

# A Cross Sectional Survey of Kidney Transplantation Cost

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## ABSTRACT

**Background:** Renal replacement therapies for end stage renal disease are considered too expensive in many countries and it is extremely expensive for the least developing countries like Nepal. It is a baseline study of its kind in Nepal that explores a real cost of kidney transplantation.

**Methods:** A cross-sectional study was conducted by stratifying the type of hospitals (private, trust, government and missionary) and then systematic random sampling in 425 kidney transplant recipients in 46 various hospitals. A set of structured questionnaire was used to determine cost of kidney transplantation and associated costs before and after transplantation between June 16, 2003 to July 15, 2008.

**Result:** Kidney transplantation cost was found to be less expensive than continuous dialysis for 3-4 years. The minimum cost paid to the hospital for transplantation was Nepalese Rupees 60,000 whereas the highest amount was 1.2 million for a dialysis. Less than 150,000 Rupees was paid by 5.3%, 150,001-300,000 by 10.7%, 300,001-450,000 by 44%, 450,001-600,000 by 29.3%, respectively. Total of 5.3% did not disclose cost paid to the hospital. Recipients' age was from 15-75 years and most of them were from productive age group (15-60 years). Depending upon the numbers of accompanying person the cost of transportation was found to be Rs.10,800 to 265,000. Varied ranges were found in for contribution to the kidney donor (Rs. 80,000 to 240,000).

**Conclusion:** The dialysis and kidney transplantation are most expensive treatment and it is beyond reach of many compared to haemodialysis cost. Kidney transplantation is less expensive as cost occurring 3-4 years dialysis could cover the cost of transplantation. If the government of Nepal could start the kidney transplantation service, cost of which would be decreased by many-fold.

**Key Words:** cost; hemodialysis; kidney; transplantation

## INTRODUCTION

Renal replacement therapies (RRT) for end stage renal disease (ESRD) are considered too expensive in many countries and it is extremely expensive for the least developing countries like Nepal. Currently, there are two methods of kidney replacement therapies available: kidney dialysis or kidney transplantation. Some weekly and national daily news papers of Nepal reported that cost of kidney transplantation to be Rs.500,000-

800,000 in neighbouring country - India in 2001 that now cost Rs. 800,000-1.6 million (US \$1 = NRs.68).<sup>1,2</sup> The evidence indicates that the kidney transplantation cost is expensive even for the national figures of Nepal and the governmental support has been sought by many individuals. It is too hard to manage the cost. On the other hand the kidney transplantation cost is considered to be more cost-effective and more desirable for patients' quality of life than dialysis.<sup>3-6</sup>

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The data indicates that the number of cases of ESRD is not decreasing (Figure 3).<sup>7</sup> In developing countries including India and also Nepal, the management of end-stage renal disease (ESRD) is largely guided by economic considerations. In the absence of health insurance plans, fewer than 10% of all patients receive renal replacement therapy (RRT). Haemodialysis (HD) is mainly a short-term measure to support ESRD patients prior to transplant.<sup>8</sup>

The chronic kidney disease data is scanty and a precise data on cost of kidney transplantation is still unavailable in Nepal. However, various data which have not been authenticated by any literature are published time to time.<sup>9,2</sup> Estimated global maintenance dialysis population is over 1.1 million and the size of this population has been expanding by 7% yearly. If the current rate continues the global ESRD population will exceed 2 million patients by 2010. A US based study reported that the prevalence of CKD was 11% (19 million US adults) and a cross-sectional study undertaken in Groningen (Holland) in 40,000 populations reported 7% albuminuria. Similarly, 5-8% Singaporeans were found with significant urinary abnormalities (proteinuria/hematuria) when screened for CKD in 450,000 population.<sup>10</sup> Studies of different races living on different continents worldwide have consistently shown that about 1 out of 10 adults has some form of kidney damage and based on the global scenario the incidence is estimated to be 2600 per year (100 ESRD/million) in Nepal.<sup>11</sup> Dialysis therapy for the rest of life or kidney transplantation remains option available for the ESRD at the very moment. In clinical medicine, both the therapies are expensive. In the context of Nepal, except those kidney transplantation performed in 3 patients in one of the nursing homes in Kathmandu in the year 1996 and one another transplantation done at central governmental hospital in November 2004 all received kidney transplant abroad.<sup>12-13</sup> So, the patients did not have any choice other than going abroad.

Nepalese ESRD patients' travelling abroad for kidney transplantation is a grim reality. Yet again, consistency is lacking on how much a patient need to spend for kidney transplantation. Thus, it is a baseline study of its kind in Nepal to explore the real cost of kidney transplantation and dialysis.

## METHODS

A cross-sectional study was conducted on patient registered between June 16, 2003 to July 15, 2008 in Out Patient Clinic of National Kidney Centre - an undertaking of Health Care Foundation Nepal for follow-up examination. After the institutional approval a stratification of the type of hospitals (private, trust, government and missionary) and then systematic random sampling of transplant recipients was done using structured questionnaire to determine cost of kidney transplantation and associated costs before and after transplantation. The study population was all kidney transplantation recipients (425) registered in follow up patients. The treating clinicians and transplant recipients were asked about the type of hospitals and websites were visited for further verification of the type.

In order to maintain the proportionate representation of recipients served by various types of hospitals were stratified (Table 1) into six groups, but reported 41 expired cases and individuals who received transplant service in army hospital and undisclosed hospital were excluded. After stratification, transplant recipients served by private, trust, government and missionary were selected randomly by using systematic sampling technique.

The research assistants were explained and the questionnaire was filled out by the transplant recipients or their close family member, voluntarily. The main objective was to explore the cost of kidney

**Table 1. Number of Kidney Transplant, recipients, deceased and sampling**

S. N.	Type of hospitals Performed transplantation	Number of transplantation	Death	Alive	Sample number of kidney transplant recipients	
1.	Private Hospitals	307	30	277	$277/374 \times 75 = 54.10$	54
2.	Trust Hospitals	53	6	47	$47/374 \times 75 = 9.18$	9
3.	Government Hospitals	44	2	42	$42/374 \times 75 = 8.20$	8
4.	Missionary Hospitals	10	2	8	$8/374 \times 75 = 1.56$	2
	Total		40	374		75
5.	Army Hospitals	7	0	7		
6.	Undisclosed (by transplant recipients)	4	1	3		
	<b>Grand total</b>	<b>425</b>	<b>41</b>	<b>384</b>		

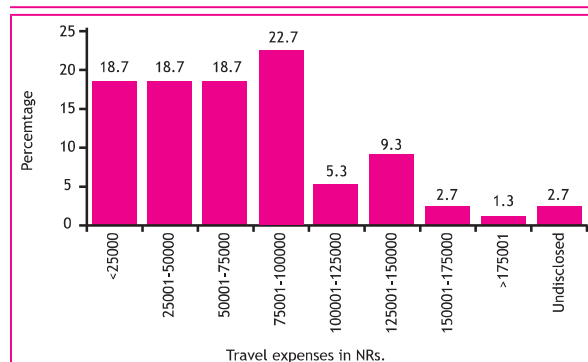
transplantation. Moreover, information about mode of transplantation, financial assistance to the kidney donor, cost of haemodialysis and medicines cost if paid separate and monthly expenses for medicines after transplantation were collected. Data were entered in to the Microsoft Excel 2003 and analyzed by Statistical Package for the Social Sciences, version 12.0 for windows. The limitation of this study was the secondary data based on information given by the transplant recipients.

## RESULTS

The minimum cost paid to the hospitals (46) for transplantation was Nepalese Rupees 60,000 whereas the highest amount was 1.2 million. Less than 150,000 Rupees was paid by 5.3%, 150,001-300,000 by 10.7%, 300,001-450,000 by 44%, 450,001-600,000 by 29.3%, respectively (Table 2). Total of 5.3% did not disclose cost paid to the hospital.

**Table 2. Transplantation cost paid to hospital**

S. No.	Amount	Frequency	Percent
1	<150000	4	5.3
2	150001-300000	8	10.7
3	300001-450000	33	44
4	450001-600000	22	29.3
5	600001-750000	2	2.7
6	750001-900000	1	1.3
7	1050001-1200000	1	1.3
8	Undisclosed	4	5.3
9	Total	75	99.9



**Figure 1. Travel expenses**

Cost of transportation ranged minimum Rs. 10,800 to maximum Rs. 265,000. Less than 25,000 Rupees was spent by 18.7%, 25,001-50,000 by 18.7%, 50,001-75,000 by 18.7%, 75,001-100,000 by 22.7%, 100,001-150,000 by 9.3% and more than 175,001 by 1.3% respectively (Figure 1).

Total of 2.7% did not disclose their travelling cost.

**Table 3. Monthly cost of medicines after transplantation**

Amount	Frequency	Percent
<5000	5	6.7
5001 - 10000	22	29.3
10001 - 15000	26	34.7
15001 - 20000	13	17.3
20001 - 25000	4	5.3
25001 - 30000	2	2.7
45001 - 50000	1	1.3
>55000	1	1.3
Undisclosed	1	1.3

About 7% kidney recipients spent less than 5000 Nepalese rupees per month for medicines after transplantation while 29.3% spent 50001-10000, 34.7% spent 10001-15000 and 17.3% spent 15001-20000. About 1% spent more than 55000 Nepalese rupees per month.

**Table 4. Age wise distribution**

Age	Frequency	Percent
15-30	18	24
31-45	27	36
46-60	25	33.3
61-75	5	6.7
Total	75	100

The lowest age was 17 and highest age was 75 years with mean age 41.93 years. There were 78% male and 28% female comprising 24% aged 15-30 years, 36% aged 31-45, 33.3% aged 46-60 and 6.7% aged 61-75 years. Among the transplant recipients were Mangol (24%), Brahmin (22.7%), Newars (33.3%), Chhetri (16%) and others (4%).

Majority of the kidney recipients (88%) had high school and above educational status and only 2.7% were illiterate.

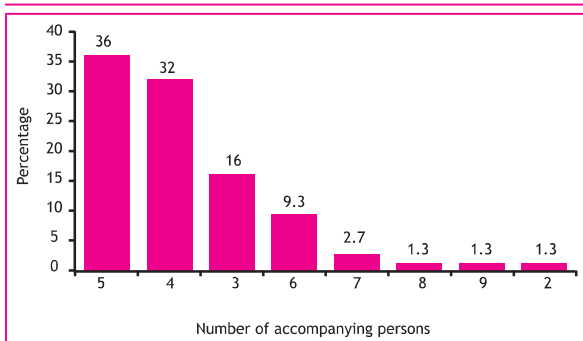
**Table 5. Family income per month**

Family income/month	Frequency	Percent
<15000	32	42.7
15001-30000	25	33.3
30001-45000	1	1.3
45001-60000	2	2.7
60001-90000	1	1.3
90001-105000	1	1.3
105000 and above	3	4
Total	65	86.7

System	10	13.3
	75	100

Among the 65 transplant recipient the minimum family income of was 5,000 and the maximum income was 800,000 Nepali Rupees. Ten transplant recipients did not want to disclose their family income. Out of 65 respondents, 76% had monthly income below 30,000. There were 4 transplant recipients whose monthly income exceeded 90,000 (Table 2).

Among transplant recipient 78.7% were known case of hypertensive and 17.3% were diabetic before transplantation.



**Figure 2. Number of Accompanying persons with kidney transplant recipients**

The total number of accompanying persons with the kidney transplant recipients were varied from two to nine. Total of 36% were accompanied by 5 persons, 32% by 4 persons, 16% by 3 persons and 1.30% by 9 persons respectively (Fig. 2).

Type and means of transport used to travel aboard were air route (28%), bus and train (37.3%) and combination of all (34.7%).

Contribution to the donor in the form of cash was Rs. 80000 to 240,000 Nepalese Rupees and job was given to one donor. One kidney recipient answered that contribution was made to the donor, but did not declare in which form. Some kidney recipients paid medicines cost in package, but many patients had to pay separately

where highest payment was 640,000 and minimum was 2600 with a mean 149282.

Out of 74 kidney recipients 94.7% required HD before transplantation where one did not disclose the information. Due to cost factor and quality of life the kidney transplantation is most recommended form of treatment for the ESRD patients who are fit for it, however the number of kidney transplant recipients is still low.

**DISCUSSION**

‘Dialysis is survival, but transplant is a return to life’ as kidney transplant can achieve endocrine and metabolic functions: the excretory function of the kidney can be partially replaced by dialysis or hemofiltration techniques.<sup>14</sup> But, it is costly and assumed that approximately 10% of total kidney failure patients’ access to the replacement therapy in developing countries like India and the scenario is similar in Nepal.<sup>15</sup> Due to poor socio-economic status of only 10-15% of those 798 patients who visited Bir Hospital with ESRD continued dialysis for more than three months and the rest of them succumbed to death after a few sessions of peritoneal or haemodialysis.<sup>16</sup>

On the contrary, either due to lack of funding or ignorance, patients tend to present late in the course of their disease. Illiterate and lay people prone to infer the illness of swelling is due to possession by spirits especially Devi and Naga. In another scenario, people are likely to have tried faith healing practices before they bring the patient to a neurologist or psychiatrist.<sup>17</sup> Therefore, it is believed that many patients with ESRD die before being diagnosed. It is assumed that the number of kidney transplant in Nepal could be 500 and approximately 409 ESRD can be accommodated on dialysis (Table 7). So, where are those rest ESRD patients?

Haemodialysis facility is available in the country for ~355 patients excluding BP Koirala Institute of Health Science (BPKIHS) facility (i.e. 2834 sessions/8 per month per patients). Estimated HD performance of BPKIHS could be approximately 430 sessions per month based on TUTH’s performance which performs 215 sessions with four machines with in shifts. If BPKIHS has eight machines it could be delivering 430 sessions HD per month means catering about 54 cases in this way ~409 dialysis is going

Disease	Number	Percent	Disease	Number	Percent
Non Diabetes	62	82.7	Non hypertensive	16	21.3
Diabetes	13	17.3	Hypertensive	59	78.7
Total	75	100	Total	75	100

**Table 7. Existing haemodialysis service capacity in Nepal: Reference from Chaitra 2064 (March/April 2008)\***

Type of organization	Name of the institutes	Total number of machines	Shifts per day	Total haemodialysis sessions performed
Government hospitals	Bir Hospital, Kathmandu	6	2	225
Teaching hospitals	Tribhuvan University Teaching Hospital, Kathmandu	4	2	215
	BP Koirala Institute of Health Science, Dharan	8	2	
	Lord Buddha Educational Academy /Nepalguni Medical College, Banke	1	2	19
	Nepal Medical college Teaching Hospital, Kathmandu	6	2	270
	College of Medical Sciences, Bharatpur, Chitwan	2	2	86
	National Medical College, Birguni	2	1	31
	Manimal College of Medical Sciences, Pokhara	2	3	148
Military hospital	Shree Birendra Hospital . Kathmandu	2	3	179
Non-governmental organization	HECAF-Nepal /National Kidney Centre, Kathmandu	30	3	1562
Private hospitals	Blue Cross Hospital and Research Centre, Kathmandu	N	N	N
	B and B Hospital and Research Centre, Kathmandu	3	2	99

\*The data is based on the telephone survey with respective units by professionals. N=Not available

on in Nepal. The question remains whether the available HD PD and CAPD facility available in the country are capable of serving entire ESRD patients.

The worst is yet to come if health system fails prescribing a concrete and feasible policy addressing ESRD. Though the media reported that a transplant cost half a million to 1.6 million rupees in general, our study shows that depending on the type of transplant centre the cost paid to the hospital varies. Rs.150,000 was paid by <5.3% and just a small number (1.3%) of transplant recipient paid 1.2 million directly to the hospital.

A total of 44% paid Rs.300,001-450,000 to the hospital as transplantation cost and 29.3% paid Rs.450,001-600,000. The currency paid to the hospital in India could be in Indian currency. In addition to the direct cost paid to the hospital they had to spend on travel that ranged from Rs.10,800 to Rs.175,000 and even more. The reason for un-uniform cost is due to the year, type of donor and type of hospital they visited.

A typical cadaveric transplant today lasts 13 years whereas the living donor kidney lasts 21 years.<sup>18</sup> The longest kidney transplant in Europe is a 65 year old kidney recipient, Swiss national, who got kidney transplantation 40 years ago (April 1968).

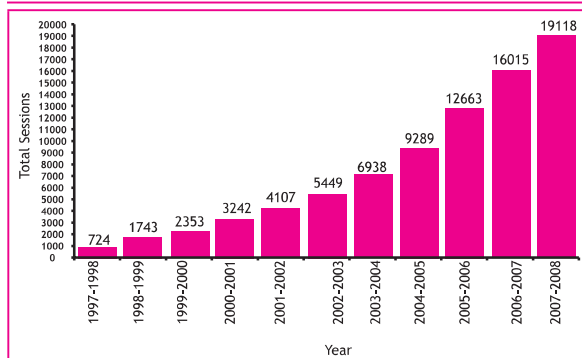
Reports from 98 countries indicated that 66,000 kidneys were transplanted in 2005, representing a paltry 10%

of the estimated need and transplant tourism accounts for about 10% of global transplants. As long as demand for organ outstrips supply, punitive measures will be ineffective: organ trafficking will just go further underground. Initiatives to dramatically increase the legal supply of organ donation are urgently needed<sup>19</sup>.

In the context of Nepal, except those kidney transplantation performed in three patients in one of the nursing homes in Kathmandu in the year 1996 and one another transplantation done at central governmental hospital in November 2004 all received kidney transplant abroad.<sup>12-13</sup>

The first hand experience earned by the researchers indicates that haemodialysis alone costs approximately Rs. 260,000 (US\$ ~4000) per person per year to maintain quality life which is extremely expensive for Nepalese. If one has to stay on dialysis, it could be beyond the affordability to many.

Approximately, 85% Nepalese live in rural and majority of them depend on agro-based earnings and is rated as one of the economically poorest countries in the world with an annual per capita income of approximately \$250 per year and 38% of the population live below the poverty line who hardly can afford the cost of transplantation.<sup>20</sup> On the other hand, many patients with ESRD have already received kidney transplant and many could be on the pipeline. In this context, the monetary issue that they are managing from various sources is notable and



**Figure 3. Total number of haemodialysis sessions provided by National Kidney Centre (1997-2008).<sup>7</sup>**

could be a new topic to study.

Nepal is one of the least developed countries (LDC) in the world and an annual per capita income in Nepal is US\$ 283 that has now improved slightly. It already proves that people with normal condition could not afford kidney replacement therapy. Tax-derived revenues and donor-assisted resources invested in the health care system of Nepal have been struggling to meet the ever-increasing demands. An average spending on health care by the public sector is barely US\$ 3.10 per head including external funding, and US\$ 2.00 without. Nepal is increasingly spending its gross domestic product (GDP) on health care sector in recent years. An unpublished report of Ministry of Health, Nepal indicated that in 2000 out-of-pocket contributions accounted for approximately 70% of total health expenditure.<sup>21</sup> Cost factor is a big barrier for very many patients. World Health Organization has reported that dialysis costs nearly US\$ 7000/year in Nepal.<sup>22</sup>

## CONCLUSIONS

The dialysis and kidney transplantation are most expensive and is beyond reach of many people in the countries like ours. Beside this, transplantation is less expensive than dialysis. Therefore, if transplantation is made possible in Nepal, cost of which would be many-fold less than the other developing countries including India. We recommend our government to start kidney transplantation service as early as possible in Nepal.

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