

Exploring Health Knowledge, Attitudes, Practices, and Quality of Life in Diabetic Hypertensive Patients in Eastern Nepal

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Abstract

This study aimed to investigate the health-related knowledge, attitude, practices (HR-KAP), and quality of life (HRQoL) of patients with diabetes and hypertension at Damak Municipal Hospital, located in Province 1, Nepal. This cross-sectional study, conducted from April to September 2022, included patients from the hospital's outpatient medicine department. HR-KAP was assessed through a 23-item self-administered questionnaire, while HRQoL was measured using the EuroQoL-5 dimensions (EQ-5D-5L) instrument. The relationship between patient characteristics and outcome variables was analyzed using independent sample t-tests and chi-square tests, with statistical significance set at $P < 0.05$. The study included 105 patients, with a mean age of $49.40 (\pm 11.11 \text{ SD})$ years. While nearly half (49.5%) of the participants demonstrated adequate disease knowledge, their attitudes and behaviors related to the disease were subpar, with only 30% showing positive attitudes and 19% engaging in appropriate health practices. The KAP scores were significantly associated with age, gender, and educational background ($P < 0.05$). Most participants reported mild to moderate issues related to mobility, daily activities, pain, and anxiety/depression, with a mean EQ-5D-5L index value of $0.78 (\pm 0.09 \text{ SD})$ and EQ-VAS score of $58.43 (\pm 10.88 \text{ SD})$. HRQoL was lower among patients aged > 65 years, females, and those without formal education ($P < 0.05$). The study concludes that while participants have some knowledge of their condition, their attitudes and practices remain inadequate, which negatively affects their quality of life. This emphasizes the need for comprehensive health education and intervention programs tailored to chronic diseases such as diabetes and hypertension in this region.

Keywords: Knowledge, Attitude, Practice, Diabetes, Hypertension, Health-related quality of life

Introduction

Non-communicable diseases, specifically diabetes and hypertension, are significant health challenges worldwide. These conditions are major contributors to severe health problems like heart disease, stroke, kidney failure, and even disability, while also placing a large

burden on healthcare systems [1]. Currently, hypertension causes approximately 9 million deaths annually, and by 2025, it is predicted that over 1.5 billion people worldwide will be affected. Hypertension is responsible for millions of deaths and a considerable number of disability-adjusted life years (DALYs). Likewise, the global prevalence of diabetes stood at 8.3% in 2013, with numbers expected to rise to 592 million people by 2035 [2, 3]. In response to the escalating crisis, the World Health Organization (WHO) established the Global Action Plan in 2011, aiming to curb the rise of diabetes by 2025 and reduce hypertension by 25% from 2010 levels [4].

Effective management of chronic diseases like diabetes and hypertension hinges on patients' understanding,

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attitudes, and practices related to their health (HR-KAP) [5]. These conditions often have a profound effect on the quality of life, making early detection and consistent management essential [6]. As populations continue to age, the prevalence of chronic diseases such as hypertension and type 2 diabetes is growing. Effective disease management can significantly reduce complications, improving patients' overall life quality [7]. This study aims to explore the HR-KAP and the quality of life (HRQoL) among patients with diabetes and hypertension attending Damak Municipal Hospital in Province 1, Nepal.

Materials and Methods

This research was conducted as a cross-sectional observational study on patients attending the outpatient medicine department at Damak Municipal Hospital between April and September 2022. The hospital, a 100-bed tertiary facility, serves as a referral center for primary healthcare centers and provides medical services to the local population as well as neighboring areas in eastern Nepal. Ethical approval was granted by the Institutional Review Committee (IRC) of Purbanchal University, School of Health Science, and institutional consent was received from Damak Municipal Hospital before the study's initiation.

Inclusion criteria for the study required participants to be aged 30 or older, with both diabetes and hypertension diagnoses for a minimum of one year and currently on medication. Patients with additional chronic diseases, those requiring hospitalization, individuals with mental impairments, hearing disabilities, or pregnant or breastfeeding women were excluded. A consecutive sampling technique was employed for participant selection. The required sample size of 98 was calculated based on the 6.8% prevalence rate of co-morbid diabetes and hypertension from a prior study conducted in Pokhara, Nepal [8], using a 95% confidence level and a margin of error of 0.05. To account for potential non-responses, 7% more participants were included, resulting in a final sample size of 105.

The questionnaire was developed after reviewing several related studies [9-12]. The validation process involved content approval by a team of researchers and supervisors. Initially written in English, it was then translated into Nepali by two bilingual healthcare professionals. The translation was reviewed through

back-translation to address discrepancies and ensure clarity. Following face validation with 10 patients, the questionnaire was adjusted for final use. The final version consisted of 23 questions, divided into three sections: 10 questions about knowledge, 6 about attitude, and 7 about practice. Knowledge questions were answered in a "yes/no/I don't know" format, while attitude and practice were evaluated on a three-point Likert scale ("never," "sometimes," "always").

The EQ-5D-5L questionnaire was employed to assess the participants' health-related quality of life (HRQoL). The questionnaire comprises two sections: the EQ-5D-5L descriptive system and the EQ visual analogue scale (EQ VAS). The descriptive system evaluates five dimensions—mobility, self-care, usual activities, pain/discomfort, and anxiety/depression—with each dimension having five levels: no problems, minor problems, moderate problems, severe problems, and extreme problems.

On scheduled outpatient days, physicians referred eligible patients with diabetes and hypertension for inclusion in the study. Patients who agreed to participate provided informed consent and were given the research questionnaire for self-completion. For participants unable to read, the investigator assisted with questionnaire completion in the presence of a witness.

Data collected were analyzed using the Statistical Package for Social Sciences (SPSS) version 11.5. KAP scores were assessed based on the mean scores for each section, with scores exceeding the mean considered indicative of good knowledge, positive attitudes, and good practices. The EQ-5D-5L health states were scored and converted into a utility index ranging from -1 to 1 (where 0 denotes death, values less than 0 represent worse-than-death health states, and 1 indicates perfect health). Due to the lack of a specific EQ index for Nepal, the index value set from India as referenced by Jyani *et al.* [13] was used. The EQ VAS scores were reported as averages. Independent t-tests and chi-square tests were performed to examine associations between dependent and independent variables, with a significance level of $P < 0.05$.

Results and Discussion

The study included 105 patients, with an average age of 49.40 years (± 11.11 SD). Among the participants, the majority (62.85%) were aged 65 years or younger, and

about half (50.5%) were women. Over half of the participants (58.9%) had completed some level of formal education, and 50.5% were employed in some capacity, either in government, private, or business sectors. Approximately 41.9% of the participants reported having a family history of hypertension or diabetes (**Table 1**).

Table 1. Sociodemographic characteristics of participants

Socio-demographic characteristics	Category	No. of patients	Percentage (%)
Age	≤ 65	66	62.85
	> 65	39	37.14
Gender	Male	52	49.5
	Female	53	50.5
Education	Illiterate	44	41.9
	Primary	23	21.9
	Secondary	27	25.7
	Above	11	10.5
Occupation	Unemployed	52	49.5
	Employed (Government/private/business)	53	50.5
Family history	Present	44	41.9
	Absent	48	45.7
	Not known	13	12.4

A significant number of respondents (85.7%) were familiar with the common signs and symptoms of diabetes, while 79% recognized the symptoms of hypertension. Additionally, 76.2% understood the importance of adhering to medication. Almost all (95.2%) participants identified obesity as a key risk factor for both conditions. However, many respondents were unaware of the potential complications of these diseases (58.1%), the medication-induced risk of hypoglycemia or hypotension (78.1%), and the causes of diabetes (68.6%) or the conditions that lead to hypertension (58.1%) (**Table 2**).

Table 2. Responses to knowledge-based questions

Question	Correct answers (n (%))
What causes hypertension?	44 (41.9%)
What condition is referred to as diabetes?	56 (53.3%)
Symptoms of hypertension	83 (79%)
Primary cause of diabetes	33 (31.4%)
Symptoms of poorly controlled blood sugar	90 (85.7%)
Major complications or risks related to the disease	44 (41.9%)
Do antidiabetic or antihypertensive medications cause hypoglycemia or hypotension?	23 (21.9%)
Importance of adhering to prescribed medication	80 (76.2%)
Does the quality of life decrease as the disease advances?	45 (42.9%)
Is being overweight a risk factor for developing these diseases?	100 (95.2%)

Attitude

In terms of attitudes toward disease management, a large proportion of participants (74.3%) believed that consuming fruits and vegetables regularly would help prevent diabetes and hypertension, and 78.1% supported the idea of engaging in regular physical activity for

disease prevention. Around half (51.4%) thought that limiting salt intake would help control the conditions. However, a significant number (72.4%) believed that taking Ayurvedic medicine alongside prescribed allopathic medication was beneficial, and 65.7% felt that

regular medication adherence was unnecessary when symptoms were absent. Additionally, 64.8% of the participants thought that excessive alcohol consumption did not negatively impact blood pressure (**Table 3**).

Table 3. Responses to attitude questions (n = 105)

Question	Positive response (n (%))
Including green leafy vegetables and fruits in the regular diet is beneficial	78 (74.3%)
Reducing salt and sugar intake is beneficial for health	54 (51.4%)
It's undesirable to consume Ayurvedic or alternative medicine alongside regular treatments	29 (27.6%)
Excessive alcohol consumption can cause or worsen high blood pressure	37 (35.2%)
Regular physical activity is necessary	82 (78.1%)
Taking medication regularly is unnecessary when feeling well	36 (34.3%)

Practice

Regarding practice, most patients did not routinely check their blood sugar or blood pressure (95.3%) or monitor vital organ functions, including eye health (99%). Furthermore, a large portion (74.3%) reported that they

never followed a controlled diet, and 81% did not engage in the physical exercise recommended by their healthcare provider. However, more than three-quarters (77.1%) adhered to their prescribed medication regimen for hypertension or diabetes regularly (**Table 4**).

Table 4. Responses to practice-based questions

Question	Response	Number of patients (n (%))
Take prescribed medications	Always	81 (77.1%)
	Sometimes	24 (22.9%)
	Never	-
Visit a doctor for routine follow-up	Always	12 (11.4%)
	Sometimes	78 (74.3%)
	Never	15 (14.3%)
Follow a controlled and planned diet	Always	3 (2.9%)
	Sometimes	24 (22.9%)
	Never	78 (74.3%)
Forget to take anti-diabetic or antihypertensive medications	Always	1 (1%)
	Sometimes	79 (75.2%)
	Never	25 (23.8%)
Follow the physical exercise recommended by a healthcare provider	Always	6 (5.7%)
	Sometimes	14 (13.3%)
	Never	85 (81%)
Check blood pressure or blood sugar regularly	Always	5 (4.8%)
	Sometimes	93 (88.6%)
	Never	7 (6.7%)

Routine eye and vital organ function examination	Always	1 (1%)
	Sometimes	56 (53.3%)
	Never	48 (45.7%)

The study revealed that 52 (49.5%) participants demonstrated sufficient awareness of diabetes and hypertension. In terms of attitude, 32 (30.5%) showed a positive outlook, while the remaining 73 (69.5%) had a more negative perspective. Regarding practical management, only 18 (19.1%) participants exhibited good practice scores for managing their condition effectively, while the majority (n = 87 (80.9%)) had poor practice scores.

A statistically significant correlation was found between knowledge and attitude with age group ($P = 0.032$ and 0.010), suggesting that individuals aged 65 years or younger had better awareness about the diseases than those older than 65. However, practice scores were linked to gender ($P < 0.001$) and education ($P < 0.004$). Males (71.15%) had higher awareness than females (28.3%). Participants with higher education were better informed

about disease causes, complications, and effects, leading to improved medication adherence and regular doctor visits. Education level also had a positive impact on attitude ($P = 0.002$) toward disease management and diet compliance. Those with lower education levels (illiterate or primary education) had more negative practices compared to those with secondary or higher education (**Table 5**). The study showed that occupation did not significantly affect knowledge ($P = 0.143$) or practice ($P = 0.965$), though there was a notable correlation with attitude ($P = 0.004$). Employed individuals tended to have more positive attitudes toward disease management than unemployed participants. Family history of the diseases did not show a statistically significant link with KAP scores ($P = 0.382$, 0.494 , and 0.848) as shown in **Table 5**.

Table 5. Association between socio-demographics with knowledge attitude and practice

Characters	Category	Knowledge				Attitude				Practice			
		N	Poor n (%)	Good n (%)	P-value	N	Negative n (%)	Positive n (%)	P-value	N	Bad n (%)	Good n (%)	P-value
Age (years)	< 65	66	28 (42.42)	38 (57.58)	0.032*	66	40 (60.61)	26 (39.39)	0.010*	66	57 (86.36)	9 (13.64)	0.215
	> 65	39	25 (64.10)	14 (35.9)		39	33 (84.62)	6 (15.38)		39	30 (76.92)	9 (23.08)	
Gender	Male	52	15 (28.85)	37 (71.15)	< 0.001*	52	28 (53.85)	24 (46.15)	0.001*	52	36 (69.23)	16 (30.77)	< 0.001*
	Female	53	38 (71.70)	15 (28.30)		53	45 (84.91)	8 (15.09)		53	51 (96.23)	2 (3.77)	
Education	Illiterate	44	36 (81.82)	8 (18.18)	< 0.001*	44	38 (86.36)	6 (13.64)	0.002*	44	40 (90.91)	4 (9.09)	0.030*
	Primary	23	12 (52.17)	11 (47.83)		23	17 (73.91)	6 (26.09)		23	21 (91.30)	2 (8.70)	
	Secondary	27	5 (18.52)	22 (81.48)		27	13 (48.15)	14 (51.85)		27	18 (66.67)	9 (33.33)	
	Above	11	-	11 (100)		11	5 (45.45)	6 (54.55)		11	8 (72.73)	3 (27.27)	
Occupation	Unemployed	52	30 (57.69)	22 (42.31)	0.143	52	43 (82.69)	9 (17.31)	0.004*	52	43 (82.69)	9 (13.31)	0.965

Family history	Employed	53	23 (43.40)	30 (56.60)	53	30 (56.60)	23 (43.40)	53	44 (83.01)	9 (16.98)
	Present	54	30 (55.56)	24 (44.44)	44	29 (65.91)	15 (34.10)	44	36 (81.82)	8 (18.18)
	Absent/Not known	61	33 (54.10)	28 (45.90)	61	44 (72.13)	17 (27.87)	61	51 (83.61)	10 (16.67)

*Indicates having association i.e. P-value < 0.05. The P-value is calculated by using the chi-square test.

Figure 1 illustrates the distribution of patients (n = 105) across the EQ-5D levels 1 to 5 (no problem, mild problem, moderate problem, severe problem, very severe/unable) for each dimension. Regarding mobility and usual activities, more than two-thirds of patients reported level 2, indicating mild issues with mobility or

performing usual activities. For pain and discomfort, the majority of patients reported level 3, signifying moderate pain/discomfort (52.40%), or anxiety/depression (45.70%). A significant portion of the respondents reported no issues with self-care (79%) (**Figure 1**).

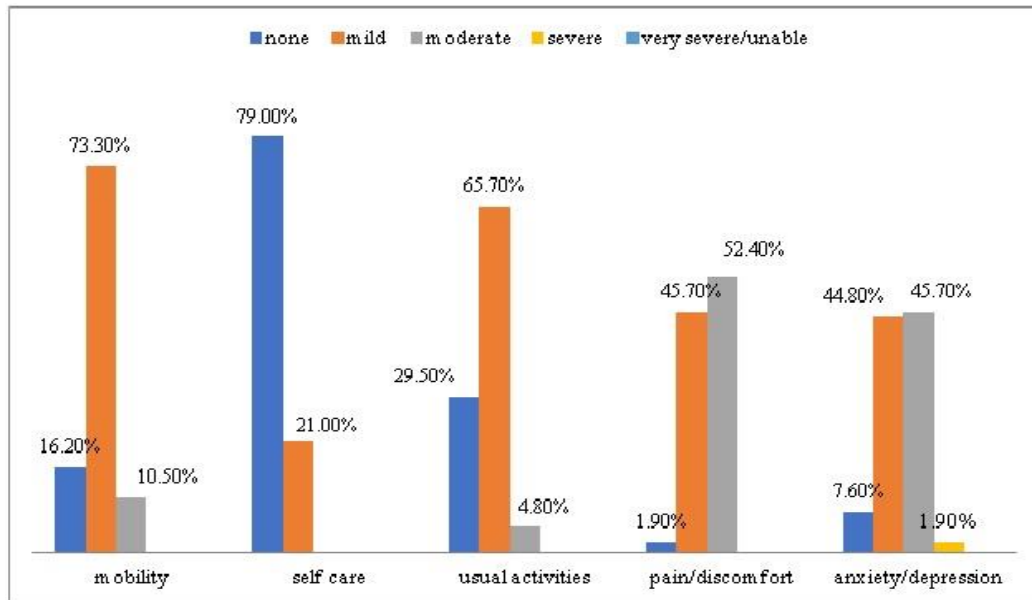


Figure 1. Distribution of diabetes and hypertensive patients reporting levels 1 to 5 by dimensions.

The average EQ index and EQ-VAS scores were 0.78 ± 0.09 and 58.43 ± 10.88 , with a minimum of 0.567 and a maximum of 1 for the EQ index, and a minimum of 40 and a maximum of 89 for the EQ-VAS score. **Table 6** provides the mean EQ index values ($\pm$ SD) based on the participants' socio-demographic characteristics. The analysis revealed that female gender, older age, and lower education levels were significantly associated with

lower quality of life and health outcomes, as indicated by both the EQ-5D index and EQ-VAS score ($P < 0.05$). However, employment status and a positive family history of diabetes and hypertension showed no significant correlation with the EQ index, though employment was linked to a 4.89% increase in the EQ VAS score (**Table 6**).

Table 6. Socio-demographic factors' impact on EQ index and EQ-VAS scores

Characteristics	Category	Mean EQ index $\pm$ SD	P-value	Mean EQ-VAS $\pm$ SD	P-value
Age	< 65	0.808 ± 0.087	< 0.001*	61.67 ± 10.278	< 0.001*
	> 65	0.733 ± 0.773		52.95 ± 9.714	

Gender	Male	0.806 ± 0.887	0.004*	61.83 ± 10.57	0.001*
	Female	0.755 ± 0.086		55.09 ± 10.14	
Education	Illiterate	0.733 ± 0.079	< 0.001*	58.48 ± 8.452	< 0.001*
	Literate	0.814 ± 0.083		63.52 ± 11.587	
Occupation	Unemployed	0.766 ± 0.88	0.094	55.96 ± 10.051	0.017*
	Employed	0.794 ± 0.091		60.85 ± 11.212	
Family history	No/Not Known	0.784 ± 0.822	0.532	57.7 ± 10.668	0.411
	Present	0.774 ± 0.101		59.43 ± 11.218	

Note: Values with asterisks indicate statistical significance (P < 0.05).

The objective of this study was to explore the knowledge, attitude, practice, and quality of life concerning health outcomes among patients with both diabetes and hypertension.

In this sample, a higher percentage of female patients (50.5%) was observed, which aligns with findings from studies in Uganda by Kaddumukasa *et al.* and Arisege *et al.* where the proportion of females was 68% and 65.7%, respectively [14, 15]. In contrast, a previous study in Nepal reported that males had a higher prevalence of comorbid diabetes and hypertension [16]. The average age of the participants in this study was 49.4 years, which is similar to a study conducted in Manipur, India, where most respondents were aged between 40 and 60 years (64.8%) [17].

When it comes to education, 41.9% of the patients were illiterate, while 21.9% had only completed primary education. Illiterate participants scored significantly lower on knowledge, attitude, and practice (KAP) measures compared to literate individuals. Similarly, in a study in Ethiopia by Mekonnen and Hussien [18], 25.1% of participants had no formal education, and those with lower education levels were more likely to have a negative attitude toward managing their disease.

A notable finding in this study was that the majority of patients did not engage in regular physical activity (81%) and did not follow a controlled diet plan (74.3%). Lifestyle changes are crucial for managing chronic conditions such as diabetes and hypertension. A study by K.Y. *et al.* demonstrated that lifestyle modifications led to a substantial reduction in systolic blood pressure (SBP) by 6.4 mmHg, diastolic blood pressure (DBP) by 3.3 mmHg, triglycerides by 12.0 mg/dl, waist circumference by 2.7 cm, and fasting blood glucose by 11.5 mg/dl [19]. Our study also found that most participants did not attend regular follow-up visits for check-ups (95.3%). Regular

monitoring of blood sugar, blood pressure, and eye and organ health is essential for patients with these chronic conditions. Other studies also found that patients with diabetes and hypertension often neglected routine follow-ups and screenings [10, 20]. Regular check-ups not only help in early disease detection but also raise awareness, reduce complications, and encourage a healthy lifestyle. Therefore, health authorities should focus on enhancing chronic disease management programs and offer services like free medical screenings, particularly for older patients and those from low-income backgrounds, as part of public health initiatives.

Lastly, our findings indicate that patients had relatively lower attitude and practice scores compared to their knowledge. This trend is consistent with a study in Guntur, which showed that while participants had a strong knowledge base, their attitudes and practices toward disease management were poor [21].

The gap between knowledge and practical implementation could stem from the fact that while patients are aware of the importance of controlling blood sugar and blood pressure, they may lack a clear understanding of how to effectively manage them.

Our research highlights a strong correlation between age, gender, education, and health-related quality of life (QoL) in patients with diabetes and hypertension. The average EQ-5D utility score in this cohort was 0.78, with scores ranging between 0.567 and 1.0. This is slightly lower than the results seen in Japan [22] but higher compared to findings in Bangladesh [23]. The study revealed that older individuals (over 65 years) experienced more mobility issues and poorer QoL across various dimensions than those aged under 65 years. This finding supports previous research suggesting that younger individuals (under 60 years) tend to have better

QoL scores [23], likely due to the progressive nature of diabetes and hypertension with age.

In terms of education, individuals with lower education levels reported poorer QoL. This may suggest that education plays a pivotal role in managing and understanding chronic conditions. Those with higher levels of education are better equipped to cope with their disease and to understand prevention and treatment strategies. Similar findings were reported by Andrade *et al.* showing that people with higher education had improved QoL scores [24]. Furthermore, Pappa *et al.* study [25] in Greece indicated that individuals with only primary education had significantly lower QoL scores, underscoring the critical role education plays in improving health outcomes.

Physical activity, a key factor in managing both diabetes and hypertension, was reported to be extremely low in our study. Existing literature suggests that regular physical activity helps prevent metabolic issues associated with chronic conditions and enhances health outcomes [26]. Our findings are consistent with this, as those who engaged in physical activity reported better QoL, while those who led sedentary lifestyles experienced poorer QoL [27].

Conclusion

This study reveals that many patients struggle with the knowledge, attitude, and practical aspects of managing diabetes and hypertension. The quality of life was notably lower in patients over 65, women, and those with low education levels. Therefore, there is an urgent need for tailored educational and intervention programs focusing on chronic disease management, particularly for these high-risk groups. These programs should be repeated periodically to ensure that patients continue to apply the knowledge gained.

Limitations

A limitation of this study is that it was conducted within a single hospital setting, which may limit the ability to generalize the findings to the broader population. Additionally, since the study was carried out in an outpatient setting, participants' EQ VAS scores might have been influenced by their immediate health condition at the time of the consultation.

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References

1. Marbaniang SP, Chungkham HS, Lhungdim H. A structured additive modeling of diabetes and hypertension in Northeast India. *PLoS One*. 2022;17(1):1-20. doi:10.1371/journal.pone.0262560
2. Petrie JR, Guzik TJ, Touyz RM. Diabetes, hypertension, and cardiovascular disease: clinical insights and vascular mechanisms. *Can J Cardiol*. 2018;34(5):575-84. doi:10.1016/j.cjca.2017.12.005
3. Abubakar S, Muhammad L, Ahmed A, Idris F. Knowledge, attitude, and adherence to nonpharmacological therapy among patients with hypertension and diabetes attending the hypertension and diabetes clinics at tertiary hospitals in Kano, Nigeria. *Sahel Med J*. 2017;20(3):102. doi:10.4103/1118-8561.223170
4. Geldsetzer P, Manne-Goehler J, Theilmann M, Davies JJ, Awasthi A, Vollmer S, et al. Diabetes and hypertension in India a nationally representative study of 1.3 million adults. *JAMA Intern Med*. 2018;178(3):363-72. doi:10.1001/jamainternmed.2017.8094
5. Le NK, Turnbull N, Van Dam C, Khiewkhern S, Thiabrithi S. Impact of knowledge, attitude, and practices of type 2 diabetic patients: a study in the locality in Vietnam. *J Educ Health Promot*. 2021;10(1):72. doi:10.4103/jehp.jehp_712_20
6. Shimels T, Kassu RA, Bogale G, Muleta MB, Akalu GT, Getachew A, et al. Health-related quality of life of patients with type 2 diabetes mellitus and hypertension in Addis Ababa, Ethiopia. *Ethiop J Health Sci*. 2022;32(2):381-92. doi:10.4314/ejhs.v32i2.19
7. Parra DI, Romero LAL, Cala LMV. Quality of life related to health in people with hypertension and diabetes mellitus. *Enferm Glob*. 2021;20(2):331-44. doi:10.6018/eglobal.423431
8. Gyawali B, Mishra SR, Ghimire S, Hansen MRH, Shah KJ, Subedee KC, et al. The burden and correlates of multiple cardiometabolic risk factors in a semi-urban population of Nepal: a community-

- based cross-sectional study. *Sci Rep.* 2019;9(1):1-10. doi:10.1038/s41598-019-51454-9
9. Kanwal S. A Cross-sectional study assessing knowledge attitude and practice of diabetic patients at tertiary care hospitals of twin of Pakistan. *J Appl Pharm.* 2016;8(210):2. doi:10.4172/1920-4159.1000210
 10. Ahmad S, Ahmad T, Ahmad S. Assessment of knowledge, attitude and practice among hypertensive patients attending a health care facility in North India hypertension. *Int J Res Med.* 2015;4(2):122-7.
 11. Fatema K, Hossain S, Natasha K, Chowdhury HA, Akter J, Khan T, et al. Knowledge attitude and practice regarding diabetes mellitus among Nondiabetic and diabetic study participants in Bangladesh. *BMC Public Health.* 2017;17(1):1-10. doi:10.1186/s12889-017-4285-9
 12. Buang NFB, Rahman NAA, Haque M. Knowledge, attitude and practice regarding hypertension among residents in a housing area in Selangor, Malaysia. *Med Pharm Rep.* 2019;92(2):145-52. doi:10.15386/mpr-1227
 13. Jyani G, Sharma A, Prinja S, Kar SS, Trivedi M, Patro BK, et al. Development of an EQ-5D value set for India using an extended design (DEVINE) study: the Indian 5-level version EQ-5D value set. *Value Health.* 2022;25(7):1218-26. doi:10.1016/j.jval.2021.11.1370
 14. Kaddumukasa M, Kayima J, Kaddumukasa MN, Ddumba E, Mugenyi L, Pundik S, et al. Knowledge, attitudes and perceptions of stroke: a cross-sectional survey in rural and urban Uganda. *BMC Res Notes.* 2015;8(1):1-7. doi:10.1186/s13104-015-1820-6
 15. Arisege SA, Awosan KJ, Oche MO, Sabir AA, Ibrahim MT. Knowledge and practices related to stroke prevention among hypertensive and diabetic patients attending specialist hospital, Sokoto, Nigeria. *Pan Afr Med J.* 2018;29(1):1-17. doi:10.11604/pamj.2018.29.63.13252
 16. Pandey AR, Karki KB, Mehata S, Aryal KK, Thapa P, Pandit A, et al. Prevalence and determinants of comorbid diabetes and hypertension in Nepal: evidence from Non communicable disease risk factors STEPS survey Nepal 2013. *J Nepal Health Res Counc.* 2015;13(29):20-5.
 17. Shah A, Afzal M. Prevalence of diabetes and hypertension and association with various risk factors among different Muslim populations of Manipur, India. *J Diabetes Metab Disord.* 2013;12(1):52. doi:10.1186/2251-6581-12-52
 18. Mekonnen Y, Hussien N. Self-care related knowledge, attitude, and practice and associated factors among patients with type 2 diabetes in JMC, Ethiopia. *Diabetes, Metab Syndr Obes Targets Ther.* 2021;14:535-46. doi:10.2147/DMSO.S296112
 19. Yamaoka K, Tango T. Effects of lifestyle modification on metabolic syndrome: a systematic review and meta-analysis. *BMC Med.* 2012;10(1):138.
 20. Mangi AA, Khan H, Junno AA, Nindwani RA, Yousuf M, Shehanshah M. Knowledge, attitude and practice about diabetes among diabetic patients in Sindh, Pakistan. *Rawal Med J.* 2018;43(1):4-7.
 21. Bollu M, Nalluri KK, Surya Prakash A, Naga Lohith M, Venkataramarao N. Study of knowledge, attitude, and practice of general population of Guntur toward silent killer diseases: hypertension and diabetes. *Asian J Pharm Clin Res.* 2015;8(4):74-8. doi:10.1016/j.jval.2015.09.907
 22. Fujikawa A, Suzue T, Jitsunari F, Hirao T. Evaluation of health-related quality of life using EQ-5D in Takamatsu, Japan. *Environ Health Prev Med.* 2011;16(1):25-35. doi:10.1007/s12199-010-0162-1
 23. Mannan A, Akter KM, Akter F, Chy NUHA, Alam N, Pinky SD, et al. Association between comorbidity and health-related quality of life in a hypertensive population: a hospital-based study in Bangladesh. *BMC Public Health.* 2022;22(1):1-12. doi:10.1186/s12889-022-12562-w
 24. Andrade JM, Rios LR, Teixeira LS, Vieira FS, Mendes DC, Vieira MA, et al. Influência de fatores socioeconômicos na qualidade de vida de idosos hipertensos [Influence of socioeconomic factors on the quality of life of elderly hypertensive individuals]. *Cien Saude Colet.* 2014;19(8):3497-504. doi:10.1590/1413-81232014198.19952013
 25. Pappa E, Kontodimopoulos N, Papadopoulos AA, Niakas D. Assessing the socio-economic and demographic impact on health-related quality of life: evidence from Greece. *Int J Public Health.* 2009;54(4):241-9. doi:10.1007/s00038-009-8057-x
 26. Carroll S, Dudfield M. What is the relationship between exercise and metabolic abnormalities? A review of the metabolic syndrome. *Sports Med.*

- 2004;34(6):371-418. doi:10.2165/00007256-200434060-00004
27. Wu XY, Zhuang LH, Li W, Guo HW, Zhang JH, Zhao YK, et al. The influence of diet quality and dietary behavior on health-related quality of life in the general population of children and adolescents: a systematic review and meta-analysis. *Qual Life Res.* 2019;28(9986):1989-2015. doi:10.1007/s11136-019-02162-4