Socioeconomic, Behavioural, and Health-related Characteristics of Older Adults

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ABSTRACT

Background: The global aging population is growing rapidly, and Nepal is no exception. This increase is driven by changes in socioeconomic conditions, health behaviours, and advancements in the health system. In Nepal, almost a quarter of the national population are older adults (≥45 years), whose health status is rarely elaborated. This study was carried out to assess the socioeconomic, behavioural, and health-related characteristics of older adults in Nepal.

Methods: A community-based cross-sectional study was conducted among 4,179 randomly selected older adults residing in Bagmati Province from July 2022 to June 2023, via a multi-stage sampling technique. A semi-structured questionnaire including Geriatric Depression Scale, Activity of Daily Living, and Instrumental Activity of Daily Living along with sociodemographic and health profiles were used for the data collection through face-to-face interviews. The data were described in frequency and percentage across the local levels (urban/rural) and gender. Chi-square tests were done for bivariate analyses.

Results: The mean age of the population was 61.66±11.1 years. The prevalence of multimorbidity, disability, and depression was found to be 27.6%, 23.3%, and 35.1% respectively. There was no significant difference between multimorbidity and depression across local levels, while there was a significant difference across disability status. There was a significant difference between multimorbidity and depression across genders.

Conclusions: This study provides comprehensive insights into the socioeconomic status, behavioural factors, and health status of older adults in Nepal. Study findings can inform interventions and policies at local levels to consider the unique needs of the older population in Nepal.

Keywords: Chronic diseases; depression; disability; Nepal; older adults.

INTRODUCTION

Advances in medical technologies coupled with improvements in public health and living standards have led to increased longevity worldwide.[1] The National Census of 2021 showed that approximately 6.9 million people in Nepal, or 23.6% of the total population, were over the age of 44. Among them, around 2.9 million individuals, accounting for 10.2% of the total population, were aged 60 and above, which was a 2.1% increase compared to the figures from the Nepal census in 2011.[2] This indicates that Nepal is gradually experiencing a demographic transition with a growing population of older adults. There is a dearth of knowledge about age-related health issues and expertise in geriatric health services in Nepal, emphasizing the need for research to develop evidence-based policies and programs for the older demographic in the country. Therefore, this study aimed to explore the socioeconomic, behavioural, and health profiles of older adults residing in central Nepal.

METHODS

A community-based cross-sectional study was conducted in Bagmati province, one of the seven provinces of Nepal from July 2022 to June 2023. This province covers all three distinct ecological regions (Mountain, Hilly, and Terai) of the nation, and represents diverse ethnic groups.

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Of 753 local governing bodies across Nepal, Bagmati province covers 119 local bodies (3 metropolitans, 1 sub-metropolitan, 41 urban municipalities, and 74 rural municipalities). Bagmati province is home to a total of 5,529,452 population living in 1,270,797 households.[3] Out of 13 districts in the province, three randomly selected districts (Nuwakot, Rasuwa, and Sindhuli) were the study area which reflects a wide range of ecological belts and population diversity inside the province.

The sample size (n) for the study was calculated using the Cochran formula ($n=z^2pq/d^2$); where z=1.96 at 95% confidence interval, unknown expected proportion, p=50%, q=1-p, and d=5% margin of error. The sample size was originally estimated to be 385 households for each local administrative level, that is municipality/rural municipality (total 8), optimizing an initial sample size of 3080 households, which was estimated to be 4215 considering a design effect of 1.3, and a non-response rate of 5%. Thus, 4215 households were approached for data collection. In total, 4179 households participated in the study, yielding a response rate of 99.14%.

A multistage systematic random sampling technique was used aiming to represent ecological regions inside Bagmati Province while four districts namely Kathmandu (Hilly), Bhaktapur (Hilly), Lalitpur (Hilly), and Chitwan (Terai) were purposely excluded from the sampling frame due to highly urbanized nature and incomparability with other districts. The detailed sampling process is illustrated in Figure 1 below.

The lottery method was used for the random selection process of districts, municipalities, rural municipalities, and wards. The households within the chosen wards were listed by visiting the respective ward offices. The households were selected using the systematic random sampling technique, with the sampling interval for each ward determined by dividing the total households by the required sample size for the respective wards. In the selection process, the first sample household was chosen randomly and was near the ward office serving as the primary point. Subsequent households were selected based on the sampling interval.

If the initially selected household did not have members meeting the inclusion criteria, the adjacent household was chosen. Similarly, if there were more than one eligible participant in a selected household, only one participant was selected based on availability and
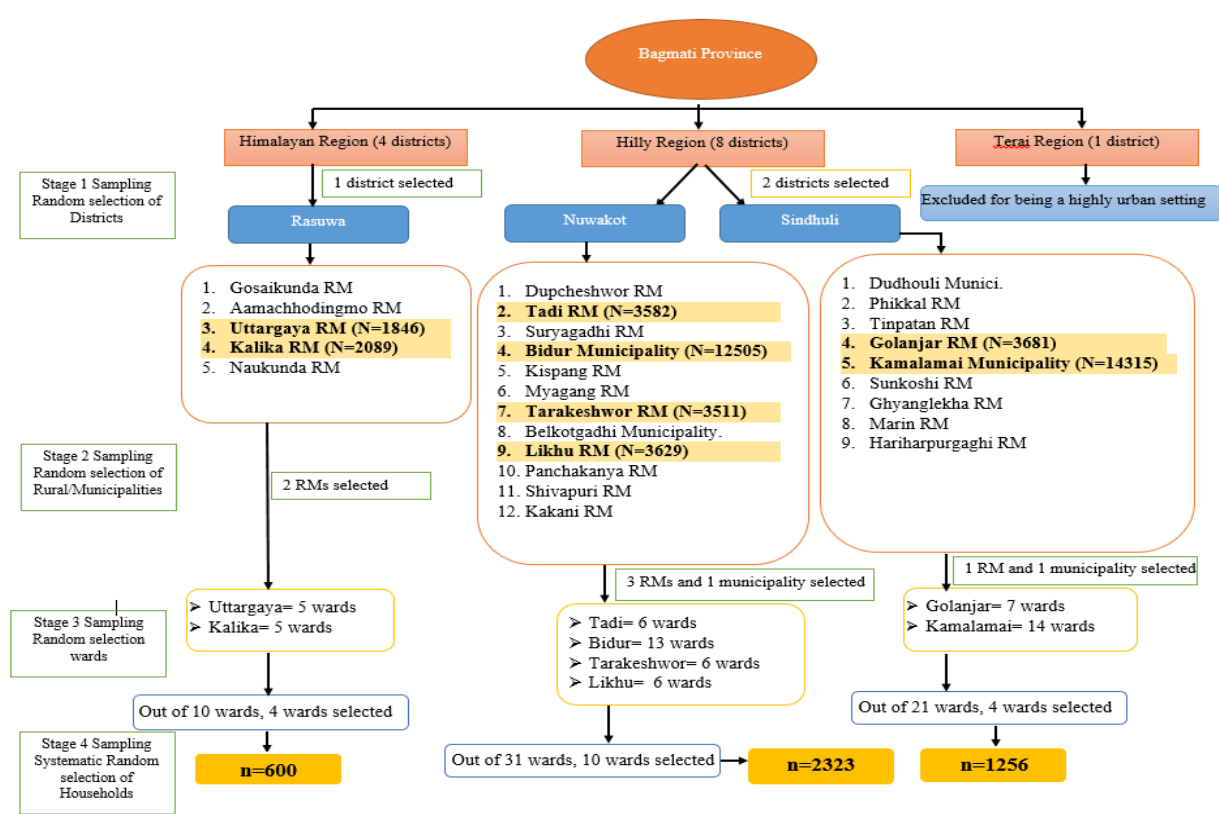

Figure 1. Sampling Flow Chart.

willingness to participate in the interview.

Adults aged 45 years and older, residing in the study areas for at least six months before the date of data collection were eligible to participate in the study. Although individuals aged 60 and over are officially considered older adults in Nepal,[4] the age of 45 was chosen for this study to make the study more comprehensive and representative. This inclusion aligns with aging studies from neighbouring countries such as India, China, and other global regions.[5,6] Proxy respondents were excluded from the study.

Ethical approval for this study was obtained from the Ethical Review Board of Nepal Health Research Council (Reg. no. 273/2021 P). Verbal consent was obtained from the participants and the participation was voluntary. The data were collected through face-to-face interviews, within the premises of the participants' household, using a semi-structured questionnaire. We included different variables for this study, which are as follows.

Age (< 60 years / ≥60 years), gender (male/female), religion (Hindu/other than Hindu), ethnicity (upper caste/other caste categories), place of residence (urban/rural), family type (nuclear/multigenerational), family income source (agriculture/non-agriculture) and household wealth were included. Other than Hindus consisted of Buddhists, Christians, and Islam. The ethnic classification for this study initially adopted national ethnic classification,[7] and dichotomized into two groups for comparison: upper caste (Brahmin/Chhetri) and other castes (Dalit, Janajatis, Madhesi, Muslim, and other minority groups). About the place of residence, selected municipalities were considered urban, and selected rural municipalities were considered rural.

Family income source was dichotomized, where non-agriculture in family income source consisted of service, labour, and business. Household wealth was determined by the International Wealth Index (IWI) tool, which is typically used in assessing the household economic status in low- and middle-income countries.[8] IWI score ranges from 0 to 100, with a higher score indicating greater wealth. In this study, due to high skewness in the score, IWI was reported as quintiles, which divided a population into five equal parts, each representing 20% of the total. The first quintile includes the lowest 20% of the data, while the fifth quintile encompasses the highest 20%.

Participant's self-reported physical activity (high/ moderate/low), Activity of Daily Living (independent/ moderate/ severe dependency), smoking status (never smoked/ past /current smoker), tobacco and alcohol consumption (yes/ no) were included. Instrumental Activity of Daily Living scale[9] aimed to assess participants' dependency status (*See Supplementary Table 1 for a detailed description*).

Multimorbidity status, depression (no/ mild/ severe), disability (no functional impairment/ moderate/ severe functional impairment), and distribution of each of the nine chronic conditions under consideration were included. All the health-related aspects were self-reported. Nepali-version of the Geriatric Depression Scale-15[10] was used to assess depression, with a cumulative score of 15 items totalling 5 or higher considered an indication of depression. Activity of Daily Living scale[11] assessed participants' level of disability (*See Supplementary Table 1 for a detailed description*). Participants were asked whether they were ever told by doctors or health personnel having any of the nine chronic conditions: hypertension, hypercholesterolemia, myocardial infarction, stroke, chronic obstructive pulmonary disease (COPD), arthritis, kidney disease, diabetes, and cancer. The occurrence of two or more chronic conditions was defined as multimorbidity.

Furthermore, health service-related attributes were also considered in the study. Variables such as regular health check-ups, knowledge of free health check-ups, receiving free health check-ups, knowledge of geriatric services, and barriers to getting health services were included.

The data were entered in EpiData software version 3.1 and exported to SPSS version 22 for analysis. Since all the variables were categorical, frequencies and percentages were calculated. The distribution of socioeconomic, behavioural, and health-related characteristics was analyzed across gender and municipalities/rural municipalities (classified as urban/rural, respectively) using a chi-square test at a 5% level of significance.

RESULTS

Out of the total 4,179 participants, the age of the participants ranged between 45 to 102 years with a mean age of 61.66±11.06 years. The total number of participants under the age of 60 was 54.7%. Nearly half (52.4%) of participants were living in a nuclear family (Table 1). The mean score for IWI was observed to be 61.1±16.65.

Bivariate analysis illustrated a significant difference at *p*<0.05 in the distribution of religion, caste, family type, family income source, and household wealth across the local levels. Similarly, statistically significant differences were observed in the distribution of socioeconomic attributes such as family type and family income source across genders. (Table 1)

Table 1. Distribution of sociodemographic characteristics. (n=4179)							
Sociodemographic Characteristics	Total	Place of Residence		p-value	Gender		p-value
	n (%)	Rural n (%)	Urban n (%)		Male n (%)	Female n (%)	
Age							
<60 years	1893 (45.3)	1228 (64.9)	665 (35.1)	0.060	949 (50.1)	944 (49.9)	0.612
≥60 years	2286 (54.7)	1546 (67.6)	740 (32.4)		1128 (49.3)	1158 (50.7)	
Religion							
Hindu	3497 (83.7)	2415 (69.1)	1082 (30.9)	**<0.001**	1755 (50.2)	1742 (49.8)	0.156
#Other than Hindu	682 (16.3)	359 (52.6)	323 (47.4)		322 (47.2)	360 (52.8)	
Caste (n=3781)							
Upper caste	1999 (52.9)	1422 (71.1)	577 (28.9)	**0.001**	994 (49.7)	1005 (503)	0.284
*Others	1782 (47.1)	1352 (75.9)	430 (24.1)		855 (48.0)	927 (52.0)	
Family type							
Nuclear	2190 (52.4)	1585 (72.4)	605 (27.6)	**<0.001**	1162 (53.1)	1028 (46.9)	**<0.001**
Multigenerational	1989 (47.6)	1189 (59.8)	800 (40.2)		915 (46.0)	1074 (54.0)	
Family Income Source				**<0.001**			
Agriculture	3006 (71.9)	2158 (71.8)	848 (28.2)		1530 (50.9)	1476 (49.1)	**0.013**
ªNon-Agriculture	1173 (28.1)	616 (52.5)	557 (47.5)		547 (46.6)	626 (50.3)	
Household wealth							
First Quintile	837 (20.0)	633 (75.6)	204 (24.4)	**<0.001**	404 (48.3)	433 (51.7)	0.713
Second Quintile	840 (20.1)	593 (70.6)	247 (29.4)		429 (51.1)	411 (48.9)	
Third Quintile	844 (20.2)	529 (62.7)	315 (37.3)		421 (49.9)	423 (50.1)	
Fourth Quintile	840 (20.1)	518 (61.7)	322 (38.3)		426 (50.7)	414 (49.3)	
Fifth Quintile	818 (19.6)	501 (61.2)	317 (38.8)		397 (48.5)	421 (51.5)	

Notes: #Other than Hindu = Buddhist, Christian, Islam.

*Other caste = Dalit, Janajatis, Madhesi and others.

ª non-agriculture= service, labour, business.

Regarding the health behaviour-related characteristics, the majority, 62.6% of participants, had a low physical activity level (Table 2). Similarly, dependency status showed that almost one-fifth (22.7%) of participants were moderately dependent on daily living. About 34% of participants were current smokers. Likewise, chewing tobacco was prevalent among 29.7% of participants, and alcohol use was reported by 34.6% of participants.

Statistically significant differences in the distribution of self-reported physical activity level, dependency status, smoking status, and chewing tobacco across local levels were observed. Similarly, differences were observed in physical activity level, dependency status, smoking status, and chewing tobacco and alcohol use across the genders. (Table 2)

Table 2. Distribution of Health Behavior-related Variables. (n=4179)							
Health Behaviour-related Variables	Total	Place of Residence		p-value	Gender		p-value
	n (%)	Rural n (%)	Urban n (%)		Male n (%)	Female n (%)	
Physical Activity Level				**<0.001**			**0.022**
High	489 (11.7)	384 (78.5)	105 (21.5)		285 (52.8)	231 (47.2)	
Moderate	1072 (25.7)	784 (73.1)	288 (26.9)		561 (52.3)	511 (47.7)	
Low	2618 (62.6)	1606 (61.3)	1012 (38.7)		1258 (48.1)	1360 (51.9)	
Dependency status				**<0.001**			**<0.001**
Independent	2754 (65.9)	1730 (62.8)	1024 (37.2)		1564 (56.8)	1190 (43.2)	
Moderate dependency	949 (22.7)	682 (71.9)	267 (28.1)		270 (28.5)	679 (71.5)	
Severe dependency	476 (11.4)	362 (76.1)	114 (23.9)		243 (51.1)	233 (48.9)	
Smoking status				**<0.001**			**<0.001**
Never smoked	1211 (29)	841 (69.4)	370 (30.6)		532 (43.9)	679 (56.1)	
Past smoker	1553 (37.2)	1153 (74.2)	400 (25.8)		957 (61.6)	596 (38.4)	
Current smoker	1415 (33.9)	780 (55.1)	635 (44.9)		588 (41.6)	827 (58.4)	
Chewing Tobacco				**0.048**			**<0.001**
No	2937 (70.3)	1922 (65.4)	1015 (34.6)		1253 (42.7)	1684 (57.3)	
Yes	1242 (29.7)	852 (68.6)	390 (31.4)		824 (66.3)	418 (33.7)	
Alcohol use				0.145			**<0.001**
No	2733 (65.4)	1793 (65.6)	940 (34.4)		1167 (42.7)	1566 (57.3)	
Yes	1446 (34.6)	981 (67.8)	465 (32.2)		910 (62.9)	536 (37.1)	

The prevalence of multimorbidity among the participants was found to be 27.6% (Table 3). Nearly a quarter (27.0%) of total participants had mild depression followed by severe depression (8.1%). It was observed that nearly one-tenth 9.57% of the participants had a severe functional impairment and 9.7% had moderate functional impairment. There were considerable differences in the prevalence of chronic conditions: hypertension (32.8%), hypercholesterolemia (5.4%), myocardial infarction (4.6%), stroke (1.9%), COPD (11.5%), arthritis (26.9%), kidney disease (3.6%), diabetes (9.9%), and cancer (1.8%).

A statistically significant difference in the distribution of disability status across local levels was observed. Similarly, multimorbidity status, depression, and disability status were distributed across gender. (Table 3)

Table 3. Distribution of Health Status. (n=4179)							
Health Status	Total	Place of Residence		p-value	Gender		p-value
	n (%)	Rural n (%)	Urban n (%)		Male n (%)	Female n (%)	
Multimorbidity status							
No multimorbidity	3025 (72.4)	2004 (66.2)	1021 (33.8)	0.771	1537 (50.8)	1488 (49.2)	**0.020**
Multimorbidity	1154 (27.6)	770 (66.7)	384 (33.3)		540 (46.8)	614 (53.2)	
Depression status							
No Depression	2711 (64.9)	1815 (66.9)	896 (33.1)	0.214	1440 (53.1)	1271 (46.9)	**<0.001**
Mild Depression	1130 (27)	749 (66.3)	381 (33.7)		512 (45.3)	618 (54.7)	
Severe Depression	338 (8.1)	210 (62.1)	128 (37.9)		125 (37.0)	213 (63.0)	

Table 3.Distribution of Health Status. (n=4179)							
Health Status	Total	Place of Residence		p-value	Gender		p-value
	n (%)	Rural n (%)	Urban n (%)		Male n (%)	Female n (%)	
Disability Status							
Full functional	3204 (76.7)	2035 (63.5)	1169 (36.5)	**<0.001**	1676 (52.3)	1528 (47.7)	**<0.001**
Moderate Functional impairment	568 (13.6)	430 (75.7)	138 (24.3)		238 (41.9)	330 (58.1)	
Severe Functional impairment	407 (9.7)	309 (75.9)	98 (24.1)		163 (40.0)	244 (60.0)	
Hypertension							
No	1369 (32.8)	1887 (67.2)	923 (32.8)	0.129	1381 (49.1)	1429 (50.9)	0.304
Yes	2810 (67.2)	887 (64.8)	482 (35.2)		696 (50.8)	673 (49.2)	
Hypercholesterolemia							
No	225 (5.4)	2622 (66.3)	1332 (33.7)	0.701	1952 (49.4)	2002 (50.6)	0.071
Yes	3954 (94.6)	152 (67.6)	73 (32.4)		125 (55.6)	100 (44.4)	
Myocardial Infarction							
No	193 (4.6)	2643 (66.3)	1343 (33.7)	0.652	1983 (49.7)	2003 (50.3)	0.777
Yes	3986 (95.4)	131 (67.9)	62 (32.1)		94 (48.7)	99 (51.3)	
Stroke							
No	81 (1.9)	2704 (66.0)	1394 (34.0)	**<0.001**	2032 (49.6)	2066 (50.4)	0.287
Yes	4098 (98.1)	70 (86.4)	11 (13.6)		45 (55.6)	36 (44.4)	
COPD							
No	481 (11.5)	2423 (65.5)	1275 (34.5)	**0.001**	1846 (49.9)	1852 (50.1)	0.435
Yes	3698 (88.5)	2423 (65.5)	1275 (34.5)		231 (48.0)	250 (52.0)	
Arthritis							
No	1123 (26.9)	2033 (66.5)	1023 (33.5)	0.743	1586 (51.9)	1470 (48.1)	**<0.001**
Yes	3056 (73.1)	741 (66.0)	382 (34.0)	0.743	491 (43.7)	632 (56.3)	**<0.001**
Kidney Disease							
No	152 (3.6)	2653 (65.9)	1374 (34.1)	**<0.001**	1999 (49.6)	2028 (50.4)	0.685
Yes	4027 (96.4)	121 (79.6)	31 (20.4)		78 (51.3)	74 (48.7)	
Diabetes				**<0.001**			0.896
No	413 (9.9)	2467 (65.5)	1299 (34.5)		1873 (49.7)	1893 (50.3)	
Yes	3766 (90.1)	307 (74.3)	106 (25.7)		204 (49.4)	209 (50.6)	
Cancer				**0.001**			0.855
No	74 (1.8)	2711 (66.0)	1394 (34.0)		2041 (49.7)	2064 (50.3)	
Yes	4105 (98.2)	63 (85.1)	11 (14.9)		36 (48.6)	38(51.4)	

Many participants (67.3%) reported having common health checkups within the past year while 4.2% reported having common health checkups five years before the date of data collection and 4.7% of participants have never used any health services to date (Table 4). Additionally, 48.2% of participants were aware of free health check-ups. More than three-fourths (76.3%) of the respondents did not receive free health check-ups. Furthermore, 68.4% of participants reported knowledge of geriatric services. Utilization of geriatric services within the past year was reported by 26.6% of participants. Reported barriers to accessing health services included transportation 24.3%, language 1.2%, financial reasons 11.4%, unsupportive family 1.5%, and other unspecified reasons 46.7%.

As shown in Table 4, it was observed that there was a statistically significant difference in the distribution of health service-related attributes such as the use of health services, knowledge of free health checkups, receiving free health checkups, knowledge of geriatric services, and barriers to getting health services across local levels. Similarly, statistically significant differences at $p<0.05$ were observed in the use of health services, knowledge of free health

checkups, knowledge of geriatric services, and barriers to getting health services across genders.

Health Service Characteristics	Total	Place of Residence		p-value	Gender		p-value
	n (%)	Rural n (%)	Urban n (%)		Male n (%)	Female n (%)	
Regular Health Check-ups							
Within past 1 year	2802 (67.3)	1856 (66.4)	940 (33.6)	0.019	1352 (48.4)	1444 (51.6)	0.041
Within past 1-2 years	710 (17.0)	458 (64.6)	251 (35.4)		372 (52.5)	337 (47.5)	
Within last 2-5 years	285 (6.8)	173 (60.9)	111 (39.1)		161 (56.7)	123 (43.3)	
≥5 years	173 (4.2)	128 (74.0)	45 (26.0)		85 (49.1)	88 (50.9)	
Never	195 (4.7)	140 (71.8)	55 (28.2)		100 (51.3)	95 (48.7)	
Knowledge on Free Health Check-up							
No	2153 (51.8)	1382 (64.3)	767 (35.7)	0.004	981 (45.6)	1168 (54.4)	<0.001
Yes	2007 (48.2)	1372 (68.5)	631 (31.5)		1087 (54.3)	916 (45.7)	
Receiving Free Health Check-up							
No	3025 (76.3)	1931 (64.0)	1088 (36.0)	<0.001	1478 (49.0)	1541 (51.0)	0.149
Yes	939 (23.7)	684 (73.0)	253 (27.0)		484 (51.7)	453 (48.3)	
Knowledge of geriatric services							
No	1306 (31.6)	796 (59.8)	536 (40.2)	<0.001	619 (46.5)	713 (53.5)	0.004
Yes	2831 (68.4)	1978 (69.5)	869 (30.5)		1458 (51.2)	1389 (48.8)	
Barriers to get health services							
Transportation	991 (24.3)	728 (73.5)	262 (26.5)	<0.001	500 (50.5)	490 (49.5)	0.011
Language	50 (1.2)	20 (40.0)	30 (60.0)		22 (44.0)	28 (56.0)	
Financial reasons	465 (11.4)	273 (58.7)	192 (41.3)		263 (56.6)	202 (43.4)	
Poor family support	60 (1.5)	28 (46.7)	32 (53.3)		21 (35.0)	39 (65.0)	
No barrier	610 (14.9)	610 (100.0)	0 (0.0)		321 (52.6)	289 (47.4)	

Table 4. Distribution of Health service-related attributes. (n=4179)

DISCUSSION

With the increase in the aging population, the health of older adults has been a topic of concern over the past few decades. This study was a comprehensive assessment of the socioeconomic, behavioural, and health aspects of older adults in Nepal. The significant differences in the distribution of religion, caste, family type, family income source, and household wealth across urban and rural settings suggest that the socio-cultural and economic context profoundly influences the lives of older adults.[12,13] These differences may reflect varying levels of access to resources, social support, and healthcare services, which are typically more abundant in urban areas. The urban-rural divide in Nepal has long been recognized, with rural areas often facing greater challenges in terms of healthcare accessibility, economic opportunities, and infrastructure.[14] The 33.8% of the total population of Nepal reside in rural areas of the country[2]. Our study adds to this body of evidence, highlighting the need for policies that specifically target rural older adults.

This study found that 27.6% of older adults had multimorbidity, a prevalence higher than some studies in Nepal (14.6% to 22.8%),[15] but lower than neighbouring India (50.0%) and higher than China (15.2%).[16,17] In the context of South Asia, the prevalence of multimorbidity has been reported to be at 9.4%, whereas globally about half of the older adults (51.0%) experience multimorbidity, which indicates significant regional variability probably influenced by socio-economic factors, cultural contexts, and differing definitions and age criteria across studies.[18] Gender disparities were evident, with females experiencing higher multimorbidity rates compared to males, consistent with findings in Nepal and India.[15,16]

The study found that 35.1% of older adults reported depression, which is lower than previously reported rate among older adults in Nepal (60.6%).[19] The observed prevalence was higher than the pooled overall prevalence of depression among older adults in China (20.0%),[20] in India (34.4%),[21] and the global average reported by WHO (5.7%).[22] Depression status was different across genders, with women reporting severe depression compared to men, consistent with global trends.[22]

Based on the ADL checklist about one-fourth of the participants experienced disability problems, which was higher than the previous study conducted in Nepal.[23] The study shows that there was a higher rate of disability in women than in men, which is consistent with the previous study.[23] Moreover, women generally have a longer lifespan than men,[24] which results in a higher risk of vulnerability to adverse health outcomes. The study found that 34.1% were dependent for using the tool of instrumental activities of daily living. Advance age and gender are important factors contributing to the development of disability leading to dependence.[25]

The study reveals that over 32% of the participants reported never or not having regular health check-ups. Compared to previous studies on health service utilization by older adults in urban Nepal,[26] we observed a higher percentage of those not having regular health checkups by the participants. It is generally recommended that individuals over the age of 40 undergo annual routine health check-ups to help prevent adverse health outcomes.[27] However, this discrepancy may be because our study site covered more rural areas, where limited public transportation makes it difficult to visit health facilities.[28]

It was revealed that 34.6% of older adults consumed alcohol and about 30% used tobacco. Traditional beliefs, cultural practices, and socio-economic factors contribute majorly to alcohol use in Nepal with increased consumption of alcohol in old age probably due to body pain, painful life events, and loneliness.[29] A study in India stated that tobacco consumption is significantly higher in poor, less educated, and socially disadvantaged castes with its prevalence increasing up to the age of 50 years and is dependent on an individual's sociocultural characters.[30] These different factors may also influence the smoking and tobacco consumption trends among older adults in Nepal.

This study covered a significant population of Bagmati Province and provided data on the socioeconomic, behavioural, and health-related characteristics of older adults in Nepal. As the initial study within a community setting focuses solely on the older population with a large sample size, this research has the potential to lay the groundwork for creating specific health interventions and policies for the health and well-being of this demographic. The available data substantiate further analysis focusing on specific health conditions such as depression, multimorbidity, disability, and functional impairment among older adults, along with other modifiable risk factors. However, the findings of this study should be generalized cautiously, given that we had to exclude the Terai region of the province, which consisted of only one district that was excluded due to its highly urbanized nature. Considering that Nepal is a culturally diverse nation, various traditions and behavioural aspects might differ across ecological zones, ethnicities, and localities.

CONCLUSIONS

This study highlights the urgent need to improve the health status of older adults in Nepal by acknowledging their chronic conditions, disability, and mental health. We recommend the importance of collaboration between federal and provincial governments with local authorities for addressing the socioeconomic, psychological, and health needs of the older adult population in Nepal. Consequently, the government must prioritize developing plans and policies to meet the needs of this growing demographic. The future, where care and support for older adults become a critical national concern, is approaching faster than anticipated.

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Supplementary Table 1.Operational Definitions	
Variable	Definition
Age	Refers to the age of the participant expressed in completed years
Household Wealth	Refers to the wealth of the participants measured through the International Wealth Index indicating to what extent households own a basic set of assets valued highly by people across the world. The total score is divided into Quintiles where the first quintile refers to the poorest and the fifth quintile refers to the richest household.
Physical Activity Level	Refers to the physical activeness of the participants' categories in three levels High: Weekly involved in vigorous activity for >90 minutes or Light activities for> 160 minutes Moderate: Weekly involved in vigorous activity for <90 minutes or Light activities <160 minutes Low: Reported not being involved in any vigorous or light activity
Dependency Status	Refers to the dependency status assessed through Lawton-Brody Instrumental Activities of Daily Living (IADL) for everyday things done to take care of yourself and home including the ability to use the telephone, shop, cook, work around the house or garden, wash clothes, traveling, taking medication and handling finances where: For Male, Score <3 indicates dependent status Score 3-4 indicates moderately dependent status Score >4 indicates independent status For Female, Score <3 indicated dependent status Score 3-7 indicated moderately dependent status Score >7 indicated independent status
Multi-morbidity status	Refers whether participants were ever told by doctors or health personnel having any of the nine chronic conditions: hypertension, hypercholesterolemia, myocardial infarction, stroke, chronic obstructive pulmonary disease (COPD), arthritis, kidney disease, diabetes, and cancer.
Depression	Refers to the Depressive symptoms experienced by the participants based on 15 items of Geriatric Depression Scale (GDS-15) where: Score >9 indicated major depression Score 5-9 indicated mild depression Score <5 indicated no depression
Disability Status	Refers level of physical functional capacity measured through modified Katz Index of Independence in Activities of Daily Living (Katz ADL) assessing five functions of bathing, clothing, toileting, moving, and eating where: Score >5 indicated Full functional Score 3-4 indicated Moderate Impairment: Score <3 indicated Severe Functional Impairment
Hypertension	Refers to the diagnosed cases of higher blood pressure in the participants

REFERENCES

1. United Nations. *World population ageing 2023: Challenges and opportunities of population ageing in the least developed countries*. UN DESA/ POP/2023/TR/NO.5, New York, 10017, USA: Population Division, Department of Economic and Social Affairs, United Nations, https://www.un.org/development/desa/pd/sites/www.un.org.development.desa.pd/files/undesa_pd_2024_wpa2023-report.pdf (2023).

2. CBS. *Preliminary report of national population census 2021*. National Statistics Office, Government of Nepal, https://censusnepal.cbs.gov.np/Home/Details?tpid=1 (2021, accessed 29 September 2023).

3. CBS. *National Population and Housing Census 2011*. Kathmandu, Nepal: Central Bureau of Statistics, https://unstats.un.org/unsd/demographic-social/census/documents/Nepal/Nepal-Census-2011-Vol1.pdf (2011).

4. Government of Nepal. *Nepal law commission: Senior citizens act, 2063*, http://www.lawcommission.gov.np/en/documents/2015/08/senior-citizens-act-2063-2006.pdf (2006).

5. IIPS. Longitudinal Ageing Study in India (LASI) | International Institute for Population Sciences (IIPS), https://www.iipsindia.ac.in/lasi (2024, accessed 24 July 2024).

6. Gong J, Wang G, Wang Y, Chen X, Chen Y, Meng Q, et al. Nowcasting and forecasting the care needs of the older population in China: analysis of data from the China Health and Retirement Longitudinal Study (CHARLS). The Lancet Public Health. 2022 Dec 1;7(12):e1005-13.[Article]

7. Bennet L, Dahal DR, Govindasamy P. Caste, ethnic, and regional identity in Nepal: Further analysis of the 2006 Nepal Demographic and Health Survey, https://dhsprogram.com/publications/publication-fa58-further-analysis.cfm (2008, accessed 27 September 2023).

8. Smits J, Steendijk R. The International Wealth Index (IWI). *Soc Indic Res* 2015; 122: 65–85.[Article]

9. Coyne R, AGACNP-BC WK. The Lawton instrumental activities of daily living (IADL) scale. Gerontologist. 2019;9(3):179-86.[Download PDF]

10. Risal A, Giri E, Shrestha O, Manandhar SM, Kunwar D, Amatya R, et al. Nepali version of geriatric depression scale-15: A reliability and validation study. *J Nepal Health Res Counc* 2020; 17: 506–511.

11. Wallace M, Shelkey M, Hartford Institute for Geriatric Nursing. Katz Index of Independence in Activities of Daily Living (ADL). *Urol Nurs* 2007; 27: 93–94.[Download PDF]

12. Gore MS. *Urbanization and Family Change*. Popular Prakashan, 1990.[Full Text]

13. Zhang C, Xiao S, Shi L, Xue Y, Zheng X, Dong F, et al. Urban–Rural Differences in Patterns and Associated Factors of Multimorbidity Among Older Adults in China: A Cross-Sectional Study Based on Apriori Algorithm and Multinomial Logistic Regression. Frontiers in Public Health. 2021 Aug 30;9:707062.[Article]

14. Devkota S, Ghimire S, Upadhyay M. What Factors in Nepal Account for the Rural–Urban Discrepancy in Human Capital? Evidence from Household Survey Data. *Economies* 2021; 9: 83.[Article]

15. Balakrishnan S, Karmacharya I, Ghimire S, Mistry SK, Singh DR, Yadav OP, et al. Prevalence of multimorbidity and its correlates among older adults in Eastern Nepal. BMC geriatrics. 2022 May 16;22(1):425.[Article]

16. Khan MR, Malik MA, Akhtar SN, Yadav S, Patel R. Multimorbidity and its associated risk factors among older adults in India. BMC Public Health. 2022 Apr 14;22(1):746.[Article]

17. Lin WQ, Yuan LX, Sun MY, Wang C, Liang EM, Li YH, et al. Prevalence and patterns of multimorbidity in chronic diseases in Guangzhou, China: a data mining study in the residents' health records system among 31 708 community-dwelling elderly people. BMJ open. 2022 May 1;12(5):e056135.[Article]

18. Chowdhury SR, Das DC, Sunna TC, Beyene J, Hossain A. Global and regional prevalence of multimorbidity in the adult population in community settings: a systematic review and meta-analysis. EClinicalMedicine. 2023 Mar 1;57.[Article]

19. Simkhada R, Wasti SP, Gc VS, Lee AC. Prevalence of depressive symptoms and its associated factors in older adults: a cross-sectional study in Kathmandu,

Nepal. Aging & mental health. 2018 Jun 3;22(6):802-7.[Article]

20. Tang T, Jiang J, Tang X. Prevalence of depressive symptoms among older adults in mainland China: A systematic review and meta-analysis. *Journal of Affective Disorders* 2021; 293: 379–390.[Article]

21. Pilania M, Yadav V, Bairwa M, Behera P, Gupta SD, Khurana H, et al. Prevalence of depression among the elderly (60 years and above) population in India, 1997–2016: a systematic review and meta-analysis. BMC public health. 2019 Dec;19:1-8.[Article]

22. WHO. Depressive disorder (depression), https://www.who.int/news-room/fact-sheets/detail/depression (2023, accessed 25 July 2024).

23. Ghimire S, Paudel G, Mistry SK, Parvez M, Rayamajhee B, Paudel P, et al. Functional status and its associated factors among community-dwelling older adults in rural Nepal: findings from a cross-sectional study. BMC geriatrics. 2021 May 25;21(1):335.[Article]

24. Carmel S. Health and Well-Being in Late Life: Gender Differences Worldwide. *Front Med (Lausanne)* 2019; 6: 218.[Article]

25. Millán-Calenti JC, Tubío J, Pita-Fernández S, González-Abraldes I, Lorenzo T, Fernández-Arruty T, et al. Prevalence of functional disability in activities of daily living (ADL), instrumental activities of daily living (IADL) and associated factors, as predictors of morbidity and mortality. Archives of gerontology and geriatrics. 2010 May 1;50(3):306-10.[Article]

26. Karmacharya I, Ghimire S, Bhujel K, Shrestha Dhauvadel A, Adhikari S, Baral S, et al. Health services utilization among older adults in Pokhara metropolitan city. Journal of Aging & Social Policy. 2022 Jul 4;34(4):568-87.[Article]

27. Kuwabara Y, Fujii M, Kinjo A, Osaki Y. Abstaining from annual health check-ups is a predictor of advanced cancer diagnosis: a retrospective cohort study. Environmental Health and Preventive Medicine. 2022;27:1.[Article]

28. Mattson J. Transportation, Distance, and Health Care Utilization for Older Adults in Rural and Small Urban Areas. *Transportation Research Record* 2011; 2265: 192–199.[Article]

29. Begam S, Paudel S, Chalise A, Khan GM, Tuladhar L, Khadka S. Exploring the Sociodemographic Factors and Consequences related to Alcohol Consumption among Older Indigenous Community of a District in Nepal: A Qualitative Study. JNMA: Journal of the Nepal Medical Association. 2024 Mar;62(271):188.[Article]

30. Rani M, Bonu S, Jha P, Nguyen SN, Jamjoum L. Tobacco use in India: prevalence and predictors of smoking and chewing in a national cross sectional household survey. Tobacco control. 2003 Dec 1;12(4):e4.[Article]