

# Impact of unstable environment on the brain drain of highly skilled professionals, healthcare workers, researchers, and research productivity in Pakistan

## ABSTRACT

**Background:** The geo-strategic position of Pakistan on the world map is incredibly important and idyllic as the country is considered the gateway to central Asia. Pakistan has faced political instability for the last three decades, causing a brain drain and adversely affecting socioeconomic growth. This study aims to investigate the impact of an unstable environment on the brain drain of highly skilled professionals, healthcare workers, researchers, and research productivity in Pakistan from January 2000 to December 2022.


**Material and Methods:** The data were recorded from the World Bank, the Higher Education Commission (HEC) Pakistan, the Pakistan Medical and Dental Council (PMDC), the Bureau of Emigration and Overseas Employment (BEOS), Pakistan, Academic Ranking of World Universities (ARWU), and Web of Science Clarivate Analytics. Initially, 32 documents were selected in this study, and finally, eight fact sheets, official government websites, and international organizations were included.

**Results:** The result revealed that due to political instability, in 2022 about 832,339 highly qualified and accomplished experts headed abroad, among them 17976 (2.15%) were highly qualified and 20865 (2.50%) were highly competent professionals. These include accountants 7197 (0.86%), engineers 6,093 (0.73%), agricultural experts 3,110 (0.37%), doctors 2,464 (0.29%), computer experts 2,147 (0.25%), nurses and paramedics 1768 (0.21%), technicians 23347 (2.80%), electricians 20322 (2.44%), and schools and university faculty 1004 (0.12%). Pakistan has a total of 380 Higher Education Commission-indexed academic journals, among them 11 (2.89%) academic journals were indexed in the Web of Science and 23 journals were placed in the Web of Science emerging indexing. Among these journals, only one journal surpassed the impact factor of more than 2.0. The quartile ranking of Pakistani journals is 01 journal in Q2; 02 in Q3; and the remaining 08 journals in Q4. From August 1947 to December 2022, Pakistan produced a total of 259249 research articles, and from January 2000 to December 2022, the number of articles published was 248457 (95.83%). Since the last 22 years, the trend of research publications was continuously increased; however, the rising trend decreased in 2022 with a declined rate of 1263 (3.42%).

**Conclusion:** The unstable sociopolitical environment in Pakistan caused a brain drain of highly qualified and skilled professionals and impaired the global standing of universities, academic journals, and research productivity in Pakistan. Pakistan must resolve the instability and establish sustainable policies to minimize the brain drain of highly qualified and skilled experts and convalesce their academic institutes and their research productivity for the development of the nation.

**Key words:** Brain drain, Pakistan, political instability, publications, research

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## Introduction

Pakistan is situated at the world's most important and highly pleasant geographical location at the Middle East and Asia crossroads, bordered by "Afghanistan and Iran on the west; India on the east; China on the north; and the Arabian Sea on the south." Pakistan is home to 231.4 million people<sup>[1]</sup> with a land area of 803,940 km<sup>2</sup> with four seasons, many major "rivers, mountains and minerals, natural gas reserves, coal and salt mines, and well-fertile agricultural land" with multi-seasonal fruits and various agricultural products. The country is also blessed with 247 universities and degree-awarding institutes,<sup>[2]</sup> including 176 medical and dental schools.<sup>[3]</sup>

Since the establishment of Pakistan in August 1947, the country has faced many waves of political instability, this situation was further aggravated when various political parties and other groups started protests, and these political conflicting situations further damaged the law-and-order situation.<sup>[4]</sup>

Political uncertainty is a leading cause of ambiguity in the public, environment, and economies. Political instability adversely affects the socioeconomic, academic, and healthy productive environment. The sociopolitical instability reduces economic growth, people's savings, earning capacity, and purchasing powers causing inflation and unemployment.<sup>[5]</sup>

The unpredictable sociopolitical environment creates uncertainty among the public, academicians, and researchers and causes uncertainty among the people and institutes.<sup>[6]</sup> The sociopolitical unrest causes a brain drain of academicians, researchers, and physicians.<sup>[7,8]</sup> This study aims to investigate the impact of an unstable environment on brain drain and research productivity in Pakistan from the period January 2000 to December 2022.

## Materials and Methods

### Study design and settings

This observational study was conducted in the "Department of Physiology, College of Medicine, King Saud University, Riyadh, Saudi Arabia" during the period from January 2022 to December 2022.

### Data collection

This study aims to investigate the impact of political instability on brain drain and research productivity in Pakistan from January 2000 to December 2022. Initially, 32 documents were selected in this study, and finally, eight fact sheets, official government websites, and "international

organizations were included. The data were obtained from the World Bank,<sup>[1]</sup> Higher Education Commission (HEC),<sup>[2]</sup> Pakistan, Pakistan Medical and Dental Council (PMDC),<sup>[3]</sup> The Bureau of Emigration and Overseas Employment (BEOS) Pakistan,<sup>[9]</sup> Academic Ranking of World Universities (ARWU),<sup>[10]</sup> QS World University Rankings<sup>[11]</sup>, and Journal Citation report Web of Science Clarivate Analytics.<sup>[12]</sup> After reviewing the reports, and summary, a total of 32 documents were selected for detailed review, and finally, 12 international organizations, institutes, and websites, including the World Bank, Higher Education Commission (HEC) Pakistan, Pakistan Medical and Dental Council (PMDC), Bureau of Emigration and Overseas Employment (BEOS) Pakistan, Academic Ranking of World Universities (ARWU), QS World University Ranking, and Web of Science Clarivate Analytics were selected for the data recording and analysis. The research team members appraised the data, recorded the information, and entered the findings into the computer, and after that, data were rechecked and analyzed.

### Data analysis

The data were presented in numbers, percentages, mean average values, and standard error of the mean, and a *P* value less than 0.05 was considered significant.

### Ethics statement

The data were documented from publicly available databases and organizations; hence, ethical approval was not required.

## Results

### Migration of highly qualified and skilled professionals from Pakistan

This study analyzes the impact of political instability on brain drain and research productivity in Pakistan. It was identified that from January 2000 to December 2022, the total number of highly qualified, highly skilled, and skilled people who left Pakistan is 4553289, among them highly qualified were 209275 (4.59%), highly skilled 289703 (6.36%), and skilled were 4054311 (89.04%) [Table 1 and Figure 1].

In 2022, about 832,339 experts headed abroad, among them 17,976 (2.15%) were highly qualified, and 20,865 (2.50%) were highly skilled people. It indicates that 2312 people left their homeland per day during 2022. These include accountants 7197 (0.86%), engineers 6,093 (0.73%), agricultural experts 3,110 (0.37%), doctors 2,464 (0.29%), computer experts 2,147 (0.25%), nurses and paramedics 1768 (0.21%), technicians 23347 (2.80%), electricians 20322 (2.44%), and schools and university faculty 1004 (0.12%), and the remaining were workers in various fields. Figure 2 demonstrates the migration of professionals from Pakistan from 2011 to 2022.

The majority of the people who migrated from Pakistan are “Islamabad (83169), Lahore (66708), Karachi (44341), Faisalabad (28385), Peshawar (20519), Rawalpindi (12437), Multan (7563), Abbottabad (6737), Jamshoro (5924), Bahawalpur (4788), and Quetta (4328).” These are the main metropolises from where a maximum number of people migrated abroad [Figure 3].

In 2022, most of the people migrated from Pakistan to “Saudi Arabia 514909, UAE 128477, Oman 82380, Malaysia 6175, Qatar 57999, Bahrain 3653, UK 2922, Cyprus 2906, Iraq 2387, Kuwait 2089, South Korea 2025,” Japan 900, USA 801, China

673, Italy 350, and 23693 people were left to the rest of the world [Figure 4].

**Impact of political instability on the global standing of universities**

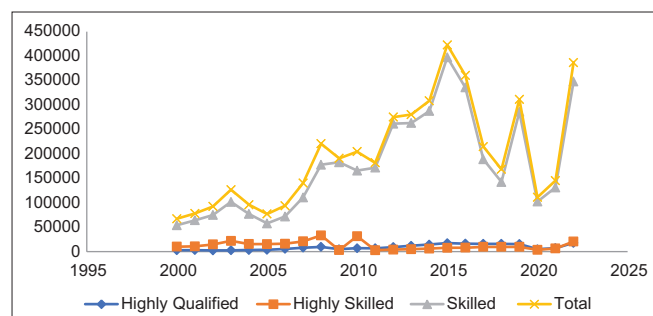
The impact of political stability on universities and research productivity was analyzed. The data were recorded from the Academic Ranking of World Universities (ARWU) 2022 and QS ranking.

Pakistan has a total of 247 universities and degree-awarding institutes.<sup>[1]</sup> Among them, in Shanghai Ranking, while analyzing the overall performance, no one university achieved a place among the top five hundred universities in global science. However, COMSATS University Islamabad achieved a position 513, the National University of Sciences and Technology Islamabad 946, Quaid Azam University Islamabad 955, the University of Punjab Lahore 889, and the University of Engineering and Technology Lahore ranked 978 [Table 2].<sup>[9]</sup>

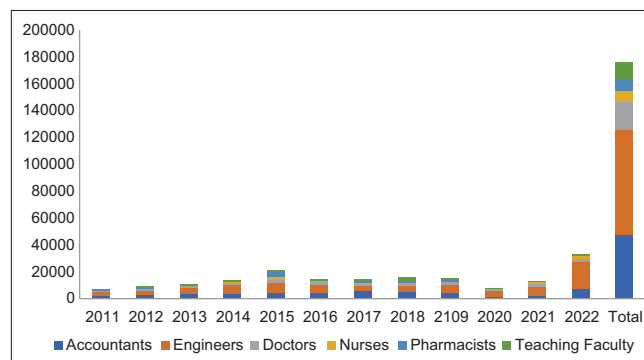
However, in subject category analysis, Aga Khan University Karachi, Pakistan, ranked in the top 102 universities in clinical sciences; COMSATS University Islamabad in Computer Sciences and Engineering 112; Quaid-i-Azam University Islamabad in Computer Sciences and Engineering 233; COMSATS University Islamabad in Engineering 311; National University of Sciences and Technology (NUST) Islamabad in Engineering 337; and University of Peshawar in Engineering 481 achieved a place among the top 500 universities in the world [Table 2]. The global standing of universities in Pakistan was further reviewed on QS ranking. As per the QS ranking, the results revealed that the National University of Sciences and Technology (NUST) Islamabad achieved a place at 334, Quaid-i-Azam University Islamabad 364, Pakistan Institute of Engineering and Applied Sciences (PIEAS) Islamabad 390, and Aga Khan University, Karachi [Table 2].

**Table 1: Migration of highly qualified and skilled professionals from Pakistan**

Year	Highly Qualified People	Highly Skilled Professionals	Skilled Professionals	Total
2000	2999	10292	54110	67401
2001	3155	10846	64098	78099
2002	2618	14778	74968	92364
2003	2719	22152	101713	126584
2004	3291	15557	77033	95881
2005	3737	15467	57793	76997
2006	5708	16332	71898	93938
2007	8178	20975	110938	140091
2008	9713	33173	177791	220677
2009	4954	3260	182657	190871
2010	7081	31650	165726	204457
2011	6974	3018	171672	181664
2012	9298	4202	261531	275031
2013	12057	5032	263138	280227
2014	14647	6216	287649	308512
2015	17484	7853	397317	422654
2016	16510	8172	335671	360353
2017	16029	9886	188745	214660
2018	16105	9770	142486	168361
2019	15525	9899	285960	311384
2020	5121	3745	102336	111202
2021	7396	6563	131348	145307
2022	17976	20865	347733	386574
Total	209275	289703	4054311	4553289



**Figure 1: Migration of highly qualified, highly skilled, and skilled people from Pakistan during the period January 2000 to December 2022**



**Figure 2: Migration of professionals from Pakistan from January 2011 to December 2022**

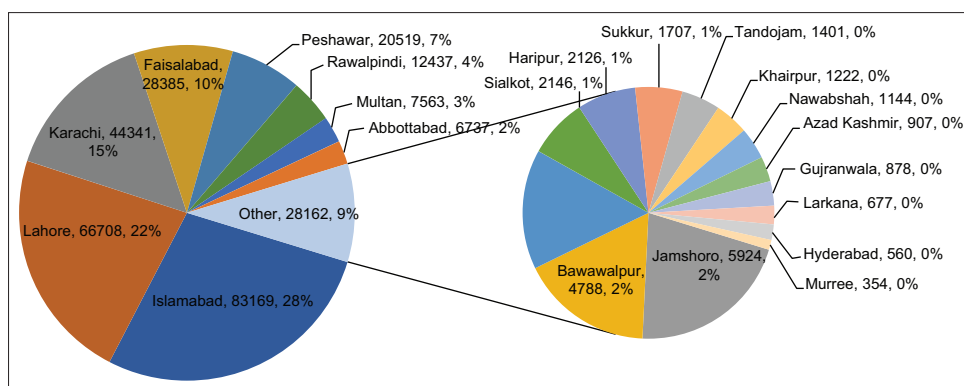


Figure 3: Migration of professionals from various regions of Pakistan from January 2011 to December 2022

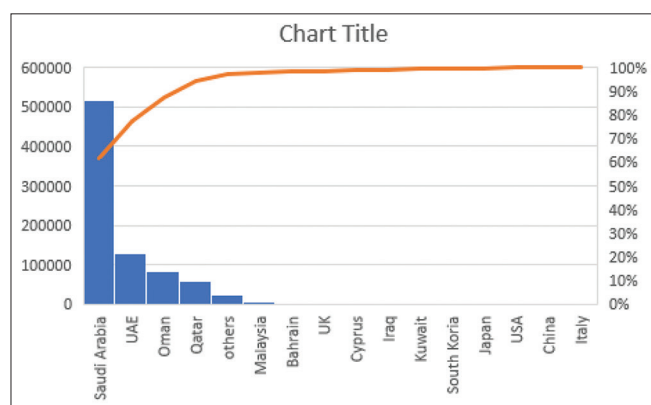


Figure 4: Countries in which people migrated in 2022

The ranking position of Pakistani universities in global science is not appealing to global academicians, science faculty, students, and science community collaborators. The political instability in Pakistan is the leading cause of the university faculty fleeing their campuses and homeland. Once the science faculty migrate, they can carry inventions and scientific prints with them. The migration of science faculty and researchers also carries research publications, inventions, and innovative ideas.

**Impact of political instability on the academic journals**

The productivity and visibility of academic journals and their indexing in global science were analyzed. Pakistan has a total of 380 Higher Education Commission (HEC) indexed academic journals, and merely 11 (2.89%) journals achieved a place in the Web of Science and quartile rankings. Only one journal surpassed the impact factor of more than 2.0 [Figure 5]. The “quartile ranking of Pakistani journals is 01 journal in Q2; 02 in Q3; and the remaining 08 journals in Q4.” However, twenty-three journals entered the Web of Science emerging indexing.

**Impact of political instability on the research productivity**

The research productivity of Pakistan was analyzed, from August 1947 to December 2022, Pakistan produced 259249 research articles, and from January 2000 to December 2022, the

Table 2: Standing of Pakistani universities in global science

University	Shanghai Ranking <sup>[9]</sup>	QS Ranking <sup>[10]</sup>
<b>Overall Ranking</b>		
National University of Sciences and Technology (NUST) Islamabad	--	334
Quaid-i-Azam University Islamabad	--	363
Pakistan Institute of Engineering and Applied Sciences (PIEAS), Islamabad	--	390
<b>Subject Category</b>		
Aga Khan University, Karachi (Clinical Sciences)	102	
COMSATS University Islamabad: Computer Sciences and Engineering	212	
Quaid-i-Azam University Islamabad (Computer Sciences and Engineering)	233	
COMSATS University Islamabad Engineering	311	
National University of Sciences and Technology (NUST) Islamabad: Engineering	337	
National University of Sciences and Technology (NUST) Islamabad: (Computer Sciences & Engineering)	446	
University of Peshawar: Engineering	481	

number of articles published was 248457 (95.83%) [Table 3]. The articles published in 2021 were 36864 and in 2022 were 34583. Since the last 22 years, the trend of research publications was continuously increased; however, the rising trend decreased in 2022 with a declined rate of 1263 (3.42%) [Table 3 and Figure 6]. Moreover, the research productivity is limited to the major cities of Pakistan including Islamabad, Lahore, Karachi, Faisalabad, and Peshawar [Figure 7]. The declining trend of research productivity is most probably due to the migration of many highly qualified and skilled professionals from Pakistan.

**Discussion**

This study investigates the impact of an unsustainable political environment on brain drain and research productivity in Pakistan. It was found that in 2022, about 832,339, highly

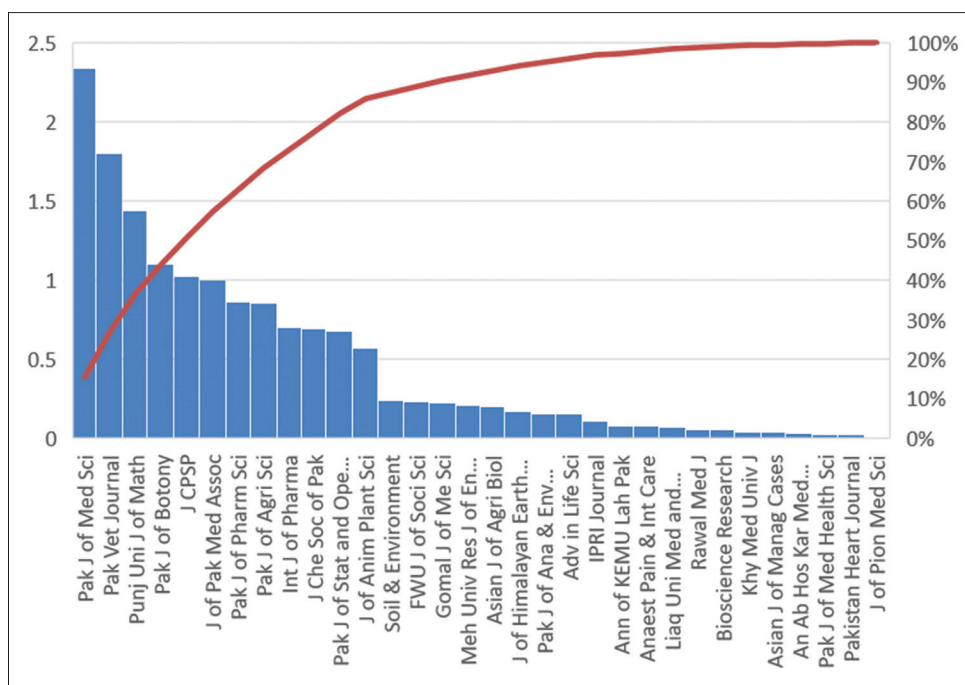


Figure 5: Pakistan's academic journals are indexed in the Web of Science

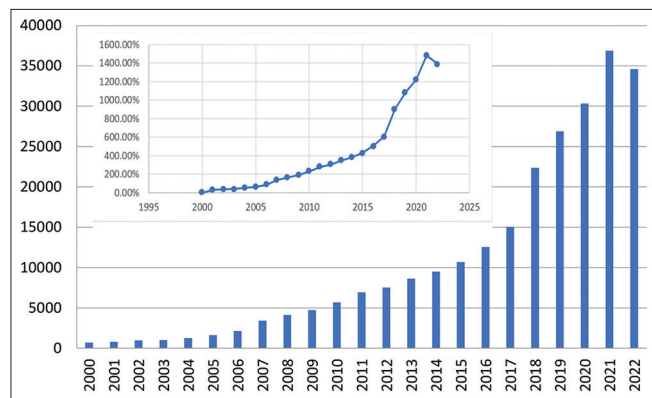


Figure 6: Research publications trends in Pakistan from January 2000 to December 2022

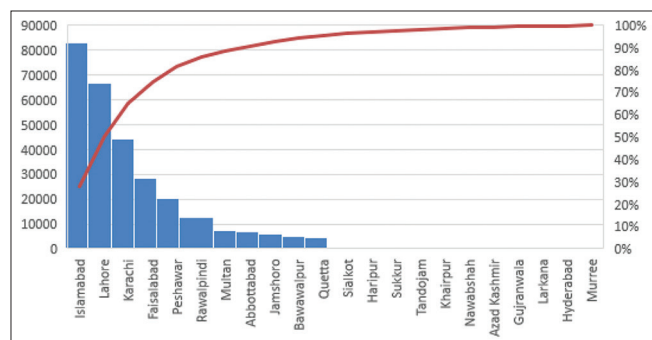


Figure 7: Research publications from various cities in Pakistan (August 1947 to December 2022)

qualified people headed abroad. The migration of these highly educated and skilled professionals hurts research productivity in Pakistan.

Table 3: Research productivity of Pakistan from 2000 to 2022<sup>[10]</sup>

Research publications year	Article published	Percentage
2000	703	0.28%
2001	809	0.32
2002	975	0.39
2003	1014	0.4
2004	1269	0.51
2005	1621	0.65
2006	2143	0.86
2007	3421	1.36
2008	4134	1.66
2009	4742	1.9
2010	5697	2.29
2011	6944	2.79
2012	7540	3.03
2013	8621	3.46
2014	9502	3.82
2015	10681	4.29
2016	12561	5.05
2017	15039	6.05
2018	22366	9.00
2019	26896	10.82
2020	30332	12.2
2021	36864	14.83
2022	34583	13.91
Total	248457	

This situation was further aggravated when various political parties and other groups started protests, these political conflicting situations further damaged the law-and-order situation.<sup>[4]</sup> Political instability adversely affects the socioeconomic, academic, and healthy productive

environment. Sociopolitical uncertainty decreases economic growth, people's savings, earning capacity, and purchasing powers and can cause inflation and unemployment.<sup>[5]</sup>

The migration of highly educated and skilled professionals is commonly known as the brain drain or the human capital flight, and people migrate for a better quality of life, high earnings, access to an advanced technology base environment, and secure political conditions.<sup>[13]</sup> People pursue their careers for critical thinking and intellectual satisfaction. These steps are inspiring, as society needs minds creative thinking. However, many countries including Pakistan are approaching a crisis point as their best brain is leaving the country. The most concerning factor is that people in various age groups are leaving the country due to political instability and economic issues.<sup>[9]</sup>

Over the last two decades, Pakistan's highly qualified and trained workforce has been moving, because of low rewards for their qualifications and experience these factors are also causing them to migrate to developed countries. The common reasons the brain drain takes place are the lack of benefits, fewer career options, low quality of life, low salary, political instability, and crime conditions. In 2022, an unexpected number of doctors, engineers, accountants, technicians, and nurses migrated from Pakistan [Figure 1]. Most of the people migrated from Pakistan to Saudi Arabia, UAE, Oman, Malaysia, Qatar, Bahrain, the UK, Cyprus, Iraq, Kuwait, South Korea, Japan, USA, China, and Italy [Figure 4].

The migration of highly academic and skilled professionals caused an impact on research progress and prospects. From January 2000 to December 2022, the number of articles published was 248457. Since the last 22 years, the trend of research publications has continuously increased; however, the rising trend decreased in 2022 [Table 3 and Figure 6]. The substantial number of qualified professionals who depart the country is a cause of concern as it decreases academic and research productivity in the country.

Political instability not only negatively affects economic and industrial growth, but political instability negatively affects the progress and prospects of universities and academic institutions. Higher academic institutes and universities are the basic birthplaces of knowledge, skills, innovative research, professionalism, and intellectual, social, and personal development. However, political instability severely affects the universities and their research environment [Meo 2022].<sup>[14,15]</sup> The long-term political stability and the continuity of a sustainable political environment are highly

essential for the better performances of the universities in global standing, quality education, and their long-term effect on the development of the nation.<sup>[16]</sup>

The political instability in Pakistan is the leading cause of the university faculty fleeing their universities and homeland. The science faculty migrated also carry inventions and scientific prints with them. Political instability is the major push factor that prompts scientists to flee their country.

Another key area that is linked to the sustainability of the nations is research productivity, its global visibility, and its linkage with industry. It has been reported that regional academic journals have a direct role in the increasing number of research publications [Meo et al., 2013].<sup>[14]</sup>

In Pakistan, the total number of HEC-indexed journals is 380, and these journals are "health sciences 58; management sciences and economics 35; engineering and technology 26; natural sciences 20, agriculture 19, multidisciplinary sciences 11; multidisciplinary social sciences 27; social sciences 82; and arts and humanities 102."<sup>[17]</sup> Out of 380 HEC-indexed academic journals, only 11 (2.89%) academic journals achieved a place in the Web of Science and quartile ranking. Among these journals, only one journal, the Pakistan Journal of Medical Sciences, (impact factor 2.340) crossed the IF of more than 2.0; the remaining journals have an impact factor of around 0.57–1.80."<sup>[12]</sup> And only a few Pakistani journals achieved a place in quartile ranking 2, and the majority of the journals are in Q4.<sup>[12]</sup> However, 23 journals entered the Web of Science emerging indexing, and these journals are still in the early phase of indexing and quartile ranking.<sup>[12]</sup>

Since the last two decades, the trend of research publications was continuously increased; however, the rising trend decreased in 2022 [Table 3, Figure 6]. The research productivity is limited to the major cities of Pakistan including Islamabad, Lahore, Karachi, Faisalabad, and Peshawar [Figure 7]. The declining trend of research productivity is most probably due to the migration of a large number of highly qualified and skilled professionals from academic and research institutes in Pakistan. It is time to understand the worth of loss of brain drain, education, scientific innovative research, and its impact on socioeconomic development and political stability. Pakistani politicians must start dialogs to establish a sustainable political environment. A sustainable political environment is incredibly important to stop the brain drain from the country and develop an educational and research environment for economic progress and sustainable development.

### Study strengths and limitations

This is the first study investigating political instability's impact on brain drain and research productivity in Pakistan. Moreover, the data were recorded from exceptionally reliable organizations and ministries. However, the limitation of this study is that due to some unavailability of data, we were unable to establish the correlations for better conclusions.

### Conclusions

The instability in a sociopolitical environment in Pakistan is the leading cause of the brain drain, low standing of universities, decreased research productivity, and visibility in global science. The government and policymakers must examine the consequences of an unstable environment and its impact on the nation. Pakistan must establish sustainable policies to minimize the brain drain of highly qualified and skilled professionals and provide a sustainable environment of brain gain rather than brain drain.

### Author contributions

S.A.M.: study design, writing, and editing the manuscript; AAD, T.S.: literature review, data collection, entry, and checking and analysis.

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### Conflicts of interest

There are no conflicts of interest.

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