participated in the study, we observed 95.2% of students hailed from urban setup and only 4.8% were from the rural background. This shows that people living in urban cities have more access to medical course compared to rural. Even the students from cities have more access to coaching classes for medical entrance examinations. Thus, we found more students from urban areas compared to rural ones.

Association of parent's profession

We presumed more medical students are of parents who are professionally and medically qualified, but

was just the opposite. The current study observed the predominance of medical students (79.9%; $n = 2080$) from non-medical professional against medical professional parents (20%; $n = 522$). Surgery was the most opted subject by medical students for post-graduation among non-medical background parents. The changing trends in medical education can be noticed in our study.

Association of first year subject in choosing their specialty in post-graduate

Students from the both first and second semesters were asked about their opinion regarding the subjects taught in first year of MBBS program. Of all the students 642 (49.3%) of students chose anatomy as their most interesting subject followed by biochemistry 347 (26.7%) and physiology (24%). Among the students who liked anatomy showed their future interest in surgery (50%) followed by OBG (48.6%). Those students whose interest was in biochemistry preferred general practice (45%) followed by internal medicine (32.9%) for their career prospects. Similarly, those who were interested in physiology were more inclined towards internal medicine (50%) followed by surgery (49%).

The medical students in their first year might have felt and learnt from their senior or teachers that if they study anatomy in more detail it would be easy for them to understand surgery, and they knew surgery is the most income generating subject in medical sciences, and that is why they embarked in MBBS program and they liked anatomy which is pre-requisite for surgery. Similarly, those who liked biochemistry and physiology, are interested to pursue their future career in internal medicine or general practice as they would be able to understand the biochemical basis of disorders, which would help them to apply their knowledge in these subjects.

Approximately 57.6% of the medical students' main reason for opting their choice of subject in various specialties was to have an early experience and good quality of life. Study reported from India^[12] also reported the factors influencing the specialty choice were job satisfaction, income, lifestyle friendliness and career prospects.

Conclusion

Anatomy was the most interesting subject among the first year medical students and they were interested in pursuing surgery as their future career prospects. General practice and internal medicine were the career of choice for those who liked Biochemistry among the first year medical students. Similarly, internal medicine was the most opted subject of choice for those interested in physiology. Furthermore, our

study also reveals that the most preferred specialties of the students were surgery, internal medicine and pediatrics with gender variations; males preferring surgical specialties and females opting OBG. Factors that had the most influence on their choices for post-graduation career were their interest in the specialty leading to good quality of life. Of all specialties, the inclination to choose basic science subjects as specialty was not generally preferred by them.

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