Impact of Adult Children's Migration on the Mental Health and Quality of Life of Older Parents 'Left Behind' in Nepal

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Statements and declarations

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List of publications from this study

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2	**Thapa, D. K.**, Visentin, D., Kornhaber, R., Cleary, M. (2018) Migration of adult children and mental health of older parents 'left behind': An integrative review. *PLoS One*, *13*(10), e0205665. https://doi.org/10.1371/journal.pone.0205665	Published	3	Literature review
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4	**Thapa, D. K.**, Visentin, D., Kornhaber, R., Cleary, M. (2020) Prevalence and risk factors for depression, anxiety and stress symptoms among older adults: A cross-sectional population-based study. *Nursing and Health Sciences*, *22*(4), 1139-1152. https://doi.org/10.1111/nhs.12783	Published	7	Results
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Located in chapter 2.

The Candidate was the primary author and contributed about 65% to the planning, conduct and analysis of the systematic review and wrote the first draft of the paper. Authors 2, 3 and 4 supervised the conduct of the review; participated in the inclusion, data extraction and analysis; provided critical review of earlier drafts of the paper; and contributed to the final manuscript.

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Table of contents

List of tables

List of figures

Glossary of key terms

Empty nest	An ‘empty nest’ is a household in which only parents are living, and all the children have moved out. In this study, older parents whose children had all migrated (were living outside the municipality) were considered ‘empty-nest older parents’.
Internal migration	Migration of children inside the country. This refers to children living outside the municipality in which their parents are living but within the country.
International migration	Migration of children outside the country. The international migration category may include one or more siblings of the internationally migrated child who migrated internally or did not migrate.
Left-behind older parent	An older parent who has a child living outside their municipality in Nepal.
Mental health symptoms	‘Mental health symptoms’ refers to the symptoms of depression, anxiety and stress as assessed by the Depression Anxiety Stress Scales (DASS-21). Higher scores for the subscales of the DASS-21 indicate higher levels of the respective symptoms.
Migration of adult child	An adult child (> 18 years) living outside the municipality of the parents’ residence for a duration of more than three months preceding the time of survey. This is in line with similar studies defining the migration of children and left-behind parents.
Municipality and ward	The study was conducted in Nepal. The country is divided into a hierarchical administrative structure: province, district, municipality, and ward. There are seven provinces, 77 districts, and 753 municipalities. A municipality is further divided into wards, the lowest level of jurisdiction. The fieldwork for this study was conducted in 18 wards across six municipalities from two districts in a single province.

Older people	People aged 60 years and over. Although some countries, including Australia, define anyone over 65 as older, this study applied the 60-year-old cut-off as used by the World Health Organization and the Government of Nepal.
Quality of life	Quality of life was measured using the World Health Organization Quality of Life – Abbreviated questionnaire (WHOQOL-BREF), which assesses quality of life in four domains: physical, psychological, social, and environmental. Higher scores indicate better quality of life.

List of abbreviations

ANOVA	Analysis of variance
b	Standardized regression coefficient
CBS	Central Bureau of Statistics, Nepal
CFA	Confirmatory factor analysis
DASS	Depression Anxiety Stress Scale
DASS-21	Depression Anxiety Stress Scale – 21-items
EFA	Exploratory factor analysis
EN	Empty nest
GDP	Gross domestic product
GDS	Geriatric Depression Scale – 30-items
GDS-15	Geriatric Depression Scale – 15-items
IADL	Instrumental Activities of Daily Living
IOM	International Organization for Migration
MSPSS	Multidimensional Scale of Perceived Social Support
NGO	Non-Governmental Organisation
NHRC	Nepal Health Research Council
NPHC	Nepal Population and Housing Census
NS	Non-significant
OR	Odds ratio
QOL	Quality of life
r	Pearson's correlation coefficient
REDCap	Research Electronic Data Capture
SD	Standard deviation
SE	Standard error
SEM	Structural equation modelling
UCLA-LS	University of California Los Angeles Loneliness Scale
UNDP	United Nations Development Programme
UNFPA	United Nations Population Fund
WHO	World Health Organization
WHOQOL-BREF	World Health Organization Quality of Life – abbreviated scale

Abstract

Population ageing and the migration of young and middle-aged people are the most significant socio-demographic trends of the 21st century. The migration of children may have both positive and negative impacts on the health and well-being of their left-behind older parents. Whilst money transferred by migrant children may increase the financial resources available to parents and enable better access to health and welfare services, the absence of a child can erode traditional intra-family care arrangements, and may adversely affect parents' physical and mental health. The two literature reviews for this thesis were a systematic review focused on the prevalence of mental health disorders in Nepal and an integrative review on the impact of adult children's migration on the mental health of left-behind older parents. The reviews found migration of children having a negative effect on parents' mental health. However, these studies were methodologically limited by the differing definitions of 'left-behind', by their not considering internal and international migration, their small-scale non-random samples, and their limited use of standard scales. In relation to Nepal, there are limited community-based studies on the mental health of older people, and no local study has assessed the impact of children's migration on parents' mental health and quality of life (QOL).

A cross-sectional community-based survey aimed to identify the association of adult children's migration with the mental health and QOL of older parents. This study also estimated the prevalence of common mental health symptoms and identified potential risk and protective factors which may influence the mental health of left-behind older parents. The study was conducted during May–July 2020 in two districts in Nepal among 794 randomly selected older adults aged 60 years or over who had at least one child aged 18 years or over. Mental health was assessed using the 21-item Depression Anxiety Stress Scales (DASS-21), which measures the mental health symptoms of depression, anxiety and stress. QOL was assessed using the World Health Organization Quality of Life-abbreviated scale (WHOQOL-BREF), which

measures QOL in physical, psychological, social, and environmental domains. Older adults having an adult child not living in the same municipality were considered ‘left-behind’ parents. Migration of children was further classified into internal (to a different municipality within Nepal) and international. A wide range of socioeconomic, health-, lifestyle- and child-related characteristics were measured for adjustment.

Data were collected through personal face-to-face interviews by trained interviewers. Socio-demographic and study variables were presented, and compared using descriptive statistics (proportion, mean and standard deviation), chi-square test, Fisher’s exact test, *t*-test, correlation, and analysis of variance (ANOVA). The risk factors of the symptoms of mental health disorders were assessed using multilevel logistic regression, while the association of migration of adult children with mental health symptoms and QOL was analysed using multilevel linear regression.

The average age of the participants was 71.1 ± 8.2 years. A higher proportion of the participants were male (52.2%), married (61.0%), living with their spouse (62.9%), and currently working (55.0%), with agriculture the main source of household income (58.4%). The mean DASS-21 score was 12.6 ± 18.7, and the domain scores were 4.1 ± 7.6 for depression, 3.5 ± 5.0 for anxiety, and 5.0 ± 7.3 for stress, with prevalence, respectively, of 15.4, 18.1 and 12.1%. The study found several associated factors which were similar among both the general sample of older adults and the left-behind sub-group. The risk factors included being female, working in agriculture, perceived poor health, smoking, having chronic condition(s), having a child outside the country, and exposure to adverse life events. Perceived social support, functional ability, physical exercise, participation in social activities, and receiving an allowance were found to have protective effects. For left-behind parents, two additional variables—closeness to a child and communication with children—showed a negative association with mental health

symptoms. Scores for QOL were 58.8 ± 19.8 for physical, 63.7 ± 18.0 for psychological, 60.7 ± 16.2 for social, and 61.8 ± 15.0 for environmental domains.

Left-behind parents showed better well-being, scoring higher on QOL and lower on mental health symptoms compared to parents whose children did not migrate, but the differences were not statistically significant. Left-behind parents whose children migrated internally had higher scores for physical (b = 5.16, p = 0.017) and environmental (b = 3.19, p = 0.046) domains compared to parents whose child had not migrated. When internal and international migration were compared, parents with internationally migrated adult children were at higher risk of mental health symptoms, particularly anxiety (b = 1.39, p < 0.001) and stress (b = 1.08, p = 0.030).

Left-behind older parents were not found to be at higher risk of mental health symptoms and they did not have lower QOL compared to non-left-behind parents. This finding contrasts with previous studies which reported adverse impacts on left-behind parents' well-being. Parents with internally migrated children were in a better position in terms of QOL and psychological well-being. Further longitudinal studies are required to determine the causal relationship between the migration of adult children and the QOL of left-behind parents, and to address selection bias associated with migration choice.

This study provides important insights into the nature of the relationship of adult children's migration with their parents' mental health and QOL by providing an in-depth analysis of data from Nepal, a low-income country. Parents with internally migrated children showing better psychological health emphasises the importance of creating local employment opportunities and facilitating migration within national borders. Interventions aiming to improve the mental health of older adults should target the identified risk and protective factors. The results have contributed new knowledge about the well-being of left-behind older people, and can inform

the development of public health social welfare policies and programmes more responsive to the needs of older people.

Keywords

Anxiety, cross-sectional survey, depression, left-behind older parents, mental health, migration of children, Nepal, older adults, prevalence, risk factors, stress

Chapter 1 – Introduction, Objectives and Study Context

1.1 Chapter overview

The study aims to estimate the prevalence of mental health symptoms, and to analyse the association of migration of children with the mental health and quality of life (QOL) of left-behind older parents. Chapter 1 provides an overview of population ageing, the mental health and QOL of older people, migration, and the phenomenon of older parents left behind. The study's rationale, objectives and research questions are detailed. This chapter also describes Nepal, where the fieldwork was undertaken, and concludes with a description of the organisation of this thesis.

1.2 Population ageing

The 21st century is witnessing rapid demographic changes, including a worldwide increase in the number and proportion of older persons. The proportion of older people, which stood at 13% in 2017 (962 million people), is projected to increase to 23% (2.1 billion) by 2050 (United Nations, 2019a). A decrease in fertility rates and increase in life expectancy are the major drivers of population ageing (Bloom et al., 2010). Although population ageing is more prominent in high-income countries, ageing is increasingly becoming a global phenomenon. The rate of increase in the proportion of older people is higher in low- and middle-income countries, and it is estimated that more than three quarters of the world's older persons will be living in such countries by 2050 (United Nations, 2019a). Population ageing reflects advancements in socio-economic development and healthcare services, both of which contribute to the prevention and control of disease, thereby increasing life expectancy (Cesario et al., 2014). This has important implications for healthcare and social welfare services, which must ensure they are responsive to and meet the needs of older people.

1.3 Mental health and quality of life of older people

Whilst advancements in medical technology have improved the treatment of diseases and chronic conditions, the ageing population remains vulnerable to chronic disease and consequent disability (Crimmins et al., 2005; Engberg et al., 2009; Puts et al., 2008; WHO, 2015) which may adversely influence their mental health and QOL. Older people also experience a higher prevalence of mental health disorders. According to the WHO (2016), 15% of adults aged 60 and above live with a mental disorder. A number of studies have identified mental health problems among older people, including depression (Bergdahl et al., 2007; Djernes, 2006; Mojtabai & Olfson, 2004; Reddy, 2012; Smith, 2014), anxiety (Bryant et al., 2008; Byers et al., 2010; Reynolds et al., 2015; Seitz et al., 2010), dementia (Crooks et al., 2008; Kim et al., 2016), cognitive impairment (Park et al., 2003), post-traumatic stress (Averill & Beck, 2000; Platts-Mills et al., 2017), and substance misuse (Cleary et al., 2017; Kuerbis et al., 2014). Mental health disorders often develop with co-morbidities (Kerfoot et al., 2011; Moussavi et al., 2007), and are associated with poor health outcomes. The consequences of a mental health disorder can include reduced QOL (Kim et al., 2011), social deprivation, loneliness, limited social relations (Blazer et al., 1987), cognitive decline (Del Brutto et al., 2015), impairments in activities of daily living, suicidal behaviour (Oon-Arom et al., 2019), mortality risk (Dewey & Saz, 2001; Holt-Lunstad et al., 2015), and increased use of health services, contributing to economic and caregiver burden (Prince et al., 2015; WHO, 2012).

1.4 Migration and left-behind older parents

People may migrate within (internal) and outside (international) their home country during their lifespan, with migration a constant feature of human civilisation and an inevitable process of demographic and economic trends. More than a billion people worldwide (15% of the world population) are internal or international migrants (IOM, 2019a). There are an estimated 272 million international migrants, accounting for 3.5% of the global population (United Nations,

2019b). There is no systematic practice of recording the volume of internal migration in most developing countries (Kuhn, 2015). However, it is estimated that the number of internal migrants is higher than international migrants (Skeldon, 2018; UNDP, 2009).

Major drivers of migration include the search for better access to economic and educational opportunities, superior living conditions, family-related reasons, and civil war and conflict (European Commission, 2000). Disparities in the economic development between rural and urban areas, and the processes of globalisation and urbanisation have contributed to an increasing trend in the flow of rural surplus labour to large cities. Clemens (2011) considers migration and subsequent remittance to be one of the most promising sources of income for poorer households in developing countries.

Emigration is a complex socio-cultural and psychological process, having a heavy impact on those who leave, as well as on those family members who are left behind and have to deal with the aftermath of this decision (Falicov, 2005). The emigration of young adults from the household results in separation from family members—children, spouses and parents who remain in the place of origin and are often referred to as the 'left-behind'. As labour migration is often a household livelihood strategy, the outcomes of migration, whether it be economic, social or cultural, affects the left-behind family members as well.

Parents who are living in their country of origin or usual place of residence and have one or more children migrated are called 'left-behind parents'. Because older adults with no children are not considered at risk of being left behind, they are often excluded in studies on left-behind parents. In other research, the term 'empty nest' is used, which denotes a household in which only older adult(s) live and any children have moved out (Gao et al., 2017; Zhang et al., 2019a).

Children leaving the parental home is a normal occurrence. Most parents would expect their children to become independent and autonomous and enjoy a range of experiences and

opportunities throughout their lifetime. However, when children leave the parental home there may be conflicting emotions for both children and parents (Seiffe-Krenke, 2006). For older parents of migrant children in low-income countries, the transition from a traditional multigenerational household to living alone involves certain trade-offs in their physical and emotional well-being, which subsequently affect their QOL.

1.5 Impact of children's migration on left-behind parents

Studies concerning the impact of migration on left-behind family members have often considered migrant-sending households as passive, remittance-dependent entities (Binford, 2003), with migration presenting a serious disruption to the social support network for older parents who traditionally relied on their adult children (Das et al., 2007; Kanaiaupuni, 2000). Labour emigration has also been considered as a household-level livelihood strategy for risk diversification by using remittances to contribute to household income (Taylor, 1999). The potential positive effects of remittances on the welfare of migrant-sending households and communities (de Haas, 2007; Katseli et al., 2006) are particularly important in resource poor settings in low-income countries (Adams Jr & Page, 2005; Aziz & Mohyuddin, 2015). Recent studies have shown that rather than being passive receivers of remittances and having dependence on support, older people in migrant-sending families are active performers of household duties (Földes, 2016), carers for left-behind grandchildren (Bastia, 2009), and manage family finances (Bastia, 2009; Mazzucato, 2011; Vullnetari & King, 2011). Other studies highlight the complex and heterogeneous nature of migration, as well as the non-economic impacts (De Haas, 2010; Siddiqui, 2019). Table 1.1, below, presents the theoretical reasoning on the impact of adult children's migration on the mental health and QOL of older parents left behind.

Table 1.1 Hypothesised effect of children's migration on the mental health and QOL of older parents

Adult children's migration status	Mental health and QOL of older parents	
	Positive effects	Negative effects
Migrated children	Increased income from remittances Feeling of prestige and dignity	Disintegration of family support system Feelings of abandonment Worry about health and safety of migrant children
No migrated children	Readily available support network Togetherness	Lack of financial support Low income leading to reduced access to health services High burden of family (including grandchild) care

Remittances provided by migrant children may increase the financial resources available to parents and enable better access to health and welfare services (Amuedo-Dorantes & Pozo, 2011; Ariadi et al., 2019; Hoermann & Kollmair, 2009), which may result in better health and QOL for their older parents (Cao et al., 2019; Kuhn et al., 2011; Kuhn, 2006). Parents with migrant children may feel pride and a sense of prestige (Yahirun & Arenas, 2018). Conversely, migration of children can affect the emotional and psychological well-being of the left-behind parents, with separation from their child(ren) being a traumatic event. It may also have long-term consequences beyond the experience of the event of migration. Parents may feel lonely and sad (King & Vullnetari, 2006), and worry, too, about the health and adjustment of the migrant children. The physical absence of their child may compromise traditional intra-family support arrangements, harming their mental health and QOL (Angel et al., 2017). In low- and middle-income countries where state infrastructure for the provision of services to older people is relatively undeveloped, adult children are often a major source of support for older persons (Barrientos, 2009; Goodman & Harper, 2006; Shen et al., 2012).

1.5.1 Research evidence on the mental health of left-behind parents

The health and well-being of left-behind older parents has received attention in recent years (King et al., 2017; Toyota et al., 2007). Research has examined the impact of children's migration on their left-behind older parents' physical health (Evandrou et al., 2017; Falkingham et al., 2017; Gao et al., 2017; Lu, 2012), mental health, QOL (Liang & Wu, 2014; Ye et al., 2017) and well-being (Gassmann et al., 2012; Silverstein et al., 2006; Yahirun & Arenas, 2018).

Left-behind older parents are identified as being at higher risk of depression (Cheng et al., 2015; Lu, 2012; Lu et al., 2012; Song, 2017; Wang et al., 2017; Zhai et al., 2015), anxiety (Arenas & Yahirun, 2010; Wang et al., 2013), and loneliness (Cheng et al., 2015; Liu & Guo, 2007; Wang et al., 2017), and to have reduced cognitive ability (Zhai et al., 2015). The migration of children is also correlated with reduced happiness among older parents left behind (Scheffel & Zhang, 2019).

In contrast, left-behind older parents were found in some studies to be at lower risk of developing depression (Abas et al., 2013; Abas et al., 2009) and to have better cognitive functioning (Inoue et al., 2019), while other studies have reported no significant differences in mental health (Chang et al., 2016; Ghimire et al., 2018; Li et al., 2016; Yahirun & Arenas, 2018) between the left- and non-left-behind. The integrative review presented in Chapter 3 found 10 of 16 studies reported poorer mental health for older adults with migrant children, with two of these showing improved mental health for left-behind parents, and four reporting null findings (Thapa et al., 2018a).

1.6 Research problem and study significance

Migration is an important issue in contemporary society. Despite the key role of migration in the socio-economic transformation of migrant-origin communities in low- and middle-income

countries, the impact at the individual, household and community level is not clear. The remittance provided by migrant children may enable older adults to access social welfare and healthcare services. Conversely, the migration of adult children may change the traditional family support system, leaving older persons more vulnerable. Studies assessing the impact of children's migration on parents' mental health have presented mixed findings on the consequences. Further, internal and international migration of children have not been well compared in the research (Bastia et al., 2020).

This study aims to address the gap in the literature on the migration of adult children and its effects on the mental health of older parents by providing an in-depth analysis of data from Nepal, a low-income country. The results provide important knowledge on the mental health and QOL of left-behind older parents, thereby advancing our understanding of the effects of the emigration of adult children. The findings of this study will inform healthcare and social welfare policies and programmes to meet the need of older people, thereby enhancing their health and well-being.

1.7 Research objectives and questions

1.7.1 Research objectives

The aim of this study is to estimate the prevalence of mental health symptoms, and to analyse the association of migration of children with mental health and QOL of left-behind older parents. The research objectives are:

- To describe the mental health status and QOL of older people in Nepal
- To assess the factors associated with mental health among older people in general
- To assess the factors associated with mental health among left-behind older parents specifically

- To identify the association between adult children's migration and the QOL of older parents, and
- To identify the association between adult children's migration and the mental health of older parents.

1.7.2 Research questions

The study answers the following research questions:

- What is the mental health and QOL status of older people in Nepal?
- What are the risk factors for mental health symptoms among older people in general in Nepal?
- What are the risk factors for mental health symptoms among left-behind older parents in Nepal?
- Is migration of adult children associated with the QOL and mental health of older parents?
- What are the protective social factors that may promote mental health among left-behind older parents?

1.8 Study context

This study was conducted in two districts of the Mid-Western region of Nepal. This section sets out the relevant country context, including a brief description of the migration pattern, ageing population, and the mental health of older people in Nepal.

1.8.1 Pattern of migration in Nepal

There has been a sharp increase in the volume of internal as well as international migration over the past few decades in Nepal. About 10 million people, comprising 36% of the country's population, are lifetime internal migrants (CBS Nepal, 2019). Wealthier households are more

likely to have members migrate internally (Suwal, 2014). In Nepal, migration is often attributed to poverty, disparities in income distribution, geographic variation in labour demand, natural disasters, and food insecurity (IOM, 2019b; Kumar, 2004). Labourers travel to other districts and provinces across Nepal to work in construction, garment factories, the hotel industry, transport services, and agriculture.

In addition to increased internal migration, international migration has also increased in recent decades (Dhital et al., 2015). Around two million people (7.3% of the population) were living outside the country during the latest census (2011), a substantial increase from 0.8 million in 2001 (3.2%), with one in four households having a family member abroad. Nepal's emigration rate was estimated at 10.8 per 1,000 population in 2011. The majority of migrants (76%) were aged between 15 and 34 years (CBS Nepal, 2012).

Since the late 1980s, migration to the Middle East, mostly to Gulf states, and to other Southeast Asian countries has increased (Kunwar, 2015). According to the Department of Foreign Employment, 3.8 million permits to work abroad were issued between 1993/94 and 2014/15 (Ministry of Labour and Employment Nepal, 2016), which is almost 14% of the total population. Most of the labour migrants from Nepal are unskilled (70%) or semi-skilled (27%), with many (40%) unemployed prior to departure, or engaged in agriculture (30%; Nepal, 2013). International labour migration is one of the major livelihood strategies for Nepalese people, with remittances being the main contributor to poverty reduction (Nepal, 2013; Sapkota et al., 2013). Nepalese migrant workers sent more than $8 billion home, accounting for almost 28% of Nepal's GDP in 2018. For many poor families, remittances received from the migrant family members are the major or only source of income (Hoermann & Kollmair, 2009). Cross-border migration to India, in which seasonal migrants travel to various Indian cities, primarily for domestic and hotel industry work, is another important characteristic of migration in Nepal.

1.8.2 Ageing population in Nepal

The increased out-flow of younger adults coincides with rapid population ageing in Nepal. Although Nepal has a smaller proportion of older people compared to high-income countries, there has been a steady increase in recent decades. The crude birth rate in Nepal decreased to 22.4 per 1,000 persons in 2016 from 33.5 per 1,000 in 2000, with the total fertility rate falling from 4.1 to 2.3 over the same period (Ministry of Health Nepal et al., 2017). The life expectancy at birth of the average Nepalese person had increased to 71 years in 2019 (UNFPA, 2019) from 60.4 years in 2001 (CBS Nepal, 2014). Consequently, the proportion of older adults aged 60 years or over accounted for 6.5% of the population in 2001 had increased to 11.1% by 2018 (CBS Nepal, 2019). About half (47.1%) of older people in Nepal are economically active (Bhattarai & Bhattarai, 2012). Subedi (2003) found more than half of the older people, despite their age, contribute to household duties, including but not limited to childcare, cattle herding, farming, and handicrafts.

1.8.3 Mental health of older people in Nepal

There has been limited research on mental health among older adults in low-income countries such as Nepal. A higher prevalence of mental disorders among older people compared to younger adults has been reported (Jha et al., 2019). As a part of the literature review for this thesis, a systematic review on mental disorders among older people in Nepal was undertaken (Thapa et al., 2018b; see Chapter 2). The review found that the studies were methodologically limited, as most were small, had used convenience samples, and were conducted in urban and semi-urban areas. The majority assessed depressive symptoms only using the Geriatric Depression Scale – Short version (GDS-15), with the prevalence of depressive symptoms ranging from 25.5% to 60.6% among older adults in a community setting. Recent research (Devkota et al., 2019; Manandhar et al., 2019; Subedi et al., 2018) reports higher prevalence

of depressive symptoms. A few studies have assessed other mental health symptoms, including anxiety (Timalsina, 2013) and loneliness (Chalise, 2010; Devkota et al., 2019).

1.8.4 Migration of children and left-behind older parents in Nepal

Co-residence with adult children, especially sons, has been a significant aspect of Nepalese traditional family life. Under this family structure, adult children, usually sons, daughters-in-law, and unmarried daughters take responsibility for caring for older family members (Chalise, 2006). There is an element of reciprocity, as older parents also provide household support, including caring for grandchildren and doing agricultural work. Due to the inadequate social security and pension system for older people, adult children are the primary source of support for their ageing parents. In recent times, migration of adult children has weakened the traditional intergenerational support system (Childs et al., 2014; Dhital et al., 2015), which may have adverse consequences for parents' health and well-being (Geriatric Center Nepal, 2010; Shrestha, 2012).

The most evident effect of migration in Nepal, as it is easily quantifiable and has been studied more often, is the remittances flowing back from migrants and their impact on the economic status of migrant-sending households (Bam et al., 2016; Lokshin et al., 2010; Wagle & Devkota, 2018). A number of studies have reported this extra income increasing access to healthcare, education, nutrition, and other services (Bansak et al., 2015; Dhungana & Pandit, 2014; Karki Nepal, 2016; Kim et al., 2019; Regmi et al., 2014; Rijal, 2013). Limited research has been conducted examining the consequences of such migration on the non-financial dimensions for the families left behind, including the impact on older parents.

Hoermann and Kollmair (2009) reported the remittances received had made healthcare more affordable, giving the poor better access to medical treatment. Ghimire et al. (2018) found parents with a migrated child (both internal and international) showed higher levels of

loneliness, but no significant difference in self-reported chronic diseases and depressive symptoms. A study in aged care homes (Khanal et al., 2018) found that 78% of residents reported mental health symptoms (such as loneliness, anxiety and insomnia), while fewer (9.1%) reported financial problems as a result of children's migration.

1.9 Thesis structure

This thesis has 10 chapters. Chapter 1 has provided a summary of the study's core constructs: population ageing, mental health and QOL of older people, and migration of children. This chapter has also stated the study objectives, the significance of the study, and its context, with a particular focus on the phenomenon of migration and the mental health of older people in Nepal.

Two reviews of the literature are presented in Chapters 2 and 3. Chapter 2 presents a systematic review on the prevalence of mental health disorders among older adults in Nepal, while Chapter 3 presents an integrative review on the impact of children's migration on the mental health of older parents. Chapter 4 details the methodological considerations, research process, and data collection activities. An evaluation of the psychometric properties for the Nepalese version of the Depression Anxiety Stress Scale (DASS-21) is presented in Chapter 5.

The results of the study are presented in four chapters (Chapters 6 to 9). These chapters present the sample characteristics and bivariate associations between migration of children and outcome variables (Chapter 6), prevalence and risk factors of mental health symptoms (Chapter 7), association of migration of children with QOL (Chapter 8) and with mental health (Chapter 9) of older parents. Chapter 10 synthesises key findings, and presents a discussion on the study's strengths and limitations. Further research and policy implications are discussed.

1.10 Conclusion

In summary, community-based studies on the mental health and QOL of older people are lacking for low-income countries such as Nepal. Previous studies reporting the impact of adult children's migration on parents' well-being have yielded inconsistent results. The first chapter of this thesis has provided a background to the study. The research questions were outlined, and the significance of the study addressed. The context in which the study was undertaken was overviewed, and the structure of the thesis outlined. The next two chapters present published literature reviews providing further context and background information.

Chapter 2 – Prevalence of Mental Disorders among Older People in Nepal: A Systematic Review

2.1 Chapter overview

This chapter presents a peer-reviewed and published systematic review reporting on the prevalence of mental health disorders among older people in Nepal (Thapa et al., 2018b). The review included 32 articles from 26 studies. The majority of the studies assessed depression rather than other mental disorders. Results identified a higher prevalence of mental health disorders, particularly depression, cognitive impairment, and other psychiatric disorders, across a range of settings.

2.2 Publication

Thapa, D. K.,* Visentin, D., Kornhaber, R., & Cleary, M. (2018). Prevalence of mental disorders among older people in Nepal: A systematic review. *Kathmandu University Medical Journal*, *16*(62), 181-190. http://www.kumj.com.np/issue/62/181-190.pdf

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Prevalence of Mental Disorders among Older People in Nepal: A Systematic Review

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ABSTRACT

Background

There has been limited research into the prevalence of mental disorders amongst older adults in developing countries. Developing countries such as Nepal are undergoing significant demographic changes with an increasing number and proportion of older persons.

Objective

This systematic review reports the prevalence of mental health disorders amongst the elderly in Nepal.

Method

Databases searched were PubMed, CINAHL, Scopus and PsycINFO. A hand search for relevant articles appearing in reference lists and previously identified research was also undertaken.

Result

Of the 26 studies (32 articles) included most were community and aged-care home -based studies measuring depression. The prevalence of depressive symptom cases ranged from 25.5% to 60.6% in the community, 17.3% to 89.1% in aged-care facilities and 53.2% to 57.1% in hospital settings. The prevalence of depressive disorders in similar settings varied between 4.4% (in community) to 53.2% (in hospital). The prevalence of anxiety symptom cases ranged from 21.7% to 32.3%. Psychosis, alcohol dependence and dementia were other identified disorders amongst the elderly. Disordered symptom cases are more prevalent in aged-care facilities than in community settings and mental disorders are higher for hospital-based studies compared to community settings.

Conclusion

This review identified a higher prevalence of depression amongst the elderly in Nepal compared to studies conducted in developed countries. The high rates of reported prevalence among the elderly warrant the need to develop more effective public health and welfare approaches to prevent, treat and manage the mental disorders among this vulnerable population.

KEY WORDS

Aged, Anxiety, Depression, Elderly, Mental disorders, Nepal, Prevalence

INTRODUCTION

Global population ageing, due to fertility decline and rising life expectancy, has extensive consequences.[1] In 2017, an estimated 962 million people were aged 60 or over comprising 13% of the global population which is predicted to rise to 1.4 billion (16.5%) by 2030 and 2.1 billion (20%) by 2050.[2] Population ageing is producing changes to demographics in developing countries with Nepal recently experiencing a sharp rise in the relative and absolute size of its elderly population.[3] A child born in Nepal in 2011 has a predicted life expectancy of 66.6 years, which is almost 17 years longer than in 1981.[4] Census data shows an increase in the proportion of older people from 5% in 1952/54, to 6.5% in 2001 and 8.1% in 2011, with a 2016 survey estimate of 9.9%.[5] In absolute terms, the elderly population increased from 857,061 in 1981 to 2,154,410 by 2011.[6] In 2030, the aged population is projected to be 3,336,000, accounting for more than 10% of the total population.[7]

Mental disorders in the elderly are a serious public health concern with the aged population having a higher prevalence of mental disorders.[8,9] The 2010 Global Burden of Disease Study identified that mental and substance use disorders accounted for 22.9% of all Years Lived with Disability (YLDs) and 7.4% of all Disability Adjusted Life Years (DALYs).[10] According to the WHO, 15% of older people (≥60 years) live with a mental disorder accounting for 6.6% of the total DALYs amongst older adults.[11] Identified mental disorders amongst the elderly include depression, anxiety, dementia, cognitive impairment, post-traumatic stress, and substance use.[12-23] Mental disorders often develop with co-morbidities and are associated with negative health outcomes.[24,25] Mental health problems amongst the elderly are often undiagnosed and untreated in part due to stigma and discrimination.[26,27]

Community-based studies in Nepal report higher prevalence of psychiatric morbidities for persons 15 years and older; with a prevalence of over 35%.[28,29] Lam et al. observed a 21.3% prevalence of depression among adults (≥18 years) and Risal et al. reported an adult (≥18 years) prevalence of anxiety and depression of 22.7% and 11.7% respectively.[30,31] Bishwajit et al. observed a higher rate of self-reported depression for Nepalese adults (>18 years) of 49.9% compared to Bangladeshi (39.0%) and Indian (17.7%) adults.[32] Hospital inpatients have a higher prevalence, with Shyangwa et al. reporting a 31.7% prevalence of neuropsychiatric illnesses.[33]

There has been limited research into the prevalence of mental disorders amongst older adults in developing countries. Elderly people in Nepal have less access to integrated health services and limited social security support in later life.[34] In addition, the devastating Nepal earthquake of 2015 had a negative impact on older peoples' psychosocial health and well-being with reduced availability of support and treatment options.[35] Relevant research is generally not population-wide, with small studies focussing on individual villages, cities, aged-care facilities and health care institutions. Whilst these studies provide useful subpopulation information, they do not individually describe the prevalence of mental disorders in Nepal.

The present review addresses this shortcoming by undertaking a comprehensive review of mental health research among the elderly in Nepal focussing on the prevalence of mental disorders to inform public health initiatives.

METHODS

This review utilised the Preferred Reporting Items for Systematic Reviews and Meta-Analyses.[36] Databases searched were PubMed, CINAHL, Scopus and PsycINFO for all published articles between January 2000 and January 2018. Search terms were 'mental health' OR 'mental disorders' OR psychological OR 'well-being' OR 'quality of life' OR depress* OR psychiatr* OR anxiety OR stress AND older OR parents OR elderly OR elder OR aged OR ageing OR geriatric OR adult AND Nepal. A hand search for relevant articles appearing in reference lists and previously identified research was also undertaken.

Studies were included if they fulfilled the following criteria: study subjects' aged 50 years or older, original quantitative research reporting the prevalence of any mental disorder in Nepal and published in an English peer-reviewed journal. No restrictions were placed on sample size or study settings. Theoretical studies, editorials, commentaries and dissertations were excluded. To account for the cohort effect, studies published before the year 2000 were also excluded.

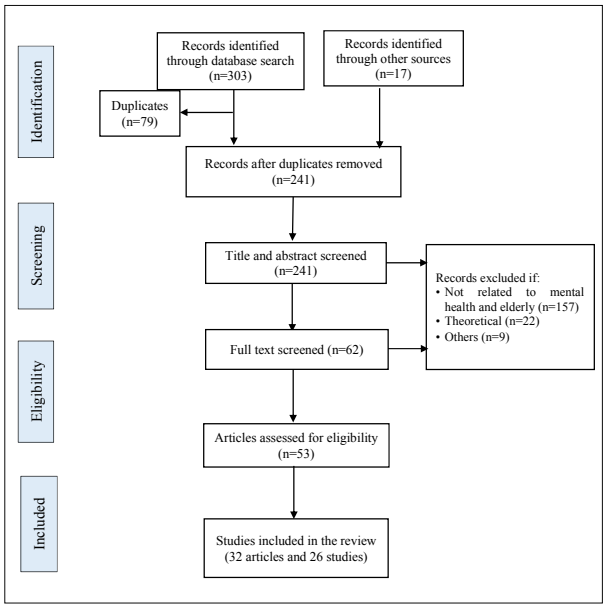

Figure 1. Flow diagram of studies identified, screened, assessed for eligibility, and included in this review

Figure 1 presents a flow diagram of the process by which studies were identified, screened, assessed for eligibility and included in this review. The literature search identified 303 articles with 17 additional articles located. After removal of duplicates, 241 articles were screened for title and abstract with 53 articles identified and assessed for eligibility, yielding 32 articles from 26 studies included in this review.

Study quality was assessed using the critical appraisal tool for prevalence studies developed by Loney et al.[37] This tool contains the following eight criteria: 1) adequate sampling; 2) unbiased sampling frame; 3) adequate sample size (>300); 4) standard measures of outcomes; 5) unbiased assessors of outcomes; 6) adequate response rate with refusals described; 7) prevalence presented with confidence intervals and by relevant subgroup analysis; and 8) study subjects and settings described and appropriate for the research question. For the third quality criterion (adequate sample size), sample size was also deemed adequate if it was calculated a priori or if the entire subpopulation was measured. The quality of the included articles was rated independently by two authors (by DKT and DV). Discrepancies were discussed and determined by consensus.

The first author extracted, cross-checked and reported data using a modified standardised data extraction form.[38] Table 1 presents participant characteristics, study settings, research design, sample size, mental disorders assessed, data collection tools/scales used and prevalence rates. Studies were categorised according to setting (community, aged-care facilities and hospital) and also separated into those reporting clinically relevant symptom cases (studies using screening scales) and those reporting clinically relevant levels of mental disorders based on ICD or DSM criteria. While no studies reported standard errors for prevalence estimates, we calculated and present confidence intervals (CIs) of the estimates based on the study data (see Table 1 and Table 2).

RESULTS

Methodological characteristics and study settings

Of the 26 studies, 20 had a cross-sectional design, and the remaining six were hospital record evaluations. Seven studies were community-based; four of which were conducted in urban/semi-urban areas of Kathmandu, while the remaining three were undertaken in the districts of Dhankuta, Dharan and Dolakha. In eight studies, participants were recruited from aged-care facilities (Kathmandu n=6, Devghat n=2) and nine studies were hospital based. One study compared the prevalence of depression between community and aged-care facilities,[66] with another comparing an aged-care facility to hospital inpatients.[67] Among the hospital-based studies, seven measured outpatients with the remaining three measuring inpatients. Four of the hospital-based studies were conducted in Tribhuvan University Teaching Hospital (TUTH), two in The Universal College of Medical Sciences teaching Hospital Bhairahawa and one each in BPKIHS Dharan, Manipal Teaching Hospital Pokhara and a private hospital in Pokhara.

Sample sizes ranged from 34 to 489 (100 to 489 in community settings; 78 to 203 in aged-care facilities and 34 to 257 in hospitals). An overall sample size of 4152 was identified across the studies, with 1746 community-based subjects, 1140 aged-care facility subjects and 1114 hospital subjects. In fourteen studies, participants were selected either by random sampling or included the whole population of the study setting. Female participants outnumbered males in 13 studies, while five studies did not provide any gender information. Mean age of participants ranged from 67.3 to 78.2 years (Table 1).

Assessment of mental health

A range of measures were used to assess mental health status with 22 studies measuring depression. Twelve studies used the Geriatric Depression Scale (GDS) to measure depressive symptoms of which four used the short 15-item version. Two studies used the Beck Depression Inventory (BDI).[64,67] Other assessments included loneliness,[50] anxiety,[61,67] and cognitive impairment.[69,76] Amongst the studies assessing anxiety, one used the Hamilton Anxiety Scale and the other the Beck Anxiety Inventory (BAI). Two studies used the Mini-Mental State Examination (MMSE) to assess cognitive function. Seven of the hospital-based studies used the International Classification of Disease tenth revision (ICD-10) to diagnose psychiatric disorders. Two community-based studies reported clinically relevant mental disorders with one using ICD-10,[41] and the other using DSM-III-R.[54] All studies used standard instruments, except Sapkota and Pandey who developed a novel stress scale.[45]

Prevalence among community living elderly

Prevalence of cases identified by depressive symptoms using the GDS among the community based studies ranged from 29.7% to 60.6%. Gupta et al.[41] diagnosed 18% of elderly participants with depressive disorder using ICD-10. Simkhada et al. reported a higher prevalence of depressive symptom cases for females (68.4%) compared to males (51.2%).[39] Gautam and Houde in a Kathmandu community-based study identified that 45.4% of older adults who lived with a married son had depressive symptoms.[46] Chalise and Rai reported a lower prevalence of 29.7% among older adults of Rai ethnicity in Kathmandu.[43] Chalise et al. reported a high prevalence of loneliness (68.7%) among the elderly in Kathmandu.[51] Sapkota and Pandey found that all participants in their study experienced stress with around 60% having moderate or severe stress.[45] Subedi et al. using the DSM-III-R found an 18% prevalence of any diagnosable psychiatric disorder with a 5.5% prevalence of both lifetime somatization and anxiety (Table 2).[54]

Table 1. Characteristics of included studies

SN	Author (Year)	Age (years)		Participants characteristics	Sample size	Scale (cut-off) Reference
		Inclusion	Mean (SD)			
Community-based study						
1	**Simkhada et al.**[39]	≥60	71.2 (8.4)	Semi-rural communities in Kathmandu	299 (164F)	GDS-15 (≥5)[40]
2	**Gupta et al.**[41]	≥60	68% in the age group of 60-69	Elderly people residing in Pakhribaas, Dhankuta	189 (81F)	ICD-10[42]
3	**Chalise and Rai**[43]	≥60	69.8 (5.7)	Rai ethnicity in Kathmandu	165 (79F)	GDS-30 (≥10)[44]
4	**Sapkota and Pandey**[45]	≥65	67% were in the age group of 65 to 75 years	Elderly living in an urban area of Dharan municipality	100 (61F)	Researcher constructed stress scale
5	**Gautam et al.**[46-49]	>60	69.9 (8.1)	Urban area (Kathmandu) - older adults aged ≥60 years who lived with at least one married son	489 (242F)	GDS-30 (≥10)[44]
6	**Chalise et al.**[50-52]	>60	68.9 (7.4)	Urban area (Kathmandu) - Newar and Chhetri ethnicity in Kathmandu	332 (168F)	Three-item loneliness scale[53]
7	**Subedi et al.**[54]	≥50	-	Jirel (Tibeto-Burman) ethnic group in Jiri Valley, Dolakha	182 (99F)	DSM-III-R Criteria Checklist
Aged-care home-based study						
8	**Gauli and Shrestha**[55]	≥60	78.2 (9.2)	Aged-care facility located in Devghat area	116 (116F)	GDS-15 (≥5)[40]
9	**Shrestha et al.**[56]	≥60	73.6 (8.2)	Elderly people in Pashupati Briddhashram (aged care Home) in Kathmandu	148 (78F)	GDS-15 (≥5)[40]
10	**Kafle et al.**[57]	≥60	-	Aged-care facility in Kathmandu	203 (133F)	ICD-10
11	**Chalise**[58]	≥60	73.7 (3.2)	Elderly adults residing in aged-care facility in Devghat area	180 (89F)	GDS-15 (≥5)[40]
12	**Ranjan et al.**[59]	≥65	-	Elderly adults residing in aged-care facility in Kathmandu	150 (85F)	GDS-30 (≥10)[44]
13	**Timalsina et al.**[60,61]	≥60	-	Elderly adults residing in aged-care facility in Kathmandu	173 (128F)	GDS-30 (≥10)[44], Hamilton Anxiety Scale[62]
14	**Choulagai et al.**[63]	≥60	-	Elderly adults residing in aged-care facility in Kathmandu	78 (38F)	GDS-30 (≥10)[44]
15	**Pradhan**[64]	>60	39.1% were ≥80 years	Elderly adults residing in aged-care facility in Kathmandu	92 (58F)	BDI[65]
Community-based and aged-care facility - comparative						
16	**Ghimire et al.**[66]	≥60	Aged-care acility: 76.0 (7.9), Community: 72.7 (8.1)	Elderly adults residing in aged-care facility in Chitwan and community sample	110 (55 from aged-care facility and 55 from community)	GDS-30 (≥10)[44]
Hospital-based and aged-care facility-comparative						
17	**Kumar et al.**[67]	≥65	Inpatients: 69.0 (4.6) & community: 69.4 (4.3)	Geriatric inpatients admitted to the Department of Internal Medicine of TUTH and elderly from aged-care facility in Kathmandu	65 (42 inpatients and 23 community dwellers from aged-care facility)	BDI (≥10) and BAI (≥8)[68]
Hospital-based Outpatients						
18	**Nepal et al.**[69]	≥60	67.3 (7.3)	Patients in psychiatric OPD in BPKIHS, Dharan	210 (107F)	MMSE[70] and ICD-10
19	**Aich et al.**[71]	≥60	33.9% in 60-64 years	OPD patients of Department of Psychiatry, Universal College of Medical Sciences-Teaching Hospital, Bhairahawa	257 (117F)	ICD-10
20	**Thapa et al.**[72]	≥65	69.7 (5.9)	Psychiatric OPD of Manipal Teaching Hospital, Pokhara	120 (62F)	ICD-10
21	**Khattri et al.**[73]	≥65	-	Patients attending psychiatric OPD in a private hospital in Western region of Nepal (Fewa City Hospital and Research Centre, Pokhara).	80 (34F)	ICD-10[74]

22	**Shakya[75]**	≥55	65	OPD patients of psychiatry department of BPKIHS, Dharan	100 (54F)	ICD-10
23	**Khattri and Nepal[76]**	≥65	-	Patients attending the Psychiatry, Medicine and General Practice OPDs of TUTH	100 79	MMSE (<24)[70] GDS-30 (≥10)[44]
24	**Koirala et al.[77]**	≥60	67.3 (6.3)	All new patients attended the psychiatric OPD of TUTH over the study period of one year	75	-
Inpatients						
25	**Dhungana et al.[78]**	≥60	-	All patients admitted in Psychiatry ward of TUTH Kathmandu, over three years from 2010 April to 2013 April	34 (18F)	ICD-10
26	**Aich et al.[79]**	≥60	42.8% were in the age group 60 to 64 years	Inpatients admitted in Department of psychiatry, Universal college of medical sciences teaching hospital Bhairahawa	138 (55F)	ICD-10

OPD: Outpatient department; F: Female; TUTH: Tribhuvan University Teaching Hospital; GDS: Geriatric Depression Scale; DSM-III-R: Diagnostic and Statistical Manual of Mental Disorders, 3rd ed., revised; ICD-10: International Classification of Disease, 10th revision; BPKIHS: B. P. Koirala Institute of Health Sciences; BAI: Beck Anxiety Inventory; BDI: Beck Depression Inventory; MMSE: Mini-Mental State Examination

Table 2. Prevalence of mental health disorders and symptom cases

Study	Mental disorder	n(cases)	Prevalence proportion [95% CI]
Simkhada et al.[39]	Depressive symptoms	175	0.61 [0.55, 0.66] Male: 0.51 [0.43, 0.60] Female: 0.68 [0.61, 0.76] Mild: 0.28 [0.23, 0.33] Moderate: 0.21 [0.16, 0.26] Severe: 0.12 [0.08, 0.15]
Gupta et al.[41]	Depressive disorder	34	0.18 [0.13, 0.23]
Chalise and Rai[43]	Depressive symptoms	49	0.30 [0.23, 0.37] Mild: 0.24 [0.18, 0.31] Severe: 0.05 [0.02, 0.09]
Sapkota and Pandey[45]	Stress	60	Mild: 0.40 [0.30, 0.50] Moderate: 0.51 [0.41, 0.61] Severe: 0.09 [0.03, 0.15]
Gautam et al.[46-49]	Depressive symptoms	222	0.45 [0.41, 0.50] Moderate: 0.26 [0.22, 0.30] High: 0.19 [0.16, 0.23]
Chalise et al.[50-52]	Loneliness	228	0.69 [0.46, 0.74]
Subedi et al.[54]	Psychiatric disorder	32	0.18 [0.12, 0.23]
Gauli and Shrestha[55]	Depressive symptoms	78	0.67 [0.59, 0.76] Mild: 0.24 [0.16, 0.32] Severe: 0.43 [0.34, 0.52]
Shrestha et al.[56]	Depressive symptoms	92	0.62 [0.54, 0.70] Mild: 0.53 [0.45, 0.61] Severe: 0.09 [0.04, 0.13]
Kafle et al.[57]	Depressive symptoms	96	0.47 [0.40, 0.54]
Chalise[58]	Depressive symptoms	104	0.58 [0.51, 0.65] Mild: 0.47 [0.39, 0.54] Moderate: 0.09 [0.05, 0.13] Severe: 0.02 [0.0, 0.04]
Ranjan et al.[59]	Depressive symptoms	71	0.47 [0.39, 0.55] Male: 0.48 [0.36, 0.60] Female: 0.47 [0.36, 0.58] Mild: 0.33 [0.26, 0.41] Severe: 0.14 [0.08, 0.20]
Timalsina et al.[60,61]	Depressive symptoms	126	0.73 [0.66, 0.79] Male: 0.62 [0.48, 0.76] Female: 0.77 [0.69, 0.84] Mild: 0.57 [0.49, 0.64] Severe: 0.16 [0.11, 0.22]
Choulagai et al.[63]	Depressive symptoms	40	0.51 [0.40, 0.62] Mild: 0.36 [0.25, 0.47] Severe: 0.15 [0.07, 0.23]

Pradhan[64]	Depressive symptoms	82	0.89 [0.83, 0.95] Mild: 0.24 [0.15, 0.33] Moderate: 0.36 [0.26, 0.46] Severe: 0.29 [0.20, 0.39]
Ghimire et al.[66]	Depressive symptoms	43 14 29	0.39 [0.30, 0.48] Community: 0.25 [0.14, 0.37] Aged-care: 0.53 [0.40, 0.66]
Kumar et al.[67]	Depressive symptoms	24 4	Inpatients: 0.57 [0.42, 0.72] Aged-care: 0.17 [0.02, 0.33]
	Anxiety symptoms	32 5	Inpatients: 0.76 [0.63, 0.89] Aged-care: 0.22 [0.05, 0.39]
Nepal et al.[69]	Depressive disorder Neurotic, stress related and somatoform disorders Alcohol dependence syndrome Dementia Bipolar affective disorder	77 29 27 24 17	0.37 [0.30, 0.43] 0.14 [0.09, 0.18] 0.13 [0.08, 0.17] 0.11 [0.07, 0.16] 0.08 [0.04, 0.12]
Aich et al.[71]	Psychosis Depression (recent) Alcohol dependence syndrome Anxiety disorders Dementia	71 39 27 25 23	0.28 [0.22, 0.33] 0.15 [0.11, 0.20] 0.11 [0.07, 0.14] 0.10 [0.06, 0.13] 0.09 [0.05, 0.12]
Thapa et al.[72]	Depressive disorder Anxiety disorders Schizophenia Dementia Alcohol dependence syndrome Bipolar affective disorder	32 28 16 15 14 7	0.27 [0.19, 0.35] 0.23 [0.16, 0.31] 0.13 [0.07, 0.19] 0.13 [0.07, 0.18] 0.12 [0.06, 0.17] 0.06 [0.02, 0.10]
Khattri et al.[73]	Alcohol dependence syndrome	4 3 1	0.05 [0.00, 0.10] Male: 0.07 [0.00, 0.14] Female: 0.03 [0.00, 0.09]
Shakya[75]	Mood affective disorders Depressive disorder Phobic, anxiety and obsessive compulsive disorders Substance use Organic (Dementia, delirium, seizure related)	46 39 22 19 12	0.46 [0.36, 0.56] 0.39 [0.29, 0.49] 0.22 [0.14, 0.30] 0.19 [0.11, 0.27] 0.12 [0.06, 0.18]
Khattri and Nepal[76]	Cognitive impairment Depressive symptoms Depressive disorder	21 42 41	0.21 [0.13, 0.29] 0.53 [0.42, 0.64] 0.52 [0.41, 0.63]
Koirala et al.[77]	Mood disorder Organic brain disorder Tension headache	23 21 7	0.31 [0.20, 0.41] 0.28 [0.18, 0.38] 0.09 [0.03, 0.16]
Dhungana et al.[78]	Depressive disorder Schizophrenia/PPD Organic (Dementia/delirium) Bipolar affective disorder	10 7 7 5	0.29 [0.14, 0.45] 0.21 [0.07, 0.34] 0.21 [0.07, 0.34] 0.15 [0.03, 0.27]
Aich et al.[79]	Depression Schizophrenia and other psychosis Alcohol dependence syndrome Mood disorder-mania Organic disorders (dementia/delirium) Anxiety and dissociative disorders	32 28 25 22 22 9	0.23 [0.16, 0.30] 0.20 [0.14, 0.27] 0.18 [0.12, 0.25] 0.16 [0.10, 0.22] 0.16 [0.10, 0.22] 0.07 [0.02, 0.11]

Prevalence among elderly living in aged-care facilities

Seven of the eight aged-care facility studies measured depression using the GDS. The prevalence of depressive symptoms in these studies ranged from 47.3% to 72.8%. Two studies in the Devghat area reported a prevalence of 67.2%,[55] and 57.8%,[58] with similar rates observed in Kathmandu.[56,59,61] Ghimire et al. observed a doubling of the rate of depressive symptoms for aged-care facility residents (52.7%) compared to community residents (25.5%).[66] One small study used the BDI and reported the highest prevalence (89.1%) of depressive symptoms.[64] Timalsina reported a 32.4% prevalence of anxiety using the Hamilton Anxiety Scale.[60]

Prevalence in hospital-based studies

Khattri and Nepal reported 53.2% of participants with depressive symptoms based on GDS among patients attending the Psychiatry, Medicine and General Practice OPDs.[76] The prevalence of depressive disorders amongst older adults attending a psychiatric OPD as measured by ICD-10 varied widely from 15.2% to 39%.[71,75] Nepal et al. found depression as the most common psychiatric illness

(36.7%) followed by neurotic stress, and somatoform disorders (13.8%), alcohol dependence syndrome (12.9%) and dementia (11.4%).[69] Similarly, in a retrospective evaluation of outpatients by Thapa et al. in Pokhara, depressive disorders (26.7%) were identified as the most common diagnosis.[72] Aich et al. reported a 27.6% prevalence for psychosis, 15.2% for depression, 10.5% for alcohol dependence syndrome, 9.7% for anxiety and 8.9% for dementia in Bhairahawa.[71] Khattri and Nepal reported 21% of geriatric OPD patients having cognitive impairment.[76]

Amongst geriatric inpatients, alcohol dependence in males and depressive disorder in females were the main psychiatric illness.[79] Kumar et al. using the BDI and BAI reported significantly higher depressive (57.1%) and anxiety (76.1%) symptoms for hospitalised inpatient elderly as compared to elderly living in aged-care facilities (21.7% and 17.3% respectively).[67]

DISCUSSION

The aim of this review was to provide a comprehensive overview of studies related to mental disorders for the elderly in Nepal. This is the first review of the prevalence of mental disorders amongst elderly in Nepal across different study settings and utilising a number of assessment tools. Depression was more frequently studied than any other mental disorder in studies based in community and aged-care facilities. There was significant variation in the reported prevalence of depressive symptom cases ranging from 29.7% in a community-based study among the Rai ethnicity,[43] to 89.1% for the elderly living in an aged-care facility in Kathmandu.[64] There were also variations in the prevalence of depressive disorders with the smallest rate (4.4%) in a community-based study,[54] and the highest rate (39%) for outpatients.[75] The prevalence rate of symptoms as measured by screening tools was higher in aged-care facilities than those reported in community-based studies. The higher prevalence in aged-care facilities could be due in part to perceived abandonment and loss of social connection. In addition, many aged-care facilities in Nepal may lack adequate resources including staff trained in mental health for older persons.[80] Mental disorders was higher for studies, which recruited elderly patients attending hospitals than community-based studies, which is consistent with findings of previous studies.[81,82] One reason aged-care residents and hospital patients have higher rates is due to comorbidities related to their general health.

This study identified a higher prevalence of depression amongst the elderly in Nepal compared to studies conducted in developed countries. A review of prevalence of depression among elderly Western populations reported that the prevalence of depressive symptom cases ranged from 5.0% to 49% in the community, 11% to 48% in institutions. The prevalence of major depression ranged from 0.9% to 9.4% in private households, and from 14% to 42% in institutions.[83] A meta-analysis of studies conducted in Western countries reported a 19.5% prevalence of depressive symptoms and 16.5% prevalence of lifetime major depression.[84] Similarly, the median prevalence rate of depressive disorders from 74 studies worldwide including developed and developing countries was 10.3%.[85] The prevalence of anxiety disorder among US older adults was only 11.4%,[16] compared to 22% in Nepal.[75] Bryant et al. found the prevalence of anxiety ranging from 1.2% to 15% in community samples, and from 1% to 28% in clinical settings in developed countries.[86] Another review reported the prevalence estimates of anxiety disorders in late age ranging from 3.2% to 14.2% in Western countries.[87]

The higher prevalence of mental disorders amongst elderly persons included in this review is similar to other South Asian countries such as India, Pakistan and Bangladesh.[85,88-91] A review of Indian research reported the prevalence of depression from 8.9% to 62.2% in community-based studies and from 42.4% to 72% in clinic-based studies.[92] The erosion of traditional family structures, inadequate social welfare, and lack of access to mental health care may contribute to higher rates of mental disorders in low-income countries like Nepal. The absence of traditional extended family living is a predictor of depression in the elderly.[93]

This review included a number of studies, which had methodological quality issues, which limited the ability to provide population-based prevalence estimates. Eight studies used convenience or purposive sampling with only four studies calculating an a priori sample size or had a sample size higher than 300. Few studies (n=6) had an adequate response rate and limited information was provided regarding refusals. No study in this review reported confidence intervals for the estimates with only a few providing sub-group analyses.

The prevalence estimates are also limited by the absence of a study using a nationwide sampling frame. Most studies were based in Kathmandu and other urban areas making the findings less generalisable. Since the prevalence of mental disorders are generally higher in rural areas compared to urban areas,[94,95] the reported prevalence is likely to underestimate the general prevalence in Nepal given that most of the studies were from urban areas.

This review reports a higher prevalence of (clinically relevant) symptom cases than mental disorders, which is consistent with other studies.[86,96] Few studies measured the prevalence of mental disorders in the community with none in aged-care facilities. Community studies using for example the DSM criteria may underestimate the prevalence due to missing clinically significant cases.[96]

This review is not without limitations. Some studies included in this review had relatively small sample sizes taken from

hospital settings, which may inflate prevalence rates. While studies were assessed for quality, this assessment was not used to determine eligibility for inclusion. This inclusive approach provides a comprehensive overview of elderly mental health in Nepal. There was a high heterogeneity among the studies with variation in study types, settings and mental health measures making a meta-analysis inappropriate for this review. Different articles arising from the same study were treated as a single entity to avoid duplication of estimates, however some studies conducted in aged-care facilities in Kathmandu and Devghat area have recruited from the same aged-care facilities with possible overlap of some participants.

The higher prevalence for the elderly in Nepal may indicate a lack of recognition and treatment of mental disorders, highlighting the importance of awareness of elderly mental health and wellbeing. Mental health amongst the elderly should be given priority in both health policy and evidence based practice. Efforts should be made to establish an appropriate referral mechanism and integrated care using appropriate screening tools and treatments. Special attention should be provided to the elderly living in aged-care facilities.

CONCLUSION

There is limited information regarding the spectrum of mental disorders among the elderly in Nepal. This review provides an overview of the prevalence of mental disorders amongst the elderly in Nepal and demonstrates higher rates for this subpopulation across a range of settings. Disordered symptom cases are more prevalent in aged-care facilities than in community settings with mental disorders also higher for hospital-based studies compared to community settings. The high rates of reported prevalence among the elderly warrant the need to develop more effective public health and welfare approaches to prevent, treat and manage mental disorders among this vulnerable population.

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2.3 Conclusion

The high prevalence of mental health disorders among older people in Nepal demonstrates the need for effective and consistent health approaches to both prevent and treat mental disorders among this vulnerable population. This review identified certain methodological issues among the studies, including their small sample sizes, purposively selected samples, and limited settings (mainly urban areas). These limitations highlight the need for more rigorous, community-based studies among a representative sample of older adults assessing common mental health disorders. Chapter 3 presents an integrative review that assessed the impact of adult children's migration on the mental health of left-behind older parents.

Chapter 3 – Migration of Adult Children and Mental Health of Older Parents 'Left Behind': An Integrative Review

3.1 Chapter overview

This chapter presents an integrative review assessing the impact of adult children's migration on the mental health of older parents (Thapa et al., 2018a). The review also identified common risk factors for poor mental health among the left-behind older parents. Twenty-five studies which reported associations between the migration of children and the mental health of left-behind parents, and/or factors associated with mental ill-health among left-behind parents were included. Sixteen studies reported the association of migration of children with the mental ill-health of older parents (left-behind or empty nest status), among which 10 reported negative associations indicating that those left behind had a higher risk of mental health conditions. Among the remaining studies, two found positive associations and four found no association. The risk factors for poor mental health among the left-behind parents included living alone, being female, low income, chronic health conditions, lack of social support, rural residence, and low frequency of children's visits.

3.2 Publication

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RESEARCH ARTICLE

Migration of adult children and mental health of older parents 'left behind': An integrative review

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Abstract

Background

Although a number of studies have examined the effect of the out-migration of children on the mental health of 'left behind' elderly parents, research on the consequences of children's migration on the mental health and well-being of elderly parents left behind is inconclusive and a systematic review is warranted.

Objectives

To identify the association between the left behind or empty nest status and the mental health of older parents, and to identify common risk factors for poor mental health among those left behind.

Methods

Online databases CINAHL, PsycINFO, PubMed, Scopus and ProQuest were searched for research (2000-September 2017) that focused on the relationship between the migration of adult children and the mental health of the older parents ($\geq$50 years) left behind. The JBI Checklist for Analytical Cross Sectional Studies was used to assess the methodological quality of the articles.

Results

25 articles met the inclusion criteria. The studies identified that left behind older parents had higher levels of mental health problems compared to non-left behind. Left behind parents had higher depressive symptoms, higher levels of loneliness, lower life satisfaction, lower cognitive ability and poorer psychological health. A number of risk factors were identified for mental health disorders among the left behind parents, which included living arrangements, gender, education, income, physical health status, physical activity, family and social support, age, rural residence and frequency of children's visit.

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Conclusions

This review synthesised the various studies related to the mental health of left behind parents, advancing the theoretical and empirical understanding of the implications of out-migration of adult children on the psychological health and well-being of older parents. More responsive preventive measures and effective management approaches are required for this vulnerable cohort.

Introduction

Over the past decade, there has been a significant increase in both international and internal migration rates. There is an increasing trend in the flow of rural surplus labour to big cities due to an imbalance in economic development between rural and urban areas, exacerbated by globalization and urbanization. Globally there are an approximately 232 million international migrants and 740 million internal migrants [1]. Potential migrants are more likely to be male, young, single and have completed secondary education [2]. The out-migration of young adults from the household results in children and older family members being 'left behind'. Studies concerning the effects of migration on health and well-being often focus on migrants themselves with the families left behind receiving limited attention [3]. Studies focusing on the left behind often consider the children [4, 5, 6] and spouse [7, 8] of migrants, ignoring the left behind older family members themselves.

The 'left behind' and 'empty nest' parents

Left behind parents are those who are living in the originating country or place of residence with one or more biological or adopted children emigrated. Older adults without living child (ren) are not considered at risk of being 'left behind'. When a household consists of only older adult(s) after children leave the home, it is called the 'empty nest' although some studies also use the term to include childless households. Hence, 'empty nest older adults' live alone or only with a spouse and may experience anxiety, depression, guilt, and loneliness; the so-called 'empty nest syndrome' [9, 10].

While both terms 'left behind' and 'empty nest' parents portray similar meanings, there are some important distinctions. Firstly, older adults who do not have a child might not be considered as 'left behind', but may fall into the 'empty nest' category if living alone or with a spouse. Secondly, when one or more children leave the household the parents are 'left behind' irrespective of the living arrangement and household structure. However, elders who live alone or with their spouse only are defined as empty nest elders, while those who live with one or more children are non-empty nest elders, despite the fact that the parent may have some children who have migrated. The focus of this paper is on the impact of out-migration of children on the mental health of the older parents left behind and hence consider studies that use either terms.

Mental health of left behind parents

A number of studies have explored the influence of adult children's migration on the health of older parents left behind, with some studies reporting a significant adverse effect on their mental health. Out-migration of young people has negative consequences for ageing parents, with loneliness, isolation and loss of basic support [11]. In Mexico, Antman [12] reported that the migration of adult children was associated with poorer physical and mental health outcomes

for ageing parents. Studies conducted among the older parents in general also show that close contact and emotional cohesion with children is associated with improved parental mental health. For instance, Dykstra and de Jong Gierveld [13] found that social and emotional loneliness among older Dutch women was negatively associated with weekly contact with their children. Similarly, older European parents who saw or talked to their children more often than once a week had significantly lower levels of depression [14]. Among the Chinese elderly, living alone was associated with low subjective well-being and living with immediate family members improved their general well-being [15]. Internal migration of children in Indonesia had a negative effect on elderly parents' daily living, self-rated health and mortality [16].

In contrast, there are studies reporting better physical and emotional well-being among the left behind elderly parents. Waite and Hughes [17] found that left behind parents in the USA enjoyed improved health conditions over parents living with their children. A study in China [18] reported non-empty nest elderly utilizing better health care than that of empty nest elderly. Wenger et al. [19] in their multi-country study showed that elders whose children were living away had more freedom with more time to make friends, and engage in social activities. Living alone provides parents with an opportunity for reconnection and reawakened interests [20, 21]. In Moldova [22], better physical health among the left behind elderly parents was a consequence of their children's migration. However, this study and a similar study by Gibson et al. [23] in Tonga showed no effect of the migration on the mental health of parents.

Among the left behind, a number of risk factors for poorer mental health have been identified ranging from predisposing inherent factors (such as age, sex, education, existing disease status, previous mental illness, and place of residence) to a wider community and social factors such as existing social support, number of social ties, community engagement and interactions, and access to health services. In general, males, younger parents, living in urban areas, and better access to medical care are positively associated with improved mental health of empty nesters. Despite the increased focus of research in this area, the empirical findings are equivocal. Research on the consequences of children's migration on the mental health and well-being of elderly people remains inconclusive and a systematic review is warranted.

Objective of the review

To identify the association between the left behind or empty nest status and the mental health of elderly parents and to identify the common risk factors for poor mental health among those left behind.

Materials and methods

This integrative review considered research relating to the migration of children and the mental health of the left behind parents. Integrative reviews are an effective method for combining studies with diverse methodologies and data sources in order to increase understanding of the topic, subsequently contributing to the evidence-base [24].

Studies identification

Well-established databases (CINAHL, PsycINFO, PubMed, Scopus and ProQuest) were searched for research published in English language to identify relevant studies on mental health status of left behind parents or elderly people. The following search terms were used: 'left behind'; 'country staying'; 'left in hometown'; 'left in rural areas'; 'stay at home'; 'empty nest'; 'empty nester'; parents; elderly; aged; adult; aging; 'mental health'; 'mental disorders'; 'psychological well-being'; 'well-being'; and 'quality of life'. The search strategy was supplemented by review of the reference lists of the included research [25].

Inclusion and exclusion criteria

Included studies met the following criteria: (a) focused on the relationship between the migration of the adult child(ren) and the mental health of the elderly parents (≥50 years) left behind or factors related to the mental health of the left behind parents; and (b) published in English from January 2000 to September 2017.

Studies were excluded if the focus was on the left behind children, spouse or family members. In addition, studies related to parents and/or elderly left behind due to the death of a child were excluded. To account for the cohort effect, studies published before the year 2000 were excluded.

The process of selection included reviewing the titles and abstracts to identify potential articles and then reading the full text to determine whether articles met the inclusion criteria. Initial screening was carried out by the first author and then checked independently by all other authors. The final sample comprised 25 articles from 23 studies that met the inclusion criteria (see Fig 1).

Data abstraction

The first author (DKT) extracted and coded the following information: authors' names, publication year, country, design, purpose, sample size, age of participants, mental health related

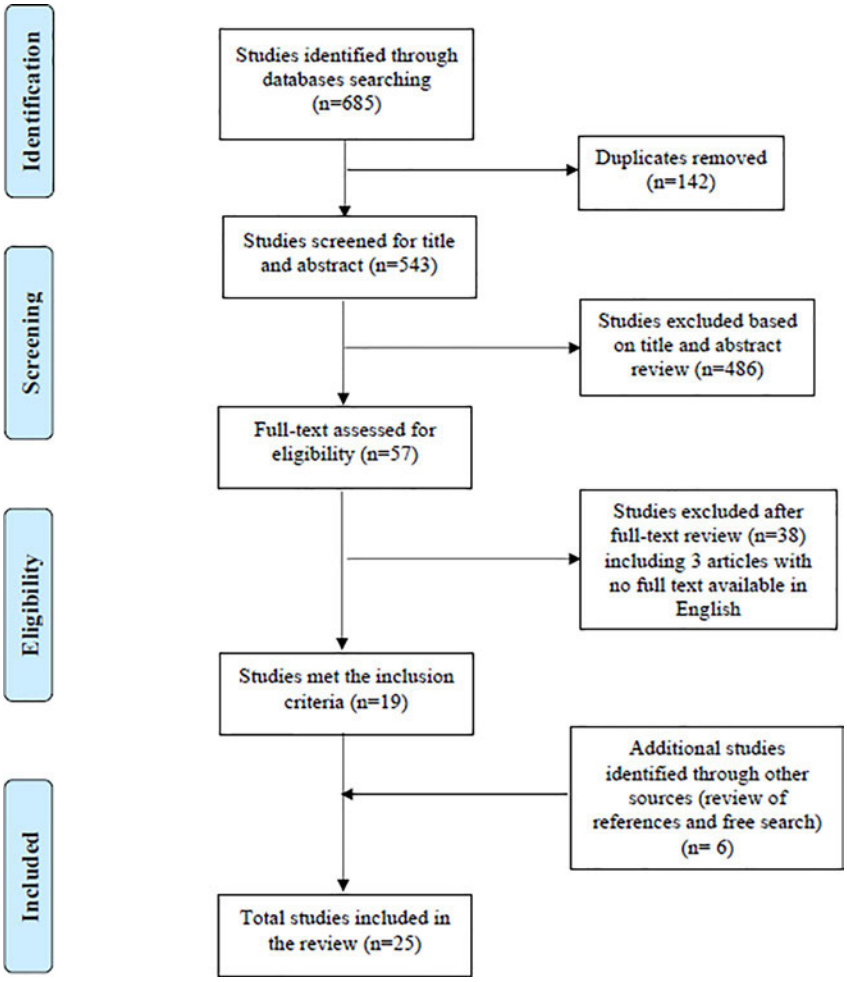

Fig 1. Study selection process for the review.

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variable(s), data collection tools/scales and data analysis method (Table 1), prevalence and/or mean scores of the scales in left behind and non-left behind groups (Table 2), and factors associated with mental health among the left behind group (Table 3). The other authors (DV RK and MC) verified the extracted data. The variety of tools and instruments used to assess mental health precluded a quantitative meta-analysis.

Quality assessment

The JBI Checklist for Analytical Cross Sectional Studies [65] was adapted to assess quality. Articles were scored *Yes*, *No*, *Unclear* or *Not Applicable* (NA) for the following: (1) criteria for inclusion in the sample clearly defined, (2) study subjects and the setting described in detail, (3) exposure measured in a valid and reliable way, (4) objective, standard criteria used for measurement of the condition, (5) confounding factors identified, (6) strategies to deal with confounding factors stated, (7) outcomes measured in a valid and reliable way, and (8) appropriate statistical analysis used. (See S1 Table)

Results of the review

Study characteristics

Twenty-three studies reported in 25 publications from six different countries were included. The majority were from China (n = 14). Other countries included Thailand (n = 3), Moldova and India (n = 2), and Mexico and Ireland (n = 1). Four studies were longitudinal [26, 30, 35, 53] with the remainder cross sectional with the exception of one qualitative study [64].

The majority of studies (n = 14) used random sampling [18, 22, 33, 38, 41, 43, 45, 46, 50, 53, 55–60, 62] while five did not provide sampling information [12, 26, 28, 30, 48]. One used total sampling [49] and another used snowball sampling [64]. The sample size of quantitative studies ranged from 352 to 28,677, and the qualitative study had 29 participants. The age of subjects ranged from 50 to 100 plus years.

Nine studies [26, 33, 38, 41, 45, 48, 55, 58, 60, 62] reported a response rate above 90% while five [18, 30, 46, 53, 59] had a response rate range of 80–90%. The remaining eight [12, 22, 28, 43, 49, 50, 56, 57, 64] did not report the response rate.

Defining 'left behind' and 'empty nest'

Thirteen articles were related to 'empty nest' [18, 26, 33, 38, 43, 45, 46, 50, 55, 57, 58, 60, 62] while the remaining 12 discussed the 'left behind' [12, 22, 28, 30, 35, 41, 48, 49, 53, 56, 59, 64]. There was uniformity on the use of the term 'empty nest', as elders who living alone, or with a spouse only, were defined as empty nest and those living with family members were considered non-empty nest across all studies. The elderly without children were deemed empty nest if living alone or with a spouse, however one study [43] excluded elderly who were childless. For the studies reporting 'left behind', the inclusion criteria included elderly parents having (adult) children and at least one of the children having migrated—excluding those without any living child. There were some variations in defining the duration of migration. He et al. [41], for example, defined 'left behind elderly' as those with adult children having left for more than 6 months while two studies [22, 53] defined migrant children having left home for more than 3 months. Antman [12] and Downer et al. [35] defined parents as left behind if any of their children were living in the USA. Sekhon and Minhas [49] considered families which had at least one member who had permanently emigrated abroad. A follow up study defined left behind as no children emigrated at baseline but one or more children emigrated at follow up [30]. Xie et al. [48] did not provide clear defining criteria.

Table 1. Summary of the included studies.

SN	Study, year and country	Design	Purpose	Sample and study population	Mental health related variable(s)	Data collection method/tools (cut-offs) Scale reference	Data analysis
1	Gao et al. 2017 [26] China	Longitudinal	*To analyse the relationship between an empty nest and the overall health of the elderly, and explored the mechanisms behind how an empty nest influences the health of the elderly in urban and rural China* (p. 3)	7823, ≥65 years (3297 EN & 4526 non-EN)	Cognitive ability	MMSE (-) [27]	Regression analysis
					Psychological health	Researcher developed scale (-)	
2	Waidler et al. 2017 [28] Moldova	Cross sectional	*To evaluate the wellbeing of elderly individuals 'left behind' by their adult migrant children in Moldova* (p. 607)	1322, ≥60 years (505 LB & 817 Non-LB)	Depression	MHI-38 (≥13) [29]	Regression analysis
3	Mosca and Barrett 2016 [30] Ireland	Longitudinal	*To explore whether older parents of adult children who emigrate experience, in the short term, increases in depressive symptoms and loneliness feelings compared to parents whose children do not migrate.* (p. 687)	2523, ≥50 years (357 LB & 2166 Non-LB)	Depression	CES-D (≥16) [31]	Regression analysis
					Loneliness	UCLA-LS (-) [32]	
4	Guo et al. 2016 [33] China	Cross sectional	*To compare mental health and related influencing factors among the empty-nest and the non-empty-nest elderly.* (p. 210)	488, ≥60 years (268 EN & 220 non-EN)	Abnormal mental symptoms	SCL-90-R (-) [34]	Regression analysis
5	Downer et al. 2016 [35] Mexico	Longitudinal	*To examine if older adults in Mexico who have one or more adult children living in the United States are more or less likely to develop cognitive impairment over an 11-year period compared to older adults who do not have any adult children living in the United States.* (p. 1)	2609, (673 LB & 1936 Non-LB)	Baseline: Cognitive impairment	CCCE [36]	Logistic regression
					Follow up: Cognitive impairment	IQCODE (abbreviated version) [37]	
	Antman 2010 [12] Mexico	Cross sectional	*To explore whether elderly parents of children in the U.S. suffer from worse health outcomes than their counterparts with no children in the U.S.* (p. 205)	6730, ≥60 years (1483 LB & 5247 Non-LB)	Mental health	Self-reported mental health (-)	Regression analysis
6	Chang et al. 2016 [38] China	Cross sectional	*To comprehensively compare the general characteristics, lifestyles, serum parameters, ultrasonic cardiogram parameters, depression, quality of life, and various comorbidities between empty nest and non-empty nest elderly* (p. 2)	3208, ≥60 years (1669 EN living as a couple, 271 EN living alone & 1268 non-EN)	Depression	PHQ-9 (≥5) [39]	Logistic regression
					Psychological dimension of WHOQOL-BREF	WHOQOL-BREF (-) [40]	
7	He et al. 2016 [41] China	Cross sectional	*To investigated the prevalence of depression and the associated factors that influence depression in the left-behind elderly population in a rural area of China* (p. 638)	509 LB, ≥65 years	Depression	GDS-30 (≥11) [42]	Multiple linear regression
8	Böhme et al. 2015 [22] Moldova	Cross sectional	*To investigate the effect of migration on various dimensions of elderly health using unique data from Moldova.* (p. 211)	1566, ≥60 years (925 LB & 614 Non-LB)	Mental health	MHI-5 (-) [29]	Regression analysis
9	Zhai et al. 2015 [43] China	Cross sectional	*To investigate the association of empty nest with depressive symptom in a Chinese elderly population.* (p. 218)	9215, ≥60 years (5289 EN & 3926 Non-EN)	Depression	PHQ-9 (≥5) [39]	Logistic regression
					Cognitive impairment	MMSE (<24) [44]	

(*Continued*)

Table 1. (Continued)

SN	Study, year and country	Design	Purpose	Sample and study population	Mental health related variable(s)	Data collection method/tools (cut-offs) Scale reference	Data analysis
10	Cheng et al. 2015 [45] China	Cross sectional	*To determine the disparities in prevalence and risk factors of loneliness between rural empty nest and non-empty nest older adults*. (p. 356)	730, ≥60 years (381 EN & 349 non-EN)	Loneliness	UCLA-LS (-) [32]	Pearson's correlation, Multivariate linear regression
					Depression	GDS-30 (≥11) [42]	
					Psychological dimension of WHOQOL-BREF	WHOQOL-BREF (-) [40]	
11	Liang and Wu 2014 [46] China	Cross sectional	*To explore the health-related quality of life of empty-nest elderly in rural China* (p. 1)	967 EN, ≥60 years	Anxiety/depression	EQ-5D (-) [47]	Regression analysis
12	Xie et al. 2014 [48] China	Cross sectional	*To investigate the quality of life and the associated factors on left behind elderly in rural China* (p. 364)	434 LB, ≥60 years	Psychological health	WHOQOL-BREF Chinese version (-) [40]	Multiple linear regression
13	Sekhon and Minhas 2014 [49] India	Cross sectional	*To get an insight into the mental health of the elderly people* (p. 31)	620,≥60 years from families which had at least one member permanently emigrated abroad	Depression	Self-reported depression (Yes/No)	Descriptive
14	Wang et al. 2013 [50] China	Cross sectional	*To determine the prevalence and correlates of anxiety disorders among empty-nest older adults in Sichuan Province, China* (p. 298)	352,≥60 years who were not living with any children	Anxiety disorders	SAS (SAS standard score ≥50) [51]	Stepwise multivariable regression
					Depression	GDS-15 (-) [52]	
					Loneliness	UCLA-LS (-) [32]	
					Cognitive impairment	MMSE (<24) [44]	
15	Abas et al. 2013 [53] Thailand	Longitudinal	*To test for prospective associations between (1) out-migration of all children and subsequent depression in parents and (2) having a child move back and an improvement in parents' depression*. (p. 226)	960,≥60 years (all the children migrated 805& at least one child inside district 155)	Depression	EURO-D (>12) [54]	Logistic regression
16	Su et al. 2012 [55] China	Cross sectional	*To compare levels of depression and social support among empty-nest elderly who living in the rural and urban area of Hunan province, China* (p. 564)	809 EN,≥60 years	Depression	GDS-30 (≥11) [42]	Two level linear mixed-effects model
17	Adhikari et al. 2011 [56] Thailand	Cross sectional	*To explore the impact of migration on the health of the elderly left behind and their health care-seeking behavior*. (p. 2)	28677,≥60 years (19275 LB & 9402 Non-LB)	Symptoms of poor mental health	Research developed composite indicator (-)	Logistic regression
18	Sun et al. 2011 [57] China	Cross sectional	*To compare health-related quality of life for elderly men and women in three mutually exclusive living arrangements: living alone, living only with spouse, and non-empty-nesters*. (p. 359)	9711, ≥60 years (-)	Anxiety/Depression	EQ-5D (-) [47]	Logistic regression
19	Xie et al. 2010 [58] China	Cross sectional	*To clarify the prevalence of depression among empty-nest elderly and evaluate the impact of social support, coping style and socio-demographic factors on depression of the empty-nest elderly* (p. 25)	414, ≥60 years (230 EN & 184 non-EN)	Depression	GDS-30 (≥11) [42]	Multiple linear regressions
20	Abas et al. 2009 [59] Thailand	Cross sectional	*To describe correlates of outmigration and to estimate any association between outmigration of children and depression in rural-dwelling older parents*. (p. 54)	1147, ≥60 years (182 all children out, 78 some children out & 187 no children living out)	Depression	EURO-D (-) [54]	Regression analysis

(*Continued*)

Table 1. (Continued)

SN	Study, year and country	Design	Purpose	Sample and study population	Mental health related variable(s)	Data collection method/tools (cut-offs) Scale reference	Data analysis
21	Liu and Guo 2008 [60] China	Cross sectional	*To estimate the life satisfaction and its predictors between the empty-nest and not empty nest elderly*. (p. 823)	590, ≥60 years (275 EN & 315 non-EN)	Depression	GDS-30 (-) [42]	Multiple linear regression
					Life satisfaction	LSI (-) [61]	
	Liu and Guo 2007 [62] China		*To estimate whether loneliness was associated with quality of life and examined the influence of socioeconomic factors in the empty nest elderly*. (p. 1275)		Loneliness	UCLA-LS (-) [32]	
					Mental health	SF-36 (-) [63]	
22	Liu et al. 2007 [18] China	Cross sectional but reported as case-control	*(i) To compare health-care utilization and perceived unmet needs between elderly empty-nesters in rural areas and those in cities to identify if the rural empty-nesters have equitable access to health services. (ii) To compare the factors associated with health-care utilization between the two groups*. (p. 407)	490, ≥60 years (250 EN & 240 non-EN)	Mental health	SF-36 (-) [63]	t-test, chi-square test and principal component analysis
23	Miltiades 2002 [64] India	Qualitative	*To examine the effect an adult child's emigration has on the familial support system available to the parents left behind, and on the parent's psychological well-being*. (p. 33)	29 parents (≥60 years) who had adult children in the United States	Psychological well-being	-	Grouping, coding, comparing and contrasting (context and thematic analysis)

Abbreviations: EN: Empty nest, MMSE: Mini-Mental State Examination, LB: Left behind, MHI: Mental health inventory, CES-D: Center for Epidemiologic Studies Depression Scale, UCLA-LS: University of California Los Angeles Loneliness Scale, SCL-90-R: Symptom Checklist-90-Revised, CCCE: Cross-Cultural Cognitive Examination, IQCODE: Informant Questionnaire on Cognitive Decline in the Elderly, PHQ-9: Patient Health Questionnaire-9 scale, WHOQOL-BREF: World Health Organization Quality of Life Questionnaire abbreviated version, GDS: Geriatric Depression Scale, EQ-5D: European Quality of Life-5 Dimensions, SAS: Self Rating Anxiety Scale, EQ-12: European Quality of Health Scale, EURO-D: European Version of Depression Scale, LSI: Life Satisfaction Index, SF-36: 36-Item Short-Form Health Survey.

'-' indicates not available or not reported.

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Sixteen studies [12, 18, 22, 26, 28, 30, 33, 38, 43, 45, 53, 56–60, 62] had a control group. Two studies [38, 57] separated the left behind group into 'living alone' and 'living with spouse/as couple'. Abas et al. [59] compared the mental health status across three groups: 'all children migrated', 'some children migrated' and 'no children migrated'. The remaining seven publications [41, 46, 48–50, 55, 64] studied the left behind and did not have a comparison group. Sixteen studies [12, 26, 28, 30, 33, 41, 43, 45, 46, 48, 50, 55, 57, 58, 60, 62] were concerned with factors affecting the mental health status of the left behind, while the remaining eight only assessed the relationship between the children's migration and the mental health status of parents.

Measures of mental health

A range of measures were used to assess mental health status with many using multiple measures. Depression was assessed in 13 studies [28, 30, 38, 41, 43, 45, 49, 53, 55, 58–60] and three studies assessed loneliness [30, 45, 62]. Other measures of mental health included anxiety [50], cognitive function [43, 50], life satisfaction [60] and social isolation [62]. Some used broader

Table 2. Prevalence and mean scores of mental health measures.

SN	Study	Age (years)		Aspects of mental health	Scale/instrument (Cut off)	Left behind parents		Non-left behind parents		Significance
		Inclusion criteria	Mean±SD			N	Prevalence % or Mean score±SD or Both	N	Prevalence % or Mean score ±SD or Both	
1	Gao et al. [26][1] China	≥65	LB : 79.6 & Non-LB : 84.9	Cognitive ability	MMSE (-)	3297	18.9±5.5	4526	14.8±14.9	***(p<0.001)
				Psychological health	Researcher developed scale (-)		17.7±10.4		14.6±13.9	***(p<0.001)
2	Waidler et al. [28] Moldova	≥60	_	Depression	MHI-38 (≥13)	505	28.7%	817	29.0%	NS
3	Mosca and Barrett [30] Ireland	≥50	LB: 60.3 ±5.1 & Non-LB: 62.9±6.4	Depression	CES-D (≥16)	357	4.7±6.0	2166	6.1±7.8	***
				Loneliness	UCLA-LS (-)		1.5±1.9		1.8±2.1	**_
4	Guo et al. [33] China	≥60	69.9±7.6	Abnormal mental symptoms	SCL-90-R	268	11.9%	220	11.8%	_
5	Downer et al. [35] Mexico	≥60	LB: 66.2 ±5.3 & Non-LB: 66.6±5.5	Cognitive impairment	IQCODE	673	15.3%	1936	16.3%	NS(p = 0.54)
	Antman [12] Mexico	_	LB: 62.9 ±8.9 & Non-LB: 61.3±9.4	Poor mental health	Researcher developed measure (-)	1483	0.6±0.4	5247	0.5±0.7	***(p<0.001)
6	Chang et al. [38] China	≥60	67.0±5.8	Depression	PHQ-9 (≥5)	271 living alone & 1669 living as a couple	26.9% (3.6±4.5) & 24.7% (3.1±3.8)	1268	26.9% (3.3 ±3.9)	NS
				Psychological health	WHOQOL-BREF		14.4±2.3 & 14.4 ±2.5		14.4±2.5	
7	He et al. [41] China	≥65	_	Depression	GDS-30 (≥11)	509	36.9%			
8	Böhme et al. [22] Moldova	≥60	69.3	Mental health	MHI-5 (-)	614	18.5	925	18.6	NS
9	Zhai et al. [43] China	≥60	Median: 68.0	Depression	PHQ-9 (≥5)	5289	11.6%	3926	8.6%	***(p<0.001)
				Cognitive impairment	MMSE (<24)	5452	15.7%	3926	13.2%	**(p = 0.001)
10	Cheng et al. [45] China	≥60	LB: 69.1 & Non-LB: 68.1	Depression	GDS-30 (≥11)	381	28.6% (7.7±6.4)	349	24.1% (6.8 ±5.9)	*(p = 0.043)
				Loneliness	UCLA-LS (-)		41.5±7.0		39.5±7.4	***(p<0.001)
				Psychological health	WHOQOL-BREF (-)		13.5±1.9		13.8±1.9	*(p = 0.011)
11	Liang and Wu [46] China	≥60	78.3±9.6	Anxiety/ depression	EQ-5D	958	82.0%			
12	Xie et al. [48] China	≥60	_	Psychological domain of quality of life	WHOQOL-BREF (-)	434	39.6±13.7	Population	61.6±13.7	***(p<0.001)
13	Sekhon and Minhas [49] India	≥60	_	Depression	Self-reported depression	620	98.0%			

(*Continued*)

Table 2. (Continued)

SN	Study	Age (years)		Aspects of mental health	Scale/instrument (Cut off)	Left behind parents		Non-left behind parents		Significance
		Inclusion criteria	Mean±SD			N	Prevalence % or Mean score±SD or Both	N	Prevalence % or Mean score ±SD or Both	
14	Wang et al. [50] China	≥60	69.1±7.1	Anxiety	SAS (SAS standard score ≥50)	352	30.1% (44.5 ±11.0)			
				Depression	GDS-SF (-)		3.7±3.1			
				Loneliness	UCLA-LS (-)		35.6±9.9			
				Cognitive impairment	MMSE (<24)		22.1±6.8			
15	Abas et al. [53] Thailand	≥60	69.0±6.7	Depression	EURO-D (>12)	All the children migrated:155	16.0%	At least one child inside district: 805	27.0%	**(p = 0.001)
16	Su et al. [55] China	≥60	70.1±7.9	Depression	GDS-30 (≥11)	809	73.3% (14.0±5.9)			
17	Adhikari et al. [56] Thailand	≥60	_	Symptoms of poor mental health	Researcher developed measure (-)	19275	58.9%	9402	56.0%	_
18	Sun et al. [57] China	≥60	_	Anxiety/ Depression	EQ-5D	-	-	-	-	
19	Xie et al. [58] China	≥60	70.2±7.9	Depression	GDS-30 (≥11)	231	79.7%	184	67.9%	**(p = 0.003)
20	Abas et al. [59] Thailand	≥60	69.8±7.1	Depression	EURO-D (-)	All children migrated: 182	2.9	No children migrated: 187	3.7	**(p = 0.001)
						Some children migrated: 778	4.0			
21	Liu and Guo [60] China	≥60	EN: 69.8 ±6.7 & Non-EN: 69.9±8.7	Depression	GDS-30 (-)	275	8.8±6.5	315	7.7 ±6.1	*(p = 0.028)
				Loneliness	UCLA-LS (-)		35.9±9.4		34.1 ± 9.3	* (p = 0.017)
				Life satisfaction	LSI (-)		18.1±6.1		19.5 ±5.2	**(p = 0.003)
	Liu and Guo [62] China			Mental health subscale	SF-36 (-)		69.1±18.3		72.8±15.1	*(p = 0.010)
22	Liu et al. [18] China	≥60	EN: 69.5 ±6.1 & Non-EN: 70.3±9.7	Mental health subscale	SF-36 (-)	250	68.6±17.7	240	77.4±20.3	** (p<0.01)
23	Miltiades [64] India	≥50	NA	Not clear		29	Emigration places a heavy psychological burden on the parents.			

[1]The study reported the scores after logarithmic transformation. We report the raw scores.

*p<0.05.

**p<0.01.

***p<0.001.

–not available/not reported.

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measures such as symptoms of poor mental health [56], self-reported mental health [12, 30], psychological well-being [64], psychological health [26, 48] and measures of mental health status [18, 22, 33].

Twenty studies used standard instruments for measuring different aspects of mental health. Depression was measured by the Center for Epidemiologic Studies Depression Scale (CES-D)

Table 3. Factors related to mental health among 'left behind' older people.

SN	Studies	Association (LB/EN and mental health)			Factors related to mental health among the left behind older people								
		Mental health aspects measured	Effect measure (95% CI)	P value	Left behind/ Empty nest	Sex	Age	Marital status/ residence type	Place of residence	Education	Income	Physical health	Other
1	Gao et al. [26] China	Cognitive ability (MMSE score)	β: (Urban) -3.585 (-)	<0.001	↓	Male↑	↓	Married↑	–	–	–	–	Exercise↑
		Cognitive ability (MMSE score)	β (Rural): -2.438 (-)	<0.001									
		Psychological health	β: (Urban) -3.751 (-)	<0.001									
		Psychological health	β (Rural): -2.595 (-)	<0.001									
2	Waidler et al. [28] Moldova	Depression (MHI-38) (Not depressed)	β: 0.31 (-)	NS	=	–	–	–	–	–	–	–	–
3	Mosca and Barrett [30] Ireland	Depression (CES-D)	β: 0.0575 (-)	< 0.05	↓	–	–	–	–	–	–	–	–
4	Guo et al. [33] China	Abnormal mental symptoms	Δp = 0.001[1]	-	= [1]	Male↑	↓	=	Urban = Rural	=	↑	Chronic disease↓	–
5	Downer et al. [35] Mexico	Cognitive impairment	OR: 0.86 (0.61–1.21)	NS	=	–	–	–	–	–	–	–	–
		Depression	OR: 1.96 (1.24–3.04)	<0.05	↓								
	Antman [12] Mexico	Poor mental health	β: 0.082	0.041	↓	Male↑	–	–	–	↑	–	–	–
6	Chang et al. [38] China	Depression	OR: 0.94 (0.79–1.11)^ and 1.03 (0.76–1.40)[+]	NS	=	–	–	–	–	–	–	–	–
7	He et al. [41] China	Depression	-	-	-	Male↑[1]	↓[1]	Living with spouse↑[1]	–	↑[1]	Financial support↑[1]	Two or more chronic disease↓[1]	Physical activity↑[1], frequency of children's visit↑[1]
8	Böhme et al. [22] Moldova	MHI-5	β: −0.07	NS	=	–	–	–	–	–	–	–	–
9	Zhai et al. [43] China	Depression	OR: 1.22 (1.05–1.43)	0.012	↓	–	–	–	–	–	–	–	–
10	Cheng et al. [45] China	Loneliness	$\Delta\bar{x}$ = 2.06	<0.001[1]	↓	=	↑	Married↑[1]	–	↑[1]	Income↑[1], Farmers↓[1]	Any chronic disease = [1]	Family support↑, Social interaction↑, General quality of life↑, Poor sleep quality↓[1], Smoking = , Drinking =

(*Continued*)

Table 3. (Continued)

SN	Studies	Association (LB/EN and mental health)			Factors related to mental health among the left behind older people								
		Mental health aspects measured	Effect measure (95% CI)	P value	Left behind/ Empty nest	Sex	Age	Marital status/ residence type	Place of residence	Education	Income	Physical health	Other
11	Liang and Wu [46] China	Anxiety/Depression (EQ-5D)	-	-	-	=	↑	Widowed = non widowed	_	↑	_	_	_
12	Xie et al. [48] China	Psychological health (WHOQoL-BREF)	-	-	-	Male↓[1]	_	Living with spouse↑[1]	_	_	_	_	Frequency of children's visit↑[1]
13	Sekhon and Minhas [49] India	Depression	-	-	-	_	_	_	_	_	_	_	_
14	Wang et al. [50] China	Anxiety (SAS)	-	-	-	Male↑[1]	= [1]	Living with spouse↑	Urban↑	↑[1]	Income↑[1], Skilled worker↑[1]	_	
15	Abas et al. [53] Thailand	Depression (EURO-D)	OR: 0.46 (0.210–0.985)	0.046	↑	_	_	_	_	_	_	_	_
16	Su et al. [55] China	Depression (GDS-30)	-	-	-	_	_	_	Urban↑[1]	_	Self-perceived income↑	Body disease↓	Physical activity↑
17	Adhikari et al. [56] Thailand	Symptoms of poor mental health	OR: 1.10 (1.05–1.17)	<0.001	↓	_	_	_	_	_	_	_	_
18	Sun et al. [57] China	Anxiety/Depression (EQ-5D)	OR: 1.10 (0.94–1.30)^ and 1.73 (1.41–2.13)[+]	NS in case of ^ and <0.01 in case of [+]	↓	_	_	_	_	_	_	_	_
19	Xie et al. [58] China	Depression (GDS)	Δp = 0.118	0.003[1]	↓	__	__	Married↑	__	__	Self-perceived income↑	__	Social support↑, religious belief↓, positive coping↑
20	Abas et al. [59] Thailand	Depression (EURO-D)	β: 0.91 (0.26–1.57)[2] and 1.05 (0.35–1.75)[3]	0.013	↑	_	_	_	_	_	_	_	_
21	Liu and Guo [60] China	Life satisfaction (LSI-Z)	β: -0.606	<0.001	↓	_	↓[1]	Married↑	_	↓	↑	Any chronic disease↓	Social support↑, Relationship with children (good)↑
	Liu and Guo [62] China	Loneliness	$\Delta\bar{x}$ = 1.85	0.017[1]									
22	Liu et al. [18] China	Mental health	$\Delta\bar{x}$ = -8.74	<0.01	↓	_	_	_	_	_	_	_	_

(*Continued*)

Table 3. (Continued)

SN	Studies	Association (LB/EN and mental health)			Factors related to mental health among the left behind older people								
		Mental health aspects measured	Effect measure (95% CI)	P value	Left behind/ Empty nest	Sex	Age	Marital status/ residence type	Place of residence	Education	Income	Physical health	Other
23	Miltiades [64] India	-	-	-	-	–	–	–	–	–	–	–	–

β: Regression coefficient

OR: Odds Ratio

↑ increase factor is associated with improved mental health (positive association with positive aspect of mental health)

↓ increase factor is associated with decreased mental health (negative association with positive aspect of mental health)

= no difference (no significant association)

–refers to 'not given'

^ Living as a couple

+ Living alone

$\Delta\bar{x}$ mean difference

Δp proportion difference

[1]Bivariate association

[2]some children migrated vs. all children migrated

[3]no children migrated vs. all children migrated.

Note: Only variables predicting significant association in multivariate analysis are included in the table, otherwise indicated.

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[30], Geriatric Depression Scale (GDS) [41, 45, 50, 55, 58, 60, 62], European Quality of Life-5 Dimensions (EQ-5D) [46, 57] and the European Version of Depression Scale (EURO-D) [53, 59]. Cognitive function of the elderly was assessed using the Mini-Mental State Examination (MMSE) [26, 43], Cross-Cultural Cognitive Examination (CCCE) and the Informant Questionnaire on Cognitive Decline in the Elderly (IQCODE) [35]. Instruments used to measure mental health included the Mental Health Inventory (MHI) [22, 28], University of California Los Angeles Loneliness Scale (UCLA-LS) [30, 45, 60, 62], Symptom Checklist-90-Revised (SCL-90-R) [33], Patient Health Questionnaire-9 scale (PHQ-9) [38, 43], Self-Rating Anxiety Scale (SAS) [50], Short Form Health Survey (SF) [18, 62] and the Life Satisfaction Index (LSI) [60, 62]. Three studies [38, 45, 48] used the World Health Organization Quality of Life Questionnaire abbreviated version (WHO-BREF).

Mental health of the 'left behind' parents

Depression. Thirteen studies reported depression among the left behind elderly parents. All studies used validated scales to measure depression, except Sekhon and Minhas [49] who asked *'Do you feel depressed that your family member has gone abroad and is no longer staying with you?'* with 98% of participants responding *'Yes'*. Among the studies that used validated scales, an equal number (n = 4) reported both prevalence and mean scores, prevalence only and mean scores only. Studies using cut-off scores (n = 8) reported the prevalence of depression among the left behind elderly ranging from 11.6% to 79.7%. Large variations in the mean score of depression were observed (Table 2).

Variation in scales resulted in large heterogeneity in depression prevalence as well as mean scores. Among the seven different scales, the Geriatric Depression Scale-Long Form (GDS-30) [42] was the most commonly used. The GDS-30 consists of 30 items with a score ranging from 0 to 30, higher scores represent increased depression. GDS scores of 11 and above suggest depressive symptoms. The studies using GDS-30 reported the proportion of left behind elderly having depressive symptoms ranging from 36.9% to 79.7% and mean GDS score from 7.7 and 14.0. Wang et al. [50] used GDS-Short form [52] comprising 15 items with a score range from 0 to 15 and reported a mean score of 3.7.

Two studies applied EURO-D, a 12-item depression screening scale with a cut-off of 6 [54]. Abas et al. [53] used a cut-off core of 12 and reported a prevalence of 16% among the elderly with all children migrated. Abas et al. [59] reported mean scores of 2.9 for the elderly with all children migrated and 4.0 for some children migrated. Two studies used the Patient Health Questionnaire (PHQ-9) with 9 items, with a scoring range of 0 to 27 [39]. Zhai et al. [43] used a cut-off of 5 and found a depression prevalence of 11.6%. Chang et al. [38] used two different cut-offs (5 and 10), resulting in the reported prevalence of depression of 26.9% and 8.1% for elderly living alone and 24.7% and 5.9% for elderly living as couple. A study using the Mental Health Inventory (MHI-38) [29] reported a mean score of 71.3 [28]. Similarly, a study using SCL-90-R [34] reported depression among 13.1% of the left behind elderly with a mean depression score of 1.5 [33].

Mosca and Barrett [30] used the 20-item Center for Epidemiologic Studies Depression Scale (CES-D) [31] to measure depressive symptoms in the week prior to the interview. Each of the 20 items was scored on a four-point scale leading to a total score of 60, with higher scores indicating higher depressive symptoms, with a mean depression score of 4.7.

Two studies used the EQ-5D scale developed by The EuroQol Group [47] to measure health-related quality of life among the empty nest elderly in rural China. Liang and Wu [46] reported an anxiety/depression prevalence of 82% using EQ-5D while Sun et al. [57] reported the depression prevalence only for sex and age sub groups.

Anxiety. Wang et al. [50] determined the prevalence of anxiety disorders using the Self-Rating Anxiety Scale (SAS) [51]. The SAS is a 20-item scale with scores ranging from 20 to 80, with higher scores representing higher anxiety. A cut-off of 50 was used for a SAS standardized score = 1.5 x SAS sum score. The mean standardized score of 44.5 indicated relatively low anxiety, while the prevalence of anxiety disorders was 30.1%. The mean SAS standardized scores were higher in females (46.7) compared to males (42.5); elderly living alone (46.3) compared to living with spouse (43.9); rural inhabitants (48.9) compared to urban (39.7); and unmarried/single/divorced or widowed (48.1) compared to married (43.8). In addition, the study also reported the association of anxiety with education level, occupation and monthly income of the elderly.

Cognitive impairment. Cognitive function of the left behind elderly was assessed using the Mini Mental State Examination (MMSE), a 30-item test to assess orientation, attention, calculation, language, and recall [44]. The MMSE yields a score of 0–30 (cut-off of 24) with higher scores indicating better functioning. Zhai et al. [43] found 15.7% of the elderly with cognitive impairment while Wang et al. [50] reported a mean MMSE score of 22.1 (SD = 6.8). The Chinese version of the MMSE [27] with 25 items (score 0 to 25) was used by Gao et al. [26] reporting a mean score of 18.9 (SD = 5.5).

Loneliness. Loneliness was assessed using the University of California, Los Angeles Loneliness Scale (UCLA-LS) [32] which consists of 20 questions, using a four-point scale, with a total score range of 20 to 80 with higher scores indicating increased loneliness. The mean UCLA-LS scores reported were 35.7 (SD = 9.9) [50], 41.5 (SD = 7.0) [45] and 35.9 (SD = 9.4) [62]. UCLA scores of 20–34, 35–49, 50–64 and 65–80 are considered to be mild, moderate, moderate–severe, and severe loneliness, respectively [66]. Cheng et al. [45] reported the prevalence of mild, moderate, moderate–severe and severe loneliness as 14.4%, 75.8%, 9.9%, and 0% respectively. Similarly, Liu and Guo [62] found 45.5% experiencing mild loneliness, 43.6% moderate, and 10.9% moderate–severe loneliness and no severe loneliness. Mosca and Barrett [30] included only five items of ULCA-LS and reported a mean score of 1.5 (in a range of 0 to 10).

Other general measures of mental health. The World Health Organization Quality of Life Questionnaire abbreviated version (WHOQOL-BREF) [40] consists of 26 items containing two objective items (overall QOL and general health status) and 24 other items divided into four domains: physiological (seven items), psychological (six items), social relationships (three items) and environment (eight items). Each item is scored from 1 to 5 and domain scores range from 4 to 20 points (mean score for all items × 4) with a higher score representing better quality of life. In this review, only scores for the psychological domain are relevant. Cheng et al. [45] report a mean score of 13.5 (SD = 1.9), and Xie et al. [48] converted the score into a centesimal grade [(original score– 4) × (100/16)] and reported the mean score of 39.6 (SD = 13.8). The equivalent centesimal score for the Cheng et al. [45] is 59.1.

Böhme et al. [22] assessed the psychological well-being of elderly parents with at least one biological child staying abroad for at least three months during the year prior to the survey. The study used MHI-5, a five question scale based on Mental Health Inventory developed by Veit and Ware [29] ranging from 5 (very poor) to 30 (very good). The mean score of psychological well-being reported by Böhme et al. [22] was 18.5.

The 36-Item Short-Form Health Survey (SF-36) [63] was used to assess general health with Mental Component Summary (MCS) scores ranging from 0 to 100, where higher scores indicate better mental health. Studies reported mean scores of 69.1 (SD = 18.3) [62] and 68.6 (SD = 17.7) [18].

Antman [12] created the 'Poor Mental Health' variable, equal to 1 if the respondent reported feeling depressed, lonely, or sad for the week prior to the survey otherwise 0. The mean score of 'Poor Mental Health' was 0.6 (SD = 0.01) among the left behind parents.

Adhikari et al. [56] using their own instrument reported 58.9% of the left behind elderly having symptoms of poor mental health.

Children's migration status and mental health of left behind parents

Among the studies that compared prevalence or mean scores between the left behind and non-left behind elderly parents (n = 15), ten reported statistically significant differences while three were non-significant. Two studies [33, 56] did not provide details on significance. Nine studies found the mental health status of the left behind elderly to be poorer than that of the elderly parents living with their children with statistically significant differences in six studies. More specifically, these studies showed that left behind parents had higher depressive symptoms [43, 45, 58, 60], higher levels of loneliness [45, 60], lower life satisfaction [60], lower cognitive ability [43] and poorer psychological health [12, 18, 33, 45, 56, 62].

Three studies found statistically significant differences showing better mental health among the left behind, with one further study showing a non-significant difference. Gao et al. [26] reported higher cognitive ability and improved psychological health scores among the left behind, however confounding by age may account for this result. Decreased prevalence of depression among the left behind parents was reported [28, 30, 53]. Two studies classified left behind into two groups, among which Chang et al. [38] found a lower proportion of depression among the elderly living with a spouse. Similarly, Abas et al. [53] reported the highest mean depression scores among the elderly with 'some children living outside', followed by 'no children living outside' and 'all children living outside' (Table 3). Guo et al. [33] stated that the mental health status of the left behind parents was better than that of the non-left behind but reported similar results for both groups.

Sixteen studies analysed the association between the left behind and the mental health of elderly, of which 12 studies conducted multivariate analysis and the remaining four studies reported only bivariate association. For multivariate analyses, seven studies [12, 26, 30, 43, 56, 57, 60] showed that parents whose children had migrated were at greater risk of mental health problems than those with non-migrant children (Table 3). For instance, Gao et al. [26] found a negative association of empty nest with cognitive ability and psychological health in both urban and rural elders. Depressive symptoms were found to be higher among the parents of migrant children [30, 43]. Sun et al. [57] reported that the risk of anxiety/depression was higher among the elderly living alone, while the risk was not statistically significant among the elderly living with spouse. In contrast, Abas et al. [59], while comparing the depression of parents without migration of adult children, found that having all or some children migrated had lower levels of depression. Having all children out-migrated reduced depression compared to none or some children out-migrated [53]. Three studies [22, 28, 38] found no association between migration of adult children and the mental health of the elderly.

Among the studies reporting a bivariate association, three [18, 45, 58] reported higher prevalence of mental health problems for left behind parents while the remaining study [33] showed no significant association.

Factors related to mental health status among the left behind parents

Gender. Eight studies examined the relationship between gender and mental health among the left behind elderly. Females had poorer mental health than males in five studies [12, 26, 33, 41, 50] while Xie et al. [48] observed women to be at lower risk. Gender differences were not observed in two studies [45, 46].

Age. Seven studies examined the influence of age on the mental health status of the left behind elderly and reported varied results. Multiple regression analyses showed cognitive

ability and psychological health were negatively associated with age [26, 33]. In addition, Liu and Guo [60] found age was positively related with loneliness in a bivariate analysis. He et al. [41] reported the prevalence of depressive symptoms in the 71–80 years age group (45.2%) to be higher than the 65–70 years (37.4%) and >80 years (6.0%) age groups. Conversely, higher rates of loneliness [45] and anxiety/depression [46] were reported among the younger elders. No significant change in anxiety with increasing age was reported in a study conducted by Wang et al. [50].

Marital status/Type of residence. Marital status using marital status groups including currently married, never married, divorced, separated and widowed, was a frequently mentioned factor influencing mental health. Being (currently) married was associated with better mental health among the left behind elderly [26, 58, 62]. Similarly, living with a spouse decreased the risk of anxiety [50], depression [41], loneliness [45] and psychological ill health [48]. Two studies [33, 46] found no difference in mental health with respect to marital status.

Education. Seven studies assessed the relationship between education level and mental health with inconsistent results. Four [12, 41, 46, 50] indicated that left behind parents with higher educational level were less likely to develop mental health problems. Cheng et al. [45] reported a lower mean loneliness score among elderly with secondary education. However, Liu and Guo [62] found a higher level of education had a higher level of loneliness for left behind with higher levels of education. Guo et al. [33] reported no difference in mental health symptoms across different education groups.

Economic status. Seven studies addressed the association between economic status (measured mostly in terms of monthly or yearly income and self-perceived income) and mental health of the left behind elderly with all observing higher income related with lower levels of mental health disorders. The results of bivariate analyses showed that elderly in the lower income groups reported higher scores of anxiety [50]. In addition, low income was associated with higher levels of loneliness [45, 62], lower life satisfaction [60], and poorer mental health symptoms [33]. Similarly, low levels of self-perceived income was identified as a significant predictor of depression [55, 58]. Furthermore, He et al. [41] found a lower prevalence of depression among the elderly who had higher levels of financial support. Two studies used occupation as an economic indicator. Cheng et al. [45] reported a higher loneliness mean score among farmers compared to other occupations; however, the association was not significant under multiple regression. Similarly, skilled workers had the lowest mean anxiety score with the highest among farmers [50].

Place of residence. Three studies assessed the association between place of residence (urban or rural) and mental health with two reporting improvements for those in urban areas. Wang et al. [50] found higher anxiety scores among rural left behind elderly parents, and Su et al. [55] reported a lower prevalence of depression in urban residents. However, one study [33] showed no significant difference in mental health symptoms by place of residence.

Disease condition. Chronic disease(s) was associated with poor mental health conditions [33], depression [41] and lower levels of life satisfaction [60]. Su et al. [55] identified physical illness as a significant risk factor for depression, while Cheng et al. [45] found no association between chronic disease and loneliness.

Social support. Four studies measured social support using the Social Support Rate Scale (SSRS) [67] comprising three dimensions: objective support, subjective support and support utilization. Cheng et al. [45] reported significantly lower social support for left behind parents and found 'objective support' was a strong negative predictor of loneliness. Xie et al. [58] found all three dimensions of SSRS were negatively correlated with depression, but in the multivariate regression, only the dimension of 'support utilization' was significant. Social support was negatively associated with life satisfaction [60] and positively associated with loneliness

[62]. Cheng et al. [45] also found that the social support from family as measured by Perceived Social Support from Family Scale (PSS-Fa) [68] and social interaction (as measured by WHO-QOL-BREF) were negatively associated with loneliness.

Other reported factors. Higher levels of exercise and physical activity were found to improve cognitive function and psychological health [26], and reduce depression [41, 55] among left behind elderly parents. Increased frequency of the children's visits was positively associated with mental health. Left behind parents whose children visited more often had lower depression [41] and better psychological health [48]. Xie et al. [58] identified religious belief as a risk factor for depression. Better relationships with children was also associated with higher levels of life satisfaction [60].

Discussion

The association between left behind status and mental health

The primary objective of this review was to identify the association between migration of adult children and the mental health of elderly parents left behind. The study designs were mostly cross sectional. While this study design limits causal inference, the quality assessment based on the JBI checklist for cross sectional analytical studies found most to be of high methodological quality allowing for adequate assessment of associations. The results were relatively consistent, where being left behind was negatively associated with mental health in 10 of the 16 studies with only 2 finding a positive association. The qualitative study [64] also found parents with adult children migrated experienced higher level of loneliness and depression.

Those left behind experienced higher levels of depression, loneliness, cognitive impairment, anxiety and had lower scores on psychological health compared to older parents with no migrant children. In a meta-analysis of studies concerning quality of life of the empty nest elderly by Lv et al. [69] found that mental health among the empty nest elderly was poorer than non-empty nesters.

In developed countries with higher standards of living and systems for social protection in older adults, independent living is often preferred [70]. In developing countries without social security and other welfare supports for older adults, intergenerational extended family is crucial for elderly health and well-being [71]. In South East Asian cultures, residing with adult children demonstrates 'filial piety' [72, 73]. The majority of studies included in this review were conducted in countries where filial piety is the major guiding principle and a strong intergenerational relationship is important. Older adults had emotional ties and high expectation for their children to provide physical, financial, instrumental and emotional support. Often when they are older, parents want to live with their children so that they can receive daily assistance and support. This may contribute to positive mental health and well-being. Being left behind may make them feel abandoned, and experience emotional ambivalence, anger and distress [74]. Older parents living with their children are reported to receive better daily care and support leading to better health [15].

A number of studies reported positive associations between parent-child co-residence and the mental health of older parents. Older adults who were left behind by migrant children were more susceptible to psychological distress such as depression [75]. Intergenerational co-residence has shown to be protective in many countries in different populations including Korea [76], Japan [77], China [78, 79] and Vietnam [80]. In Spain, Zunzunegui et al. [81] showed elders living with their children had more instrumental and emotional help and improved physical and mental health. Left behind adults in Sri Lanka had a higher prevalence of depression, anxiety and somatoform disorder [82]. Those left behind elderly may also feel a loss of status and fear for their future [83]. Cheng and Chan [84] demonstrated an association

between filial behaviour of children and psychological well-being among Chinese older parents. Living with their son is considered the traditional living arrangement, but those living with their daughters report better psychological health [15, 77]. Unfortunately, no studies in our review reported the sex of the migrant children.

A study in India showed that living in multigenerational households had protective benefits in physical health [85]. Other studies showed older adults with migrant sons were more likely to report lifestyle-related chronic diseases such as hypertension, diabetes and heart disease [86, 87]. For those left behind, research shows increased time spent on agricultural and domestic work [88], especially among older women. Zhou et al. [89] observed lower utilization of healthcare services among the empty nest elderly. Liu et al. [18] emphasized that despite having ill health, empty nesters were more likely to report being unable to obtain the health care needed. Inadequate access to health care is likely to adversely affect mental health, given the relationship between physical and mental health disorders [90]. However, co-residence is not always influenced by parents needs. A study in China [91] emphasized parental support strongly influencing children to live with their parents.

Two of the 16 studies in this review (both from Thailand) [53, 59] showed improved mental health for those left behind, whilst four reported null findings. Children, who are leaving, are more likely to feel that their parents have an alternative means of support with most families having more than one child who can provide emotional, physical and financial support. A study by Stohr [92] showed that children in Moldova made strategic migration decisions to ensure some children stayed behind to care for their parents. Other children increase their contribution to compensate for their migrant siblings [93], and hence the effects of high rates of out-migration may be mitigated by this support [94].

Older parents with only some of their children migrated may not experience all the negative consequences compared to those with all their children migrated. These circumstances allow financial support from the migrant child and local support from the child(ren) at home which may have positive outcomes for their mental health and well-being. In addition, technological developments, especially in communication, have enabled continuous communication between the left behind parents and migrant children, potentially decreasing the negative impact of adult child migration [95, 96]. According to White and Edwards [21] empty nest status improved marital happiness; termed the 'post-launch honeymoon'. The departure of the last child from the household can have a positive impact for parents [20]. The impact of left behind on the mental health of the elderly also depends on the socio-cultural context of the families. Mitchell and Lovegreen [97] reported higher levels of empty nest syndrome among the Indo/East Indian parents compared to British parents. Indian parents found more difficulties due to their expectations that sons stay with the parents and daughters remain until marriage. Gao et al. [26] found that that "living resources" and "availability of medical treatment" have an important mediating role in urban areas while engagement in "social activities" showed significant mediators among the rural sample.

Risk factors of mental health disorders among the left behind elderly

This review also examined risk factors of mental health disorders among the left behind elderly. Fourteen factors were identified with different levels of influence, of which nine factors were associated with mental health disorders across the studies. The risk factors identified among the left behind elderly in this study are common to the elderly more generally. As there is a higher prevalence of mental health disorders for this cohort, consideration should be given to those most at risk.

Currently married older people had better mental health consistent with other studies showing widowhood negatively associated with subjective well-being [98] and mental health

[99]. Living with a spouse was beneficial in reducing loneliness [100, 101] and Turner and Brown [102] noted co-residence with a spouse to be an important source of social support decreasing the risk of depression. For Buber and Engelhardt [14] the presence of a spouse or partner was more important than living with, or having regular contact with, their children. Paúl and Ribeiro [103] supported this observation as non-married status and/or widowhood lacked the support provided by a partner and sharing of intimate feelings that may result in loneliness. Empty nest couples have to rely on each other with spouses often providing essential daily care and emotional support [104].

Females may be at higher risk for mental health disorders consistent with other studies reporting older women at greater risk of loneliness [100] and depression [105]. Mothers often have a different bond with their child due to the time and effort they invest in raising their children. In contrast, males are more often engaged in social activities [13] reducing their loneliness whereas women whose main role is domestic, may be limited from establishing and maintaining non-family contacts [106].

The left behind elderly with lower education may be at greater risk of mental illness. This review supports the finding that educated empty nesters had greater subjective well-being [98] and cognitive function [107]. Lower education is associated with greater risk of depression [108, 109], dementia [110] and loneliness [100]. In general, educated older people are more likely to access health services [111] and seek new social contacts, thereby improving mental health.

Higher income was associated with better mental health consistent with research reporting higher levels of income associated with lower depressive symptoms [108, 112], improved quality of life [113] and decreased loneliness [100]. Lund et al. [114] reported a strong correlation between poverty and common mental health disorders. Higher income elderly are more financially independent and hence can pay expenses, and afford social activities, which may contribute to improved mental health and well-being [115]. Financial constraints may negatively affect self-esteem and self-efficacy, reducing social contacts.

Four out of five studies identified physical health as a risk factor for mental health problems with the other study reporting no association. Huang et al. [116] similarly found that chronic conditions such as stroke, cardiac/lung disease and loss of hearing/vision were risk factors for depression among older people. Other evidence [108, 109] shows that chronic disease is associated with poor psychological health consistent with our review results.

Physical exercise is noted to be beneficial for the elderly, with several studies finding significant psychological and cognitive benefits from regular physical activity [117–119]. A systematic review and meta-analysis of randomized control trials showed that exercise was associated with significantly lower depression in older people [120]. Exercise training was found to increase fitness, physical function, cognitive function, and positive behaviour in people with cognitive impairments [121].

Family and social support is a predictor of better mental health among the left behind elderly. Studies demonstrate the preventive effect of family and social support on depression [122], cognitive impairment [107] and loneliness [123]. Ryan and Willits [124] observed that the quality of relationships with spouse, children, and other family members was associated with feelings of well-being, rather than the quantity of relationships with the presence of family members not necessarily ensuring social support. The absence of positive relations with children is related to depression [125] as social support provides a buffering role [99]. Social support has direct as well as mediating effects among the elderly with mental health status and personality influencing the availability and perception of social support [102]. Intergenerational social support networks are important predictors of old-age health and survival in developing countries [126, 127]. Older adults who participate in socially engaging activities and

have social support networks are less likely to become cognitively impaired than non-engaged older adults [128].

Four out of seven studies identified older age as a predisposing risk factor for mental health problems. Previous studies have shown that social activities decrease with age, which is a risk factor for depression [129]. Higher levels of loneliness [100] and depression [116] were reported with increased age among older adults as they reduced opportunities for social contact due to physical limitations and loss of close friends and family members [106].

Three studies compared the mental health of rural and urban elderly left behind with two finding those living in urban areas at lower risk while the remaining study found no difference. Rural people often have closer neighbourhood relationships than urban people, which may help to improve psychological well-being [130]. However, our findings favour urban inhabitants. This could be due in part to farming being important in the daily life of rural elders, with the out-migration of adult children directly affecting older parents' workloads.

Of the 16 studies that examined the associations between migration of adult children and psychological well-being of the left behind elderly, only four employed longitudinal design. Three of the four longitudinal studies reported increased risk of psychological ill health among the parents with migrant children. The cross sectional design of the majority of studies limits the ability to determine cause and effect relationships [131] hence the association between the adult child's migration and the mental health outcomes of older parents, conceivably due to reverse causality. The decision to migrate may be influenced by the health status of elderly parents. Children may be more likely to migrate if the older parents are in good health and they have strong family and social support networks. Conversely, adult children with elderly parents with poor health may migrate to pursue higher earnings to help pay for medical expenses. Migrants and their families may have better education, higher access to socioeconomic resources or social capital [132], and these characteristics may contribute to better health outcomes of the elderly parents irrespective of the children's migration [16, 133].

Policy recommendations

The findings of this review have important implications for programs and policies aiming to promote the mental health of older adults. Targeting social security for the elderly left behind could enhance the feeling of security and support, thereby improving metal health and well-being [123]. Given the higher prevalence of physical illnesses and chronic diseases among the left behind elderly and its association with mental disorders, it is recommended to consider this risk group in health service delivery. The health care delivery system in low-income countries is inadequate to meet the mental health needs of older people [134–136] resulting in a range of unmet emotional and physical needs among the older adults left behind.

Programs to extend emotional intimacy between older parents and their migrant children are required, with intergenerational relationships and translational care particularly important in reducing risk of mental illnesses among the older adults. Zechner [137] enlisted the three basic elements of transnational care: distance, resources and circumstances. Attention should be paid to the social policies involved in care-related activities. Maintaining older parents' contact with their migrant children, being visited by children more frequently, and engaging older people in a range of social activities reduces the negative consequences of their children's migration [138]. Migrant children can provide emotional support or may organize the care needs of the older parent(s) with someone who lives close by [137]. Certainly, the availability of social media and communication technologies provides opportunities for more active communication and interaction within the family irrespective of geographical location. Consideration should be given to training community health workers and field workers in identifying

older adults who are at risk, connecting to community resources to those who are at risk and counselling families to better support close family relationships.

Efforts to lower the prevalence of mental health disorders in the left behind elderly should target those at particular risk. Special attention should be given to the elderly who are unmarried or widowed, have lower education, poorer socioeconomic background, older, living in rural areas and with chronic disease.

Finally, physical activity plays an important role to offset the negative influence of an empty nest on health and well-being. A greater focus on the importance of physical activity levels by both professionals and volunteers [139] may promote and support physical activities for the left behind elderly.

Implications for future research

A number of implications for future studies for the mental health of left behind elderly arise from this review. Family support plays a pivotal role in determining the psychological well-being of the older parents. While the migration of the younger generation is unavoidable in many societies, its effect is often to undermine traditional care and support structures for older parents. Hence more research is required to address care and support needs from friends, neighbours and other community based organizations. Such studies should also examine the effects of different types of social support to improve the mental health status among older adults left behind.

The issue of transnational care; care giving across political and geographical spaces, is not well recognized in gerontology [137, 140, 141]. Future studies are required to identify effective transnational care provision. Well-designed studies are also required to identify additional factors related to mental health among the left behind elderly, as this review did not identify the effect of important risk factors such as remittances, frequency and intensity of the communication between parents and migrant children, purpose of migration, migrant receiving place or country, physical environment (e.g. housing) in which elderly were residing, religious belief, functional disability and bereavement or loss of close contacts by the elderly. In particular, information technology and religious attendance are likely to have a positive effect on mental health and increased social relationships among the elderly [142]. Future research could also compare systematic differences in the risk factors of mental health disorders between the left behind and non-left behind older adults.

Longitudinal studies are required to provide clarity on the direction of causality between migration of adult children and mental health of elderly parents left behind. Apart from the longitudinal studies, a matched-control design with parents whose children emigrated with those with children living nearby would help to distinguish the empty nest component from the left behind. Qualitative studies are essential to understand diverse and complex sociocultural contexts. Local surveys and investigations will also inform local service needs.

Study limitations

This review is not without limitations. The definition of 'left behind elderly' varied across the studies and many different definitions of mental health are summarised in this review. Studies were diverse and often did not report prevalence of any aspects of mental health, nor the strength of association for each risk factor. The high level of heterogeneity among the studies precluded meta-analysis.

Results of the multivariate analyses might be convoluted by adjustments for different variables in different studies. Likewise, only the main effects of risk factors on mental health disorders were reviewed and as such, it is not clear whether the concurrent occurrence of multiple risk factors results in a synergistic increase in the risk.

The studies included in this review did not always measure potential risk factors that could have affected the mental health of the left behind elderly and often only provided bivariate analyses, making it difficult to confirm the association between migration of adult children and the mental health of parents left behind under the influence of potential confounders. In addition, risk factors for mental health disorders identified in this review are based on studies reporting risk factors from left behind elderly. Comparison of putative risk factors between left behind and non-left behind groups would be more informative.

The review did not assess publication bias, with negative or non-significant results being less likely to be submitted and accepted for publication [143]. Other limitations of this review include the search was limited to peer-review articles published in English with grey literature excluded. Many studies employed secondary analyses of large samples, which may have produced statistically significant results for effect sizes which are small, limiting the clinical significance of the results. Almost half of the studies included in this review are from China. This may reflect a general lack of research in other low-income countries, which is unfortunate given the potentially higher vulnerability of older people being left behind and psychological disorders [144].

Conclusion

The key finding of this review is that being left behind is negatively associated with the mental health of older adults. Empty nesters were at higher risk of mental health disorders such as loss of cognitive function, depression, anxiety and loneliness. Elderly living with their children may receive better care, economic and emotional supports. The risk factors for mental disorders include marital status, income, education, physical health status, gender, age, family and social support, and physical exercise.

This study synthesises the research related to mental health of the left behind elderly parents, thereby advancing our theoretical and empirical understanding of out-migration of adult children and its implication on psychological well-being of the parents. Authorities and organizations working in the field of gerontology should be aware that the left behind elderly are at increased risk of mental health problems. More responsive preventive measures and effective management approaches are required for this cohort. More rigorous studies are required to identify the additional risk factors of mental health problems using clinically relevant instruments. Additionally, mechanisms of transnational care by the migrant children should be explored to reduce the psychological cost of the phenomena of being 'left behind'.

Supporting information

S1 Table. Quality assessment of included studies.
(DOCX)

S1 Checklist. PRISMA checklist.
(DOC)

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3.3 Conclusion

This integrative review reported the consequences of children's migration for the mental health of left-behind older parents. Migration of children was associated with higher levels of depression, loneliness, anxiety, and lower levels of cognitive ability and life satisfaction. Living arrangements, gender, income, chronic health conditions, social support, and frequency of children's visits were the major risk factors for poor mental health among those left behind. Limitations of the studies included unclear definitions of 'left-behind' and 'empty nest', limited use of standard scales, and not including potential covariates, such as functional ability, bereavement or loss of close contacts, and children's migration-related characteristics. In addition, the studies did not compare mental health between left-behind parents of internally and internationally migrated adult children. This review and the one presented in Chapter 2 both provide important insights which have informed this research study and subsequent chapters. The next chapter details the study's methodology.

Chapter 4 – Research Methods

4.1 Chapter overview

This chapter details the methods used in this study to address the research questions. It presents the research objectives, conceptual framework, and study design. This is followed by an outline of the research process, including the study setting, sampling framework, inclusion and exclusion criteria, assessment measures, ethical considerations, data collection, and data analysis. It repeats some of the content of the methods sections of the published papers presented in Chapters 5, 7, 8 and 9 as this content was required for each individual paper (Appendix 7 contains the license permissions).

4.2 Study aim and objectives

The primary aim of this study was to assess the association of adult children's migration with the mental health and QOL of older parents. Other objectives addressed the prevalence of mental health disorders, and factors associated with mental health among older people in general and left-behind older parents in particular.

4.3 Conceptual framework

The central objective of this research was to assess the association of the migration of adult children with the mental health and QOL of their parents. The main independent variable of interest was the migration status of children (defining whether their older parents were left behind). The two dependent variables were the mental health and QOL of older parents. Other potential covariates identified in the systematic literature reviews (Chapters 2 and 3) were measured and considered as confounders for adjustment (Figure 4.1).

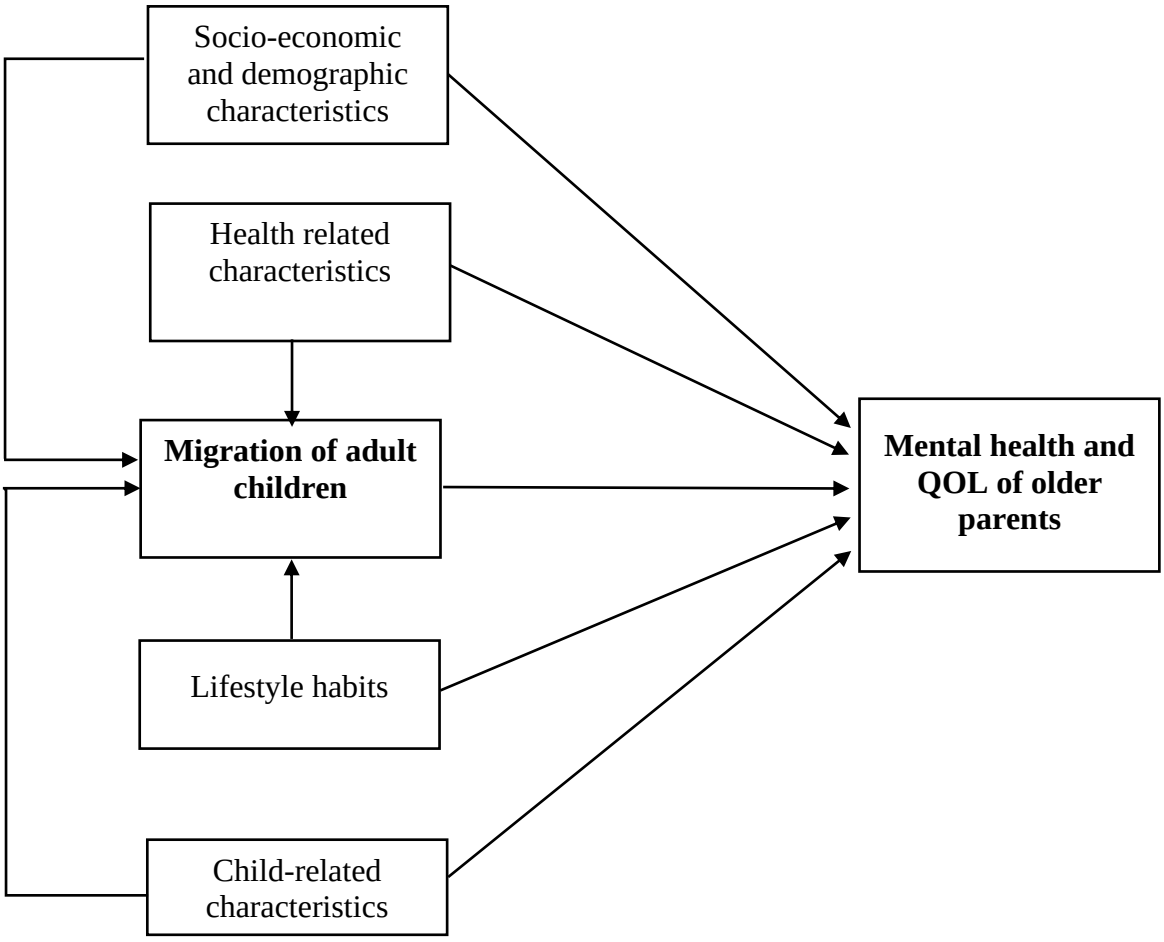

Figure 4.1 Conceptual framework

4.4 Study design

The study used a quantitative cross-sectional community survey design. Cross-sectional surveys are useful in determining the frequency and distribution of a particular health-related condition, such as a specific exposure, health behaviour or disease status in a defined population at a particular point in time (Bruce et al., 2017). Using a cross-sectional survey enabled an assessment of the mental health and QOL of older parents, identification of the factors associated with mental health, and an assessment of the relationship between children's migration and older parents' mental health. This involved randomly surveying older adults aged 60 years or over. Participants were interviewed by trained enumerators using a structured questionnaire, which included questions related to participants' socio-demographic characteristics, migration status of children, QOL, and mental health symptoms.

4.5 Study setting

The study was conducted in Nepal, which is a mountainous, land-locked South Asian country with a total area of 147,181 square kilometres. The country is bordered by Tibet to the north and by India to the east, south and west. Ecologically, it is divided into three eco-regions: the mountains, the hills and lowland. Administratively, it is divided into seven provinces, comprising 77 districts and 752 municipalities. Each municipality is further divided into smaller units called wards. Approximately one third of the GDP is generated by the agricultural sector (Government of Nepal, 2016).

Figure 4.2 Map of Nepal by province and district, adapted from Nepal in Data (2020)

Nepal is a patrilineal country where agriculture is the primary means of subsistence. In agricultural households, a high value is placed on extended family networks in which the members of the household live together, sharing resources and expenses. There is a limited social security system in place for older people, and hence they often depend in late life on their children for income. More recently, young couples are seeking employment and education away from family, often in cities. City living is expensive, and consequently people are having

smaller families, with supporting older parents decreasing as a priority for many. In addition to the changing family structure, migration has directly affected older family members (Limbu, 2012), with members of the traditional family unit not being close by to care, as was traditional.

The setting for this study was the Arghakhachi and Rupandehi districts of Lumbini province in the Middle-Western region of Nepal. These two districts were selected based on their large number of international migrants. Arghakhachi district has one of the highest proportions of households with a family member who has migrated, with 25% of households having at least one member living abroad CBS Nepal (2012). Rupandehi district is among the top ten districts in terms of number of international labour migrants (Ministry of Labor & Employment, 2018).

4.6 Participants and sampling

Participants were older people aged 60 years or over who were permanent residents of the selected municipalities. The cut-off age used to define 'older adult' is the one used by the Government of Nepal (Nepal Law Commission, 2006).

The sample size was calculated assuming a prevalence of mental disorders of 30% for the left-behind group and 20% for the non-left-behind group for an absolute difference of 10%, power of 80%, and significance level of 5% (two-sided). The calculated sample size was 626. The intent was to oversample by 25% to account for those declining to participate, so the plan was to approach 814 older adults.

The reference population for this study was older adults aged 60 years and over registered on the voter list in the selected municipalities. At the time of the survey, the voters' list was more than a year old and included temporary residents at the time of the election, who might not have been present at the time of survey, which supported the sample plan and oversampling approach.

A multistage random sampling technique was used to select the participants (see Table 4.1, below).

Table 4.1 Sampling procedure

Sampling steps	Procedure
1 Determine study districts	Two districts with the highest proportion of households with migrant members (Rupandehi and Arghakhanchi districts)
2 Identify study municipalities	3 municipalities randomly selected from each of the 2 districts (6 municipalities in total)
3 Identify study wards	3 wards randomly selected from each of the 6 municipalities (18 wards in total)
4 Select sample units	Random sampling, probability proportionate to size, from each of the selected wards

(i) Selection of study districts

Two districts, Arghakhachi and Rupandehi, from the Lumbini province of Nepal with the highest proportion of households with migrant members were purposively selected.

(ii) Selection of municipalities

Three municipalities were randomly selected by simple random sampling from each of the two districts, giving six municipalities in total.

(iii) Selection of wards

From each of these six municipalities, three wards (the lowest level administrative unit) were randomly selected, giving a total 18 wards. All wards selected were rural. A list of older adults aged 60 years or over living in the selected wards (including their voter identify number, name, age and address) was developed from the Nepal Election Commission 2017 Voters' List, which served as the sampling frame for this study. A total of 11,354 older adults were identified, with populations ranging from 330 to 1,184 per ward.

(iv) Selection of study participants

Samples were drawn from the sampling frame using computer-aided simple random sampling within each of the selected wards. Participants were selected from each of the chosen wards using the probability proportionate to size method. If the selected subject could not be contacted, did not meet the inclusion criteria, or was not willing to participate, the next eligible person listed in the sampling frame replaced them. The study did not identify more than one sampled participant from the same household, although this was not a requirement of the sampling procedure. The sample size per ward ranged from 23 to 78.

4.7 Inclusion and exclusion criteria

Older adults having an adult child (≥ 18 years) irrespective of the migration status of child(ren) were included. Other inclusion and exclusion criteria are presented in Table 4.2, below.

Table 4.2 Inclusion and exclusion criteria

Inclusion criteria	Exclusion criteria
Age ≥ 60 years	Unable to provide informed consent
An adult child ≥ 18 years	Unable to speak Nepali
Permanent resident of the sampled municipality	Institutionalised (hospital or aged care homes) older adults
Able to provide informed consent	
Able to complete the questionnaire	

4.8 Ethical considerations

4.8.1 Ethical approval

Ethical approval was obtained from the Social Science Ethics review committee of the University of Tasmania (ethics reference number H0017555; Appendix 2.1) and the Nepal Health Research Council (registration number 729/2018; Appendix 2.2). The study adhered to

all ethical principles, consistent with the National Statement on Ethical Conduct in Human Research (National Health Medical Research Council et al., 2018), including the requirements for consent, privacy, confidentiality, and for undertaking research in other countries.

4.8.2 Informed consent

All participants were provided with a written participant information sheet (Appendix 3) providing information about the research, the study's purpose, what the study required of them, possible benefits and risks, confidentiality, and the complaints procedure. All participants were informed that their participation was voluntary and that they had full right to refuse to participate or withdraw at any time without providing any reason. Participants were given the opportunity to ask any questions. The information sheet included information and contact details for the District Hospital, which participants presenting with symptoms of distress at the time of interview were advised to access for mental health services.

Written informed consent (Appendix 4) was obtained from all participants prior to the interview. If participants were unable to sign the form due to being unable to read or write, or for some other reason, the information sheet and consent form were also presented to another adult member of the family who was with the participant when informed verbal consent was obtained. This family member then signed on the participant's behalf (witnessed by the participant). The family member was not present during the interview.

4.8.3 Privacy and confidentiality

To protect the privacy and confidentiality of study participants, interviews were conducted with participants in their homes. Identifying information (i.e. name, date of birth, residential address, telephone number) was not collected. The signed consent forms are stored as stipulated in the ethics application, and hard copies will be shredded five years after data collection. The

electronic database is password-protected and securely stored on the university network. It is accessible only to the research team.

4.9 Study variables and measurements

4.9.1 Mental health symptoms – dependent variable(s)

Mental health symptoms were assessed using the 21-item Depression Anxiety Stress Scales (DASS-21) developed by Lovibond and Lovibond (1995a), a shorter version of the 42-item version of the original DASS. The DASS-21 is a set of three self-report sub-scales designed to measure the emotional states of depression, anxiety, and stress, each consisting of seven items (Table 4.3).

Table 4.3 Domains of the DASS-21

Domain	Items within domain
Depression (7 items)	dysphoria, hopelessness, devaluation of life, self-deprecation, lack of interest, anhedonia, and inertia
Anxiety (7 items)	autonomic arousal, skeletal muscle effects, situational anxiety, and subjective experience of anxious affect
Stress (7 items)	difficulty relaxing, nervous arousal, being easily upset, agitated, irritable, over-reactive, and impatient

Participants rated the extent to which they experienced symptoms over the past week on a four-point Likert scale (0 *Did not apply at all* to 3 *Applied very much or most of the time*). The scale provides scores for depression, anxiety, and stress separately by summing the scores for the relevant items. Subscale scores range from 0 to 21 for each subscale. The raw DASS-21 scores are doubled to equate to the original 42-item DASS (Lovibond & Lovibond, 1995b). Although the DASS-21 is based on a dimensional rather than a categorical conception of psychological disorder, subscale scores are categorised into severity levels as normal, mild, moderate, severe, and extremely severe (Table 4.4; Lovibond & Lovibond, 1995a).

Table 4.4 Categories of the DASS-21

Categories	Depression	Anxiety	Stress
Normal	0–9	0–7	0–14
Mild	10–13	8–9	15–18
Moderate	14–20	10–14	19–25
Severe	21–27	15–19	26–33
Extremely severe	≥ 28	≥ 20	≥ 34

The DASS-21 has been extensively used in research with older adults (Alavi et al., 2017; Anderson et al., 2018; Bruce et al., 2014; Eashwar et al., 2017; Gholamzadeh & Pourjam, 2019; Supasiri et al., 2019). Its discriminant validity among older adults was demonstrated by Gloster et al. (2008), with higher scores of the DASS-21 predicting the diagnostic presence of depression and anxiety disorders. Tonsing (2014) validated the psychometric properties of Nepalese version of the DASS-21, reporting adequate internal consistency (Cronbach's alpha values of 0.77 for the depression; 0.80 for the anxiety; and 0.82 for the stress) and construct validity depicting a significant inverse correlation with subscales of the DASS-21 (r = -0.27 for depression, -0.30 for anxiety, and -0.35 for stress; $p < 0.01$) with life satisfaction assessed by the Satisfaction with Life Scale. The Nepalese version of the DASS-21 (Tonsing, 2014) was refined for and used in this study (Chapter 5, Supplementary file 1). The scale demonstrated high reliability in this study, with Cronbach alpha values of 0.95 for the overall scale, 0.93 for depression, 0.79 for anxiety, and 0.91 for stress.

4.9.2 Quality of life – dependent variable(s)

QOL was measured using the World Health Organization Quality of Life – Abbreviated scale (WHOQOL-BREF; WHOQOL Group, 1998). The WHOQOL-BREF is the short version of the WHOQOL-100, and is a 26-item self-reported instrument with responses ranging from 1 (*very dissatisfied/very poo*r) to 5 (*very satisfied/very good*). The WHOQOL provides a

subjective assessment of perceived QOL and considers QOL to be a multidimensional concept. Of the 26 items, 24 comprise four domains (Table 4.5); physical health (seven items), psychological health (six items), social relationships (three items), and environment (eight items). These four domains were assessed separately in the analysis.

The physical domain consists of questions related to daily activities, treatment compliance, pain and discomfort, sleep and rest, energy, and fatigue. The psychological domain includes questions assessing positive and negative feelings, self-esteem, body image and physical appearance, personal beliefs, and attention. The social relationship domain assesses personal relationships, social support, and sexual activity. The environmental domain explores physical security and safety, financial resources, health and social care and their availability, opportunities for acquiring new information and skills, participation in, and opportunities for, recreation, and transport. The remaining two questions are the stand-alone rating of the individual's perception of their overall QOL, and satisfaction with their health. The scores on the domains are initially measured on a scale of 4 to 20, and are converted to a scale of 0 to 100 in order to make them compatible with studies employing the WHOQOL-100 (WHO, 1996). A higher score reflects a better QOL. As domain scores were the focus of the present analysis, the two stand-alone items were not included.

Table 4.5 Domains of the WHOQOL-BREF

Domain	Items within domain
Physical health (7 items)	Activities of daily living Dependence on medicinal substances and medical aids Energy and fatigue Mobility Pain and discomfort Sleep and rest Work capacity
Psychological (6 items)	Bodily image and appearance Positive feelings Negative feelings Self-esteem Personal beliefs and attentions Thinking, learning, memory and concentration
Social relationships (3 items)	Personal relationships Social support Sexual activity
Environmental (8 items)	Financial resources Freedom, physical safety and security Health and social care: accessibility and quality Home environment Opportunities for acquiring new information and skills Participation in, and opportunities for, recreation/leisure activities Physical environment (pollution/noise/traffic/climate) Transport

The WHOQOL-BREF has adequate psychometric properties with good content and discriminant validity, internal consistency, and test-retest reliability (WHOQOL Group, 1998). The WHOQOL-BREF questionnaire (WHO, 1996) has been validated in a range of settings, and has been used to assess QOL of older adults (Asadullah et al., 2012; Bodur & Cingil, 2009; Chachamovich et al., 2006; Kwan et al., 2016; Mudey et al., 2011; Mukherjee & Diwan, 2016; Parshad & Tufail, 2014). Past application of this scale in Nepal has revealed higher internal consistency with Cronbach's alpha coefficient > 0.70 (Giri et al., 2013b; Yadav, 2010). Most studies using the WHOQOL-BREF in Nepal focused on clinical settings—HIV/AIDS (Giri et al., 2013a; Mishra et al., 2015; Yadav, 2010), leprosy (Brouwers et al., 2011), renal patients (Sapkota et al., 2013), and diabetes (Mishra et al., 2015). Fewer studies (Brouwers et al., 2011; Sapkota et al., 2013) have used the WHOQOL-BREF to assess QOL of older adults in Nepal.

The scale in the present study showed high internal consistency, with a Cronbach's alpha coefficient of 0.93 for the overall scale, and coefficients ranging from 0.63 to 0.85 across individual domains.

4.9.3 Migration of adult children – independent variable

The independent variable in this study was the migration status of adult children. The United Nations (1998) defines a current migrant as any individual who has lived abroad for three or more months consecutively at the time of data collection. Measuring the effect of migration on QOL and psychological health of older parents may require that migrants have been away for longer. In this study, the cut-off for defining older adults as 'left-behind' was three months, consistent with the definition of migration used in other left-behind studies (Abas et al., 2013; Böhme et al., 2015), while children who have left more recently (< 3 months) were not considered migrants.

The migration status of adult children was measured by asking whether the child(ren) was living with their parents at the time of the survey, and the duration of this absence. Once the duration of migration was confirmed as greater than three months, the place of residence of each child was recorded (see Appendix 1. Survey instrument for details). During the analysis, migration status was recorded as 'migrant' or 'non-migrant'. Migration status also considered whether a child had been living in another municipality in the same province or in another province (internal migration), or in another country (international migration) for more than three months at the time of survey. The international migration category could include siblings of a migrant child who had not migrated and/or internally migrated, and the internal migration category would specify 'sibling/s not migrated'. Outcome variables were further compared across different variable types, measuring the migration status of children based on the place of migration (none, internal, or international) and the number of children migrated (none, some, or all; see Chapter 6, Section 6.7).

4.9.4 Other covariates

Recognising that the mental health of older adults may be affected by many other individual and household-level factors besides the migration of children, this study assessed a range of health-, lifestyle habit-, and child(ren)-related characteristics, including financial support provided by adult children.

4.9.4.1 Socio-economic and demographic variables

The sociodemographic variables measured at household level were family size, ethnicity, main source of household income, living arrangement, and household wealth quintile. Family size was measured as a continuous variable. Ethnicity includes four caste categories: the *Brahmin/Chhetri*, *Dalit*, indigenous, and other. The main source of income of the household in which the participant lived was recorded as: agriculture/livestock, business/self-employed, daily wages, service, foreign employment, pension, or other. More than half of the participants reported agriculture as their main source of household income, with 'other' the second most common. Living arrangements included living alone, living with children, or living with others. The wealth quintile of the household in which the participant lived was generated by principle component analysis based on the ownership of household properties and assets, including radios, televisions, computers, and refrigerators, and land size, housing structure, and availability of, and access to, electricity, tap water, and a flush toilet. The items were similar to those used in the Nepal Demographic and Health Survey 2016 (Ministry of Health Nepal et al., 2017). The wealth index was categorised into five groups (quintiles); lowest, second, middle, fourth, and highest.

Individual-level socio-demographic variables included: gender, age, education, marital status, present occupation, whether the individual is receiving a pension or allowance, grand-parenting, whether they watched television and read newspapers at least once a week, had a mobile phone, and number of children. Age was measured as a continuous variable and further categorised

into less than 70 years, 70 to 79 years, and 80 years or over. Education included whether older adults were able to read or write. Marital status was coded as married or not married (including widowed, divorced, separated, or never married). Present occupation measured whether older adults were currently working. 'Receiving a pension' included those who were previously employed and receiving a retirement allowance. Older adults were asked whether they were receiving a monthly old-age allowance from the government, and whether they had cared for their grandchildren during the previous year. The number of (living) children was measured as a continuous variable.

In addition to the above, the study measured the following social factors reported to influence the mental health of older adults: social support, participation in social activities, and adverse life events.

Social support

The Multidimensional Scale of Perceived Social Support (MSPSS) assesses an individual's perception of the level of social support received from family members, friends, and significant others (Zimet et al., 1988). The 12-item scale was scored on a 7-point Likert scale, ranging from 1 (*very strongly disagree*) to 7 (*very strongly agree*). The MSPSS total reflects the average score for the 12 items, with scores ranging from 1 to 7, with the mean scale score ranging from 1 to 2.9 considered low support; 3 to 5 moderate support; and 5.1 to 7 high support. Stanley et al. (1998) examined the psychometric properties of the MSPSS in older individuals and found strong internal consistency for the sub-scale and total scores (alphas 0.87 to 0.94) and test-retest reliability ($r > 0.70$). Kwan et al. (2016) used MSPSS to measure social support among older adults in India and reported its internal consistency as 0.88. The MSPSS has been used in a number of other studies undertaking research with older persons (Bozo et al., 2009; Cao et al., 2015; Jones et al., 2003; Kumar et al., 2014) including in Nepal (Walker et al., 2018). The

validity and reliability of the Nepali version of MSPSS has been confirmed by Tonsing et al. (2012) reporting a Cronbach's alpha of 0.90. The reliability coefficient of the MSPSS in the present study sample was 0.94.

Participation in social activities

Participation in social activities assessed engagement in eight different kinds of activity: political associations, volunteer groups, formal committees of community-based organisations, neighbourhood/residential associations, domestic work, agricultural work, meeting friends, and attending religious activities. The response options range from *never participate* (coded as 1) to *participate every day* (coded as 3). Possible total scores thus range from 8 to 24, with higher scores indicating more frequent participation in social activities. Similar measures have been used in previous studies to measure social engagement (Gautam et al., 2007) in Nepal. The reliability coefficient (Cronbach's alpha) in the present study was 0.76.

Adverse life events

The occurrence of adverse life events was measured by asking about loss of family members, close friends and/or relatives during the past year, with responses recorded as *yes* or *no*.

4.9.4.2 Health-related characteristics

Health-related characteristics included self-perceived general health status, number of chronic conditions, and functional ability. Self-perceived health status was gauged using the question '*In general, compared with other people of your age, how do you describe your health?*' with response options *good*, *fair*, and *poor*. The number of chronic conditions was self-reported from a list of 13 common chronic illnesses (high blood pressure, diabetes, heart disease, cancer, stroke, arthritis, backache, liver or gall bladder disease, kidney disease, respiratory problems, uric acid/gout, gastritis, and visual/hearing impairment), with possible total scores ranging

from 0 to 13. A similar approach has been used by other researchers in Nepal (Gautam et al., 2011) and elsewhere (Kim et al., 2009).

Functional ability was measured using the Instrumental Activities of Daily Living (IADL; Lawton & Brody, 1969). The scale contains eight items assessing the ability to use a telephone, shopping, food preparation, housekeeping, laundry, mode of transportation, responsibility for own medications, and ability to handle finances. The IADL score ranges from 0 (low function, dependent) to 8 (high function, independent). Studies using the IADL among older adults (Bell-McGinty et al., 2002; Chi et al., 2005; Suchy et al., 2011) have shown the scale to have adequate psychometric properties. Ng et al. (2006) reported the validity and cross-cultural applicability of IADL among Asian older adults. A previous study using the IADL among Nepalese older adults reported an adequate internal consistency reliability of 0.87 by Chalise (2010), who excluded two items from the IADL scale, use of the telephone (look up the number, dial and answer), and management of money (write cheques and pay bills), because these items were considered to be inapplicable to most Nepalese older people (Chalise et al., 2007). However, given the widespread use of mobile phones and the increasing phenomenon of independent living among older adults in Nepal in recent years, these items were measured in the present study. The reliability coefficient (Cronbach's alpha) for the IADL in this study is 0.80.

4.9.4.3 Lifestyle habits

Lifestyle habits included alcohol use, smoking, and physical exercise. Alcohol use was recorded as abstainer, infrequent, moderate, or excessive, with the latter two categories merged for analysis. Smoking was categorised into never, former, and current, with the latter two categories merged for analysis. Physical exercise was measured by asking participants '*How often are you involved in physical exercise?*' with responses recorded as *rarely/never*, *sometimes*, and *frequently*.

4.9.4.4 Child-related characteristics

Child-related variables addressed the number of children, their gender, the parent's closeness to the child, financial support, frequency of communication and visits to the parent, and financial support. Gender was recorded as having a son(s) only, a daughter(s) only, or both. Closeness to a child, adapted from the Affectual Solidarity Inventory (Mangen et al., 1988), is reported as a binary variable, recording participants reporting a *very close* relationship with any child as having a close relationship. Frequency of communication with the child was categorised into three groups: daily contact with all children, daily contact with some children, and no daily contact with any children. Children's visit was assessed using four categories: daily visits (or children living with the parent), all children visiting at least monthly, some children visiting at least monthly, and no children visiting monthly. Financial support from children was measured by financial transfers (> US$50) from the migrant child in the past year by any of three means: monetary remittance transferred to parents to use as they chose, substantial gifts (e.g. television, cell phone) provided to the parents, and household expenses directly paid by a child to cover parent's household bills, with a score ranging from 0 to 3.

4.10 Data collection

The instrument (questionnaire) was developed in English and then translated into Nepali. The draft instrument was then reviewed and revised by a colleague proficient in both English and Nepali. The questionnaire was finalised following comparison with the original English version and correction of differences. The final questionnaire included eight sections, beginning with information on socio-demographic characteristics and followed by the migration history of the children, the WHOQOL-BREF, the DASS-21, health-related questions including the IADL, the MSPSS, involvement in physical exercise, and questions related to stressful life events. The standardised scales—WHOQOL-BREF, DASS-21, IADL and MSPSS, which had been translated into Nepali—were used in this study after further improvement and refinement.

Data were collected through individual face-to-face interviews by trained interviewers during May–July 2020 in participants' homes. Each interview took about an hour on average. All responses were recorded on Android tablets using Research Electronic Data Capture (REDCap; Harris et al., 2009). A total of 825 older adults were approached and 810 interviews were conducted, with 794 participants completing the survey and thus being included in the analysis.

4.11 Organisation of the fieldwork

4.11.1 Meetings with key stakeholders

Prior to the commencement of fieldwork, relevant government authorities at district and municipality level were approached and informed of the purpose, importance, methodology and expected outcome of the study. Recommendation letters from the respective District Public Health Office and municipalities were obtained. A meeting was held with all local health facilities and local government authorities to discuss the aims, objectives and methods prior to commencing data collection.

4.11.2 Recruitment and training of field researchers

Two field supervisors and eight enumerators with public health and research backgrounds were recruited. The criteria for selecting field researchers include having academic qualifications at certificate level or above and prior experience in remote data collection using a tablet/cell phone. The field researchers were trained over a four-day workshop on topics related to interview skills, approaching the participants and rapport building, research ethics, including informed consent, inclusion/exclusion criteria, content of the questionnaire, and quality assurance. The training consisted of hands-on experience using tablet/cell phones for data collection. Several mock sessions were conducted to test and confirm complete understanding of the questionnaire and of the data collection procedure. See Appendix 5 for the training schedule.

4.11.3 Pre-testing of the questionnaire

During the third day of training, pre-testing of the questionnaire was conducted. The questionnaire was tested among 30 older adults from adjoining areas (separate from the identified study settings). Based on the findings and feedback from this pre-testing process, minor changes were made to the sequencing of questions, and this process also ensured enumerators had firsthand experience in interviewing.

4.11.4 Data collection

The fieldwork (data collection) commenced immediately after the field researchers' training. The nature and purpose of the study were explained to the potential participant and informed consent received before each interview commenced. Interviews were conducted individually at the participants' home in private. A review session was organised midway through the data collection process to share experiences and challenges, provide support, and ensure consistency. All data collection and fieldwork were closely supervised by the candidate, and oversight support was provided by the research team for the duration of data collection-related activities.

4.12 Statistical analysis

Following fieldwork, all e-forms submitted to the REDCap dashboard were checked for accuracy and completeness. Data were cleaned and verified for consistency, missing values, and errors. Data processing and analysis entailed downloading the data from the REDCap dashboard, performing exploratory analysis to check for accuracy, completeness, relevance and consistency of the data, creating a Stata 'do file' of commands, as per the analysis plan, performing actual data analysis using descriptive and analytical statistics, and generating log files to record the analysis process and outcomes.

Sample characteristics were described using frequencies and percentages for categorical variables and means, standard deviations and ranges for continuous variables. Internal consistency of the instruments was evaluated using Cronbach's alpha. Outcome variables were checked for normal distribution, homogeneity of variance, independence of errors (residuals), homoscedasticity of residuals (equal error of variances), and collinearity among the independent variables. Cross-tabulation of key outcome variables with independent variable(s) and demographic characteristics was conducted using the chi-square (or Fisher's exact) test for categorical variables, and *t*-tests, ANOVA, or Pearson correlations for continuous variables. *Cohen's d* was used to assess the effect size of mean differences of mental health symptoms between internal and international migration. Risk factors for mental health disorder symptoms were identified using multilevel logistic regression, while the association of migration of children with QOL and mental health disorder symptoms was evaluated using multilevel mixed-effect linear regression after adjusting for potential covariates. Three-level hierarchical models were used as the study samples were nested within the municipalities and the municipalities within districts. *p*-values were two-sided with < 0.05 considered statistically significant. The multivariate analyses initially included all the study variables, and the final reduced models were arrived at using the manual backward selection method including only variables significant at $p < 0.05$. Some variables are removed from the models due to their collinearity with other independent variables. Statistical analysis was conducted in Stata version 16 (StataCorp, 2017).

4.13 Conclusion

This chapter has detailed the study's methods. The study used a community-based cross-sectional survey among randomly selected older adults with an adult child from six rural municipalities in Nepal. Validated scales were used to assess their mental health symptoms and QOL, and a number of potential risk factors for mental health disorders were measured. The study protocol was approved by the research ethics board of the University of Tasmania and

the Nepal Health Research Council. Data were collected by face-to-face interview, and appropriate statistical analyses conducted. This study used the DASS-21 to assess symptoms of mental ill-health among older adults in Nepal. Chapter 5 presents the results of the psychometric properties of the Nepalese version of the DASS-21.

Chapter 5 – Psychometric Properties of the Nepalese Version of the Depression Anxiety Stress Scales (DASS-21)

5.1 Chapter overview

This study used the DASS-21 to assess the mental health symptoms of older adults in Nepal. As no previous studies have reported the validation of the DASS-21 in Nepal and there is limited research on the psychometric properties of the scale among older people, a factor structure and reliability check of the Nepalese version of the DASS-21 was undertaken. This chapter presents the results of the evaluation of the psychometric properties of the DASS-21. Exploratory factor analysis found that the 21 items loaded on three factors, which is consistent with the original factor structure. Confirmatory factor analysis, however, suggested a four-factor model, including the three subscales and an additional common general 'mental state' factor, which demonstrated a better overall fit. Good reliability was found for each subscale, with Cronbach's alpha ranging from 0.79 for anxiety to 0.93 for depression.

5.2 Submission

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Title: Psychometric properties of the Nepalese version of the Depression Anxiety Stress Scales (DASS-21)

Abstract

Aim: To assess the psychometric properties of the Nepali language version of the Depression Anxiety Stress Scales (DASS-21).

Design: Descriptive, cross-sectional survey.

Methods: Factor structure of the DASS-21 was evaluated among older adults (N = 794, age ≥ 60 years) using exploratory and confirmatory factor analyses. Cronbach's alpha was calculated, and correlation analyses evaluated the reliability and convergent validity.

Results: Exploratory factor analysis indicated that the 21 items loaded on three factors, with factor loadings ranging from 0.50 to 0.88. Confirmatory factor analysis suggested a four-factor model, including the three subscales and an additional common general 'mental state' factor, which demonstrated a better overall fit. Good reliability was found for each subscale, with Cronbach's alpha ranging from 0.79 for Anxiety to 0.93 for Depression. The Nepali language version of the DASS-21 satisfied convergent validity, with all subscales depicting significant negative correlations with quality of life, demonstrating adequate psychometric properties.

Keywords: DASS-21; psychometric properties; factor analysis; validity; reliability; Nepal

1. INTRODUCTION

The Depression Anxiety Stress Scales (DASS), developed by Lovibond and Lovibond (1995), is a set of screening tools designed to assess depression, anxiety and stress. The DASS questionnaire is a 42-item instrument which has been widely used among different population groups in diverse study settings due to its applicability to assessing multiple domains of negative emotional states. The DASS-21 is the abbreviated version of the original DASS scale, with seven items for each subscale. Based on the cut-off scores, each subscale of the DASS-21 is grouped into 'normal', 'mild', 'moderate', 'severe' and 'extremely severe' clinical categories. The psychometric properties of the DASS-21 have been assessed among clinical (Gloster et al., 2008; Musa et al., 2011; Ramli & Salmiah, 2009) and non-clinical populations (Gomez et al., 2014; Henry & Crawford, 2005; Osman et al., 2012), confirming its validity and reliability.

The original design of the DASS-21 proposed by Lovibond and Lovibond (1995) was to assess depression, anxiety and stress as three distinct factors. Studies evaluating the factor structure of the DASS-21 using both exploratory (Akin & Çetın, 2007; Saricam, 2018; Tonsing, 2014; Vignola & Tucci, 2014) and confirmatory (Gomez et al., 2014; Pezirkianidis et al., 2018; Sinclair et al., 2012; Wood et al., 2010) analyses have supported the original three-factor structure. However, some analyses have supported alternative models to the original three-factor structure (Imam, 2008; Le et al., 2017; Szabó, 2010; Tully et al., 2009; Yusoff, 2013). Le et al. (2017), for example, could not find an adequate fit for the original three-factor structure, and thus included a fourth, 'General Distress', which has since been supported in other studies (Henry & Crawford, 2005; Osman et al., 2012). Other potential structural issues have been identified, with Imam (2008) and Wang et al. (2016) finding items of the DASS-21 not loading to their corresponding subscales, while Tran et al. (2013) report all 21 items loading on a single factor. These discrepancies are more often observed in studies conducted among

adolescents (Le et al., 2017; Szabó, 2010), suggesting that the factor structure of the DASS-21 may be different for this cohort.

The high reliability of the DASS-21 was reported in the original study (Lovibond & Lovibond, 1995) among a large non-clinical sample, with Cronbach's alpha for the Depression, Anxiety and Stress subscales of 0.91, 0.84 and 0.90, respectively. Most studies using the DASS-21 report good internal consistency (Antony et al., 1998; Asghari et al., 2008; Gloster et al., 2008; Sinclair et al., 2012). Test-retest correlational analyses of the DASS-21 subscales indicate good temporal reliability for the instrument (Asghari et al., 2008; Gomez et al., 2014; Saricam, 2018).

The divergent validity of the DASS-21 scale has been extensively analysed, showing significant correlations with other scales measuring similar constructs. The DASS-21 subscales were found to have strong correlations with the Beck Anxiety Inventory (BAI; Akin & Çetın, 2007; Gloster et al., 2008; Vignola & Tucci, 2014), the Beck Depression Inventory (BDI; Akin & Çetın, 2007; Antony et al., 1998; Vignola & Tucci, 2014), the Hospital Anxiety and Depressive Scale (HADS; Musa et al., 2011), and the State-Trait Anxiety Inventory (STAI; Antony et al., 1998; Wang et al., 2016). The DASS-21 is also negatively correlated with the Satisfaction with Life Scale (SWLS; Tonsing, 2014).

The DASS-21 scale demonstrates discriminant validity by differentiating between clinical and non-clinical populations for different diagnostic groups (Akin & Çetın, 2007; Antony et al., 1998; Daza et al., 2002). Gloster et al. (2008) reported that the DASS-21 predicted the diagnostic presence of both depression and generalised anxiety disorder. Saricam (2018) found significantly higher mean DASS subscale scores among patients from a psychiatric clinic compared to controls. Studies have also demonstrated the validity of the DASS-21 as a routine clinical outcome measure (Ng et al., 2007).

2. BACKGROUND

The DASS-21 has been extensively used across different cultural and ethnic groups. The translated versions have been validated in languages including Greek (Pezirkianidis et al., 2018), Malaysian (Ramli et al., 2012; Ramli & Salmiah, 2009), Spanish (Ruiz et al., 2017), Turkish (Saricam, 2018), Chinese (Wang et al., 2016), Korean (Lee et al., 2019), Hindi (Singh et al., 2013), Vietnamese (Le et al., 2017; Tran et al., 2013; Van Nguyen et al., 2015), and Brazilian Portuguese (Vignola & Tucci, 2014).

Given the high prevalence of depression, anxiety and other mental illnesses in Nepal (Thapa et al., 2018b), the DASS-21 may be a useful mental health screening tool to identify the symptoms in their early phase. Recent studies have used the Nepalese version of the DASS-21 (Paudel et al., 2020; Samson, 2020; Sharma et al., 2019). While the DASS-21 has been widely evaluated across the globe in different languages, the Nepali version has not been validated in Nepal. Further, while the DASS has been extensively used in research with older adults, only a few studies (Gloster et al., 2008; Gomez et al., 2014) have attempted to analyse its validity and reliability among this cohort. The present study aimed to assess the psychometric properties of the Nepali language translated version of the DASS-21 among community-dwelling older adults in Nepal. More specifically, the study aimed to determine the latent structure, internal consistency and convergent validity of the Nepali version of the DASS-21.

Companion papers from this study assessed the prevalence of mental health symptoms (Thapa et al., 2020b) and the quality of life of older parents left behind (Thapa et al., 2020a), and a further paper describing the mental health of left-behind older parents is currently under review.

3. METHODS

3.1 Design

Cross-sectional population-based survey among randomly selected community-dwelling older adults.

3.2 Study settings and participants

This research uses data from a survey performed between May and July 2019 in Province 5 in Nepal. A multistage sampling technique was employed to access study participants. Two districts (Rupandehi and Arghakachi) were purposively selected. Three local government units (Municipalities) were randomly selected from each of the two districts. From each of the local units, three smaller units (Wards) were randomly selected. Samples were drawn from a sampling frame developed from the Nepal Election Commission 2017 Voters' List and comprised the list of older people aged 60 years or over living in the selected Municipalities. The inclusion criteria were: older people with at least one child aged 18 years or over. Participants who could not provide informed consent, or did not have the ability to respond to the questionnaire, or were not able to speak Nepali were excluded. Data were collected through face-to-face interviews, conducted individually, and responses recorded on Android tablets using Research Electronic Data Capture (REDCap; Harris et al., 2009). A total of 810 people were approached, with 794 included in the final analysis.

3.3 Ethics

Ethical approval was obtained from the University of Tasmania (Reference number H0017555) and the Nepal Health Research Council (Registration number 729/2018). Letters of approval were obtained from the respective Municipalities. Informed written consent was obtained from each participant prior to the interview.

3.4 Measures

3.4.1 Depression Anxiety Stress Scales (DASS-21)

The DASS-21 (Lovibond & Lovibond, 1995) measures the prevalence of symptoms of three subscales, depression, anxiety, and stress, over the prior week. Each subscale has seven items with answers reported on a four-point Likert scale ranging from ‘0’ (does not apply to me) to ‘3’ (applies to me most of the time). The subscale scores are obtained by summing the individual item scores, with a maximum total score of 21 for each subscale. The final score is obtained by multiplying the score by two to obtain the equivalent score for the DASS-42. The Nepali version of the DASS-21 (Tonsing, 2014) was refined for this study. The original English version (Lovibond & Lovibond, 1995) and its Nepali translated version are presented as Supplementary file 1.

3.4.2 Quality of Life

QOL was assessed using the WHOQOL-BREF scale (WHOQOL Group, 1998), which is a 26-item self-report instrument. WHOQOL-BREF subjectively measures perceived QOL across four domains: physical health (seven items), psychological health (six items), social relationships (three items), and environment (eight items). The WHOQOL-BREF has demonstrated adequate validity, test-retest reliability, and internal consistency (α ranging from 0.84 for physical health to 0.66 for social relationships; WHOQOL Group, 1998).

3.5 Statistical analysis

The psychometric properties of the DASS-21 were examined by exploratory (EFA) and confirmatory factor analysis (CFA) for construct validity, Cronbach’s alpha for reliability, and correlation analysis with the WHOQOL-BREF dimensions for convergent validity. This study employed principal components extraction methods for factor analysis, with the number of

factors determined by the Scree test and eigenvalues (Nesselroade & Cattell, 2013). The correlations between the three subscales of the DASS-21 in this study were strong and statistically significant ($p < 0.0001$), which is consistent with previous studies which suggest that the three subscales are associated. Given the correlations among the factors, oblique rotation (promax) was applied. Factor loadings higher than 0.4 were considered good (Piedmont, 2014). Correlations between the items and the total scores of each subscale were also analysed. Higher correlations of items with the subscale to which they belong indicate good validity.

To examine if the Nepali version of the DASS-21 supports the construct of the three factors of the original DASS-21, its construct validity was evaluated using CFA. Models examined were based on the results from previous factor structure research. Factor invariance was examined using structural equation modelling (SEM) with maximum likelihood estimation. Factors were allowed to correlate in the models without covariances between error terms. The goodness of fit of the tested models was assessed using the following fit indices:

(i) Chi-square likelihood ratio test (Bollen, 1989), with lack of significance indicating a good fit ($p \geq 0.05$; Hooper et al., 2008);

(ii) Comparative Fit Index (CFI; Bentler, 1990), which should be greater than or equal to 0.90 for an adequate fit;

(iii) Tucker–Lewis Index (TLI; Tucker & Lewis, 1973), which should be greater than 0.90 for an adequate fit (Hu & Bentler, 1999);

(iv) Root Mean Square Error of Approximation (RMSEA; Browne & Cudeck, 1993), which should be less than or equal to 0.05 for a model fit (Hoyle, 1995);

(v) Standardized Root Mean Square Residual (SRMR; Hu & Bentler, 1995), which should be less than or equal to 0.08 (Hu & Bentler, 1999);

(vi) Akaike's Information Criterion (AIC), with smaller AIC indicating better fit;

(vii) Bayesian Information Criterion (BIC; Neath & Cavanaugh, 2012), with smaller BIC indicating better fit; and

(viii) Coefficient of determination, with higher values (closer to 1) indicating better fit.

To assess the reliability, the internal consistency of the Nepali version was examined by calculating Cronbach's alpha coefficients for the overall scale and the three subscales. Values higher than 0.70 indicate good internal consistency (DeVellis, 2016). Additionally, we calculated corrected item-total correlations of the three subscales, which is the correlation of each of the DASS items with its own DASS subscale with that item removed.

Convergent validity was evaluated by examining the correlation of DASS-21 scores with WHOQOL-BREF. All analyses were conducted using Stata version 16 (StataCorp, 2017).

4. RESULTS

4.1 Sample characteristics

Table 1, below, provides the socio-demographic profile of the sample (N = 794). The mean age of the participants was 71.1 (SD = 8.2, range 60 to 107) years. Almost half of the participants (47.9%) were 60 to 69 years old. More than half (52.1%) were male and 61% were married. The majority of the participants could not read or write. Agriculture (47.1%) was the main occupation, and nearly one-third of the older adults were not currently working. Table 2, below, shows the summary statistics of the measures used in this study.

Table 1. Participant characteristics

	n	%
Sex		
Female	380	47.9
Male	414	52.1
Marital status		
Married/living with spouse	484	61.0
Single (widowed, divorced, separated, unmarried)	310	39.0
Age (years)		
60 to 69	380	47.9
70 to 79	273	34.4
≥ 80	141	17.8
Education		
Unable to read or write	377	47.5
Literate, but no schooling	246	31.0
Primary level (grade 1 to 5)	77	9.7
Secondary level (grade 6 to 10)	50	6.3
Higher secondary or above	44	5.5
Occupation		
Agriculture	374	47.1
House duties	116	14.6
Daily wage/labour	12	1.5
Service/regular income	15	1.9
Business/self-employed	36	4.5
Currently not working	241	30.4

Table 2. Descriptive statistics of the study variables

Variables	*N*	Possible range	Mean	*SD*	Min	Max
DASS Depression	794	0–42	4.2	7.6	0.0	40.0
DASS Anxiety	794	0–42	3.6	5.0	0.0	36.0
DASS Stress	794	0–42	5.1	7.4	0.0	38.0
QOL Physical	790	0–100	58.8	19.8	3.6	100.0
QOL Psychological	791	0–100	63.7	18.0	0.0	100.0
QOL Social	794	0–100	60.7	16.2	8.3	100.0
QOL Environmental	790	0–100	61.7	15.0	9.4	100.0

4.2 Exploratory factor analysis

The study employed the principal components extraction method for factor analysis, and the number of factors was determined by the Scree test and eigenvalues (Nesselroade & Cattell, 2013). As the three subscales of the DASS-21 are strongly correlated with each other, oblique rotation was applied. Both the scree plot and eigenvalues greater than one criteria indicated a three-factor solution (eigenvalues 11.59, 1.61, and 1.38), with this model accounting for 69.5% of the variance. The Kaiser–Meyer–Olkin (KMO) test result was 0.960 (χ^2 = 14034, p < 0.0001), indicating high adequacy of the model. Table 3 shows the factor loadings for each item of the DASS-21 with factor loadings greater than 0.40 demonstrating adequate loading.

The three factors did not reproduce the loading intended by the DASS-21 subscales. Five items from the depression subscale and four items from the stress subscale loaded to Factor 1 (Depression). Two items from the depression subscale, three from anxiety and two from stress loaded to Factor 2 (Stress). The third factor (Anxiety) consisted of only four items, all from the anxiety subscale. There were five cross-loading items observed (secondary loadings of 0.40 or greater), as shown in Table 3.

Table 3. Items and Factor Loadings for the DASS-21

Item #	Variable	Factor 1	Factor 2	Factor 3
10	I felt that I had nothing to look forward to (D)	**0.847**	0.139	-0.121
13	I felt down-hearted and blue (D)	**0.831**	0.030	0.099
11	I found myself getting agitated (S)	**0.805**	0.101	0.026
18	I felt that I was rather touchy (S)	**0.774**	0.140	0.003
1	I found it hard to wind down (S)	**0.721**	0.003	0.246
3	I could not seem to experience any positive feeling (D)	**0.695**	0.134	0.134
12	I found it difficult to relax (S)	**0.597**	0.218	0.089
21	I felt that life was meaningless (D)	**0.592**	**0.423**	-0.207
16	I was unable to become enthusiastic about anything (D)	**0.538**	**0.486**	-0.093
15	I felt I was close to panic (A)	0.038	**0.882**	0.037
20	I felt scared without any good reason (A)	0.018	**0.878**	0.028
9	I was worried about situations in which I might panic and make a fool of myself (A)	0.071	**0.821**	0.032
14	I was intolerant of anything that kept from getting on with what I was doing (S)	0.239	**0.677**	0.087
8	I felt I was using a lot of nervous energy (S)	0.184	**0.598**	0.244
17	I felt I was not worth much as a person (D)	**0.470**	**0.548**	-0.214
5	I found it difficult to work up the initiative (D)	0.306	**0.506**	0.044
6	I tended to over-react to situations (S)	0.216	**0.495**	0.073
7	I experienced trembling (A)	-0.152	0.170	**0.737**
4	I experienced breathing difficulty (A)	0.108	-0.015	**0.695**
19	I was aware of the action of my heart in the absence of physical exertion (A)	-0.207	**0.468**	**0.587**
2	I was aware of dryness of my mouth (A)	**0.546**	-0.396	**0.576**
	Eigenvalue	11.59	1.61	1.38
	Variance (%)	55.2	7.7	6.6
	Total variance: 69.5%			

Note: D: Depression; A: Anxiety; S: Stress.

Kaiser–Meyer–Olkin measure of sampling adequacy (KMO) = 0.960; Bartlett's test of sphericity ($\chi 2$) = 14034.1, $P < 0.0001$.

Factor loadings > 0.40 are presented in **bold**.

4.3 Confirmatory factor analysis

Eight different structural models were assessed using confirmatory factor analysis, with the fit indices for the models presented in Table 4, below. A one-factor model (Model 1) was tested in which all items of the DASS-21 scale were allowed to load to a single 'emotional state'

factor (Tran et al., 2013). This did not provide a good fit. A two-factor model collapsing the depression and anxiety scales (Model 2) was assessed, as depression and anxiety may not be independent constructs in an older population (Schoevers et al., 2003). Similarly, other two-factor models collapsing the depression and stress scales (Model 3) and the anxiety and stress scales (Model 4), as proposed by Brown et al. (1997), were also assessed. These three two-factor models significantly improved the model fit compared to Model 1 (p value of $\Delta\chi^2 < 0.05$), however, the model fit indices remained unsatisfactory.

A three-factor model consistent with the original scale design (Model 5) and a three-factor model allowing the items to load to one of the three factors, as identified from the EFA (KMO > 0.4; Model 6), were tested. Both models showed improved model fit compared to one- and two-factor models, but did not provide adequate fit indices. Model 6 was then modified to allow for cross-loadings of items based on the results of the EFA for this study (Model 7); improvements were observed across most indices, with CFI and SRMR meeting the model fit criteria. Finally, a four-factor model (Model 8) was tested which included the three factors of the original model and one additional factor, 'General Distress' (Le et al., 2017; Szabó, 2010), to which all items were allowed to load. Model 8 showed optimal fit according to the model fit indices, except RMSEA, compared to other models. An RMSEA value below 0.06 is usually considered a good fit; values below 0.10 are considered adequate (Hu & Bentler, 1999). The chi-square statistic, although statistically significant, was lower than for other models tested. All items, with the exception of three from the anxiety subscale, loaded significantly in this model (see Figure 1, below).

Table 4. Confirmatory factor analysis (model fit indices) for the tested models of DASS-21

Model	χ^2	*df*	CFI	TLI	RMSEA	SRMR	AIC	BIC	CD	χ^2 difference ($\Delta\chi^2$)
M1: 1-Factor model	3008.1***	189	0.798	0.776	0.137	**0.071**	19433.4	19662.5	0.968	
M2: 2-Factor model DA-S	3003.3***	188	0.799	0.775	0.137	**0.071**	19428.5	19657.7	0.972	M1 - M2 = 4.8*
M3: 2-Factor model AS-D	2821.1***	188	0.812	0.790	0.133	**0.072**	19246.3	19475.5	0.986	M1 - M3 = 187.0***
M4: 2-Factor model DS-A	2455.9***	188	0.838	0.819	0.123	0.081	18881.2	19110.3	0.993	M1 - M4 = 552.2***
M5: 3-Factor model (original model)	2402.4***	186	0.841	0.821	0.123	**0.078**	18861.6	19170.3	0.995	M4 - M5 = 53.5**
M6: 3-Factor model identified from the EFA	1933.4***	186	0.875	0.859	0.109	**0.063**	18392.7	18701.4	0.997	M4 - M6 = 522.5***
M7: 3-Factor model identified from the EFA, considering the double-loading items	1570.0***	181	**0.901**	0.885	0.098	**0.056**	18039.3	18371.3	0.998	M4 - M7 = 363.4***
M8: 4-Factor model	1299.2***	165	**0.919**	**0.900**	0.093	**0.045**	17800.5	18207.4	0.998	M7 – M8 = 270.8***

Note: D: Depression; A: Anxiety; S: Stress; *df*: degrees of freedom; CFI: Comparative Fit Index; TLI: Tucker-Lewis Index; RMSEA: Root Mean Square Error of Approximation; SRMR: Standardized Root Mean Square Residual; AIC: Akaike's Information Criterion; BIC: Bayesian Information Criterion; CD: Coefficient of Determination.

* $P < 0.05$, ** $P < 0.01$, *** $P < 0.001$.

Figure 1. Confirmatory factor analysis of DASS-21, the best fit model (model 8)

A second-order four-factor model (Model 9) suggested by some studies (Lee et al., 2019; Osman et al., 2012; Ruiz et al., 2017) was also tested. This model included a second-order factor linking the three latent factors—depression, anxiety and stress—but, with no direct item loading on this common factor, did not converge.

4.4 Reliability

The Nepali version of the DASS-21 had adequate internal reliability, with Cronbach alpha values of 0.95 for the overall scale, 0.93 for depression, 0.79 for anxiety, and 0.91 for stress (Table 5). The corrected item–rest correlation for the overall scale ranged from 0.35 to 0.83, with an item–rest correlation higher than 0.3 for all three subscales, demonstrating good internal consistency for the DASS-21. Supplementary file 2 shows inter-item correlations for the individual DASS-21 items with each other.

Table 5. Internal consistency of DASS-21

Scale/subscale	Cronbach's alpha	Item–rest correlation	Corrected item–rest correlation
Total scale	0.95	0.40–0.85	0.35–0.83
Depression	0.93	0.77–0.88	0.66–0.83
Anxiety	0.79	0.59–0.77	0.37–0.67
Stress	0.91	0.69–0.86	0.58–0.79

4.5 Convergent validity

Between-scale correlation coefficients were 0.72 for depression and anxiety, 0.91 for depression and stress, and 0.79 for anxiety and stress, with correlations between individual items ranging from 0.17 to 0.85. The convergent validity of the scale was examined by correlating the DASS-21 scores with the WHOQOL-BREF instrument. All four QOL dimensions were negatively correlated with subscales of the DASS-21 (see Table 6, below). These correlations were higher for psychological and physical QOL dimensions. All correlations were significant ($P < 0.001$) and represented moderate associations with QOL dimensions, demonstrating convergent validity.

Table 6. Correlation among the study variables

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(1) DASS Depression	1						
(2) DASS Anxiety	0.72	1					
(3) DASS Stress	0.91	0.79	1				
(4) QOL Physical	-0.55	-0.54	-0.58	1			
(5) QOL Psychological	-0.65	-0.52	-0.62	0.69	1		
(6) QOL Social	-0.37	-0.36	-0.37	0.54	0.65	1	
(7) QOL Environmental	-0.41	-0.42	-0.41	0.61	0.74	0.67	1

Note: All the correlation coefficients were significant at $P < 0.001$.

5. DISCUSSION

The study primarily aimed to investigate the factorial structure of the Nepali version of the DASS-21. An EFA conducted using an oblique rotation varimax identified three factors for the DASS-21 with eigenvalues greater than 1, with the model explaining 69.5% of the total variance. In contrast to previous studies (Akin & Çetın, 2007; Antony et al., 1998; Crawford & Henry, 2003; Gloster et al., 2008; Gomez et al., 2014; Lovibond & Lovibond, 1995; Saricam, 2018; Tonsing, 2014; Vignola & Tucci, 2014; Wood et al., 2010), this study identified alternative models to the original grouping of the DASS-21 items into three subscales. Some items did not load to their corresponding factors, while a few items also demonstrated cross-loading. A CFA analysis using structural equation modelling did not demonstrate that the original three-factor solution of the DASS-21 was to be preferred to competing models. This result indicated that the Nepali version of the DASS-21 may not adequately distinguish between depression, anxiety, and stress in this setting.

This study assessed participants 60 years of age and older, while most previous studies assessed adults and adolescents. The inherent differences between these cohorts may account

for the difference between these results and those of previous studies. Differences in socioeconomic demographics from other studies may result in differing levels of awareness and recognition of emotional health.

Based on the recommended cut-off criteria of the DASS-21, we have previously reported a high prevalence of anxiety from this sample (Thapa et al., 2020b). Some anxiety items also could not load significantly on the anxiety subscale. This could be because the items in the anxiety subscale may have been interpreted by participants as being related to somatic symptoms (such as difficulty breathing, trembling hands). Participants might also have reported these symptoms more frequently due to the presence of symptoms with a physical rather than mental cause.

A model with depression and stress subscales collapsed together (Model 4 in Table 4) showed better fit compared to other two-factor models, however, many of the model fit indices did not meet the criteria. A three-factor model identified from the EFA in this study considering the double-loading items (Model 7) was superior to other three-factor models. Finally, among the eight models tested, a four-factor model including the three factors of the original model and one additional factor, 'General Distress', where all the items of the scale were permitted to load, yielded relatively better model fit indices. This result aligns with Le et al. (2017) and Szabó (2010), where a four-factor latent structure representing general distress, depression, anxiety, and stress factors, provided the best fit for adolescent data. Imam (2008) also did not support a simple factor structure for the DASS-21.

One reason for the limited support for the original three-factor model identified in the literature is likely the overlapping of mental health states such as anxiety and depression in assessment (Afzali et al., 2017; Bleich et al., 1997; Gros et al., 2012). The samples in this study showed high correlation between depression and stress. The Nepali version of the DASS-21 may not be able to distinguish older adults experiencing depression from those under stress.

While the DASS-21 may be able to detect significant 'Negative Affect', it may be less able to distinguish between the specific states. The strong correlations between the three factors also suggested the similarity between these factors. Tran et al. (2013) reported somewhat similar results, with the DASS-21 able to detect the common mental disorders of depression and anxiety, but not able to distinguish those experiencing depression from anxiety. Research has shown that, among older adults, it is difficult to differentiate between depression, anxiety and stress (Lenze et al., 2005).

The Nepali version of the DASS-21 showed adequate internal consistency in line with previous studies. Moderate negative correlations with QOL dimensions supports the convergent validity of the Nepali version, with correlations in this direction expected. These results demonstrate that the Nepali version of the DASS-21 is a reliable and valid instrument with which to assess negative emotional states among older people in Nepal.

5.1 Limitations

The study did not validate the scale with an independently administered diagnostic interview, which is considered the gold standard of scale validity testing. Scores were not compared across diagnostic groups and no clinical group was studied. The sample consisted of older adults aged 60 years and over, and the factor structure of the Nepali version of the DASS-21 may be different for other age groups. Due to the cross-sectional nature of the study, the data could not provide test-retest reliability over time.

5.2 Research and policy implications

The empirical overlap between the three subscales of the DASS-21 showed that there could be similar symptoms and risk factors for depression, stress, and anxiety in this setting. At a community level, it may not be necessary to distinguish between these states among the older population, as interventions addressing these risks will be similar (Tran et al., 2013).

Universal psychosocial programmes targeting these risks could have a positive effect on overall mental health and well-being. Further validation of the Nepali version of the DASS-21 among other age groups is suggested. Longitudinal designs involving follow-ups and comparative studies between the diagnostic groups are also encouraged for future studies.

6. CONCLUSION

The Nepali version of the DASS-21 has good internal consistency, indicating it is a reliable tool and has significant correlations with the WHOQOL-BREF, showing its convergent validity. The factor analysis suggests that the DASS-21 factor structure is different among Nepalese older adults than studies with adult samples in other settings have found. Confirmatory factor analysis could not support the original three-factor solution of the DASS-21. A four-factor model consisting of depression, anxiety, stress, and a common general distress factor showed a better fit to the data. Further studies are required to validate the psychometric properties of the Nepali version of DASS-21.

Supplementary file 1. Original English version (Lovibond & Lovibond, 1995) and Nepalese translated version of the DASS-21.

Please read each statement and choose the options which indicate how much the statement applied to you over the past week. The four response options are ‘Did not apply to me at all’, ‘Applied to me to some degree, or some of the time’, ‘Applied to me to a considerable degree, or a good part of time’ and ‘Applied to me very much, or most of the time’. There are no right or wrong answers. Do not spend too much time on any statement.	
1	I found it hard to wind down.
2	I was aware of dryness of my mouth.
3	I could not seem to experience any positive feeling at all.
4	I experienced breathing difficulty (e.g. excessively rapid breathing, breathlessness in the absence of physical exertion).
5	I found it difficult to work up the initiative to do things.
6	I tended to over-react to situations.
7	I experienced trembling (e.g. in the hands).
8	I felt that I was using a lot of nervous energy.
9	I was worried about situations in which I might panic and make a fool of myself.
10	I felt that I had nothing to look forward to.
11	I found myself getting agitated.
12	I found it difficult to relax.
13	I felt down-hearted and blue.
14	I was intolerant of anything that kept me from getting on with what I was doing.
15	I felt I was close to panic.
16	I was unable to become enthusiastic about anything.
17	I felt I was not worth much as a person.
18	I felt that I was rather touchy.
19	I was aware of the action of my heart in the absence of physical exertion (e.g. sense of heart rate increase, heart missing a beat).
20	I felt scared without any good reason.
21	I felt that life was meaningless.

कृपया गत हप्ताभरि यो कुराहरु तपाईमा कत्तिको लागु भयो भन्नुहोस । कृपया आफ्नो जवाफ 'ममा पटक्कै लागु हुँदैन', 'कुनै कुनै समय ममा लागु हुन्छ', 'धेरै समयसम्म ममा लागु हुन्छ' वा 'पूर्णरूपमा वा प्रायजसो समय ममा लागु हुन्छ' मध्ये कुनै एक मा दिनुहोला । त्यहाँ कुनै ठीक वा बेठीक उत्तरहरू छैनन् । कुनै पनि वक्तव्यमा ज्यादा समय खर्च नगर्नुहोस् ।	
१	तपाईलाई तनावमुक्त हुन गाह्रो लाग्यो ।
२	तपाईको मुख सुख्खा भएको तपाइलाई थाहा थियो ।
३	तपाईले कुनै पनि सकारात्मक भावनाको अनुभव गर्न सक्नुभएन ।
४	तपाईलाई सास फेर्न गाह्रो भएको तपाईले अनुभव गर्नुभयो (उदाहरण दम बढ्नु, सास रोकिनु) ।
५	तपाईले कुनै पनि नयाँ काम आफै सुरु गर्न गाह्रो परेको अनुभव गर्नुभयो ।
६	कतिपय स्थितिहरूमा तपाइले चाहिनेभन्दा बढी प्रतिकार गर्नुभयो ।
७	तपाइले आफू काँपेको अनुभव गर्नुभयो (उदाहरण हातहरू)।
८	तपाई धेरै अतालिएको तपाईलाई अनुभव भयो ।
९	तपाई डराउने अनि आफैलाई मूर्ख ठान्ने परिस्थितिहरूको विषयमा चिन्तित हुनुभयो।
१०	तपाईले आशावादी हुनुपर्ने केही कारण देख्नुभाएन ।
११	तपाईले आफैंलाई अशान्त भएको महशुस गर्नुभयो ।
१२	तपाईले आराम गर्न गाह्रो भएको महशुस गर्नुभयो ।
१३	तपाई आफू दुःखी र उदास भएको महसुस गर्नुभयो ।
१४	तपाईले गर्दै गरेको कुरामा बाधा पर्दा तपाईलाई हतास लाग्ने गर्थ्यो ।
१५	तपाईले डराउन लागेको वा आतंकित भएको महसुस गर्नुभयो ।
१६	तपाई कुनै पनि कुरोको विषयमा उत्साहित बन्न असक्षम हुनुभयो ।
१७	तपाई एउटा नालायक व्यक्ति रहेछु जस्तो तपाईलाई लाग्यो ।
१८	तपाई भावुक भएको जस्तो तपाईलाई महसुस भयो ।
१९	शरीरिक परिश्रमविना नै तपाईको मुट्टूको धड्कन (हृदयगति) बढेको महसुस गर्नुभयो।
२०	विना कुनै कारण तपाईले डराएको अनुभव गर्नुभयो ।
२१	तपाईलाई जीवन अर्थहीन भएको जस्तो लाग्यो ।

Supplementary file 2. Correlation matrix between the individual DASS-21 items with each other.

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)
(1) stress_1	1.00																				
(2) anxiety_2	0.50	1.00																			
(3) depression_3	0.74	0.41	1.00																		
(4) anxiety_4	0.35	0.35	0.35	1.00																	
(5) depression_5	0.54	0.20	0.57	0.34	1.00																
(6) stress_6	0.49	0.24	0.54	0.26	0.54	1.00															
(7) anxiety_7	0.30	0.34	0.29	0.35	0.22	0.21	1.00														
(8) stress_8	0.56	0.31	0.59	0.35	0.56	0.52	0.39	1.00													
(9) anxiety_9	0.50	0.19	0.57	0.26	0.58	0.54	0.28	0.70	1.00												
(10) depression_10	0.63	0.35	0.70	0.26	0.56	0.45	0.18	0.59	0.57	1.00											
(11) stress_11	0.66	0.37	0.68	0.33	0.54	0.45	0.21	0.64	0.56	0.79	1.00										
(12) stress_12	0.58	0.34	0.59	0.36	0.59	0.43	0.23	0.60	0.54	0.65	0.69	1.00									
(13) depression_13	0.73	0.44	0.73	0.33	0.52	0.51	0.27	0.58	0.54	0.74	0.78	0.66	1.00								
(14) stress_14	0.59	0.30	0.62	0.26	0.61	0.57	0.33	0.70	0.74	0.63	0.60	0.62	0.65	1.00							
(15) anxiety_15	0.52	0.22	0.57	0.24	0.58	0.59	0.27	0.69	0.80	0.56	0.56	0.56	0.55	0.80	1.00						
(16) depression_16	0.60	0.28	0.67	0.29	0.63	0.54	0.21	0.66	0.68	0.75	0.70	0.63	0.68	0.72	0.72	1.00					
(17) depression_17	0.53	0.17	0.59	0.20	0.58	0.49	0.18	0.57	0.67	0.71	0.63	0.55	0.60	0.67	0.66	0.76	1.00				
(18) stress_18	0.66	0.38	0.65	0.31	0.56	0.51	0.22	0.58	0.55	0.75	0.76	0.65	0.75	0.65	0.59	0.72	0.64	1.00			
(19) anxiety_19	0.37	0.27	0.33	0.43	0.35	0.26	0.36	0.45	0.40	0.28	0.36	0.34	0.34	0.43	0.44	0.33	0.32	0.32	1.00		
(20) anxiety_20	0.49	0.19	0.54	0.24	0.60	0.55	0.22	0.69	0.74	0.55	0.56	0.55	0.52	0.74	0.85	0.68	0.64	0.55	0.48	1.00	
(21) depression_21	0.54	0.21	0.62	0.20	0.59	0.46	0.18	0.57	0.61	0.77	0.66	0.61	0.64	0.63	0.62	0.74	0.81	0.66	0.32	0.61	1.00

Note: All the correlation coefficients are significant at 0.001 level of significance.

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5.3 Conclusion

The Nepali version of the DASS-21 demonstrated good reliability, showing adequate Cronbach's alpha and convergent validity depicting significant negative correlations with domains of QOL. There were some issues with factor structure, suggesting that the scale may not be able to distinguish the individual states of depression, anxiety, and stress. Further validation studies of the Nepali version of the DASS-21, including with other age groups, are required. The following chapters present the results of the survey, with Chapter 6 describing the study variables and Chapters 7 to 9 presenting the results in relation to the risk factors of mental health symptoms, QOL, and the mental health of left-behind older parents respectively.

Chapter 6 – Descriptive Statistics of the Study Variables

6.1 Chapter overview

The first of four results chapters, this chapter presents the descriptive statistics of the study variables. Depending upon the type of measurements used, variables are presented as means, standard deviations, medians, or proportions. The chapter commences with an overview of the socio-demographic characteristics of the study participants, followed by their health-related characteristics, lifestyle habits, social support and social participation, child(ren)-related characteristics, migration status of children, mental health, and QOL (Chapter 4 detailed the variables measured). Sample characteristics and study variables are compared using *t*-test, or one-way ANOVA by left-behind status of older parents, with being 'left-behind' defined as the parent 'having a child living outside the municipality in which the parent was living for a duration of three months or more at the time of survey'. Most of the participants (87.8%, n = 697) had a migrated adult child at the time of survey.

6.2 Socio-demographic characteristics

Socio-demographic characteristics of the study sample are presented in Table 6.1, below. Approximately half of the participants were male (52.2%). The average age of participants was 71.1 (SD = 8.2) years, with almost half (47.9%) aged between 60 and 70 years. The average number of household members was 5.0 (SD = 2.8). A large proportion of participants were married (61.0%), of *Brahmin/Chhetri* caste (56.1%), currently working (55.0%), and living with their spouse (62.9%). More than half (58.4%) reported agriculture as their main source of household income. A similar proportion (57.7%) reported receiving an old age allowance from the government, and about one fifth (19.3%) received a pension.

Table 6.1. Sample characteristics by migration status of children

Characteristics		*n* (%) or mean ± *SD*			
		Total (*N* = 794)	Migration of children		p^a
			No (*n* = 97)	Yes (*n* = 697)	
Gender	Female	380 (47.9)	51 (52.6)	329 (47.2)	0.321
	Male	414 (52.1)	46 (47.4)	368 (52.8)	
Age years	Mean ± *SD*	71.1±8.2	72.7±8.6	70.9±8.1	0.044
Age category (years)	60 to 69	380 (47.9)	40 (41.2)	340 (48.8)	0.334
	70 to 79	273 (34.4)	36 (37.1)	237 (34.0)	
	80 and above	141 (17.8)	21 (21.7)	120 (17.2)	
Family size	Mean ± *SD*	5.0 ± 2.8	5.5 ± 3.0	4.9 ± 2.8	0.050
Education	Unable to read/write	377 (47.5)	51 (52.6)	326 (46.8)	0.283
	Can read or write	417 (52.5)	46 (47.4)	371 (53.2)	
Marital status	Married	484 (61.0)	53 (54.6)	431 (61.8)	0.173
	Single	310 (39.0)	44 (45.4)	266 (38.2)	
Ethnicity	*Brahmin/Chhetri*	445 (56.1)	42 (43.3)	403 (57.8)	0.003
	Dalit	105 (13.2)	14 (14.4)	91 (13.1)	
	Indigenous	181 (22.8)	25 (25.8)	156 (22.4)	
	Other	63 (7.9)	16 (16.5)	47 (6.7)	
Working status	Not currently working	357 (45.0)	47 (48.5)	310 (44.5)	0.461
	Currently working	437 (55.0)	50 (51.6)	387 (55.2)	
Main source of household income	Agriculture/livestock	464 (58.4)	60 (61.9)	404 (58.0)	0.466
	Other	330 (41.6)	37 (38.1)	293 (42.0)	
Living arrangement	Living alone	38 (4.8)	6 (6.2)	32 (4.6)	0.082
	Living with spouse	499 (62.9)	51 (52.6)	448 (64.3)	
	Living with others	257 (32.4)	40 (41.2)	217 (31.1)	
Household wealth quintile	Lowest	159 (20.0)	12 (12.5)	147 (21.2)	0.162
	Second	158 (20.0)	20 (20.8)	138 (19.9)	
	Middle	159 (20.0)	16 (16.7)	142 (20.4)	
	Fourth	158 (20.0)	24 (25.0)	134 (19.3)	
	Highest	158 (20.0)	24 (25.0)	134 (19.3)	
Receiving pension	No	641 (80.7)	78 (80.4)	563 (80.8)	0.932
	Yes	153 (19.3)	19 (19.6)	134 (19.2)	
Receiving allowance	No	336 (42.3)	37 (38.1)	299 (42.9)	0.375
	Yes	458 (57.7)	60 (61.9)	398 (57.1)	
Grandparenting	No	305 (38.4)	31 (32.0)	274 (39.3)	0.163
	Yes	489 (61.6)	66 (68.0)	423 (60.7)	
Watch television	No	283 (35.6)	42 (43.3)	241 (34.6)	0.093
	Yes	511 (64.4)	55 (56.7)	456 (65.4)	
Read newspaper	No	636 (80.1)	15 (15.5)	554 (79.5)	0.243
	Yes	158 (19.9)	82 (84.5)	143 (20.5)	
Have a mobile phone	No	313 (39.4)	55 (56.7)	258 (37.0)	< 0.001
	Yes	481 (60.6)	42 (43.3)	439 (63.0)	
Adverse life events	No	597 (75.2)	76 (78.3)	521 (74.7)	0.442
	Yes	197 (24.8)	21 (21.7)	176 (25.3)	

[a] *p*-value obtained from chi-square or *t*-test.

About two thirds of older adults (61.6%) had been a carer for their grandchild(ren) during the previous 12 months. Two thirds (64.4%) reported watching television, while only 19.9% read newspapers. The proportion of older adults who reported having a mobile phone was 60.6%. A quarter (24.8%) had experienced an adverse life event in the previous year. Migration of

children was associated with age ($p = 0.044$), ethnicity ($p = 0.003$) and having a mobile phone ($p < 0.001$), while other socio-demographic characteristics reported did not show significant difference across the migration categories (Table 6.1).

6.3 Health-related characteristics

Nearly half (44.3%) of participants perceived their health status as 'fair' (neither 'good' nor 'poor') and 38.7% reported 'good' health. The mean number of chronic conditions was 2.1 ± 1.6 (among the 13 conditions surveyed, range 0 to 13) and the mean score for functional ability was 6.0 ± 2.1 (measured by the IADL, range 0–8), indicating a good functional ability. The mean score for functional ability was significantly higher among older adults with a migrant child (6.2 ± 2.1) compared to older adults with no migrant children (5.3 ± 2.1; $p < 0.001$); the mean score for the number of chronic conditions was higher for the non-migrant group, but the difference was not significant ($p = 0.067$; Table 6.2).

Table 6.2. Health-related characteristics of the study participants

Characteristics	*n* (%) or mean ± *SD*			
	Total (*N* = 794)	Migration of children		p^a
		No (*n* = 97)	Yes (*n* = 697)	
Perceived health status				0.910
Good	307 (38.7)	38 (39.2)	269 (38.6)	
Fair	352 (44.3)	44 (45.4)	308 (44.2)	
Poor	135 (17.0)	15 (15.5)	120 (17.2)	
Chronic conditions[b], mean ± *SD*	2.1 ± 1.6	2.4 ± 1.8	2.0 ± 1.6	0.067
Functional ability (IADL)[c], mean ± *SD*	6.0 ± 2.1	5.3 ± 2.1	6.2 ± 2.1	< 0.001

[a] *p*-value obtained from chi-square or *t*-test.

[b] Possible scores range from 0 to 13, with higher scores indicating more chronic health problems.

[c] Possible scores range from 0 to 8, with higher scores indicating better functional ability.

6.4 Lifestyle habits

The survey included questions related to alcohol consumption, smoking, and physical exercise. Three-quarters (74.4%) abstained from alcohol and 44.1% reported having never smoked. A third (33%) reported engaging in physical exercise 'sometimes', while 41.4% said they 'rarely/never' did. Physical exercise was significantly associated with migration of children in bivariate analysis (p = 0.031), with older adults having a migrant child exercising more frequently (Table 6.3).

Table 6.3. Lifestyle habits of the study participants

Characteristics	*n* (%)			p^a
	Total	Migration of children		
		No	Yes	
Alcohol use				0.836
No	590 (74.4)	73 (75.3)	517 (74.3)	
Yes	203 (25.6)	24 (24.7)	179 (25.7)	
Smoking				0.477
No/never	349 (44.1)	46 (47.4)	303 (43.6)	
Yes (former/current)	443 (55.9)	51 (52.6)	392 (56.4)	
Physical exercise				0.031
Never/rarely	329 (41.4)	52 (53.6)	277 (39.7)	
Sometimes	262 (33.0)	27 (27.8)	235 (33.7)	
Frequently	203 (25.6)	18 (18.6)	185 (26.5)	

[a] *p*-value obtained from chi-square test.

6.5 Social support and social participation

The mean score for social support was 5.1 ± 1.1 (possible range 1 to 7), indicating a high level of social support. The mean score for social participation was 13.9 ± 3.3 (possible range 8 to 24) for social participation. Older adults having a migrant child reported higher levels of social participation compared to older adults with no migrant children (14.1 ± 3.3 versus 13.0 ± 3.4;

p = 0.004), while there was no difference in receiving social support between the two groups (Table 6.4).

Table 6.4. Social support and participation in social activities

Characteristics	mean ± *SD*			
	Total (N = 789)	Migration of children		p
		No	Yes	
Social support (MSPSS score)[a]	5.1 ± 1.1	5.0 ± 1.3	5.1 ± 1.1	0.182
Participation in social activities[b]	13.9 ± 3.3	13.0 ± 3.4	14.1 ± 3.3	0.004

[a] Possible scores range from 1 to 7, with higher scores indicating receiving more social support.

[b] Possible scores range from 8 to 24, with higher scores indicating more participation.

6.6 Child related characteristics

The average number of older adults' children was 4.1 (*SD* = 1.8). Around 5% had daughters only, while the majority (81.2%) had both son(s) and daughter(s). More than three quarters (77.6%) reported that they have at least one child with whom they felt 'very' close. Two thirds (66.5%) reported daily contact with some children (irrespective of the child's location), and 63.1% had some children visiting once a month or more. The mean score for financial support from children was 1.7 (*SD* = 1.1; Table 6.5).

Table 6.5. Child-related characteristics of the study participants

Characteristics	*n* (%) or mean ± *SD*			p^a
	Total	Migration of children		
		No	Yes	
Number of children, mean ± *SD*	4.1 ± 1.8	2.6 ± 1.3	4.4 ± 1.8	< 0.001
Gender composition				< 0.001
Has a son(s) only	112 (14.1)	39 (40.2)	73 (10.5)	
Has a daughter(s) only	37 (4.7)	13 (13.4)	24 (3.4)	
Has a son(s) and a daughter(s)	645 (81.2)	45 (46.4)	600 (86.1)	
Closeness with child				0.114
No	179 (22.6)	28 (28.9)	151 (21.7)	
Yes	614 (77.4)	69 (71.1)	545 (78.3)	
Frequency of communication				< 0.001
Children living together or daily contact with all children	126 (15.9)	60 (61.9)	66 (9.5)	
Daily contact with some children	529 (66.6)	32 (33.0)	497 (71.3)	
Daily contact with no children	139 (17.5)	5 (5.2)	134 (19.2)	
Children's visit				< 0.001
Children living together or daily visit by all children	57 (7.2)	57 (58.8)	0 (0.0)	
All children visiting once a month or more	120 (15.1)	29 (29.9)	91 (13.1)	
Some children visiting once a month or more	503 (63.4)	11 (11.3)	492 (70.6)	
All children visiting less than once a month	114 (14.4)	0 (0.0)	114 (16.4)	
Financial support from children[b], mean ± *SD*	1.7 ± 1.1	1.6 ± 1.2	1.7 ± 1.1	0.062

[a] *p*-value obtained from chi-square, *t*-test, or Fisher's exact.

[b] Possible scores range from 0 to 3, with higher scores indicating more financial support.

Number of children was associated with migration status, with the non-migrant group having fewer children (2.6 ± 1.3 versus 4.4 ± 1.8; $p < 0.001$). The gender of the child(ren) was associated with migration status, with the migrant group having a higher proportion of older adults with both sons and daughters (86.1% versus 46.4%). Similarly, associations between migration status and frequency of communication and children's visit were also significant. Older adults having a migrant child received more financial support from children, but the difference was at cut-off level ($p = 0.062$).

6.7 Migration status of children

Table 6.6, below, presents the proportion of study participants by expanded categories of migration status of children. Only 3.4% ($n = 27$) of participants had all children living together,

while 38.0% (*n* = 302) had no children living together (all children migrated)—in other words, they were empty-nesters. In terms of migration status of children, 12.2% (*n* = 97) had all children living within the municipality, and thus the majority (87.7%) had at least one migrant child. Two thirds (67.5%) had some children who had migrated and a fifth (20.3%) had all children having migrated.

More than half of the participants (52.5%) had a child living outside the country (international migration), with 2.3% (*n* = 18) having had all their children migrate internationally. One third (35.3%) had had child(ren) migrate only internally, while 38.0% had both internally and internationally migrated children (Table 6.6).

Table 6.6. Distribution of study participants by different types of migration of children

Migration type	Total sample (*N* = 794)	
	n	%
Type of migration		
Child living together	27	3.4
Child living in neighbour	25	3.2
Living in the Municipality	45	5.6
Outside the Municipality but within the province	197	24.8
Outside the Province but within country	83	10.5
Outside the country	417	52.5
Empty nest		
Empty nest (no child(ren) living with the older adult)	302	38.0
Non-empty nest (at least one child living with the older adult)	492	62.0
At least one child not living with the older adult		
All child(ren) living with the older adult	27	3.4
At least one child not living with the older adult	767	96.6
Migration, no vs. yes (yes included both internal and international)		
No migrant child	97	12.2
Had a migrant child (both internal and international)	697	87.8
No children migrated vs. some vs. all (both internal and international)		
No children migrated	97	12.2
Some children migrated	536	67.5
All children migrated	161	20.3
Migration, no (within country) vs. international		
No migrant child	377	47.5
Had a migrant child (only international)	417	52.5
Migration, no vs. some vs. all (international)		
No children migrated	377	47.5
Some children migrated (international)	399	50.2
All children migrated (international)	18	2.3
Migration, no vs. internal vs. international		
No children migration	97	12.2
Internal migration	280	35.3
International migration	417	52.5
Migration, no vs. internal vs. international vs. both		
No child migration	97	12.2
Internal migration	280	35.3
International migration	115	14.5
Both internal and international migration	302	38.0

6.8 Mental health status (symptoms of depression, anxiety, and stress)

6.8.1 Mean scores and prevalence

The mental health of the older adults was assessed using the DASS-21 scale, which provides separate scores for the symptoms of depression, anxiety, and stress. The mean scores for the DASS-21 subscales were 4.2 (*SD* = 7.6) for depression, 3.6 (*SD* = 5.0) for anxiety, and 5.1 (*SD* = 7.4) for stress. The DASS subscale scores are categorised into normal, mild, moderate, severe, and extremely severe (Lovibond & Lovibond, 1995a). The mean scores for all the subscales were in the normal range.

The latter four categories (mild, moderate, severe, and extremely severe) were grouped into mental health problem 'present', with the normal category labelled mental health problem 'absent' for each of the three sub-scales. The cut-off scores for the presence of symptoms were: greater than nine for depression, greater than seven for anxiety, and greater than 14 for stress. Based on these cut-off scores, the prevalence of mental health symptoms was 15.4% for depression, 18.1% for anxiety and 12.1% for stress. DASS-21 domain scores, as well as the prevalence of symptoms, were not associated with migration of children (Table 6.7).

Table 6.7 DASS-21 scores and the prevalence of depression, anxiety, and stress symptoms

Characteristics	*n* (%) or mean ± *SD*			p^a
	Total (*N* = 794)	Migration of children		
		No (*n* = 97)	Yes (*n* = 697)	
DASS-21 total score, mean ± *SD*	13.0 ± 18.9	15.4 ± 20.1	12.6 ± 18.7	0.171
Depression, mean ± *SD*	4.2 ± 7.6	5.1 ± 8.0	4.1 ± 7.6	0.235
Anxiety, mean ± *SD*	3.6 ± 5.0	4.4 ± 5.3	3.5 ± 5.0	0.130
Stress, mean ± *SD*	5.1 ± 7.4	6.0 ± 8.1	5.0 ± 7.3	0.216
Prevalence of mental health symptoms				
Any symptoms, *n* (%)				
Depression, *n* (%)	122 (15.4)	19 (19.6)	103 (14.8)	0.218
Anxiety, *n* (%)	144 (18.1)	21 (21.7)	123 (17.7)	0.338
Stress, *n* (%)	96 (12.1)	13 (13.4)	83 (11.9)	0.672

[a]*p*-value obtained from chi-square, *t*-test, or Fisher's exact test.

6.8.2 Depression, anxiety, and stress according to the study variables

Depression, anxiety, and stress symptoms mean scores by study variables are presented in Table 6.8, below. Variables associated with higher scores for mental health symptoms in bi-variate analyses were female gender, unable to read or write, single, currently working, agriculture as the main source of household income, not living with spouse, not watching television or reading the newspaper, and adverse life events.

Older adults who perceived their health status as 'poor' reported significantly higher scores across depression, anxiety, and stress symptoms. Smoking and low levels of physical exercise were associated with higher levels of symptoms. Among the child-related variables, mental health symptoms differed significantly according to closeness with a child (all three symptoms), frequency of communication (anxiety) and children's visit (anxiety and stress), while gender composition of children was not associated with symptoms.

Chapter 7 details the prevalence of mental health symptoms and presents the bi-variate associations of mental health symptoms by study variables where the symptom scores were dichotomised into symptoms present or absent.

Table 6.8. Mean scores for depression, anxiety, and stress according to study variables

Characteristics		Depression		Anxiety		Stress	
		Mean (SD)	p^a	Mean (SD)	p^a	Mean (SD)	p^a
Gender	Female	5.0 (7.9)	0.004	4.5 (5.6)	<0.001	6.2 (7.8)	<0.001
	Male	3.5 (7.3)		2.9 (4.3)		4.1 (6.9)	
Age category (years)	60 to 69	3.9 (7.4)	0.568	3.3 (4.9)	0.1377	4.9 (7.3)	0.535
	70 to 79	4.5 (7.9)		3.7 (4.7)		5.5 (7.3)	
	80 and above	4.5 (7.6)		4.3 (5.7)		5.1 (7.9)	
Education	Unable to read/write	5.2 (8.1)	0.001	4.4 (5.6)	<0.001	6.2 (8.0)	<0.001
	Can read or write	3.3 (7.1)		2.9 (4.4)		4.2 (6.7)	
Marital status	Married	3.7 (7.1)	0.010	3.1 (4.6)	0.0004	4.5 (7.0)	0.006
	Single	5.1 (8.3)		4.4 (5.6)		6.0 (8.0)	
Ethnicity	*Brahmin/Chhetri*	4.2 (7.8)	0.524	3.6 (5.2)	0.251	5.0 (7.7)	0.179
	Dalit	5.2 (7.1)		4.5 (5.1)		6.6 (7.4)	
	Indigenous	3.8 (7.0)		3.4 (5.5)		4.8 (6.8)	
	Other	4.2 (8.9)		3.2 (3.6)		4.5 (7.3)	
Working status	Not currently working	3.5 (6.2)	0.016	4.0 (5.1)	0.055	4.6 (6.3)	0.065
	Currently working	4.8 (8.6)		3.3 (5.0)		5.6 (8.2)	
Main source of household income	Agriculture/livestock	5.1 (8.5)	<0.001	4.1 (5.6)	0.001	5.8 (8.1)	0.003
	Other	3.1 (6.0)		2.9 (4.1)		4.2 (6.2)	

Characteristics		Depression		Anxiety		Stress	
		Mean (SD)	p^a	Mean (SD)	p^a	Mean (SD)	p^a
Living arrangement	Living alone	6.7 (9.3)	0.002	4.2 (6.1)	<0.001	6.7 (8.1)	0.002
	Living with spouse	3.5 (6.9)		3.1 (4.5)		4.4 (6.8)	
	Living with others	5.2 (8.4)		4.7 (5.6)		6.3 (8.2)	
Household wealth quintile	Lowest	5.0 (8.1)	0.281	3.5 (5.6)	0.591	5.4 (8.1)	0.436
	Second	4.7 (8.6)		3.6 (5.0)		5.5 (8.4)	
	Middle	4.2 (7.4)		4.2 (5.5)		5.5 (7.2)	
	Fourth	4.1 (7.3)		3.7 (4.5)		5.3 (7.0)	
	Highest	3.2 (6.6)		3.3 (4.5)		4.1 (6.4)	
Receiving pension	No	4.1 (7.4)	0.446	3.7 (4.9)	0.789	5.0 (7.2)	0.485
	Yes	4.7 (8.6)		3.5 (5.5)		5.5 (8.3)	
Receiving allowance	No	4.1 (7.8)	0.721	3.4 (4.8)	0.249	5.0 (7.5)	0.627
	Yes	4.3 (7.5)		3.8 (5.2)		5.2 (7.4)	
Grandparenting	No	3.8 (7.6)	0.240	3.2 (5.3)	0.039	4.2 (7.0)	0.006
	Yes	4.5 (7.6)		3.9 (4.9)		5.7 (7.6)	
Watch television	No	6.2 (9.5)	<0.001	4.6 (5.9)	<0.001	6.8 (8.9)	<0.001
	Yes	3.1 (6.1)		3.1 (4.4)		4.2 (6.3)	
Read newspaper	No	4.8 (8.0)	<0.001	4.0 (5.3)	<0.001	5.7 (7.8)	<0.001
	Yes	2.0 (5.4)		2.0 (3.4)		2.7 (5.2)	
Have a mobile phone	No	4.7 (7.9)	0.149	4.1 (5.4)	0.0339	5.6 (7.5)	0.114
	Yes	3.9 (7.4)		3.3 (4.7)		4.8 (7.3)	
Adverse life events	No	3.2 (6.5)	<0.001	3.1 (4.7)	<0.001	4.0 (6.4)	<0.001
	Yes	7.4 (9.6)		5.2 (5.5)		8.5 (9.1)	
Perceived health status	Good	2.4 (5.0)	<0.001	2.1 (3.6)	<0.001	3.2 (5.8)	<0.001
	Fair	4.0 (7.5)		4.2 (5.3)		5.2 (7.5)	
	Poor	9.1 (10.3)		5.6 (6.1)		9.3 (8.8)	
Alcohol use	No	4.2 (7.6)	0.624	3.7 (5.1)	0.372	5.0 (7.4)	0.493
	Yes	4.5 (7.5)		3.4 (4.9)		5.4 (7.4)	
Smoking	No/never	3.2 (6.5)	0.001	3.5 (4.8)	0.540	4.6 (6.5)	0.049
	Yes (former/current)	5.0 (8.3)		3.7 (5.2)		5.6 (8.1)	
Physical exercise	Never/rarely	6.3 (9.0)	<0.001	5.2 (5.8)	<0.001	7.0 (8.4)	<0.001
	Sometimes	2.9 (5.7)		3.0 (4.4)		4.0 (5.9)	
	Frequently	2.6 (6.6)		1.9 (3.6)		3.5 (7.0)	
Children composition	Has a son(s) only	5.9 (9.5)	0.190	4.5 (5.6)	0.119	6.6 (9.2)	0.069
	Has a daughter(s) only	5.6 (7.5)		3.5 (4.6)		5.4 (6.1)	
	Has a son(s) and a daughter(s)	3.9 (7.2)		3.5 (4.9)		4.9 (7.1)	
Closeness with child	No	8.9 (10.3)	<0.001	5.9 (5.7)	<0.001	10.0 (9.2)	<0.001
	Yes	2.9 (6.0)		3.0 (4.6)		3.7 (6.2)	
Frequency of communication	Daily contact with all children	5.3 (8.7)	0.221	4.5 (6.1)	0.009	6.4 (8.8)	0.105
	Daily contact with some children	4.0 (7.4)		3.7 (5.0)		5.0 (7.2)	
	Daily contact with no children	4.3 (7.4)		2.7 (3.9)		4.6 (6.9)	
Children's visit	Daily visit by all children	6.1 (8.6)	0.105	5.3 (6.2)	0.002	7.3 (9.4)	0.024
	All children visiting once a month or more	3.9 (7.4)		3.5 (5.1)		5.0 (7.1)	
	Some children visiting once a month or more	4.3 (7.9)		3.8 (5.1)		5.2 (7.5)	
	All children visiting less than once a month	3.1 (5.9)		2.3 (3.6)		3.7 (6.1)	

[a] *p*-value obtained from *t*-test, or ANOVA.

6.8.3 Depression, anxiety, and stress according to the migration status of children

Table 6.9, below, shows the scores for mental symptoms according to the expanded categories of migration status of children. Mental health symptoms were not associated with empty nest status or children's migration status (measured as having a child living outside the municipality). In terms of number of children migrated, older parents with all children migrated had lower anxiety scores. Regarding international migration, parents having a child migrated outside the country had higher anxiety scores compared to parents whose children were all living inside the country.

When internal and international migration was compared with no migrated child, the internal migration group had lower symptom scores, with the difference significant in anxiety (p = 0.001) and stress (p = 0.05). Scores for anxiety and stress symptoms were lowest for parents with an internal migrant adult child, followed by parents whose child did not migrate, both internal and international migration, and were highest for parents whose migrated children were all overseas.

Table 6.9. Mean scores for depression, anxiety, and stress according to different categories of migration status of children

Characteristics	Value	Depression		Anxiety		Stress	
		Mean (*SD*)	p^a	Mean (*SD*)	p^a	Mean (*SD*)	p^a
Type of migration	Child living together	6.2 (9.7)	0.406	5.2 (6.6)	0.005	7.3 (10.7)	0.203
	Child living in neighbour	5.0 (7.7)		5.0 (6.1)		5.3 (7.5)	
	Living in the municipality	4.4 (7.0)		3.5 (3.8)		5.6 (6.6)	
	Outside the municipality but within the province	3.7 (7.4)		3.0 (4.4)		4.4 (7.0)	
	Outside the province but within country	3.3 (7.1)		2.3 (4.1)		4.0 (6.8)	
	Outside the country	4.5 (7.7)		4.0 (5.3)		5.5 (7.6)	
Empty nest	Empty nest (no child living with the older adult)	4.6 (7.9)	0.291	3.5 (5.0)	0.607	5.3 (7.7)	0.609
	Non-empty nest (a child living with the older adult)	4.0 (7.4)		3.7 (5.1)		5.0 (7.3)	
At least one child not living with the older adult	All child(ren) living with the older adult	6.2 (9.7)	0.167	5.2 (6.6)	0.101	7.3 (10.7)	0.129
	At least one child not living with the older adult	4.2 (7.5)		3.8 (4.9)		5.1 (7.3)	
Considering migration as living outside the municipality							
No vs. yes	No migrant child	5.1 (7.8)	0.235	4.4 (5.3)	0.130	6.0 (8.1)	0.216
	Had migrant child (both internal and international)	4.1 (7.6)		3.5 (5.0)		5.0 (7.3)	
No children migrated vs. some vs. all	No children migrated	5.1 (8.0)	0.309	4.4 (5.3)	0.037	6.0 (8.1)	0.146
	Some children migrated	4.3 (7.8)		3.7 (5.1)		5.2 (7.4)	
	All children migrated	3.6 (6.7)		2.8 (4.5)		4.2 (6.9)	
Considering migration as living outside the country							
No (within country) vs. international	No migrant child	3.9 (7.5)	0.308	3.2 (4.6)	0.014	4.7 (7.3)	0.145
	Had migrant child (only international)	4.5 (7.7)		4.0 (5.3)		5.5 (7.6)	
No children migrated vs. some vs. all (international)	No children migrated	3.9 (7.5)	0.547	3.2 (4.6)	0.045	4.7 (7.3)	0.317
	Some children migrated (international)	4.5 (7.8)		4.1 (5.4)		5.5 (7.6)	
	All children migrated (international)	3.8 (5.3)		3.6 (4.3)		4.8 (5.5)	
Considering both internal and international migration							
No vs. internal vs. International	No children migration	5.1 (8.0)	0.134	4.4 (5.3)	0.001	6.0 (8.1)	0.050
	Internal migration	3.5 (7.3)		2.8 (4.3)		4.3 (6.9)	
	International migration	4.5 (7.7)		4.0 (5.3)		5.5 (7.6)	
No vs. internal vs. international vs. both	No child migration	5.1 (8.0)	0.191	4.4 (5.3)	<0.001	6.0 (8.1)	0.069
	Internal migration	3.5 (7.3)		2.8 (4.3)		4.3 (6.9)	
	External migration	5.0 (7.9)		5.0 (6.2)		6.1 (7.5)	
	Both internal and international migration	4.3 (7.7)		3.7 (4.9)		5.3 (7.6)	

[a]*p*-value obtained from chi-square, *t*-test, or ANOVA.

6.9 Quality of life

The mean scores for QOL were 58.8 (*SD* = 19.8) for physical, 63.7 (*SD* = 18.0) for psychological, 60.7 (*SD* = 16.2) for social, and 61.8 (*SD* = 15.0) for environmental domains (Table 6.10). QOL scores across all domains were higher for the migration group, with the difference statistically significant for the physical domain ($p = 0.004$) and at cut-off level for the environmental domain ($p = 0.067$).

Table 6.10. QOL scores

QOL domains	mean ± *SD*			*p*
	Total (*N* = 791)	Migration of children		
		No (*n* = 97)	Yes (*n* = 694)	
Physical domain	58.8 ± 19.8	53.4 ± 19.5	59.6 ± 19.7	0.004
Psychological domain	63.7 ± 18.0	61.7 ± 19.2	63.9 ± 17.8	0.257
Social domain	60.7 ± 16.2	58.8 ± 17.4	61.0 ± 16.0	0.213
Environmental domain	61.7 ± 15.0	59.1 ± 14.0	62.1 ± 15.2	0.067

6.9.1 Quality of life according to the study variables

As shown in Table 6.11, below, several variables were associated with domains of QOL. Older adults who were male, could read or write, were married, living with a spouse, were not receiving an allowance, watched television and read the newspaper, had a mobile phone, reported adverse life events, perceived ‘good’ health status, did not smoke, participated in physical exercise, had both sons and daughters, and who reported being close to a child scored significantly higher across all four domains of QOL. Frequency of communication was significantly associated with social ($p < 0.001$) and environmental ($p = 0.003$) domains, and was at cut-off level with the psychological ($p = 0.057$) domain, with higher contact with children associated with better QOL. Frequency of children’s visits was significantly associated with social domain QOL ($p = 0.005$), with higher frequency of visits correlated with improved social QOL. For physical QOL, the trend was reversed, with more frequent visits indicating poor QOL, although the significance was at cut-off level ($p = 0.052$; Table 6.11).

Table 6.11. Quality of life scores according to the study variables

Characteristics	Value	Physical		Psychological		Social		Environmental	
		Mean (*SD*)	*p*	Mean (*SD*)	*p*	Mean (*SD*)	*p*	Mean (*SD*)	*p*
Gender	Female	54.9 (19.6)	<0.001	60.7 (17.4)	<0.001	57.1 (16.0)	<0.001	60.3 (15.0)	0.009
	Male	62.4 (19.4)		66.3 (18.2)		63.9 (15.7)		63.1 (15.0)	
Age	60 to 69 years	63.8 (18.5)	<0.001	65.0 (16.8)	0.112	62.4 (16)	0.006	63.2 (14.8)	0.028
	70 to 79 years	57.2 (19.6)		62.9 (19.8)		59.8 (16.3)		60.8 (15.0)	
	≥ 80 years	48.6 (19.5)		61.6 (17.5)		57.6 (16)		59.6 (15.5)	
Education	Cannot read or write	53.9 (19.5)	<0.001	59.6 (17.6)	<0.001	56.4 (15.3)	<0.001	58.1 (14.3)	<0.001
	Can read or write	63.2 (19.0)		67.3 (17.6)		64.5 (16)		65.0 (15.0)	
Marital status	Married	61.5 (19.2)	<0.001	65.7 (18.0)	<0.001	64.4 (15.6)	<0.001	63.0 (14.6)	0.004
	Single	54.5 (19.9)		60.4 (17.6)		54.8 (15.3)		59.8 (15.5)	
Ethnicity	*Brahmin/Chhetri*	59.1 (20.7)	0.009	65.4 (18.0)	0.003	62.8 (15.9)	<0.001	63.9 (14.6)	<0.001
	Scheduled caste (*Dalit*)	55.1 (18.3)		58.9 (17.6)		55.7 (16.8)		57.9 (16.4)	
	Indigenous	57.7 (18.9)		61.6 (18.1)		58.0 (15.1)		59.0 (15.2)	
	Other	65.5 (17.2)		65.3 (16.8)		61.8 (17.8)		60.8 (13.1)	
Working status	Currently not working	54.7 (18.6)	<0.001	63.2 (16.6)	0.499	58.7 (15.7)	0.002	61.4 (14.6)	0.603
	Currently working	62.2 (20.1)		64.1 (19.1)		62.3 (16.5)		62.0 (15.4)	
Main source of household income	Agriculture	57.0 (21.0)	0.003	62.7 (19.8)	0.070	60.8 (16.9)	0.802	61.6 (15.9)	0.673
	Other	61.2 (17.7)		65.0 (15.0)		60.5 (15.1)		62.0 (13.9)	
Living arrangement	Alone	56.5 (21.0)	<0.001	52.0 (20.5)	<0.001	52.5 (14.5)	<0.001	54.5 (15.6)	<0.001
	Living with spouse	61.8 (19.0)		66.1 (17.6)		64.3 (15.3)		63.3 (14.5)	
	Living with others	53.3 (20.0)		60.6 (17.4)		54.8 (16.0)		59.8 (15.6)	
Wealth quintile	Lowest	58.8 (20.1)	0.198	60.9 (19.7)	<0.001	58.4 (15.7)	<0.001	57.7 (16.7)	<0.001
	Second	57.1 (19.9)		62.0 (17.6)		58.0 (16.1)		59.5 (13.1)	
	Middle	57.1 (18.4)		62.3 (15.1)		60.7 (14.1)		59.9 (13.0)	
	Fourth	58.9 (19.4)		63.9 (18.3)		60.4 (16.3)		63.2 (14.3)	
	Highest	61.9 (21.2)		69.3 (18.0)		66.1 (17.6)		68.6 (15.5)	
Receiving pension	No	58.6 (19.6)	0.554	63.1 (17.4)	0.051	60.1 (15.6)	0.040	60.9 (14.8)	0.001
	Yes	59.6 (20.9)		66.2 (20.1)		63.1 (18.4)		65.5 (15.5)	
Receiving allowance	No	63.4 (19.2)	<0.001	65.4 (17.8)	0.018	64.0 (15.39)	<0.001	63.5 (14.3)	0.004
	Yes	55.4 (19.6)		62.4 (18.1)		58.3 (16.4)		60.4 (15.5)	
Watch television	No	53.3 (20.1)	<0.001	57.4 (18.7)	<0.001	54.7 (15.8)	<0.001	56.5 (14.9)	<0.001
	Yes	61.8 (19.0)		67.1 (16.6)		64.0 (15.5)		64.7 (14.3)	
Read newspaper	No	55.6 (19.5)	<0.001	60.8 (17.6)	<0.001	58.2 (15.3)	<0.001	59.3 (14.7)	<0.001
	Yes	71.7 (15.7)		75.4 (14.6)		70.8 (15.8)		71.7 (12.0)	

Characteristics	Value	Physical		Psychological		Social		Environmental	
		Mean (*SD*)	*p*	Mean (*SD*)	*p*	Mean (*SD*)	*p*	Mean (*SD*)	*p*
Have mobile phone	No	53.2 (19.4)	<0.001	59.0 (17.9)	<0.001	57.1 (16.1)	<0.001	57.4 (15.1)	<0.001
	Yes	62.4 (19.2)		66.7 (17.5)		63.0 (15.9)		64.6 (14.3)	
Adverse life events	No	60.2 (18.9)	<0.001	65.9 (16.9)	<0.001	61.5 (16.4)	0.015	62.9 (15.3)	<0.001
	Yes	54.4 (21.9)		56.9 (19.5)		58.2 (15.4)		58.1 (13.8)	
Perceived health status	Good	68.4 (18.5)	<0.001	71.1 (15.6)	<0.001	66.5 (16.1)	<0.001	68.2 (14.3)	<0.001
	Fair	57.2 (16.7)		62.2 (16.2)		58.5 (14.3)		59.4 (12.9)	
	Poor	41.4 (16.9)		50.6 (19.2)		53.2 (16.5)		53.1 (15.7)	
Alcohol intake	No	58.3 (19.8)	0.296	64.3 (17.8)	0.107	60.8 (16.3)	0.550	62.6 (14.8)	0.006
	Yes	60.0 (19.9)		61.9 (18.7)		60.1 (15.8)		59.2 (15.6)	
Smoking habit	No	60.4 (17.9)	0.032	67.1 (15.7)	<0.001	62.6 (15.7)	0.003	64.4 (13.3)	<0.001
	Yes	57.4 (21.1)		60.9 (19.2)		59.2 (16.4)		59.6 (16.0)	
Physical exercise	Never	50.6 (19.3)	<0.001	59.0 (19.9)	<0.001	57.4 (16.2)	<0.001	57.9 (14.8)	<0.001
	Sometimes	59.6 (17.2)		62.9 (15.1)		58.2 (14.0)		59.7 (13.1)	
	Frequently	71.1 (17.1)		72.2 (15.1)		69.1 (16.0)		70.6 (14.2)	
Gender composition of children	Has a son(s) only	56.5 (20.4)	0.041	60.8 (19.4)	0.041	56.7 (18.2)	0.018	60.5 (16.0)	0.037
	Has a daughter(s) only	52.4 (20.8)		59.1 (19.0)		60.4 (14.4)		56.3 (15.0)	
	Has a son(s) and a daughter(s)	59.6 (19.6)		64.4 (17.6)		61.4 (15.8)		62.3 (14.8)	
Closeness with child	No	49.0 (18.6)	<0.001	51.1 (16.8)	<0.001	50.7 (16.4)	<0.001	54.5 (13.0)	<0.001
	Yes	61.6 (19.3)		67.3 (16.7)		63.6 (15.0)		63.8 (15.0)	
Contact with children (frequency of talking with children)	Children living together or daily contact with all children	58.2 (22.5)	0.937	66.2 (19.3)	0.057	65.0 (16.9)	<0.001	62.7 (15.5)	0.003
	Daily contact with some children	59.0 (19.3)		63.8 (17.5)		60.6 (15.9)		62.6 (14.9)	
	Daily contact with no children	58.8 (19.1)		60.9 (18.4)		57.2 (15.8)		57.8 (14.7)	
Children's visit	Children living together or daily visit by all children	52.9 (21.7)	0.052	61.3 (18.8)	0.103	60.5 (18.0)	0.005	59.3 (14.5)	0.229
	All children visiting once a month or more	58.9 (18.7)		67.2 (19.0)		65.5 (16.4)		63.9 (14.5)	
	Some children visiting once a month or more	58.8 (20.0)		63.2 (18.0)		59.9 (16.0)		61.7 (15.3)	
	All children visiting less than once a month	61.9 (18.9)		63.3 (16.1)		59.3 (15.0)		61.0 (14.6)	

6.9.2 Quality of life according to the migration status of children

Table 6.12 shows the scores of QOL domains according to the expanded categories of migration status of children. Empty-nest parents had significantly lower scores in the physical, social, and environmental domains. Having migrated children (being left behind) was associated with higher physical domain scores (p = 0.004), with the significance level at cut-off (p = 0.067), and environmental domain scores, with QOL scores higher among older parents having a migrant child. Further, parents with all children migrated showed significantly higher scores for the physical domain (p = 0.005), with no difference in other domains. QOL scores did not show significant differences between parents having a child migrated internationally compared to parents with all their children living inside the country. When compared to no migration and internal migration, the internal migration group had higher QOL scores, with the difference significant for both the physical (p = 0.008) and environmental domains (p = 0.049).

Table 6.12. Mean scores for QOL domains according to different categories of migration status of children

Characteristics	Value	Physical		Psychological		Social		Environmental	
		Mean (*SD*)	*p*	Mean (*SD*)	*p*	Mean (*SD*)	*p*	Mean (*SD*)	*p*
Type of migration	Child living together	56.3 (20.6)	0.042	65.0 (19.9)	0.383	60.5 (15.8)	0.190	61.8 (12.0)	0.152
	Child living in neighbour	49.4 (21.7)		59.3 (20.7)		54.7 (21.7)		59.4 (17.7)	
	Living in the municipality	53.7 (17.7)		61.1 (18.2)		60.0 (15.8)		57.4 (12.7)	
	Outside the municipality but within the province	60.4 (19.4)		65.3 (16.8)		62.0 (14.7)		63.7 (14.7)	
	Outside the province but within the country	61.3 (20.1)		65.4 (17.9)		63.1 (17.0)		62.1 (15.9)	
	Outside the country	58.9 (19.8)		63.0 (18.3)		69.0 (16.4)		61.4 (15.2)	
Empty nest	Empty nest (no child living with the older adult)	58.4 (19.8)	0.658	61.4 (18.7)	0.0047	58.2 (15.9)	0.0006	59.3 (14.7)	0.0003
	Non-empty nest (a child living with the older adult)	59.1 (19.9)		65.1 (17.4)		62.2 (16.2)		63.3 (15.1)	
At least one child not living with the older adult	All child(ren) living with the older adult	56.3 (20.6)	0.509	65.0 (19.9)	0.7031	60.5 (15.8)	0.9509	61.8 (12.0)	0.9898
	At least one child not living with the older adult	58.9 (19.8)		63.6 (18.0)		60.7 (16.2)		61.8 (15.1)	
Considering migration as living outside the municipality									
No vs. yes	No migrant child	53.4 (19.5)	0.004	61.7 (19.2)	0.257	58.8 (17.4)	0.213	59.1 (14.0)	0.067
	Had migrant child (both internal and international)	59.6 (19.7)		63.9 (17.8)		61.0 (16.0)		62.1 (15.2)	
No children migrated vs. some vs. all	No children migrated	53.4 (19.5)	0.005	61.7 (19.2)	0.275	58.8 (17.4)	0.445	59.1 (14.0)	0.172
	Some children migrated	59.0 (19.8)		63.5 (18.1)		60.9 (16.4)		62.3 (15.3)	
	All children migrated	61.6 (19.5)		65.4 (16.7)		61.2 (14.8)		61.7 (14.8)	
Considering migration as living outside the country									
No (within country) vs. international	No migrant child	58.8 (19.8)	0.930	64.4 (17.7)	0.296	61.4 (16.0)	0.227	62.2 (14.9)	0.443
	Had migrant child (only international)	58.9 (19.8)		63.0 (18.3)		60.0 (16.4)		61.4 (15.2)	
No children migrated vs. some vs. all (international)	No children migrated	58.8 (19.8)	0.993	64.4 (17.7)	0.573	61.4 (16.0)	0.115	62.2 (14.9)	0.632
	Some children migrated (international)	58.9 (19.8)		63.0 (18.3)		60.3 (16.1)		61.3 (15.2)	
	All children migrated (international)	58.5 (21.2)		63.7 (17.1)		53.7 (21.0)		63.4 (16.4)	
Considering both internal and international migration									
No vs. internal vs. International	No children migration	53.4 (19.5)	0.008	61.7 (19.2)	0.141	58.8 (17.4)	0.084	59.1 (14.0)	0.049
	Internal migration	60.6 (19.6)		65.3 (17.1)		62.3 (15.4)		63.3 (15.0)	
	International migration	58.8 (19.8)		63.0 (18.3)		60.0 (16.4)		61.4 (15.2)	
No vs. internal vs. international vs. both	No child migration	53.4 (19.5)	0.008	61.7 (19.2)	0.169	58.8 (17.4)	0.147	59.1 (14.0)	0.107
	Internal migration	60.6 (19.6)		65.3 (17.1)		62.3 (15.4)		63.3 (15.0)	
	External migration	56.6 (20.8)		61.5 (17.2)		59.2 (16.5)		61.0 (15.5)	
	Both internal and international migration	59.8 (19.4)		63.6 (18.7)		60.3 (16.3)		61.5 (15.1)	

6.10 Correlation structure of study variables

Bi-variate association between the variables measured in continuous scale was analysed using the Pearson's correlation coefficient. Strong positive correlations ($r > 0.7$) were observed among the subscales of DASS-21 (depression, anxiety, and stress). All the domains of the WHOQOL-BREF showed moderate positive correlations ($0.3 < r < 0.7$), except the correlation between the environmental and psychological domains of QOL, which showed strong correlation ($r = 0.74$). Similarly, moderate positive correlations were found between the subscales of DASS-21 and domains of QOL. Age was negatively associated with social participation ($r = -0.34$), functional ability ($r = -0.53$), and physical ($r = -0.28$), social ($r = -0.12$) and environmental ($r = 0.09$) QOL. Other variables, including social support, social participation, functional ability, and chronic conditions, showed moderate correlations with the domains of the DASS-21 and WHOQOL-BREF (Table 6.13, below).

Table 6.13. Correlation among the scale (continuous) variables

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	Age	1														
2	Number of children	0.06	1													
3	Family size	0.05	0.07	1												
4	Social support	-0.04	0.00	0.14***	1											
5	Social participation	-0.34***	0.03	-0.06	0.35***	1										
6	Chronic conditions	0.04	-0.06	0.05	-0.09*	-0.16***	1									
7	Functional ability	-0.53***	0.01	-0.16***	0.13***	0.56***	-0.15***	1								
8	Financial support from children	0.01	0.06	0.17***	0.28***	-0.02	0.05	-0.10**	1							
9	Depression	0.02	-0.07	-0.05	-0.47***	-0.24***	0.16***	-0.18***	-0.10**	1						
10	Anxiety	0.07	-0.03	0.03	-0.38***	-0.24***	0.23***	-0.25***	-0.04	0.72***	1					
11	Stress	0.01	-0.06	-0.02	-0.45***	-0.23***	0.21***	-0.18***	-0.11**	0.91***	0.79***	1				
12	Physical QOL	-0.28***	0.01	0.00	0.42***	0.47***	-0.35***	0.51***	0.05	-0.55***	-0.54***	-0.58***	1			
13	Psychological QOL	-0.06	0.02	0.12***	0.58***	0.39***	-0.24***	0.30***	0.15***	-0.65***	-0.52***	-0.62***	0.69***	1		
14	Social QOL	-0.12***	-0.06	0.13***	0.49***	0.31***	-0.13***	0.27***	0.14***	-0.37***	-0.37***	-0.37***	0.54***	0.65***	1	
15	Environmental QOL	-0.09*	-0.01	0.11**	0.51***	0.35***	-0.08*	0.28***	0.11**	-0.41***	-0.42***	-0.41***	0.61***	0.74***	0.67***	1

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

6.11 Conclusion

This results chapter has summarised and presented the descriptive statistics of the study variables. The main outcome variables (mental health and QOL) were further compared across the study variables with the migration status of children. The results showed that the relationship of adult children's migration with their parents' mental health and QOL varied across domains and by type of migration. In the next chapter, findings on prevalence and risk factors of mental health symptoms are presented, with subsequent chapters presenting further results on associations between migration of children and QOL (Chapter 8) and mental health (Chapter 9).

Chapter 7 – Prevalence and Factors Associated with Depression, Anxiety and Stress Symptoms among Older Adults: A Cross-sectional, Population-based Study

7.1 Chapter overview

This chapter presents results relevant to addressing the first research objective: to assess the prevalence of and risk factors for mental health symptoms among older people in Nepal (Thapa et al., 2020b). In this cross-sectional study, mental health symptoms were measured using the 21-item Depression Anxiety Stress Scales (DASS-21), which provides separate scores for symptoms of depression, anxiety, and stress. Based on the cut-off scores, the prevalence of mental health symptoms was calculated. Associations between potential risk factors and mental health symptoms were analysed using multilevel mixed method logistic regression. The mean scores for the DASS-21 subscales were 4.2 (*SD* = 7.6) for depression, 3.6 (*SD* = 5.0) for anxiety and 5.1 (*SD* = 7.4) for stress, with a corresponding prevalence of 15.4%, 18.1%, and 12.1% respectively. Factors positively associated with higher levels of mental health symptoms were being female, working in agriculture, lower household wealth, perceived poor health, smoking, chronic conditions, migration of adult children, and adverse life events. Factors negatively associated were social support, functional ability, receiving an allowance, physical exercise, and participation in social activities.

7.2 Publication

Thapa, D. K.,* Visentin, D., Kornhaber, R., & Cleary, M. (2020). Prevalence and factors associated with depression, anxiety and stress symptoms among older adults: A cross-sectional population-based study. *Nursing and Health Sciences, 22*(4), 1139-1152. https://doi.org/10.1111/nhs.12783 **Corresponding author*

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RESEARCH ARTICLE

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Prevalence and factors associated with depression, anxiety, and stress symptoms among older adults: A cross-sectional population-based study

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Abstract

Despite population aging and the increase in mental health problems, studies on the mental health of older people in developing countries are lacking. This population-based cross-sectional study estimated the prevalence and associated factors for depression, anxiety and stress symptoms among older adults in Nepal. Community-dwelling older adults (N = 794) were interviewed using a questionnaire which consisted of the 21-item Depression Anxiety Stress Scales; and a wide range of sociodemographic, health-related, and lifestyle characteristics; functional ability, social support, participation in social activities, and adverse life events. The prevalence of symptoms was 15.4% for depression, 18.1% for anxiety, and 12.1% for stress. Risk factors for symptoms included female gender, working in agriculture, lower household wealth, perceived poor health, smoking, chronic conditions, migration of adult children, and exposure to adverse life events. Receiving an allowance, physical exercise, functional ability, social support, and participation in social activities were found to have protective effects. The findings indicate the need for community-based interventions, including appropriate diagnosis and treatment of mental health conditions, and mental health promotion programs targeting the risk and protective factors.

KEYWORDS
anxiety, cross-sectional research, depression, mental health, Nepal, older adults, stress

1 | INTRODUCTION

1.1 | Population aging

Population aging is one of the most significant global demographic trends. The proportion of people aged 65 years or over is 9% in 2019 and projected to reach 12% by 2030, 16% by 2050, and 23% by 2100 (United Nations, 2019). While the proportion of older people is higher in high-income countries at present, the greatest change in the near future is projected to occur in low- and middle-income countries. By 2050, 80% of the aging population will live in these countries (WHO, 2018).

Nepal has experienced population ageing in recent years with this trend expected to continue. There were 2.1 million older people aged 60 years and above living in Nepal, comprising 8% of the total population in 2011. The older population in Nepal is growing rapidly (3.8% per year) compared to the annual population growth rate (1.4%) from 2001 to 2011. By 2031, the older people will account for 10.2% of the total population of Nepal, for a total of 3.4 million people (CBS Nepal, 2014).

1.2 | Mental health of older people

The worldwide acceleration in population aging has raised concerns for the mental health of older people. Aging can increase the risk of mental health problems (Phongsavan et al., 2013); subsequently, the prevalence of mental health disorders has been observed to be higher

among the older people (Byers, Yaffe, Covinsky, Friedman, & Bruce, 2010). More than one fifth of adults aged 60 years and above experience a mental disorder (WHO, 2017) with depression, dementia, and anxiety the most common (Benbow, 2009).

Mental disorders in older adults contribute to increased mortality (Andreescu & Varon, 2015; Skoog, 2017), higher suicide rates (Waern et al., 2002), and cognitive disorders (Pálsson, Johansson, Berg, & Skoog, 2000), with negative effects on well-being (Jongenelis et al., 2004) and quality of life (Karlsson et al., 2009; Sousa et al., 2017). Older adults with mental disorders may experience physical health problems such as stroke (Lambiase, Kubzansky, & Thurston, 2014) and heart disease (Tully, Cosh, & Baune, 2013), increased disability and limited capacity to undertake activities of daily living (Gureje, Kola, & Afolabi, 2007; Li et al., 2011), increased use of health and home care services (Marinho, Gherman, & Blay, 2019), financial issues (Gustavsson et al., 2011; Vos et al., 2015), and social isolation (Skoog, 2011). A European study estimated the lifetime prevalence of any mental disorder among individuals older than 65 years was 47.0%, with 35.2% having a mental disorder within the past year (Andreas et al., 2017). A meta-analysis found the lifetime prevalence of depressive disorders for older adults was 16.5% in Western countries (Volkert, Schulz, Harter, Wlodarczyk, & Andreas, 2013). The prevalence of anxiety disorder was 11.4% among older US adults (Reynolds, Pietrzak, El-Gabalawy, Mackenzie, & Sareen, 2015). The prevalence of symptoms of mental disorders is higher than that of clinical diagnoses (Bryant, Jackson, & Ames, 2008; Rowe & Rapaport, 2006).

Most studies on mental disorders among older people have been conducted in high-income countries, with similar studies less common in developing countries such as Nepal. Studies suggest higher prevalence of mental disorders among older people compared to younger adults (Jha et al., 2019). A systematic review among older people in Nepal (Thapa, Visentin, Kornhaber, & Cleary, 2018a) reported prevalence of depressive symptoms ranging from 25.5 to 60.6% among community-dwelling older adults. More recent studies also reported higher prevalence of depressive symptoms (Subedi, Shrestha, & Thapa, 2018, 49.4%; Sharma, Yadav, & Battachan, 2018, 65.2%; Manandhar et al., 2019, 53.1%; Devkota, Mishra, & Shrestha, 2019, 49.2%), all using the GDS-15. Devkota et al. (2019), using the University of California, Los Angeles (UCLA) scale, found 55.6% of older adults showing the symptoms of loneliness; the same was reported to be 68.7% by Chalise (2010). Subedi, Tausig, Subedi, Broughton, and Williams-Blangero (2004) used the DSM-III-R and found an 18% prevalence of any psychiatric disorder with a 5.5% prevalence of lifetime somatization and anxiety in community settings. Sapkota and Pandey (2012) found all older adults in their study experienced stress with around 60% having moderate or severe level of stress, using a scale developed by the researchers. Timalsina (2013) reported a 32.4% prevalence of anxiety symptoms among older people living in aged-care homes using the Hamilton Anxiety Scale.

The correlates of mental health conditions among older people may differ from younger cohorts, with differing levels of exposure and impacts (Beekman et al., 2000). Older people are more likely to experience life stressors related to functional ability, cognition, mobility, chronic pain, fragility and bereavement (WHO, 2017). These factors may contribute to mental disorders such as depression, anxiety, stress, isolation, loneliness or psychological distress in older people. Vink, Aartsen, and Schoevers (2008) provided a comprehensive review on the risk factors for depression and anxiety among older adults. Common risk factors for depression and anxiety were female gender, lack of social support, adverse life events, functional limitations, chronic health conditions, poor self-perceived health, personality traits, inadequate coping strategies, and psychopathology. This review found many similarities between the risk factors for depression and anxiety. Furthermore, there was considerable overlap between the risk factors for symptoms and disorders for depression and anxiety, suggesting that the risk factors may not differ for the whole continuum of severity.

1.3 | Present study

Most studies on mental health of older people focus on specific disorders such as depression or dementia (De Almondes, Costa, Malloy-Diniz, & Diniz, 2016; Sharifi et al., 2016) neglecting other common mental health conditions such as anxiety and stress-related disorders (Skoog, 2011; Volkert et al., 2013). In Nepal, most studies used small-scale convenience samples from urban and satellite (semi-urban) areas (Devkota et al., 2019; Joshi, 2018) and conducted in hospital settings (Ghimire et al., 2018; Poudel & Belbase, 2019) or aged care homes (Ananta, 2020; Shrestha, Ojha, Dhungana, & Shrestha, 2020). The majority assessed depression, with limited focus on other mental health conditions such as anxiety and stress (Thapa et al., 2018a). Studies concerning the comprehensive set of risk factors of mental health conditions among this vulnerable population are also lacking. This population-based study conducted in Nepal attempts to address the gap in literature on mental health among older adults in the developing world. The objectives of the study were: to estimate the prevalence of depression, anxiety, and stress symptoms among the older adults, and to identify the risk and protective factors associated with these symptoms, which has not been previously conducted in Nepal.

A companion report from this study reporting on the quality of life of older adults left behind is in press (Thapa, Visentin, Kornhaber, & Cleary, 2020), with two additional reports on the validation of the Depression Anxiety Stress Scales (DASS-21) and the mental health of the left-behind older parents currently under review.

2 | METHOD

2.1 | Study design and participants

This study is a part of a larger cross-sectional population-based study to assess the impact of adult children's migration on mental health and quality of life of older parents “left-behind.” The study setting was the Rupandehi and Arghakachi districts of Province 5 in Nepal. A

multistage random sampling technique was employed. Three municipalities were randomly selected by lottery method from each of the two districts giving rise to six municipalities. All municipalities selected were rural settings. From each of the municipalities, three smaller units (wards) were randomly selected. A sampling frame of adults aged 60 years or above living in the selected wards was developed from the Nepal Election Commission 2017 Voters' List. From this sampling frame participants were selected using computer-aided simple random sampling. The study did not identify more than one participant from the same household. The inclusion criteria were older people with at least one child aged 18 years or older. Participants who were unable to provide consent, those institutionalized (hospital or aged care home) or not able to speak the Nepali language were excluded.

2.2 | Measures

2.2.1 | Mental health symptoms (dependent variables)

Mental health symptoms were assessed using the Depression Anxiety Stress Scales (DASS-21) developed by Lovibond and Lovibond (1995a). The DASS-21 has been extensively used in research with older adults (Gholamzadeh & Pourjam, 2019; Manaf, Mustafa, Rahman, Yusof, & Aziz, 2016; Supasiri, Lertmaharit, Rattananupong, Kitidumrongsuk, & Lohsoonthorn, 2019). Gloster et al. (2008) demonstrated the discriminant validity of the DASS-21 among older adults with higher DASS-21 scores predicting the diagnostic presence of depression and anxiety disorders. The scale consists of 21 items divided into three subscales for depression, anxiety, and stress consisting of seven items each. Participants rated the extent to which they experienced symptoms over the past week on a 4-point Likert scale (0 "Did not apply at all" to 3 "Applied very much or most of the time"). Subscale scores range from 0 to 21 for each subscale. DASS-21 raw scores are doubled to equate to the original 42-item DASS. The DASS subscale scores are categorized into normal, mild, moderate, severe, and extremely severe. The latter four categories were re-grouped into mental health problem "present" with the normal category labeled as "absent" for each of the three subscales. The cut off scores are >9 for depression, >7 for anxiety, and >14 for stress (Lovibond & Lovibond, 1995b).

Tonsing (2014) performed a validation study on the Nepalese version of the DASS-21 among Nepalese speaking adults aged 18 to 60 years living in Hong Kong using the Exploratory Factor Analysis, which found to support the original 3-factor DASS-21 model. The Nepalese version of the DASS-21 (Tonsing, 2014) was refined for this study. The Cronbach alpha values of DASS-21 in our study was 0.95 for the overall scale, 0.93 for depression, 0.79 for anxiety, and 0.91 for stress. A factor analysis of the psychometric properties has been submitted for publication elsewhere (authors under review), which identified that the scale had validity and reliability among older adults residing in Nepal.

2.2.2 | Demographic and socioeconomic factors

Individual level demographic and socioeconomic factors included were sex, age, education, marital status, present occupation, and whether the individual is receiving a pension, or an allowance. Other questions involved grandparenting, whether they watched television, read newspapers, had a mobile phone, and number of children.

Sociodemographic variables measured at household level were ethnicity, living arrangements, main source of household income, number of family members, household wealth index, and migration of adult children outside the country. The survey asked a number of questions about ownership of household properties and assets including items such as bicycle, radio, television, computer, refrigerator, as well as availability of, and access to, electricity, tap water, and flushable toilet. The items were similar to those used in the Nepal Demographic and Health Survey 2016 (Ministry of Health Nepal, New ERA, & ICF, 2017). The wealth index was generated by principal component analysis and categorized into five groups among the sample (quintiles): lowest, second, middle, fourth, and highest. Migration of children was assessed by asking whether any child(ren) lived outside the country at the time of survey.

2.2.3 | Health related characteristics

Self-perceived health status was measured by the question "In general, compared with other people of your age, how do you describe your health?" with response options: "good," "fair" and "poor." The number of chronic conditions was self-reported from a list of 13 common conditions (high blood pressure, diabetes, heart disease, cancer, stroke, arthritis, backache, liver or gallbladder disease, kidney disease, respiratory problems, uric acid/gout, gastritis, and visual/hearing impairment) in line with other studies on older people in Nepal (Gautam, Saito, Houde, & Kai, 2011) and elsewhere (Kim, Choe, & Chae, 2009).

2.2.4 | Lifestyle characteristics

Lifestyle habits of older adults included alcohol use, smoking, and physical exercise. Alcohol use was assessed as abstainer, infrequent, moderate, and excessive with the latter two categories merged for analysis. Smoking was categorized into never, former, and current with the latter two categories merged for analysis. Participants reported engagement in physical activity as never/rarely, sometimes, and frequently.

2.2.5 | Functional ability

Functional ability was measured by Instrumental Activities of Daily Living (IADL; Lawton & Brody, 1969). The IADL score ranges from 0 (low function, dependent) to 8 (high function, independent).

Adequate psychometric properties of the scale have been reported in other studies among older adults in Nepal (Chalise, 2010) and elsewhere (Chi et al., 2005; Suchy, Kraybill, & Franchow, 2011). Cronbach's alpha of the IADL in this study was 0.80.

2.2.6 | Social support

Social support was measured using the Multidimensional Scale of Perceived Social Support (MSPSS), which comprises 12 items related to an individual's perception of the level of social support received from family members, friends, and significant others (Zimet, Dahlem, Zimet, & Farley, 1988). Items are scored on a 7-point Likert scale ranging from 1 (*very strongly disagree*) to 7 (*very strongly agree*) with possible scores from 12 to 84. The MSPSS total reflects the average score for the 12 items; thus, scores range from 1 to 7. The scale has been previously used in the older population (Cao, Li, Zhou, & Zhou, 2015). The reliability coefficient of the MSPSS in our study was 0.94.

2.2.7 | Participation in social activities

Participation in social activities was measured by engagement in eight different social activities; political associations, volunteer groups, formal committees of community-based organizations, neighborhood/residential associations, domestic work, agricultural work, meeting friends, and attending religious activities. The responses range from "participate everyday (coded as 3)" to "never participate (coded as 1)." The scores of the eight questions are summed with higher scores indicating more active participation in social activities (total scores range from 8 to 24). Similar measures have been used in previous studies to measure social engagement (Gautam, Saito, & Kai, 2007) in Nepal. The reliability coefficient (Cronbach's alpha) in our study was 0.76.

2.2.8 | Adverse life event

Adverse life events assessed loss of family members, close friends, and/or relatives during the past year.

2.3 | Data collection

Ethical approval was obtained from the University of Tasmania (Ethics number H0017555) and the Nepal Health Research Council (Registration number 729/2018). The questionnaire initially developed in English was translated into Nepali and piloted among 30 older adults prior to the data collection. Ten experienced research assistants were recruited for fieldwork and trained in interviewing using the instruments. Individual face-to-face interviews were conducted at the participant's homes between May and July 2019, and data were recorded using android tablets using the Research Electronic Data Capture (Harris et al., 2009). A total of 810 interviews were conducted, among which 794 completed the survey and were analyzed.

2.4 | Statistical analysis

Sample characteristics are presented using frequencies and percentages for categorical variables and means, standard deviations, and ranges for continuous variables. Characteristics were compared using chi-square tests for categorical and *t*-tests for scale variables. Assessment of collinearity between the independent variables by Pearson's correlation coefficient ($|r| > 0.50|$) found significant correlation between sex and education ($r = 0.58$); age and receiving allowance ($r = 0.57$); age and IADL ($r = -0.51$); having a mobile phone and IADL ($r = 0.54$); and education and reading newspapers ($r = 0.58$). Due to the observed collinearity between exposure variables and low association with outcome measures, age, education and have a mobile phone were not included in the multivariate models. Multilevel mixed-effects logistic regression, involving three-level models (districts, municipalities, and participants), investigated associations of mental health outcomes with the risk factors. The multivariate analyses initially included all variables and final reduced models were arrived from manual backward selection method including only variables significant at $P < 0.05$. Analyses were conducted using the Stata version 16 (StataCorp, 2017).

3 | RESULTS

3.1 | Sample characteristics

Tables 1 and 2 provide the descriptive statistics of sample characteristics measured in categorical and continuous scales respectively. The mean age of the study participants was 71.1 (SD = 8.2) years. Highest categories of all participants for categorical variables were male gender (52.1%), aged 60 to 69 years (47.9%), unable to read or write (47.5%), married (61.0%), and working in agriculture (47.1%). Most participants (57.7%) reported receiving an allowance, mostly the non-contributory old age allowance, provided by the government, with a smaller proportion (19.3%) receiving pension. A majority of the older adults (61.6%) had been a carer for their grandchild(ren) during the previous 12 months.

Around half (44.3%) of the respondents perceived their health status as "fair" (neither "good" nor "poor"). Three-quarters abstained from alcohol consumption and 44.1% reported having never smoked. More than half of the respondents had at least one child who had migrated to another country, and 24.8% had witnessed an adverse life event in the previous year.

The mean number of chronic conditions reported was 2.1 (SD = 1.6). The mean scores were 6.0 (SD = 2.1) for functional ability, 5.1 (SD = 1.1) for social support, and 13.9 (SD = 3.3) for social participation. The mean scores for the DASS-21 subscales were 4.2 (SD = 7.6) for depression, 3.6 (SD = 5.0) for anxiety, and 5.1 (SD = 7.4) for stress (Table 2). The correlations between the three subscales of the DASS-21 in this study were strong and statistically significant ($P < 0.001$),

TABLE 1 Socio-demographic characteristics and study variables (N = 794)

Characteristics	n (%)
Gender	
Female	380 (47.9)
Male	414 (52.1)
Age (years)	
60 to 69	380 (47.9)
70 to 79	273 (34.4)
80 and above	141 (17.8)
Education	
School education	171 (21.5)
Literate, but no schooling	246 (31.0)
Unable to read or write	377 (47.5)
Marital status	
Married	484 (61.0)
Single	310 (39.0)
Ethnicity	
Brahmin/Chhetri	445 (56.1)
Dalit	105 (13.2)
Indigenous (*Janajati/Adibashi*)	181 (22.8)
Other (*Newar, Madheshi, Mushlim*)	63 (7.9)
Present occupation	
Currently not working	241 (30.4)
Agriculture	374 (47.1)
Household duties	116 (14.6)
Other (business, labor, service)	63 (7.9)
Main source of household income	
Agriculture/livestock	464 (58.4)
Business/self-employed	85 (10.7)
Foreign employment	80 (10.1)
Other (service, labor, pension, etc.)	165 (20.8)
Living arrangement	
Living alone	38 (4.8)
Living with spouse	499 (62.9)
Living with others	257 (32.4)
Household wealth quintile	
Lowest	159 (20.0)
Second	158 (20.0)
Middle	159 (20.0)
Fourth	158 (20.0)
Highest	158 (20.0)
Receiving pension	
No	641 (80.7)
Yes	153 (19.3)
Receiving allowance	
No	336 (42.3)
Yes	458 (57.7)
Grand-parenting	
No	305 (38.4)
Yes	489 (61.6)

(Continues)

TABLE 1 (Continued)

Characteristics	n (%)
Watch television	
Daily	339 (42.7)
Sometimes	172 (21.7)
Never	283 (35.6)
Read newspaper/magazines	
No	636 (80.1)
Yes	158 (19.9)
Have a mobile phone	
No	313 (39.4)
Yes	481 (60.6)
Perceived health status	
Good	307 (38.7)
Fair	352 (44.3)
Poor	135 (17.0)
Alcohol use	
Abstain	590 (74.4)
Infrequent	132 (16.7)
Moderate/extreme	71 (9.0)
Smoking	
No/never	349 (44.1)
Yes (former/current)	443 (55.9)
Physical activity	
Never/rarely	329 (41.4)
Sometimes	262 (33.0)
Frequently	203 (25.6)
Migration of children	
No	377 (47.5)
Yes	417 (52.5)
Adverse life events	
No	597 (75.2)
Yes	197 (24.8)

with the correlation coefficients between depression and anxiety 0.72, depression and stress 0.91, and anxiety and stress 0.79.

Table 3 presents the mental health status of the older adults based on the scores of DASS-21 subscales. The prevalence of depressive, anxiety, and stress symptoms were 15.4, 18.1 and 12.1%, respectively. Among the total sample, 22.9% had at least one, 13.6% had at least two of three, and 9.1% had all three symptoms. Further, 11.2% showed depression and anxiety, 10.8% showed depression and stress, and 9.7% showed anxiety and stress symptoms.

3.2 | Sample characteristics by mental health symptoms

Table 4 presents the participant characteristics by depression, anxiety, and stress. In bivariate analyses; sex, education, occupation, main source of household income, watching television, reading newspapers, perceived health, smoking, physical activity, living arrangement, adverse life

TABLE 2 Descriptive statistics for continuous variables

	N	Possible range	Mean	SD	Min	Max
Age (years)	794	≥60	71.1	8.2	60.0	107.0
Number of family members	794	—	5.0	2.8	1	19
Number of children	794	—	4.2	1.8	1	10
Number of chronic conditions	794	0–13	2.1	1.6	0	9
Functional ability (IADL score)	788	0–8	6.0	2.1	0.0	8.0
Social support (MSPSS score)	790	1–7	5.1	1.1	1.0	7.0
Participation in social activities	789	8–24	13.9	3.3	8.0	24.0
DASS-21						
DASS-21 total	794	0–126	13.0	18.9	0.0	106.0
Depression	794	0–42	4.2	7.6	0.0	40.0
Anxiety	794	0–42	3.6	5.0	0.0	36.0
Stress	794	0–42	5.1	7.4	0.0	38.0

Abbreviations: DASS-21, Depression Anxiety Stress Scales; IADL, Instrumental Activities of Daily Life; MSPSS, Multidimensional Score of Perceived Social Support; N, sample size; SD, standard deviation.

TABLE 3 Depression, anxiety and stress categories, based on scores of DASS-21 subscales

	Depression		Anxiety		Stress	
	n	%	n	%	n	%
Absent (normal)	672	84.6	650	81.9	698	87.9
Present	122	15.4	144	18.1	96	12.1
Mild	31	3.9	37	4.7	43	5.4
Moderate	47	5.9	74	9.3	25	3.2
Severe	18	2.3	18	2.3	23	2.9
Extremely severe	26	3.3	15	1.9	5	0.6

events, number of children, number of self-reported chronic conditions, functional ability (IADL score), social support (MSPSS score), and social participation were significantly associated ($P < 0.05$) with depression. Similarly, characteristics that were significantly associated ($P < 0.05$) with anxiety included sex, education, marital status, grandparenting, watching television, reading newspapers, perceived health, physical activity, living arrangement, migration of children, adverse life events, number of self-reported chronic conditions, functional ability, social support, and social participation. Occupation, main source of household income, watching television, reading newspaper/magazines, perceived health, smoking habit, physical activity, adverse life events, number of chronic conditions, functional ability, social support, and social participation were significantly associated ($P < 0.05$) with stress.

3.3 | Factors associated with mental health symptoms

Table 5 presents the multivariate logistic regression analyses estimating the risk factors of mental health symptoms among the older adults. In the final adjusted model, several factors were positively associated with depressive symptoms: adverse life events (OR = 4.14, 95% CI: 2.39, 7.19); perceiving health status as poor (OR = 3.41, 95% CI: 1.69, 6.86) versus good; working in agriculture (OR = 2.54, 95% CI: 1.29, 5.00) versus currently not working; smoking (OR = 2.04, 95% CI: 1.16, 3.59); and the number of chronic conditions (OR = 1.24, 95% CI: 1.05, 1.46). Factors negatively associated with depressive symptoms were: being in a household from the middle wealth quintile (OR = 0.37, 95% CI: 0.16, 0.85) versus lowest quintile group; social support (OR = 0.39, 95% CI: 0.31, 0.48); receiving an allowance (OR = 0.47, 95% CI: 0.27, 0.82); male gender (OR = 0.51, 95% CI: 0.29, 0.91); and functional ability (OR = 0.83, 95% CI: 0.72, 0.94).

Factors positively associated with anxiety in the final model included: adverse life events (OR = 3.39, 95% CI: 2.08, 5.53); working in agriculture (OR = 2.07, 95% CI: 1.13, 3.77) versus currently not working; perceiving health status as fair (OR = 1.80, 95% CI: 1.02, 3.16) or poor (OR = 1.97, 95% CI: 1.01, 3.84) versus good health status; migration of children (OR = 1.95, 95% CI: 1.22, 3.10); and number of chronic conditions (OR = 1.37, 95% CI: 1.19, 1.58). Several factors were negatively associated with anxiety: frequently participating in physical exercise (OR = 0.41, 95% CI: 0.20, 0.85) versus rarely/never participating; receiving social support (OR = 0.49, 95% CI: 0.40, 0.59); male gender (OR = 0.55, 95% CI: 0.33, 0.91); receiving an allowance (OR = 0.58, 95% CI: 0.35, 0.96); and functional ability (OR = 0.78, 95% CI: 0.69, 0.88).

Factors positively associated with stress were: perceiving health status as poor (OR = 4.44, 95% CI: 2.06, 9.56) versus good; adverse life events (OR = 3.37, 95% CI: 1.88, 6.03); receiving a pension (OR = 2.19, 95% CI: 1.09, 4.40); working in agriculture (OR = 2.05, 95% CI: 1.00, 4.18) versus currently not working; and number of chronic conditions (OR = 1.23, 95% CI: 1.04, 1.46). Factors negatively associated with stress in the final model were: having a remittance

TABLE 4 Sample characteristics by depression, anxiety and stress status

Characteristics	Depression			Anxiety			Stress		
	Absent (n = 672) n (%)	Present (n = 122) n (%)	*P*-value[a]	Absent (n = 650) n (%)	Present (n = 144) n (%)	*P*-value[a]	Absent (n = 698) n (%)	Present (n = 96) n (%)	*P*-value[a]
Gender			0.022			<0.001			0.079
Female	310 (81.6)	70 (18.4)		289 (76.1)	91 (24.0)		326 (85.8)	54 (14.2)	
Male	362 (87.4)	52 (12.6)		361 (87.2)	53 (12.8)		372 (89.9)	42 (10.1)	
Age (years)			0.971			0.657			0.770
60 to 69	322 (84.7)	58 (15.3)		315 (82.9)	65 (17.1)		337 (88.7)	43 (11.3)	
70 to 79	230 (84.3)	43 (15.8)		223 (81.7)	50 (18.3)		237 (86.8)	36 (13.2)	
80 and above	120 (85.1)	21 (14.9)		112 (79.4)	29 (20.6)		124 (87.9)	17 (12.1)	
Education			0.001			<0.001			0.075
School education	155 (90.6)	16 (9.4)		153 (89.5)	18 (10.5)		155 (90.6)	16 (9.4)	
Literate, but no schooling	217 (88.2)	29 (11.8)		209 (85.0)	37 (15.0)		222 (90.2)	24 (9.8)	
Unable to read or write	300 (79.6)	77 (20.4)		288 (76.4)	89 (23.6)		321 (85.2)	56 (14.9)	
Marital status			0.199			0.005			0.313
Married	416 (86.0)	68 (14.1)		411 (84.9)	73 (15.1)		430 (88.8)	54 (11.2)	
Single	256 (82.6)	54 (17.4)		239 (77.1)	71 (22.9)		268 (86.5)	42 (13.6)	
Ethnicity			0.860			0.210			0.296
Brahmin/Chhetri	379 (85.2)	66 (14.8)		366 (82.3)	79 (17.8)		391 (87.9)	54 (12.1)	
Dalit	86 (81.9)	19 (8.1)		79 (75.2)	26 (24.8)		87 (82.9)	18 (17.1)	
Indigenous *(Janajati/ Adibashi)*	153 (84.5)	28 (15.5)		150 (82.9)	31 (17.1)		163 (90.1)	18 (9.9)	
Other *(Newar, Madheshi, Mushlim)*	54 (85.7)	9 (14.3)		55 (87.3)	8 (12.7)		57 (90.5)	6 (9.5)	
Present occupation			0.019			0.440			0.009
Not currently working	215 (89.2)	26 (10.8)		204 (84.7)	37 (15.4)		222 (92.1)	19 (7.9)	
Agriculture	302 (80.8)	72 (19.3)		302 (80.8)	72 (19.3)		314 (84.0)	60 (16.0)	
Household duties	103 (88.8)	13 (11.2)		91 (78.5)	25 (21.6)		107 (92.2)	9 (7.8)	
Other (business, labor, service)	52 (82.57)	11 (17.5)		53 (84.1)	10 (15.9)		55 (87.3)	8 (12.7)	
Main source of household income			0.008			0.051			0.003
Agriculture/livestock	376 (81.0)	88 (19.0)		366 (78.9)	98 (21.1)		392 (84.5)	72 (15.5)	
Business/self-employed	75 (88.2)	10 (11.8)		73 (85.9)	12 (14.1)		76 (89.4)	9 (10.6)	
Foreign employment	74 (92.5)	6 (7.5)		66 (82.5)	14 (17.5)		77 (96.3)	3 (3.8)	
Other (service, labor, pension, etc.)	147 (89.1)	18 (10.9)		145 (87.9)	20 (12.1)		153 (92.7)	15 (7.3)	
Receiving pension			0.534			0.448			0.214
No	545 (85.0)	96 (15.0)		528 (82.4)	113 (17.6)		568 (88.6)	73 (11.4)	
Yes	127 (83.0)	26 (17.0)		122 (79.7)	31 (20.3)		130 (85)	23 (15)	
Receiving allowance			0.636			0.718			0.762
No	282 (83.9)	54 (16.1)		277 (82.4)	59 (17.6)		294 (87.5)	42 (12.5)	
Yes	390 (85.2)	68 (14.9)		373 (81.4)	85 (18.6)		404 (88.2)	54 (11.8)	
Grand-parenting			0.165			0.020			0.124
No	265 (86.9)	40 (13.1)		262 (85.9)	43 (14.1)		275 (90.2)	30 (9.8)	
Yes	407 (83.2)	82 (16.8)		388 (79.4)	101 (20.7)		423 (86.5)	66 (13.5)	
Watch television			<0.001			0.002			<0.001
Daily	303 (89.4)	36 (10.6)		295 (87.0)	44 (13.0)		309 (91.2)	30 (8.9)	
Sometimes	153 (89.0)	19 (11.1)		139 (80.8)	33 (19.2)		159 (92.4)	13 (7.6)	
Never	216 (76.3)	67 (23.7)		216 (76.3)	67 (23.7)		230 (81.3)	53 (18.7)	

(Continues)

TABLE 4 (Continued)

Characteristics	Depression			Anxiety			Stress		
	Absent (n = 672) n (%)	Present (n = 122) n (%)	*P*-value[a]	Absent (n = 650) n (%)	Present (n = 144) n (%)	*P*-value[a]	Absent (n = 698) n (%)	Present (n = 96) n (%)	*P*-value[a]
Read newspaper			<0.001			<0.001			0.001
No	522 (82.1)	114 (17.9)		502 (78.9)	134 (21.1)		547 (86.0)	89 (14.0)	
Yes	150 (94.9)	8 (5.1)		148 (93.7)	10 (6.3)		151 (95.6)	7 (4.4)	
Have a mobile phone			0.323			0.324			0.797
No	260 (83.1)	53 (16.9)		251 (80.2)	62 (19.8)		274 (87.5)	39 (12.5)	
Yes	412 (85.7)	69 (14.4)		399 (83)	82 (17.1)		424 (88.2)	57 (11.9)	
Perceived health status			<0.001			<0.001			<0.001
Good	279 (90.9)	28 (9.1)		277 (90.2)	30 (9.8)		287 (93.5)	20 (6.5)	
Fair	306 (86.9)	46 (13.1)		282 (80.1)	70 (19.9)		314 (89.2)	38 (10.8)	
Poor	87 (64.4)	48 (35.6)		91 (67.4)	44 (32.6)		97 (71.9)	38 (28.2)	
Alcohol use			0.693			0.322			0.390
Abstain	503 (85.3)	87 (14.8)		483 (81.9)	107 (18.1)		524 (88.8)	66 (11.2)	
Infrequent	109 (82.6)	23 (17.4)		104 (78.8)	28 (21.2)		112 (84.9)	20 (15.2)	
Moderate/extreme	59 (83.1)	12 (16.9)		62 (87.3)	9 (12.7)		61 (85.9)	10 (14.1)	
Smoking			<0.001			0.052			0.013
No (never)	314 (90.0)	35 (10.0)		296 (84.8)	53 (15.2)		318 (92.1)	31 (8.9)	
Yes (ever)	356 (80.4)	87 (19.6)		352 (79.5)	91 (20.5)		378 (85.3)	35 (14.7)	
Physical activity			<0.001			<0.001			<0.001
Never/rarely	252 (76.6)	77 (23.4)		235 (71.4)	94 (28.6)		267 (81.2)	62 (18.8)	
Sometimes	236 (90.1)	26 (9.9)		227 (86.6)	35 (13.4)		242 (92.4)	20 (7.6)	
Frequently	184 (90.6)	19 (9.4)		188 (92.6)	15 (7.4)		189 (93.1)	14 (6.9)	
Living arrangement			0.038			0.002			0.252
Living alone	28 (73.7)	10 (26.3)		30 (79)	8 (21.1)		31 (81.6)	7 (18.4)	
Living with spouse	433 (86.8)	66 (13.2)		427 (85.6)	72 (14.4)		445 (89.2)	54 (10.8)	
Living with others	211 (82.1)	46 (17.9)		193 (75.1)	64 (24.9)		222 (86.4)	35 (13.6)	
Household wealth index			0.132			0.495			0.529
Lowest	125 (78.6)	34 (21.4)		133 (83.7)	26 (16.4)		135 (84.9)	24 (15.1)	
Second	131 (82.9)	27 (17.1)		128 (81.0)	30 (19.0)		136 (86.1)	22 (13.9)	
Middle	137 (86.7)	21 (13.3)		122 (77.2)	36 (22.8)		140 (88.6)	18 (11.4)	
Fourth	138 (87.3)	20 (12.7)		131 (82.9)	27 (17.1)		141 (89.2)	17 (10.8)	
Highest	138 (87.3)	20 (12.7)		133 (84.2)	25 (15.8)		143 (90.5)	15 (9.5)	
Migration of children			0.332			0.005			0.224
No	324 (85.9)	53 (14.1)		324 (85.9)	53 (14.1)		337 (89.4)	40 (10.6)	
Yes	348 (83.5)	69 (16.6)		326 (78.2)	91 (21.8)		361 (86.6)	56 (13.4)	
Adverse life events			<0.001			<0.001			<0.001
No	536 (89.8)	61 (10.2)		519 (86.9)	78 (13.07)		549 (92.0)	48 (8.0)	
Yes	136 (69.0)	61 (31.0)		131 (66.5)	66 (33.5)		149 (75.6)	48 (24.4)	
No. of children, mean (SD)	4.2 (1.8)	3.8 (1.8)	0.042	4.2 (1.8)	4.1 (1.9)	0.676	4.2 (1.8)	4 (1.9)	0.410
No. of family member, mean (SD)	5.1 (2.8)	4.7 (2.8)	0.177	5.0 (2.8)	5.0 (3.0)	0.969	5.1 (2.8)	4.7 (2.9)	0.310
No. of chronic conditions, mean (SD)	2.0 (1.6)	2.6 (1.7)	<0.001	1.9 (1.5)	2.8 (1.7)	<0.001	2.0 (1.6)	2.7 (1.6)	<0.001
Functional ability (IADL) score, mean (SD)	6.1 (2.0)	5.5 (2.3)	0.003	6.2 (2.0)	5.2 (2.4)	<0.001	6.1 (2.0)	5.4 (2.3)	0.007
Participation in social activities, mean (SD)	14.2 (3.4)	12.5 (2.4)	<0.001	14.2 (3.4)	12.7 (2.8)	<0.001	14.1 (3.8)	12.5 (2.3)	<0.001
Social support (MSPSS) score, mean (SD)	5.3 (0.9)	3.9 (1.4)	<0.001	5.3 (1.0)	4.1 (1.3)	<0.001	5.3 (1.0)	3.8 (1.4)	<0.001

[a]Chi-square or *t*-test.

TABLE 5 Multivariate logistic regression models (estimating adjusted odds ratio) for associations with DASS-21 subscales[a]

	Depression (N = 780)				Anxiety (N = 784)				Stress (N = 786)			
		P-	95% CI			*P*-	95% CI			*P*-	95% CI	
Variables	OR	value	LL	UL	OR	value	LL	UL	OR	value	LL	UL
Male gender	0.51	0.022	0.29	0.91	0.55	0.019	0.33	0.91	-			
Present occupation *(Currently not working)*	Ref.				Ref.				Ref.			
Agriculture	2.54	0.007	1.29	5.00	2.07	0.018	1.13	3.77	2.05	0.050	1.00	4.18
Household duties	0.85	0.729	0.34	2.14	1.75	0.132	0.84	3.62	0.96	0.934	0.36	2.56
Other (business/self-employed, labor, service)	2.40	0.103	0.84	6.85	2.50	0.074	0.91	6.81	2.07	0.204	0.67	6.36
Ethnicity *(Brahmin/Chhetri)*	-				-				Ref.			
Dalit									1.48	0.301	0.70	3.11
Indigenous *(Janajati/Adhibashi)*									0.46	0.039	0.22	0.96
Other *(Madheshi, Newar, Muslim)*									0.55	0.288	0.18	1.66
Main household income source *(Agriculture/livestock)*	-				-				Ref.			
Business/self-employed									0.52	0.195	0.19	1.40
Foreign employment									0.19	0.011	0.05	0.68
Other (service, labor, pension, allowance)									0.65	0.300	0.28	1.48
Household wealth quintile *(Lowest)*	Ref.				-				-			
Second	0.67	0.306	0.32	1.44								
Middle	0.37	0.020	0.16	0.85								
Fourth	0.50	0.124	0.21	1.21								
Highest	0.59	0.296	0.22	1.58								
Receiving pension	-				-				2.19	0.028	1.09	4.40
Receiving allowance	0.47	0.008	0.27	0.82	0.58	0.033	0.35	0.96	-			
Perceived health status *(Good)*	Ref.				Ref.				Ref.			
Fair	1.27	0.445	0.69	2.35	1.80	0.042	1.02	3.16	1.52	0.229	0.77	3.01
Poor	3.41	0.001	1.69	6.86	1.97	0.047	1.01	3.84	4.44	<0.001	2.06	9.56
Smoking	2.04	0.014	1.16	3.59	-				-			
Physical activity *(Never/rarely)*	-				Ref.				-			
Sometimes					0.74	0.254	0.44	1.24				
Frequently					0.41	0.017	0.20	0.85				
Migration of children	-				1.95	0.005	1.22	3.10	-			
Adverse life events	4.14	<0.001	2.39	7.19	3.39	<0.001	2.08	5.53	3.37	<0.001	1.88	6.03
Functional ability *(Continuous variable)*	0.83	0.005	0.72	0.94	0.78	<0.001	0.69	0.88	-			
Social support *(Continuous variable)*	0.39	<0.001	0.31	0.48	0.49	<0.001	0.40	0.59	0.43	<0.001	0.34	0.54
Participation in social activities *(Continuous variable)*	-				-				0.90	0.047	0.81	0.99
Number of chronic conditions *(Continuous variable)*	1.24	0.011	1.05	1.46	1.37	<0.001	1.19	1.58	1.23	0.015	1.04	1.46

Abbreviations: CI, confidence interval; LL, lower limit; OR, adjusted odds ratio; UL, upper limit. - variable not included in the model.
[a]Reference categories are provided in parentheses and italicized in boldface.

(foreign employment) as the main source of household income (OR = 0.19, 95% CI: 0.05, 0.68) versus agriculture; receiving social support (OR = 0.43, 95% CI: 0.34, 0.54); indigenous ethnicity (OR = 0.46, 95% CI: 0.22, 0.96) versus upper caste groups *(Brahmin/Chhetri)*; and participation in social activities (OR = 0.90, 95% CI: 0.81, 0.99).

4 | DISCUSSION

4.1 | Prevalence of mental health symptoms

Measured by the DASS-21, the prevalence of mental health symptoms among the Nepalese older adults in community setting was 15.4% for depression, 18.1% for anxiety and 12.1% for stress. This study observed comparatively lower prevalence of depressive symptoms compared to other studies (Manandhar et al., 2019; Sharma et al., 2018) conducted in community settings in Nepal which could be due in part to the differences in scales used. Most previous studies on mental health symptoms among older people in Nepal assessed depression using the GDS. Pilania et al. (2019) reported that the GDS as a screening tool generally has higher prevalence compared to other instruments. To our knowledge this study is the first to use the DASS-21 which allows estimates of the prevalence of anxiety and stress as well as depression which were previously under researched in Nepal.

Another explanation for the lower rates observed could be the study setting as most community-based studies measuring prevalence of depression in Nepal were undertaken in urban or semi-urban communities (Devkota et al., 2019; Simkhada, Wasti, Gc, & Lee, 2018), while this study was performed in rural community settings in the Mid-Western region of Nepal. Protective factors such as availability of social support network and engagement in community activities might have contributed to a lower prevalence among community dwelling older adults in this study. Convenience samples used in previous studies may have a directional effect on the results, with low sample size employed in most studies.

The results of this study are comparable with research using the DASS-21 in other countries. Supasiri et al. (2019) reported the prevalence of depression 20.2%, anxiety 25.6% and stress 10.9% among older adults from a community sample in Thailand. A study among the older adults from the general community in Australia (Gomez, Summers, Summers, Wolf, & Summers, 2014) reported the prevalence of severe and extremely severe levels for depression, anxiety and stress were 2.3, 1.9, and 4.1%, respectively, which is comparable to our findings. Our study showed somewhat lower prevalences of depression and anxiety, and a higher prevalence of stress compared to Manaf et al. (2016) who reported the prevalence of depression, anxiety, and stress using the DASS-21 as 27.8, 22.6 and 8.7%, respectively, among older adults in Malaysia, although this used a convenience sample.

4.2 | Factors associated with mental health symptoms

Common risk factors associated with symptoms for all three mental health conditions were: working in agriculture, adverse life events, low social support, perceived poor health status, and chronic diseases. Male gender, receiving an allowance, and functional ability were negatively associated with depressive and anxiety symptoms but not with symptoms of stress. Older adults of indigenous ethnicity (compared to *Brahmin/Chhetri* and *Dalit*) and from households receiving foreign remittances as the main source of income were less likely to have stress symptoms. Somewhat contrary to expectations, older adults receiving a pension (those having retired from permanent employment) had significantly higher stress. This could be attributed to the loss of a professional network and identity after retiring. Migration of adult children outside the country was significantly associated with anxiety, which may be due to concerns about their migrated children, or reduced contact. Unhealthy lifestyle habits were correlated with mental health symptoms, with smoking associated with depression, and low levels of physical exercise associated with anxiety. Participation in social activities reduced symptoms of stress.

These results are, in general, comparable with earlier studies reporting risk factors for poor mental health among the older people. Studies conducted locally (Chalise, 2014; Ghimire et al., 2012) and internationally (Sousa et al., 2017; Vink et al., 2008) have consistently reported females at higher risk of both depression and anxiety in old age. Older adults working in agriculture were found to be more likely to have mental health symptoms compared to those who were not working. The study participants primarily consisted of migrant-sending families with more than half of the participants having one or more children migrated outside of Nepal. When older adults are left behind, they often have more household and income-generation responsibilities, increasing the burden of physically demanding agricultural work common in rural areas as seen in other studies (Chang, Dong, & MacPhail, 2011; Thapa, Visentin, Kornhaber, & Cleary, 2018b). Consistent with our results, other studies have recognized poor perceived general health (Abdul Manaf, Mustafa, Abdul Rahman, Yusof, & Abd Aziz, 2016; Chang-Quan et al., 2009) and the presence of chronic diseases (Apte, Dolas, Choubisa, Jadhav, & Bhaskar, 2018; Timalsina, Sherpa, & Dhakal, 2014) as significant predictors of poor mental health among the older people. Lack of adequate physical activity was a risk factor for anxiety which is consistent with other studies (Chodzko-Zajko et al., 2009; Stubbs et al., 2017). Physical activity, although significantly associated in bivariate analyses, was not retained in the final multivariate models predicting depression and stress.

Several studies have reported associations between mental health symptoms and adverse life events (Chawla, Gour, Goel, & Rohilla, 2018; Welzel et al., 2019), functional ability (Corna et al., 2007; Gauli & Shrestha, 2017), social participation (Amagasa et al., 2017; Gautam et al., 2007), social support (Jongenelis et al., 2004; Vink et al., 2009), and smoking habit (Strine et al., 2008) consistent with those found in this study. A novel finding of this study is the protective effect of the old age allowance for mental health symptoms. The Universal Old Age Allowance, provided by the government of Nepal is often the main source of income for the older people and which is used for household expenses, health related expenditure, education of grandchildren, and traveling (Malakar & Chalise, 2018) and supports low-income households to meet the basic subsistence needs in Nepal (Sony et al., 2014).

Sociodemographic characteristics such as age, marital status, living arrangement, education, and grandparenting were not found to have significant effects on any of the mental health symptoms assessed. Age

and education were excluded from the final model because of the high collinearity with other variables, however models including either age or education did not find either as significant predictors. Previous studies analyzing the association between these social factors and mental health also provided mixed results. With increasing age, there is consequent increase in physical risk factors such as brain atrophy, decrease in testosterone level, and cerebrovascular disease (Blazer & Hybels, 2005). In this study, age was limited to >60, and while age is a known predictor, the non-association could be due to this limited range. A large range of potential risk factors, which vary with age and education, were also assessed, which may have limited the effect of age as an independent predictor (Norton et al., 2006; Sousa et al., 2017).

The risk and protective factors identified in this study should be considered in conjunction with both bivariate and multivariate results. Those variables not retained in the final multivariate models may still have important associations as demonstrated in the bivariate results.

4.3 | Limitations and strengths

The study design was cross-sectional, and hence the analysis does not allow for conclusions regarding causality of the associations between risk factors and mental health outcomes. Voter's list used as a sampling frame in this study may limit the generalizability of the findings as it might have excluded non-registered older adults. The generalizability of the study may also be limited by the eligibility criteria. The survey was conducted in six municipalities of a province in Nepal. Due to the lack of stratification in sampling we ended up only with rural municipalities, limiting its wider generalizability. Symptoms of mental disorders were assessed using a validated screening tool, rather than clinical diagnosis, with data based on self-reported subjective assessments. The study although included a wide range of risk factors, potential factors such as access to health care, history of mental illness, family dysfunction and use of psychotropic medicine were not included.

Notwithstanding these limitations, this study has several strengths. This large-scale community-based study included three aspects of mental health and covered a wide range of variables across several domains. Random sampling techniques, use of standardized and validated instruments, piloting to evaluate the instruments, face-to-face interview by trained interviewers with standardized procedure, and training were used.

4.4 | Study implications

Given the paucity of studies on the mental health of older people in developing countries, this study adds to our understanding by providing a set of risk profiles for common mental health symptoms. The observed risk factors associated with mental health disorders provide a basis for cost-effective preventive interventions (Cuijpers, 2003; Schoevers et al., 2006). Such interventions should incorporate socially protective factors such as promotion of physical activity, establishing social support mechanisms, optimizing functional ability, enabling community involvement of the older adults, provision of public security (e.g. old-age allowance), and identifying and treating accompanying physical illness. Further studies should consider whether addressing these factors reduce the prevalence of mental disorders among this population.

Similar studies in institutional settings are suggested, as psychosocial problems among this group are higher in Nepal (Singh, Singh, Lall, & Jain, 2013). In addition, it would be useful to compare the clinical diagnosis of the psychiatric disorder with assessments of depression, anxiety and stress symptoms. Older adults identified as at risk could be targeted for screening for clinically relevant psychiatric disorders.

The findings of the study indicate a need to provide appropriate training for healthcare staff in identifying potential risk and protective factors as well as risk groups for targeted interventions. Such interventions should consider the prevalence, risk factors and how they can be mitigated in coordination with health and other social service organizations.

5 | CONCLUSION

Mental health disorders are prevalent among older people in Nepal. This study found the prevalence of 15.4% for depression, 18.1% for anxiety, and 12.1% for stress among community-dwelling older adults in Nepal. Female gender, working in agriculture, being in a household from a lower wealth quintile, perceived poor health status, smoking, concurrent chronic conditions, migration of adult children, and exposure to adverse life events were identified as potential risk factors for symptoms of poor mental health. Receiving an old-age allowance, involvement in physical activity, improved functional ability, social support and participation in social activities were found to have a protective effect. Community-based interventions might include appropriate diagnosis and treatment of physical illness, enhancement of social support, and supporting protective factors such as participation in physical activity, participation in local community activities and functional ability. The results of the study could benefit health professionals, educators, and policy makers for the improvement of mental health of older people.

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7.3 Conclusion

The study showed lower prevalence of depression symptoms among older people compared to previous studies conducted in Nepal, which could be due to differences in measurement scales, study design, and settings. As no published community-based studies assessing anxiety- and stress-related disorders in Nepal were found, comparison of the prevalence of anxiety and stress with previous studies was not possible. This study identified a comprehensive set of risk and protective factors for three common mental health conditions among older people. These findings indicate the need for mental health interventions targeting risk and protective factors. Chapter 8 presents results relating to the association of children's migration with the QOL of older parents.

Chapter 8 – Migration of Adult Children and Quality of Life of Older Parents Left-Behind in Nepal

8.1 Chapter overview

This chapter presents the published results of a study by Thapa et al. (2020a) to address the research objective: To identify the association of adult children's migration with the QOL of older parents. QOL was assessed using the WHOQOL-BREF, which provides individual scores for physical, psychological, social, and environmental domains of QOL. Migration of adult children was measured using the following three categories: no migration, internal migration only, and any international migration. Associations between the migration of children and domains of QOL were evaluated using multilevel regression analyses adjusting for a range of sociodemographic variables. The results showed that the QOL scores among parents with a migrant adult child were either higher or no different compared to parents with children who did not migrate. Older parents having internally migrated children showed better physical and environmental QOL compared to older parents whose children did not migrate.

8.2 Publication

Thapa, D. K.,* Visentin, D., Kornhaber, R., & Cleary, M. (2018). Migration of adult children and quality of life of older parents left-behind in Nepal. *Geriatrics and Gerontology International*, *20*(11), 1061-1066. https://doi.org/10.1111/ggi.14047

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ORIGINAL ARTICLE

EPIDEMIOLOGY, CLINICAL PRACTICE AND HEALTH

Migration of adult children and quality of life of older parents left-behind in Nepal

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Aim: Studies regarding the impact of adult children's migration on older parents left-behind have focused on physical and mental health. This study assessed the relationship between migration of adult children and quality of life (QOL) of older parents left-behind in Nepal.

Methods: A cross-sectional community-based survey was carried out (May–July 2019) among 791 randomly selected older adults aged ≥60 years. QOL was measured using the World Health Organization Quality of Life-abbreviated scale, and migration status was assessed into three categories: no migration, internal migration only and any international migration. A range of sociodemographic characteristics were measured for adjustment. Associations between migration of children and each domain of the QOL were examined by multilevel mixed regression.

Results: Scores for QOL were; 58.8 ± 19.8 for physical, 63.7 ± 18.0 for psychological, 60.7 ± 16.2 for social, and 61.8 ± 15.0 for environmental domains. This study identified positive and null associations between the migration of children and QOL for parents, with higher scores for physical (b = 5.16, P = 0.017) and environmental (b = 3.19, P = 0.046) domains among left-behind parents whose children migrated internally compared with parents whose children did not migrate.

Conclusions: The findings differ from previous research showing poorer QOL among left-behind older parents. Migration plays a significant role in shaping physical and environmental QOL among left-behind parents living in rural areas with important implications for migrants, their families, researchers and social scientists. **Geriatr Gerontol Int 2020; 20: 1061–1066**.

Keywords: cross-sectional research, left-behind older parents, migration of children, quality of life, WHOQOL-BREF.

Introduction

By 2050, there will be 2.1 billion people aged ≥60 years (23% of the world's total population), more than double the 2015 estimate of 900 million (13% of the world's total population).[1] Although population aging is more advanced in developed countries, the rate of aging is higher in low- and middle-income countries. The aging population in general reflects improvements in the standard of living and healthcare services.

Disorders among the older population and associated limitations adversely influence the QOL of older adults. QOL is "an individual's perception of his or her position in life in the context of the culture and value system where they live, and in relation to their goals, expectations, standards and concerns".[2] Enhancing QOL in older age by optimizing opportunities for health, participation and security is the major aim of active aging. Aging-related international action plans and conventions have endorsed the importance of QOL, with recent research assessing QOL as a healthcare outcome for older adults.[3]

Phenomenon of migration

The volume of both internal (within the country) and international (outside the country) migration has increased considerably in recent years. In 2019, an estimated 272 million people lived outside their country of birth.[4] Most migrants move within the boundaries of their own country as internal migrants, but there is no systematic practice of documenting internal migration in many developing countries.[5] Work, family and study, in addition to poverty, limited employment opportunities and deteriorating agricultural productivity are major migration drivers. The phenomenon of migration is more prominent in developing countries, such as Nepal, which are experiencing significant increases among youth seeking employment and education abroad.

These demographic and mobility transitions can create considerable pressures on traditional intergenerational family support mechanisms, particularly in rural areas. Outmigration reduces the number of active family members who can provide labor in traditional agricultural households, often resulting in older parents spending more time in physically demanding roles. The physical absence of their child can erode traditional intrafamily care arrangements, and the decreased support can adversely impact their well-being and QOL.

Impact of migration of children on older left-behind parents

Research carried out on the effect of migration of adult children on their older parents has shown inconsistent and conflicting results. Researchers have identified adverse impacts of the emigration of children for left-behind older parents, including poorer

mental health outcomes, such as depression, loneliness and lower levels of cognitive ability.[6] Other negative aspects include physical health conditions, lower functional ability and chronic disease.[7,8]

In contrast, some studies report the left-behind older parents benefiting from migration through the remittance provided by migrant family members. Remittances from migrants might provide older adults better access to healthcare, thereby improving their health and well-being.[9] Migration of children contributed positively to older parents in rural areas, including lower rates of depression, lower mortality and better functional ability.[10,11] There are also studies reporting no significant difference between left-behind and non-left-behind older adults in physical health, mental health and well-being.[12,13]

Among the limited studies regarding the QOL of left-behind older parents, Ye *et al.* found lower health-related QOL among the empty nest rural older adults, particularly those living alone.[14] Zhu *et al.* found no difference in the risk of low QOL for empty nest older adults in China.[15] International migration has been found to be associated with poorer psychological health, whereas internal migration did not affect parental well-being.[13] Guo *et al.* found no difference in depression and life satisfaction, with parents with internationally migrated children having greater concerns regarding lack of care and fewer financial worries.[16]

Present study

Previous studies have largely focused on the impact of a child's migration on physical and mental health rather than the QOL of the left-behind parents. Using the World Health Organization Quality of Life-BREF (WHOQOL-BREF) scale, the present study examined the relationship between the migration of adult children and QOL domains for left-behind older adults. The WHOQOL-BREF is based on subjective evaluation of QOL which approaches QOL as a multidimensional concept. An assessment of QOL involving a number of domains provides a more comprehensive picture of an individual's well-being. Most studies regarding left-behind older adults assessed migration status as a binary variable (a child migrated or not), with limited attempts to differentiate internal and international migration. As there are often different drivers for internal and international migration, the impacts on the left-behind population can vary. In the present study, we analyzed whether internal or international migration of children affect parental QOL compared with no child migration in Nepal, a low-income migrant-sending country.

The Human Development Report 2019 ranked Nepal 147th out of the world's 189 countries on the Human Development Index.[17] The proportion of older adults aged 60 years in Nepal was 6.5% in 2001, increasing to 8.1% in 2011 and 11.1% in 2018.[18] With a social security system that is often inadequate to meet the needs of older persons, adult children are traditionally responsible for the care and support to their older parents.[19] With accelerating urbanization, Nepal has experienced increased migration of young people from rural to urban areas within the country, and overseas to seek better employment and educational opportunities. One-quarter (25.4%) of households have at least one member living outside the country, with the majority of the absent population (90%) aged 15–54 years.[20] Employment is the main reason for migration (70%), with remittances from international migrants the primary income source for many households. Due to inadequate institutional support mechanisms, older adults in Nepal are more likely to face an additional burden of rapid demographic transition.

The present study is part of a larger project assessing the impact of adult children's migration on the mental health and QOL of left-behind older parents in Nepal. Other studies reporting risk factors and instrument validation are under review (authors).

Methods

Participants and procedure

Nepal is divided into a hierarchy of administrative units from province, district, municipality to ward. A cross-sectional population-based survey was carried out in six rural municipalities in Arghakachi and Rupandehi districts of Province 5 in Nepal between May and July 2019. These two districts were selected based on their high number of international migrants. Arghakachi district had the highest proportion of households (54.0% as compared with 25.4% for the national) with a member living outside the country.[20] Rupandehi is among the top 10 districts with the highest number of youth labour outmigration, with 2.6% of all international labour migrants originating from the district.[21]

The multistage random sampling procedure encompassed: (i) selection of three municipalities from each of the two districts; (ii) selection of three wards/villages in each of the three municipalities (18 wards in total); and (iii) selection of study participants. A sampling frame comprising all older adults (≥60 years) living in the selected wards was developed from the Nepal Election Commission 2017 Voters' List. A total of 11 354 older adults were identified with the number ranging from 330 to 1184 across wards. Participants were randomly selected using the probability proportionate to size method from each of the selected wards. The sample size of each ward ranged from 22 to 78. Older adults with an adult child (aged ≥18 years) irrespective of migration status of children were included, whereas those who were unable to provide informed consent and those who were institutionalized (hospital or aged care homes) were excluded. A total of 810 eligible older adults were approached, of which 794 completed the questionnaire. The study did not identify more than one participant from the same household. Three participants with missing data on >20% QOL items were excluded, giving 791 for the final analysis.

The study protocol was approved by the research ethics committee of the University of Tasmania (reference no. H0017555) and Nepal Health Research Council (reference no. 729/2018). Written informed consent was obtained from participants before the interview. Data were collected through face-to-face interviews by trained interviewers in participants' homes (approximately 1-h duration), with responses recorded on android tablets using the Research Electronic Data Capture.

Measurement of variables

QOL: Dependent variable(s)

The WHOQOL-BREF questionnaire was used to assess the QOL of participants.[22] The WHOQOL-BREF consists of 26 items with the response options ranging from 1 (very dissatisfied/very poor) to 5 (very satisfied/very good). A total of 24 of the 26 items comprised four domains: physical, psychological, social and environmental, and the remaining two were the stand-alone items relating to the individual's perception on overall QOL and satisfaction with health. The physical domain (7 items) assessed activities of daily life, including dependence on medicine, energy and fatigue, mobility, and work capacity. The psychological domain (6 items) assessed positive and negative feelings, including self-esteem, body image and appearance. The social domain (3 items) assessed personal relationship, social support and sexual activity. The environmental domain (8 items) included questions related to financial resources, freedom, safety and security, health and social care,

physical and home environment, and transport. Domain scores are transformed to a 0–100 scale, with higher scores indicating better QOL. As domain scores were the focus of the analysis, the two stand-alone items were not reported in the present study.

The WHOQOL-BREF has been validated for assessing QOL in a range of settings and used to assess QOL of older adults by a number of studies. The WHOQOL-BREF has been previously used in Nepal, with the Nepalese version showing high reliability.[23] The WHOQOL-BREF scale in the present study showed high internal consistency with a Cronbach's alpha coefficient of 0.93 for the overall scale, and 0.85 for each of the physical, psychological and environmental domains, and 0.63 for the social domain.

Migration of children: Independent variable

Information was collected regarding the age, sex, and marital status of each child and place of residence. Having a migrant child was defined as having any child currently living in another municipality in the same province or in another province (internal migration), or in another country (international migration) for >3 months preceding the time of survey. The independent variable, child migration, included three categories: no migration, internal migration only and any international migration.

Sociodemographic characteristics

Sociodemographic variables that might act as confounders were measured and included for adjustment. They included age, sex, marital status, education, working status, whether the individual is receiving a pension, main source of household income, family size, living arrangement and household wealth quintile. Marital status was coded as married or not married (widowed, divorced, separated or never married). Education included whether older adults were able to read or write. Receiving a pension included those who were previously employed and receiving a retirement allowance. The wealth quintile of the household in which the participant lived was generated by principle component analysis based on the ownership of household properties and assets.

Statistical analysis

Descriptive statistics (mean and percentages) were used to summarize the study variables. Statistical analysis involved χ^2-tests, *t*-tests, analysis of variance (ANOVA), correlation analysis and regression analysis, with Cronbach's alpha used to assess reliability. Multilevel mixed-effects linear regression assessed associations between migration status and domains of the WHOQOL-BREF. Three-level models were used as participants (n = 791) were nested within the municipalities (n = 18), and municipalities were then nested within the districts (n = 2). Multivariate regression models were carried out for each of the four QOL domains by including sociodemographic variables for adjustment. Data were analysed using Stata version 16 (StataCorp, College Station, TX, USA).

Results

Sample characteristics

The average age of the participants was 71.2 years (SD 8.2 years). More than half were male (52.2%), married (61.1%) and currently working (55.0%). Approximately one-fifth (19.2%) were receiving a pension, and 58.4% reported agriculture as the main source of household income (Table 1).

Table 1 also presents sociodemographic characteristics by children's migration status. The international migration category might include siblings that have not migrated and/or internally migrated. Child migration status was associated with the age of the older adults (P = 0.022), whereas other sociodemographic characteristics reported did not show significant differences across migration categories.

Table 1 Sample characteristics according to migration status of children

		n (%) or mean (SD) Migration status of children				
Characteristics		Total sample (n = 791)	No migration (n = 97)	Internal migration (n = 279)	International migration (n = 415)	$P^{\dagger}$
Sex	Male	413 (52.2)	46 (47.4)	153 (54.8)	214 (51.6)	0.421
Age (years)	Mean (SD)	71.1 (8.2)	72.7 (8.6)	71.6 (8.9)	70.4 (7.5)	0.022
Marital status	Married	483 (61.1)	53 (54.6)	171 (61.3)	259 (62.4)	0.367
Education	Can read or write	416 (52.6)	46 (47.4)	159 (57.0)	211 (50.8)	0.156
Working status	Currently working	435 (55.0)	50 (51.6)	153 (54.8)	232 (55.9)	0.738
Receiving pension	Yes	152 (19.2)	19 (19.6)	56 (20.1)	77 (18.6)	0.879
Household income source	Agriculture	462 (58.4)	60 (61.9)	166 (59.5)	236 (56.9)	0.602
No. family members	Mean (SD)	5 (2.8)	5.5 (3.0)	5 (2.8)	4.9 (2.8)	0.128
Living arrangement	Alone	36 (4.6)	6 (6.2)	11 (3.9)	19 (4.6)	0.243
	Living with spouse	498 (63.0)	51 (52.6)	178 (63.8)	269 (64.8)	
	Living with others	257 (32.5)	40 (41.2)	90 (32.3)	127 (30.6)	
Wealth quintile	Lowest	159 (20.2)	12 (12.5)	56 (20.1)	91 (22.0)	0.463
	Second	157 (19.9)	20 (20.8)	54 (19.4)	83 (20.1)	
	Middle	157 (19.9)	16 (16.7)	56 (20.1)	85 (20.5)	
	Fourth	158 (20.1)	24 (25.0)	59 (21.2)	75 (18.1)	
	Highest	157 (19.9)	24 (25.0)	53 (19.1)	80 (19.3)	

$^{\dagger}P$-value obtained from the χ^2-test, Fisher's exact test or ANOVA.

Table 2 Quality of life domain scores according to study variables

	Physical			Psychological			Social			Environmental		
Characteristics	Mean	SD	$P^{\dagger}$	Mean	SD	$P^{\dagger}$	Mean	SD	$P^{\dagger}$	Mean	SD	$P^{\dagger}$
Total sample	58.8	19.8		63.7	18.0		60.7	16.2		61.8	15.0	
Sex			<0.001			<0.001			<0.001			0.009
Female	54.9	19.6		60.7	17.4		57.1	16.0		60.3	15.0	
Male	62.4	19.4		66.3	18.2		63.9	15.7		63.1	15.0	
Age			<0.001			0.112			0.006			0.028
60–69 years	63.8	18.5		65.0	16.8		62.4	16.0		63.2	14.8	
70–79 years	57.2	19.6		62.9	19.8		59.8	16.3		60.8	15.0	
≥80 years	48.6	19.5		61.6	17.5		57.6	16.0		59.6	15.5	
Marital status			<0.001			<0.001			<0.001			0.004
Married	61.5	19.2		65.7	18.0		64.4	15.6		63.0	14.6	
Single	54.5	19.9		60.4	17.6		54.8	15.3		59.8	15.5	
Education			<0.001			<0.001			<0.001			<0.001
Cannot read or write	53.9	19.5		59.6	17.6		56.4	15.3		58.1	14.3	
Can read or write	63.2	19.0		67.3	17.6		64.5	16.0		65.0	15.0	
Working status			<0.001			0.499			0.002			0.603
Currently not working	54.7	18.6		63.2	16.6		58.7	15.7		61.4	14.6	
Currently working	62.2	20.1		64.1	19.1		62.3	16.5		62.0	15.4	
Receiving pension			0.554			0.051			0.040			0.001
No	58.6	19.6		63.1	17.4		60.1	15.6		60.9	14.8	
Yes	59.6	20.9		66.2	20.1		63.1	18.4		65.5	15.5	
Main source of household income			0.003			0.070			0.802			0.673
Agriculture	57.0	21.0		62.7	19.8		60.8	16.9		61.6	15.9	
Other	61.2	17.7		65.0	15.0		60.5	15.1		62.0	13.9	
Living arrangement			<0.001			<0.001			<0.001			<0.001
Alone	56.5	21.0		52.0	20.5		52.5	14.5		54.5	15.6	
Living with spouse	61.8	19.0		66.1	17.6		64.3	15.3		63.3	14.5	
Living with others	53.3	20.0		60.6	17.4		54.8	16.0		59.8	15.6	
Wealth quintile			0.198			<0.001			<0.001			<0.001
Lowest	58.8	20.1		60.9	19.7		58.4	15.7		57.7	16.7	
Second	57.1	19.9		62.0	17.6		58.0	16.1		59.5	13.1	
Middle	57.1	18.4		62.3	15.1		60.7	14.1		59.9	13.0	
Fourth	58.9	19.4		63.9	18.3		60.4	16.3		63.2	14.3	
Highest	61.9	21.2		69.3	18.0		66.1	17.6		68.6	15.5	
Migration of children			0.008			0.141			0.084			0.050
No migration	53.4	19.5		61.7	19.2		58.8	17.4		59.1	14.0	
Internal migration	60.6	19.6		65.3	17.1		62.3	15.4		63.3	15.0	
International migration	58.8	19.8		63.0	18.3		60.0	16.4		61.4	15.2	

$^{\dagger}P$-value obtained from *t*-test or ANOVA.

QOL domain scores by study variables

The scores for QOL were 58.8 (SD 19.8) for physical, 63.7 (SD 18.0) for psychological, 60.7 (SD 16.2) for social and 61.8 (SD 15.0) for environmental domains. Table 2 presents the QOL domain scores according to sociodemographic characteristics and migration status of children. Scores for the physical domain (P = 0.008) differed significantly across the migration groups, whereas significance was at the cut-off level for the environmental domain (P = 0.050), and there were no significant differences for the psychological and social domains.

Table 3 Associations between quality of life domain scores and migration of children, regression analysis

	Physical domain			Psychological domain			Social domain			Environmental domain		
Migration status	*b*	SE	*P*	*b*	SE	*P*	*b*	SE	*P*	*b*	SE	*P*
No migration	Ref.			Ref.			Ref.			Ref.		
Internal migration	5.16*	2.17	0.017	1.57	1.95	0.421	1.67	1.71	0.329	3.19*	1.6	0.046
International migration	3.30	2.08	0.111	0.18	1.87	0.923	−0.10	1.64	0.949	1.98	1.53	0.195

*$P < 0.05$.

Adjusted for sociodemographic characteristics presented in Table 1, except living arrangement because of its collinearity with marital status. *b*, Regression coefficient; SE, standard error.

Table 3 presents multilevel regression analysis results, estimating the effect of migration of children on the physical, psychological, social and environmental domains. Each model was adjusted for sociodemographic characteristics, which included age, sex, marital status, education, work status, receiving pension, major source of household income, family size and wealth quintile.

Migration of children was associated with higher scores for physical QOL. Older adults having an internally migrated child showed better physical scores ($b = 5.16$, $P = 0.017$) compared with older adults with no migrant child. In terms of psychological and social QOL, left-behind older parents reported higher scores, but the differences were not significant. Migration of adult children within the country was associated with higher scores for environmental QOL ($b = 3.19$, $P = 0.046$). No significant differences were observed on QOL scores between older adults having no child migration and international migration.

Discussion

The present study provides evidence for better QOL for those parents whose children migrated internally. These findings differ from many past studies in rural settings that suggest negative impacts on their physical and mental well-being after the migration of an adult child.[6–8] Rather, parents with a migrant child had scored higher in domains of QOL, with the difference statistically significant in physical and environmental domains between parents with a child migrated internally and parents with no child migrated.

One explanation for better physical and environmental QOL could be that migrant children in general contribute to the material resources of the household. The improved economic position as a result of the remittances provided by the migrant children support increased access to resources for enhanced well-being. The international remittance inflow to Nepal in 2016 was almost $7 billion, comprising 28% of the gross domestic product, whereas there are no data on the size of internal remittance.[24] These monetary remittances from labor migrants might buffer the potential negative QOL effects of outmigration. Better QOL among parents with internal migrant children could be due to their frequent interaction with and visits from their children. Other studies have found that as the distance to the nearest child increases, older parents are less likely to receive support from the children, making them more vulnerable.[25]

Higher levels of QOL observed among older adults with a child migrated within the country might also be due to the geographical sample. This survey was carried out in Province 5 in Nepal, from which the distance to nearby cities is less than in other rural areas. Although children resided in cities for >3 months (according to the definition of left-behind in the present study), they often visited during family rituals and at times of labor demand for agricultural work, especially sowing and harvesting. Receiving both material support from remittances and emotional support from frequent visits of internally migrant children might explain the improved QOL.

The low levels of QOL among the parents with no migrant children could be due to the outmigration culture among young people in rural Nepal in recent decades. Migration might serve as a sign of prestige and parents might have a sense of pride, particularly when their migrant children are sending remittances. This could also be due to reverse causation, as older parents with poorer health and functional ability might have children staying in the household to support their parents, and hence unable to migrate.

The findings of the present study differ from the generally held view that left-behind older parents show lower QOL, as reported in previous studies. Different social contexts might have contributed to such a discrepancy. In traditional Nepalese households, it is common for older adults to live with their adult children and grandchildren. In an extended family living structure, older family members are receiving as well as providing support.[26] Care for older persons is embedded within a larger kin-based support system and hence the absence of an adult child might not adversely affect parental well-being. Stohr explained that migrant family members make necessary arrangements before migration to ensure that older parents are not left without any support, which might account for the lack of negative impacts observed in the present study.[27]

The relationship between being left-behind and physical well-being could also be due to "migrant selectivity," as parents who are more independent and physically active are more likely to have migrant children. As members from richer households,[28] and with better education and occupational skills[29] are more likely to migrate internally in Nepal, parents with internally migrated children might already have better access to resources that enhance their QOL. The pre-existing position of the household, which affects the migration decision, might be associated with better QOL. Longitudinal studies are required to specify the direction of the association between migration of children and QOL of left-behind parents, to investigate causality and address issues of "migrant selectivity."

Improvements in transportation in rural areas in recent years allow more frequent visits. Widespread improvements in communication technology might also contribute to enhanced interaction across distance. These have mitigated the negative impacts of being left-behind observed in earlier studies in rural settings.[8]

The present study used a random sampling design to ensure sample representativeness. Multilevel linear regression was carried out for investigating associations between types of child migration status and QOL among older people. The analysis goes beyond the conventional migrant and non-migrant dichotomy, which mainly considered left-behind as the absence of a child from the household. Use of a standardized instrument to assess the QOL, large sample size and high response rate were other strengths of the study. The cross-sectional design of the study limited assessing casual relations. The survey was carried out in selected rural municipalities of a single province in Nepal, thus limiting generalizability. People migrate both internally and internationally for different reasons, and there might exist heterogeneity in the impacts of migration-related characteristics, such as number and sex of children migrated (or remaining), and duration of migration on the QOL of older adults.

The present study draws on a community-based survey to present a comprehensive view of adult child migration and its impact on the left-behind parents' QOL. This study identified generally positive and null associations between migration and QOL of left-behind older parents. Migration of children within the country was associated with higher levels of physical and environmental QOL, but not with psychological and social domains. International migration was not associated with the QOL of the left-behind older parents. The findings extend the current literature on left-behind older parents' QOL, and might have important implications for migrants and their families, as well as researchers and social scientists.

Disclosure statement

The authors declare no conflict of interest.

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8.3 Conclusion

The results of this study indicate that left-behind older parents do not show poorer QOL, in contrast to previous research reporting poorer QOL and psychological well-being among the left-behind. While there were no significant differences in QOL domains between parents with no migrated child and parents with a migrated child outside the country, those with internally migrated adult children showed significantly higher QOL scores across the physical and environmental domains. The next chapter presents the risk factors of mental health symptoms among the left-behind group, and compares the differences in the symptoms of left-behind older parents between internal and international migration of children.

Chapter 9 – Mental Health of 'Left-Behind' Older Parents

9.1 Chapter overview

The results presented in the previous chapters show that the migration of adult children had either no effect or a beneficial effect on the mental health of left-behind older parents. In this chapter, which reproduces the text of a paper currently under peer review, the mental health symptoms of the left-behind parents are further analysed. Of the total sample of 794, 697 older parents with a migrated adult child at the time of survey were included in this analysis. This chapter is divided into two sections. In the first, the variation in mental health symptoms of left-behind parents with children migrated internally and internationally are presented. In the second section, risk factors for mental health symptoms among left-behind parents are outlined.

9.2 Internal and international migration, and the mental health of 'left-behind' older parents

This section addresses the research objective: To identify the association of adult children's migration with the mental health of older parents left behind. This section presents the manuscript under review. Migration type was divided into either internal (within the country) or international (outside the country). The analysis showed that older parents who had adult children migrated outside the country had significantly higher scores for anxiety and stress, indicating worse mental health compared to parents whose children had migrated within the country.

9.2.1 Submission

Thapa D. K.,* Visentin D., Kornhaber R., Cleary M. (Under peer review) Internal and international migration and the mental health of 'left-behind' older parents.

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Internal and International Migration and the Mental Health of 'Left-Behind' Older Parents

Abstract

Despite evidence of the impact of children's migration on left-behind older parents, comparison between internal and international migration has so far been limited. This study examined how the relationship between children's migration and parent's mental health differs according to the migrant's destination—internal (within country) or international (outside country). A cross-sectional, population-based survey among 794 older adults (≥ 60 years) was undertaken in May–July 2019 in Nepal. Left-behind parents with a migrated adult child (n = 697) were included. Mental health was assessed using the 21-item Depression, Anxiety and Stress Scale, and a range of socio-demographic, health-, lifestyle-, and child-related characteristics were assessed for adjustment. Multilevel mixed-method linear regression was performed to assess the effect of adult children's migration on depression, anxiety, and stress symptoms individually, after adjusting for potential covariates. The mean score for mental health was 12.6 ± 18.7, with domain scores of 4.1 ± 7.6 for depression, 3.5 ± 5.0 for anxiety, and 5.0 ± 7.3 for stress. Multivariate analyses showed that parents with internationally migrated children were at higher risk of mental health problems, particularly anxiety and stress, compared to parents with internally migrated children. The distinction between internal and external migration is important when considering the impact of children's migration on older parents left behind as the type of migration affects the implications for older parents' mental health.

Keywords: Migration, Left Behind Older Parents, Mental Health

Background

Rapid urbanization and industrialization have increased the number of rural people migrating to urban areas. However, the impact of children's migration on their left-behind older parents' health and well-being is unclear. As the migration of younger adults is common in developing countries, it is important to investigate how the place of migration and geographical proximity of migrant children affects parents' well-being. Internal and international migration remain under-compared in the literature on the impact of children's migration on parents' well-being. This study examined the mental health of older parents left behind by comparing differences between older parents with children who had migrated internally and who had migrated internationally.

Introduction

People may migrate within (internal) and outside (international) their home country over their lifespan. Migration is common across the world, with more than a billion people living and working outside their birth country, or other than in their place of birth within their home country (Démurger 2015). Internal and international migrants comprise an estimated 15% of the world population (IOM 2019a), with increasing migration in recent years in developing countries. There are an estimated 272 million international migrants, accounting for 3.5% of the global population, with 41% of these (105.7 million) originating from Asian countries. Almost half (48%) of the international migrants are from the 20 to 44 years age group (United Nations 2019). Internal migration is higher, with nearly four times the number of international migrants (Skeldon 2018). In most developing countries, however, there is no systematic practice of determining the scale of internal migration (Kuhn 2015). Although work, study and family are among the major drivers, migration decisions involve a complex set of economic,

social and cultural factors in migrant-sending families, with some factors dominant in particular regions, age groups, and times (Ye et al. 2013).

The outmigration of young adults occurs alongside an increasing ageing population in rural areas in developing countries. By 2050, the proportion of people aged 60 years and over will reach 23%, or 2.1 billion people, with 80% of these older people living in developing countries (WHO 2018). In low- and middle-income countries, where the provision of social security for older people is relatively weak, adult children are often the major source of support (Shen et al. 2012). Older adults become more vulnerable to mental health conditions as they age (Byers et al. 2010), requiring significant care and support. The migration of children may impact family networks, where the traditional intergenerational support from co-resident children is no longer available, leaving them more vulnerable and affecting their well-being.

Studies examining the impact of migration in migrant-sending households have focused on the role of remittances in increasing household income and avoiding poverty (Ullah and Huque 2019; de Haas and van Rooij 2010; Castles 2015). Studies have generally concentrated on international migration, and the distinction between internal and international migration has not been fully examined (King and Skeldon 2010). In general, international migrants originate from wealthier households (McKay and Deshingkar 2014; Ebadi et al. 2020), provide higher remittances (Semyonov and Gorodzeisky 2008; Antman 2012), and have greater potential for improving the well-being of left-behind members (Ebadi et al. 2020). Estimates of remittances from internal migration are limited, however, surveys suggest that they contribute positively to household income and education (Housen et al. 2013). A study conducted across Asia and Africa (McKay and Deshingkar 2014) reported larger remittances being sent to poor households from internal migrants compared to international. According to Czaika and Spray (2013), international remittances are less consistent than internal.

There are a number of explanations for the relationship between migration of children and mental health of left-behind parents. The increased workload as a result of the absence of an active member of the household may adversely affect older adults' health (Burazeri et al. 2007). Parents may feel lonely, depressed (King and Vullnetari 2006), and worry about the welfare of migrant children. Conversely, the financial assistance received from migrant children has increased healthcare expenditure (Amuedo-Dorantes and Pozo 2011) and improved service access (Ariadi et al. 2019; Hoermann and Kollmair 2009), leading to better health outcomes for the older people (Kuhn et al. 2011; Cao et al. 2019).

Mental health of older parents left behind – research evidence

Researchers have studied the impact of children's migration on left-behind older parents' physical health (Lu 2012; Evandrou et al. 2017), mental health (Song 2017; Wang et al. 2017; Inoue et al. 2019; Mergo 2020), quality of life (Liang and Wu 2014; Ye et al. 2017), and overall well-being (Gassmann et al. 2012; Silverstein et al. 2006). Generally, research has reported increased depression (Cheng et al. 2015; Song 2017; Wang et al. 2017; Zhai et al. 2015), loneliness (Cheng et al. 2015; Liu and Guo 2007; Wang et al. 2017) and anxiety (Wang et al. 2013; Arenas and Yahirun 2010), and poorer cognitive ability (Zhai et al. 2015) among parents with migrant children. Migration of children is correlated with reduced happiness among older parents left behind (Scheffel and Zhang 2019; Jones 2014). In contrast, other studies have found left-behind parents at lower risk of developing depression (Abas et al., 2013), with higher cognitive function (Inoue et al. 2019), and a few studies have reported no significant differences (Chang et al. 2016; Li et al. 2016; Ghimire et al. 2018). Yahirun and Arenas (2018) found parents with internationally migrated children at risk of poorer psychological health, while internal migration did not affect parental well-being. A review found 10 of 16 studies reported poorer mental health for older adults with migrant children, with two studies (of 16) showing improved mental health for the left-behind (Thapa et al. 2018a).

Research problem

Previous studies provide valuable insight into the psychological consequences of being left behind for older parents. Much of this research has overlooked internal migration, focusing on international migration only, despite the importance of the type of migration (Bastia et al. 2020). The distinction between internal and international migration in terms of cost, procedures and risks may result in different impacts on the left-behind population (Bastia et al. 2020; de Haas and van Rooij 2010; Arenas and Yahirun 2010). It is not clear whether the mental health of parents with children migrated internally differ from those with internationally migrated children.

Nepalese context

Nepal has experienced a rapid increase in the volume of internal and international migration over the past few decades. More than 10 million people, accounting for 36.2% of the population in Nepal, are lifetime (internal) migrants. Richer households are more likely to have members migrated internally. In the past decade, the predominant rural-to-rural stream of internal migration in Nepal has shifted to rural-to-urban. Around 2.5 million (7.3% of the population) were living outside the country, with one in every four households having a family member abroad (CBS Nepal 2019), 76% of whom were between 15 and 34 years old, and 71% of whom moved for employment. Although men were the majority of migrants, more recently Nepal has seen an increase in women seeking to work or study abroad.

Since the late 1980s, increased economic migration has resulted in the traditional agriculture-based Nepalese economy moving to a remittance-based economy (Kunwar 2015). According to the Department of Foreign Employment, 3.8 million permits to work abroad were issued between 1993/94 and 2014/15 (Ministry of Labour and Employment Nepal 2016), which

is almost 14% of the total population. Nepalese migrant workers sent more than $8 billion, accounting for almost 28% of GDP in 2018.

Nepal, although having a smaller proportion of older people compared to other high-income countries, has witnessed a steady increase in the age of its population in recent decades. The life expectancy at birth in Nepal had increased to 71 years by 2019 (UNFPA 2019) from 60.4 years in 2001. The proportion of older adults aged 60 years and over was 6.5% in 2001 and had increased to 8.1% by 2011 (CBS Nepal 2012) and 11.1% by 2018 (CBS Nepal 2019). Around half (47.1%) of the rural older population are economically active (Bhattarai and Bhattarai 2012), contributing to household activities including childcare, cattle herding, farming, and handicrafts.

Among the limited studies on the health impact of migration on left-behind family members in Nepal, Hoermann and Kollmair (2009) reported that the remittances received had made healthcare more affordable, giving the poor better access to medical treatment. Ghimire et al. (2018) found migration (both internal and international) of children influencing producing higher levels of loneliness, but not of self-reported chronic diseases and depressive symptoms. A study in old age care homes (Khanal et al. 2018) found 78% of older people self-reported emotional problems such as loneliness, anxiety and insomnia, while fewer (9.1%) reported financial problems as a result of children's migration.

Study objective

The objective of this study was to examine the relationship between children's migration and parents' mental health by the migrant's destination—internal (within country) or international (outside country). Differences in symptoms of depression, anxiety and stress were compared.

Data, measures and methods

This cross-sectional, population-based survey among randomly selected older adults was undertaken in May–July 2019 in six municipalities of Nepal's Province 5. Participants were selected from a sampling frame developed from the voter list obtained from the Nepal Election Commission, comprising a list of older people aged 60 years or over living in the selected Municipalities. Institutionalised older adults (in hospital or aged care homes) and those not able to speak Nepali were excluded. Data were collected through individual face-to-face interviews, and responses recorded on Android tablets using Research Electronic Data Capture software.

Prior to the study, ethical approval was obtained from the review committees of the University of Tasmania (Ethics reference number H0017555) and the Nepal Health Research Council (Registration number 729/2018). Written informed consent was obtained before each interview.

Measures and variables

Mental health—Depression Anxiety Stress Scale (DASS-21)

Mental health symptoms of the older adults were assessed using the Depression Anxiety Stress Scale (DASS-21; Lovibond and Lovibond 1995), which measures the prevalence of symptoms over the prior week in three domains—depression, anxiety, and stress—and provides a score for each domain. Each subscale has seven items, with responses reported on a four-point scale, ranging from '0' (does not apply to me) to '3' (applies to me most of the time). Domain scores are obtained by summing the individual item scores, with a maximum total score of 21 for each subscale. The final score is obtained by multiplying the score by two to obtain the equivalent score for the DASS-42. The Nepali version of the DASS-21 employed by Tonsing (2014) was refined for use in this study. The scale demonstrated high reliability, with Cronbach alpha values of 0.95 for the overall scale, 0.93 for depression, 0.79 for anxiety, and 0.91 for stress.

Migration of adult children

Having a migrant child was defined as having any child currently living in another municipality in the same province or in another province, or in another country for more than three months preceding the time of survey. Migration type was a dichotomous variable: whether the migration of children was internal (inside Nepal) or international (outside Nepal). The category of older parents with children migrated internationally may include siblings not migrated and/or internally migrated.

Controlled variables

A range of socio-demographic, health-, lifestyle-, and children-related characteristics (see Table 1, below) which may act as confounders were measured and included for adjustment. Socio-demographic variables included gender, age, family size, education, marital status, ethnicity, working status, main source of household income, living arrangement, household wealth quintile, and whether the individual is receiving a pension or an allowance. Participants' grandparenting duties, whether they watched television, read newspapers, had a mobile phone, had experienced adverse life events, social participation, and social support were also assessed. Health-related characteristics included self-perceived general health status, number of chronic conditions, and functional ability. Lifestyle characteristics assessed were alcohol consumption, smoking, and physical exercise. Child-related variables included the number of children, gender composition, closeness to a child, financial support, and frequency of communication and visits to the parent. A detailed description of the variables and their measurements is available upon request.

Data analysis

Socio-demographic and study variables were presented and compared using descriptive statistics (proportion, mean and SD), chi-square test, Fisher's exact test, *t*-test, correlation, and ANOVA. Cohen's *d* was used to assess the effect size of the difference in mental health symptom scores between internal and international migration. Multilevel mixed-method linear regression assessed the effect of adult children's migration on depression, anxiety, and stress symptoms individually, after adjusting for potential covariates. The reported *p*-values were two-sided, and less than 0.05 was considered statistically significant. Analyses was conducted using Stata version 16 (StataCorp 2017).

Findings reported in this paper are part of a larger study assessing the impact of children's migration on the quality of life and mental health of older parents left behind in Nepal. Other papers have reported the prevalence and risk factors of mental health symptoms among older adults (Thapa et al., 2020b) and quality of life of left-behind older parents (Thapa et al., 2020a).

Results

Sample characteristics

Sample characteristics are presented in Table 1, below. Out of the total sample of 794, this study reported 697 participants having a migrated adult child at the time of survey. The mean age of participants was 70.9 years. Around half of the participants were female (47.2%), half were unable to read and write (46.8%), and half were currently working (55.2%). Higher proportions of the participants were married (61.8%), living with their spouse (64.3%), receiving an aged care allowance (57.1%), and had grandparenting responsibilities (60.7%). Two thirds (64.4%) reported watching television, while only 20.5% read newspapers.

The average number of chronic conditions was 2.0 ± 1.6. The mean scores were 14.1 ± 3.3 for social participation, 5.1 ± 1.1 for social support, and 6.2 ± 2.1 for functional ability. The average number of children was 4.4 ± 1.8. Few (3.4%) had only daughter(s) while most (86.1%) had both son(s) and daughter(s). Three quarters (78.3%) reported having a child they felt 'very' close to. About three quarters (71.3%) reported talking daily with a child (irrespective of migration), and 70.6% had a child visit at least monthly.

Table 1, below, presents study variables according to the type of migration. Child migration status was associated with grandparenting ($p = 0.028$), number of chronic conditions ($p = 0.012$), alcohol consumption ($p = 0.013$), physical exercise ($p = 0.012$), number of children ($p < 0.001$), gender composition of the children ($p = 0.01$), frequency of communication ($p < 0.001$) and visits ($p < 0.001$), and financial support ($p = 0.009$).

Table 1. Sample characteristics by migration type

Characteristics		*n* (%) or mean ± SD			*p*-value[a]
		Total (*N* = 697)	Migration of children		
			Internal migration (*n* = 280)	International migration (*n* = 417)	
Socio-demographic characteristics					
Sex	Female	329 (47.2)	127 (45.4)	202 (48.4)	0.424
	Male	368 (52.8)	153 (54.6)	215 (51.6)	
Age (years)	Mean ± SD	70.9 ± 8.1	71.6 ± 8.9	70.4 ± 7.5	0.053
Number of family members	Mean ± SD	4.9 ± 2.8	5.0 ± 2.8	4.9 ± 2.8	0.455
Education	Unable to read or write	326 (46.8)	121 (43.2)	205 (49.2)	0.123
	Can read or write	371 (53.2)	159 (56.8)	212 (50.8)	
Marital status	Married	431 (61.8)	172 (61.4)	259 (62.1)	0.856
	Single	266 (38.2)	108 (38.6)	158 (37.9)	
Ethnicity	*Brahmin/Chhetri*	403 (57.8)	174 (62.1)	229 (54.9)	0.055
	Dalit	91 (13.1)	32 (11.4)	59 (14.2)	
	Indigenous (*Janajati/Adibashi*)	156 (22.4)	51 (18.2)	105 (25.2)	
	Other (*Newar, Madheshi, Mushlim*)	47 (6.7)	23 (8.2)	24 (5.8)	
Working status	Not currently working	310 (44.5)	126 (45.0)	184 (44.1)	0.820
	Currently working	387 (55.2)	154 (55.0)	233 (55.9)	
Main source of household income	Agriculture	404 (58.0)	167 (59.6)	237 (56.8)	0.462
	Other	293 (42.0)	113 (40.36)	180 (43.2)	
Living arrangement	Living alone	32 (4.6)	11 (3.9)	21 (5.0)	0.737
	Living with spouse	448 (64.3)	179 (63.9)	269 (64.5)	
	Living with others	217 (31.1)	90 (32.1)	127 (30.5)	
Household wealth quintile	Lowest	147 (21.2)	56 (20.1)	91 (21.9)	0.886
	Second	138 (19.9)	55 (19.7)	83 (20.0)	
	Middle	142 (20.4)	56 (20.1)	86 (20.7)	
	Fourth	134 (19.3)	59 (21.2)	75 (18.0)	
	Highest	134 (19.3)	53 (19.0)	81 (19.5)	

Characteristics		*n* (%) or mean ± SD			*p*-value[a]
		Total (*N* = 697)	Migration of children		
			Internal migration (*n* = 280)	International migration (*n* = 417)	
Receiving pension	No	563 (80.8)	224 (80.0)	339 (81.3)	0.671
	Yes	134 (19.2)	56 (20.0)	78 (18.7)	
Receiving allowance	No	299 (42.9)	118 (42.1)	181 (43.4)	0.741
	Yes	398 (57.1)	162 (57.9)	236 (56.6)	
Grandparenting	No	274 (39.3)	124 (44.3)	150 (36.0)	0.028
	Yes	423 (60.7)	156 (55.7)	267 (64.0)	
Watch television	No	241 (34.6)	93 (33.2)	148 (35.5)	0.535
	Yes	456 (65.4)	187 (66.8)	269 (64.5)	
Read newspaper	No	554 (79.5)	213 (76.1)	341 (81.8)	0.068
	Yes	143 (20.5)	67 (23.9)	76 (18.2)	
Have a mobile phone	No	258 (37.0)	113 (40.4)	145 (34.8)	0.134
	Yes	439 (63.0)	167 (59.6)	272 (65.2)	
Adverse life events	No	521 (74.7)	220 (78.6)	301 (72.2)	0.057
	Yes	176 (25.3)	60 (21.4)	116 (27.8)	
Social participation[b]	Mean ± SD	14.1 ± 3.3	14.1 ± 3.4	14.1 ± 3.2	0.986
Social support[c]	Mean ± SD	5.1 ± 1.1	5.1 ± 1.1	5.1 ± 1.1	0.768
Health characteristics					
Perceived health status	Good	269 (38.6)	118 (42.1)	151 (36.2)	0.250
	Fair	308 (44.2)	119 (42.5)	189 (45.3)	
	Poor	120 (17.2)	43 (15.4)	77 (18.5)	
Chronic conditions[d]	Mean ± SD	2.0 ± 1.6	1.9 ± 1.5	2.2 ± 1.6	0.012
Functional ability[e]	Mean ± SD	6.2 ± 2.1	6.0 ± 2.2	6.2 ± 2.0	0.217
Lifestyle habits					
Alcohol use	No	517 (74.3)	222 (79.3)	259 (70.9)	0.013
	Yes	179 (25.7)	58 (20.7)	121 (29.1)	
Smoking	No/Never	303 (43.6)	129 (46.1)	174 (41.9)	0.280
	Yes (Former/current)	392 (56.4)	151 (53.9)	241 (58.1)	

Characteristics		*n* (%) or mean ± SD			*p*-value[a]
		Total (*N* = 697)	Migration of children		
			Internal migration (*n* = 280)	International migration (*n* = 417)	
Physical exercise	Never/rarely	277 (39.7)	94 (33.6)	183 (43.9)	0.012
	Sometimes	235 (33.7)	110 (39.3)	125 (30.0)	
	Frequently	185 (26.5)	76 (27.1)	109 (26.1)	
Child related characteristics					
Number of children	Mean ± SD	4.4 ± 1.8	4.1 ± 1.7	4.6 ± 1.8	< 0.001
Children composition	Has a son(s) only	73 (10.5)	23 (8.2)	50 (12.0)	0.010
	Has a daughter(s) only	24 (3.4)	16 (5.7)	8 (1.9)	
	Has a son(s) and a daughter(s)	600 (86.1)	241 (86.1)	359 (86.1)	
Closeness with child	No	151 (21.7)	54 (19.3)	97 (23.3)	0.206
	Yes	545 (78.3)	226 (80.7)	319 (76.7)	
Frequency of communication	Children living together or daily contact with all children	66 (9.5)	45 (16.1)	21 (5.0)	< 0.001
	Daily contact with some children	497 (71.3)	199 (71.1)	298 (71.5)	
	Daily contact with no children	134 (19.2)	36 (12.9)	98 (23.5)	
Children's visit	All children visiting once a month or more	91 (13.1)	81 (28.9)	10 (2.4)	< 0.001
	Some children visiting once a month or more	492 (70.6)	162 (57.9)	329 (79.1)	
	All children visiting less than once a month	114 (16.4)	37 (13.2)	77 (18.5)	
Financial support from children[f]	Mean ± SD	1.7 ± 1.1	1.6 ± 1.1	1.8 ± 1.1	0.0091

[a] *p*-value obtained from chi-square, *t*-test, or Fisher's exact test. [b] Possible scores range from 8 to 24, with higher scores indicating more participation. [c] Possible scores range from 1 to 7, with higher scores indicating receiving more social support. [d] Possible scores range from 0 to 13, with higher scores indicating more chronic health problems. [e] Possible scores range from 0 to 8, with higher scores indicating better functional ability. [f] Possible scores range from 0 to 3, with higher scores indicating more financial support.

Association between migration type and mental health

The mean score for the DASS-21 was 12.6 ± 18.7, with domain scores of 4.1 ± 7.6 for depression, 3.5 ± 5.0 for anxiety, and 5.0 ± 7.3 for stress. Supplementary file 1 presents the mean scores for the DASS domains by study variables, while pairwise correlations among the study variables are presented in Supplementary file 2. Comparison of mental health symptom scores according to migration type showed that the mean DASS score was significantly higher among older adults with children migrated internationally (p = 0.017). Across the subscales, scores for anxiety and stress symptoms were significantly lower among older parents with children migrated internally (Cohen's *d* -0.26 and -0.17 respectively; see Table 2).

Table 2. Depression, anxiety and stress scores by migration type (Mean ± SD)

	Total	Migration type				
		Internal	International	*t*	Cohen's d	*p*
DASS total	12.6 ± 18.7	10.6 ± 17.4	14.0 ± 19.3	-2.40	-0.19	0.017
Depression	4.1 ± 7.6	3.5 ± 7.3	4.5 ± 7.7	-1.63	-0.13	0.104
Anxiety	3.5 ± 5.0	2.8 ± 4.3	4.0 ± 5.3	-3.37	-0.26	0.001
Stress	5.0 ± 7.3	4.3 ± 6.9	5.5 ± 7.6	-2.15	-0.17	0.032

The results of mixed-effects multiple linear regression are shown in Table 3, below. Three different models for each of the mental health domains are presented. Model 1 is the basic, unadjusted model and Model 2 is adjusted for all study variables, except education, receiving allowance, and having a mobile phone, due to collinearity with the other variables. Model 3 was generated using backward the stepwise selection method, and includes different variables for adjustment for different mental health domains.

Table 3. Association of migration of children with depression, anxiety and stress symptoms

Models	Depression			Anxiety			Stress		
	β	*SE*	*p*	*β*	*SE*	*p*	*β*	*SE*	*p*
Model 1[a]	0.87	0.58	0.135	1.16	0.37	0.002	1.04	0.55	0.060
Model 2[b]	0.76	0.55	0.162	1.47	0.38	< 0.001	1.01	0.52	0.049
Model 3[c]	0.77	0.49	0.113	1.39	0.36	< 0.001	1.08	0.50	0.030

[a] Model 1 is the basic (bivariate), unadjusted model.

[b] Model 2 adjusted for all the variables—socio-demographic, health-, lifestyle-, and child-related characteristics—removed collinear variables education, receiving allowance, and has mobile phone.

[c] Model 3 uses backward stepwise selection. Depression adjusted for sex, ethnicity, currently working, household income source, receiving pension, watching TV, adverse life events, social support, perceived health status, functional ability, smoking, physical exercise, closeness with children, and contact with children.

Scores for all mental health symptoms were higher among parents with internationally migrated children compared to internally migrated in all models. The difference was significant for anxiety in the basic model (Model 1), and for anxiety and stress in the adjusted models (Models 2 and 3). Older adults with internationally migrated children were significantly more likely to have symptoms of anxiety ($p < 0.001$) and stress ($p < 0.05$), with a stronger effect for anxiety. The difference in scores for depressive symptoms between migration types was not significant.

Discussion

This study contributes to the literature on the impact of children's migration on their left-behind older parents by presenting a comparative analysis of internal and international migration. Older adults with international migrant children had worse mental health symptoms, particularly anxiety and stress. The effect of migration type highlights the importance of internal migration for parental psychological well-being.

A reason for this effect could be that the material and financial protection of the left-behind households by internationally migrated children does not necessarily prevent left-

behind people from experiencing insecurity and loneliness (Khan et al. 2010). Inconsistent remittances from international migration and the time lag in sending remittances may place left-behind older parents at greater risk. Older parents may be more anxious and psychologically vulnerable due to factors such as: the high cost of and complexities in procedures associated with international migration, worry for the safety of their child overseas, and responsibility for the welfare of left-behind grandchildren (Aminuddin et al. 2019).

The lower risk for parents with internally migrated children could be related to the frequent interaction with and visits from their children. International migrants may make less frequent return visits, while internal migration is often seasonal and usually causes shorter periods of separation (Dewind and Holdaway 2008). Hugo (2002) suggests that international migration is more likely to weaken the connection between the parents and their adult migrant children. The distance inherent in international migration can make relationships more challenging to maintain (Coe 2011). As the distance to the nearest child increases, older parents are found to be less likely to receive support from their children (Quashie and Zimmer 2013).

These findings may be context-specific. In general, internal migrants, in contrast to international migrants, originate from poorer households, and subsequently receive smaller remittances. However, in Nepal, wealthier households are more likely to have family members migrate internally (IOM 2019b), and those with better education and occupational skills are readily able to earn internally rather than by moving internationally (Bohra and Massey 2009). This study was conducted in municipalities near big cities. which are the major internal migration destinations in Nepal. Parents in these settings may receive both financial and direct support, thereby improving their mental health. These contextual factors may partly account for the better psychological well-being observed among parents with internal migrant children.

Implications

The main policy implication of this study is the importance of creating employment opportunities inside the country, facilitating migration within national borders. When people migrate internally, their left-behind older parents can benefit from the domestic remittances, as well as from close contact with their children. The aged care welfare system should prioritise older adults with children migrated internationally who are at higher risk of mental health problems. The impact of children's migration on older parents left behind may be heterogeneous, depending on children's migration-related variables, such as the gender of the migrated child, the duration of migration, reasons for migration, and the number of children migrated.

Limitations

The cross-sectional design of this study, while providing evidence of statistical association between type of migration and mental health of left-behind older parents, cannot determine causal relationships. The survey was conducted in rural municipalities of a province in Nepal, limiting its wider generalizability. This study considered migration to India to be international migration, but the border between the countries is open, and thus migration to India is different from migration to other countries, and may therefore have a different impact on older parents' mental health.

Conclusion

By comparing the mental health of older parents with internal and international migrant children in Nepal, these findings provide an important contribution to the literature on the impact of migration on the left-behind population. Parents with internationally migrated children were at higher risk of mental health problems, particularly anxiety and stress, compared to parents with internally migrated children. Internal and international migration can

potentially have different implications for older parents' mental health. The distinction between internal and external migration is important when studying the impact of migration on older parents left behind.

Supplementary file 1. Depression, anxiety and stress scores by study variables[a]

Variables		Depression mean ± SD	*p*-value	Anxiety mean ± SD	*p*-value	Stress mean ± SD	*p*-value
Socio-demographic characteristics							
Sex	Female	5.0 ± 7.9	0.004	4.5 ± 5.7	< 0.001	6.2 ± 7.9	< 0.001
	Male	3.3 ± 7.1		2.7 ± 4.0		4.0 ± 6.6	
Education	Unable to read or write	5.0 ± 8.0	0.006	4.3 ± 5.5	< 0.001	6.0 ± 7.9	0.001
	Can read or write	3.4 ± 7.1		2.8 ± 4.3		4.2 ± 6.7	
Marital status	Married	3.7 ± 7.2	0.079	3.1 ± 4.5	0.006	4.6 ± 7.0	0.049
	Single	4.8 ± 8.1		4.2 ± 5.6		5.7 ± 7.7	
Ethnicity	*Brahmin/Chhetri*	4.0 ± 7.7	0.577	3.5 ± 5.1	0.339	4.9 ± 7.5	0.146
	Dalit	5.1 ± 7.0		4.4 ± 4.9		6.6 ± 7.4	
	Indigenous (*Janajati/Adibashi*)	3.8 ± 7.3		3.4 ± 5.2		4.6 ± 6.9	
	Other (*Newar, Madheshi, Mushlim*)	3.7 ± 8.6		3.0 ± 3.0		4.3 ± 7.2	
Working status	Not currently working	3.5 ± 6.2	0.063	4.0 ± 5.2	0.015	4.6 ± 6.3	0.159
	Currently working	4.6 ± 8.5		3.1 ± 4.8		5.4 ± 8.1	
Main source of household income	Agriculture	4.9 ± 8.5	0.001	4.0 ± 5.5	0.004	5.7 ± 8.0	0.006
	Other	3.0 ± 5.6		2.9 ± 4.1		4.1 ± 6.1	
Living arrangement	Living alone	4.9 ± 7.9	0.082	3.5 ± 5.7	0.003	5.3 ± 7.3	0.037
	Living with spouse	3.6 ± 7.1		3.1 ± 4.5		4.5 ± 7.0	
	Living with others	5.0 ± 8.4		4.5 ± 5.6		6.0 ± 8.0	
Household wealth quintile	Lowest	4.4 ± 7.5	0.836	3.2 ± 5.4	0.382	4.8 ± 7.5	0.763
	Second	4.3 ± 8.2		3.2 ± 4.4		5.1 ± 8.1	
	Middle	4.1 ± 7.5		4.1 ± 5.6		5.4 ± 7.2	
	Fourth	4.4 ± 7.7		3.9 ± 4.6		5.4 ± 7.2	
	Highest	3.4 ± 7.0		3.3 ± 4.7		4.4 ± 6.7	

Receiving pension	No	4.0 ± 7.3	0.424	3.6 ± 4.9	0.505	4.9 ± 7.1	0.606
	Yes	4.6 ± 8.7		3.3 ± 5.4		5.3 ± 8.2	
Receiving allowance	No	3.9 ± 7.5	0.470	3.3 ± 4.6	0.293	4.8 ± 7.2	0.463
	Yes	4.3 ± 7.6		3.7 ± 5.2		5.2 ± 7.5	
Grandparenting	No	3.6 ± 7.4	0.155	3.0 ± 5.2	0.031	4.1 ± 6.9	0.007
	Yes	4.4 ± 7.7		3.9 ± 4.8		5.6 ± 7.6	
Watch television	No	5.8 ± 9.4	< 0.001	4.4 ± 5.8	< 0.001	6.5 ± 8.8	< 0.001
	Yes	3.2 ± 6.2		3.0 ± 4.4		4.2 ± 6.3	
Read newspaper	No	4.6 ± 7.9	< 0.001	3.9 ± 5.2	< 0.001	5.6 ± 7.7	< 0.001
	Yes	2.1 ± 5.7		2.0 ± 3.5		2.8 ± 5.4	
Have a mobile phone	No	4.3 ± 7.7	0.527	3.9 ± 5.4	0.108	5.3 ± 7.3	0.353
	Yes	4.0 ± 7.5		3.3 ± 4.7		4.8 ± 7.4	
Adverse life events	No	3.1 ± 6.4	< 0.001	3.1 ± 4.8	< 0.001	4.0 ± 6.4	< 0.001
	Yes	7.1 ± 9.6		4.9 ± 5.3		8.0 ± 9.0	
Health characteristics							
Perceived health status	Good	2.4 ± 5.1	< 0.001	2.0 ± 3.6	< 0.001	3.3 ± 5.9	<0.001
	Fair	3.8 ± 7.4		4.1 ± 5.2		5.0 ± 7.2	
	Poor	8.7 ± 10.4		5.5 ± 6.1		8.9 ± 9.0	
Lifestyle habits							
Alcohol use	No	4.1 ± 7.7	0.935	3.7 ± 5.1	0.163	5.0 ± 7.4	0.986
	Yes	4.1 ± 7.1		3.1 ± 4.7		5.0 ± 7.1	
Smoking	No/Never	3.4 ± 6.7	0.018	3.6 ± 4.9	0.755	4.7 ± 6.6	0.270
	Yes (Former/current)	4.7 ± 8.1		3.5 ± 5.1		5.3 ± 7.9	
Physical exercise	Never/rarely	6.3 ± 9.0	< 0.001	5.2 ± 5.8	< 0.001	7.1 ± 8.4	< 0.001
	Sometimes	2.8 ± 5.7		2.9 ± 4.4		3.9 ± 5.8	
	Frequently	2.5 ± 6.6		1.8 ± 3.3		3.3 ± 6.7	
Child-related characteristics							

Children composition	Has a son(s) only	5.7 ± 9.6	0.148	4.1 ± 5.0	0.489	6.3 ± 8.7	0.243
	Has a daughter(s) only	4.4 ± 6.2		2.8 ± 3.8		4.1 ± 5.1	
	Has a son(s) and a daughter(s)	3.9 ± 7.3		3.5 ± 5.0		4.9 ± 7.2	
Closeness with child	No	8.6 ± 10.3	< 0.001	5.6 ± 5.5	< 0.001	9.9 ± 9.2	< 0.001
	Yes	2.9 ± 6.1		3.0 ± 4.7		3.7 ± 6.1	
Frequency of communication	Children living together or daily contact with all children	5.0 ± 8.9	0.578	4.3 ± 6.1	0.033	6.2 ± 8.5	0.258
	Daily contact with some children	4.0 ± 7.5		3.7 ± 5.1		5.0 ± 7.3	
	Daily contact with no children	3.9 ± 7.0		2.6 ± 3.8		4.3 ± 6.7	
Children's visit	All children visiting once a month or more	3.9 ± 7.5	0.282	3.7 ± 5.6	0.014	5.3 ± 7.6	0.109
	Some children visiting once a month or more	4.4 ± 7.9		3.8 ± 5.1		5.3 ± 7.5	
	All children visiting less than once a month	3.1 ± 5.9		2.3 ± 3.6		3.7 ± 6.1	

[a] *p*-value obtained from *t*-test, or ANOVA.

Supplementary file 2. Pair-wise correlation among the study variables

Variables	DASS total	Depression	Anxiety	Stress
DASS total	1			
Depression	0.96***	1		
Anxiety	0.87***	0.72***	1	
Stress	0.97***	0.91***	0.79***	1
Age	0.02	0.01	0.07	0.01
Household size	-0.02	-0.05	0.03	-0.03
Social participation	-0.26***	-0.24***	-0.25***	-0.23***
Social support	-0.47***	-0.46***	-0.37***	-0.46***
Chronic conditions	0.22***	0.17***	0.24***	0.23***
Functional ability	-0.23***	-0.20***	-0.28***	-0.20***
Number of children	-0.03	-0.04	0.01	-0.03
Financial support from children	-0.06	-0.07	0.01	-0.07

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

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9.3 Factors associated with mental health symptoms among left-behind parents

This section addresses the research objective: To identify factors associated with mental health among left-behind older parents. Table 3 in the previous section (Section 9.2) shows the association of children's migration type with mental health symptoms among left -behind older parents. Model 3 in the table was arrived at using the backward stepwise selection method, including variables which were significant ($p < 0.05$). As the focus of the previous section was migration of children, only the effect measures for association between migration type and mental health symptoms were presented. A complete table showing the factors associated with the mental health symptoms among left-behind older parents is presented in this section (Table 9.1, below), and the risk and protective factors are described.

A number of factors were positively and negatively associated with mental health symptoms. Factors positively associated with depressive symptoms were: currently working ($b = 1.70$, $p = 0.002$); receiving a pension ($b = 1.65$, $p = 0.008$); adverse life events ($b = 2.59$, $p < 0.001$); smoking ($b = 1.29$, $p = 0.009$); and perceiving health status as poor ($b = 4.42$, $p < 0.001$) versus good. Factors negatively associated with depressive symptoms were: being male ($b = -1.26$, $p = 0.012$); indigenous ethnicity ($b = -1.67$, $p = 0.005$) versus upper caste (*Brahmin/Chhetri*); not having agriculture as the as the main source of household income ($b = -1.13$, $p = 0.023$); participating in physical exercise sometimes ($b = -1.13$, $p = 0.023$) versus rarely/never; receiving social support ($b = -2.17$, $p < 0.001$); functional ability ($b = -0.48$, $p < 0.001$); closeness to child ($b = -2.61$, $p < 0.001$); and daily communication with some ($b = -2.06$, $p = 0.012$) or no children ($b = -2.99$, $p = 0.002$) versus daily communication with all children.

Table 9.1. Multivariate regression models (estimating regression coefficients) showing factors associated with mental health symptoms†

	Depression			Anxiety			Stress		
	b	*SE*	*p*	*b*	*SE*	*p*	*b*	*SE*	*p*
International migration ***(internal)***	0.77	0.49	0.113	1.39	0.36	< 0.001	1.08	0.50	0.030
Male gender (female)	-1.26	0.50	0.012	-0.84	0.33	0.011	-1.45	0.47	0.002
Ethnicity ***(Brahmin/Chhetri)***	Ref			Ref			–		
Dalit	-0.43	0.72	0.550	0.28	0.51	0.587			
Indigenous *(Janajati/Adhibashi)*	-1.67	0.60	0.005	-0.96	0.40	0.018			
Other *(Madheshi, Newar,* Muslim*)*	-1.37	0.98	0.162	-1.27	0.66	0.056			
Currently working ***(not working)***	1.70	0.56	0.002	–			1.86	0.52	< 0.001
Main household income source – other ***(agriculture)***	-1.13	0.50	0.023	–			–		
Receiving pension ***(not receiving pension)***	1.65	0.62	0.008	–			–		
Receiving allowance ***(no)***	–			-0.85	0.36	0.020	–		
Adverse life events ***(no)***	2.59	0.55	< 0.001	1.42	0.38	< 0.001	2.97	0.53	< 0.001
Smoking ***(no)***	1.29	0.49	0.009	–			–		
Physical exercise ***(never/rarely)***	Ref			Ref			–		
Sometimes	-1.31	0.57	0.022	-0.78	0.39	0.046			
Frequently	-0.53	0.66	0.422	-0.74	0.45	0.103			
Perceived health status ***(good)***	Ref			Ref			Ref		
Fair	0.67	0.54	0.208	1.11	0.37	0.003	0.30	0.50	0.556
Poor	4.42	0.70	< 0.001	1.77	0.50	< 0.001	2.89	0.69	< 0.001
Perceived social support ***(continuous variable)***	-2.17	0.24	< 0.001	-1.20	0.16	< 0.001	-2.05	0.23	< 0.001
Functional ability ***(continuous variable)***	-0.48	0.13	< 0.001	-0.47	0.09	< 0.001	-0.52	0.12	< 0.001
Number of chronic conditions ***(continuous variable)***	–			0.37	0.11	0.001	0.57	0.15	< 0.001
Closeness with child ***(no)***	-2.61	0.66	< 0.001	–			-3.33	0.63	< 0.001
Communication with child ***(daily contact with all children)***	Ref			Ref			Ref		
Daily contact with some children	-2.06	0.82	0.012	-1.59	0.57	0.006	-2.21	0.80	0.006
Daily contact with no children	-2.99	0.97	0.002	-2.53	0.69	< 0.001	-3.00	0.97	0.002

Abbreviations: *b*, unstandardised regression coefficient; *SE*, Standard error.
– variable not included in the model.
† Reference categories are provided in parentheses and italicised in bold.

In terms of anxiety symptoms, international migration of adult children (b = 1.39, p < 0.001) versus internal migration, adverse life events (b = 1.42, p < 0.001), perceiving health status as fair (b = 1.11, p = 0.003) or poor (b = 1.77, p < 0.001) versus good, and number of chronic conditions (b = 0.37, p = 0.001) had positive associations. Factors negatively associated with anxiety symptoms were being male (b = -0.84, p =0.011), indigenous ethnicity (b = -0.96, p =0.018) compared to upper caste (*Brahmin/Chhetri*), receiving an allowance (b = -0.85, p = 0.020), participating in physical exercise sometimes (b = -0.78, p = 0.046) versus rarely/never, receiving social support (b = -1.20, p < 0.001), functional ability (b = -0.47, p < 0.001), and daily communication with some (b = -1.59, p = 0.006) or no children (b = -2.53, p < 0.001) versus daily communication with all children.

Stress symptoms were positively associated with international migration of adult children (b = 1.08, p = 0.030) versus internal migration, currently working (b = 1.86, p < 0.001), adverse life events (b = 2.97, p < 0.001), perceiving health status as poor (b = 2.89, p < 0.001) versus good, and number of chronic conditions (b = 0.57, p < 0.001). Conversely, being male (b = -1.45, p = 0.002), receiving an allowance (b = -0.85, p = 0.020), receiving social support (b = -2.05, p < 0.001), functional ability (b = -0.52, p < 0.001), closeness to child (b = -3.33, p < 0.001), and daily communication with some (b = -2.21, p = 0.006) or no children (b = -3.00, p < 0.002) versus daily communication with all children were negatively associated with stress.

9.4 Conclusion

Lower scores for mental health symptoms among older parents with adult children migrated internally showed that migration within the country is beneficial for older parents compared to international migration. The lower risk for parents with internal migrant children could be due to the remittances sent by their migrant children, in addition to the frequent communication with and return visits from the child(ren) possible when the child still lives within the country.

Receiving both financial and direct support may contribute positively to older parents' mental health.

The results showed that internal and international migration may involve different levels of family disruption, and that the distinction between internal and external migration is important when studying the impact of migration on older parents left behind. The chapter also presented a range of socio-demographic, health-, lifestyle- and children-related factors which influence the mental health of left-behind older parents, which could inform mental health interventions for this vulnerable population. The next chapter discusses the major findings of this cross-sectional study, the study's implications, strengths and limitations, and avenues for further research.

Chapter 10 – Discussion and Conclusion

10.1 Chapter overview

This chapter summarises and integrates the results of this cross-sectional study with reference to the study objectives, research methods and the literature. The strengths and limitations of the study are examined, policy and practice implications are outlined, and suggestions for future research made. Finally, conclusions based on the findings of the study are offered.

10.2 Overview of findings

With the growing older population across the world, mental health and QOL of older people is an important area of research, and one which is lacking in low-income countries. The increased rate of migration among younger members of families in recent decades has left many older people on their own in rural and regional settings. This study examined the relationship between the migration of adult children and older parents' mental health and QOL, estimated the symptom prevalence of common mental health disorders—depression, anxiety and stress—among older people, and identified the risk factors for these symptoms. Table 10.1, below, summarises the key findings for each research objective, and the contribution these results make to the existing literature on left-behind older parents' mental health and QOL. These findings are then discussed in the subsequent sections.

Table 10.1. Summary of key findings

	Research objectives	Chapter	Key findings	Main contributions
1	To describe the mental health status and QOL of older people in Nepal.	2	A systematic review of studies reporting the prevalence of mental health disorders among older people in Nepal found that most studies assessed depression. The studies reported higher prevalence of mental health disorders, particularly depression, across a range of settings.	Systematic review of published (peer-reviewed) articles reporting the prevalence of mental health disorders among older people in Nepal.
		5	The evaluation of the psychometric properties of the Nepali version of the DASS-21 showed adequate validity and reliability.	The psychometric properties of the Nepali version of the DASS-21 were evaluated.
		6	Mean scores for QOL were 58.8 for physical, 63.7 for psychological, 60.7 for social, and 61.8 for environmental domains.	Described the QOL of older people.
		7	Mean scores for mental health symptoms were 4.2 for depression, 3.6 for anxiety, and 5.1 for stress, with prevalence of 15.4%, 18.1% and 12.1% respectively.	Estimated the community prevalence of three common mental health symptoms.
2	To assess the factors associated with mental health among older people in general.	7	Being female, working in agriculture, lower household wealth, perceived poor health, smoking, having a number of chronic conditions, having a child outside the country, and exposure to adverse life events were positively associated with mental health symptoms. Receiving an allowance, physical exercise, improved functional ability, social support and participation in social activities were negatively associated.	Provided a comprehensive mental health risk profile of older people with potential risk and protective factors.
3	To assess factors associated with mental health among left-behind older parents specifically.	3	The integrative review of the risk factors for mental health disorders among left-behind parents identified being female, age, living alone, low education and income, poor physical health, lack of physical activity, social support, rural residence, and lower frequency of children's visit as the major risk factors.	Integrative review identified the risk factors for poor mental health among left-behind parents.
		9	Being female, currently working, adverse life events, perceived poor health, having a number of chronic conditions, receiving pension, smoking, and international migration of a child were positively associated with mental health symptoms. Social support, functional ability, being of Indigenous ethnicity, physical exercise, closeness with child, and communication with child were negatively associated.	Identified risk and protective factors for mental health disorders among left-behind older parents.
4	To identify association between adult children's migration and the QOL of older parents.	8	Scores for QOL among parents with a migrant adult child were either higher or no different compared to parents whose child had not migrated. Older parents having internally migrated children showed better physical and environmental QOL.	Left-behind older parents enjoy equal or better QOL compared to non-left-behind older parents.
5	To identify association between adult children's migration and the mental health of older parents.	3	The integrative review of studies reporting the impact of adult children's migration on the mental health of older parents found that left-behind older parents had higher levels of mental health problems compared to the non-left-behind.	Integrative review synthesised studies related to the mental health of left-behind parents and identified the knowledge gap.
		9	Parents whose children had migrated outside the country had significantly higher scores for anxiety and stress, indicating poorer mental health compared to parents whose children had migrated within the country.	Internal and international migration of children may have different implications for the mental health of left-behind older parents.

10.2.1 Mental health and QOL of older adults

The study estimated the prevalence of mental health symptoms of older adults in Nepal as follows: 15.4% depression, 18.1% anxiety, and 12.1% stress. The reported prevalence is lower for depression symptoms compared to previous studies conducted in Nepal, which reported the prevalence ranging from 25.2% to 60.6% among older adults living in the community as identified in the review undertaken as part of this thesis (Thapa et al., 2018b). Differences in the measurements used to assess the symptoms of depression may account for the low prevalence reported in the present study, with the majority of previous studies assessing depression using the GDS-15. The prevalence of depression among older adults varies according to the diagnostic criteria and rating scales used (Sjöberg et al., 2017), with GDS-15 as a screening tool generally yielding a higher prevalence (Pilania et al., 2019).

Convenience samples with low sample sizes in previous studies might have overestimated the prevalence, while in the current study, exclusion of those who could not provide informed consent (due to potential cognitive impairment), and those who were institutionalised either in aged care homes or hospitals, might have led to the prevalence being underestimated. Consistent with other research (Evans et al., 2019), there was substantial co-occurrence of mental health symptoms in the current study, with 22.9% having at least one, 13.6% having at least two of three, and 9.1% having all three symptoms, with 11.2% exhibiting depression and anxiety, 10.8% depression and stress, and 9.7% anxiety and stress symptoms.

Previous studies in Nepal have not reported the prevalence of anxiety and stress symptoms in community settings. As identified by the review, this study is the first to use the DASS-21 to estimate the prevalence of depression, anxiety, and stress among older people in Nepal. The results are comparable with research conducted among older people using the DASS-21 in Thailand (depression 20%, anxiety 25% and stress 11%; Supasiri et al. 2019) and Ecuador

(depression 12%, anxiety 15% and stress 5%; Brutto et al., 2015). The higher prevalence of anxiety compared to depression among older people observed in this study is consistent with previous research (Mutepfa et al., 2020; Supasiri et al., 2019).

The scores for the domains of QOL were 58.8 (*SD* = 19.8) for physical, 63.7 (*SD* = 18.0) for psychological, 60.7 (*SD* = 16.2) for social, and 61.8 (*SD* = 15.0) for environmental. Nepalese older adults showed higher QOL scores for the psychological domain, followed by environmental, social, and physical domains. Considering the cut-off of QOL scores of < 60 for poor QOL (Samira Monteiro et al., 2019), the proportions of older adults showing poor QOL in each domain were 54.9% for social, 47.7% for environmental, 46.8% for physical, and 40.0% for psychological. Previous research using the WHOQOL-BREF in Nepal has sampled clinical populations (Mishra et al., 2015; Ranabhat et al., 2020) with none specifically focusing on older adults, and thus cannot be compared to the current findings.

10.2.2 Risk and protective factors for mental health symptoms

This study measured a range of factors which may have important influences on the mental health of older adults. A separate analysis was conducted to identify risk and protective factors associated with mental health among left-behind older parents. Among the total sample of older people, a number of risk and protective factors were identified which are consistent with previous research in Nepal (Chalise, 2014; Simkhada et al., 2018) and other countries (Anstey et al., 2007; de Sousa et al., 2017; Nakulan et al., 2015; Volkert et al., 2013; Yunming et al., 2012). For older persons, being female, working in agriculture, lower household wealth, perceived poor health, smoking, having a number of chronic conditions, having a child outside the country, and exposure to adverse life events were positively associated with mental health symptoms. Receiving an allowance, physical exercise, improved functional ability, social support, and participation in social activities were negatively associated. The discussion section

in Chapter 7 details the interpretation and implications of findings related to the factors associated with mental health symptoms among older adults.

The risk factors identified among the left-behind older parents in this study are similar to those for older adults in general, consistent with the review conducted on risk factors for left-behind older parents as part of this thesis (Thapa et al., 2018a; see Chapter 3). Receiving low social support, perceived poor health status and adverse life events were common risk factors for depression, anxiety, and stress symptoms in both the total sample and the left-behind sub-group. In addition, being male, better functional ability, and communication with children had protective effects against all three mental health symptoms, indicating these factors may be unique to left-behind parents. Other risk factors significantly associated with mental health symptoms common to the total and left-behind subgroup were: currently working, having a number of chronic conditions, having agriculture as a main source of household income, smoking, and receiving the pension. In contrast, physical activity, receiving an allowance, and Indigenous ethnicity had protective effects. The analysis, however, identified some factors, such as the wealth quintile and social participation, that were protective for the whole sample population and were not found to be associated for the left-behind subgroup.

In terms of child-related characteristics, contact with children had significant associations with QOL, with parents having daily contact with all children showing better QOL. Anxiety symptoms, however, showed higher scores for those who had all children communicating daily, compared to having daily contact with no children. Closeness to a child showed a significant protective effect on the mental health of left-behind older parents. In contrast to the studies reporting higher frequency of communication with children being associated with better mental health (Haagsman & Mazzucato, 2014), this study showed parents reporting more frequent communication with children had poorer mental health.

10.2.3 Migration of adult children and left-behind parents' mental health and QOL

According to the definitions used for 'migration of children' and 'left-behind' in this study, the majority (87.7%) of the older adults had a child living outside their municipality, and were considered left-behind. Half of the participants (52.5%) had a child who had migrated internationally. The findings showed that the left-behind older parents, compared to the non-left-behind, were younger, more likely to own a mobile phone, had more children, had fewer chronic conditions, scored higher on functional ability, participated in physical exercise and social activities more often, and received a higher level of financial support from their children.

The analysis suggests that the association of children's migration with outcome variables varies with the type of migration. In terms of QOL, left-behind parents had lower physical QOL score compared to non-left-behind parents. When compared between empty nest and non-empty nest, empty-nest older adults showed lower scores on psychological, social, and environmental domains of QOL. QOL did not differ between older parents with a migrated child internationally compared to those with all children inside the country. Scores for QOL across all domains were lower among those with no children migrated compared to those with some or all children migrated, with the difference significant for the physical domain. Finally, QOL effects of internal and international migration of children were compared with those of having no children migrated. In bivariate analyses, parents with children migrated internally had higher scores for QOL, and the difference persisted in multivariate analyses adjusting for potential confounders with internal migration showing a beneficial effect on parents' QOL, particularly on physical and environmental domains. These results show that there are null or positive associations between migration of children and QOL of older parents, indicating left-behind older parents had similar or better QOL compared to non-left-behind parents.

Simar patterns of association were observed for mental health symptoms. Scores for mental health did not differ between the left-behind and non-left-behind groups, nor between the

empty nest and non-empty nest groups. When compared against the number of children migrated, anxiety symptoms were higher for parents with no children migrated compared to those with some or all children migrated. Scores for mental health symptoms were higher for parents having a child migrated outside the country than for those with internally migrated children, with the difference significant for anxiety symptoms. The study further compared the effect of internal and international migration on mental health symptoms within the left-behind group. The results showed that parents having a child migrated outside the country had significantly higher scores for mental health symptoms, particularly anxiety and stress, compared to parents with children migrated only internally. These results showed that the migration of children was not associated with depressive symptoms, while internal migration of children showed protective effects against the symptoms of anxiety and stress compared to parents whose child(ren) had not migrated or had migrated internationally.

10.2.4 Mental health and QOL of left-behind parents

The various levels of analyses in general showed that left-behind parents have similar or better mental health and QOL compared to non-left-behind older parents. The positive and null associations between the migration of children and parents' well-being observed in this study differs from the generally held view that left-behind older adults are at greater risk of mental health disorders (Thapa et al., 2018a). The findings of the current study challenge research reporting left-behind parents having worse depressive symptoms and poorer psychological health (Adhikari et al., 2011; Antman, 2010; Zhai et al., 2015). These differences could in part be due to the study setting, characteristics of the study population, the methods adopted, covariates used for adjustment, and assessment measures, including mental health outcomes and children's migration status.

Research reporting associations between children's migration and the mental health of parents has generally assessed depression (Huang et al., 2020; Torres et al., 2018; Waidler et al., 2017),

cognitive function (Downer et al., 2016), loneliness (Mosca & Barrett, 2016), life satisfaction (Liu & Guo, 2008) and other broader measures of mental health (Antman, 2010; Böhme et al., 2015; Liu et al., 2007), with many studies employing secondary analyses of data (Thapa et al., 2018a). This curent study used the DASS-21, which measures anxiety, stress and depression symptoms, and the WHOQOL-BREF to assess QOL. Two important findings to be considered in this context are that:

(i) this study did not find children's migration to be associated with depression symptoms among parents, with previous studies reporting both positive and negative associations; and

(ii) this study found migration of children to be negatively associated (left-beind at lower risk) with anxiety and stress, with previous studies having limited their focus to anxiety and stress-related disorders. Anxiety and stress symptoms among the left-behind parents further differred by the type of migration, with international migration of children showing greater risk compared to internal migration.

These findings contribute important evidence/knowledge, as research is limited on anxiety- and stress-related disorders.

Left-behind older parents showed better mental health and QOL in this study, which was similar to the findings of research conducted in Thailand (Abas et al., 2013; Abas et al., 2009) reporting parents with no migrant child to be at greater risk of depression than those with a migrated child. Consistent with the findings of this study, Torres et al. (2018) reported a negative association of mental health for parents in Mexico with an adult child having migrated to the US, and a positive association for those with an adult child migrated within Mexico. The null associations observed across different domains of QOL (particularly psychological and social) and mental health (particularly depression) in this study align with other studies which have reported no association between children's migration and depression (Waidler et al.,

2017), psychological health (Chang et al., 2016), QOL (Zhu et al., 2018), and well-being (Ghimire et al., 2018).

Left-behind older parents reporting better or similar mental health and QOL compared to non-left-behind parents could be related to the beneficial effect of financial support provided by migrant children through remittances (Pan & Dong, 2020). Improved financial capacity may have contributed to improved access (and use) of healthcare and other associated services. Since migration in low-income countries generally originates from poor households as a livelihood strategy, the migration of children may also reduce the number of family dependents, and thus expenses, providing some relief to older adults who are economically active despite their old age. Parents may feel relief when their children have migrated and become independent. In addition, successful migration and the remittances received are often awarded prestige, contributing to social status (Markov, 2018), which may buffer against the negative consequences of children's migration on parents' mental health and QOL. Parents may also be resilient to the separation from their child(ren).

Some parents may already have established physical and psychosocial support networks, mitigating the effects of a child's migration. In low-income countries, older adults commonly live with an extended family, which includes children, sons- and daughters-in-law, and grandchildren. Siblings of the migrant child often provide and assist with providing the necessary care and support. Research suggests that children typically migrate after ensuring alternative support arrangements for their parents, mitigating the potential negative effects associated with migration (Stohr, 2013; Zimmer & Knodel, 2013).

Better mental health and QOL for parents with internal migrant children could be related to the frequent interaction with, and visit(s) from, these children. Internal migration is usually periodic and implies frequent return visits with shorter periods of disruption (Dewind & Holdaway, 2008). Parents of internal migrant children also receive both financial and physical

support, thereby positively affecting their mental health and QOL. An important contribution of this study is its finding that parents whose children visited ‘once a month or more’ had better mental health and QOL compared to parents whose children visited ‘daily’ or ‘less than once a month’, indicating that being too close (non-migrants) or too far away (international migrants) from their children may be unfavourable for older parents. Having children visit ‘once a month or more’ was found to provide the benefits required from contact. Physical QOL scores were, however, higher among parents with ‘all children visiting less than once a month’ compared to those reporting more frequent visits. This may be explained by those parents who were physically able and mentally healthy having children who were able to migrate and visit less frequently (Böhme et al., 2015).

Consistent with earlier research (Liu et al., 2018), this study highlights the importance of closeness to the child, which was significantly associated with better mental health outcomes. On the other hand, financial support from children was not associated with mental health. From this, it can be inferred that perceived closeness and interaction with children is more important than the financial support they provide. Previous studies reported close relationships with children being associated with lower risk of depression (Ward, 2008) and a higher level of life satisfaction (Liu & Guo, 2008). These findings highlight the importance of providing social support and emotional connection in protecting QOL and the mental health of left-behind parents. Previous studies have emphasised the centrality of transnational care—care provided irrespective of geographical distance and state boundaries—for improving left-behind parents’ mental health and well-being (Baldassar & Merla, 2014; De Silva, 2018).

The findings of this study build on other research (Abas et al., 2013; He et al., 2016) which has attributed the better mental health among the left-behind parents to the remittances provided by migrant children. In this study, financial support from children did not show a significant effect on parents’ mental health. Moreover, parents of international migrants, although

receiving higher levels of financial support compared to internal migrants, showed poorer mental health. Khan et al. (2010) reported that the financial protection from international migrants does not always protect left-behind family members from feelings of insecurity, anxiety and loneliness. While migration increases material benefits for non-migrant family members, it reduces leisure time, with increased labour work compromising the benefits of increased financial and material support (Murard, 2020). International migration, compared to internal, is costly, and requires eligibility and administrative procedures, and the longer distances, associated travel time, and safety may be sources of worry for left-behind parents. In addition to safety concerns for the migrant child, their marriage prospects if unmarried, and the welfare of the left-behind spouse of the migrant child and grandchildren may contribute to anxiety and stress, leaving parents psychologically vulnerable (Aminuddin et al., 2019). Although parents with a child who had migrated internationally showed poorer mental health and lower QOL, the destination country may also have an important influence. Nepalese young people typically migrate to the Middle East, India, and high-income countries. Across these countries there are differences in the purpose of migration, administrative procedures and processes required, and the remittances sent by the migrant children, which may have differing implications for parents' mental health and QOL.

The study setting, Nepal, provides an important socio-cultural context similar to many other low- and middle-income countries for left-behind older adults, where the increasing number and proportion of older people with mental health problems is coupled with a lack of universal health coverage and inadequate social security mechanisms. In these resource-poor settings, children traditionally represent an important emotional and material resource, with the existing evidence indicating that migration of children has a negative effect on older parents' health and well-being. Most of the previous studies on the mental health of left-behind older parents were conducted in China (Chang et al., 2016; Cheng et al., 2015; Huang et al., 2020; Liang et al.,

2017; Liu & Guo, 2007; Lv et al., 2013; Wang et al., 2017; Zhang et al., 2019a; Zhang et al., 2019b) and Mexico (Antman, 2010; Downer et al., 2018; Yahirun & Arenas, 2018), with a few conducted in other countries. Studies done in China often examined empty nest status, and did not differentiate between internal and international migration of children. Studies conducted in Mexico considered migration to the USA when defining the left-behind status of older parents, again without looking at internal migration. These studies were methodologically limited in terms of non-probability sampling, with low sample sizes, being limited in scope by assessing depression only, making limited use of standard scales for measuring mental health and QOL, and by not considering potential confounders when estimating the effect measures. The study reported in this thesis assessed three common mental health disorders (depression, anxiety, and stress), measured QOL, and compared internal and international migration. A rigorous methodology with a relatively larger sample size, random selection of samples, and inclusion of a wide range of potential confounds have contributed to findings which are more generalisable to countries with similar socioeconomic conditions.

The findings observed in this study could also be context-specific, as the social and cultural meanings attached to the concepts of migration and being left behind vary. Nepal's 1996–2006 armed conflict displaced many young adults who were forced to migrate within and outside the country. International labour migration has also increased substantially in the past two decades, with overseas employment now a major source of household income for many poor families. Most households in Nepal have at least one member migrated (Samir, 2020), with the long-standing migration of labour from the high hills to the lowlands having socioeconomic consequences. Where there is a lack of employment and educational opportunities in the place of origin, parents' distress over their child(ren)'s migration may be balanced against the hope that their children may enjoy a better life. Thus, it is not surprising that these findings showed left-behind parents with better mental health and QOL.

The low risk to the mental health of parents with internally migrant children could be due to the rural setting of Lumbini province in Nepal, which is near the large cities which are the major destinations of internal migrants. Internal migration (inside the country) when close to home often enables visits for family functions, and at times of demand for agricultural labour. In such cases, parents might have received financial support from remittances, as well as emotional and physical support from frequent visits, contributing positively to their mental health and QOL.

This finding has important implications in the present global pandemic context with its changing migration dynamics; all over the world, an increasing number of migrant children are returning home. Abas et al. (2013) indicated that parents can feel a burden in adjusting after their child has returned. As internal migration of children has positive effects compared to both no migration and international migration, there is an opportunity to retain returning international migrants by creating employment opportunities at home, and by facilitating migration within national borders, which may also improve older parents' mental health and QOL.

Figure 10.1, below, summarises the risk and protective factors for mental health among older people, including the migration status of adult children as identified in this thesis. This is drawn from the community-based survey, as well as from the integrative review of left-behind older parents. As the risk and protective factors were similar for both the general population of older adults and the left-behind subgroup, these factors are not differentiated between the two groups in Figure 10.1.

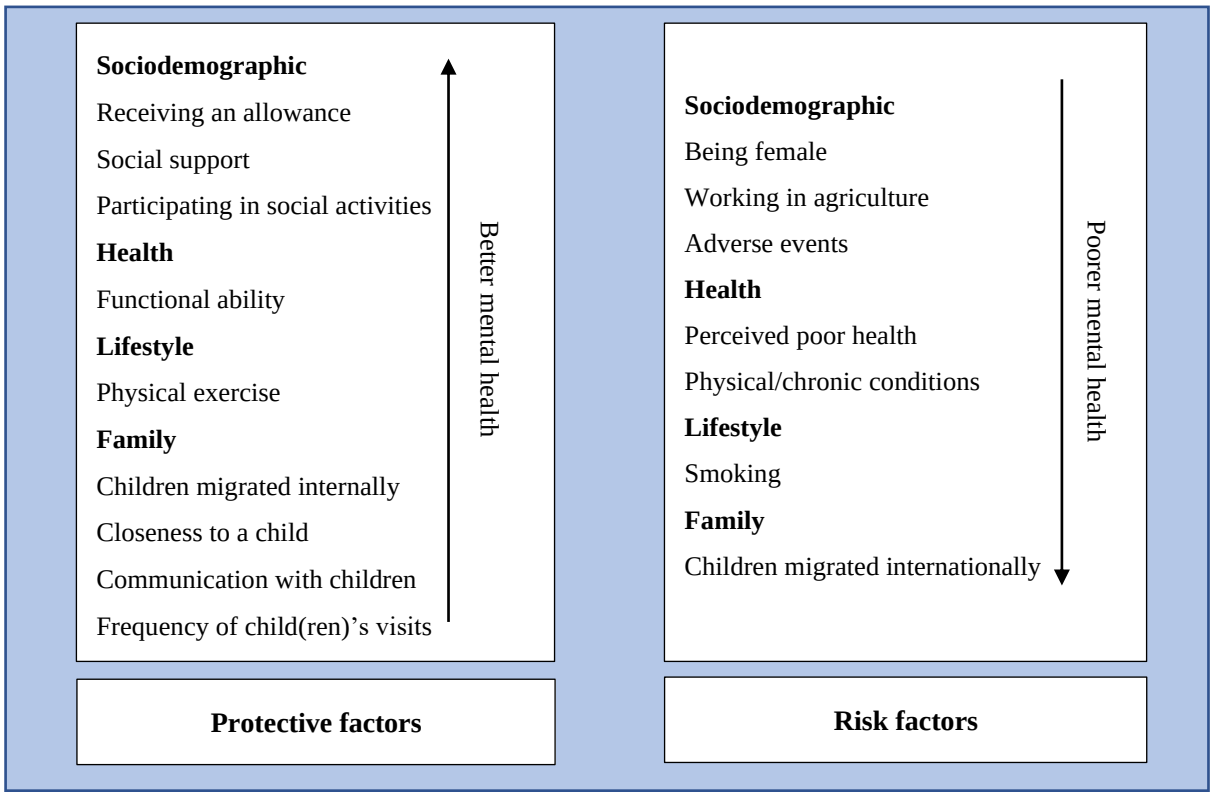

Figure 10.1 Factors associated with mental health among older people

10.3 Strengths and limitations

10.3.1 Strengths

This study has several strengths in terms of the contributions it makes to knowledge about left-behind older adults and its methodological aspects. Two comprehensive reviews (one systematic, one integrative) were carried out, which identified current knowledge and the knowledge gap, including the methodological limitations of previous studies. There were limited community-based studies on the mental health of older people, with most in Nepal focusing on depression. This study estimated the prevalence of the symptoms of three common mental health disorders—depression, anxiety, and stress—and provided a comprehensive risk profile for these symptoms. This had not previously been researched among community-dwelling older adults in Nepal. Further, the present study identified risk and protective factors

for mental health symptoms among left-behind older parents, thus making a substantial contribution to the literature.

Previous studies on left-behind older parents have largely focused on physical and mental health, and, within mental health, most assessed depression. These studies were methodologically limited in terms of defining ‘left-behind’, their use of standard scales, and not considering internal and international migration. Based on the shortcomings identified in the review of existing studies on the impact of children’s migration on parents’ mental health, this study contributes to further understanding of the phenomenon of older parents being left behind in rural settings. This study defined ‘left-beind parents’ as older adults having a child migrated outside the municipality for more than three months during the time of survey, with ‘migrated’ carrying its United Nations (2018) definition. This survey was comprehensive; it assessed depression, anxiety and stress, which are the three most common mental health disorders among older people. Its comparison of QOL between left-behind and non-left-behind parents, and its drawing of a distinction between internal and international migration of children are additional strengths of this study which have previously been neglected.

The methodological strengths of this study include its use of a population-based random sample, a relatively large sample size with a high response rate, standardised scales, its assessment of a comprehensive set of risk factors, primary data collection using face-to-face interviews, and robust statistical analysis. The random sampling method used supported representativeness. The sampling frame was developed from the 2017 voter list of the National Election Commission of Nepal. As the list had been recently updated for the December 2017 election, the sampling frame was up to date and thus the best available. This has contributed to the representativeness of the sample of the older population of Nepal.

The questionnaire was developed and finalised in close consultation with experts in English and Nepali. The use of standardised tools to measure QOL, mental health, functional ability,

and social support further supported the validity and reliability of the study. These instruments have been translated and used in Nepal, and this study contributes to further refinement of the Nepali version of these scales. The reliability coefficient (Cronbach's alpha) of all scales used was adequate, suggesting reliability in this study. The questionnaire was piloted among 30 older adults prior to the actual administration. The piloting of the questionnaire served to ensure the appropriate flow and sequencing of the questions.

Migration of children was further analysed according to whether it was internal or international. The research supervisors and enumerators were adequately trained for data collection. Personal interviews were conducted using a standardised procedure. During the fieldwork, enumerators were closely overseen by field supervisors, as well as by the candidate. Data were collected using tablets and thus real-time monitoring and feedback to enumerators was possible. Appropriate statistical analysis taking account of the multi-level sampling method was used. This study, informed by the systematic reviews, included a wide range of potential confounding factors, yielding more roboust estimates of the effect measures.

10.3.2 Limitations

This study is not without its limitations. Its cross-sectional nature, the statistical associations of the migration of children with mental health and QOL, and the risk factors for mental health symptoms do not imply causal relationships. The relationship between being left behind and physical well-being could be due to 'migrant selectivity' (Ichou & Wallace, 2019). Parents who are more independent and healthier may be more likely to have children migrated (Giles & Mu, 2007; Vanore et al., 2018). This may contribute to selection bias when estimating the health effects of migration (Démurger, 2015). In Nepal, previous research has shown that people with lower education and skills, and from poor households, are more likely to migrate internationally (compared to internally), and undertake labouring work abroad (Bohra & Massey, 2009). These

socioeconomic differences could account for the better mental health of left-behind older parents with internally migrant children observed in this study.

The survey was conducted in selected rural municipalities of a single province in Nepal, limiting its wider generalisability. The results are also not generalisable to older people living in institutions and those who were hospitalised at the time of the survey, as they were excluded. Exclusion of those who could not provide informed consent or comprehend and answer the questionnaire (due to cognitive impairment, for example) may have contributed to the prevalence of mental health symptoms being underestimated. This study highlighted the distinction between internal and international migration, however, the impact on parents' mental health may vary across the destination countries in the case of international migration, and this was not captured. While a wide range of risk factors were included, others, such as previous mental health history, family history of mental illness, access to healthcare, and use of psychotropic medicine, were not. Children's migration-related factors, such as gender and number of migrated children, duration (short- or long-term) of migration, and purpose of migration, may influence parents' mental health; these were not assessed in this study. Finally, symptoms of mental disorders were assessed using a validated screening tool rather than clinical diagnosis, with data based on self-reported subjective assessments.

10.4 Implications

This study contributes to the growing literature by empirically investigating the impact of adult children's migration on the mental health and QOL of older parents. There is limited research specific to Nepal on the mental health and QOL of older people. The prevalence of depression, anxiety and stress symptoms, and risk profiles of these symptoms, provide a basis to inform a review of Nepal's mental health programmes. As the data showed a strong correlation among the domains of QOL and depression, anxiety, and stress symptoms, similar risk profiles can be

expected for QOL. Results showed that the migration of children plays an important role in determining the mental health and QOL of older parents, with parents of non-migrant children generally showing poorer mental health and QOL compared to parents of a migrant child.

10.4.1 Policy and practice implications

Among the total sample, the prevalence of at least one mental health symptom was 23%. This high prevalence of mental health symptoms indicates mental health among older people to be a public health issue requiring appropriate attention. For prevention measures to support and improve mental health, factors associated with the level of mental health should be identified (Cuijpers, 2003; Schoevers et al., 2006). In the current study, receiving social support, having better functional ability, perceived closeness to a child, communication with children, participation in physical activity, and receiving an allowance were identified as protective factors. In contrast, perceived poor health, physical health conditions, adverse life events, being female, international migration of children, currently working in agriculture, receiving the pension, and smoking were identified as risk factors for poorer mental health.

There was considerable overlap in risk and protective factors among the mental health symptoms, with being female, adverse life events, perceived health status, physical (chronic) condition, physical exercise, social support, functional ability, closeness to children, communication with children, and the migration of children significantly associated with two or more symptoms. Further, there was substantial co-occurrence of mental health symptoms. Evaluation of the factor structure of the Nepali version of the DASS-21 (see Chapter 5) yielded similar results, suggesting that the DASS-21 may not distinguish the specific states of depression, anxiety and stress, and rather that it will detect an additional common factor, the so-called ‘Negative Affect’ or ‘Emotional Distress’. Other research suggests it is not necessary to distinguish the domains of mental health among the older population because interventions to address any disorders will be similar (Tran et al., 2013).

These findings provide the evidence base necessary for the relevant stakeholders to review and implement targeted interventions addressing the identified risk and protective factors. The findings suggest the need for health interventions, alongside appropriate social services for older adults in Nepal (Figure 10.2, below). Findings of this study can be used to inform mental health service development for this vulnerable population, and mental health promotion and education initiatives.

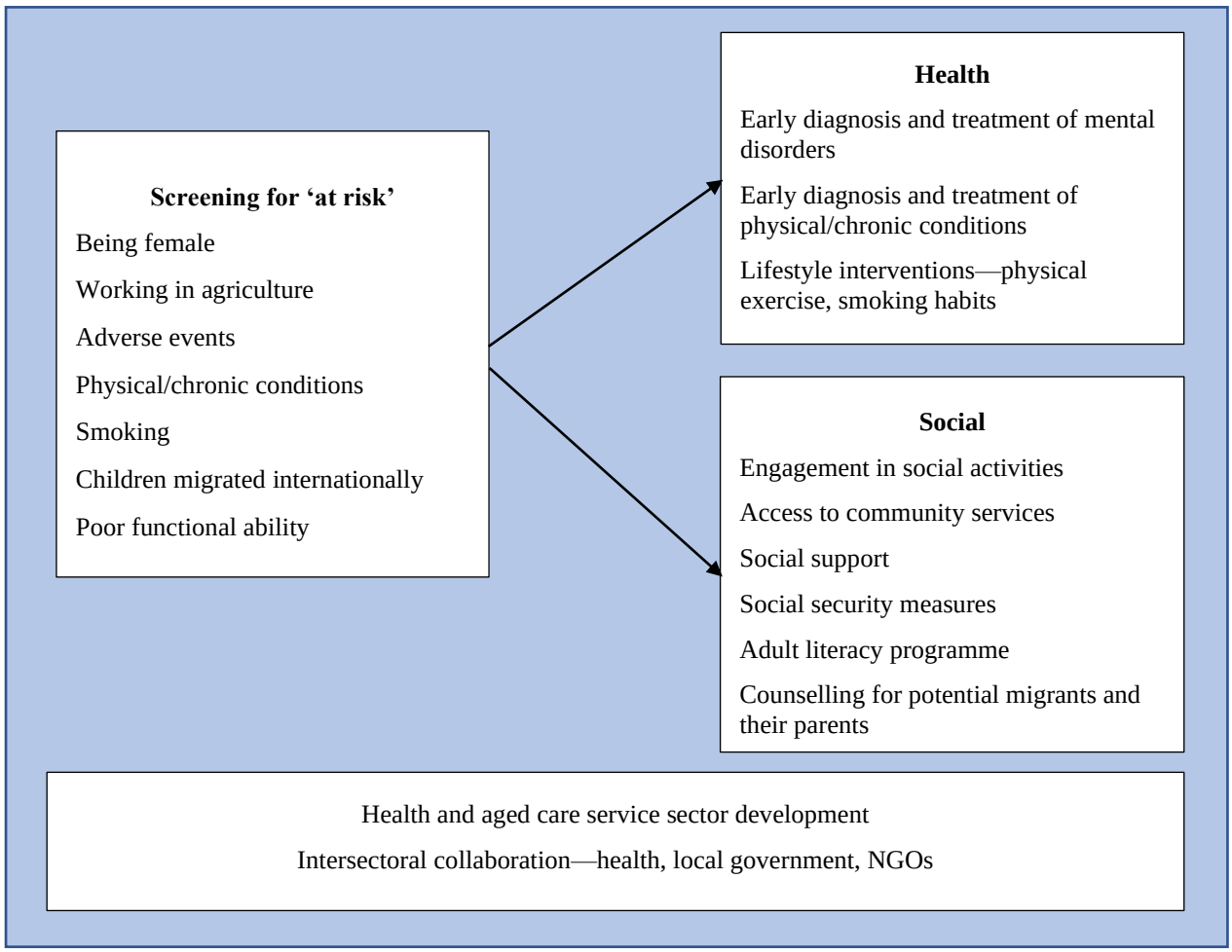

Figure 10.2 Programmes for improving mental health among older people

10.4.1.1 Healthcare services

The estimated prevalence of depression, anxiety and stress symptoms was high, with 23% among the community sample of older adults having at least one of the three symptoms. This indicates the need for community-based mental health prevention programmes, including appropriate diagnosis and treatment of mental health disorders, and promotion programmes

targeting the potential protective factors. Community-based screening programmes should be considered on the basis of identified risk factors, which include being female, working in agriculture, adverse life events, concurrent chronic conditions, smoking, poor functional ability, and children migrated internationally. Early detection of mental health disorders is important for timely treatment and interventions. Mobilisation of volunteers and informants using the Community Informant Detection Tool (Subba et al., 2017) has been found to be effective in proactive detection of mental health disorders and promotion of treatment initiation at community level in Nepal (Jordans et al., 2017; Jordans et al., 2020). Older adults identified as at risk could be targeted for screening of mental disorders. Targeted interventions can then be implemented to address and thus reduce the risk factors.

Studies in low- and middle-income countries, including Nepal, have identified low allocation of resources to mental health services, overburden of health workers, lack of trained mental health workers, and inadequate access to affordable psychotropic medications as barriers to accessing mental health services (Acharya et al., 2017; Hanlon et al., 2014; Luitel et al., 2015; Upadhaya et al., 2017). Saraceno et al. (2007) highlight that mental health is often given low priority, with mental health services limited to central geographical locations, such as cities. Research in Nepal found healthcare workers lacking the knowledge and skills for mental healthcare delivery among primary healthcare providers (Acharya et al., 2016; Mahato et al., 2018). In addition to workforce issues, many have unmet mental health needs, with one Nepalese study reporting 90% of respondents with a depressive disorder not seeking treatment (Luitel et al., 2017).

In Nepal, each local administrative unit (ward) has a health post which is the first contact point for healthcare services. At the community level, there are volunteer cadres as well as venues for outreach clinics. Each level above the health post is a referral point in a network from the health post to the primary healthcare centre, on to the district, zonal and regional hospitals, and

finally to specialty tertiary care centres (Department of Health Services, 2019). To increase access to mental health services, their integration into existing primary healthcare networks is recommended. It is also recommended that current health workers be mobilised by providing appropriate mental health training and education (Mendenhall et al., 2014).

In Nepal, the extensive networks of community-based health workers and volunteers, and increased focus of non-governmental organisations (NGOs) in mental health issues in recent years, provide opportunities to develop and expand mental health, well-being, and other supportive services (Saraceno et al., 2007; Upadhaya et al., 2017). More recently, initiatives such as the District Mental Healthcare Plan are being rolled out in low- and middle-income countries, including Nepal (Jordans et al., 2019). Such initiatives could prioritise access to integrated health services for older people living in rural and remote communities, who often experience challenges. Addressing the treatment gap is crucial, with Mugisha et al. (2017) suggesting that long-term monitoring and evaluation systems are also necessary to support the integration of mental health into primary healthcare in low- and middle-income countries.

The results of this study suggest a need for a more responsive healthcare system if the mental health needs of the older people in Nepal and elsewhere are to be met. Given the limited access and availability of mental health services for general population as well as the older people, development of health system by increased number of trained mental health workforce; appropriate diagnosis, referral, and access to treatment. The findings of this study can be used to inform training programmes for healthcare workers in identifying older people at risk, as well as protective factors.

10.4.1.2 Social services

In recognition that a number of modifiable social factors are associated with the mental health of older adults, consideration should be given to social interventions that take into account the

prevalence and risk factors to ensure that health and social services can better address the challenges for this vulnerable group. Interventions aimed at improving mental health should incorporate socially protective factors, including access to support groups and social networks, preservation of functional ability and independence, and enabling active participation and involvement in community activities. Priority should be given to older adults at higher risk, who include women, singles and those living alone, those working in agriculture, and parents whose children have migrated internationally. Older adults identified as being at risk need to be able to access resources in their local community, including aged care, disability support, and rehabilitative services.

There is opportunity for existing services to strengthen local community services for older adults and to ensure access and support for individuals, particularly those who have children migrated internationally. In Nepal, there are several community-based organisations and networks, such as farmers' groups, forest users committees, water users committees, faith-based organisations, and yoga groups. Involvement of older adults in such community organisations and cultural activities may contribute to social connectedness and provide a sense of achievement, and thereby improve mental health and QOL (Toepoel, 2013; Wells et al., 2014). More recently, older people's organisations and self-help groups supported by NGOs have been established, which are reported to have had benefits including the promotion of active participation in community life and healthcare (HelpAge International, 2019). Peer support groups have been found to be effective for older adults exposed to adverse life events and bereavement (Cattan et al., 2002; Stewart et al., 2001). Initiatives such as those described can facilitate and support social connections through establishing support programmes and networks. Individual characteristics, including motivation, preferences, needs, functioning level, as well as the type and purpose of group-based activities, must be considered when designing mental health support services for older people (Niclasen et al., 2019).

Educated older adults showed lower mental health symptoms and better QOL. Since around half of participants identified as not being able to read or write, community literacy classes targeting this cohort may be beneficial. As individual lifestyle was associated with QOL and mental health, behavioural interventions could be effective, particularly those promoting physical activity and reduction of smoking. Physical exercise has been reported to reduce depressive symptoms and improve QOL (Leggett & Zarit, 2014; Rosenberg et al., 2010). Given the close correlation between physical health and mental health, the findings emphasise the importance of identifying and treating comorbidities, including physical health-related conditions.

Receiving an allowance reduced the risk of mental health symptoms among older people, demonstrating the importance of social security measures to support mental health and well-being. Allowances benefit many older persons in Nepal who have no other source of income (Samson, 2012), with those living in rural areas or alone reporting higher levels of benefit (HelpAge International, 2009). More recently, the social security system has been reported to be inadequate to meet the needs of older people (Malakar & Chalise, 2018). There is opportunity for social security measures to be reviewed, especially for women, those working in agriculture, and those who have a child migrated internationally.

In relation to migration of children, parents with no children migrated had more mental health symptoms and lower QOL compared to parents with a child migrated internally. Among left-behind older parents, international migration of children presented a higher risk of mental health symptoms compared to internal migration, which implies the importance of employment opportunities in low- and middle-income countries such as Nepal.

Further, interventions should promote and support strategies for improved communication with children, given that closeness to children showed a positive effect on parents' mental health and QOL. Community health and social workers and volunteers should be aware of the

influence of family relationships on the mental health of older people. Potential migrants and their parents may be selectively targeted and counselled on the importance of care from a distance, frequent communication, emotional closeness with their parents, and methods of transnational care. Maintaining frequent contact with left-behind parents, providing financial support, and making frequent visits are expected to have a positive effect, but this study yielded mixed results in this regard. This is particularly important in the case of international migration where older parents are at higher risk of poor mental health. Staying in touch with family and friends, including migrant children, may benefit older adults' mental health and well-being. The effective use of available communication technology, including mobile phones and social media, provides opportunities for more active communication and interaction (Wilding & Baldassar, 2018).

Although a common set of risk factors for various symptoms of mental ill-health were identified, the factors included a wide range of social, health-, individual lifestyle-, and child migration-related variables. This emphasises the importance of a multi-sectoral and coordinated approach to improve or maintain the general health, mental health, and well-being of older people and their families. The high correlation among mental health symptoms and QOL, as well as the common risk factors for the symptoms, suggests that universal psychosocial programmes targeting the common risks factors would be beneficial. In this vein, a number of opportunities exist in low-income countries, including task-sharing approaches, intersectoral linkage, and collaborative arrangements with local government, community-based organisations and families. There is a need for health staff to partner with NGOs and community-based organisations in rural and remote areas to increase access to available services. Partnerships are important to increase access to mental health services in resource-poor settings (Acharya et al., 2017). A combination of approaches, including biopsychosocial interventions tailored to an individual's needs and preferences, are reported to improve the

emotional well-being of older people (Wells et al., 2014). Collective actions for promoting mental health should be based on shared values among stakeholders, including consumers (WHO, 2005). In Nepal, there is a need for a coordinated approach by government services to support and work with local communities and NGOs to tailor innovative, flexible, culturally sensitive, and contextually appropriate mental health and psychosocial services based on local needs to promote independence, functional ability, dignity, and QOL of older people.

10.4.2 Research implications

This research has addressed several knowledge gaps and methodological limitations present in previous studies, and whilst the findings are context-bound, they resonate with the literature. The study has made a unique contribution to the literature on the mental health of left-behind older parents, providing a comprehensive comparison of three common mental health conditions—depression, anxiety and stress—and four domains of QOL—physical, psychological, social and environmental. Given the limited research on the mental health and QOL of older people in low-income countries, including Nepal, the results of this study may serve as a foundation for further research on the prevalence and risk factors of mental health disorders, and the impact of children's migration on the mental health of older people.

Another notable contribution of this research is the evaluation of the psychometric properties of the Nepalese version of the DASS-21. The scale showed good internal consistency and convergent validity, correlating significantly with the domains of QOL. The exploratory factor analysis supported the original three-factor model, however, the confirmatory factor analysis suggested inclusion of a fourth factor, 'Negative Affect', for a better model fit. Although the Nepalese version did not completely support the original factor structure of the DASS-21, these results are consistent with other research, supporting the overlapping of concepts of mental health states such as anxiety and depression (Afzali et al., 2017; Gros et al., 2012). Other studies have reported difficulties in differentiating depression, anxiety and stress (Lenze et al., 2005).

Further studies on the psychometric properties of the Nepali version of the DASS-21 including adolescent and adult samples is required to confirm its validity and reliability.

Longitudinal designs involving follow-up and comparative studies between the diagnostic groups can provide higher level evidence in this regard by elucidating the possible pathways and mechanisms whereby migration of children affects the mental health of older people. Longitudinal studies are required to provide clarity on the direction of causality between migration of adult children and parents' mental health, as well as to address the issues related to migrant selectivity (whether the pre-existing characteristics affect migration decisions) and reverse causality (whether return of migrants affects mental health, and, if so, in which direction). Qualitative research may be useful in this context to provide in-depth understanding of the diverse and complex sociocultural contexts, as migration may have different meanings in different cultures.

This study identified several risk and protective factors for poor mental health among older adults, many of which are modifiable. Further studies should consider whether addressing these factors would improve mental health among this population. Similar studies in aged-care homes and clinical settings are suggested, as psychosocial problems in institutional settings are more common in Nepal (Singh et al., 2013). The association reported in this study between these risk factors and mental health, and migration of children and mental health and QOL does not imply causation.

Future research should include other potential covariates, such as previous mental health history, family history of mental illness, and access to healthcare and use of psychotropic medicine, while identifying the risk factors of mental health disorders, and assessing the relationship between migration of the children and mental health of parents. In addition, migration-related characteristics of the children, such as gender (of migrated or remaining children), number of children migrated, purpose of migration, and duration of migration may

have differing impacts on parents' mental health and QOL. Future research needs to focus on these aspects.

This study also identified the importance of transnational care. Both the family and the state have a role in the construction of care systems and mechanisms to access the care resources (Díaz Gorfinkiel & Escrivá, 2012). However, the issues and models of providing care across geographical, political and socio-cultural distance have not been clearly identified (Baldassar, 2007; Zechner, 2008). Future studies should focus on exploring additional means of effective transnational care and support, and enhancing closeness between migrant children and left-behind older parents. The findings of this study also suggest incorporating child-related characteristics, including migration status, in surveys and studies related to older people's mental health and QOL.

10.5 Conclusion

This thesis has described the mental health and QOL of older adults in Nepal with migrated children, and has identified protective and risk factors for poor mental health among older adults in general and left-behind older parents in particular. The reported prevalence of mental health symptoms—with 22% of older adults having symptoms of at least one condition—has important public health implications for Nepal, a country witnessing rapid demographic ageing. Migration of children showed positive or null associations across the measures of mental health and QOL. Parents of migrant children did not display lower levels of mental health and QOL. Overall, the study observed poor mental health and QOL among parents whose child(ren) did not migrate compared to those with a migrated child, suggesting that parents view children's migration as a positive decision, and that they do not perceive the separation as a loss and source of distress. Further, parents whose child migrated internationally showed poor mental health compared to those with children migrated internally. The findings of the study presented

in Chapters 2, 3, 5, 7, 8 and 9 extend previous research, and provide valuable information which contributes to the growing literature on the mental health and QOL of left-behind older parents using robust research methods.

This cross-sectional survey shows that Nepalese older parents do not compromise their mental health and QOL as a result of the migration of their children. Traditional norms of 'filial piety' may be less important, as parents expect their children to move beyond the household and achieve success irrespective of location (local, national, and international). This study highlights the importance of place of migration, with internal and international migration having different implications for left-behind parents. Understanding the type of migration is important, with internal migration having the greater benefit, suggesting that parents want their migrated children close by.

The findings support the need for coordinated access to and support for physical and mental health services, workforce development, and social support programmes facilitating social connections, networks, and participation. Effective ways of providing transnational care by the migrant children should be identified to reduce the negative consequences for mental health and QOL of being left behind. In the context of inadequate mental health services for the general population in Nepal and other low- and middle-income countries, the findings provide a basis for policymakers, educators, clinicians and social workers to work together to develop a model of care to promote the mental health and QOL of older adults.

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Appendices

Appendix 1. Survey instrument (questionnaire)

Impact of adult children's migration on the quality of life and mental health of older parents 'left behind' in Nepal

School of Health Sciences, College of Health and Medicine

University of Tasmania, Australia

Questionnaire for Survey – 2019

(To be asked to older adults (60 years or above) having at least one child 18 years or above)

Name of the enumerator: Questionnaire Number:

Name of the Supervisor: Date: ……../……../2019

Section 1: Questionnaire identification and respondent socio-demographics

No	Question	Response	Skip	Remarks
1.1	District	1. Arghakhanchi 2. Rupandehi		
1.2	VDC/Municipality	…….		
1.3	Ward Number	.....		1 digit
	Selected household number (copy from sampling frame)	……..		
1.4	Sex of the respondent	1. Male 2. Female 3. Other		
1.5	How old are you? *(Completed age in years)*	……..		2 digit (NUMERIC: INTEGER)
1.6	How do you describe your ethnicity?	1. Dalit 2. Indigenous (Janajati/Aadibashi) 3. Terai/Madheshi 4. Brahmin/Chhetri 5. Muslim 6. Other ……		
1.7	Please indicate your level of literacy. *(Completed level)*	1. Cannot read and write 2. Literate, but no schooling 3. Primary (1 to 5 class) 4. Secondary (6 to 10 class) 5. SLC and intermediate 6. Graduate and above		
1.8	What is your (present) main occupation? ***(tick only one)***	1. Agriculture 2. Housewife 3. Labour/Daily wage 4. Service/Job (Regular income) 5. Business/ self-employment 6. Other…….. 7. Do not work		
1.9	What is the main source of income of your household? *(Definition: Main source of income refers to occupation in which the family's survival mainly depends on)* ***(tick only one)***	1. Agriculture 2. Livestock 3. Business/self-employed 4. Labour/daily wage 5. Service/Job 6. Foreign employment 7. Pension 8. Other ……		

1.10	Are you receiving any pension or other benefits? *(Instruction: pension refers to cash provided by the employees' (previous) organization)*	1. Yes 2. No		
1.11	Are you receiving any allowance (non-contributory pension such as old age allowance, widowhood allowance, etc.)?	1. Yes 2. No		
1.12	What is your current marital status?	1. Single never married 2. Married 3. Separated 4. Divorced 5. Widow/widower 6. Other		
1.13	Whom are you living with at present? Please the relationship of all the members who live in your family with you. ***(Check all that apply, only include those who usually live in the household)***	1. Alone 2. Spouse (Wife/husband) 3. Son 4. Daughter 5. Parent (Mother/Father) 6. Brother/sister 7. Grandchildren 8. Son-in-law/Daughter-in-law 9. Other relative(s) 10. Other ……		
1.14	Are you taking care of any grandchildren younger than 16 years old in the past 12 months?	1. Yes 2. No		
1.15	Number of family members	……..		1-2 digit
1.16	Number of (living) children	……		1-2 digit
1.17	Number of (living) children above 18 years of age	……		1-2 digit
1.18	How often do you watch TV? ***(Read the answers)***	1. Never 2. Daily 3. At least once a week 4. Once in every two weeks 5. Once a month or less		
1.19	How often do you read newspaper/magazines? ***(Read the answers)***	1. Never 2. Daily 3. At least once a week 4. Once in every two weeks 5. Once a month or less		
1.20	Do you have your own mobile phone?	1. Yes 2. No		

Section 2: Support from children and children's migration status

Now, I would like to ask you some questions related to the support provided by your adult children and the migration status of your children (NOT other family members). Let us start with your eldest child.

Child	**Sex**	**Age**	**Marital status**	**Support from children**				**Migration status**	**Month and year moved away**	**Place travelled to?**	**Reason for moving**	**Communication**	**Children's visit**
	2.1	2.2	2.3	2.4.1	2.4.2	2.4.3	2.4.4	2.5	2.6	2.7	2.8	2.9	2.10
									Ask only if 'No' in 2.5	Ask only if 'No' in 2.5	Ask only if 'No' in 2.5	Ask only if 'No' in 2.5	Ask only if 'No' in 2.5
	Is your child son or daughter?	How old is your child now? *(Completed years)*	What is the marital status if this child?	Has your child provided/sent money (>5000 NPR) to you in last 12 months?	Has your child provided/sent any gifts or household gadgets (such as TV, cell phones) which costs more than NPR 5000 to you in the past 12 months?	Has your child directly paid household expenses to cover your household bills in the past 12 months?	Taking everything into consideration, how close do you feel to this child?	Does this child live with you now?	In what month and year did s/he move away?	Where has s/he travelled to? (If Outside the province, but within Nepal (3), ask for the name of the city. If Outside Nepal (4), record the name of the country)	What is the primary reason that s/he moved away?	How often do you talk with this migrant child?	How often does this child visit to you?
Eldest child	1. Son 2. Daughter 3. Other	…… years	1. Single never married 2. Married 3. Separated 4. Divorced 5. Widow/widower 6. Other....	1. Yes 2. No	1. Yes 2. No	1. Yes 2. No	0. Not at all 1. Somewhat 2. Very	1. Yes 2. No	Month ☐☐ Year ☐☐☐☐	1. Neighbour/close to the house 2. Living in same village 3. Outside the village but within same province 4. Outside the Province, but within Nepal …… (city) 5. Outside Nepal …… (country)	1. Separated from the household 2. Work/service/business 3. Study 4. Marriage 5. Dependent 6. Security /conflict 7. Other …… 8. Don't know	1. Daily 2. Weekly 3. Every 2 weeks 4. Monthly 5. 3 months 6. 6 months 7. Less than once in 6 months	1. Daily 2. Weekly 3. Every 2 weeks 4. Monthly 5. 3 months 6. 6 months 7. 1 year 8. Less than once in 1 year
Second child	1. Son 2. Daughter 3. Other	…… years	7. Single never married 8. Married 9. Separated 10. Divorced 11. Widow/widower 1. Other....	1. Yes 2. No	1. Yes 2. No	1. Yes 2. No	0. Not at all 1. Somewhat 2. Very	1. Yes 2. No	Month ☐☐ Year ☐☐☐☐	1. Neighbour/close to the house 2. Living in same village 3. Outside the village but within same province	1. Separated from the household 2. Work/service/business 3. Study 4. Marriage 5. Dependent	1. Daily 2. Weekly 3. Every 2 weeks 4. Monthly 5. 3 months 6. 6 months	1. Daily 2. Weekly 3. Every 2 weeks 4. Monthly 5. 3 months 6. 6 months 7. 1 year

										4. Outside the Province, but within Nepal …… (city) 5. Outside Nepal …… (country)	6. Security /conflict 7. Other …… 1. Don't know	7. Less than once in 6 months	8. Less than once in 1 year
Third Child	1. Son 2. Daughter 3. Other	…… years	1. Single never married 2. Married 3. Separated 4. Divorced 5. Widow/widower 6. Other....	1. Yes 2. No	1. Yes 2. No	1. Yes 2. No	0. Not at all 1. Somewhat 2. Very	1. Yes 2. No	Month Year	1. Neighbour/close to the house 2. Living in same village 3. Outside the village but within same province 4. Outside the Province, but within Nepal …… (city) 5. Outside Nepal …… (country)	1. Separated from the household 2. Work/service/business 3. Study 4. Marriage 5. Dependent 6. Security /conflict 7. Other …… 8. Don't know	1. Daily 2. Weekly 3. Every 2 weeks 4. Monthly 5. 3 months 6. 6 months 7. Less than once in 6 months	1. Daily 2. Weekly 3. Every 2 weeks 4. Monthly 5. 3 months 6. 6 months 7. 1 year 8. Less than once in 1 year
……	……	……	……	……	……	……		……	……	……	……	……	……
Youngest child	1. Son 2. Daughter 3. Other	…… years	1. Single never married 2. Married 3. Separated 4. Divorced 5. Widow/widower 6. Other....	1. Yes 2. No	1. Yes 2. No	1. Yes 2. No	0. Not at all 1. Somewhat 2. Very	1. Yes 2. No	Month Year	1. Neighbour/close to the house 2. Living in same village 3. Outside the village but within same province 4. Outside the Province, but within Nepal …… (city) 5. Outside Nepal …… (country)	1. Separated from the household 2. Work/service/business 3. Study 4. Marriage 5. Dependent 6. Security /conflict 7. Other …… 8. Don't know	1. Daily 2. Weekly 3. Every 2 weeks 4. Monthly 5. 3 months 6. 6 months 7. Less than once in 6 months	1. Daily 2. Weekly 3. Every 2 weeks 4. Monthly 5. 3 months 6. 6 months 7. 1 year 8. Less than once in 1 year

Section 3: Health related

No	Question	Answer	Skip	Remarks
3.1	In general, compared with other people of your age, how do you describe your health? ***(Read the answers)***	1. Very good 2. Good 3. Fair 4. Poor 5. Very poor		
3.2	Have you ever been diagnosed with any of these conditions or do you currently have the condition? Please indicate 'Yes', or 'No'. ***(Read the answers)***	1. High blood pressure 2. Diabetes 3. Heart disease 4. Cancer 5. Stroke 6. Arthritis 7. Back pain 8. Liver or gall bladder disease 9. Kidney/urinary disease 10. Respiratory problems 11. Uric acid or gout 12. Gastritis 13. Visual/hearing impairment		
3.3	How do you like to rate your alcohol consumption status? ***(Read the answers)***	1. Abstainer 2. Infrequent drinker 3. Moderate drinker 4. Excessive drinker		
3.4	How do you describe your smoking status? ***(Read the answers)***	1. Never 2. Former 3. Current		
3.5	How often do you undertake physical exercise? ***(Read the answers)***	1. Never 2. Occasionally 3. Sometimes 4. Frequently		

3.6	Functional ability: Now I will ask whether you can do some of the household activities independently or you require any support. For each category, please tell me the item description that most closely resembles to your highest functional level. ***(Read the answers)***					
	Activities	**Response**				
3.6.1	Ability to Use Telephone	Operates telephone on own initiative-looks up and dials numbers, etc.	Dials a few well-known numbers	Answers telephone but does not dial	Does not use telephone at all	
3.6.2	Shopping	Takes care of all shopping needs independently	Shops independently for small purchases	Needs to be accompanied on any shopping trip	Completely unable to shop	
3.6.3	Food Preparation	Plans, prepares and serves adequate meals independently	Prepares adequate meals if supplied with ingredients	Heats, serves and prepares meals, or prepares meals, or prepares meals but does not maintain adequate diet	Needs to have meals prepared and served	
3.6.4	Housekeeping	Maintains house alone or with occasional assistance (e.g. "heavy work domestic help")	Performs light daily tasks such as dish washing, bed making	Performs light daily tasks but cannot maintain acceptable level of cleanliness	Needs help with all home maintenance tasks	Does not participate in any housekeeping tasks

3.6.5	Laundry	Does personal laundry completely	Launders small items-rinses stockings, etc.	All laundry must be done by others		
3.6.6	Mode of Transportation	Travels independently on public transportation or drives own car	Arranges own travel via taxi, but does not otherwise use public transportation	Travels on public transportation when accompanied by another	Travel limited to taxi or automobile with assistance of another	Does not travel at all
3.6.7	Responsibility for Own Medications	Is responsible for taking medication in correct dosages at correct time	Takes responsibility if medication is prepared in advance in separate dosage	Is not capable of dispensing own medication		
3.6.8	Ability to Handle Finances	Manages financial matters independently (budgets, writes checks, pays rent, bills, goes to bank), collects and keeps track of income	Manages day-to-day purchases, but needs help with banking, major purchases, etc.	Incapable of handling money		

Section 4: Participation in social activities

Now I will ask you how often you are engaged in the following social activities. For each of the activities, please respond, "never participate (0)", "participate sometime (1) or "participate everyday (2)".

	Activities	**Never participate (No affiliation)**	**Participate sometime (Passive participation)**	**Participate everyday (Active participation)**
4.1	Political associations	0	1	2
4.2	Volunteer groups/non-profit organizations	0	1	2
4.3	Any formal committees or boards (e.g. School management committee, Community disaster management committee, health facility management committee)	0	1	2
4.4	Residential/neighbourhood/local level associations or groups (e.g. Ward citizen forum, health mothers' group, saving and credit group, farmers' group)	0	1	2
4.5	Domestic work (e.g. gardening, cooking, caring and support for children and young people)	0	1	2
4.6	Agricultural work and/or rearing livestock	0	1	2
4.7	Hanging out with friends, playing cards or other parlour games	0	1	2
4.8	Participating in physical exercise	0	1	2
4.9	Religious activity (e.g. saying prayers)	0	1	2
4.10	Other organized social activities	0	1	2

Section 5: Quality of life (WHOQOL-BREF)

Now I will ask how you feel about your quality of life, health, or other areas of your life in the **last two weeks**. I will read out each question to you, along with the response options. Please keep in mind that there are **five** response options for each of the questions starting from very low (1) to very high (5). Please choose the answer that appears most appropriate. There are no right or wrong answers. Please keep in mind your standards, hopes, pleasures and concerns. If you are unsure about which response to give to a question, please choose the one that appears most appropriate. This can often be your first response.

	Questions	**1**	**2**	**3**	**4**	**5**
5.1	How would you rate your quality of life?	Very poor	Poor	Neither poor nor good	Good	Very good
5.2	How satisfied are you with your health?	Very dissatisfied	Dissatisfied	Neither satisfied nor dissatisfied	Satisfied	Very satisfied
	The following questions ask about **how much** you have experienced certain things in the last four weeks.					
5.3	To what extent do you feel that physical pain prevents you from doing what you need to do?	Not at all	A little	A moderate amount	Very much	An extreme amount
5.4	How much do you need any medical treatment to function in your daily life?	Not at all	A little	A moderate amount	Very much	An extreme amount
5.5	How much do you enjoy life?	Not at all	A little	A moderate amount	Very much	An extreme amount
5.6	To what extent do you feel your life to be meaningful?	Not at all	A little	A moderate amount	Very much	An extreme amount
5.7	How well are you able to concentrate?	Not at all	A little	A moderate amount	Very much	Extremely
5.8	How safe do you feel in your daily life?	Not at all	A little	A moderate amount	Very much	Extremely
5.9	How healthy is your physical environment?	Not at all	A little	A moderate amount	Very much	Extremely
	The following questions ask about **how completely** you experience or were able to do certain things in the last two weeks.					
5.10	Do you have enough energy for everyday life?	Not at all	A little	Moderately	Mostly	Completely
5.11	Are you able to accept your bodily appearance?	Not at all	A little	Moderately	Mostly	Completely
5.12	Have you enough money to meet your needs?	Not at all	A little	Moderately	Mostly	Completely
5.13	How available to you is the information that you need in your day-to-day life?	Not at all	A little	Moderately	Mostly	Completely
5.14	To what extent do you have the opportunity for leisure activities?	Not at all	A little	Moderately	Mostly	Completely
5.15	How well are you able to get around?	Very poor	Poor	Neither poor nor good	Good	Very good
	The following questions ask you to say how **good or satisfied** you have felt about various aspects of your life over the last two weeks.					
5.16	How satisfied are you with your sleep?	Very dissatisfied	Dissatisfied	Neither satisfied nor dissatisfied	Satisfied	Very satisfied
5.17	How satisfied are you with your ability to perform your daily living activities?	Very dissatisfied	Dissatisfied	Neither satisfied nor dissatisfied	Satisfied	Very satisfied
5.18	How satisfied are you with your capacity for work?	Very dissatisfied	Dissatisfied	Neither satisfied nor dissatisfied	Satisfied	Very satisfied
5.19	How satisfied are you with yourself?	Very dissatisfied	Dissatisfied	Neither satisfied nor dissatisfied	Satisfied	Very satisfied
5.20	How satisfied are you with your personal relationships?	Very dissatisfied	Dissatisfied	Neither satisfied nor dissatisfied	Satisfied	Very satisfied
5.21	How satisfied are you with your sex life?	Very dissatisfied	Dissatisfied	Neither satisfied nor dissatisfied	Satisfied	Very satisfied
5.22	How satisfied are you with the support you get from your friends?	Very dissatisfied	Dissatisfied	Neither satisfied nor dissatisfied	Satisfied	Very satisfied
5.23	How satisfied are you with the conditions of your living place?	Very dissatisfied	Dissatisfied	Neither satisfied nor dissatisfied	Satisfied	Very satisfied

	Questions	1	2	3	4	5
5.24	How satisfied are you with your access to health services?	Very dissatisfied	Dissatisfied	Neither satisfied nor dissatisfied	Satisfied	Very satisfied
5.25	How satisfied are you with your transport?	Very dissatisfied	Dissatisfied	Neither satisfied nor dissatisfied	Satisfied	Very satisfied
	The following question refers to **how often** you have felt or experienced certain things in the last four weeks.					
5.26	How often do you have negative feelings such as blue mood, despair, anxiety, depression?	Never	Seldom	Quite often	Very often	Always

Section 6: DASS 21

Now I will ask how you some similar questions. This time, I will be reading the statements and the **four** response options, which shows how much the statement applied to you over the **past week**. Please choose the answer that appears most appropriate. There are no right or wrong answers. Do not spend too much time on any statement. The four response options are 'Did not apply to me at all', 'Applied to me to some degree, or some of the time', 'Applied to me to a considerable degree, or a good part of time' and 'Applied to me very much, or most of the time'.

	Statements	Did not apply to me at all	Applied to me to some degree, or some of the time	Applied to me to a considerable degree, or a good part of time	Applied to me very much, or most of the time
1	I found it hard to wind down.	0	1	2	3
2	I was aware of dryness of my mouth.	0	1	2	3
3	I could not seem to experience any positive feeling at all.	0	1	2	3
4	I experienced breathing difficulty (e.g. excessively rapid breathing, breathlessness in the absence of physical exertion).	0	1	2	3
5	I found it difficult to work up the initiative to do things.	0	1	2	3
6	I tended to over-react to situations.	0	1	2	3
7	I experienced trembling (e.g. in the hands).	0	1	2	3
8	I felt that I was using a lot of nervous energy.	0	1	2	3
9	I was worried about situations in which I might panic and make a fool of myself.	0	1	2	3
10	I felt that I had nothing to look forward to.	0	1	2	3
11	I found myself getting agitated.	0	1	2	3
12	I found it difficult to relax.	0	1	2	3
13	I felt down-hearted and blue.	0	1	2	3
14	I was intolerant of anything that kept me from getting on with what I was doing.	0	1	2	3
15	I felt I was close to panic.	0	1	2	3
16	I was unable to become enthusiastic about anything.	0	1	2	3
17	I felt I was not worth much as a person.	0	1	2	3
18	I felt that I was rather touchy.	0	1	2	3

19	I was aware of the action of my heart in the absence of physical exertion (e.g. sense of heart rate increase, heart missing a beat).	0	1	2	3
20	I felt scared without any good reason.	0	1	2	3
21	I felt that life was meaningless.	0	1	2	3

Section 7: Multidimensional Scale of Perceived Social Support

Now we are in the final section of the interview. This time I will be asking some statements and you have to respond how much do you agree or disagree with each of the statements. Please remember this time there will be **seven** response options starting from **'very strongly disagree (1)** to **very strongly agree (7)'.** I will read the statement and the response options. Please choose the most appropriate that you feel.

SN	Items	Very Strongly Disagree	Strongly Disagree	Mildly Disagree	Neutral	Mildly Agree	Strongly Agree	Very Strongly Agree
7.1	There is a special person who is around when I am in need.	1	2	3	4	5	6	7
7.2	There is a special person with whom I can share my joys and sorrows.	1	2	3	4	5	6	7
7.3	My family really tries to help me.	1	2	3	4	5	6	7
7.4	I get the emotional help and support I need from my family.	1	2	3	4	5	6	7
7.5	I have a special person who is a real source of comfort to me.	1	2	3	4	5	6	7
7.6	My friends really try to help me.	1	2	3	4	5	6	7
7.7	I can count on my friends when things go wrong.	1	2	3	4	5	6	7
7.8	I can talk about my problems with my family.	1	2	3	4	5	6	7
7.9	I have friends with whom I can share my joys and sorrows.	1	2	3	4	5	6	7
7.10	There is a special person in my life who cares about my feelings.	1	2	3	4	5	6	7
7.11	My family is willing to help me make decisions.	1	2	3	4	5	6	7
7.12	I can talk about my problems with my friends.	1	2	3	4	5	6	7

Section 8. Household assets

	Question	Response	Skip
8.1	What type of fuel does your household mainly use for cooking? ***(Check only one)***	1. Electricity 2. LPG 3. Biogas/natural gas 4. Kerosene 5. Coal/charcoal/lignite 6. Wood 7. Straw/grass/shrubs 8. Animal dung 9. No food cooked in household 10. Other …….	
8.2	How many rooms in this household are used for sleeping?	…….	
8.3	Does this household own any livestock, herds, other farm animals, or poultry? How many of the following animals does this household own? ***(Record 0 if none)***	1. Cows/bulls …….. 2. Buffalo …… 3. Horses, donkeys, mules …… 4. Goats/sheep……. 5. Chicken or other poultry …….. 6. Ducks …… 7. Pigs ……	
8.4	Does any member of this household own any agricultural land?	1. Yes 2. No	*If No, go to QN 8.5*
8.4.1	How many 'ropani' of agricultural land do members of this household own?	……	
8.5	Does your household (any member of your household) have?	1. Electricity 2. Radio 3. Television 4. Non-mobile telephone 5. Computer/laptop 6. Internet 7. Refrigerator 8. Table 9. Chair 10. Bed 11. Sofa 12. Cupboard 13. Clock 14. Fan 15. Invertor 16. Dhiki/janto 17. Improved toilet 18. Water tap 19. Mobile phone 20. Wristwatch 21. Bicycle/rickshaw 22. Motorcycle/scooter 23. Car/truck/tractor	
8.6	Does any member of this household have a bank account/cooperative or other savings account?	1. Yes 2. No	
8.7	Observe the main material of the floor of the dwelling. ***(Observe and record)***	1. Earth/sand/dung 2. Wood planks 3. Palm/bamboo 4. Parquet or polished wood 5. Vinyl or asphalt strips 6. Ceramic tiles 7. Cement 8. Carpet 9. Other ……	

8.8	Observe the main material of the roof of the dwelling. ***(Observe and record)***	1. No roof 2. Thatch/palm leaf 3. Rustic mat 4. Palm/bamboo 5. Cardboard 6. Metal/galvanized sheet 7. Wood 8. Calamine/cement fibre 9. Ceramic tiles 10. Cement 11. Roofing shingles 12. Other ……	
8.9	Observe the main material of the exterior walls of the dwelling. ***(Observe and record)***	1. No walls 2. Cane/palm/trunks/Mud/sand 3. Bamboo with mud 4. Stone with mud 5. Plywood 6. Cardboard 7. Reused wood 8. Metal/galvanized sheet 9. Cement 10. Stone with lime/cement 11. Bricks 12. Cement blocks 13. Wood planks/shingles 14. Other ……	

9. Stressful life events:

Finally, I would like to ask you if you have witnessed loss (death) of family member, close friends or relatives during past one year.

1. Yes
2. No

10. Referral of 'at risk' individuals

At the end of the interview, the enumerators can see the scores and categories for Depression, Anxiety and Stress based on the responses of the respondents on DASS-21.

	Depression score	**Anxiety score**	**Stress score**
Scores	……	……	……
Category	1. Normal 2. Mild 3. Moderate 4. Severe 5. Extremely severe	1. Normal 2. Mild 3. Moderate 4. Severe 5. Extremely severe	1. Normal 2. Mild 3. Moderate 4. Severe 5. Extremely severe

*For those individuals showing **'Moderate, Severe or Extremely severe'** level of any of the three conditions, please request them to visit the nearby Health Post for counselling and further treatment purpose. Notify that the 'Information Sheet' contains the address and contact details of the nearby Health Post. Also, do not forget to tell the respondents that the scores and categories depicted do not necessarily mean that the individual has disease, but only imply that the individual may be 'at risk'.*

That is the end of the interview. Thank you for your time and information.

Do you want to ask anything about the topics we discussed today?

THANK YOU.

Appendix 2. Ethics approval

Appendix 2.1 Ethics approval from the university

Appendix 2.2 Ethics approval from the Nepal Health Research Council

Social Science Ethics Executive Officer
Private Bag 01 Hobart
Tasmania 7001 Australia
Tel: (03) 6226 6254
Fax: (03) 6226 7148
ss.ethics@utas.edu.au

UTAS

HUMAN RESEARCH ETHICS COMMITTEE (TASMANIA) NETWORK

29 October 2018

Professor Michelle Cleary
Health Sciences
Private Bag 5052

Dear Professor Cleary

Re: FULL ETHICS APPLICATION APPROVAL
Ethics Ref: H0017555 - The impact of adult children's migration on the quality of life and mental health of older parents 'left behind' in Nepal

We are pleased to advise that the Tasmania Social Sciences Human Research Ethics Committee approved the above project on 29 October 2018.

This approval constitutes ethical clearance by the Tasmania Social Sciences Human Research Ethics Committee. The decision and authority to commence the associated research may be dependent on factors beyond the remit of the ethics review process. For example, your research may need ethics clearance from other organisations or review by your research governance coordinator or Head of Department. It is your responsibility to find out if the approval of other bodies or authorities is required. It is recommended that the proposed research should not commence until you have satisfied these requirements.

Please note that this approval is for four years and is conditional upon receipt of an annual Progress Report. Ethics approval for this project will lapse if a Progress Report is not submitted.

The following conditions apply to this approval. Failure to abide by these conditions may result in suspension or discontinuation of approval.

1. It is the responsibility of the Chief Investigator to ensure that all investigators are aware of the terms of approval, to ensure the project is conducted as approved by the Ethics Committee, and to notify the Committee if any investigators are added to, or cease involvement with, the project.

2. Complaints: If any complaints are received or ethical issues arise during the course of the project, investigators should advise the Executive Officer of the Ethics Committee on 03 6226 6254 or human.ethics@utas.edu.au.

3. Incidents or adverse effects: Investigators should notify the Ethics Committee immediately of any serious or unexpected adverse effects on participants or unforeseen events affecting the ethical acceptability of the project.

4. Amendments to Project: Modifications to the project must not proceed until approval is obtained from the Ethics Committee. Please submit an Amendment Form (available on our website) to notify the Ethics Committee of the proposed modifications.

5. Annual Report: Continued approval for this project is dependent on the submission of a Progress Report by the anniversary date of your approval. You will be sent a courtesy reminder closer to this date. **Failure to submit a Progress Report will mean that ethics approval for this project will lapse.**

6. Final Report: A Final Report and a copy of any published material arising from the project, either in full or abstract, must be provided at the end of the project.

Yours sincerely

Jude Vienna-Hallam
Executive Officer
Tasmania Social Sciences HREC

Government of Nepal
Nepal Health Research Council (NHRC)
Estd. 1991

Ref. No.: 1784

28 December 2018

Mr. Deependra Kaji Thapa
Principal Investigator
University of Tasmania
Australia

Ref: **Approval of thesis proposal** entitled **Impact of adult children's migration on the quality of life and mental health of older parents 'left behind' in Nepal**

Dear Mr. Thapa,

It is my pleasure to inform you that the above-mentioned proposal submitted on **19 November 2018 (Reg. no. 729/2018)** please use this Reg. No. during further correspondence) has been approved by Nepal Health Research Council (NHRC) Ethical Review Board on **12 December 2018**.

As per NHRC rules and regulations, the investigator has to strictly follow the protocol stipulated in the proposal. Any change in objective(s), problem statement, research question or hypothesis, methodology, implementation procedure, data management and budget that may be necessary in course of the implementation of the research proposal can only be made so and implemented after prior approval from this council. Thus, it is compulsory to submit the detail of such changes intended or desired with justification prior to actual change in the protocol. Expiration date of this proposal is **June 2020.**

If the researcher requires transfer of the bio samples to other countries, the investigator should apply to the NHRC for the permission. The researchers will not be allowed to ship any raw/crude human biomaterial outside the country; only extracted and amplified samples can be taken to labs outside of Nepal for further study, as per the protocol submitted and approved by the NHRC. The remaining samples of the lab should be destroyed as per standard operating procedure, the process documented, and the NHRC informed.

Further, the researchers are directed to strictly abide by the National Ethical Guidelines published by NHRC during the implementation of their project proposal and **submit progress report in between and full or summary report upon completion.**

As per your thesis proposal, the total research amount is **NRs 8,25,000** and accordingly the processing fee amounts to **NRs 10,000.** It is acknowledged that the above-mentioned processing fee has been received at NHRC.

If you have any questions, please contact the Ethical Review M & E Section at NHRC.

Thanking you,

Prof. Dr. Anjani Kumar Jha
Executive Chairperson

Tel: +977 1 4254220, Fax: +977 1 4262469, Ramshah Path, PO Box: 7626, Kathmandu, Nepal
Website: http://www.nhrc.gov.np, E-mail: nhrc@nhrc.gov.np

Appendix 3. Information sheet

UNIVERSITY of TASMANIA | FACULTY OF HEALTH

Participant Information Sheet [version number: 4] [date: 25 October 2018]

The impact of adult children's migration on the quality of life and mental health of older parents 'left behind' in Nepal

Participant Information Sheet

1. Invitation

You are invited to participate in a study, which examines the impact of children's migration on the quality of life and mental health of older parents 'left behind'. This study is being conducted in partial fulfilment of a Doctor of Philosophy (PhD) study by Deependra Kaji Thapa under the supervision of Professor Michelle Cleary, Dr Denis Visentin and Dr Rachel Kornhaber from the School of Health Sciences, College of Health and Medicine, University of Tasmania (Sydney based), Australia.

2. Purpose of the study

This study aims to identify how migration of adult children affects the mental health of older parents staying behind in the host country. The study will also identify the risk factors for poor mental health among the left behind older parents. This knowledge will be used to inform public health and welfare programs that aim to improve the mental health of older adults in Nepal.

3. Why have I been invited to participate?

You have been selected to participate in this study because you are a senior citizen (60 years and above). Participants were selected from the 2017 voter list of the Nepal Election Commission. Participation in this study is voluntary and there is no obligation to participate.

4. What will I be asked to do?

You will be asked questions related to your daily life and circumstances, the migration status of your children, your quality of life and your health and well-being. The interview will be conducted in your home and will take about 60 minutes to complete. Responses will be documented but our conversation will not be audio-recorded.

5. Are there any possible benefits from participation in this study?

Participating in the interview may not be of any direct benefit to you, but the information provided will help to understand the impact of children's migration on their parents' psychosocial wellbeing, and this may have potential benefits to the wider community.

6. Are there any possible risks from participation in this study?

There are no foreseeable risks to this study. As we will be asking some personal information about your children's migration status and your psychosocial wellbeing, which may be upsetting to you. If you feel upset by any of the matters discussed, you may wish to visit the nearby hospital for counselling. This information sheet includes the contact details of the nearest district hospital. At the end of the interview, you will be provided with feedback related to the potential level of psychological well-being.

7. What if I change my mind during or after the study?

Your participation in this study is voluntary. You can choose not to answer any questions. You may stop the interview at any time and you do not need to provide an explanation. If you do not wish to continue, the survey will be deleted, and the consent form will be shredded. If you choose to withdraw, you can do so within 7 days of the interview by requesting the researcher Deependra Kaji Thapa (email: deependrakaji.thapa@utas.edu.au, Ph: +977-9841704048) and your data will not be utilised in the study. In this case, the data provided by you will be deleted and you will not be identified as having withdrawn from the study.

8. What will happen to the information when this study is over?

The information provided will be recorded in a tablet/smart phone and electronically transferred to the database in computer server (dashboard). Once the data is transferred to the dashboard, it will be deleted from smart phones/tablets. All the information obtained from you will remain confidential and will be used for this research study only. Only the core research team will have access to the computer and filing cabinet where the data is to be stored. Electronic data will be stored on a password protected computer and only members of the research team will have access to the data. All data collected in this study will be kept for a minimum of 5 years after publication after which it will be disposed of by deleting computer files and shredding any hard copies.

9. How will the results of the study be published?

Information from the study will be used in the PhD thesis report, journals articles and conference presentations. Any publications from this study will not contain your identity and the information presented will be de-identified.

10. What if I have questions about this study?

If you have any questions about this study, you may contact

Deependra Kaji Thapa
Nakhudole, Sainbu – 3
Lalitpur, Nepal
deependrakaji.thapa@utas.edu.au
Ph: 977-...../+61-4.....

Supervisors:
Professor Michelle Cleary
University of Tasmania, Australia
michelle.cleary@utas.edu.au
Ph: +61 2 8572 7954

Dr Denis Visentin
University of Tasmania, Australia
denis.visentin@utas.edu.au
Ph: +61 2 8572 7957

Dr Rachel Kornhaber
University of Tasmania, Australia
rachel.kornhaber@utas.edu.au
Ph: +61 2 8572 7969

Participant Information Sheet [version number: 4] [date: 25 October 2018]

This study has been approved by the Tasmanian Social Sciences Human Research Ethics Committee (ethics reference number H0017555) and Nepal Health Research Council (NHRC) (ethics reference number 729/2018). If you have concerns or complaints about the conduct of this study, please contact the Executive Officer of the HREC (Tasmania) Network, Australia on +61 3 6226 6254 or email human.ethics@utas.edu.au. The Executive Officer is the person nominated to receive complaints from research participants.

You can also contact Nepal Health Research Council (NHRC) for any complaints about the research in the following address:

Nepal Health Research Council
Ramshah Path, Kathmandu, Nepal
P.O. Box 7626
nhrc@nhrc.gov.np
Ph: 9.....

If you feel upset and wish to visit local health facility for counselling services, you may contact the Hospital.

For participants from Arghakachi district:

Sandhikharka Hospital

Sandhikharka -1, Gorusinghe Road

Phone no.: 077....., 077-.....

For participants from Rupandehi district:

Lumbini Zonal Hospital

Hospital Road, Butwal

Phone no.: 071-....., 071-5.....

This information sheet is for you to keep. If you wish to participate in this study, please provide us your consent and we can start the interview process.

Appendix 4. Informed consent form

UNIVERSITY of TASMANIA | FACULTY OF HEALTH

Participant Consent Form [version number: 4] [date: 25 October 2018]

The impact of adult children's migration on the quality of life and mental health of older parents 'left behind' in Nepal

Consent form for participants

Please read (or listen) carefully and if you do not understand or do not agree with any of the statements, please let me know.

1. I agree to take part in this research.
2. I have (read and) understood the Information Sheet for this study.
3. The nature and possible effects of the study have been explained to me.
4. I understand that the study involves answering the questions related to my personal socio-demographic information, my children's migration status, my quality of life and psychosocial wellbeing.
5. I understand that participating in this study may lead to recalling memories of my migrant child which may cause distress.
6. I understand that I may be provided with feedback related to my psychological well-being at the end of the interview.
7. I understand that all research data will be securely stored on the University of Tasmania premises (Sydney) for five years from the publication of the study results and will then be destroyed.
8. Any questions that I have asked have been answered to my satisfaction.
9. I understand that the researcher(s) will maintain confidentiality and that any information I supply to the researcher(s) will be used only for the purposes of the research.
10. I understand that when the results of the study will be published, I cannot be identified as a participant.
11. I understand that my participation is voluntary and that I may withdraw at any time without any effect. If I so wish, I may request within 7 days of the interview that any data I have supplied be withdrawn from the research.
12. I understand that if I am unable to sign this consent form, this information will also be provided to my witness who is one of the adult member (18 years or above) of my family and who may sign on my behalf.

Participant Consent Form [version number: 4] [date: 25 October 2018]

Name of the participant: _____

Signature of the participant: _____

If the participant cannot give written consent,

Name of the witness: _____

Signature of the witness: _____

Statement by Enumerator

☐ I have explained the project and the implications of participation in it and I believe that the consent is informed and that he/she understands the implications of participation.

Enumerator's name: _____

Enumerator's signature: _____ Date: _____

Appendix 5. Schedule (agenda) for field researchers' training

Impact of adult children's migration on the quality of life and mental health of older parents 'left behind' in Nepal

Training schedule for Field Researchers – Kathmandu, Nepal (April 23 – 27, 2019)

School of Health Sciences, College of Health and Medicine, University of Tasmania, Australia

Day	**9.00 – 9.30**	**9.30 – 10.00**	**10.00 – 11.30**	**11.30 -13.00**	**13.00 – 14.00**	**14.00 – 15.30**	**15.30 – 15.45**	**15.45 – 17.00**
Day I	Morning tea	Climate setting- Introduction of participants	Welcome and Objectives of Training	Study protocol summary and Interview technique and questionnaire	Lunch	Research ethics- informed consent, respecting participants freedom to participate	Tea break	Research ethics continue- determining psychological risk, referring participants to the health facilities (if required), code of conduct
Day II	Morning tea	Review of previous day	Information sheet and consent form - discussion	Detail discussion of each questions of the survey instrument	Lunch	Detail discussion of each questions survey instrument	Tea break	Detail discussion of each questions of the survey instrument
Day III	Morning tea	Review of previous day	Use of tablet apps- REDCap (Time setting, GPS, Wi-Fi, launching of apps, review status)		Lunch	Pre-testing of the instrument in the field (each of the participants will complete 2-3 interviews)		
Day IV	Morning tea	Sharing of field experience	Discussion on difficulties encountered during pre-testing	Study site and sampling	Lunch	Planning for field work, team division	Tea break	Role of supervisor (team leader) and enumerators Review of the trainings and wrap up
Day V (For supervisors only)	Morning tea	Study site, sampling, respondent selection	Monitoring field work- tracking sheet, adverse events, supporting the enumerators	Data quality, dashboard monitoring				

Note: The final day (Day V) sessions will be only for the team leaders/supervisors.

Appendix 6. Permission for using the survey instruments

Appendix 6.1 WHOQOL-BREF

WHOQOL-BREF ENGLISH AND NEPALI ATTACHED - 284192 Permission request for WHO copyrighted material

permissions <permissions@who.int>

Sat 11/05/2019 12:12 AM

To: Deependra Thapa <deependrakaji.thapa@utas.edu.au>

7 attachments (1,002 KB)

WHOQOLUserManual.pdf; BREF.SPS; BREF_English version.docx; BREF_English version.pdf; Bref_Instructions.pdf; Bref_Syntaxfiles.pdf; Nepali_WHOQOLBREF.PDF;

WHOQOL-BREF ENGLISH AND NEPALI ATTACHED

Dear Mr Thapa,

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With our best regards,

Dolores

Ms Dolores Campanario

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Appendix 6.2 DASS-21

RE: Using DASS-21 scale among Nepalese older adults

Peter Lovibond <p.lovibond@unsw.edu.au>

Sat 14/04/2018 4:34 PM

To: Deependra Thapa <deependrakaji.thapa@utas.edu.au>

Dear Deependra,

You are welcome to use the DASS in your research. Please see the DASS website www.psy.unsw.edu.au/dass/ to download the ques onnaires, and the FAQ page for further informa on.

I am not aware of a Nepali translation having been completed, and there is no Nepali translation on the DASS website. However if you have access to the version created by Tonsing et al then that's great; perhaps you could encourage them to make it available on the DASS website.

There should be no problem with using the DASS with older adults, providing they can read and understand the items.

Best regards,
Peter Lovibond

From: Deependra Thapa [mailto:deependrakaji.thapa@utas.edu.au]
Sent: Friday, 13 April 2018 1:55 PM
To: Peter Lovibond <p.lovibond@unsw.edu.au>
Subject: Using DASS-21 scale among Nepalese older adults

Dear Prof. Peter,

I am a first year PhD student from the University of Tasmania (Rozelle college, Sydney). I am doing my PhD project on**"Impact of adult children's migration on mental health of 'left behind' older parents"** in Nepal which is my home country. For measuring mental health of older parents' mental health, I am planning to use the DASS-21 scale that you have developed. I found this scale quite comprehensive encompassing different domains of mental health. The Nepali version of the scale has been validated by Tonsing (2014).

In this regard, I kindly request your permission to use the scale for my research. My sample will be older adults (>60 years), and if I understood correctly, this scale can be used for older adults too? I need your guidance in this regard.

Thank you for your support.

Sincerely,

Deependra Kaji Thapa
PhD Scholar
School of Health Sciences, University of Tasmania
Corner of Church and Glover St., Lilyfield NSW 2040, Locked Bag 5052, ALEXANDRIA NSW 2015
Locked Bag 5052, ALEXANDRIA NSW 2015
E: deependrakaji.thapa@utas.edu.au; thapa.deepen@gmail.com
T: +61 404131272
Skype: deependra001

Appendix 7. Permission from the journal/publisher

Appendix 7.1 Permission from *Kathmandu University Medical Journal*

Re: Request for permission

KUMJ (Kathmandu University Medical Journal) <editor@kumj.com.np>

Fri 2/10/2020 7:10 PM

To: Deependra Thapa <deependrakaji.thapa@utas.edu.au>

Dear Author,

Thank you for mail, we are pleased to inform you that the full editorial board has decided to permission to download and use the published article.

This article main purpose should be educational or researcher but do not use business commercial.

Thank you.

> Dear Editor

Kathmandu University Medical Journal,

> As part of my PhD study at the University of Tasmania, Australia, I had published the ollowing paper: Thapa DK, Visentin D, Kornhaber R, Cleary M. Prevalence of Mental Disorders among Older People in Nepal: A Systematic Review. Kathmandu Univ Med J. 2018;62(2):181-90 (http://www.kumj.com.np/issue/62/181-190.pdf) . The paper is a part of a comprehensive study: "Impact of adult children's migration on the mental health of older parents left behind in Nepal".

> I am currently preparing my thesis and I am requesting permission to include the PDF of the publication in my doctoral thesis as a standalone chapter.
Thank you for your consideration and I look forward to hearing from you in due course.

> Kind regards.

> Deependra Kaji Thapa, PhD candidate
> School of Health Sciences, University of Tasmania (Sydney), Australia
> E: deependrakaji.thapa@utas.edu.au; thapa.deepen@gmail.com
> T: +61 404131272
> Skype: deependra001

Appendix 7.2 Permission from the *PLoS One*

Re: Request for information - using the publication in thesis

noreply@salesforce.com <noreply@salesforce.com>
on behalf of
plosone <plosone@plos.org>

Fri 2/10/2020 3:39 PM
To: Deependra Thapa <deependrakaji.thapa@utas.edu.au>

Dear Mr Thapa,

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Thank you for your interest in PLOS ONE and for your continued support of the Open Access model. Please do not hesitate to be in touch with any additional questions.

Kind regards,

Amy Sutherland

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---------- Original Message ----------
From: Deependra Thapa [deependrakaji.thapa@utas.edu.au]
Sent: 02/10/2020 01:33
To: jheber@plos.org; **Cc:** plosone@plos.org
Subject: Request for information - using the publication in thesis

Dear Dr Joerg Heber,

As part of my PhD study at the University of Tasmania, Australia, I had published the following paper 'Thapa, D. K., Visentin, D., Kornhaber, R., & Cleary, M. (2018). Migration of adult children and mental health of older parents 'left behind': An integrative review. *PloS One*, *13*(10), e0205665. https://doi.org/10.1371/journal.pone.0205665.'
I am currently preparing my thesis and I understand that I need permission to present the PDF of this publication in my doctoral thesis as a standalone chapter. I could not find any 'permission' link in the journal website as it used to be in other journals. May you kindly confirm whether I need to seek permission to include this publication in my PhD thesis?

Thank you for your consideration and I look forward to hearing from you soon.

Kind regards.

Deependra Kaji Thapa, PhD candidate
College of Health and Medicine, University of Tasmania (Sydney), Australia
E: deependrakaji.thapa@utas.edu.au; thapa.deepen@gmail.com
T: +61 404131272?
Skype: deependra001

Appendix 7.3 Permission from Nursing & Health Sciences

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Dec 07, 2020

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Licensed Content Title	Prevalence and factors associated with depression, anxiety, and stress symptoms among older adults: A cross-sectional population-based study
Licensed Content Author	Deependra K. Thapa, Denis C. Visentin, Rachel Kornhaber, et al
Licensed Content Date	Oct 26, 2020
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Portion	Full article
Will you be translating?	No
Title	Prevalence and factors associated with depression, anxiety, and stress symptoms among older adults: A cross-sectional population-based study
Institution name	University of Tasmania
Expected presentation date	Jan 2021
Requestor Location	Mr. Deependra Thapa Locked Bag 5052 Alexandria Alexandria, NSW 2015, A Sydney, NSW 2015 Australia Attn: University of Tasmania
Publisher Tax ID	EU826007151
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Appendix 8. Conference abstract

10th International conference on Ageing Research and Geriatric Medicine

A population-based study of mental health symptoms among older persons in Nepal.

Deependra K. Thapa, Denis Visentin, Rachel Kornhaber, and Michelle Cleary
College of Health and Medicine, University of Tasmania, Australia

Risk factors of mental disorders for the older people have been extensively researched with many studies identifying issues with cognitive decline. However, there is less evidence regarding the causes and trajectory for older people's mental health in low-income countries. Nepal is undergoing a population aging transition, with 8.6% of the total population in 2019 aged 60 years and above, which is expected to increase to 10.2% by 2030. Due to rapid urbanization, high migration rates of young population, and erosion of traditional values of 'filial piety', more older adults in Nepal live outside a communal household, which may contribute to poorer mental health outcomes. This presentation reports on a large cohort population-based study of older adults across rural municipalities in Nepal. The prevalence of mental health symptoms was assessed using the Depression Anxiety and Stress Scale (DASS-21). Other measures assessed were socio-economic-demographic factors, health characteristics, lifestyle, migration status of children, quality of life (WHOQOL-BREF), Instrumental Activities of Daily Living (IADL), the Multi-dimensional Scale of Perceived Social Support (MSPSS), and social participation to identify the risk and protective factors for mental health disorder symptoms among the older people. Depression, anxiety and stress were observed at high rates among this group, with many participants experiencing symptoms across the three dimensions. This presentation will discuss different risk factors identified for anxiety, depression and stress, including factors common to all three. These results have broad implications for health service delivery to improve the mental health of the older population in Nepal and similar countries and regions. Interventions aiming to improve older people's mental

health should target specific risk groups and promote socially protective factors to support an enabling environment for active and healthy ageing.

Biography

This conference abstract is the part of the PhD work of the first author Deependra Kaji Thapa. Mr Thapa holds an MSc in Health and Society from the Wageningen University, Netherlands and a Masters' in Public Health from Tribhuvan University, Nepal. Mr Thapa is an experienced public health researcher, with more than 15 years of experience in public health for NGOs in development projects in Nepal. He is a final year PhD student in the College of Health and Medicine at the University of Tasmania, Australia.

Presenting author details

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Session name/ number: Track 4 – Ageing and Cognition
Category: Oral presentation

Appendix 9. Conference poster

Graduate Research Conference 2018, University of Tasmania

Adult children's migration and the mental health of older parents 'left behind' in Nepal: A study protocol

Deependra Kaji Thapa, PhD candidate

School of Health Sciences, College of Health and Medicine, University of Tasmania, Rozelle Campus, Sydney, Australia

Introduction

Ageing world

- The proportion of older people (>60 years) which stands at 13% in 2017 (962 million) is projected to increase to 16.5% (1.4 billion) by 2030 and 23% (2.1 billion) by 2050 (United Nations, 2017).

Migration

- Significant increase in migration in recent decades, with 232 million international and 740 million internal migrants in 2016 (IOM, 2017).
- Usually, emigrants are male, young, single and have completed secondary education (Laczko, Tjaden, & Auer, 2017).
- 7.3% of the population in Nepal live in a foreign land, among which 76% are 15-34 years old (CBS Nepal, 2012).

The 'left behind' older parents

- Being left behind may be problematic for older parents.
- Erosion of traditional intra-family care arrangements and decrease in family and social support networks may adversely effect the mental health of older adults (Gao et al., 2017).
- Left behind older parents may experience loneliness, anxiety and depression; the 'empty nest syndrome' (Chaukkar, 2009).
- Left behind parents had higher depressive symptoms, higher levels of loneliness, lower life satisfaction, lower cognitive ability, poorer psychological health and decreased quality of life (Thapa et al. 2018).

Research problem

- The phenomenon of migration not only comprises 'arrival', but also encompasses 'departure'.
- Migrants are physically absent, but psychologically present in the lives of those who are left behind (Falicov, 2002).
- Emigration is a complex socio-cultural and psychological process which affects those who are 'left behind'.
- Migration literature has largely ignored the impact on older parents left behind.
- The risk factors for mental health problems among the left behind may be different from the non-left behind elderly.

Objectives

- To assess the impact of adult children's migration on the mental health of older parents left behind.
- To identify whether the predictors of mental health disorders differ between left behind and non-left behind older parents.
- To identify the protective social factors which may promote mental health among the left behind older parents.

Method

Study design: Cross sectional, community based survey
Sampling: Simple random sampling
Study unit: Older adults aged ≥ 60 years having child(ren) aged ≥ 18 years
Study variables and measurement scales: Mental health (Depression, Anxiety and Stress Scale, DASS-21), migration status of children, socio-demographics, physical health, functional ability, social support, physical exercise, social activities and stressful life events

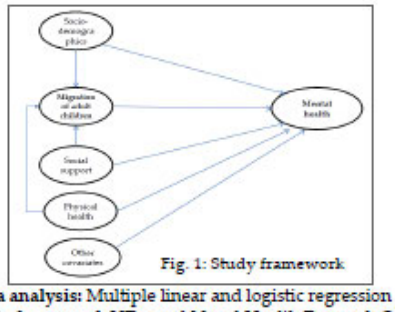

Fig. 1: Study framework

Data analysis: Multiple linear and logistic regression
Ethical approval: UTas and Nepal Health Research Council

Study significance

- Advances theoretical and empirical understanding for psychological well-being of left behind older adults.
- Identifies predictors of older adult's psychological health, and analyses the differences between 'left behind' and 'non-left behind' parents.
- Builds on previous studies and addresses research gaps.

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Appendix 10. Paper presentation

Paper presented in Ageing Nepal Platform, 12 July 2019

Ageing Nepal
Serving Senior Citizens

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17-07-2019

To,
Deependra Kaji Thapa
College of Health and Medicine, School of Health Sciences
University of Tasmania, Australia

Letter of Appreciation

Ageing Nepal would like to express our sincere thanks to **Mr. Deependra Kaji Thapa** from the University of Tasmania, Australia for presenting his research paper entitled **"Mental Health of Older Parents Left-Behind in Nepal"** on Monthly Discussion Forum on Ageing (MDFA) on 12 July 2019. MDFA is a common platform for sharing scientific research on ageing issues in Nepal, which is jointly organized by Ageing Nepal, Manchuka Memorial Fund, National Senior Citizens Fund and National Disabled Fund under Ministry of Women, Children and Senior Citizens.

We found the paper presented by Mr. Thapa is highly relevant in present context in Nepal, with increasing number of older people being abandoned by their children. We wish best of luck for his future academic and professional career.

Krishna M. Gautam
Founder Chairperson, Ageing Nepal,
HelpAge Global Network Member
Yellow Gumba, Nagarjun Municipality, Kathmandu
Web: www.ageingnepal.org
Call: 977-1-4880621

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A common platform for sharing Ageing Issues

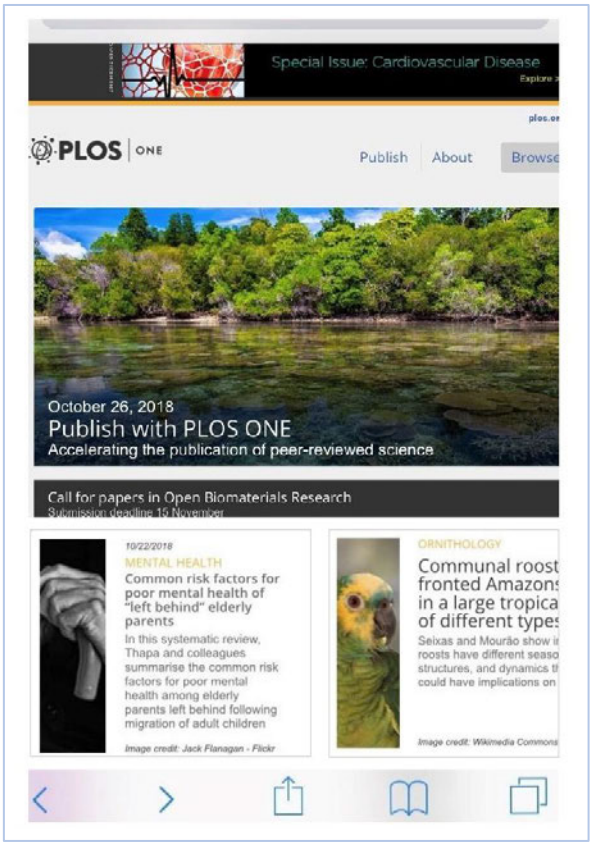
Bhrikuti Mandap, Kathmandu

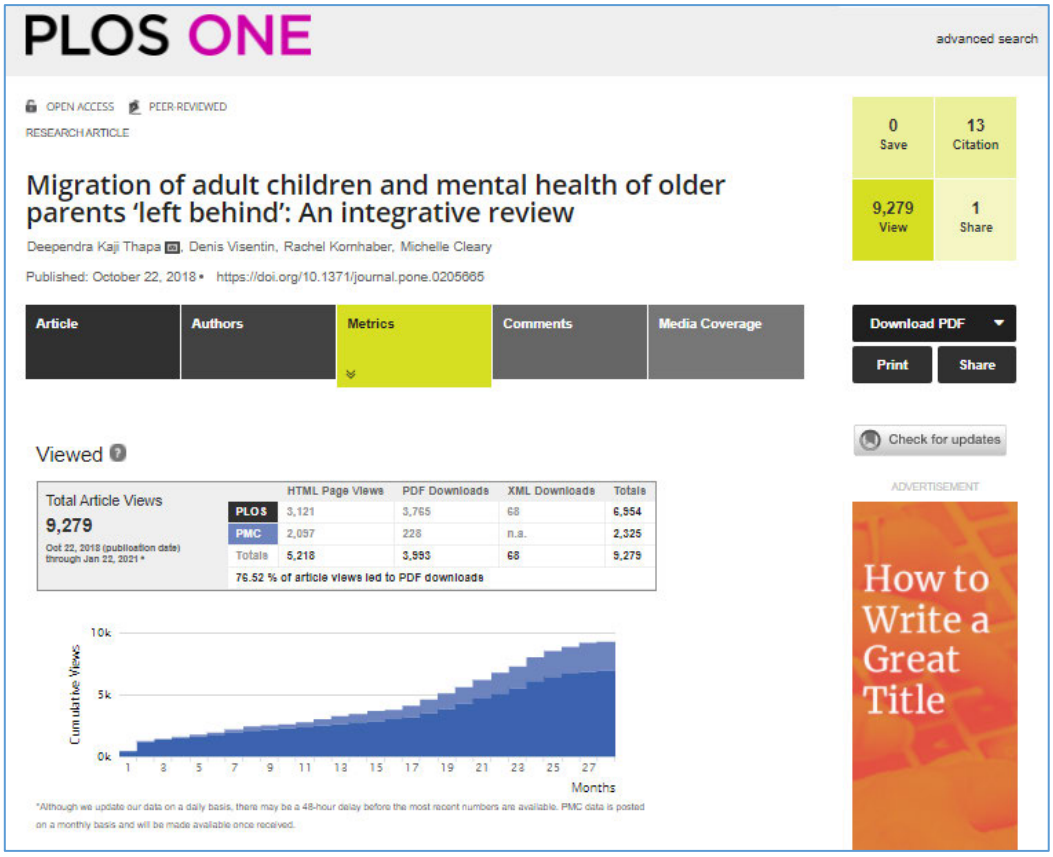
Each Last Friday of the Month at 1 PM

Speaker of the Month : Mr. Deependra Kaji Thapa
PhD Scholar, School of Health Sciences, University of Tasmania
Issue : Mental health of older parents 'left behind' in Nepal
Date : 12th July 2019

Organized by: Ageing Nepal Incoordination with: National Disabled Fund & Manchuka Memorial Fund

Appendix 11. Article in *PLOS One* Journal home page and metrics





Appendix 12. Other outcomes beyond the PhD project

The following research activities beyond this PhD project were undertaken during the PhD candidature.

Course

Graduate Certificate in Research, University of Tasmania which involved XGR501 Introduction to Higher Degree by Research and XGR502 Communicating Research.

Publications

Alavi, M., Hunt, G. E., Visentin, D. C., Watson, R., **Thapa, D. K.**, & Cleary, M. (2020). Seeing the forest for the trees: How to interpret a meta-analysis forest plot. *Journal of Advanced Nursing*. https://doi.org/10.1111/jan.14721

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Conference presentation

Thapa, D. K., Karki, A., Shah, M., & Ojha Y. P. (October 2020). *Patients' perspective of service quality in District and Regional Hospitals in Nepal*. Paper presented at the 1st Public Health Conference, Health Sector Reform in Federalism in Nepal, Nepal Public Health Association, Kathmandu, Nepal.