Brain drain of health professionals from Pakistan: a narrative review

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To cite: Idrees M, Muskan U, Masaud MS. Brain drain of health professionals from Pakistan: a narrative review. Health Innov J Eur. 2026; 1:1-10.

Received [24 September 2026]

Accepted [23 October 2026]

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ABSTRACT

Background: International migration of health professionals can affect the availability and distribution of health workers in source countries. Pakistan-specific evidence is fragmented across professional cadres and includes both migration-intention surveys and administrative or secondary reports.

Objective: To synthesize available Pakistan-specific evidence on the drivers, documented scale, destinations, and potential health-system implications of health-professional migration across doctors, nurses, pharmacists, and allied health professionals, while identifying evidence gaps.

Methods: This narrative review synthesizes Pakistan-specific studies, administrative information, and relevant international literature identified through AI-assisted literature discovery and targeted manual searching. Sources were checked against accessible original publications or traceable records. The search was not designed as a systematic review and can-not establish exhaustive coverage.

Findings: One published analysis reported that 50,110 healthcare professionals left Pakistan between 1971 and 2022. Separate, physician-specific indicators include US residency placements reported for 2025 and the subsequent cycle; these indicators should not be interpreted as a complete annual emigration series. Studies of students, junior doctors, nurses, and pharmacy students report substantial migration intention, but intention is not equivalent to completed migration. Reported drivers include remuneration, postgraduate training opportunities, workplace conditions, and perceived professional opportunities abroad. Evidence on policy effectiveness and several non-physician cadres remains limited.

Conclusion: Available evidence documents ongoing international mobility and substantial migration intention among some groups of Pakistani health professionals. Better routine migration data and rigorous evaluations of retention interventions are needed before trends or policy effectiveness can be established with confidence.

Keywords: brain drain; physician migration; health workforce; Pakistan; nurse migration; retention policy

1. INTRODUCTION

The emigration of highly skilled professionals, often termed "brain drain," is a global health-workforce concern.

International migration of doctors, nurses, pharma-cists, and allied health professionals from low- and middle-income countries (LMICs) has been dis-cussed in international reviews and commentary.[1,2] For Pakistan, the available literature includes administrative estimates of completed emigration, institutional surveys of migration intention, and reports concerning destination-country training pathways. These sources measure different phenomena and should not be treated as interchangeable.

Pakistan-specific sources describe economic pressures, political instability, working conditions, and postgraduate training opportunities as factors associated with health-professional migration.[3–12] How-ever, available evidence is not a complete, cadre-specific annual series of completed emigration. In particular, US residency-placement figures describe a destination-specific training pathway and should not be presented as a comprehensive measure of all Pakistani physician emigration.[13]

The potential health-system implications include loss of trained personnel and public or institutional in-vestment in education. However, estimates of training costs and physician-to-population ratios depend on the source and assumptions used; they should be interpreted as estimates rather than direct measurements of the cost attributable to migration.[3,14]

Existing Pakistan-specific studies are concentrated more heavily on physicians than on nurses, pharma-cists, and other allied health professionals. Evidence is also stronger for stated migration intention than for verified completed migration or the effectiveness of retention interventions. This narrative review there-fore aims to summarize what the available sources support, distinguish findings from evidence gaps, and identify priorities for better workforce-migration data and evaluation.

2. METHODS

This is a narrative review and does not claim systematic completeness or follow PRISMA reporting standards. It synthesizes available evidence on health-professional migration from Pakistan across doctors, nurses, pharmacists, and allied health professionals, while distinguishing studies of migration intention from evidence of completed migration.

Search strategy. Sources were identified using AI-assisted literature discovery tools (AnswerThis.io and Consensus) and targeted manual web searches. Search concepts covered health-professional cadres (doctors, physicians, pharmacists, nurses, allied health professionals, and healthcare workers), migration (emigration, brain drain, migration intention, and retention), and Pakistan. Searching and source verification were conducted in July 2026. The strategy involved broad scoping, cadre-specific follow-up searches, and verification of quantitative claims against accessible original publications or traceable sources. Grey literature and official statements were used where relevant for administrative or time-sensitive figures. The final narrative synthesis cites 23 sources, including 13 primary empirical studies relevant to migration or return migration. A record-level screening log was not retained; therefore, the number of records initially retrieved, screened, and excluded cannot be reported reliably.

Sources were checked, where accessible, against the original publication, DOI record, journal website, or a traceable institutional source. For sources published in journals not indexed in major bibliographic databases, indexing status was treated as contextual information rather than a substitute for

appraisal. The qualitative appraisal considered study design, sampling, population, and whether the source directly supported the claim. No formal item-by-item AXIS or JBI checklist scoring was undertaken, and no independent second appraiser was involved. The manuscript was prepared with reference to the Scale for the Assessment of Narrative Review Articles (SANRA).[15] The push–pull framework was used to organize reported migration drivers.[1]

Exclusion criteria. Sources not specific to health-professional migration, sources focused exclusively on non-health skilled-worker emigration, and sources whose relevant claims could not be checked against a traceable record were excluded from the synthesis.

The search was narrative rather than systematic and did not use a reproducible database-by-database search log. The findings should therefore be interpreted as a narrative synthesis of the identified evidence, not an exhaustive census of all relevant studies.

3. DOCUMENTED SCALE OF MIGRATION

A published analysis estimated that 50,110 healthcare professionals left Pakistan between 1971 and 2022: 31,418 doctors, 12,853 nurses, and 5,839 pharmacists.[3] This is a cumulative figure spanning five decades, not an annual series for 2005–2026. Other reports describe increased emigration of Pakistani nationals in 2022, but administrative categories and source definitions differ and should be checked before direct year-to-year comparisons are made.[6,16,17]

A Pakistan Medical and Dental Council (PM&DC) press statement dated 8 April 2025 reported that 1,061 Pakistani doctors had obtained residency positions in the United States.[3] Residency placements are a destination-specific training indicator, not a complete measure of physician emigration. The available sources do not provide a comparable annual series for all cadres.

Taken together, the available evidence documents a substantial cumulative outflow and continuing inter-national mobility, but does not provide a complete, comparable annual series for every health-professional cadre from 2005 through 2026. The available data therefore do not establish that total emigration is accelerating or that the trend has or has not begun to reverse.

Figure 1. Verified Trend Data on Health Professional Emigration from Pakistan

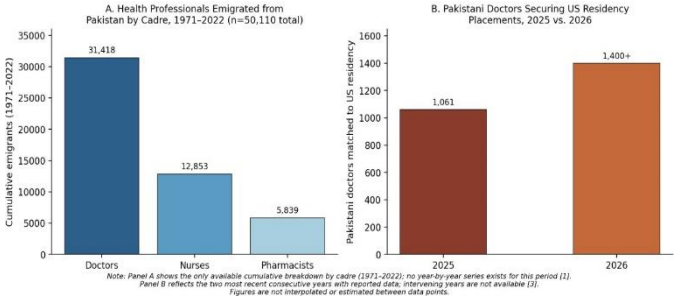

Figure 1. Available indicators of health-professional migration from Pakistan. The indicators cover different periods and measure different outcomes; they should not be interpreted as a continuous annual emigration series.

4. PUSH FACTORS

Studies of Pakistani physicians and trainees describe several potential push factors, although much of the evidence comes from single-institution, cross-sectional surveys rather than nationally representative samples. Themes reported across studies include remuneration, training and career opportunities, work-place conditions, and broader social or political circumstances.

Remuneration and financial insecurity. Inadequate pay is the most consistently cited push factor across the Pakistani literature. Among final-year students and recent graduates surveyed at Dow Medical College, salary considerations ranked as the leading rea-son for wanting a career abroad.[9] This pattern holds across career stages: financial conditions were rated among the strongest motivators for training abroad among Lahore graduates, alongside job opportunities and the

perceived impact of foreign residency on future career trajectory.[10]

Training quality and postgraduate bottlenecks. In addition to remuneration, postgraduate training quality and availability are reported concerns. A survey of Ayub Medical College graduates identified work environment and training quality among the reasons associated with migration intention.[7] In a nationwide survey of neurosurgery trainees, the availability of fellowship training within the trainee's own hospital was associated with the decision to stay or leave ($p = 0.034$).[6] This association does not establish that fellowship availability operates independently of remuneration, workplace conditions, or other factors.

Political instability and system-level insecurity. Political and economic instability are discussed as potential macro-level drivers of migration in Pakistan-focused commentary and policy literature.[4,5] These sources provide context but do not quantify the independent contribution of instability to completed health-professional emigration.

Gender-specific barriers. Some literature discusses social expectations and workplace barriers affecting female health professionals, but the evidence available for this review is limited and does not establish the size or independent contribution of gender-related factors to completed emigration.[5] These issues are best treated as a potential concern requiring more focused research rather than as a quantified, distinct migration driver.

Institutional and structural conditions. A qualitative study of Pakistani-trained physicians practicing in the United Kingdom, Canada, Saudi Arabia, and the United Arab Emirates reported concerns involving institutional support, professional agency, infrastructure, meritocracy, and professional dignity.[12] Be-cause this evidence is qualitative and based on a selected group of physicians already practicing abroad, it provides insight into participants' accounts but cannot establish the prevalence or independent effect of each factor across Pakistan's health workforce.

Overall, the reviewed sources suggest that financial pressures, training and workplace conditions, and broader social or political circumstances may inter-act. The available cross-sectional and qualitative evidence does not permit reliable ranking of their independent contributions.

5. PULL FACTORS AND DESTINATION PAT-TERNS

Push factors describe reasons respondents give for considering migration, while destination-focused sources describe where some professionals seek training or employment. The available evidence identifies the United States, United Kingdom, Canada, and Gulf countries in different contexts, but does not provide a single comparable destination ranking for all cadres.

The United States is an important destination for Pakistani physicians pursuing postgraduate specialty training. The pathway involves the United States Medical Licensing Examination (USMLE) and the National Resident Matching Program.

Among Lahore-based final-year students and graduates, the United States and United Kingdom were preferred destinations for postgraduate training, and perceived career trajectory was an important re-ported motivator.[10] PM&DC reported 1,061 Pakistani doctors obtaining US residency positions in 2025.[13] This figure reflects residency placements, not all physician migration. The United Kingdom is another destination for Pakistani doctors. The Professional and Linguistic Assessments Board (PLAB) route is one pathway for international medical graduates seeking registration, subject to General Medical Council requirements. The sources cited here

do not establish a complete annual count of Pakistani doctors entering UK practice.

Canada, Saudi Arabia, and the UAE. feature prominently as destinations in the qualitative literature on physician emigration, with Pakistani-trained physicians describing an "architecture of professional promise abroad" encompassing not just higher pay, but structured specialization pathways, access to advanced medical technology, and a degree of professional dignity perceived as unavailable domesti-cally.[12]

For nurses, available studies describe international destinations and report pull factors such as remuneration, workplace conditions, and career opportuni-ties.[18,19] In one study, push and pull factors were re-ported as weighting scores of 65.67% and 83.32%, respectively. These are not proportions of migration decisions and should not be interpreted as shares of nurses who migrated or as prevalence estimates.

For pharmacists, the available evidence describes migration intention and employment-related considerations, but the sources reviewed do not justify presenting the United States and Canada as a definitive ranking of completed migration destinations.[20,21] Destination preferences and actual migration destinations should be distinguished.

Across cadres, reported pull factors extend beyond compensation to include training, licensure, work-place conditions, and career development. However, the available studies differ in population and out-come measures, so their findings should not be combined into a single ranking of destination attractive-ness.

6. WHO IS LEAVING: CADRE AND CA-REER-STAGE PATTERNS

Table 1 summarizes selected Pakistan-specific studies included in the cadre-focused synthesis. The measures are heterogeneous and should not be pooled.

Table 1 Pakistan-specific studies on health-worker migration intent by cadre

Cadre	Study (Ref.)	Population / Sample	Reported metric	Evidence tier
Physicians (students/junior)	Sheikh et al.[9]	n = 323, Dow Medical College students	60.4% want career abroad	T1
Physicians (junior doctors)	Balouch et al.[7]	n = 201, Ayub Medical College graduates	63.68% want to emigrate (71.6% of remainder open to it)	T1
Physicians (students/graduates)	Tariq et al.[8]	n = 305, Peshawar students / house officers	67.5% intend to migrate	T1
Physicians (neurosurgery trainees)	Shakir et al.[6]	n = 120, 22 CPSP-accredited centers, nationwide	64% intend to leave; fellowship availability significant (p = 0.034)	T1
Nurses	Rizwan et al.[18]	n = 100, migrating nurses	Push/pull weighting scores: 65.67% / 83.32%; not migration-intent prevalence	T2
Pharmacists (students)	Naqvi et al.[20]	n = 539, 3 cities	94.06% emigration intent	T1
Allied health (non-pharmacy)	—	—	No Pakistan-specific studies identified	Evidence gap
Post-fellowship / FCPS specialists (all cadres)	—	—	No Pakistan-specific studies identified	Evidence gap

T1 = study published in an indexed journal and independently checked against an accessible source; T2 = article verified as traceable but published in a journal not indexed in the major databases checked. These labels describe source traceability and are not formal risk-of-

bias ratings. Percentages are not pooled or averaged because populations, sampling frames, and measures differ.

Doctors. The available evidence on physician migration is concentrated at the early-career end of the pipeline—medical students, house officers, and recent graduates—rather than distributed evenly across career stages. Institutional surveys report migration intention of 60.4% among Dow Medical College stu-dents,10 63.68% among Ayub Medical College graduates (with an additional group open to migration later),[7] and 67.5% among students and early-career doctors in Peshawar.[8] These are institution-specific intention estimates, not nationally representative estimates of completed emigration.

Direct evidence on post-fellowship or Fellowship of the College of Physicians and Surgeons (FCPS)-qualified specialists is limited. Existing studies often survey trainees before specialist qualification or physicians who have already emigrated, without a matched comparison group of specialists who remained. The available Pakistan-specific evidence therefore does not establish whether qualified specialists emigrate at higher or lower rates than junior doctors.

Nurses. The nursing literature is smaller and includes institutional studies with differing designs and measures.[18,19,22] Findings should be interpreted in light of their sample selection and the fact that some studies report push/pull weighting scores rather than a single prevalence estimate of migration intention.

Pharmacists. Pharmacist migration is less extensively studied than physician migration in the sources identified for this review. The available studies examine migration intention among pharmacy students and employment-related factors among pharmacists, but do not pro-vide a comprehensive national series of completed pharmacist emigration.[20,21]

Specialty-Level Case Study: Neurosurgery. A survey of 120 neurosurgery trainees across 22 College of Physicians and Surgeons Pakistan (CPSP)-accredited training centers reported that 64% in-tended to leave Pakistan and that local fellowship availability was associated with the decision to stay or leave ($p = 0.034$).[6] This observational association should not be interpreted as independent of financial, workplace, or political factors unless an adjusted analysis demonstrates independence.

Evidence Gap. Current evidence does not support a national ranking of physician emigration by specialty. The neurosurgery survey identified above is the only specialty-specific dataset located in this narrative synthesis; additional studies are needed before comparisons across specialties can be made.

7. IMPACT ON PAKISTAN'S HEALTH SYS-TEM

The results of sustained health-worker emigration are explained best by three interconnected dimensions: financial/ educational investment loss, workforce capacity and downstream effects on care quality and delivery.

Workforce capacity. The most direct and measurable consequence of emigration is a widening gap be-tween the health workforce Pakistan trains and the workforce that remains to serve its population. As noted in Section 3, the current physician-to-population ratio of approximately 1:1,300 falls short of the WHO-recommended 1:1,000 benchmark, placing Pakistan among a group of 57 countries facing a recognized shortage of human resources for health.[2] This shortage is not evenly distributed: because emigration is concentrated among recent graduates of the country's leading medical institutions (Section 3) and among trainees in specialties with limited local fellowship capacity (Section 6.4), the workforce loss likely falls disproportionately on higher-acuity and subspecialty care though Pakistan-specific data quantifying this distributional effect directly is

not currently available, and this should be treated as a plausible inference rather than an established finding.

Financial and educational investment loss. Health-professional training represents a substantial public and private investment that is lost, in economic terms, when a trained professional emigrates rather than practices domestically. Saluja and his col-leagues estimated that educating a single physician costs approximately US$114,000 and a nurse US$32, 000, and migration of physicians and nurses results in US$15.86 billion in annual losses across LMICs and Pakistan ranked among countries bearing greatest costs.[14] This figure represents training-cost loss specifically; it does not include the separate, mentorship capacity, harder-to-quantify cost of lost long-term productivity, or health-system leadership that would otherwise have accrued domestically.

Care delivery and quality. The remaining workforce absorbs the burden of the resulting shortage through increased workload, a pattern noted consistently, if largely qualitatively, across the reviewed litera-ture.[3,16] The qualitative physician-emigration study cited in Sections 4–5 adds a further dimension to this picture: diaspora physicians interviewed described a persistent "moral residue" regarding Pakistan's healthcare conditions, suggesting the psychological and professional costs of the brain drain are borne not only by those who remain, but also, in a different form, by those who leave.[12]

Taken together, the impact of emigration on Pakistan's health system should be understood as com-pounding rather than purely additive: workforce loss increases burden on remaining staff, which per the training-quality and working-condition push factors identified in Section 4 itself constitutes a further push factor for the professionals who remain, creating a feedback loop that the currently available literature describes but does not yet quantify longitudinally.

8. POLICY RESPONSES AND THEIR (UN)EVALUATED EFFECTIVENESS

The literature proposes responses including improved remuneration and overtime compensation, more postgraduate training opportunities, safer workplaces, attention to gender-related barriers, and improvements to infrastructure and professional ad-vancement.[6–8,12] These are recommendations in the literature, not interventions shown by this review to be effective. Broader reviews discuss health-worker migration and retention internationally,[1,2,23] but do not establish the effectiveness of any specific Pakistan policy.

No Pakistan-specific outcome evaluation of the retention recommendations identified in this review was found. A broader scoping review of physician-retention strategies in low- and middle-income countries also reported limitations in the evidence on ef-fectiveness.[20] This does not mean that no measures have been implemented; rather, the sources reviewed do not establish their effects using robust outcome data.

A standardized and linked national dataset covering registration, emigration, return migration, and work-force participation could support future evaluation. The available sources do not establish that a particular registry or policy has already been implemented effectively.

International reviews and commentary place health-worker migration within a wider global pattern and discuss push–pull dynamics and the shared responsibilities of source and destination countries.[1,2] These sources provide context; they do not evaluate Pakistan-specific policy mechanisms directly.

The policy literature relevant to Pakistan contains recommendations but limited evaluation. A standardized national health-workforce migration dataset, potentially linking registration, emigration, return migration, and workforce participation data, could support future monitoring and policy evaluation. This is a research and data-infrastructure

recommendation, not evidence that any specific retention intervention is effective.

9. LIMITATIONS OF THE EVIDENCE BASE

Several methodological and structural limitations run across the literature synthesized in this review and should inform how confidently its conclusions are read.

Intent is not behavior. The large majority of quantitative studies reviewed here measure intention to emigrate typically among students, house officers, or trainees rather than confirmed, completed emigration. Migration-intent surveys consistently report high percentages (60–95% depending on cadre and institution; Section 6), but intent-to-migrate literature across settings globally is known to overstate eventual migration behavior, since career plans formed early are subject to revision as personal circumstances, licensing outcomes, and domestic opportunities evolve. None of the studies reviewed here followed respondents longitudinally to confirm whether stated intent translated into actual emigration, meaning the true "conversion rate" from intent to completed migration among Pakistani health professionals remains unknown.

Sampling is convenience-based and single-institution. With few exceptions, the underlying primary studies rely on convenience or non-probability sampling drawn from a single medical college, hospital, or training program (Sections 4 and 6). While the consistency of findings across geographically distinct institutions (Karachi, Lahore, Peshawar, Abbottabad, Multan) lends some confidence that the broad pattern generalizes, no study in this review employed a nationally representative sampling frame across Pakistan's full population of health professionals.

Evidence quality varies across cadres and studies. The qualitative appraisal considered study design, sampling, population, and whether the source sup-ported the claim. Indexing status was treated as con-textual information about traceability, not as a substitute for appraisal. Nursing and pharmacy findings require cautious interpretation because of design and sampling limitations.

Specialty- and allied-health-level data are sparse. As stated explicitly in Section 6.5, this review identified only one Pakistan-specific specialty-level dataset (neurosurgery) and no dedicated studies of al-lied health professions beyond pharmacy. Claims about which specialties or allied health cadres are most affected by emigration cannot currently be sup-ported by Pakistan-specific evidence.

Policy-effectiveness evidence was not identified in the sources reviewed. No study identified for this narrative synthesis evaluated the effect of a specific Pakistan retention policy using a controlled or pre/post outcome design. The absence of such evidence should be interpreted within the limits of the narrative search. AI-assisted tools were used to identify potentially relevant sources, followed by manual checks against accessible original publications or traceable records. A complete search log was not retained, so the number of records initially identified, screened, and excluded cannot be reported reliably. The search was narrative rather than systematic and should not be de-scribed as exhaustive. These limitations constrain conclusions about specialty-level patterns, allied-health cadres, and the effectiveness of proposed policy responses. A future systematic or scoping review with a prespecified protocol, reproducible searches, and formal study appraisal could complement this narrative synthesis.

10. CONCLUSION AND FUTURE RESEARCH DIRECTIONS

This narrative review synthesizes available evidence on health-professional migration from Pakistan, distinguishing cumulative administrative estimates, destination-specific training-placement figures, and studies of migration intention.

Available evidence documents a substantial cumulative outflow and continuing international mobility, alongside high stated migration

intention in several institutional studies. Reported drivers include remuneration, postgraduate training opportunities, work-place conditions, and broader political or social circumstances. The strength of evidence varies by cadre, and available data do not establish a complete annual emigration trend or prove that any single factor independently determines migration.

Important gaps remain: evidence on qualified specialists and allied health cadres is sparse; stated migration intention cannot be equated with completed migration; and rigorous evaluations of retention interventions were not identified in the sources re-viewed. Policy recommendations such as expanding training opportunities and improving workplace conditions remain plausible proposals that require evaluation.

Future studies should prioritize the following directions:

1. A standardized national health-workforce migration tracking system that can link registration, emigration, return migration, and workforce participation data.
2. Longitudinal cohort studies following medical, nursing, and pharmacy graduates over time to establish how often stated migration intention translates into completed emigration.
3. More research across cadres, including nurses, pharmacists, allied health professionals, and specialists, using transparent sampling and clearly defined outcomes.
4. Prospective or quasi-experimental evaluation of specific retention interventions when they are implemented.

The available evidence supports concern about health-professional migration from Pakistan, but it does not justify claims that overall outflow is accelerating or definitively "not slowing" across all cadres. Future work should prioritize standardized migration tracking, longitudinal studies linking stated intention to actual migration, broader cadre cover-age, and evaluation of retention interventions.

Funding No external funding was received for this work.

Competing interests The authors declare no competing interests.

Author contributions All the authors have contributed equally to the preparation of manuscript.

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