

Ten-year review of renal transplants in Punjab Province, Pakistan

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Abstract

Background: The Punjab Human Organ Transplantation Authority was established in 2012 as a provincial regulatory entity responsible for providing oversight for human organ transplants. However, little is known about the capacity of the province to deliver kidney transplant services.

Aim: To review kidney transplant services in Punjab, Pakistan, from January 2014 to December 2023.

Methods: This retrospective, cross-sectional study analysed secondary data on kidney transplants from 41 hospitals in Punjab Province, Pakistan. It examined the availability and accessibility of transplant services, the distribution of centres, and number and types of transplants.

Results: Only 8 of the 28 districts in the province had kidney transplant centres. Most (75%) of these centres were located in Lahore and Rawalpindi and belonged mostly to the private sector. The average number of transplant centres per million population varied widely, from 0.13 in Sahiwal to 1.13 in Lahore. The average coverage was 0.37 per million population. During the 10-year period, the centres performed 3627 kidney transplants, with an average of 362 transplants per year. Kidney transplant was not included in insurance coverage.

Conclusions: The variations in availability and use of kidney transplant services in Punjab Province may be due to the lack of essential infrastructure and equipment, lack of trained transplant health workforce and inadequate funding. There is a dire need to improve renal transplant facilities and services and encourage organ donation in the province, including in the public sector.

Keywords: kidney transplant, organ transplant, private sector, Punjab, Pakistan

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Introduction

The burden of chronic kidney disease is increasing globally, with an estimated prevalence of 3.7% and 1.2 million deaths in 2016. Population growth and the increasing incidence of diabetes and hypertension are considered the main contributing factors (1). Poverty has been recognized as an independent risk factor for chronic kidney disease (2). Poor people in high-income countries are at greater risk due to the metabolic and behavioural factors and reduced access to healthcare. Low-income countries have an even greater burden due to infections, poverty and poor education. Approximately 24.3% of Pakistan's population lived below the poverty line in 2015, thus predisposing them to the risk of chronic kidney disease (3). An estimated 25 000 Pakistanis suffer from renal failure every year, while dialysis is accessible to only 10% and transplant to only 2.3% of renal patients (4).

Pakistan is the fifth most populous country, with an estimated 207.77 million population (51% male, 49% female, 10 418 transgender) and 2.4% annual population growth rate (5). Approximately 36.3% of the population resides in urban areas. Punjab is the most populous province, with an estimated population of 110.01 million and 31.3% living in urban areas. Four (Lahore, Faisalabad, Rawalpindi, Gujranwala) of the 5 most crowded cities in

Pakistan are located in Punjab Province (6). The province is divided into 9 divisions, 36 districts and 127 *tehsils* (towns) administratively. Each division consists of 4 districts, except Gujranwala and Sahiwal, which have 6 and 3 districts, respectively (7).

Kidney transplant has been taking place in Pakistan since 1979, increasing gradually from 50 to 1000 transplants per year by 2000 (8). The initial beneficiaries were local citizens, however, changes at the regional level has led to transplant tourism in Pakistan, with approximately 1500 transplants performed for foreigners in private hospitals in 2007. This growth was possible mainly because there was no law prohibiting organ trade in Pakistan and India (8).

On 4 September 2007, Pakistan achieved a milestone with the legislation to prohibit illegal transplant, and promulgation of the “Transplantation of Human Organs and Tissues Ordinance 2007”. Subsequently, the president signed the “Transplantation of Human Organs and Tissues Act, 2010” in March 2010, and it became an act of parliament. The Human Organ Transplantation Authority was then established to implement the Act and stop illegal organ trade in Pakistan (9). The 18th Constitutional Amendment in 2011 devolved the health sector to provinces, and the Act was adopted and amended as the

Punjab Transplantation of Human Organs and Tissues (Amendment) Act 2012, followed by the establishment of the Punjab Human Organ Transplantation Authority (PHOTA) in 2017 (10).

PHOTA is a provincial regulatory entity established to oversee organ donation and transplant in Punjab Province. It registers and authorizes hospitals to perform renal transplant according to prescribed standards (11). However, little is known about the capacity of the province to deliver kidney transplant services. Therefore, this study reviewed kidney transplant services across 9 administrative divisions and 36 districts of Punjab over a 10-year period.

Methods

This retrospective, cross-sectional study used data collected by PHOTA from 41 hospitals registered with PHOTA to perform kidney transplant across 9 administrative divisions and 36 districts of Punjab Province, Pakistan. The data included geographic distribution of the hospitals, number of transplants performed and epidemiology of the kidney transplants. All extracted data were validated and follow-up was conducted over the telephone with registered hospitals that did not submit their data to ensure 100% response rate. Data from each hospital were compared with those obtained from PHOTA to identify and correct any discrepancies. Officials of PHOTA or the relevant hospitals were contacted to clarify any significant variations before reaching a consensus.

Operational definition

Incidence of kidney transplant was defined as the total number of transplants performed in Punjab Province in a given year, expressed per million population. Transplant centre density was defined as the total number of transplant centres in a geographic area, expressed per million population. The denominator population estimates used for calculating the summary measures were obtained from the 6th National Population and Housing Census conducted in 2017 by the Pakistan Bureau of Statistics.

Data analysis

We analysed the data at the divisional level to produce descriptive statistics and presented them as numbers and/or percentages. For the purposes of this study, we focused our analysis on the availability of kidney transplant services, density of transplant centres, accessibility of kidney transplants, as well as number and types of kidney transplants (living versus deceased donors). Administrative data managed by federal and provincial governments and their departments and other healthcare organizations are easily available, of low cost and typically cover vast populations. They are very useful for identifying areas requiring improvement and further investigation and for gaining insights into health inequalities, geographical variation in service use and outcomes (12,13).

Results

Only 8 of 28 districts in Punjab Province had kidney transplant services. Almost 75% of registered transplant centres were located in Lahore and Rawalpindi, and most of them belonged to the private sector. Only 42% of renal transplants were performed in public sector hospitals. Coverage of centres varied widely, from 0.13 per million population in Sahiwal to 1.13 in Lahore. The average coverage was 0.37 per million population (Table 1).

An estimated 3627 live kidney transplants were performed between January 2014 and December 2023, with an annual average of 362 transplants (Figure 1). There were only 2 deceased organ donors reported, leading to the retrieval of 4 kidneys along with the liver and cornea. The National Program for Donation and Transplantation of Human Organs and Tissue and United Arab Emirates shared one liver and one kidney with Pakistan and these were transplanted at the Pakistan Kidney and Liver Institute and Research Centre, Lahore, in November 2021 (Table 2).

Pre-emptive kidney transplants were being performed in the province but no data was available on this. No kidney swaps were performed between 2014 and 2021; kidney swap was allowed in March 2022. Swap transplant was performed in Lahore and around 26 pairs were transplanted (Table 1).

Punjab does not have an official transplant registry or waitlist and reporting of kidney transplant services, e.g. patient survival rates, graft survival, delayed graft function and rejection rate, etc. is inconsistent. Although Punjab Human Organ Transplantation Authority collects data on patient survival, they do not analyse the data.

There was no insurance coverage for kidney transplant under the Universal Health Coverage.

Discussion

Our study is believed to be the first to describe the status of kidney transplant services in Punjab Province, Pakistan. We have identified substantial variations in the availability and use of kidney transplant services in the province. Many administrative divisions and districts lack the essential infrastructure, relevant health workforce and funding needed to increase coverage of kidney transplant services. There is a dire need to promote organ donation and investment in kidney transplant in the province to address the shortage.

Pakistan's healthcare system is characterized by inequalities in the availability and accessibility of healthcare for the poor and rich (14,15). Although citizens are entitled to free healthcare in public sector health facilities, the quality of care is not being monitored systematically. Many people are forced to go to private healthcare facilities due to the poor and unsatisfactory services at public sector health facilities. The poor have to pay for treatment by themselves even if they cannot afford it (14,15). This is supported by the finding that 58% of renal transplants performed in the last 10 years

Table 1. Live renal transplant services in Punjab Province, Pakistan, 2014–2023

Division	Population of division ¹	No. of transplant centres ²			Distribution of transplant centres (per million population)	No. of renal transplants ²			Transplants per million population
		Public	Private	Total No. (%)		Public hospitals	Private hospitals	Total No. (%)	
Lahore	19 398 081	6	16	22 (54)	1.13	13533	1242	2595 (72)	133.77
Faisalabad	14 177 081	1	1	2 (5)	0.14	3	0	3 (0.08)	0.21
Rawalpindi	10 007 821	1	8	9 (22)	0.89	7	835	842 (23)	84.13
Multan	12 265 161	1	1	2 (5)	0.16	74	18	92 (2.5)	7.5
Bahawalpur	11 464 031	1	1	2 (5)	0.17	86	0	86 (2.4)	7.7
Gujranwala	16 123 984	1	2	3 (7.3)	0.18	9	0	9 (0.25)	0.56
Dera Ghazi Khan	11 014 398	–	–	–	–	–	–	–	–
Sahiwal	7 380 386	1	–	1 (2.4)	0.13	–	–	–	–
Sargodha	8 181 499	–	–	–	–	–	–	–	–
Grand total	110 012 442	1 (29)	29 (71)	41 (100)	0.37	1532 (42)	2095 (58)	3627 (100)	33.00

¹ Pakistan Bureau of Statistics Census 2017. ² Punjab Human Organ Transplantation Authority, Lahore. ³ Including 26 pairs of swap transplants

Figure 1. Kidney transplants in Punjab Province, Pakistan, 2014–2023

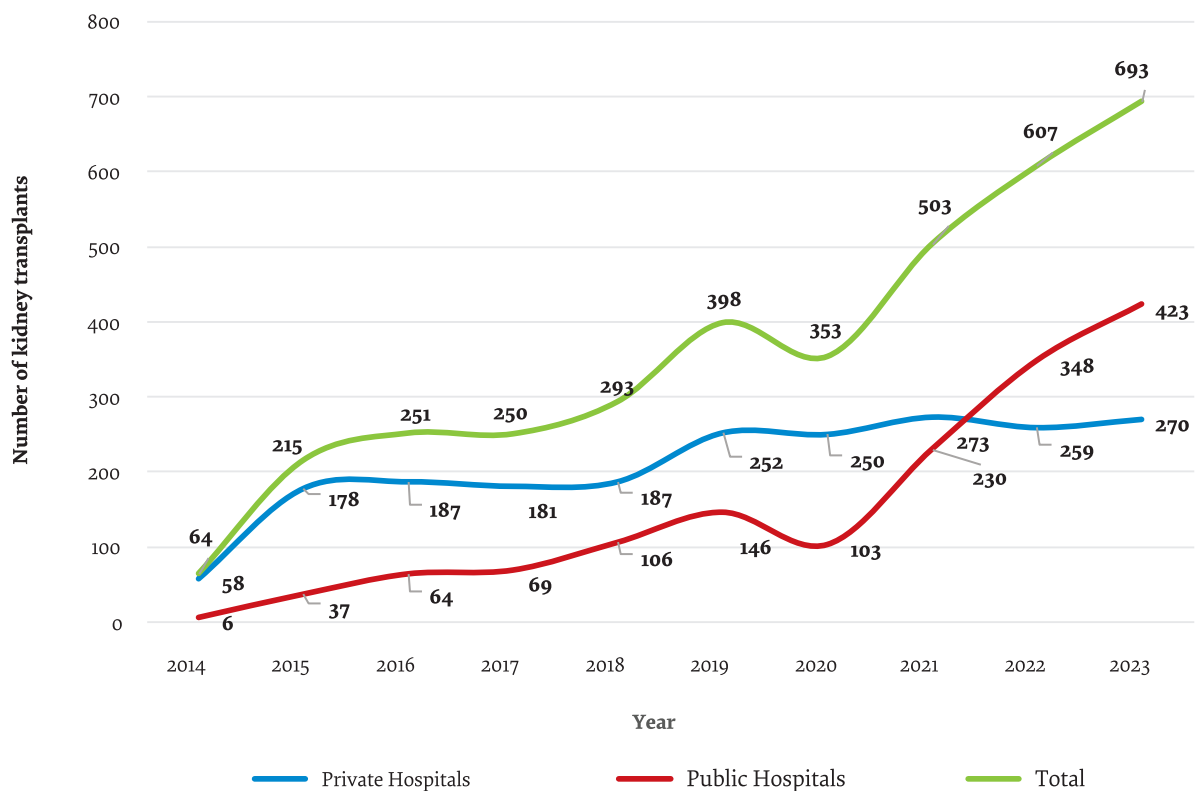


Table 2. Deceased renal transplants in Punjab Province, Pakistan, 2014–2023

Donor	Age	Gender	Organs procured	Organs transplanted	Year of donation/transplant	City & country of donation	City & country of transplant
Donor 1*	53	Female	Both kidneys & both cornea	All	November 2017	Lahore, Pakistan	Lahore, Pakistan
Donor 2*	22	Male	One kidney** & liver**	All	December 2021	United Arab Emirates	Lahore, Pakistan
Donor 3*	60	Female	Both kidneys & liver	All	November 2023	Rawalpindi, Pakistan	Rawalpindi, Lahore, Pakistan

*Anonymous. **Shared by the National Program for Donation and Transplantation of Human Organs and Tissue, United Arab Emirates.

were in private sector hospitals and the fact that the private sector catered for 70% of the healthcare needs of Pakistanis (14,15).

Public sector health institutions in Rawalpindi, Gujranwala, Sahiwal, and Faisalabad performed only 19 procedures, although very few private healthcare facilities catered to renal transplant needs in these areas. However, the number of kidney transplants performed by the public sector increased significantly from 2021, due mainly to the operationalization of the Pakistan Kidney and Liver Institute and Research Centre in Lahore. The existence of quality healthcare institutions with specialized skills governed by comprehensive law is an important factor in the sustainability of organ transplant services (16).

The average number of kidney transplant centres of 0.37 per million population found by this study in Punjab Province is similar to other South Asian countries except Sri Lanka which has 0.5 transplant centre per million population, but higher than the national average (17,18). The global median is 0.4, with substantial variations globally (17,18).

Urbanization is a significant factor in the development of transplant services (19) and this is corroborated by our finding that all registered renal transplant centres were located in urban areas; 75% concentrated in metropolitan cities of Lahore and Rawalpindi. Ninety-five percent of renal transplants were performed in these 2 cities whereas only 32% of transplant recipients resided in them. Three administrative divisions did not have a single renal transplant facility whereas 20% of transplant recipients lived there. Twenty-eight percent of kidney transplant recipients lived in Gujranwala and Faisalabad, but only 9 and 3 transplants, respectively, were performed there. Patients from these 2 districts travelled to other districts for healthcare, thus increasing their burden in terms of out-of-pocket expenditure (15).

An average Pakistani spends about US\$ 17 per year on healthcare, most (US\$ 13) of which is out-of-pocket expenses (20), and renal transplant costs US\$ 8000–23000 (21). The patient pays around 51–75% of the total cost of transplant as out-of-pocket expense in Pakistan and there is no funding for dialysis and transplant (17). Availability of organ, cost of treatment and technical capacity are

very important factors that determine access to organ transplant (22).

The number of kidney transplants in Punjab Province increased steadily from 64 per year in 2014 to 693 per year in 2023, despite stringent government regulations that permit organ donation only by relatives of the patient. Our finding aligns with global trends; the rate of kidney transplants worldwide has increased over the past few years, reaching 17.1 transplants per million population in 2022, compared to 11.1 in 2012 (23).

Approximately 157 494 solid organ transplants were performed worldwide in 2022, including 102 090 kidney transplants (23). Only 39% of these kidney transplants were from living donors whereas almost all kidneys transplanted in Pakistan were from living donors. The mean number of live kidney transplants performed in Punjab was 33 per million population during the 10-year study period, while the median incidence of live donor kidney transplants was 5 per million population globally and 4.8 in South Asia. Türkiye, an Islamic country, had a high median incidence of live kidney transplant (24).

Our finding aligns with the findings that majority of kidney transplants performed in low-income and developing countries involved donations from living donors (18). This low prevalence of donation from deceased individuals can be attributed to the lack of a legal framework on determination of brain death, high cost of transplant, inadequate infrastructure, and social and religious limitations (18). The Punjab Human Organ Transplantation Authority is establishing an organ procurement cell to promote organ donation by deceased individuals in the province (25). The World Health Organization has acknowledged that organ donation by living and deceased individuals are vital to developing national capacity for organ transplant (26). Data from 20 countries show that the median global incidence of pre-emptive kidney transplant is 5 per million population, ranging from 0.3 in Bosnia and Herzegovina to 12.4 in Norway, but no data is available for Punjab (18).

Around 62% of countries offering kidney transplant have a national waitlist, 19% have a regional waitlist, and 21% do not have any waitlist (18). Pakistan does not have a national or provincial transplant waiting list, just like other lower- and lower-middle-income countries,

whereas the majority of high- and upper-middle-income countries have a national waiting list (18). Similarly, Pakistan does not have an official registry for chronic kidney disease and haemodialysis. Bangladesh is the only country in South Asia that has an official dialysis and transplant registry (17).

This study has some limitations. The secondary data used for the study were collected by the Punjab Human Organ Transplantation Authority as part of its administrative processes and not for specific research purposes. Our study did not explore the reasons for disparities in the availability and use of kidney transplant services across the different districts of Punjab. This needs to be evaluated through further qualitative and quantitative studies. Despite its limitation, this study has made systematic data available on the capacity of the Punjab Province healthcare system to provide kidney transplant services. This is critical evidence for policy-

and decision-making to improve availability and use of kidney transplant services across Punjab. Researchers and health authorities need to design and adopt strategies to address the inequalities reported by the study.

Conclusion

There are variations in the availability and use of kidney transplant services in Punjab Province. These disparities may be due to the lack of well-equipped transplant centres as well as the lack of trained transplant surgeons and other relevant specialists. In addition to promoting healthy lifestyles to prevent diabetes, hypertension and other conditions that lead to chronic kidney disease, the capacity of the healthcare system of Punjab Province should be developed to provide comprehensive kidney transplant services to the increasing number of patients requiring renal transplant.

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Conflict of interest: None declared.

Examen sur 10 ans des transplantations rénales dans la province du Pendjab, Pakistan

Résumé

Contexte : L'Autorité du Pendjab pour la transplantation d'organes humains a été créée en 2012 en tant qu'organisme de réglementation provincial chargé d'assurer la surveillance de la transplantation d'organes humains. Toutefois, peu d'informations sont disponibles sur la capacité de la province à offrir des services de transplantation rénale.

Objectif : Examiner les services de transplantation rénale au Pendjab (Pakistan) de janvier 2014 à décembre 2023.

Méthodes : La présente étude transversale rétrospective a permis d'analyser des données secondaires sur la transplantation rénale provenant de 41 hôpitaux de la province du Pendjab. Elle a examiné la disponibilité et l'accessibilité des services de transplantation, la répartition des centres, ainsi que le nombre et les types de greffes.

Résultats : Seuls huit districts sur 28 disposaient de centres de transplantation rénale. La plupart d'entre eux (75 %) sont situés à Lahore et à Rawalpindi et appartiennent principalement au secteur privé. Le nombre moyen de centres de transplantation pour un million d'habitants variait considérablement ; il était compris entre 0,13 à Sahiwal et 1,13 à Lahore. La couverture moyenne pour la province du Pendjab s'élevait à 0,37 par million d'habitants. Au cours de la période de 10 ans, les centres ont réalisé 3627 greffes de rein, soit une moyenne de 362 par an. La transplantation rénale n'était pas incluse dans la couverture d'assurance.

Conclusion : Les variations dans la disponibilité et l'utilisation des services de transplantation rénale dans la province du Pendjab peuvent être dues au manque d'infrastructures et d'équipements essentiels, à la pénurie de personnels de santé formés dans ce domaine et à un financement insuffisant. Il est urgent d'améliorer les installations et les services de transplantation rénale et d'encourager le don d'organes dans la province, y compris dans le secteur public.

استعراض عمليات زرع الكلى في إقليم البنجاب في باكستان على مدى عشر سنوات

رجا سجاد أصغر، الجواهري سليم، عثمان جواد، مدثر زهور، فاروق عزيز

الخلاصة

الخلفية: أُسست "هيئة البنجاب لزرع الأعضاء البشرية" في عام 2012 بصفتها كياناً تنظيمياً إقليمياً مسؤولاً عن الرقابة على زرع الأعضاء البشرية. ومع ذلك، فإن المعلومات المتوفرة قليلة بشأن القدرة الاستيعابية للإقليم لتقديم خدمات زرع الكلى.

الأهداف: هدفت هذه الدراسة الى استعراض خدمات زرع الكلى في إقليم البنجاب في باكستان، من يناير/ كانون الثاني 2014 إلى ديسمبر/ كانون الأول 2023.

طرق البحث: حللت هذه الدراسة الاستراتيجية المقطعية البيانات الثانوية المتعلقة بزرع الكلى من 41 مستشفى في إقليم البنجاب في باكستان. وبحثت كذلك مستوى توفر خدمات زرع الأعضاء وتيسر الحصول عليها، وتوزيع المراكز المختصة بذلك، وعدد عمليات زرع الأعضاء وأنواعها.

النتائج: توجد مراكز زرع الكلى في 8 مناطق فقط من أصل 28 منطقة. وتقع معظم هذه المراكز (بنسبة 75%) في لاهور وروالبندي، وتنتمي في معظمها إلى القطاع الخاص. وقد تبين متوسط عدد مراكز زرع الأعضاء لكل مليون نسمة تبايناً كبيراً، من 0.13 في ساهيوال إلى 1.13 في لاهور، بينما كانت أعلى نسبة (0.37) في البنجاب. وخلال مدة السنوات العشر (2014-2023)، أجرت المراكز 3627 عملية زرع كلى، بمعدل 362 عملية سنوياً. ولم تكن عمليات زرع الكلى مشمولة في التغطية بالتأمين.

الاستنتاجات: قد يرجع التباين في توفر خدمات زرع الكلى والاستفادة من هذه الخدمات في إقليم البنجاب إلى الافتقار إلى البنية الأساسية والمعدات الضرورية، ونقص القوى العاملة الصحية المدربة في مجال الزرع، وقصور التمويل. وهناك حاجة ماسة إلى تحسين مرافق زرع الكلى وخدماتها والتشجيع على التبرع بالأعضاء في الإقليم، بما في ذلك في إطار القطاع العام.

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