




Sex-based Disparities Among Surgical Faculty Positions Across Medical Colleges in Pakistan

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Abstract

Introduction Despite women being under-represented in academic surgery, there is no publicly accessible repository describing the distribution of surgeons by sex and specialty in Pakistan. This short report aims to fulfill this gap by describing female representation across surgical faculty positions in medical colleges across Pakistan.

Methods This cross-sectional study was conducted in 2021 across medical universities in Pakistan. A dual mode of data collection was employed, whereby data regarding sex, academic designation, and subspecialty of surgical faculty was retrieved via emails to representative faculty from medical colleges, and from medical colleges' websites.

Results A total of 97/114 (85.1%) medical colleges across Pakistan were included, providing us with data of 2070 surgical faculty. Overall, only 10.3% of surgical faculty were women, with women comprising 14.1% of assistant professors, 9.3% of associate professors, and only 5.7% of professors. Most women surgical faculty were assistant professors (63.1%), with only 17.8% being professors. Sindh (14.3%) and Punjab (9.7%) had the greatest percentage of women across surgical faculty overall, while Khyber Pakhtunkhwa had the lowest (6.5%). Apart from breast surgery (100%), pediatric surgery (29.4%), ophthalmology (15.0%) and general surgery (11.6%), women did not represent more than 10% of surgical faculty for any surgical subspecialty.

Conclusion In Pakistan, there is a blatant lack of female representation across all faculty positions and in most surgical specialties, with imbalances more pronounced in the relatively under-developed Khyber Pakhtunkhwa and Balochistan. These sex disparities may aggravate the surgical disease burden and adversely impact surgical prospects for women across the country.

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Introduction

Over the last few years, there has been a gradual increase in the proportion of women in surgical training positions [1]. However, women continue to be under-represented in leadership and higher academic positions within the ranks of surgery, particularly so in surgical subspecialties such as orthopedics surgery, cardiothoracic surgery, neurosurgery, urology, and vascular surgery [2, 3]. A wide array of reasons contribute to the paucity of female representation in academic surgery.

Pakistan, a lower-middle-income country in South Asia, ranks 153 out of 156 countries for gender equality [4]. Despite the fact that 70% of the medical students in

Pakistan are females, a figure that is higher than several high-income countries in the West [5–7], only a small fraction opt to pursue a career in surgery [8]. Over half of graduating women doctors do not practice, opting instead to get married and become homemakers—the so-called doctor brides phenomenon [9]. Women aspiring to be surgeons face an additional myriad of challenges, including patriarchal sociocultural norms, a lack of family support, sex-based discrimination during medical school, surgical training, and practice, workplace harassment, and a lack of mentors and role models [10–15]. Women are also more likely to suffer from mental health issues, such as depression, during their surgical training [16]. In addition, given frequent occurrences of physical aggression from patients or attendants [17], particularly during the COVID-19 (coronavirus disease 2019) pandemic [18, 19], many aspiring women surgeons in Pakistan are deterred from pursuing a surgical career due to the threat of aggressive behavior [20]. Even as surgical faculty, women in Pakistan still face hindrances to progression up the academic hierarchy, with sex-based biases in the workplace affecting most aspects of their careers, including promotion opportunities and access to leadership positions [11].

While in Western countries, national bodies such as the Association of American Medical Colleges [21], National Health Service [22] and Australian Health Practitioner Regulation Agency [23], maintain active repositories of surgeons by sex and specialty, no such publicly accessible data exists in Pakistan. Thus, this short report aims to fulfill this gap by describing female representation across surgical faculty positions in medical colleges across Pakistan.

Methods

Study design and sample population

This nationwide cross-sectional study was conducted by the Association of Women Surgeons of Pakistan (AWSP) and Pakistan Global Surgery Students' Alliance (PGSSA) in 2021 across medical universities in Pakistan. AWSP is a platform for female surgeons and surgeons in training in Pakistan, and provides members with support, mentorship, and opportunities to build networks. PGSSA is a recently established student-run organization formed by global surgery enthusiasts across Pakistan and aims to promote surgical interests among medical students. Ethical approval for this study was obtained from the institutional review board of the Aga Khan University, Pakistan.

Universal sampling was employed, whereby the target sample comprised all medical colleges in Pakistan, and thus sample size calculation was not required. In Pakistan, hospitals may be categorized as either “academic”

(affiliated with a medical college) or “non-academic” (not affiliated with a medical college). This categorization is independent of their ownership, i.e., private-owned or government-/public-owned.

Thus, we included all medical colleges in Pakistan that were registered with the Higher Education Commission (HEC) and affiliated with a teaching hospital (i.e., an “academic” hospital) that possessed a department of surgery. Medical colleges with non-functional websites were excluded from our study.

Data collection

The data required from each medical college was a list of surgical faculty, along with their sex, academic designation (assistant professor, associate professor, or professor), and surgical subspecialty. The specialties considered were orthopedics, pediatrics, neurosurgery, plastic surgery, general surgery, cardiothoracic surgery, ENT, urology, vascular surgery, ophthalmology, and breast surgery. Data regarding medical college ownership (private-owned vs. government-/public-owned) was also collected. Lastly, the human development index (HDI) of district in which the medical college was located was also sourced using the United Nations Development Programme's Pakistan National Human Development Report 2017 [24].

A dual mode of data collection was employed. Email addresses for all medical colleges were retrieved from their websites, and emails requesting the aforementioned data were sent to representatives of all medical colleges that fulfilled the inclusion criteria. Secondly, two members of the research team independently extracted the required data from the surgical faculty pages of the websites of each of the medical colleges. Discrepancies in collection were identified and settled via revisiting the website in the presence of a third member of the research team. In cases where the data received from the medical colleges in response to the email request conflicted with that collected from the website, only the data received via email was included for analysis.

Ethical considerations

All colleges approached were ensured that the data they share will be kept confidential and used for research purposes only. Anonymity was ensured as much as possible, with the only identifiers being province and ownership (public vs. private-owned) of the medical college. No institute was forced to share the required data, and every college was given the right to withdraw from participation in this study at any point in time. There were no benefits, incentives or risks associated with participation in this study.

Statistical analysis

Statistical analysis was performed using the IBM SPSS (Armonk, NY, version 23). All data in this study was categorical, and thus presented as frequencies and percentages. District HDIs were categorized into tertiles (topmost: >66th; middle: 33rd to 66th percentile; and bottom: <33rd percentile).

Results

Institution characteristics

We were able to retrieve data from 97/114 (85.1%) medical colleges across Pakistan, providing us with data of 2070 surgical faculty across the country. The missing medical colleges did not reply to our email address or have a functional website with the necessary data. 56/62 (response rate: 90.3%) medical colleges across the Punjab province reported data of the highest number of surgical faculty (1038/2070; 50.1%), followed by 21/29 (response rate: 72.4%) colleges in Sindh (573/2070; 27.7%). Both of the two medical colleges in Balochistan were included (92/2070; 4.4%). Most colleges were private-owned (64/97; 66%) and contributed data of 1114/2070 (62.1%) faculty. Among the provinces, Balochistan had the lowest percentage of faculty from the private sector (14/92; 15.2%).

Distribution of female faculty

Overall, only 214/2070 (10.3%) of surgical faculty were women, with women comprising 135/960 (14.1%) of assistant professors, 41/440 (9.3%) of associate professors, and only 38/670 (5.7%) of professors. Around half of women surgical faculty (121/214; 57.9%) belonged to private sector colleges. Most women faculty were from the Punjab (101/214; 47.2%), with only 7/214 (3.1%) from Balochistan. Most women surgical faculty were assistant professors (135/214; 63.1%), with only 38/214 (17.8%) being professors.

Sindh (82/573; 14.3%) and Punjab (101/1038; 9.7%) had the greatest percentage of female representation across surgical faculty overall, while Khyber Pakhtunkhwa had the lowest (24/367; 6.5%). Sindh (17/159; 10.7%) and Khyber Pakhtunkhwa (8/138; 5.8%) had the greatest female representation across professors, while Balochistan had no female professors of surgery (Fig. 1).

Table 1 shows the distribution of women surgical faculty across designation and surgical subspecialty. Apart from breast surgery (3/3; 100%), pediatric surgery (53/180; 29.4%), ophthalmology (42/280; 15%) and general surgery (81/697; 11.6%), women did not represent more than 10% of surgical faculty overall for any surgical subspecialty. Women comprised less than 5% of surgical faculty overall across vascular surgery, cardiothoracic surgery, orthopedic surgery, urology, neurosurgery, and plastic surgery. Barring breast surgery, pediatric surgery had the greatest female representation across assistant professors (32/84;

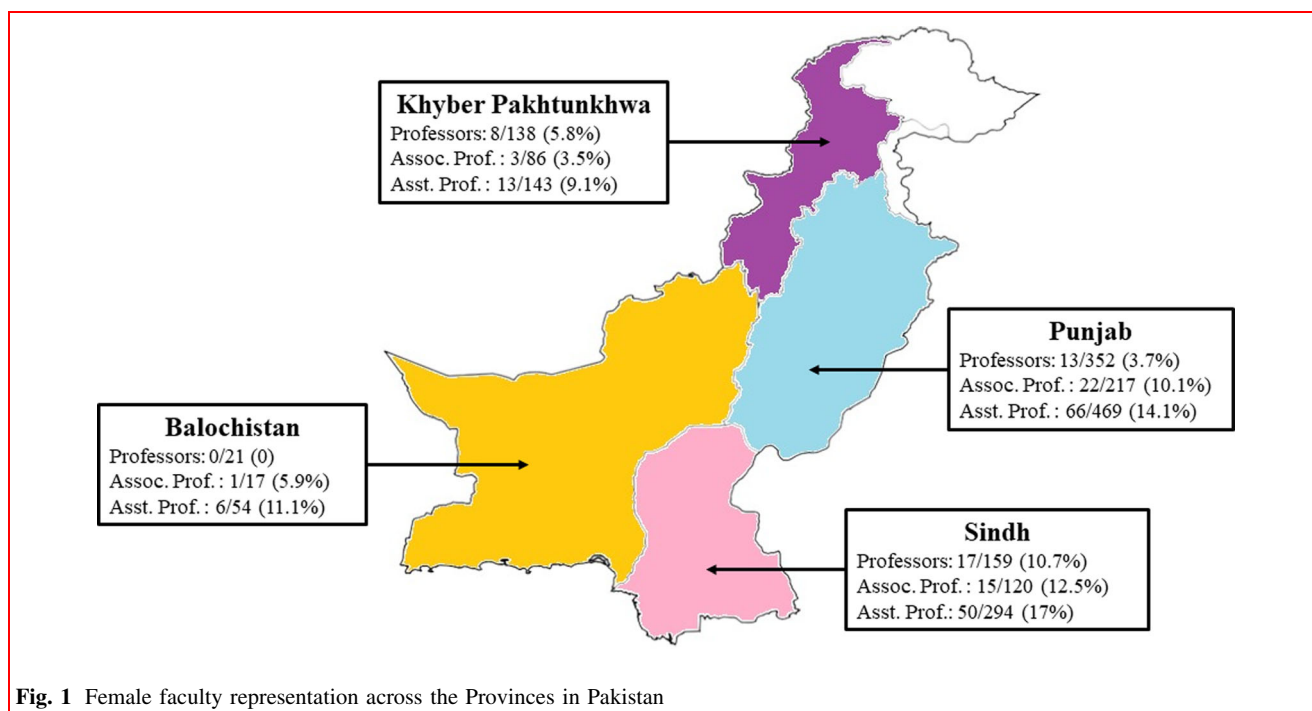


Fig. 1 Female faculty representation across the Provinces in Pakistan

Table 1 Female representation among faculty designations across surgical subspecialties

Subspecialty	Overall <i>n/N</i> (%)	Assistant professor <i>n/N</i> (%)	Associate professor <i>n/N</i> (%)	Full professor <i>n/N</i> (%)
Breast surgery	3/3 (100)	2/2 (100)	0/0 (0)	1/1 (100)
Pediatrics surgery	53/180 (29.4)	32/84 (38.1)	8/35 (22.9)	13/61 (21.3)
Ophthalmology	42/280 (15)	25/113 (22.1)	10/62 (16.1)	7/105 (6.6)
General surgery	81/697 (11.6)	54/315 (17.1)	15/161 (9.3)	12/221 (5.4)
Plastic surgery	5/53 (9.4)	5/35 (14.2)	0/5 (0)	0/13 (0)
Otolaryngology	17/280 (6.1)	10/114 (8.7)	5/72 (6.9)	2/94 (2.1)
Neurosurgery	5/122 (2.4)	3/68 (4.4)	2/24 (8.3)	0/30 (0)
Urology	3/131 (2.1)	2/65 (3.1)	0/26 (0)	1/40 (2.5)
Cardiothoracic surgery	1/52 (1.9)	1/23 (4.3)	0/7 (0)	0/22 (0)
Orthopedic surgery	4/265 (1.5)	1/137 (0.7)	1/47 (2.1)	2/81 (2.5)
Vascular surgery	0/7 (0)	0/4 (0)	0/1 (0)	0/2 (0)
Total	214/2070 (10.3)	135/960 (14.0)	41/440 (9.3)	38/670 (5.7)

Table 2 Female representation among provinces across surgical subspecialties KPK: Khyber Pakhtunkhwa

Subspecialty	Punjab <i>n/N</i> (%)	KPK <i>n/N</i> (%)	Balochistan <i>n/N</i> (%)	Sindh <i>n/N</i> (%)
Breast surgery	0/0 (0)	0/0 (0)	0/0 (0)	3/3(100)
Pediatrics	28/105 (26.6)	4/19 (21.1)	1/7 (14.2)	20/49 (40.8)
Ophthalmology	24/144 (16.6)	5/56 (8.9)	1/4 (25.0)	12/76 (15.8)
General surgery	32/342 (9.3)	10/126 (7.9)	3/25 (12.0)	36/204 (17.6)
Plastic surgery	4/34 (11.8)	0/4 (0)	0/3 (0)	1/12 (8.3)
Otolaryngology	9/142 (6.3)	2/60 (3.3)	1/17 (5.9)	5/61 (8.2)
Neurosurgery	2/59(3.4)	2/24 (8.3)	1/8 (12.5)	0/31 (0)
Urology	1/69 (1.4)	0/17 (0)	0/10 (0)	2/35 (5.7)
Cardiothoracic surgery	0/24 (0)	0/8 (0)	0/4 (0)	1/16 (6.25)
Orthopedic surgery	1/115 (0.9)	1/53 (1.9)	0/14 (0)	2/83 (2.4)
Vascular surgery	0/4 (0)	0/0 (0)	0/0 (0)	0/3 (0)
Total	101/1038 (9.7)	24/367 (6.5)	7/92 (7.6)	82/573 (14.3)

38.1%), associate professors (8/35; 22.9%), and professors (13/61; 21.3%).

Table 2 shows the distribution of female surgeons among surgical subspecialties across the four provinces of Pakistan. In Punjab, only pediatric surgery (28/105; 26.6%), ophthalmology (24/144; 16.6%) and plastic surgery (4/34; 11.8%) displayed female representation >10%. In Sindh, only pediatric surgery (20/49; 40.8%), ophthalmology (12/76; 15.8%) and general surgery (36/204; 17.6%) did so. In Khyber Pakhtunkhwa, only pediatric surgery (4/19; 21.1%) showed a female representation >10%. Urology, cardiothoracic surgery, orthopedic surgery, and vascular surgery showed a female representation of <3% in all provinces except Sindh.

Table 3 shows the proportion of female surgeons' designation across HDI tertiles of district of the medical

college. The highest representation of assistant professor (77/328; 23.4%), associate professors (22/132; 16.6%) and professors (17/217; 7.8%) were in medical colleges located in the topmost HDI tertiles. The lowest female representation among professors was seen in the middle tertile (8/270; 2.9%). The lowest representation of associate (5/127; 3.9%) and assistant (16/245; 6.5%) professors lay in the lowest tertile.

Discussion

Women physicians not being able to ascend to leadership positions is a global problem that transcends lower-middle-income countries and extends to most medical specialties, particularly so in surgery. Our study is the first to

Table 3 Female Representation across human development index tertiles

HDI tertile	Overall <i>n/N</i> (%)	Assistant professor <i>n/N</i> (%)	Associate professor <i>n/N</i> (%)	Professor <i>n/N</i> (%)
Topmost	116/677 (17.1)	77/328 (23.4)	22/132 (16.6)	17/217 (7.8)
Middle	64/838 (7.6)	42/387 (10.8)	14/181 (7.7)	8/270 (2.9)
Bottom	34/555 (6.1)	16/245 (6.5)	5/127 (3.9)	13/183 (7.1)

comprehensively describe female representation across surgical faculty in medical colleges in Pakistan. With only 10.3% surgical faculty being women, our results highlight the sex-based disparity in academic surgery in Pakistan. Female representation at all levels of academic surgery (assistant professor, associate professor and full professor) remains poor, and this disparity is exacerbated higher up the academic ranks, with women constituting only 5.7% of professors. In addition, it was noted although disparities were present across all surgical subspecialties barring breast surgery, imbalances were more pronounced in certain subspecialties. Moreover, we found that sex-based disparity was more pronounced in the two under-developed provinces namely Khyber Pakhtunkhwa and Balochistan.

Sex-based disparities permeate even the senior most surgical ranks, with most faculty positions being dominated by men. The so-called sticky floor phenomenon results in difficulties for women surgeons to rise along the academic ladder, with their progress limited by “glass ceilings” where they are unable to progress above a certain level [25]. A relatively high number of women faculty was observed in lower faculty positions such as at the level of assistant professors (14.1%), which dropped at the level of associate professors (9.3%) and full professors (5.7%). A similar decreasing trend was noticed by Valsangkar et al. in the US, even though female representation reported in their study was more than double to ours (23.1% vs 10.4%) [26]. Our results are even more concerning considering that 70% of medical students in Pakistan are women [8]. Globally, an overall lack of role models and strong mentorship are cited as reasons for decreased interest of female medical students in surgery [27, 28]. Sociocultural barriers specific to Pakistan including patriarchal societal norms, discouragement to pursue surgery, lack of family support and sex-based discrimination during medical school and at the workplace [13, 14]. In addition, many females experience role conflicts between their social perception as homemakers and their professional medical careers, which pressurizes women to opt for less demanding specialties in search of better work-life balance. Moreover, perceptions also exist that women may not be “physically suited” to certain surgical subspecialties, such as orthopedic surgery [29]. Lastly, high rates of attrition of women from surgical

training programs has been observed, chiefly due to the lack of lifestyle flexibility and strong role models, which worsens the sex-based disparities among surgical faculty [30].

However, some surgical fields tend to have a relatively better representation of women. The specialties with the greatest proportions of females in our study were breast surgery (100%), pediatric surgery (29.4%), and ophthalmology (15%). This could be attributed to these specialties being perceived as more “female-friendly” with a better work-life balance and lack of stereotypical male domination as is generally observed in the surgical culture [31]. The complete domination of women in breast surgery is not surprising especially in a conservative society such as in Pakistan, whereby female patients feel hesitant to undergo breast procedures or examinations by a male surgeon, thus discouraging men from pursuing this subspecialty in Pakistan. A survey conducted in the country confirms this rationale, revealing that over 70% of female patients would prefer a female breast surgeon for themselves and over 95% of men would prefer a female breast surgeon for a female family member [32]. Thus, in the case of breast surgery, the sex-based disparity among surgeons is reversed and driven primarily by patient preference based on sociocultural and religious conservatism. Additionally, although nowhere close to depicting sex-based equity, the better representation of women in pediatric surgery can be attributed to their personal willingness or perceived suitability to work with children [31, 33]. Moreover, in a conservative society like Pakistan, working with children and their families is often seen to be more socially acceptable for women, which may be a major driving factor for women to uptake pediatric surgery as their profession [31]. In ophthalmology, a relatively better proportion of females may result from it being perceived as a less demanding surgical specialty with a better working environment.

In Pakistan, the provinces of Sindh and Punjab have the highest gross domestic product (GDP) per capita (USD 1748 and USD 1577, respectively), while Khyber Pakhtunkhwa and Balochistan have the lowest (USD 771 and USD 740) [34]. Although no clear association between sex-based inequity in surgical specialties and rural areas has

been established before [35] our data shows that the majority of female surgeons belong to Sindh and Punjab (85.6%), with only 3.1% belonging to the under-developed province of Balochistan. In rural settings in Pakistan, the lack of women surgeons may be exacerbated by early marriages lack of security to support female safety in hospitals, and lack of the facilities and infrastructure to encourage women to pursue a surgical career [36]. Owing to the low GDP per capita in Khyber Pakhtunkhwa and Balochistan, the infrastructure and facilities remain under-developed in these two provinces leading to a poorer quality of life and lack of basic services like education, health facilities, etc. These contribute to a relatively backward way of life and a greater prevalence of conservative thinking in these areas, thereby leading to poorer women representation across surgical faculty positions.

The burden of surgical disease is rapidly increasing in Pakistan with little to no parallel improvement in the capacity and services of the country's health system [37]. Sex-based disparities in the field of surgery hamper Pakistan's progress toward developing its required surgical workforce. Given the conservative setup of Pakistani society, integration of women into the surgical field becomes even more important, as a considerable proportion of women patients in Pakistan may be reluctant to, or even be prohibited by their family to, seek healthcare from male surgeons. This preference for gender concordance between patient and surgeon has been decisively demonstrated in Pakistan for most surgical subspecialties [32]. Thus, it is vital for women to be adequately represented at the top so that others may receive the much-needed guidance and mentorship to become surgeons, which may subsequently help alleviate Pakistan's unmet need for surgical healthcare. Furthermore, in the context of surgical research, innovative strategies, such as leveraging surgical networks on social media [38] to provide peer-mentoring [39] and research training [40], can be developed to aid women surgeon's academic capacities and growth.

Limitations

There are certain limitations that need to be kept in mind while interpreting our article. In the absence of a publicly available central database of surgical faculty in medical schools across the country, the absolute accuracy of our findings may be limited by the response rate of our study (85.1%). Nevertheless, our study is the first to report national level data regarding sex-based disparities across surgical faculty and represents a resounding and long overdue call to action to the surgical community in Pakistan.

Conclusion

In a lower-middle-income country like Pakistan, there are extensive sex-based disparities in academic surgery, with a blatant lack of female representation across all faculty positions and in most surgical specialties. Imbalances are more pronounced in the two relatively under-developed provinces of Pakistan, Khyber Pakhtunkhwa and Balochistan. The implications of these worrying sex-based disparities are far-reaching, as they aggravate the surgical disease burden and adversely impact surgical prospects for women across the country.

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