

## Research Article

# Adult Children's Migration and Well-being of Left Behind Nepalese Elderly Parents

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## ABSTRACT

The objective of this study is to assess whether adult children's migration is associated with overall well-being of left-behind elderly parents in Nepal. A cross-sectional house-to-house survey was conducted among 260 community-dwelling elderly residents of Krishnapur municipality, Nepal. Binary logistic regression was used to identify whether migration of adult children was associated with elderly parent's self-reported chronic diseases, depressive symptoms, perceived loneliness and social support. More than half of the study household (51.2%) had at least one adult migrant child. Compared to participants without a migrant child, participants with a migrant child had higher odds of self-reported chronic diseases (OR = 1.79, 95%CI: 0.91–3.54), presence of depressive symptoms (OR = 1.07, 95%CI: 0.64–1.77), and self-perceived loneliness (OR = 1.23, 95%CI: 1.06–1.42) but except for loneliness, the odds ratio for other indicators of well-being were not statistically significant. Although the literature posits an inverse relationship between adult children's migration and the overall well-being of the elderly parents, in our study, adult children's migration was not associated with inverse health outcomes among study participants. However, from a policy perspective, it should be understood that these observations may be transient since the family structure of Nepalese society is rapidly changing.

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## 1. INTRODUCTION

In 2010, the global population of elderly, aged 65 or older, was 524 million, representing eight percent of the world's population [1]. By 2050, it is expected that the elderly population will have tripled, with most of the increase occurring in developing countries [1]. The growing elderly population in Nepal matches the world's aging demographic transition. Nepal's Senior Citizens Act classifies elderly or senior citizens as individuals aged sixty and over [2]. In 2011, there were 2.1 million senior citizens in Nepal, comprising 8.1% of the total population, and showing a marked increase from the 2001 census [3,4].

Chronic health conditions, such as heart disease, stroke, cancer, diabetes, arthritis, osteoporosis, and falls, are common among elderly populations [5]. Additionally, mental health related challenges, such as depression, Alzheimer's disease, and dementia, are frequent health concerns for older adults [5]. In addition to physical and mental health problems, elderly adults face many social challenges; of which loneliness and social isolation are significant concerns [6]. Among Nepali elderly adults, physical health problems (69%), depressive illness (53%), loneliness (18%), and mistreatment by family members (12%) are prevalent [7,8]. In Nepal,

older adults face a variety of health and social challenges but the resources to address their health and social needs are limited [9].

### 1.1. Migration Status in Nepal

Increasing labor migration and the simultaneous aging population are two important demographic challenges currently facing Nepal. Since the late 1980's, Nepal has consistently been a source of out-migration for global labor. The current net migration rate of Nepal is -2.2 per thousand population [10]. The internal migration rate, from rural to urban areas in search of education, employment, health and social services, is 18% [11]. More than 3.8 million Nepalese obtained international work permits during the 2014/2015 fiscal year [12]. The 2011 census revealed that one in every four households (25.4%; 1.38 million households) had at least one absent or migrant member [4]. Nearly three quarters (71%) of the total absentees were found leaving their respective places of origin in search of employment [13].

### 1.2. Migration and Geriatric Health

The interaction between health and migration is complex, dynamic, and bidirectional. Migration can impact physical, mental, and

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emotional health and well-being of migrants themselves, on those left behind in the place of origin, and on those at the destination [14]. Through the inflow of remittance, migration can benefit both migrants and left behind family members by reducing economic risk and overcoming capital constraints, thus improving families' sanitation, health care, and nutrition and bringing positive changes in quality of life [15,16].

The limited literature on the impact of adult children's migration on well-being of elderly parents is inconsistent [17–20]. The outmigration of adult children has been shown to have a negative effect on parental health outcomes [21]. A study from rural China examining the impact of migration of adult children on financial, physical and psychological support received by the elderly parents found that the migration of sons significantly negatively impacted the mental health of rural elderly people [18]. Another study from Moldova investigating the effect of migration on various dimensions of elderly health found a positive migration effect on body mass index, mobility and self-reported health, but no effect on depression and cognitive capacity [20]. A survey of older persons in Thailand assessing the net effect of migration of adult children on the health of the left behind elderly found that, after controlling for socio-demographic and economic variables, elderly adults who had a migrant child were more likely to have symptoms of poor mental health (OR = 1.10; 95% CI 1.05–1.17) than those whose children had not migrated [19]. However, no significant association was observed among physical health, such as experience of chronic disease and perceived poor health [22]. In Mexico, migration of at least one child to the United States caused poorer self-reported health and a higher likelihood to suffer from stroke or heart attack in Mexican elderly parents [21].

In traditional Nepali society, a joint/extended family structure, where multiple generations reside together in the same household, was more predominant than the nuclear family structure, where adult parents reside with their underage children [23]. Under the joint/extended family structure, family members, particularly sons and daughters-in-law, are responsible for caring for elderly parents and providing them with support [23]. Recent literature suggests that the conventional joint/extended family system is being replaced by nuclear family types in modern Nepali society, especially in the urban areas due to internal and external children migration [23,24]. Adult children's migration, within and outside of the country, is breaking down the traditional family support tree, which may have serious implications on the left behind elderly parents [25]. Although it is critical that policy makers in Nepal understand the impact of adult children's migration on non-migrant parents remaining in the home country, the literature on the effects of migration on sending communities and of the family members 'left behind' by migrants is lacking. Therefore, this study aims to assess whether adult children's migration is associated with overall well-being of left-behind elderly parents in Nepal.

## 2. MATERIAL AND METHODS

### 2.1. Study Setting

A cross sectional study was conducted, from June to September 2017. Kanchanpur district, one of Nepal's 75 districts, located in south-west Nepal, was selected purposely because of its high rate of migration; 94% of household heads in the district are migrants [26]. Given that

Nepalese workers do not require work permits and/or visas to work in India, the high rate of out-labor migration in the district is attributable primarily to the proximity with the open Indian border [27]. Additionally, large numbers of young people from this district migrated to Gulf countries and Malaysia for labor related jobs and there is a rapidly increasing trend in labor permit applications from the district [12]. Furthermore, the district is one of the five districts with the highest percentage of adolescents and young people in Nepal [13], making it an ideal setting for studying migration related challenges.

Of the total 20 municipalities and villages (locally called Village Development Committees) in the Kanchanpur district [4], we randomly selected Krishnapur municipality to conduct this study. In 2011, Krishnapur municipality had 6723 households with a total population of 36,706 (17,552 males and 19,154 females); of which the population of elderly people was 2505 (1184 male and 1321 female) [4]. Krishnapur municipality had 1861 (27.68%) households with an absent family member, with a total of 3026 absent people (2549 male and 477 female) [4].

### 2.2. Study Procedure

A necessary sample size of 260 elderly participants for this survey was estimated by Decision Analyst software, based on a 24% prevalence of malnutrition among Nepalese elderly [28], 95% confidence intervals, 5% precision level, and a total population of 2505 elderly in the study area [4]. Surveyors started from one end of a street and visited every fifth alternate household in that direction. On the following day, another street was selected conveniently and the process was repeated until the required sample size was met. One eligible respondent was selected from each household. Therefore, the number of households in the study is similar to the number of elderly participants. If two or more eligible participants were in one household, as is common in Nepal, the eldest by age was selected. If an eligible participant was not present in the selected house, then data was sought from an eligible participant in the adjacent house. There were no refusals. Criteria for eligibility included being at least 60 years old, a permanent resident of Krishnapur municipality (defined as at least one year of residence), and having at least one biological, step, or adopted adult child ( $\geq 18$  years old). Participants were selected irrespective of children's migration status.

### 2.3. Data Collection and Variables

Individual interviews were conducted at each participant's home. Surveyors were undergraduate students in public health, fluent in Nepali Language, local residents of the survey district and were involved in every phase of study planning. Thus, surveyors were acquainted with the research objectives, study tools, sampling strategy, and data collection techniques.

#### 2.3.1. World Health Organization's framework of well-being

The World Health Organization (WHO) defines health as 'a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity' [29]. It is a broad model of health

that takes into account the physical, mental and social well-being of the individual. Therefore, being inspired by WHO's framework, we captured information on the physical, mental and social well-being of our participants.

### 2.3.1.1. Physical well-being

According to WHO's framework of well-being, the first component is physical well-being, which indicates absence of any disease or impairment. Therefore, to capture physical well-being of the participants, we asked them about the presence of chronic diseases (any health problems, including: hypertension, heart disease, diabetes, kidney disease, respiratory diseases, any cancer, musculoskeletal pain, gastritis, arthritis, and uric acid or gout). For each of the conditions, we asked following three questions in sequence: i) Has a doctor or a health professional ever told you that you have (the health problem); ii) How long had you had (the health problem)?; iii) Are you conducting any treatment or taking any medication for (the health problem)?

### 2.3.1.2. Mental well-being

According to WHO's framework of well-being, the second component is mental well-being, which indicates individuals' ability to adequately cope with all demands of daily life. Mental well-being, through the presence of depressive symptoms, was quantified using patient health questionnaire, PHQ-9 [30]. The PHQ-9 is a nine-item depression screening instrument that asks about the frequency of symptoms of depression over the past two weeks [30]. Each of the nine items' response included 'not at all,' 'several days,' 'more than half the days,' and 'nearly every day,' and were scored from 0 (not at all) to 3 (nearly every day). The PHQ-9 is a valid and reliable tool [30]. The PHQ-9 was developed, based on Diagnostic and Statistical Manual of Mental Disorders (DSM-IV 4th ed.) and International Classification of Diseases, 10th Edition (ICD-10) diagnostic criteria, for assessing and monitoring depression severity among adults [31,32]. The reliability and validity of the original scale was established among 6000 patients in eight primary care and seven obstetrics-gynecology clinics [30]. The PHQ-9 is a very popular tool used globally in different medical settings including general medical outpatient, injury, stroke, cardiology, and primary care [32]. In addition, it has been adopted "as a standard measure for depression screening" across a variety of health care systems and health surveys [32]. A previous study has validated the Nepali version of PHQ-9 [33] and in our study, the Cronbach's alpha of the PHQ-9 scale was 0.704. Cronbach's alpha, a common measure of scale reliability or consistency, indicates how consistently the scale measures the constructs that it is measuring [34]. The Cronbach's alpha ranges between 0 and 1; higher value indicating higher internal consistency of the scale. In general, Cronbach's alpha of 0.7 or more are usually preferred and a value <0.5 are usually unacceptable [34]. The cumulative total of all questions in PHQ-9 ranged from 0 to 27. A PHQ-9 score  $\geq 10$  was considered a case of depression, following the approach recommended by the National Quality Forum [35].

### 2.3.1.3. Social well-being

According to WHO's framework of well-being, the third component is social well-being, which indicates a state of balance or

an equilibrium between an individual and his social and physical environment. Social well-being was quantified in terms of participants' perceived loneliness and social support using the De-Jong Gierveld Loneliness Scale [36] and the Duke Social Support Scale (DUSOCS) [37], respectively.

The De-Jong Gierveld Loneliness Scale, a six-item scale, each with a three-level response, 'yes,' 'more or less' and 'no,' characterizes participants emotional and social loneliness [36]. The details of the tool are reported elsewhere [36]. The cumulative score for overall loneliness score ranges from 0 to 6, where 0 means no loneliness and 6 indicates severe loneliness [36]. The scale has been used extensively and found to be a reliable and valid measure of loneliness among older adults in different countries [38]. Cronbach's alpha across the 6 items was 0.63 for all respondents in this sample.

The Duke Social Support and Stress Scale (DUSOCS), a well-accepted and validated tool [37], contains items addressing the social support received by an individual. In a four-point scale ('none,' 'some,' 'a lot' and 'there is no such person'), participants are allowed to rate their family members, non-family members and special supportive person as people who give personal support. The DUSOCS provides a summary measure of overall social support which can further be sub-categorized as family support and non-family support. The DUSOCS was scored according to standard instructions to give the overall social support score as a percentile [37]. The higher the score, the more are supportive the relationships [37]. Cronbach's alpha for DUSOCS scale was 0.512 in this sample.

## 2.3.2. Migration related variables

In this study, migration was defined as living outside the home district for the sole purpose of employment or income generation, for a period of at least six months, excluding the occasional visits. Migration due to family conflicts, for education, or for purpose other than income generation was not considered. The primary variable of interest was migration of adult children, dichotomized as yes, if at least one child in the household was a migrant, and no, if none of the children were migrants. However, it should be noted that even though adult children, e.g., son, is a migrant, other family members such as other children, daughters-in-law, and grandchildren would still be non-migrant, live in the same household with the elderly participants, and may continue to provide care and support to the left behind elderly parents. The majority of our participants in migrant households lived with other family in a joint/extended family structure [Table 1](#). A household where at least one adult child had departed for employment for a period of at least six months was termed as a migrant household and its counterpart with no migration was termed as a non-migrant household.

The number of migrants in the family, their age, sex, relation with the participant, migration destination, and the economic activity involved in the destination country/place were asked about. Based on migration destination, migration was classified into internal, external and both. Internal migration was defined as living outside the parent's district of residence but within Nepal for a minimum of the past six months. External migration was defined as living outside of Nepal for a minimum of the past six months. For a household with multiple migrant children, if the children had migrated within and outside Nepal, they were classified as both. Additionally, we also asked if, over the past year, the

**Table 1** | Socio-demographic characteristics of parents in migrant and non-migrant households

Characteristics	Total sample n = 260	Non-migrant households n = 127, 48.8%	Migrant households n = 133, 51.2%	p-value
	n (%)	n (%)	n (%)	
Age (mean ± SD)	68.9 ± 7.6	68.9 ± 7.4	68.9 ± 7.9	0.976 <sup>a</sup>
Sex				0.349
Male	150 (57.7)	77 (60.6)	73 (54.9)	
Female	110 (42.3)	50 (39.4)	60 (45.1)	
Ethnicity				0.003
Upper Caste	174 (66.9)	76 (59.8)	98 (73.7)	
Janjatis	53 (20.4)	37 (29.1)	16 (12.0)	
Dalit	33 (12.7)	14 (11.0)	19 (14.3)	
Educational Status				0.010
Illiterate	181 (69.6)	98 (77.2)	83 (62.4)	
Literate	79 (30.4)	29 (22.8)	50 (37.6)	
Participants Past Occupation				0.046
Unemployed	23 (8.8)	8 (6.3)	15 (11.3)	
Housewife	82 (31.5)	36 (28.3)	46 (34.6)	
Agriculture	96 (36.9)	59 (46.5)	37 (27.8)	
Public Service	23 (8.8)	11 (8.7)	12 (9.0)	
Business	13 (5.0)	4 (3.1)	9 (6.8)	
Labor	23 (8.8)	9 (7.1)	14 (10.5)	
Family's Monthly Income, \$ (mean ± SD)	95.7 ± 65.9	77.8 ± 54.6	112.7 ± 71.4	<0.001 <sup>a</sup>
Source of Family Income				<0.001
Agriculture	145 (55.8)	94 (74.0)	51 (38.3)	
Business	29 (11.2)	5 (3.9)	24 (18.0)	
Service	26 (10.0)	11 (8.7)	15 (11.3)	
Labor	52 (20.0)	12 (9.4)	40 (30.1)	
Pension/Allowance	8 (3.1)	5 (3.9)	3 (2.3)	
Family Size (mean ± SD)	7.9 ± 3.1	7.8 ± 2.9	8.0 ± 3.3	0.602 <sup>a</sup>
Family Structure				0.699
Nuclear	11 (4.2)	4 (3.1)	7 (5.3)	
Joint	154 (59.2)	76 (59.8)	78 (58.6)	
Extended	95 (36.5)	47 (37.0)	48 (36.1)	
Number of Children				0.002
One	132 (50.8)	80 (63.0)	52 (39.1)	
Two	66 (25.4)	23 (18.1)	43 (32.3)	
Three	44 (16.9)	18 (14.2)	26 (19.5)	
Four	18 (6.9)	6 (4.7)	12 (9.0)	
Living Arrangement				0.004
Live with children	245 (94.2)	124 (97.6)	121 (91.0)	
Live with relatives	2 (0.8)	2 (1.6)	0 (0.0)	
Live alone or with spouse	13 (5.0)	1 (0.8)	12 (9.0)	
Availability of Care Taker				0.935
Yes	248 (95.4)	121 (95.3)	127 (95.5)	
No	12 (4.6)	6 (4.7)	6 (4.5)	

<sup>a</sup>p-value from independent *t*-test; all others are from chi-square; Abbreviations: SD: standard deviation.

household had received any remittance from migrated children, the amount received, and how much of the family's necessity was fulfilled by the sent remittance (very much, some, and minimal). Finally, the frequency of visits by the migrated child and whether the participants' care has been affected by their children's migration were asked about.

### 2.3.3. Socio-demographic variables

Socio-demographic variables, assessed by self-report, were age, sex, ethnicity, educational status (illiterate or literate), past occupation

of the participant, family's monthly income and primary source of income, and family size and structure (nuclear, joint or extended). For ethnicity, three ethnic groups: Upper Caste, Janjatis and Dalit were classified based on the Nepal Health Management Information System's classification. Historically, Upper Caste represents higher, Janjatis represents medium and Dalit represents the lower social status [39]. Caste system is deeply rooted in Nepali society and has been a major force for driving disparities between the ethnic groups, with Upper Caste being the most advantaged caste and Dalit being the most marginalized of all castes [39,40]. Family type was classified as nuclear (elderly participant living by themselves or with a spouse), joint



(elderly participant living with an adult child and their family), and extended family (elderly participant living with more than one adult child and their family in the same household). We also asked about participants' number of children, living arrangements, and availability of a caretaker. A caretaker is defined as a person living in the migrant family household who was responsible for taking on the burden of care of the left-behind parents on a daily basis. This care consists of activities such as arranging daily schedules, preparing meals, washing clothes, and looking after the parents when they are sick. The living arrangement of the elderly participants was classified into three categories: live alone or with spouse only, live with children (and their family), and live with relatives (other than their children and their family) such as siblings or cousins.

## 2.4. Data Processing and Statistical Analysis

Data management and analyses were done in EpiData and IBM SPSS22 (SPSS Inc. Chicago IL, USA), respectively. Values for numerical variables are expressed as mean  $\pm$  standard deviation (SD) and for categorical variables, as frequency (percentage). Differences in mean and frequency distributions between the migrant and non-migrant households were assessed using independent t-tests and Pearson's chi-square ( $\chi^2$ ) tests, respectively. Univariate binary logistic regression was used to assess whether migration of adult children was associated with self-reported chronic diseases, presence of depressive symptoms, self-perceived loneliness, and social support among the elderly participants.

## 3. RESULTS

### 3.1. Socio-demographic Characteristics

A total of 260 elderly adults with a mean age of 69 years participated in the study [Table 1](#). The majority of the participants were male (57.7%), from upper caste ethnicity (66.9%), illiterate (69.6%), and lived in a joint family (59.2%) with a mean family size of 8. The mean monthly household income was \$ 95.7 and agriculture was the main source of family income (55.8%). Most of the elderly study participants had a caretaker (95.4%) and lived with their family (94.2%). Compared to the households without migrant children, households with migrant children belonged to upper caste ethnicity, had literate parents, and had higher household incomes [Table 1](#).

### 3.2. Migration Related Characteristics of Migrant Households

More than half of the study household (51.2%) had at least one adult migrant child. The migrant children were mostly sons (86.4%), 25–35 years old (50.4%) ([Table 2](#)). Most of the children had migrated to India (73.0%) and worked as laborers (51.9%). The majority of the elderly parents received remittances from (63.3%) and were visited annually by (70.0%) their migrant children.

**Table 2** | Migration related characteristics of migrant households (n = 133)

Characteristics	n (%)
Household with migrants	
None	127 (48.8)
One	102 (39.2)
Two	19 (7.3)
More than Two	12 (4.6)
Migrants Age	
Under 25	39 (31.2)
25–35	63 (50.4)
Above 35	23 (18.4)
Migrants Sex	
Male	114 (86.4)
Female	18 (13.6)
Relation with Migrant	
Son	114 (86.4)
Daughter in Law	18 (13.6)
Migration Type	
Internal	47 (35.6)
External	81 (61.4)
Both	4 (3.0)
Country of External Migration	
Gulf Countries	11 (13.0)
India	62 (73.0)
Malaysia	11 (13.0)
Migrant Occupation	
Agriculture	14 (10.7)
Business	14 (10.7)
Industry	11 (8.4)
Labor	68 (51.9)
Service	24 (18.3)
Received Remittance over Past Year	
No	47 (36.7)
Yes	81 (63.3)
Remittance Amount Received, \$ (mean $\pm$ SD)	426.9 $\pm$ 522.4
Necessity Fulfillment by the Remittance	
Very Much	14 (14.1)
Average	45 (45.5)
A Few	24 (24.2)
Minimal	16 (16.2)
Frequency of Migrants Visit	
3–4 times a year	40 (30.8)
Annually	51 (39.2)
Never	39 (30.0)
Effect on Care Due to Children's Migration	
No	91 (70.0)
Yes	39 (30.0)

Most of the participants' care was not affected by children's migration (70.0%) ([Table 2](#)).

### 3.3. Children's Migration and Well-being of Elderly Parents

Irrespective of children's migration status, various chronic ailments, most commonly physical pain, gastritis, respiratory diseases, and arthritis, were highly prevalent among participants [Table 3](#). The prevalence of depressive symptoms (PHQ-9 score  $\geq 10$ ) was 35.4%. In unadjusted binary logistic regression, compared to participants without a migrant child, participants with a migrant child had higher odds of self-perceived loneliness [Table 3](#). For other

**Table 3** | Participants well-being indicators by child migration status

Health indicators	Total sample n = 260	Non-migrant households n = 127, 48.8%	Migrant households n = 133, 51.2%	p-value	Unadjusted (reference = non-migrant)	
	n (%)	n (%)	n (%)		OR	95% CI
At least one chronic diseases	219 (84.2)	102 (80.3)	117 (88.0)	0.090	1.79	0.91–3.54
Physical pain	168 (64.6)	78 (61.4)	90 (67.7)	0.292	1.31	0.79–2.19
Gastritis	89 (34.2)	41 (32.3)	48 (36.1)	0.518	1.18	0.71–1.98
Respiratory diseases	57 (21.9)	30 (23.6)	27 (20.3)	0.518	0.82	0.46–1.48
Arthritis	44 (16.9)	19 (15.0)	25 (18.8)	0.410	1.32	0.68–2.53
Hypertension	27 (10.4)	10 (7.9)	17 (12.8)	0.195	1.71	0.75–3.90
Heart disease	20 (7.7)	6 (4.7)	14 (10.5)	0.079	2.37	0.88–6.38
Diabetes	18 (6.9)	9 (7.1)	9 (6.8)	0.919	0.95	0.37–2.48
Kidney disease	13 (5.0)	5 (3.9)	8 (6.0)	0.442	1.56	0.50–4.91
Depressive Symptoms	92 (35.4)	44 (34.6)	48 (36.1)	0.808	1.07	0.64–1.77
Loneliness (mean ± SD)	3.6 ± 1.7	3.3 ± 1.7	3.9 ± 1.6	<b>*0.006</b>	<b>1.23</b>	<b>1.06–1.42</b>
Social support (mean ± SD)	32.4 ± 13.1	34.0 ± 12.7	30.9 ± 13.3	*0.061	0.98	0.96–1.00
Family support(mean ± SD)	39.0 ± 17.2	40.9 ± 17.0	37.1 ± 17.2	*0.069	0.99	0.97–1.00
Non-Family support (mean ± SD)	16.8 ± 11.4	17.4 ± 10.8	16.2 ± 11.9	*0.382	0.99	0.97–1.01

p-value comparing the health indicators between migrant and non-migrant households; Significant findings ( $p < 0.05$ ) are bolded; \*p-value from an independent samples *t*-test; all others are from chi-square test.

indicators of well-being, reported in Table 3, the findings were not statistically significant.

## 4. DISCUSSION

This study aimed to examine if adult children's migration was associated with the physical, mental and social well-being of the left behind elderly parents and found that except for loneliness other indicators of well-being were not significantly associated with adult children's migration.

Our findings of no association between children's migration and self-reported physical health and depressive symptoms are supported by previous studies in Nepal, Tonga, and Thailand [9,41,42]. The discrepant findings among the studies suggest that in understanding migration and health, context is critical. Various factors may explain our null findings. The literature suggests that migration of adult children causes absence of caregivers and a disrupted family life, increasing the feelings of loneliness, all of which in turn lead to poor health outcomes and increased psychological problems [15,43–45]. The majority of our participants lived in a joint/extended family which implies that our participants, despite a child's migration, continued to live with other family members and had someone, usually a family member, to take care of them. Several advantages enjoyed in a joint/extended family structure, such as emotional support from family members, immediate help and care during illness and adversity, increased efficiency due to pooled labor and decreased economic vulnerability due to multiple income generators and a shared kitchen, is disrupted when the society trends towards nuclearization [23]. As evident from our study and a previous needs assessment study from Nepal [9], most of the elderly did not feel that their care was limited due to their children's migration. Previous research from Mexico and Moldova, suggests that even though one child is away as migrant, the remaining siblings are likely to substitute and make up for migrants' contributions to the elderly [46,47]. This implies that the migration of an adult child does not necessarily mean that elderly parents lose their care and support and in fact the monetary contributions by the

migrant child and elderly care by remaining siblings ensure elderly parents receive both income and care [46,47]. Therefore, based on previous research findings, we assume that the joint/extended family type and the presence of other family members to provide care and support to the elderly participants might have resulted in inconsistent findings compared to other studies conducted outside of Nepal. However, due to the small sample size, especially the small number of elderly with no care taker ( $n = 12$ ) or living by themselves ( $n = 13$ ), we could not specifically test if family structure and support received from other family members might have played any role in study outcomes. Future studies should look into these aspects to determine potential relationships between family structure and support and the wellbeing of elderly in migrant vs non-migrant households. Furthermore, given that the frequency of migrant's visiting their home has an impact on health of the elderly adults [48] and in most cases, the migrant child visited our study participants frequently in the previous twelve months, it may partly explain the no association observed in our study.

Compared to participants without a migrant child, participants with a migrant child had higher odds of self-perceived loneliness. This finding is notable especially given that there were no significant differences in depression or social support among our participants with and without a migrant child. Although loneliness and depression are correlated, previous research indicates that they are clearly different constructs [49]. Two types of loneliness i.e. emotional and social loneliness, are defined in the literature [50]. Emotional loneliness is due to the absence of a definite relationship, whereas social isolation is due to the absence of a social network [50]. Therefore, the loneliness perceived by our participants is more likely to be of emotional type, due to the absence of some definite needed relationship i.e. their migrant children [51].

Irrespective of children's migration status, various physical ailments and depressive symptoms were highly prevalent among participants. This finding was not surprising as old age is marked with increased comorbidities [5]. Among the Nepalese elderly, there is a high prevalence of at least one chronic health problem, of which gastritis and arthritis are the most common problems [52]. The

prevalence of depressive symptoms among Nepalese elderly is high, ranging from 39% to 53% [8,9], consistent with our findings.

#### 4.1. Strengths, Limitations, and Future Research Directions

This study has some limitations. One limitation is that no inference could be made regarding the causal relationship between adult children's migration and the well-being of the elderly parents because the study followed a cross-sectional design. Future studies should determine the impact of migration on elderly health outcomes and care using a longitudinal design. The sample size of the study is small which may have reduced the statistical power to detect any differences. The health status is self-reported by the participants which may not reflect the true estimates of the health status. However, self-reported information on health has been the widely accepted approach, especially when available resources are limited [53]. Most of the participants in our study lived with a family member and had a care taker. Findings may not be generalized to elders who live alone and/or do not have a caretaker. The study setting included an urban area and thus the findings may not be extrapolated to older adults from rural parts of the country. Nevertheless, the importance of the present study is significant. High rates of adult migration, and the prerequisites to address the needs of the burgeoning Nepalese elderly population are two concurrent pressing issues in Nepal. In addition to a previous needs assessment from Pharping [9], our study is one of the pioneering studies to shed light on such an important topic. Future research direction could include assessing the impact of predicted family structure change and well-being among elderly with and without migrant children.

#### 5. CONCLUSIONS

The impact of adult children's migration on the well-being of elderly parents may be bidirectional. Although studies conducted around the world have shown an inverse relationship between adult children's migration and physical and mental health of the elderly parents, two studies in two different settings in Nepal show such findings may not be valid, at present, for the Nepali context. In Nepal, remittances received may have helped to meet the necessities of daily life. The joint family structure and strong family support may have played a significant role in the care of the elderly parents, despite the migration of some family members. However, from a policy perspective, it should be understood that these observations may be transient since the family structure of Nepalese society is rapidly changing.

#### 6. AUTHORS' CONTRIBUTIONS

Conceived and designed the study: SG. Tool translation to Nepali: DS, DN, and MK. Facilitated data collection in the field: DS, DN, and MK. Analyzed the data: SG, and EJ. Drafted the manuscript: SG, DN, and EJ. Critical revision of the manuscript: DS, DN, EJ, and MK. Approval of the final version of the manuscript: SG, DS, DN, EJ, and MK.

#### 7. DISCLOSURE STATEMENT

The authors state that they have no competing interests.

#### 8. ETHICS AND CONSENT

The Ethical Review Board at Nepal Health Research Council approved this study. Permission was also granted by the Municipality Office. Informed verbal consent was given by the participants. Participation was voluntary, and participants' identity was kept confidential.

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