



Kidney transplants in Nepali migrant workers: health and employment insights

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Background: Chronic kidney disease affects 10–15% of the global population and 6% in Nepal. Nepali migrant workers in Gulf countries and Malaysia face significant health risks, including kidney problems, due to harsh working conditions.

Methods: A descriptive cross-sectional study was conducted among Nepali returnee migrant workers who had a kidney transplant from 2013 to 2023 at a National Transplant Center. Data on their sociodemographic profiles, employment, and health practices were collected via telephone questionnaires.

Results: Among the 217 returnee migrants surveyed, 56.2% had returned from Gulf countries, with two-thirds working in temperatures above 40°C and over 75% working more than 10 hours daily. Alarming, 78.1% drank less than 2 L of water daily, and many frequently skipped urinations despite the urge.

Conclusion: The study underscores the severe health hazards faced by these workers and calls for stricter policies to protect their well-being.

Keywords: health determinants, kidney transplant, migrant workers

Introduction

Chronic kidney disease (CKD) is a significant global health issue, affecting 10–15% of the population and straining societal and financial resources^[1–3]. The global burden of CKD has escalated, with over 697.3 million cases recorded in 2019, which is more than double the number from 1990, accompanied by increased death rates^[4]. CKD is now the 11th leading cause of

HIGHLIGHTS

- This study examines the health risks faced by Nepali migrant workers returning from Gulf countries and Malaysia, focusing on their kidney health and employment conditions.
- Among 217 returnee transplant recipients, 56.2% worked in extreme temperatures (>40°C), with over 75% working more than 10 hours daily.
- Alarming, 78.1% consumed less than 2 L of water per day, and many skipped urinations despite the urge. Nearly half (49.3%) were diagnosed with end-stage kidney disease (ESKD) before returning home.
- These findings underscore the urgent need for policy interventions, including workplace hydration, labor protections, and predeparture health education, to safeguard migrant workers from kidney-related complications.

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death, and 20% of the global population requires dialysis or kidney transplants^[5].

In Nepal, CKD prevalence has also surged from 726 897 cases in 1990 to 1 895 080 in 2019^[6]. The age-standardized prevalence rate climbed from 5979.1 to 7634.7 per 100 000 population, and CKD-related deaths increased from 1728 in 1990 to 5108 in 2019^[6]. CKD significantly contributes to the overall disease burden, increasing disability-adjusted life years and premature mortality. In a study conducted in 2022, the overall prevalence of CKD in Nepal was reported to be 6.0%^[7].

Labor migration is vital for many Nepalis, with over 4 million work permits issued since 2008/2009 for employment abroad. Over 80% of Nepali migrant workers have been employed in Gulf countries, Malaysia, and India since 2013/2014^[8]. Although this trend supports economic growth and development,

it also poses health risks for migrants^[9]. Specific data on CKD among Nepali migrant workers are limited. However, adverse living and working conditions exacerbate health issues, including CKD^[10]. Risk factors include poor diet, lack of healthcare access, and occupational hazards^[11]. Migrants often return home due to severe health problems, and many struggle to work or live long in Nepal due to limited and costly medical care, particularly for end-stage kidney disease (ESKD), which requires dialysis or transplantation^[12].

Prolonged working in hot temperatures, rigorous job duties, and dehydration among migrant laborers, especially in Gulf countries and Malaysia, contribute to acute kidney injury and subsequent CKD^[13]. Nepali migrants, often from cooler hilly regions, face difficulties adapting to hot climates and long working hours^[14]. Physical aches from extended work hours lead to use of painkiller medications, further harming kidneys. Factors like red meat, high protein intake, and stress also impair kidney health^[15].

Nepal provides specialized transplantation services at subsidized rates. In its 12 years, the study center conducted over 1230 kidney transplants, many involving returnee migrants. Some studies conducted so far have only shown the health and well-being of Nepali migrants and lifestyle patterns among them, while others have shown the risk of kidney health from nephrologists' perspective^[10,12,16]. This study aims to bridge the data gap by assessing the incidence of kidney transplants among Nepali migrant workers, examining their sociodemographic characteristics, employment histories, working conditions, and health determinants. These comprehensive data are essential for understanding the underlying causes and addressing the health challenges faced by this population.

This cross-sectional study has been reported in line with the STROCSS guidelines^[17].

Methods

A descriptive cross-sectional study was conducted among returnee Nepali migrant workers who underwent kidney transplant surgery at a National Transplant Centre in Nepal between 6 February 2013 and 30 September 2023. A structured questionnaire, developed through literature review and expert consultation, was pretested and finalized. Non-probability purposive sampling was employed to collect data via telephone interviews from 18 March 2024 to 17 May 2024, using the Nepali version of the questionnaire, with responses recorded in the English version. Informed consent was obtained verbally at the beginning of the telephone interview. The study assessed sociodemographic characteristics, employment histories, working conditions, and health determinants, including smoking status, alcohol consumption, tobacco use, dietary choices, processed food intake, painkiller usage, water intake, drinking water supply at the workplace, skipping urination, and skipping drinking water.

Data were reviewed for completeness, consistency, and accuracy, and then coded, organized, and entered into IBM SPSS version 20.0 for descriptive statistical analysis. Mean, median, and standard deviation were used where applicable. The study was approved by the ethical board of the Nepal Health Research Council (protocol registration number 666/2023). AI tools were not used in the research and manuscript development.

Results

A total of 751 respondents answered our telephone interview calls, among whom 217 were returnee migrant workers. Nearly half (41.5%) of those returnee migrant workers who received a kidney transplant were aged between 30 and 39 years, with a mean age of 36.49 ± 8.63, and the majority (94.5%) were male. Seven of the migrant workers had expired post-transplantation. Among the 210 currently alive migrant worker transplant recipients, the majority (68.1%) followed Hinduism, half were Janajati, and the majority (63.6%) were literate (Table 1).

Majority of the migrant workers had worked in Gulf countries (Qatar: 25.3%, UAE: 21.7%, and Saudi Arabia: 9.2%). Similarly, 11.5% had worked in Malaysia and 6.5% had worked in India. Around one-fourth (26.7%) had worked abroad for 3–4 years, and 19.4% worked abroad for less than 2 years. Notably, almost half (49.3%) were diagnosed with ESKD before returning to Nepal (Table 2).

Most of the migrant workers were in service jobs (54.8%) and worked 10 hours daily (41.9%). Nearly all had weekly days off (97.6%), mainly 1 day (94.6%). Most of them worked indoors (59.5%), and work shifts were split between day (46.7%) and

Table 1 Sociodemographic characteristics of returnee migrant workers (N = 217)

Categories	Number	Percentage
Age group in years		
20–29	53	24.4
30–39	90	41.5
40–49	55	25.3
50–59	16	7.4
60–69	3	1.4
Mean (±SD) = 36.49 (±8.637), Min =21 years, Max = 65 years		
Gender		
Male	205	94.5
Female	12	5.5
Living status		
Living	210	96.8
Expired	7	32
Religion (n = 210) ^a		
Hindu	143	68.1
Buddhist	57	27.1
Others ^b	10	4.7
Ethnicity (n = 210) ^a		
Dalit	14	6.7
Janajati	105	50.0
Madhesi	15	7.1
Muslim	5	2.4
Brahmin/Chhetri	60	28.6
Others ^c	11	5.2
Educational level (n = 210) ^{a,d}		
Illiterate	8	3.8
Literate	133	63.6
Primary	19	9.1
Secondary	28	13.4
Higher secondary	17	8.1
Bachelor's and above	5	2

^aNo detail information was available in case of expired respondents.

^bChristian, Islam.

^cMaithili, Tharu, Thakuri.

^dThe definitions of each category are provided in supplementary file.

Table 2
Distribution of migrant workers according to country (N = 217)

Categories	Frequency	Percent
Name of employed countries		
Qatar	55	25.3
UAE	47	21.7
Malaysia	25	11.5
Saudi Arabia	20	9.2
India	14	6.5
More than 1 country	23	10.6
Others ^a	33	15.2
Total time worked in abroad (in months)		
Less than 24 months	42	19.4
25–48 months	58	26.7
49–72 months	38	17.5
73–96 months	20	9.2
97–120 months	27	12.4
More than 120 months	32	14.7
Median: 60 months + 64.125, minimum: 3 months, maximum: 384 months		
Diagnosis of ESKD		
Before returning to home country	107	49.3
After returning to home country	91	41.9
Don't know	19	8.8

^aOthers India, Kuwait, Denmark, Japan, Jordan, South Korea, Singapore, Lebanon, USA, South Africa, Libya, Portugal, UK, Haiti, Iraq, Bahrain, and Afghanistan

both day and night (45.7%). The work temperatures mostly ranged between 41°C and 50°C (40%). Living conditions included air conditioning for 67.6%, with most sharing rooms of four to six people (33.8%) (Table 3).

Almost everyone (95.2%) had access to drinking water at their workplace. Mineral water (67.5%) was the most common type of drinking water used. Nearly three-fourth of the respondents drank 1–2 L of water per day, 18.1% drank 2–3 L per day, while 5.7% drank less than a liter per day (Table 4).

Of 210 respondents, nearly half (43.8%) were nonsmokers, while half of them were moderate drinkers, and 15.7% were tobacco users (Table 5). Our study revealed that almost all (95.7%) of the respondents were nonvegetarian. Nearly two-third (61.4%) of the respondents had home-cooked meals in every meal, while nearly one-third (36.2%) of the migrant workers had processed food (the definition of processed food has been provided in the supplementary file. <http://links.lww.com/MS9/A922>) at least once per day. Among the respondents (22.4%) who used painkillers, 23.5% reported using three painkillers in a day. Around one-third of the respondents skipped drinking water despite the urge to drink (39.5%). Despite the urge to urinate, 40.5% sometimes skipped urination (Table 5).

In terms of etiology, the most commonly identified cause of end-stage renal disease (ESRD) was hypertension, accounting for 89.9% of cases, followed by diabetes mellitus (8.8%) (Table 6). Some respondents had more than one reported etiology.

Discussion

This study presents the first population-based survey of Nepali returnee migrant workers who underwent kidney

Table 3
Working environment of returnee immigrant workers n = 210^a

Variables	Number	Percent
Type of work		
Labor	91	43.3
Service	115	54.8
Business	4	1.9
Working hours in a day		
6 hours a day	3	1.4
8 hours a day	45	21.4
10 hours a day	88	41.9
12 hours a day	74	35.3
Day off in a week		
Yes	205	97.6
No	5	2.4
If yes, how many? (n = 205)		
1 day in a week	194	94.6
2 days in a week	11	5.4
Work settings		
Indoors (offices, factories, laboratories, cleaners, security, housemaids, business, etc.)	125	59.5
Outdoors (agriculture, construction site, drivers)	85	40.5
Workplace time		
Day	98	46.7
Night	16	7.6
Both	96	45.7
Workplace temperature		
20–30°C	35	16.4
31–40°C	47	22.4
41–50°C	84	40
51°C and above	44	21
Living arrangements		
Air condition	142	67.6
Fan	58	27.6
None	10	4.8
Number of persons in a room		
1–3 persons in a room	23	11
4–6 persons in a room	71	33.8
7–9 persons in a room	57	27.1
More than 9 persons in a room	59	28.1

^aNo detail information was available in case of expired respondents.

transplantation, reporting their socioeconomic and demographic profiles and their lifestyle and health behaviors that are potentially related to CKD.

Demographics

Nepal's latest housing and population census by the International Organization for Migration showed that over half of households have a member working or recently returned from overseas^[18]. Similarly, this study found that 28.9% of kidney transplant recipients had worked abroad. Migration for work and education is a prominent trend in Nepal, influencing nearly every family's decision^[18,19].

Nearly all returnee migrant workers in this study belonged to the economically most productive age group of 20–49, with 41.5% aged 30–39 years, and 94.5% were male. A similar study found that half of the returnee workers were aged under 40 years^[12]. Concurring with our findings of gender distribution, the Labor Migration Report 2022 noted male dominance

Table 4
Drinking water facilities in workplace of the respondents n = 210

Variables	Number	Percent
Drinking water supply at workplace		
Yes	200	95.2
No	10	4.8
Type of drinking water used		
Tap water	72	34.3
Mineral water	138	65.7
Water intake per day		
< 1 litre	12	5.7
1–2 L	152	72.4
2–3 L	38	18.1
More than 4 L	8	3.8

in labor migration, with women comprising less than 6% of new labor permits from 2008 to 2022^[18].

The Nepal Labor Migration Report 2022 highlighted the top destinations for Nepali migrant workers as Qatar (31.8% of permits), UAE (26.6%), Saudi Arabia (19.6%), Kuwait (6.8%), and Malaysia (4.2%)^[8]. Our study aligned with these findings, showing Qatar (25.3%) as the most common destination, followed by the UAE (21.7%), Malaysia (11.5%), and Saudi Arabia (9.2%).

Our study also showed that many migrant workers were employed abroad for 2–4 years (26.7%) and 4–6 years (17.5%). Other studies found 59.6% worked overseas for less than 4 years, indicating many Nepali workers spend short periods abroad due to factors like visa regulations and employment contracts^[16]. Nearly half (49.3%) of the respondents were diagnosed with CKD before returning to Nepal, raising concerns about working conditions abroad. Other studies also report a rise in CKD among returnee Nepali migrant workers^[20].

Living and working conditions

Our research sheds light on the living and working conditions of migrant workers, with 54.8% in service jobs and 43.35% in labor-focused work. Over two-third of migrant workers worked 10 or more hours daily. This underscores the need to examine the risk factors from these environments that could lead to ESKD and the impact of long work hours on work–life balance and occupational health. Further research into the effects of these conditions on kidney health is needed.

Most respondents worked in temperatures of 41–50°C, with 21% working in conditions over 51°C. Dehydration and heat stress increase kidney disease risk, especially in hot conditions^[21–24]. With 40.5% working outdoors and 67.6% living in air-conditioned rooms, the sudden change in temperature from high to low may have an indirect effect on kidney health by causing electrolyte imbalances and dehydration. Similar studies have shown that extreme temperature variations impact migrant workers’ physical health^[25].

Food intake, water consumption, and urination practices

In our study, 56.2% of respondents had a history of smoking before transplantation. Smoking is a known risk factor for kidney disease. Several large population-based studies have demonstrated a significant association between smoking and increased risk of

Table 5
Health determinants (before transplantation) n = 210

Health determinants	Number	Percent
Smoking status		
Smoker	47	22.4
Ex-smoker	71	33.8
Nonsmoker	92	43.8
Alcohol consumption ^a		
Nondrinkers	83	39.5
Moderate drinkers	105	50
Binge drinkers	21	10
Heavy alcohol use	1	0.5
Chewing tobacco		
Tobacco users	33	15.7
Nontobacco users	177	84.3
Dietary choices		
Vegetarian	9	4.3
Nonvegetarian	201	95.7
Home cooked foods		
Every meal	129	61.4
At least once per day	59	28.1
Almost everyday	12	5.7
Now and then during a week	3	1.4
Never	7	3.3
Processed foods		
Every meal	23	11
At least once per day	76	36.2
Almost everyday	6	2.9
Now and then during a week	48	22.9
Never	57	27.1
Usage of painkillers		
Yes	47	22.4
No	163	77.6
Ibuprofen, most used by 10 people		
Number of painkillers per day (n = 47)		
1	7	14.9
2	8	17
3	11	23.5
>4	8	17
Not specified	13	27.6
Skipping drinking water despite the urge to drink water		
Always	7	3.3
Often	71	33.8
Sometimes	83	39.5
Seldom	12	5.7
Never	37	17.6
Skipping urination despite the urge to urinate		
Always	9	4.3
Often	62	29.5
Sometimes	85	40.5
Seldom	19	9
Never	35	16.7

^aThe definitions of each category are provided in the supplementary file.

CKD. A Korean nationwide cohort study involving over 23 million adults found that both current smokers and ex-smokers had a significantly increased risk of CKD compared with nonsmokers. The study also reported that the risk of CKD was directly correlated with smoking duration, the number of cigarettes smoked per day, and total pack-years^[26]. A cross-sectional study conducted in tertiary hospitals affiliated with Aleppo University in Syria also identified smoking as a significant risk factor associated with impaired kidney function and increased CKD prevalence^[27].

Table 6
Causes of ESKD in migrant workers (N = 217)

Cause	Frequency	Percent
Hypertension	195	89.86
Diabetes mellitus	19	8.76
Chronic glomerulonephritis	10	4.63
IgA nephropathy	8	3.70

Another observation from our study was that 60.5% of the participants reported moderate to heavy alcohol use prior to developing CKD. While existing literature does not establish alcohol consumption as a direct risk factor for CKD, excessive drinking places added strain on the kidneys, diminishing their filtration capacity. Additionally, alcohol interferes with the kidneys' role in maintaining fluid and electrolyte balance, which can lead to dehydration – a condition that hampers the proper functioning of cells and organs, including the kidneys^[28].

Health determinants are also an influencing factor in maintaining proper kidney health. Despite the urge to drink, 76.6% of the workers reported skipping drinking water sometimes to always. Although 95.2% had a water drinking facility at the workplace, 4.8% lacked it. Long work hours (10–12 hours/day) led to only 1–2 L of water intake daily. A study on Nepali migrant workers in Malaysia found that work conditions often prevent breaks for drinking water or urinating, as it might impact team productivity and manufacturing processes. Security guards, for instance, were allowed restroom use only twice daily, limiting water intake^[9]. Workers in extreme heat faced dehydration due to limited water supply from company policies and high costs, causing kidney problems and forcing early job termination. Similarly, Paudyal *et al* found that in Gulf countries, high water costs and lack of company-provided water resulted in insufficient hydration and increasing kidney failure among workers^[25].

Similarly, despite the urge to urinate, 74.3% reported delaying urination. Although this behavior was commonly reported by our respondents, it cannot be directly considered a risk factor for CKD or progression to ESKD.

Among the respondents who used Nonsteroidal Anti-Inflammatory Drugs (NSAIDs), 23.5% of them reported using at least three painkillers in a day. The most common over-the-counter painkillers used by the migrant worker were NSAIDs. In line with our findings, hypertension, kidney difficulties, stomach troubles, and fluid retention have been reported to result from long-term NSAID usage^[29].

Our findings indicate that hypertension was the predominant cause of ESKD among the migrant workers in this study, reported in nearly 90% of cases (Table 6). This is notably higher than global averages, where both hypertension and diabetes are common contributors to ESRD. These results support the growing body of evidence linking occupational stressors to secondary hypertension and kidney injury in labor-intensive settings^[25].

To investigate this further within our cohort, we conducted cross-tabulation analyses between key occupational and lifestyle risk factors and the timing of ESRD diagnosis – specifically, whether the diagnosis occurred before or after the participants returned to Nepal. The variables examined included working temperature, daily working hours, daily water intake, and

behaviors such as skipping water consumption or delaying urination. Our intention was to identify any patterns suggesting greater exposure to these risk factors among those diagnosed while still abroad. However, our statistical analysis did not reveal any significant associations between these variables and the timing of ESRD diagnosis. We believe this highlights the complex and multifactorial nature of CKD development among migrant workers.

Limitations

The study used a descriptive cross-sectional design and collected data from individuals who underwent kidney transplant surgery over a 10-year period (2013–2023). This long timeframe provides a robust dataset for analysis. However, the survey was conducted through telephone calls, which could make it difficult to understand tone and body language, which can lead to misunderstandings. The possible limitations of this study include potential recall bias, nonresponse bias from those who declined telephone interviews, and interviewer bias due to multiple interviewers. Additionally, data from patients who expired post-transplantation were not collected, thus not represented in the study.

Conclusion

Our study highlights alarming conditions faced by migrant workers, including long hours and extreme heat, contributing to deteriorating kidney health. Workers often neglect hydration and urination during shifts. Governments and employers must share responsibility for their well-being by reducing work hours, providing breaks, and ensuring water availability. Predeparture orientations on occupational safety, public awareness on kidney health, and adequate hydration are crucial. Labor departments should include these provisions in labor agreements with foreign governments to protect workers' health.

Ethical approval

This study was approved by the Ethical Review Board of Nepal Health Research Council. Protocol Registration number: 666/2023.

Consent

Written informed consent was obtained from the patient for publication and any accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

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None.

Author contributions

PCS: study concept, writing paper, and final approval. CB: data collection and writing paper. PS: writing paper. SRT: data analysis and interpretation, and writing paper. KKS: study concept, writing paper, and final approval.

Conflicts of interest disclosure

The authors declared that no conflict of interest.

Guarantor

Pukar Chandra Shrestha.

Research registration unique identifying number (UIN)

Registry used: Research Registry (<https://www.researchregistry.com/>). Unique Identifying number or registration ID: researchregistry11125. Hyperlink to your specific registration (must be publicly accessible and will be checked): <https://www.researchregistry.com/browse-the-registry#home/>.

Provenance and peer review

Not invited.

Data availability statement

Available upon reasonable request.

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