



Original Article



Comparison of Brain Drain Perception Between Medical and Non-Medical Undergraduate Students in Lahore

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ABSTRACT

Brain drain is a serious issue for developing countries like Pakistan. Economic, political, and social determinants influence undergraduate students' intention to migrate. **Objectives:** To evaluate the perceptions and trends that would determine the intention of brain drain among medical and non-medical undergraduate students in Lahore. **Methods:** A stratified sampling strategy selected 300 participants from both medical and non-medical programmes. This cross-sectional study was carried out through a properly structured questionnaire from October 2024 to March 2025. Data were entered and analyzed using SPSS V-26; the Chi-square test and Cramer's V were applied for group comparisons. **Results:** A total of 300 undergraduates participated (47% male, 53% female; mean age 20.0 ± 1.4 years), with most in first (48.0%) or second year (29.7%). In general, 83.3% expressed willingness to migrate for foreign employment, while 90.3% cited poor working conditions and 76.7% long working hours as push forces. Employment safety abroad was perceived as better by 91.7% of respondents. Two significant discipline-based associations were observed: political instability was more frequently reported by non-medical students than medical students (16.7% vs. 5.3%, $p=0.003$, Cramer's $V = 0.17$), and lifestyle/safety concerns were also more common among non-medical students (31.3% vs. 20.7%, $p=0.03$, Cramer's $V = 0.13$). **Conclusions:** Brain drain intentions among medical and non-medical undergraduates are substantial overall, driven by workplace environment, as well as socio-economic factors. These systemic problems have to be resolved to ensure that skilled youth are retained.

INTRODUCTION

Brain drains, the movement of highly skilled people in search of better opportunities outside their home country [1]. It presents a great challenge to developing nations, and Pakistan is one of them. Undergraduate students represent the future professional workforce, and their aspirations are strongly shaped by economic, political, and social factors. Since they are at the beginning of their career paths, their perceptions and intentions provide an early indication of future brain drain trends [2]. It is important to understand the perception of these students towards brain drain for drawing policy measures to retain talent and create better conditions within the country.

According to recent studies, one of the leading causes of brain drain has been the desire by individuals to have a more favorable socio-economic setting. Pointing out the internationalization aspect of higher education, Alam et al. signify that such practice causes the outflow of talents, leaving their home countries vulnerable to a massive shortage of intellectual capital [3]. On the same note, Meo et al. argue that the lack of political and economic stability contributes to increasing the number of highly skilled professionals who fly out, even to the healthcare sector [4]. In this respect, undergraduate students may be especially vulnerable to these areas, because their career and



educational choices may usually depend on their beliefs of security and opportunity [5]. It is worthwhile giving more attention to the specific effect of the socio-economic situation on the intentions to brain drain among students. Nadir et al. found in a study that 72% of medical students expressed willingness to migrate after graduation due to socio-medical concerns [6]. More so, Kousar et al. assume that insufficient openings in the Pakistani job market force graduates to work in another country; therefore, there will always be a brain drain of educated people [7]. This is reiterated by the research, which pinpoints threats to human security as being one of the aggravating factors that give birth to brain drain [8]. The impact of brain drain varies across disciplines, influencing student migration intentions in distinct ways. For instance, 66.3% of nursing undergraduate students aspire to work internationally [9]. This pattern has a larger implication, as it indicates the gaps in educational and career structure with systematic issues like economic instability, limited institutional support, and political uncertainty, driving students to seek opportunities abroad [10]. Consequently, there is a need to eliminate the causes underlying brain drain, whose source factors include economic fluctuations, poor institutional support, and political instability, which influence student decisions negatively [11, 12]. Understanding the perceptions and attitudes of the undergraduate students towards the brain drain is important in coming up with specific measures to help the skilled graduates stay back. Determining the economic, social, and professional factors that affect their intentions to migrate can be used to influence policymakers to set up strategies that help in improving the job climate in their country, better career options, and lessen the drain of skilled personnel to foreign nations.

Understanding undergraduate students' perceptions of brain drain is essential to inform policies aimed at retaining future skilled professionals in Pakistan. Limited comparative evidence exists on differences in brain drain perceptions between medical and non-medical undergraduate students in Lahore. This study aimed to compare the perceptions of brain drain between medical and non-medical undergraduate students in Lahore, in order to identify discipline-specific differences and the factors influencing their views on migration.

METHODS

A quantitative, cross-sectional comparative design was used with a structured, closed-ended questionnaire. The duration of the study was six months from October 2024 to March 2025. The aim was to compare the perception and attitude to brain drain in medical and non-medical undergraduate students in Lahore, Pakistan. The study group included undergraduate students pursuing medical

and non-medical degrees (MBBS, BDS, Pharm-D, Allied Health Sciences) and non-medical (e.g., Computer Science, Aviation, Fashion Designing, Business Administration) in different departments of the University of Lahore. Participation was voluntary, anonymity was maintained, and no identifying information was recorded to ensure confidentiality. The Ethical Review Board of University College of Medicine and Dentistry, University of Lahore (No. ERC/52/24/09) gave the ethical clearance. Data collection was carried out in person by the principal investigator, who visited each participating department. The researchers personally visited classrooms and common student areas to distribute and collect self-administered questionnaires. The eligible students were first-year through final-year students. It was determined that the sample size was to be calculated by the following formula: $n = Z^2 \cdot p \cdot (1-p) / d^2$. Where: $Z = 1.96$, $Z = 1.96$, $Z = 1.96$ at 95% confidence level, $d = 0.05$, $d = 0.05$, $d = 0.05$ margin of error and $p = 0.78$ [10]. This gave a minimum required sample of 264 subjects. The provision of sample size was increased to 300 individuals (150 medical students and 150 non-medical students) to account for possible non-response and incomplete questionnaires. Stratified random sampling was used to ensure representation of the medical and non-medical groups. In each stratum, the students were randomly approached in between normal academic activities, and every *n*th student (systematic approach) who gave their consent was invited to take part until the target sample was reached. Students who are already living in foreign countries through scholarship programs were excluded from the study. The research survey was done using a structured, self-administered questionnaire, which had been designed specifically after scrutiny of the related literature on migration intentions and student perceptions. It was divided into two parts: the demographic (age, gender, and academic degree program) and the issues concerning migration intentions, reasons to leave, and perceived push and pull factors. Expert review was used to establish content validity, where three senior faculty members in the field of public health and medical education were involved. To ensure that the items were equally appropriate and understandable for non-medical undergraduate students, one faculty member from the Faculty of Social Sciences was later consulted. Refinement of uncertain items was done based on their feedback to make them clear and relevant. A pilot test was done with 20 students (who were not in the main study) before the data collection, and the questionnaire proved to be acceptable in terms of internal consistency, with a Cronbach's alpha of 0.78. The answers were mainly categorical (i.e., Yes/No or Agree/Disagree) and were coded in numeric form to undergo statistical analysis (Yes = 1, No = 0). In the case of multiple-choice questions, the best answer was obtained.

There were no composite scores, although the data were analyzed as individual items. To conduct this study, the operational definition of migration intention was the desire of a student to leave Pakistan to undertake postgraduate studies or seek jobs. The poor working conditions, political instability, long working hours, and the perception that it is better and safer in other countries were the predisposing factors of brain drain, and the preventive factors were the freelancing opportunities and supportive jobs in Pakistan that might have discouraged migrating. The Statistical Package of Social Sciences (SPSS) version 26.0 was used to analyze data. The Shapiro-Wilk test was used to examine the normalcy of continuous variables. The variables that were normally distributed were summarized by the value of mean with SD, whereas the non-normally distributed variables were summarized by the value of median with SD. Categorical variables were in the form of frequency (percentage). In the case of the group comparisons, the Chi-square test of independence was used, and the extent of the association was presented as the Cramer V. All proportions were given a 95% confidence interval (CI). A p-value of less than 0.05 was taken as significant.

RESULTS

There were 300 respondents; 141 (47.0%) men and 159 (53.0%) women. Most of them were in the first year (48.0%), second year (29.7%), third year (19.7%), and only a small proportion of them were in the fourth (2.0%) and fifth year (0.7%). The mean age of participants was 20.0 ± 1.4 years (range: 17–24 years). The Shapiro-Wilk test indicated that age was not normally distributed, $W(300) = 0.946$, $p < 0.001$. Therefore, both mean \pm SD and median (IQR) are reported, with a median age of 20 years (IQR: 19–21) presented in table 1.

considerations have a stronger influence on determining the migration intentions of non-medical students, but medical students seem to have a more consistent motivation to migrate to foreign countries because of the professional opportunities that they have there, as shown in table 2.

Table 2: Migration Intentions and Perceptions among Medical and Non-Medical Students (n=300)

Variables	Medical (n=150)	Non-Medical (n=150)	Total (n=300)	χ^2 (p-value)	Cramer's V
Perceive the Scope in Pakistan	87 (58.0%)	96 (64.0%)	183 (61.0%, 95% CI: 55.3–66.5)	1.01 (0.32)	0.06
Willing to Leave for Foreign Employment	126 (84.0%)	124 (82.7%)	250 (83.3%, 95% CI: 78.7–87.2)	0.09 (0.76)	0.02
Poor Working Conditions Drive Brain Drain	139 (92.7%)	132 (88.0%)	271 (90.3%, 95% CI: 86.5–93.1)	2.10 (0.15)	0.08
Long/Exhausting Working Hours as a Factor	115 (76.7%)	115 (76.7%)	230 (76.7%, 95% CI: 71.5–81.2)	0.00 (1.00)	0.00
Prefer a Side Business With a Degree	94 (62.7%)	96 (64.0%)	190 (63.3%, 95% CI: 57.7–68.5)	0.04 (0.83)	0.01
Believe Employment Safety is Better Abroad	138 (92.0%)	137 (91.3%)	275 (91.7%, 95% CI: 87.8–94.6)	0.05 (0.82)	0.01
Reason for Working Abroad – Good Environment	100 (66.7%)	115 (76.5%)	215 (71.6%, 95% CI: 66.4–76.3)	3.37 (0.07)	0.11
Would Still Leave Under Better Work Conditions	89 (59.3%)	81 (54.0%)	170 (56.7%, 95% CI: 51.0–62.3)	0.84 (0.36)	0.05
Supportive Jobs Prevent Leaving	91 (60.7%)	83 (55.3%)	174 (58.0%, 95% CI: 52.3–63.5)	0.83 (0.36)	0.05
Reason for Leaving – Political Instability	8 (5.3%)	25 (16.7%)	33 (11.0%, 95% CI: 7.7–15.3)	9.13 (0.003)*	0.17
Reason for Leaving – Better Lifestyle & Safety	31 (20.7%)	47 (31.3%)	78 (26.0%, 95% CI: 21.1–31.5)	4.70 (0.03)*	0.13
Freelancing Prevents Leaving	76 (50.7%)	74 (49.3%)	150 (50.0%, 95% CI: 44.3–55.7)	0.05 (0.82)	0.01

*Significant at $p < 0.05$.

Table 1: Demographic Characteristics of Study Participants (n=300)

Characteristic	Frequency (%)
Gender	
Male	141 (47.0%)
Female	159 (53.0%)
Year of Study	
1 st Year (1 st –2 nd Sem)	144 (48.0%)
2 nd Year (3 rd –4 th Sem)	89 (29.7%)
3 rd Year (5 th –6 th Sem)	59 (19.7%)
4 th Year (7 th –8 th Sem)	6 (2.0%)
5 th Year	2 (0.7%)
Age (Years)	
Mean \pm SD	20.0 \pm 1.4
Median (IQR)	20 (19–21)*

*Normality assessed using the Shapiro-Wilk test: $W(300) = 0.946$, $p < 0.001$.

The study shows the difference in the migration perceptions and intentions of medical and non-medical students. Generally, no significant differences were found between the two groups on their intentions to emigrate to foreign jobs, their view on bad working conditions in Pakistan, tiring working hours, or even their safety in foreign working jobs (all $p > 0.05$). However, two significant associations were observed. Political instability was more frequently reported as a reason for leaving among non-medical students compared to medical students (16.7% vs. 5.3%), $\chi^2(1, N = 300) = 9.13$, $p = 0.003$, Cramer's V = 0.17. Similarly, lifestyle and safety concerns were more commonly cited by non-medical students (31.3% vs. 20.7%), $\chi^2(1, N = 300) = 4.70$, $p = 0.03$, Cramer's V = 0.13. These results indicate that, although the overall migration intentions seem to be fairly similar across academic backgrounds, political instability and lifestyle

DISCUSSIONS

Undergraduate brain drain in Lahore is a significant concern, considering its impact on personal ambition and socio-economic situation in Pakistan. Brain drain, defined as the emigration of skilled individuals from one country to another, is influenced by various factors, particularly working conditions and educational opportunities [13]. This discussion presents the synthesis of results of the latest investigations on the migration attitudes of students with a focus on the downtrodden local working environment and the charm of global opportunities. The study reveals that the gender distribution of the undergraduates in the survey is characterized by a significant number of female respondents (53%) relative to the male ones (47%). This observation demonstrates that women are becoming more active and needing higher education despite socioeconomic hardships and limiting social norms [14]. Most undergraduates were ready to go abroad to work, with 83.33% showing their willingness to abandon local employment opportunities, which translates to an increasing trend amongst Pakistani youth and especially women with intentions to seek foreign opportunities [15]. Perceptions of the local working conditions are also a critical factor in shaping migration intentions. Upon sampling the students, most of them, i.e., 90.3% of the total number of sampled students, identified poor working conditions as a major factor that would make them contemplate migration; 76.7% of the students identified long work hours as a reason [16]. These sentiments are associated with poor local environments act as major push factors in motivating students to pursue opportunities in countries that have better work environments [17]. With the improvement of local conditions, a significant % age (56.7%) of students even now remain willing to leave, which means that decisions on the issue of migration are in many cases made not only based on the existing situation but also with reference to long-term intentions of a higher quality of living [18]. The family structure also engages in matters of influences migration intentions. A significant (78%) proportion of respondents belong to nuclear families; similarly, the numbers are larger in medical students (84%) than in non-medical students (72%) [19]. Family influence in career aspirations implies that family context can be used to inform the move to pursue opportunities in foreign countries, as imminently resembled in other studies, which point out that the family plays a major role in determining the career choices and migration intentions of students [20]. Job security abroad is viewed positively by 91.7% of respondents, reflecting a sharp contrast with the instability of Pakistan's domestic labor market. This perception reinforces migration intentions, as many

students feel that sustainable income and career growth are more attainable overseas [21]. The fact that personal ambitions on the level of safety and professional growth overlap means the brain drain remains a highly complex phenomenon that expresses that migration is not a trade but frequently a need pursued by young people and focused on achieving a better future. The findings indicate that there is a high level of brain drain intentions among the Lahore undergraduate students, largely driven by poor local job conditions. The sentiments enable this great readiness to migrate because students are faced with the reality of the future of their disciplines in Pakistan. Brain drain has more implications than the personal dream of an individual, and possibly, there is a risk to the future of the country because it may lose the necessary skills and human capital needed for the development of the country. Gender relations, family background, and the situation in the region of work become the critical points in this persistent challenge.

The cross-sectional design limits causal inference between identified factors and migration intentions, while reliance on self-reported data may introduce response and social desirability bias. Additionally, conducting the study within a single private university may limit the generalizability of findings to other institutions or regions of Pakistan. Future multicenter longitudinal studies involving public and private universities are recommended to enhance representativeness and explore changes in migration intentions over time.

CONCLUSIONS

In conclusion, this study emphasizes that the perceptions of brain drain are common among the medical and non-medical undergraduates in Lahore, where poor working conditions, extensive working hours, and socio-economic instability are the most influential factors. Non-medical students were more likely to mention political instability and lifestyle issues as their motives to migrate. So, it is necessary to systematically address these issues in Pakistan to retain talented youth in the country.

Authors' Contribution

Conceptualization: AR

Methodology: MHT, MMA, MMI, MHA, MIB

Formal analysis: MMI

Writing and Drafting: AR, MMA

Review and Editing: AR, MHT, MMA, MMI, MHA, MIB

All authors approved the final manuscript and take responsibility for the integrity of the work

Conflicts of Interest

All the authors declare no conflict of interest.

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