KNOWLEDGE, ATTITUDE AND PRACTICE ABOUT HYPERTENSION AND DIETARY PRACTICES AMONG ANTI-HYPERTENSIVE MEDICATION USERS OF URLABARI MUNICIPALITY, MORANG

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Knowledge, Attitude and Practice about Hypertension and Dietary Practices among Anti-Hypertensive Medication Users of Urlabari Municipality, Morang

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Approval Letter

This ***dissertation*** entitled ***Knowledge, Attitude and Practice about Hypertension and Dietary Practices among Anti-Hypertensive Medication Users of Urlabari Municipality, Morang*** presented by **Babita Ghimire** has been accepted as the partial fulfillment of the requirement for the **B.Sc. degree in Nutrition and Dietetics**

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Abstract

A community based cross-sectional descriptive study was conducted to assess the level of knowledge, attitude and practice about hypertension and dietary practices among antihypertensive medication users of Urlabari Municipality, Morang. A semi-structured questionnaire was used to collect data of 189 clinically diagnosed patients of hypertension who were taking anti-hypertensive drugs for more than 6 months. Dietary intake was assessed using 24-hour dietary recall and food frequency questionnaire. Data collected was analyzed using statistical package for the social sciences (SPSS) v25. Chi-square test and correlation tests were used for necessary analysis.

The analysis revealed that the prevalence of hypertension is higher in male and increase in age is statistically significantly associated with prevalence of hypertension. The blood pressure ranged from 120-190 for systolic blood pressure and 70-110 mmHg for diastolic blood pressure. The study revealed that 93.70%, 95.2% and 10.1% of the patient had a good knowledge, attitude and acceptable practice score respectively. Most of the respondents knew that overweight/obesity (92.06%), alcohol consumption (94.18%) and higher salt intake (91%) as risk factors of hypertension. Positive attitude regarding medicine intake and regularly exercising were found in 98.94% and 96.81% respectively. However, 21.69% never performed any sorts of exercises. 24.87% and 46.56% of respondents smoked daily and never consumed alcoholic beverages. Despite good knowledge and attitude towards healthy lifestyle habits, practice of lifestyle modification among hypertensive patients is low. Therefore, it is recommended to initiate awareness and educational interventions aimed at these respondents.

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List of Abbreviations

Abbreviations	Full form
ACE	Angiotensin-converting enzyme
AGT	Angiotensinogen
AHA	American Heart Association
BMI	Body mass index
BP	Blood pressure
CDC	Centers for Disease Control and Prevention
CHD	Coronary heart disease
CHO	Carbohydrate
CI	Confidence interval
CVD	Cardiovascular diseases
DASH	Dietary approaches to stop hypertension
DBP	Systolic blood pressure
DFTQC	Department of Food Technology and Quality Control
DM	Diabetes mellitus
FFQ	Food frequency questionnaire
GLV	Green leafy vegetables
HDL	High-density lipoprotein
HMOD	Hypertension mediated organ damage
HTN	Hypertension
ICMR	Indian Council of Medical Research
IQR	Inter quartile range
KAP	Knowledge, Attitude and Practice
LDL	Low-density lipoprotein
LMIC	Low- or Middle-Income Country
NHANES	National Health and Nutrition Examination Survey
NHLBI	National Heart, Lung, and Blood Institute
NIH	National Institute of Health
PA	Physical activity
RAAS	Renin angiotensin aldosterone system
RDA	Recommended dietary allowance

SBP	Systolic blood pressure
SD	Standard deviation
SPSS	Statistical package for social sciences
TLC	Therapeutic lifestyle changes
VAT	Visceral adipose tissue
WHO	World Health Organization

Part I

Introduction

1.1 General introduction

Hypertension, commonly known as high blood pressure, is a global public health problem that persists, and it is characterized by persistently elevated pressure in blood vessels. It is a critical health issue that can lead to serious complications such as heart attacks, stroke, kidney failure, blindness, and cognitive impairment. Hypertension, being the primary cause of mortality across the globe, is currently more prevalent in low-income and middle-income countries (LMICs) compared to high-income nations (Heller and Kishore, 2017). The number of adults diagnosed with hypertension is predicted to increase to an alarming 1.56 billion by 2025 (Tabrizi *et al.*, 2016).

Men are more likely to have hypertension than women, and although the prevalence of hypertension is higher in urban areas, it's spreading rapidly in rural populations (Ghosh and Kumar, 2019). In Nepal, 18% of women and 23% of men age 15 and older have high blood pressure or hypertension. Among individuals age 60 and older, 46% of women and 42% of men have high blood pressure or hypertension. Hypertension is more prevalent among men than women until the age range of 55-59, after which the prevalence among women exceeds that among men. Controlled hypertension means having SBP less than 140 and DBP less than 90 mmHg while taking antihypertensive medication. Around 19% of women and 17% of men with hypertension have controlled hypertension (Ministry of Health and Population, 2022).

In the rural region, the prevalence of hypertension is recorded to be at 41.55% (Kafle *et al.*, 2018), while in semi-urban areas it stands at 28.9% (Koju *et al.*, 2010). In an urban setting, the prevalence of hypertension is slightly higher at 32.5% (Dhungana *et al.*, 2016). However, when examining the mid-Western region, the prevalence of hypertension reaches 48% (Khanal *et al.*, 2017).

The rise in the prevalence of hypertension is ascribed to factors such as advancing age, urbanization, sedentary lifestyle, insufficient physical exercise, obesity, excessive alcohol consumption, and prolonged exposure to stressful circumstances (J *et al.*, 2019). Prevention, plays significant role in controlling this disease which is achieved by increasing the

knowledge and awareness of the public and changing their attitude and practice (Sabouhi *et al.*, 2011).

A KAP survey means knowledge, attitude, and practice. KAP questions tend to reveal not only characteristic traits in knowledge, attitude, and behaviors about health but also the idea that each person has of the disease. These factors are often the source of misunderstandings. The obstacle to change may be lack of knowledge (Sabouhi *et al.*, 2011). Assessing the patients' knowledge and awareness of hypertension is crucial in the programs and interventions aimed at controlling hypertension. Patient education plays a vital role in these programs (Oliveria *et al.*, 2005). Studies have demonstrated that good knowledge on hypertension is associated with better control of hypertension. Evidence suggests an important role in the management of chronic diseases like hypertension can be achieved through simple interventions such as providing educational support for patients (Sharma *et al.*, 2014).

The KAP scores of hypertensive patients on hypertension were found to be low (Shrestha *et al.*, 2016). A high proportion of respondents reported to have good knowledge on hypertension as well as about the behavioral risk factors for hypertension (Aubert *et al.*, 1998). Patients with hypertension exhibited fair levels of knowledge and practice, accompanied by a good level of attitude towards their medical condition (Machaalani *et al.*, 2022).

1.2 Statement of the problem

Hypertension presents a major area of intervention as it is a frequently occurring medical condition that is manageable through both non-pharmacological lifestyle modification and pharmacological treatment (Aubert *et al.*, 1998).

It is crucial for individuals to possess awareness regarding their condition so that appropriate measures can be implemented to regulate their blood pressure. Data on the levels of awareness and treatment status among women and men aged 15 and above, who have elevated blood pressure or hypertension, reveal that 48% of women with elevated blood pressure or hypertension remain unaware of their condition. (Ministry of Health and Population, 2022).

The improvement of the overall knowledge, attitudes, and practices (KAP) regarding hypertension among individuals who use antihypertensive medications in Bharatpur is necessary in order to alleviate the burden. An appropriate educational intervention is imperative with regards to dietary habits, which would in turn enhance their behavior (Shrestha *et al.,* 2016). Dietary factors significantly influence the prevention and treatment of hypertension (J *et al.*, 2019).

It was discovered that solely the dietary intervention had the capacity to reduce systolic blood pressure by approximately 6 to 11 mm Hg (Control and Prevention, 2012). Thomas *et al.* (2021) concluded that education has a vital role in improving health outcomes. The cross-sectional study conducted in Dhulikhel, Nepal, as part of the Dhulikhel Heart Study involving 1073 adults revealed that 43.6% of the participants were aware of their hypertension condition. Merely 35.3% of the participants had achieved blood pressure control (Vaidya *et al.*, 2012).

A study conducted by Rahmawati *et al.* (2022) in Indonesia where health education was provided to a group of patients and found that SBP declined for approximately 18 mmHg, while DBP reduced by 9 mmHg.

It was assumed that majority of the hypertensive patient have poor knowledge, attitude and practices (medical as well as dietary) towards hypertension. This may be due to lack of awareness of oneself and/or of caregivers. Changing the perspective of hypertensive patients can be done. By giving full information and carrying out education campaigns that are successful, one can control the diet and better the life of the hypertensive individuals. A proper understanding of both the knowledge, attitudes and practices of patients with regard this condition makes it very important that they receive education. Nevertheless, there is a scarcity of studies that have specifically focused on this aspect, resulting in a lack of knowledge, attitude, and practices (KAP) data among hypertensive patients.

Nepal has limited published works on KAP regarding hypertension among diagnosed hypertensive patients. No paper was found on such research conducted here in Urlabari, Morang. Such works are necessary to help decrease the effects of this disease in developing countries by implementing measures that prevent or control it. Understanding KAP among hypertension cases is vital because one may acquire this condition through poor living habits. Consequently, the purpose of this study is to assess hypertension related KAP among

hypertensive patients living in semi-urban regions. This study is expected to reveal the current knowledge gap that needs improvement, thereby providing valuable information for the advancement of initiatives for preventing hypertension.

1.3 Objectives of the study

1.3.1 General Objectives

The general objective of the study is to assess the knowledge, attitude, practice and lifestyle behaviour and dietary modification regarding hypertension among adults and older adults hypertensive patients of Urlabari municipality.

1.3.2 Specific Objectives

1) To assess the association between knowledge and blood pressure.
2) To assess the behavioral factors and dietary practices.
3) To assess the factor associated with KAP score of hypertensive patients

1.4 Research Questions

1) What is the knowledge and attitude of hypertensive patient regarding hypertension?
2) What are their dietary practices regarding hypertension?
3) What is the practice status of hypertensive patients about the care of hypertension?

1.5 Significance of the study

1) Useful in informing the health sector and the public health planners in the mobilization and allocation of resources for the control and prevention of hypertension.
2) The knowledge on risk factors of hypertension and practices directly impacts on the health of an individual.
3) Useful in Acknowledging wrong behaviors and practices, which is the first step towards change for betterment.
4) Helpful in generating awareness regarding importance of modification in dietary pattern in prevention and control of hypertension.
5) To provide better insights, to hypertensive patients, on managing hypertension, of Urlabari Municipality.

Part II

Literature review

2.1 Hypertension

Hypertension, also known as high blood pressure, is a critical medical condition where blood pressure in arteries is elevated chronically. It is diagnosed when the systolic blood pressure is ≥140 mmHg and/or their diastolic blood pressure is ≥ 90 mmHg (Unger *et al.*, 2020). Blood pressure is the force exerted on the walls of arteries, by blood. The higher the blood pressure, the greater is the risk of getting other health conditions, such as heart diseases, stroke, heart attack, heart failure and chronic kidney diseases. It usually develops overtime and shows no warning signs or symptoms. Due to this, it's also referred as silent killer (CDC, 2021b).

There are two types of hypertension viz primary and secondary hypertension. Most cases are idiopathic, which is also known as essential or primary hypertension. Essential hypertension is a major modifiable risk factor for cardiovascular diseases (CVD). It accounts for 95% of all cases of hypertension (Carretero and Oparil, 2000). This condition is theorized to originate from a genetic predisposition that interacts with the long-term cumulative impact of multiple lifestyle factors. The elevated blood pressure levels observed in these individuals lack a singular identified root cause (Rossi *et al.*, 2006).

Whereas, Secondary hypertension is defined as raised blood pressure resulting from a recognizable and often potentially correctable cause, and is thus to be distinguished from the much more prevalent primary hypertension (Beevers and Robertson, 2007). Secondary hypertension includes monogenic forms of hypertension as well as various other medical conditions that lead to elevated blood pressure, such as chronic kidney disease and renal artery stenosis (Rossi *et al.*, 2006).

2.2 Classification of Blood Pressure

The classification of systolic and diastolic blood pressure is shown in **Table 2.1**.

Table 2.1 Categorization of BP

Blood pressure category	Systolic (mm Hg)		Diastolic (mm Hg)
Normal	Less than 120	And	Less than 80
Elevated	120 – 129	And	Less than 80
Hypertension stage I	130 – 139	Or	80 – 89
Hypertension stage II	140 or higher	Or	90 or higher
Hypertensive crisis	Higher than 180	And/or	Higher than 120

Source: AHA (2023)

2.3 Hypertension Status

Hypertension affects 1 in 3 adults worldwide. The number of people living with hypertension (blood pressure of 140/90 mmHg or higher or taking medication for hypertension) doubled between 1990 and 2019, from 650 million to 1.3 billion. Nearly half of people with hypertension globally are currently unaware of their condition (WHO, 2023a). The Ghana ministry of health reported that about 50% of all adults presently have hypertension. The prevalence of hypertension among the study participants was 53.72% (Dai *et al.*, 2022), which was higher than the prevalence reported by WHO African Regions, that stood for 27% (Organization, 2021).

The rapid progression of the economy, industrialization process, and change in societal behaviors witnessed in South Asia have led to an increasing prevalence of hypertension in this region (Sharma, 2008). A study conducted in Sri Lanka shows that One in four Sri Lankans over the age of 20 years was found to be hypertensive, with a prevalence of 27.8 % in rural areas and 30.7 % in urban areas of the country. The latter figure is similar to the prevalence of hypertension observed in developed nations (Katulanda *et al.*, 2014).

A study conducted in India in 2021 found that the prevalence of HTN was 25.8%. Overall, 40% of adults aged over 45 in India were found to lack awareness of their hypertensive status. Among those who were not aware , 73% reported current use of medication, with a mere 10% achieving optimal control of their hypertension (Bhatia *et al.*, 2021). A study conducted in Bangladesh shows that the prevalence of hypertension with age-standardized is 26.2%: 23.5% of males and 28.9 % of females. For patients who were diagnosed, only 36.7% of respondents reported being aware of the problem, only 31.1%

were treated with clinically applied anti-hypertension drugs. Controlled blood pressure among patients with hypertension was 12.7%: in patients who received treatment 43.6% (Khan *et al.*, 2021).

In the context of Nepal, 24.5% (4.7 M) of the adult population (15 – 69 year) have hypertension. However, only 4.5 M have uncontrolled hypertension. The prevalence of uncontrolled hypertension has increased overtime (WHO, 2019). Studies conducted in various regions of Nepal revealed different levels of hypertension prevalence across the country: 5.3% in the Mountain region (specifically Jumla), 6% in rural areas of Kathmandu (Bhadrabas and Alapot), 8.1% in the Terai plains (Parsauni), and 9.9% in urban Kathmandu (Vaidya *et al.*, 2012). Research conducted in different geographical locations points towards a high prevalence of hypertension within the Nepalese population. For instance, a blood pressure survey conducted in the town of Dharan in Eastern Nepal in the year 2005 reported a prevalence rate of approximately 23% (Vaidya *et al.*, 2007).

2.4 Symptomatology

Hypertension is a silent disease, but it is commonly linked to headache and other neurological disorders such as migraine and tension-type headache (Mancia *et al.*, 2013).

Individuals afflicted with excessively elevated blood pressure (typically measuring 180/120 or greater) may encounter various indications such as intense cephalalgia, thoracic discomfort, lightheadedness, respiratory distress, queasiness, emesis, impaired visual acuity or other visual alterations, unease, mental perplexity, tinnitus, epistaxis, and anomalous cardiac rhythm (WHO, 2023b)

2.5 Risk factors

The risk factors for developing hypertension are categorized as modifiable and non-modifiable risk factors. The modifiable risk factors consist of diet, physical activity, alcohol consumption and tobacco smoking, and obesity or overweight. On the other hand, the non-modifiable risk factors consist of family history of hypertension, age exceeding 65 years, and the existence of other comorbidities, such as diabetes and chronic kidney diseases (Kaddumukasa *et al.*, 2017). A study conducted by Radhika *et al.* (2011) concluded that low intake of fish, fruit and vegetables could possibly contribute to the risk of non-communicable diseases.

I. Family history of hypertension

Research has shown that blood pressure (BP) is a trait influenced by genetic factors, with heritability estimates falling within the range of 31% to 68% (Hottenga *et al.*, 2005). Presence of family history in parents, grandparents, and siblings in all adults was significantly linked to an elevated risk of hypertension development (Ranasinghe *et al.*, 2015).

Numerous mechanisms have been suggested to clarify the link between hypertension and a positive family history of hypertension. These mechanisms include increased renal proximal sodium reabsorption (Simsolo *et al.*, 1999), genetic factors linked to elevated blood pressure like high sodium-lithium counter-transport, reduced excretion of urinary kallikrein, increased levels of uric acid, higher concentrations of fasting plasma insulin, high-density LDL sub-fractions, fat pattern index, oxidative stress, and body mass index (Williams *et al.*, 1994). A study conducted in Sri Lanka on KAP in adult hypertensive patients reported above 50% had family history of hypertension (Mahajan *et al.*, 2012).

II. Age group

The prevalence of secondary hypertension and the most common etiologies vary by age group (Viera and Neutze, 2010). The prevalence of hypertension shows an increase with advancing age, starting at 7% in individuals aged 18 to 39 years and rising to 65% in those aged 60 years and older (Hajjar and Kotchen, 2003). The US National Health and Nutrition Examination Survey (NHANES) indicated that 70% of older adults over 65 years of age have high blood pressure (Mozaffarian *et al.*, 2015). As individuals grow older, there is a decrease in the amount of physical activity they engage in, which aligns with a trend towards more sedentary behaviors and a rise in body mass (Kearney *et al.*, 2005). Ageing induces alterations in the gradual enlargement and stiffening of the major arteries (McEniery *et al.*, 2007). The stiffening of these arteries results in various unfavorable outcomes, such as an increase in pulse pressure and, eventually, the emergence of isolated systolic hypertension (Nielsen *et al.*, 1995)

III. Presence of co-morbidities

Hypertension (HTN) infrequently appears on its own, usually coexisting with cardiovascular disease (CVD) comorbidities, including coronary heart disease (CHD),

stroke, congestive heart failure, chronic kidney disease, diabetes mellitus, metabolic syndrome, and dyslipidemia (Wong *et al.*, 2007). The presence of cardiovascular risk factors such as obesity, diabetes and dyslipidemia, and the resulting endothelial dysfunction may play a role in the pathophysiology of hypertension (Oparil *et al.*, 2003).

There exists a significant correlation between hypertension and diabetes, with a minimum of 15% of individuals diagnosed with hypertension also having diabetes concurrently (Weycker *et al.*, 2007). Furthermore, individuals with hypertension are more prone to develop diabetes as compared to those without hypertension, irrespective of the treatment regimen employed. The prevalence of hypertension is roughly double in individuals with diabetes as compared to individuals without the condition (Sowers *et al.*, 2001), reaching as high as 70% to 80% in patients diagnosed with type 2 diabetes (Mancia *et al.*, 2007).

Hypertension and dyslipidemia are significant risk factors contributing to the development of cardiovascular disease. The concomitance of hypertension and dyslipidemia is a common occurrence in routine clinical settings (Kario *et al.*, 2014). Furthermore, population-based epidemiological investigations have indicated a correlation between gradual elevations in blood pressure (BP) or the prevalence of hypertension and the escalation in blood lipid concentrations (Freiberg *et al.*, 2008). There is a probable cause behind these relations and that is the fact that obesity may cause high blood pressure through metabolic alterations which will also lead to dyslipidemia due to changes in adipocytokine secretion owing to an increase in fat deposits (McGill *et al.*, 2009). In addition, dyslipidemia impairs arterial compliance and increases susceptibility to atherogenesis (Wilkinson *et al.*, 2002). The adjustments have the ability to disturb the control of blood pressure, thereby raising the susceptibility of individuals with dyslipidemia to the initiation of hypertension (Otsuka *et al.*, 2016).

IV. Overweight or obesity

BMI (body mass index) categorizes adults based on weight-to-height ratio. It is calculated by dividing weight in kg by height in meters squared. The classification of BMI given by WHO (2010) is shown in **Table 2.2**.

Table 2.2 Classification of BMI

BMI (kg/m²)	**Category**
<18.5	Underweight
18.5-24.9	Normal weight
≥25.0	Overweight / pre-obesity
≥30.0	Obesity
30.0–34.9	Obesity class I
35.0–39.9	Obesity class II
Above 40	Obesity class III

The prevalence of obesity and underweight has increased in recent years due to changes in eating habits all over the world (Omidvar and Begum, 2014). Several factors such as the increased availability and accessibility of sugary beverages containing calories, the assertive promotion carried out by beverage companies, and shifts in human inclination towards beverages could potentially be attributed to the worldwide surge in obesity (Kim *et al.*, 2011).

On average, a 10 kg increase in weight from age 20 to mid-life showed a association with a 2.2 mmHg elevation in systolic and a 1.7 mmHg rise in diastolic mid-life blood pressure among males. In females, the same weight increase was linked to a 3.2 (2.5–4.0) mmHg surge in systolic and a 2.4 (1.9–2.9) mmHg increase in diastolic mid-life blood pressure. The association between mid-life weight and blood pressure was found to be stronger compared to weight at 20 years of age. Individuals with a greater weight gain since age 20 exhibited higher blood pressure levels at a given mid-life weight (Sundström *et al.*, 2020).

The investigation conducted by the National Health and Nutrition Examination Survey III Study demonstrated that in comparison to individuals with a normal weight as the standard, overweight individuals (BMI: 25.0–29.9) exhibited an odds ratio of 1.7 for the manifestation of hypertension. This ratio increased to 2.6 for individuals with class I obesity (BMI 30.0–34.9), 3.7 for severe or class II obesity (BMI 35.0–39.9), and peaked at 4.8 for morbid or class 3 obesity (BMI > 40.0) (Nguyen *et al.*, 2008).

Weight gain during adulthood appears to play an important role as a risk factor in the development of hypertension (Friedman *et al.*, 1988). Each 5% of total weight gain is

associated with 20–30% increased odds of hypertension (Vasan *et al.*, 2001). A distribution of fat around the central region is regarded as a more reliable marker for hypertension than the total body fat mass (Lapidus *et al.*, 1984). In a recent investigation conducted by Kanai *et al.* (1996), it was observed that reduction in average blood pressure subsequent to weight loss were associated with modifications in the visceral fat area rather than changes in body weight or body mass index (BMI). This observation implies that a reduction in intra-abdominal fat content leads to a decrease in blood pressure among individuals who are obese and hypertensive.

The accumulation of body weight and adipose tissue, especially leading to an increase in visceral adipose tissue (VAT), has been associated with increased systemic inflammation and oxidative stress (Pou *et al.*, 2007). Inflammation and oxidative stress is associated with increased arterial stiffness and high blood pressure (Schnabel *et al.*, 2008). The activation of the Renin-Angiotensin-Aldosterone System (RAAS) is another important mechanism in the onset of hypertension related to obesity. It is observed that various serum levels of the RAAS, such as ACE, AGT, renin, and aldosterone, are increased in individuals with obesity. Furthermore, a reduction in body weight has been associated to reduce RAAS function and this was accompanied by a 7 mmHg decrease in systolic blood pressure (Engeli *et al.*, 2005).

V. Anxiety

Anxiety disorders are the most common mental health disorders (Kessler *et al.*, 2009). They are characterized by intense and prolonged feelings of fear and distress, often accompanied by physiological symptom (Baxter *et al.*, 2014). Pan *et al.* (2015) conducted the first systematic review and meta-analysis summarizing the available literature and found a positive association between anxiety and increased risk of hypertension. Lim *et al.* (2021) conducted a meta-analysis that shows significant association between anxiety and diastolic BP.

2.6 Complications of hypertension

The complications of high BP can be classified as short- and long-term consequences. Short-term and long-term outcomes of high blood pressure create issues. Despite the notable improvement in hypertension management due to advances in pharmacotherapeutic options and awareness campaigns in the general public, risks associated with this long-lasting

disease continue to demand more intervention and vigilance must be maintained. (Bhargava *et al.*, 2012).

Hypertension is responsible for causing organ complications, known as hypertension-mediated organ damage (HMOD) (Dziedziak *et al.*, 2022). High BP is undeniably the primary reason behind long-term consequences such as heart failure, both with and without preserved ejection fraction (Emdin *et al.*, 2017), valvular heart disease (Rahimi *et al.*, 2018), peripheral arterial disease, and aortic syndromes (Emdin *et al.*, 2015). Additionally, high BP is associated with chronic kidney disease, end stage renal disease (Hsu *et al.*, 2005), and Alzheimer's Disease (Joas *et al.*, 2012). (Fuchs and Whelton, 2020).

Hypertension in older individuals causes maladaptation of the cerebral circulation, leading to dysregulation of cerebral blood flow, microvascular rarefaction, disruption of the blood-brain barrier, oxidative stress, and impaired neurovascular coupling (Ungvari *et al.*, 2021).

2.7 Lifestyle Modification

Appropriate lifestyle modification is markedly critical in preventing elevated blood pressure which is hypertension. This also goes for treatment. Nonetheless, they should never delay commencing drug therapy with patients at high risk levels. In addition, lifestyle changes don't only help lower the pressure rate but also assist in managing other clinical conditions and cardiovascular risk factors (Williams *et al.*, 2018). A study conducted in Sri Lanka showed that nearly two-thirds of the individuals had received advices from professionals regarding modifications in their lifestyle, leading to change in their behavioral patterns (Ralapanawa *et al.*, 2020).

2.7.1 Dietary Modifications

a) Salt intake:

Increased intake of salt in food (sodium chloride) has been tied to a greater chance of getting hypertension, which is a major risk for stroke and heart diseases including kidney failure (Rust and Ekmekcioglu, 2017).

Elevated salt intake in the diet is a key contributor to the development of essential hypertension in a person. This might also be responsible to some extent for target organ

impairments that have no correlation with blood pressure. The retention of water, an escalation in systemic peripheral resistance, changes in the functionality of the endothelium, modifications in the structure and operation of large elastic arteries, sympathetic activity alterations, and adjustments in autonomic neuronal modulation of the cardiovascular system are closely related to blood pressure increase due to high sodium intake (Cowley Jr, 1991).

The World Health Organization (WHO) advises that salt consumption should be no more than five grams a day and no more than two grams of sodium a day. Also, people who are middle aged, older adults and those with conditions like hypertension, diabetes and chronic kidney disease among others will need to restrict their intake of sodium to less than one point five grams daily. In contrast, it is recommended to increase the consumption of potassium to approximately 4.7 grams per day. Finally, it is suggested to restrict the intake of alcohol (Rust and Ekmekcioglu, 2017).

Among respondents whose BP was equal or greater than 140/90 mmHg, it was found that 57.1% of those respondents had a sodium intake exceeding 3000 mg (Reyhani *et al.*, 2020). Improving the understanding, attitude, and behaviors related to salt consumption is an essential aspect of successfully controlling blood pressure (Haron *et al.*, 2021).

A study found that 81.6% of the population reported to be consuming higher intake than the WHO recommendation of <5 g/day (Ghimire *et al.*, 2019).

b) DASH diet:

The Dietary Approaches to Stop Hypertension (DASH) diet was established during the 1990s. It was in the year 1992 that the National Institute of Health (NIH) commenced the funding of various research projects to examine the usefulness of specific dietary interventions in the treatment of hypertension. Those included in the study were instructed to solely adhere to the dietary interventions, excluding any other lifestyle modifications, so as to avoid any confounding factors. It was discovered that solely the dietary intervention had the capacity to reduce systolic blood pressure by approximately 6 to 11 mm Hg. This effect was observed in individuals with both hypertension and those without. As a result of these findings, there have been instances where DASH has been recommended as the primary pharmacologic therapy, accompanied by lifestyle modification (Challa *et al.*, 2022).

Fruits, vegetables, and low-fat dairy foods are highly recommended by the Dietary Approaches to Stop Hypertension (DASH). It suggests whole grains, fruits, fish, and nuts should be a part of one's diet. Additionally, it is focused on reducing intake on red meat, sugars, sugary beverages, total fats (particularly saturated), and cholesterol sources (Nih, 2006). The DASH diet pattern ensures that you consume more protective micronutrients such as K, Ca, Mg, fiber, and plant proteins while at the same time limiting refined carbs and saturated fat intake. Plus, feeding trials have found out that reduction in salt enhances the efficacy of DASH diet in combating high blood pressure. The American Heart Association (AHA) has a high recommend for this diet for managing high blood pressure without drugs (Appel *et al.*, 2006). The DASH diet has a wide range of positive impacts, not just on blood pressure. Several studies have shown significant improvements in insulin sensitivity (Soltani *et al.*, 2016), inflammation (Azadbakht *et al.*, 2011), oxidative stress (Asemi *et al.*, 2013), and recognized risk factors for cardiovascular disease, such as fasting glucose levels (Azadbakht *et al.*, 2005), and total cholesterol concentrations (Chen *et al.*, 2010).

A typical guideline for dietary intake of an individual adhering to the DASH diet is as follows:

1) Vegetables: about five servings per day
2) Fruits: about five servings per day
3) Carbohydrates: about seven servings per day
4) Low-fat dairy products: about two servings per day
5) Lean meat products: about two or fewer servings per day
6) Nuts and seeds: 2 to 3 times per week (Challa *et al.*, 2022).

c) Low saturated fat diet:

It has been shown in studies frequently conducted that hypertension tends to coexist with high levels of cholesterol – hypercholesterolemia, hence the conjunction of these two conditions is referred to as dyslipidemic hypertension. If one has both high blood pressure and extreme high levels of fat; that is; if they suffer from both hypercholesterolemia and high blood pressure, their risks of getting affected by cardiovascular diseases are bigger than adding all individual odds that comprise them (Dalal *et al.*, 2012). Blood pressure maintains

a continuous and consistent correlation with the likelihood of cardiovascular events; an increase in BP directly corresponds to an elevation in the probability of CVD. The existence of each supplementary risk factor amplifies the susceptibility to hypertension (Anderson *et al.*, 1991).

The foundation of the Therapeutic Lifestyle Changes (TLC) approach was established through the examination conducted by the panel in 1999. This investigation ultimately determined that both diet and exercise possess the capacity to yield advantageous results in relation to serum levels of total cholesterol, low-density lipoprotein (LDL) cholesterol, high-density lipoprotein (HDL) cholesterol, and triglycerides. The TLC diet recommendations consist of the consumption of 25 to 35 percent of daily caloric intake from fats, as well as the limitation of saturated fats to less than 7 percent of total caloric intake and cholesterol to less than 200 mg per day. When comparing a baseline or Western diet to a dietary approach that limits saturated fat intake to 7 percent of total calories and restricts cholesterol to 200 mg per day, a notable reduction in LDL cholesterol levels of 9 to 12 percent is observed (Kelly, 2010).

2.7.2 Physical activity

Evidence suggests that a lack of participation in physical activity (PA) is connected to an increased vulnerability to lifestyle-related diseases and premature mortality (Lundqvist *et al.*, 2017). The effects of exercise on reducing blood pressure are most significant in individuals with hypertension who participate in endurance exercise. After a single exercise session (acute) or a period of exercise training (chronic), blood pressure typically decreases by approximately 5-7 mm Hg. Furthermore, the reduction in blood pressure can last for up to 22 hours after an endurance exercise session, a phenomenon known as post exercise hypotension. The individuals with the highest baseline blood pressure experience the greatest decreases in blood pressure during this period (Pescatello *et al.*, 2004).

One episode of aerobic activity and regular engagement in aerobic activity has been found to lead to a decrease in the blood pressure of hypertensive individuals. The hypotensive effect of high-intensity aerobic exercise, which can reach up to 70% of the maximum oxygen consumption, is not greater when compared to moderate-intensity aerobic exercise. However, intermittent aerobic and anaerobic exercise performed at an intensity exceeding 70% of the maximum oxygen uptake has been demonstrated to significantly

reduce the blood pressure of hypertensive individuals. Therefore, faster and more intense forms of exercise can also result in a reduction of blood pressure in the hypertensive population (Boutcher and Boutcher, 2017).

Individual with high blood pressure should partake at least 30 min of moderate dynamic exercise on 5 to 7 days per week (Challa *et al.*, 2022).

2.7.3 The termination or confinement of tobacco consumption and the ingestion of alcoholic beverages

Active smoking and exposure to secondhand smoke account for over 30% of mortality caused by coronary heart disease (CHD). Smoking induces oxidative mechanisms, which have a detrimental impact on platelet functionality, fibrinolysis, inflammation, and vasomotor functionality. All of these proatherogenic consequences lead to a twofold increase in the 10-year risk of fatal occurrences among smokers in comparison to individuals who do not engage in smoking (Gallucci *et al.*, 2020). According to Urbán *et al.* (2006), 18% of the sample started smoking at age 13 or before, 50% between ages 14 and 16, 25% between ages 17 and 18, and 7% at age 19 or later.

The impact of smoking on arterial stiffness may potentially exert a more pronounced influence on central blood pressure, which is closely associated with target organ damage, particularly in comparison to brachial blood pressure (Virdis *et al.*, 2010). The consequences of discontinuing the act of smoking have also been thoroughly examined. The act of discontinuing at a young age (40 years) boasts a remarkable 90% decrease in the additional hazards of mortality (Gallucci *et al.*, 2020). The slight elevation in pulse pressure found in chronic smokers might influence the increased cardiovascular disease risk (Luehrs *et al.*, 2021).

In a study conducted in Nepal showed that Out of total respondents, 17% were current smoker, 6.8% were consuming ≥60g/month alcohol per month (Bista *et al.*, 2021). The act of consuming alcoholic beverages has been found to heighten the likelihood of experiencing elevated blood pressure, particularly in individuals who habitually indulge in excessive drinking (Santana *et al.*, 2018). The study conducted by Handa *et al.* (1990) concluded that smoking cigarettes is as a risk factor for cardiovascular diseases, primarily by influencing the elevation of the atherogenic index. Consequently, diminishing alcohol consumption,

either by limiting the quantity of alcohol consumed or opting for beverages with lower alcohol concentrations, consistently diminishes levels of blood pressure (Abramson *et al.*, 2010).

Efforts are needed to support tobacco prevention intervention programs that consider gender, with the aim of discouraging young individuals of all genders from initiating such behaviour. Furthermore, it is important to increase the understanding among females, particularly girls and young women regarding the smoking side effects (Mandil *et al.*, 2010).

2.8 Knowledge, attitude and practice related literatures

A study conducted in Letang, Morang showed that majority of the participants had good knowledge (54%), good attitude (89%), and poor practice (69.44%) about hypertension (Sah *et al.*, 2023).

A comparative study conducted in Nepal showed that the respondents residing in the metropolitan area exhibited notably higher mean knowledge scores compared to respondents residing in the urban and rural municipalities ($p<0.001$), whereas no substantial variance was observed in mean attitude scores (Sitaula *et al.*, 2022).

A KAP study conducted in Bharatpur shows a statistically significant link between knowledge and attitude with respect to both gender ($p<0.001$ and $p<0.001$, respectively) and educational achievement ($p<0.001$ and $p=0.016$, respectively). Males exhibited higher median scores in knowledge (K=11) and attitude (A=4) compared to females, while individuals with university-level education demonstrated higher median scores in knowledge (K=12) and attitude (A=4) (Shrestha *et al.*, 2016).

A study conducted in India showed a lack of knowledge among hypertensive patients regarding normal blood pressure, symptoms and complications. However, a positive attitude as well as practice were observed among the patients except for practice of regular exercise (J *et al.*, 2019).

A majority of the participants (56.36%), demonstrated adequate understanding about hypertension. On average, 85.68% had positive attitude towards hypertension. Approximately 68.3% of the respondents reported never monitoring their blood pressure, while 94.2% could not recollect their exercise routines. In summary, the majority of

respondents displayed a high level of knowledge and positive perceptions towards hypertension, yet engaged in minimal practices (Rahman *et al.*, 2018).

In a study conducted in Lebanon, a percentage of 74.85% of patients diagnosed with hypertension indicated a "Limited" level of knowledge about hypertension, with 33.9% having poor knowledge scores and 40.9% having fair knowledge scores. Merely 25.15% of patients with hypertension demonstrated an "Adequate" level of knowledge on the subject. It was found that 32.75% of patients with hypertension reported a "Limited" attitude towards hypertension, with 2.0% having poor attitude scores and 30.7% having fair attitude scores. A majority, specifically 67.25%, of patients with hypertension displayed an "Adequate" attitude towards the condition. Moreover, a significant proportion of 78.07% of patients with hypertension exhibited a "Limited" practice level concerning hypertension, with 57.0% having poor practice scores and 21.1% having fair practice scores. Merely 21.93% of patients with hypertension demonstrated an "Adequate" practice level regarding hypertension (Machaalani *et al.*, 2022).

Similarly, a significant proportion of 52% of males who suffer from elevated blood pressure or hypertension are unaware of their elevated blood pressure. It is noteworthy that 20% of males possess awareness regarding their condition but have not undergone any form of treatment (Ministry of Health and Population, 2022).

2.9 Prevention, control and management

The management of hypertension (HTN) poses a difficult task, particularly in developing nations such as Nepal. A major issue emerges from the limited understanding and perspectives regarding the risk factors associated with HTN (Control and Prevention, 2012). Thomas *et al.* (2021) concluded that education has a vital role in improving health outcomes.

Only One out of every seven individuals globally who suffer from hypertension are able to achieve control over their blood pressure levels, that is, reaching a clinical target of less than 140/90 mm Hg (Pereira *et al.*, 2009). Numerous guidelines have been formulated specifically for the management of hypertension (Weber *et al.*, 2014). These guidelines are aimed at establishing criteria for the provision of care to individuals with elevated blood pressure, encompassing recommendations related to lifestyle modifications such as engagement in physical activities, cessation of smoking, moderation of alcohol

consumption, adoption of healthy and low-sodium diets, incorporation of algorithms for medication selection, frequency for blood pressure monitoring, as well as implementation of strategies to enhance both patient adherence to prescribed medications and compliance with recommended lifestyle changes (Wagner *et al.*, 2001).

The cross-sectional study conducted in Dhulikhel, Nepal, as part of the Dhulikhel Heart Study involving 1073 adults revealed that 43.6% of the participants were aware of their hypertension condition. The awareness of hypertension was found to be associated with advancing age ($p<0.001$), with over 76.1% of those informed about their condition receiving treatment. Significant differences in treatment status were noted in relation to gender, level of education, age, and BMI. Merely 35.3% of the participants had achieved blood pressure control (Vaidya *et al.*, 2012).

A study conducted in the US From 1999 to 2014, young adults experienced larger increases in hypertension awareness, treatment, and control than older adults. However, all of these components of hypertension control were found lower among young adults than among middle-aged or older adults (74.7% younger versus 81.9% middle versus 88.4% older for awareness; 50.0% versus 70.3% versus 83.0% for treatment; and 40.2% versus 56.7% versus 54.4% for control) (Zhang and Moran, 2017).

A study conducted by Mounica (2015) concluded that Motivation and counseling, emphasizing the significance of lifestyle adjustments and self-care, are important for individuals suffering with chronic conditions such as hypertension and diabetes.

2.10 Dietary assessment

A dietary survey is a scientific assessment of individuals' dietary patterns to identify potential nutrient deficiencies. Multiple methods are used to conduct dietary surveys. They are used in various level, ranging from regional to individual levels. For instance, national/regional dietary surveys often rely on the food balance sheet method, while institutional settings or homogeneous populations may utilize the inventory method. At the individual level, weighment method, 24-hour dietary recall, and food frequency questionnaires are used (Shrivastava *et al.*, 2014).

Dietary assessment involves the collection of data on food and drinks consumption over a certain period. The data is then coded and analyzed to determine the levels of intake of

energy, essential nutrients, and other dietary components using food composition tables. There are multiple dietary assessment tools used for this purpose (Bates *et al.*, 2017). The most commonly used methods are Food Frequency Questionnaires (FFQ) and either single or repeated 24-hour dietary recall (Gemming *et al.*, 2015). A study conducted by in Belgium concluded that efforts are essential to improve dietary intake of macronutrients while taking into account differences in age categories (Temme *et al.*, 2010).

24 – Hour dietary recall

A 24-hour dietary recall technique records the intake of food and beverages over a 24-hour period, presenting a detailed analysis of the items consumed, amount ingested, and preparation methods including cooking styles, fat usage, and particular ingredients incorporated in dishes (Robertson *et al.*, 2005). Participants are presented with a series of structured yet open-ended, non-suggestive inquiries regarding each food or beverage consumed within a 24-hour period (typically from midnight to midnight of the previous day, or covering the preceding 24 hours from the start of the recall, if appropriate). Quantities may be articulated in terms of household units, with or without the utilization of food replicas or images (Raper *et al.*, 2004). Using 24-hour dietary recall to collect data of respondents is dependent on the respondent's ability to recall accurately about consumed foods and estimate the amount consumed (Angeles-Agdeppa *et al.*, 2019). the agreement between nutrient values obtained from two different methodologies suggested that the 24-hour dietary recall serves as a viable approach for nutritional evaluation (Marjan *et al.*, 1999).

Food frequency questionnaire

The food frequency approach requires participants to indicate the typical frequency at which they consume various food items over a designated timeframe. Data related to the frequency of consumption is collected during this procedure. Almost all food frequency instruments are designed to be self-administered. Because of the comparatively lower expenses connected with data gathering and analysis, along with the reduced burden on respondents, Food Frequency Questionnaires (FFQs) have historically emerged as a prevalent method for assessing typical dietary consumption in extensive epidemiological investigations (Thompson *et al.*, 2017).

Part III

Materials and methods

3.1 Research design

A community based cross-sectional study was conducted to assess the level of knowledge, attitude and practice about hypertension among antihypertensive medication users.

3.2 Study site

The study was conducted in Urlabari municipality of Morang district of Koshi province, Nepal. The study site was selected because HTN was the most prevalent chronic disease as per 2078/2079 annual report (Health section, 2023).

3.3 Target population

The target population of the study were the patients that were diagnosed with hypertension 6 months prior to the investigation taking anti-hypertensive medications.

- Inclusion criteria: diagnosed with hypertension 6 months prior and taking antihypertensive medication.
- Exclusion criteria: pregnant women, unresponsive patients, and critically ill patients.

3.4 Study variables

The dependent as well as independent variables of the study are briefly described below:

a) Dependent variable: knowledge, attitude and practice of hypertensive patients
b) Independent variables:
    - Socio-demographic: age, sex, weight, education
    - Behavioral: smoking, alcohol consumption, exercise
    - Diet: salt, fat, green leafy vegetables and fruits, red meat

3.5 Sampling technique

Cross-sectional descriptive study followed by purposive sampling was used to select samples. According to 2078/79 annual report, ward no 04 and 07 had the highest number of hypertensive patients in Urlabari municipality so, those two wards were selected for data collection.

3.6 Sample size calculation

The sample size for the data collection for this study is calculated by using a single proportion formula, with 20.5% as prevalence rate of hypertension (Ministry of Health and Population, 2022), 95% confidence interval (CI) and 6% margin of error (d).

Calculation of sample size for infinite population:

Sample size (n) = $\frac{z^2 \times p(1-p)}{d^2}$ (Pradhananga, 2017)

Where,

Z = 1.96 (Confidence Interval at 95%)

P = 20.5% (prevalence of HTN)

d = 6 % (margin of error)

now,

n = $\frac{1.96^2 \times 0.205(1-0.205)}{0.06^2}$ = 172.22 ≈ 172.

The calculated sample size was 172.

Thus, calculated sample size was adjusted for non-response. Considering non-response rate as 10%, the adjusted sample size was calculated to be 189.

3.7 Data collection tools and techniques

A semi structured questionnaire was developed on the basis of objective to study the knowledge and practices related care of hypertension among antihypertensive medication users. Data was collected through face-to-face interview using semi-structured questionnaire and anthropometric measurement were taken using:

- Stadiometer: A well calibrated stadiometer to measure the height (1 piece).

Stadiometer was used to measure the height. Height of the respondent was measured barefoot with minimal clothing and unbraided hair to facilitate correct positioning of the body. The respondent was made to stand with heels together, arms to the side, legs straight, shoulders relaxed, and head in the Frankfort horizontal plane. Heels, buttocks, scapulae

(shoulder blades), and back of the head as possible, was made against the vertical surface of the stadiometer. The measurement was then read to the nearest 0.1 cm with the eye level (CDC, 2021a).

- Weighing balance:

Weight was measured by a reliable electronic weighing scale with the nearest 0.1kg reading. Proper calibration was done before the usage of the machine. Respondent was asked to remove shoes and heavy clothing and was made to stand still in the middle of the scale's platform without touching anything with the body weight equally distributed on both the feet (CDC, 2021a).

- Blood pressure was measured by a sphygmomanometer. (1 piece)

The respondent was asked to loosen any tight clothing or remove long-sleeved garments so that it is possible to access the upper arm. I placed the cuff around the upper arm and secured. I connected the cuff tubing to the sphygmomanometer tubing. I asked the respondents to rest their arm on a surface that is level with their arm. I placed the stethoscope over the brachial artery (in the bend of the elbow) and listened to the pulse. After pumping up the cuff slowly and listened for when the pulse disappears. When the pulse disappeared, I started to deflate the cuff very slowly whilst watching the mercury level in the sphygmomanometer and recorded the level where pulse appeared and disappeared. The first time where the pulse appeared was the systolic and when the pulse disappeared was the diastolic (Pickering and Stevens, 2013).

Interview was conducted with the patients to fill up the questionnaire and when they were not able to fill the form by themselves, then I helped fill out the questionnaire providing my assistance. Of those few respondents who filled out the form by themselves were guided with my thorough supervision.

The questionnaire was divided into following parts:

A. Questions related to general information
B. Questions related to socio-demographic information
C. Questions related to knowledge regarding HTN
D. Questions related to attitude towards HTN

E. Questions related to practice regarding HTN
F. 24-hour dietary recall
G. Food frequency table
H. Questions related to Physical activity

3.7.1 Grading of the score

The questionnaire had been divided into three distinct modules in order to measure the levels of various aspects of Knowledge, Attitude, and Practice (KAP). Within each module, the respondents were asked relevant questions to assess their level of knowledge of hypertension in the Knowledge module. To evaluate knowledge, attitude, and practices, a total of 15, 5, and 10 questions were asked, respectively.

Knowledge and attitude answers were assigned a score of one for correct responses and zero for incorrect responses. On the other hand, the practice response was rated as two for consistent adherence to the guidelines, one for occasional adherence, and zero for non-adherence (never) for all questions except questions 6, 9, and 10, where non-adherence was scored as two, occasional adherence as one, and consistent adherence as zero. The total score for each variable was calculated by summing up the scores from each question (Shrestha *et al.*, 2016).

Respondents who achieve knowledge scores above 60% were classified as having good knowledge, whereas those with scores below 60% were deemed to possess poor knowledge (Yusof *et al.,* 2018). Similarly, Respondents who attain attitude scores of 80% or higher were regarded as having a good attitude, while those falling within the range of 60-79% were considered to have a moderate attitude, and individuals with scores below 59% were labeled as having an unacceptable attitude (Sara *et al.,* 2020). In the practice section, participants who score above 80% were classified as taking acceptable preventive measures, whereas those with scores below 80% were categorized as taking unacceptable preventive measures (Arbiol *et al.*, 2016).

3.8 Pre- testing

The instruments were tested before the actual survey by measuring the people. As no fault was found on the equipment they were confirmed and used for the actual survey. The questionnaire was pretested among the people to see if there were any ambiguous questions

or not and also to see if all the questions and options present on the question was easily understandable by the community members or not. By taking the suggestions from the community people the questions were modified to achieve most practical format and the prepared questionnaire was translated to local language for collecting data.

3.9 Validity and reliability

Questionnaire in this research was prepared from review of published articles and research report (Shrestha *et al.*, 2016). The validity of the instruments and techniques were ascertained. The consistency or repeatability of the measure is reliability, utmost priority was given to reduce the bias and mistakes of both researcher and participant so that reliability can be attained to its maximum.

3.10 Food frequency and dietary recall

A well-designed food frequency table along with 24-hour dietary recall sheet was used to study the food consumption pattern and nutrient intake. The food frequency questionnaire was used to obtain information on the type of foods usually consumed by the respondents and the frequency of consumption of those foods. The respondents were asked to recall in detail all the food and drink consumed in the previous 24 hours. Adequate time and assistance were given to respondent to recall properly and estimate the portion sizes. Necessary comparisons were made between the household utensils and measuring cups used in data collection for assistance of respondents to recall with accuracy.

From the data collected from dietary recall, gram equivalents of those foods consumed were first calculated which were converted into nutrient intake namely, carbohydrate, protein, fat, iron, and total calories by using food composition table given by DFTQC (2012). For adequacy, nutrients intake per day for <59 year old and > 59 year old were taken from ICMR (2020) and wellman and kamp . However energy intake for >59 year old was taken as per DASH diet recommendation (NHLBI, 2021).

3.11 Data analysis

The collected data were first checked for completeness and consistency; edited, organized, coded, and entered into the statistical package for social science (SPSS v25). The data was analyzed both by descriptive and inferential statistics. Frequency and percentage

distribution were used to describe demographic characteristics, socio-economic characteristics, dietary habit and behaviors, consumption of food groups, knowledge, attitude and practice regarding HTN. Mean, SD, IQR and median were used to describe the dietary intakes. Chi square (Pearson's chi square and likelihood ratio) was used to find out the association of KAP with independent variables. Pearson's correlation as well as spearman row were applied to assess the correlation among KAP.

3.12 Ethical consideration

Permission to conduct the survey was obtained from the office of Urlabari municipality. Before the study, oral and written consent was obtained from the respondents of the survey. Privacy and confidentiality of the survey were assured at all levels.

3.13 Conceptual framework

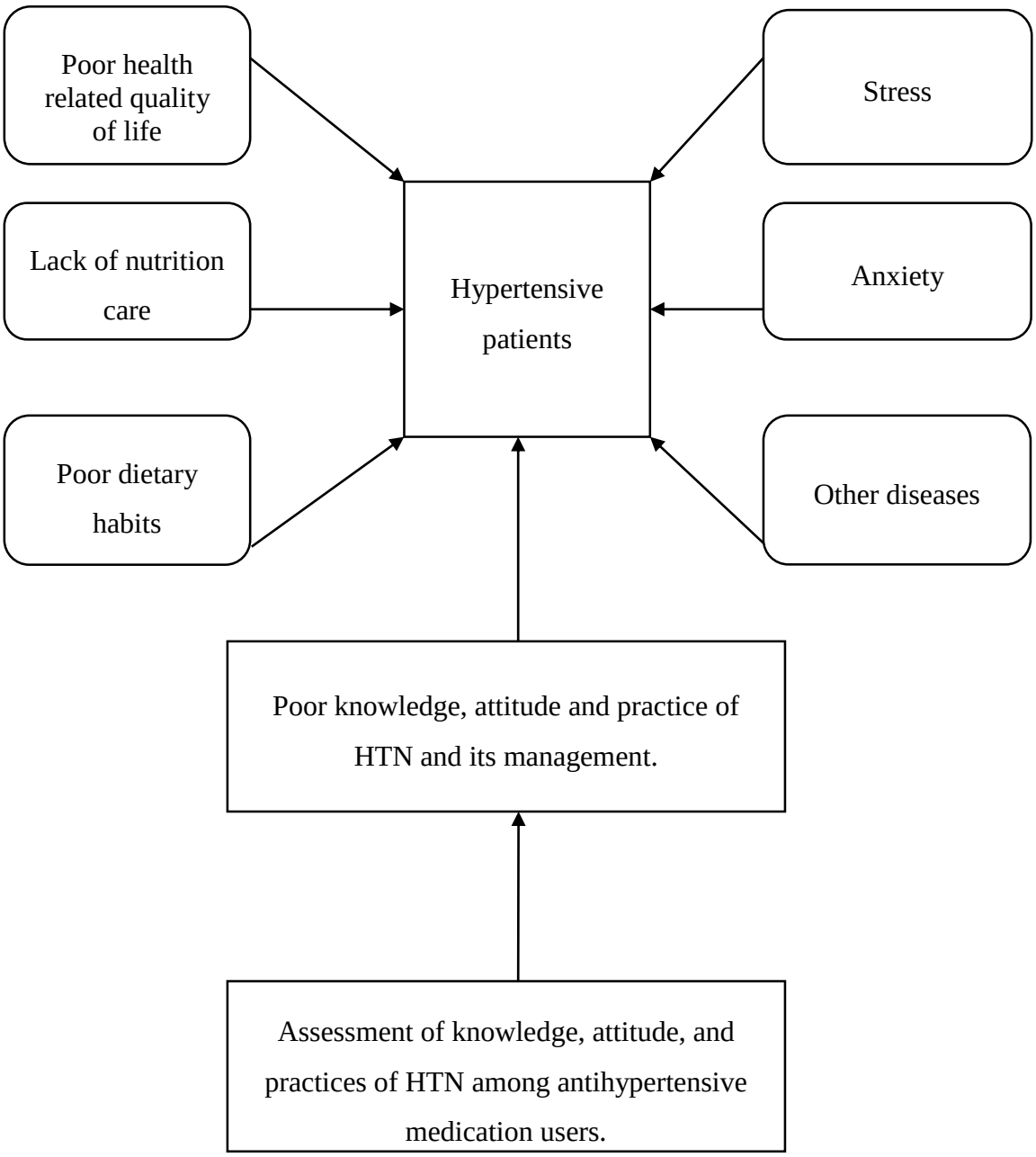

Fig. 3.1 Conceptual framework

Source: Pradhananga (2017)

Part IV

Results and discussion

The cross-sectional study was conducted to assess the level of knowledge, attitude, and practices and their influence in the level of blood pressure. Also, the study was carried out to assess the association of KAP with age, literacy, genetic history of hypertension, physical activity, and their dietary practices. A well-structured questionnaire related to socio-demographic status, lifestyle modifications and physical activity was used to collect data. The results and findings of the study are expressed into several following headings.

4.1 Socio-demographic and health status

4.1.1 Classification of age of respondents

The survey revealed that the age group 40-50 years comprised highest proportion in the total hypertensive population, whereas age group above 80 years comprised the lowest proportion. The mean age was 52.59 ± 15.156. **Table 4.1** shows age-wise classification of the respondents.

Table 4.1 Distribution of age of the respondents (n = 189)

Age group	Frequency	Percent (%)
18 – 30	11	5.8
30 - 40	38	20.1
40 - 50	46	24.3
50 - 60	37	19.6
60 - 70	29	15.3
70 - 80	22	11.6
> 80	6	3.2
Total	189	100.0

Increase in age is statistically significantly associated (p value < 0.05) with prevalence of hypertension. The finding shows that age group 40 – 50 had the highest proportion in the study is similar to the finding of the study which conducted in India on silent killer disease hypertension and diabetes (Mounica, 2015). Older adults show a heightened sensitivity to salt consumption compared to their younger counterparts, which contributes to elevated

systolic blood pressure and increased pulse pressure (Weinberger *et al.*, 1986). Also, it might be due to the presence of other concomitant diseases (Soliev *et al.*, 2019).

4.1.2 Gender distribution

Of total 189 respondents, 50.79% and 49.20% were male and female respectively. The finding is consistent with the study done in Lebanon, where it was found that there were more male respondents (51.2%) than female (Machaalani *et al.*, 2022). **Fig. 4.1** shows the percentage distribution of genders of the respondents.

More number of male respondents were found to indulge in smoking and there is significant association between smoking, DBP and gender (p value <0.05). The finding is consistent with a research investigation carried out at King Saud University (KSU) and the study demonstrated a greater prevalence among male students (32.7%) in comparison to females (5.9%) (Mandil *et al.*, 2010). A study on relationship of cigarette smoking to blood pressure and serum lipids also found that there was a significant association with DBP and smoking (Handa *et al.*, 1990).

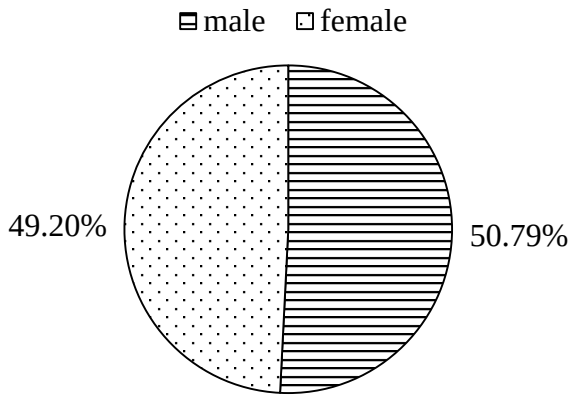

Fig. 4.1 Gender distribution of the respondents

4.1.3 Religion distribution

Fig. 4.2 shows the distribution of religion of the respondents. Out of 189 patients, 166 (87.8%) of them followed Hinduism religion whereas 23 (12.2%) patients followed religions other than Hinduism. The reason why Hinduism had higher proportion of hypertensive respondents is that the study was conducted where it was found there were

higher proportion of Hindu people inhabited. Also, The link between religion and hypertension has been attributed to a variety of factors including encouragement toward healthy behaviors such as avoiding tobacco, exercising regularly, and adhering to a particular diet (Koenig, 2012).

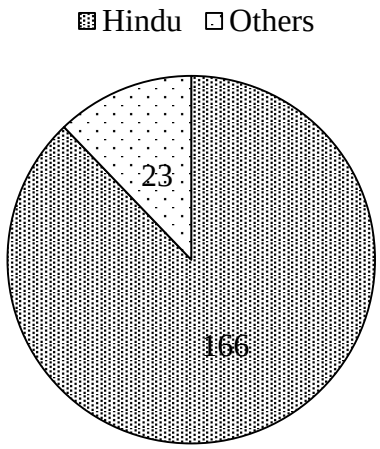

Fig. 4.2 Religion distribution of patients

4.1.4 Distribution by ethnicity, family type and food preference

The majority of the respondents were from Brahmin ethnicity with 36.5%, followed by Chhetri (24.9%), Janajati (20.6), Dalit (7.4) and Madhesi (6.3). 4.2% belonged to another ethnicity. The majority of participants belonged to nuclear families (54.0%), with joint families (46.0%) following closely behind. A considerable number of respondents indicated their consumption of non-vegetarian items i.e. 86.8%, while a minority adhered to a vegetarian lifestyle (12.2%), with only a small fraction practicing veganism (1.1%). The frequency distribution of ethnicity, family type and food preference of the respondents is shown in **Table 4.2**.

The study showed significant association between ethnicity and alcohol consumption. It might suggest that respondents of some ethnicities consume alcohol more frequently. The study showed no significant association between BP and food preference. It might be due to the fact that not an individual who said yes to consuming non-vegetarian products consumed in huge quantity or on a daily basis.

Table 4.2 Distribution of ethnicity, family type and food preference of the respondents (n = 189)

Variables	Frequency	Percent (%)
Ethnicity		
Brahmin	69	36.5
Chhetri	47	24.9
Janajati	39	20.6
Dalit	14	7.4
madhesi	12	6.3
others	8	4.2
Family type		
Nuclear	102	54.0
Joint	87	46.0
Food preference		
Veg	23	12.2
Non-veg	164	86.8
Vegan	2	1.1

4.1.5 Socio-economic characteristics

Table 4.3 and **Table 4.4** shows the frequency distribution of the literacy level and occupation of the respondents. Out of the 189 respondents, 31.7% were reported to study up to secondary level, followed by informal education. Similarly, 31.7% have studied higher secondary and above and 7.4% were illiterate. The study shows that there was significant association between education level and smoking (p value <0.005). The finding was in line with a 2006 study that demonstrated a significant association between education level and smoking. Smokers were more common among those with lower education levels (Urbán *et al.*, 2006).

Majority of the respondents i.e. 68.6% were employed and 30.7% were unemployed with 1.1% student. The finding of unemployed proportion was similar with the KAP study conducted in Nepal (Shrestha *et al.*, 2016). There was no statistically significant association (p value >0.05) between occupation and blood pressure (both SBP and DBP). It might be due the fact that respondents engaged in high paying jobs may be sedentary or may not care

as much whereas those earning less might be taking care of their blood pressure better. The finding was in contrast with the finding provided by (Opit *et al.*, 1984).

Table 4.3 Distribution of literacy level of the respondents (n = 189)

Education level	Frequency	Percent (%)
Illiterate	14	7.4
Informal	51	27.0
Primary	31	16.4
Secondary	60	31.7
Higher secondary and above	33	17.5

Table 4.4 Distribution of occupation of the respondents (n = 189)

Occupation	Frequency	Percent (%)
Government	18	9.5
Non-Government	18	9.5
Self-employed	87	46.0
Student	2	1.1
Unemployed	58	30.7
Others	6	3.2

4.1.6 Marital and Hypertension status

From the survey it was found that the majority of the respondents were married i.e. 87.8% and only 4.8%, were found unmarried. 3.2% and 8% were respectively divorced and widowed.

Majority 102 (54%) participants were reported to have a family history of hypertension and 87 (46.0%) of participants were reported to have no any history of hypertension in their families. The finding is consistent with the study conducted in Sri Lanka on KAP in adult hypertensive patients, where above 50% had family history of hypertension (Ralapanawa *et al.*, 2020). There was no significant association between BP and marital status. The finding of the study was found to be in consistent with the finding of the longitudinal study (Schwandt *et al.*, 2010). The family history was not found to be significantly associated with BP. The finding is consistent with the finding of the cohort study (Tozawa *et al.*, 2001).

Other factors such as physical activity, correct usage of medication and dosage might factor into hypertension than the marital status. It might be the reason for the association to be insignificant. The frequency distribution of marital and hypertension status of the respondents is illustrated in **Table 4.5**.

Table 4.5 Distribution of marital and hypertension status of the respondents (n = 189)

	Frequency	**Percent (%)**
Marital status		
Unmarried	9	4.8
Married	166	87.8
Divorced	6	3.2
Widow/widower	8	4.2
Hypertension family history		
Yes	102	54.0
No	87	46.0

4.1.7 Duration of Hypertension

Table 4.6 shows the frequency distribution of duration of hypertension of the respondents. A major proportion of respondents i.e. 54% reported the onset of hypertension before 2 years, followed by 1-2 years, which is 34.9% and then 6 months to 1 year i.e. 11.1%.

Table 4.6 Duration of hypertension among the respondents (n = 189)

HTN duration	**Frequency**	**Percent (%)**
6 months-1 year	21	11.1
1-2 years	66	34.9
>2 years	102	54.0
Total	189	100.0

4.1.8 Disease status

The presence or absence of other diseases among the respondents is presented in **Fig. 4.3**. Among 189 respondents, 18%, 11.1%, 32.3% and 30.7% reported to having suffered from heart problem, kidney problem, DM and anxiety respectively. It was found that there was

significant association between DBP and disease status (p value <0.05) whereas only heart problem was associated with SBP.

Our study shows significant association between anxiety and diastolic BP which is similar to findings by Lim *et al.* (2021). Ministry of Health and Population (2022) reported that 22% of women and 11% of men of age range 15–49 have symptoms of anxiety. Heightened blood pressure enhances the chance of developing cardiovascular diseases as well as kidney diseases (National Kidney foundation). Diabetic patients often have elevated blood pressure (Ohishi, 2018).

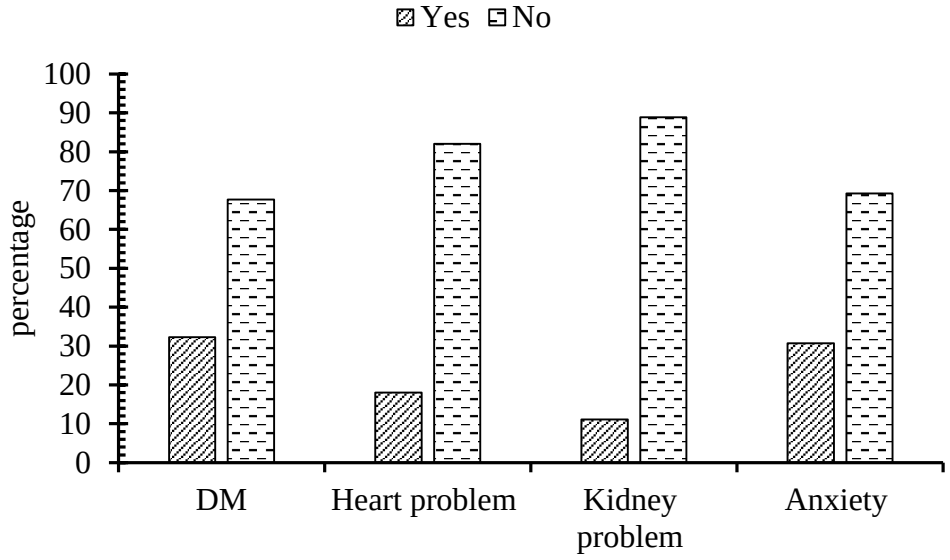

Fig. 4.3 Presence or absence of diseases

4.1.9 Sleeping time

Table 4.7 shows the sleeping time of the respondents. Majority had a sleep duration of 6-8 hours in a day, a period which was most represented, with those who slept for more than eight hours in second place and lastly those that slept for less than five hours. The study found no significant association between blood pressure and duration of sleep (p value >0.05). The finding was in contrast with the finding of Lo *et al.* (2018), where poor sleeping participants had higher blood pressure.

Table 4.7 Sleeping time of the respondents (n = 189)

	Frequency	Percent (%)
5 hours or less	32	16.9
6-8 hours	114	60.3
>8 hours	43	22.8
Total	189	100.0

4.1.10 Current systolic and diastolic blood pressure

Of the 189 participants, 138.04 ± 13.001 mmHg and 86.77 ± 6.736 mmHg were the average systolic blood pressure (BP) and diastolic BP, respectively. Hypertension was found in 79.4% consisting of 150 people, while 19.6% (37) had normal BP and 1.1% (2) were in crisis stage. A major proportion 57.7% (109) were found to be hypertensive, followed by elevated BP i.e. 42.3% (80). The frequency distribution of blood pressure of the respondents is shown in **Table 4.8**.

The study shows that there is significant association between smoking and DBP. A thirty-year longitudinal study found that there is significant association (p value <0.05) between smoking and DBP in white smokers (Luehrs *et al.*, 2021).

Dietary factors like rice consumption (p value = 0.02), roots & tubers consumption (p value = 0.002), carbonated drinks consumption (p value = 0.029), calorie adequacy (p value = 0.002) and protein adequacy (p value = 0.046) were found to be statistically significant with DBP. Similarly, consumption of wheat (p value = 0.024), and roots and tubers consumption (p value = 0.023) were found to be statistically significant with SBP.

A randomized control trial found that the group consuming whole grains had systolic BP significantly reduced by 6 mmHg (Tighe *et al.*, 2010). A research has demonstrated that certain amino acids present in proteins could potentially exhibit antihypertensive properties leading to reduced or controlled BP (Vasdev and Stuckless, 2010). A study found that BP increased more sharply as sodium levels rose at lower levels of energy intake compared to higher levels of energy intake, indicating a significant association (p value <0.001) (Murtaugh *et al.*, 2018).

The systolic blood pressure (SBP) showed a rise of 5.4 mmHg in the population of individuals who drank diet soft drinks. Furthermore, the diastolic blood pressure (DBP) demonstrated a higher value in the group of diet soft drink consumers compared to non-consumers, by a margin of 3.3 mmHg (da SN Souza *et al.*, 2016).

Table 4.8 Distribution of blood pressure of the respondents (n = 189)

	Frequency	**Percent (%)**
Systolic Blood pressure		
Normal	37	19.6
Elevated	0	0.0
Hypertensive	150	79.4
Crisis	2	1.1
Diastolic Blood pressure		
Elevated	80	42.3
Hypertensive	109	57.7

4.2 Anthropometric measurements

The frequency distribution of BMI of the respondents is illustrated in **Table 4.9**. The mean height and weight of the respondents were 163.536 ± 8.926 and 66.573 ± 11.155 respectively. The mean BMI was found to be 25.875 ± 3.748. **Table 4.9** shows that majority of the respondents i.e. 45% fell into normal BMI category and 2.6% fell into underweight category.

There was no significant association between BMI and BP of the study respondents. It meant that there is no significant difference in BP among respondents with different category of BMI. The finding is consistent with the finding of the study conducted by Haron *et al.* (2021). Several studies have indicated that BMI is highly correlated with overall obesity but relatively poorly with visceral obesity (central obesity, android-type obesity or abdominal adiposity) (Willett, 2012), which tends to be more closely associated with blood pressure and/or hypertension (Siani *et al.*, 2002).

Table 4.9 Categorization of BMI of the respondents (n = 189)

BMI	Frequency	Percent (%)
Underweight	5	2.6
Normal	85	45.0
Overweight	83	43.9
Obese	16	8.5
Total	189	100.0

4.3 Dietary practices

A questionnaire was employed to assess dietary intake, including specific food items (salad, red meat) and overall dietary habits (frequency of eating at home vs. outside). The dietary practices of the respondents are tabulated in **Table 4.10** and **Table 4.11**.

Table 4.10 Eating pattern of the respondents (n = 189)

	Frequency	Percent (%)
Red meat consumption		
> once a week	20	10.6
Once a week	61	32.3
Rarely	77	40.7
Never	31	16.4
Total	189	100.0
Dining outside		
> once a week	35	18.5
Once a week	43	22.8
Rarely	84	44.4
Never	27	14.3
Total	189	100.0

Consumption of salad daily in a mean was found to be significantly associated with both SBP (p value <0.001) as well as DBP (p value = 0.014). It might mean that consuming salad improve the blood pressure control. DASH diet is a diet that promotes consumption of fruits and vegetables and it was discovered that solely the dietary intervention had the capacity to reduce systolic blood pressure by approximately 6 to 11 mmHg (Challa *et al.*, 2022). Salt

intake was found to be not significantly associated with BP. It may be due to the fact that consumption of sodium intake from packaged/processed food, and pickle were not estimated.

Table 4.11 Daily dietary practices of the respondents (n = 189)

	Frequency	**Percent (%)**
Salad daily		
Yes	113	59.8
No	76	40.2
Meals in a day		
2 times	47	24.9
3 times	103	54.5
>3 times	39	20.6
Salt intake		
5 g (1 tsp)	138	73.0
>5 g	51	27.0
Separate meal preparation		
Yes	45	23.8
No	144	76.2
Oil type		
Mustard	83	43.9
Sunflower	79	41.8
soybean	9	4.8
sunflower and mustard	17	9.0
Soybean and mustard	1	0.5

40.7% reported to rarely consume red meat, followed by once a week (32.3%), and then never (16.4%). Only 10.6% consumed red meat once a week. 44.4% of the respondents rarely dined outside followed by once a week (22.8%).

4.4 Dietary intake

4.4.1 Dietary intake preceding one day

The mean (±SD) calorie intake was 1614.66 (463.88) kcal, mean (±SD) protein intake was 54.70 (23.30) g, mean (±SD) CHO intake was 233.07 (70.13) g and mean (±SD) fat intake

was 50.60 (20.65) g. This is similar to the findings where mean calorie intake was 1677.5 kcal (Angeles-Agdeppa *et al.*, 2019), mean protein intake was 55.1 g (Angeles-Agdeppa *et al.*, 2019), mean CHO intake was 217.0 g (Marcenes *et al.*, 2003) and mean fat intake was 36.3 (17.2) g (Marjan *et al.*, 1999).

Table 4.12 Mean and median distribution of nutrients

Nutrients	Median (IQR) intake	Mean (±SD) intake
Energy	1572 (479.5) kcal	1614 (463.88) kcal
Protein	50.7 (20.4) g	54.70 (23.30) g
Fat	48 (19.5) g	50.60 (20.65) g
Carbohydrate	227 (88.55) g	233.07 (70.13) g

It was found that majority of participants 68.25% (129) consumed inadequate calories and only 31.74% (60) respondents consumed adequate calories in their diet. The finding is opposite to the finding in the study conducted by Temme *et al.* (2010) where only 20% of the respondents were found to be consuming inadequate energy.

4.23% (8) of the participants were identified as consumers of low carbohydrate, while 80.95% (153) were found to consume adequate carbohydrate, and 14.81% (28) were found to consume high carbohydrate. The finding is similar to the study conducted in Ethiopia where only 2.8% of respondents were found to consume low carbohydrate than RDA (Amare *et al.*, 2012). In a similar vein, in terms of fat intake, a majority of the participants, specifically 150 (79.37%), were noted to have adequate fat consumption, followed by 11.11% (21) who were found to have high fat consumption and 9.52% (18) were found to have low fat consumption. The respondents who had enough protein was 88, which represents 46.6%. Whereas only 101 (53.4%) individuals did not get enough protein. The finding is opposite to the finding of the study done in Ethiopia where Protein intake was inadequate only in 11.2% of the respondents (Amare *et al.*, 2012).

Major proportion of participants, especially 73% (138) were recorded consuming less than 2000 mg of sodium per day opposed to 27% (51) with more than 2000 mg of sodium per day. A study conducted in Iran showed that more than half of the respondents consumed salt above recommended level (Reyhani *et al.*, 2020). The nutrient adequacy among the respondents is shown in **Table 4.13**.

Table 4.13 Nutrient distribution among the respondents (n = 189)

	Frequency	Percent (%)
Calories		
Adequate	60	31.74
Inadequate	129	68.25
Protein		
Inadequate	101	53.4
Adequate	88	46.6
Carbohydrate		
Low	8	4.23
Adequate	153	80.95
High	28	14.81
Total fat		
Low	18	9.52
Adequate	150	79.37
High	21	11.11
Sodium intake		
< 2000 mg	138	73.0
> 2000 mg	51	27.0

Dietary factors like calorie adequacy (p value = 0.002) and protein adequacy (p value = 0.046) were found to be statistically significant with DBP. A research has demonstrated that certain amino acids present in proteins could potentially exhibit antihypertensive properties (Vasdev and Stuckless, 2010).

4.4.2 Food frequency questionnaire

Table 4.14 shows that as per FFQ, it was established that the majority of respondents (94.2%) incorporated rice into their daily dietary intake. This was followed by consumption occurring 3-4 times per week, representing 3.2% of the participants, and subsequently by 2.6% of the participants who consumed rice once weekly or less. A study found similar findings where rice was the most favored followed by wheat (Omidvar and Begum, 2014).

A significant portion (63.0%) of the respondents were found to consume wheat products daily. In contrast, only 9.0% and 2.1% reported daily consumption of maize or barley, and

millet or buckwheat respectively. Further, there were 25.9%, 6.3%, 3.7%, and 1.1% of participants who reported consuming wheat products 3-4 times a week, once a week or less, monthly, and never, respectively. A small proportion of 2.1% and 5.3% reported never consuming maize or barley, and millet or buckwheat, respectively. Dietary factors like rice consumption (p value = 0.02) and consumption of wheat (p value = 0.024) were found to be statistically significant with DBP and SBP respectively. It has been recommended to consume more whole grains rather than refined carbohydrates to manage blood pressure (Appel *et al.*, 2006).

Table 4.14 Distribution of cereals consumption among the respondents (n = 189)

Cereals	**Frequency**	**Percent (%)**
Rice		
Daily	178	94.2
3-4 times a week	6	3.2
Once a week or less	5	2.6
Wheat		
Daily	119	63.0
3-4 times a week	49	25.9
Once a week or less	12	6.3
Monthly	7	3.7
Never	2	1.1
Maize or barley		
Daily	17	9.0
3-4 times a week	54	28.6
Once a week or less	55	29.1
Monthly	59	31.2
Never	4	2.1
Millet or Bucket wheat		
Daily	4	2.1
3-4 times a week	18	9.5
Once a week or less	40	21.2
Monthly	117	61.9
Never	10	5.3

Table 4.15 shows that almost every individual of the study reported to daily consume whole dal, followed by 3-4 times a week and then, once a week or less and monthly. Most of the respondents reported to consume grams, beans and peas 3-4 times a week, closely followed by daily intake. 23.8% and 4.2% reported to consume once a week or less and monthly respectively. Only 1.1% reported that they never consume such. A study conducted by Omidvar and Begum (2014) showed that only 39.8% of respondents mentioned consuming pulses and legumes every day. (Nih, 2006) suggested to consume whole grains as a part of one's diet.

Table 4.15 Distribution of pulses consumption among the respondents (n = 189)

	Frequency	**Percent (%)**
Whole dal		
Daily	178	94.2
3-4 times a week	9	4.8
Once a week or less	1	0.5
Monthly	1	0.5
Grams beans or peas		
Daily	65	34.4
3-4 times a week	69	36.5
Once a week or less	45	23.8
Monthly	8	4.2
Never	2	1.1

Table 4.16 shows that above three quarters of respondents reported to consume green leafy vegetables (GLV) on a daily basis. This was followed by consumption occurring 3-4 times per week, representing 19.0% of the respondents, and subsequently by 3.2% of the respondents who consumed GLV once weekly or less. A mere proportion i.e. 0.5% reported to never consume GLV.

Over 80% (162) of respondents reported to daily consume other vegetables, followed by 14.3% (27) respondents that consumed 3-4 times a week. 62.4% (118) of the respondents reported to consume roots and tubers on a daily basis. This was followed by 3-4 times a week that stood for 16.9% (32), and then by once a week or less i.e. 12.7% (24).4.8% (9) of

the respondent consumed on monthly basis, closely followed by never that stood for 3.2% (6).

The study shows that 39.7% (75) of the respondents reported to consume fruits 3-4 times a week, followed by consumption on a daily basis i.e. 29.6% (56). 25.4% (48) and 5.3% (10) of the respondents of the study reported to consume fruits once a week or less and monthly respectively. None of the respondents reported to never take fruits. A study conducted in Nepal showed that respondents consumed insufficient amount of fruits and vegetables (Bista *et al.,* 2021)

Table 4.16 Distribution of fruits and vegetables consumption among the respondents (n = 189)

Fruits and vegetables	Frequency	Percent (%)
GLV		
Daily	146	77.2
3-4 times a week	36	19.0
Once a week or less	6	3.2
Never	1	0.5
Other vegetables		
Daily	162	85.7
3-4 times a week	27	14.3
Roots and tubers		
Daily	118	62.4
3-4 times a week	32	16.9
Once a week or less	24	12.7
Monthly	9	4.8
Never	6	3.2
Fruits		
Daily	56	29.6
3-4 times a week	75	39.7
Once a week or less	48	25.4
Monthly	10	5.3

Dietary factors like roots & tubers consumption, were found to be statistically significant with DBP (p value = 0.002) and SBP (p value = 0.023) respectively. DASH diet suggests to consume more fiber, potassium and less refined carbohydrates (Appel *et al.*, 2006) and it had been recommended to improve blood pressure (Soltani *et al.*, 2016).

By contrast, consumption of GLVs was found to be insignificantly associated with BP. It might be due to portion sizes i.e. even though the consumption was daily, the amount needed to consume was less than the recommendation to control BP. It is recommended to consume five servings per day (Challa *et al.*, 2022). The finding of the study is in contrast with the study conducted by Johnson *et al.* (2019) where consumption of GLV have been demonstrated to reduce disease risk.

Table 4.17 shows that curd is the most preferred dairy product to consume on a daily basis, closely followed by milk. A study conducted by Radhika *et al.* (2011) showed the similar finding that curd product was the most preferred dairy product. 112 (59.3%) and 129 (68.3%) reported to consume milk and curd on daily basis. This was closely followed by intake of 3-4 times a week i.e. 23.3% (44) for milk and 16.4% (31) for curd. 7.4% (14), 2.1% (4) and 8.5% (16), 2.1% (4) reported to consume milk on curd once a week or less and on monthly basis respectively.

The majority of respondents indicated consuming ghee and paneer or cheese on a monthly basis, followed by once a week or less, and then 3-4 times a week. Only a mere proportion i.e.3.7% reported to consume ghee on daily basis. A small proportion of 27.5% and 15.9% reported never consuming ghee, and paneer or cheese, respectively.

Challa *et al.* (2022) in their study recommended to consume low fat dairy products. The respondents of this study were found to doing similar i.e. consuming dairy products containing high less frequently, to the suggestions made. If an individual has HTN as well as hypercholesterolemia, their risks of getting affected by cardiovascular diseases increases (Dalal *et al.*, 2012).

Table 4.17 Distribution of dairy products consumption among the respondents (n = 189)

Dairy products	Frequency	Percent (%)
Milk		
Daily	112	59.3
3-4 times a week	44	23.3
Once a week or less	14	7.4
Monthly	4	2.1
Never	15	7.9
Curd		
Daily	129	68.3
3-4 times a week	31	16.4
Once a week or less	16	8.5
Monthly	4	2.1
Never	9	4.8
Ghee		
Daily	7	3.7
3-4 times a week	15	7.9
Once a week or less	37	19.6
Monthly	78	41.3
Never	52	27.5
Paneer or cheese		
3-4 times a week	7	3.7
Once a week or less	42	22.2
Monthly	110	58.2
Never	30	15.9

Table 4.18 illustrates that the consumption of eggs is the most preferred compared to other animal products on a daily basis. Nevertheless, it is also the least favored for consumption overall, as indicated by 25.9% of respondents who reported never consuming eggs, representing the highest proportion. 35.4%, 15.9% and 9.0% reported to consume eggs 3-4 times a week, once a week or less and monthly respectively. A study conducted by (Omidvar and Begum, 2014) showed that 13.7% of the respondents consumed at least one animal product, such as meat or an egg every day.

The study shows that 37.0% of the respondents reported to consume chicken 3-4 times a week, closely followed by consumption once a week or less i.e. 36.5%. 1.6% and 2.1% of the respondents of the study reported to consume chicken on daily and monthly basis respectively. 22.8% of the respondents reported to never consume chicken. Both red meat and fish were mostly consumed on monthly basis, closely followed by consumption in once a week or less. 2.6% and 10.6% of those in study reported to consume fish and red meat 3-4 times a week respectively. 22.8% and 16.4% of the respondents reported to never consume fish and read meat respectively.

Table 4.18 Distribution of consumption of non-veg products (n = 189)

	Frequency	**Percent (%)**
Chicken		
Daily	3	1.6
3-4 times a week	70	37.0
Once a week or less	69	36.5
Monthly	4	2.1
Never	43	22.8
Fish		
3-4 times a week	5	2.6
Once a week or less	65	34.4
Monthly	76	40.2
Never	43	22.8
Red meat		
3 - 4 times a week	20	10.6
Once a week or less	61	32.3
Monthly	77	40.7
Never	31	16.4
Egg		
Daily	26	13.8
3-4 times a week	67	35.4
Once a week or less	30	15.9
Monthly	17	9.0
Never	49	25.9

Nih (2006) suggested in their study to reduce the intake of red meat and foods that are particularly rich in saturated fat to better control the blood pressure. The suggestion was found to be followed by the respondents of this study even though there was no statistically significant association between red meat and BP. It might be due to some of the factors like age group, genetics, physical activity and not adhering to the dosage and timing of medications advised by their physician.

Table 4.19 Distribution of processed products consumption among the respondents (n = 189)

	Frequency	**Percent (%)**
Carbonated drinks		
Daily	4	2.1
3-4 times a week	11	5.8
Once a week or less	48	25.4
Monthly	89	47.1
Never	37	19.6
Fast foods		
Daily	11	5.8
3-4 times a week	50	26.5
Once a week or less	50	26.5
Monthly	56	29.6
Never	22	11.6
Packaged foods		
Daily	64	33.9
3-4 times a week	82	43.4
Once a week or less	19	10.1
Monthly	14	7.4
Never	10	5.3

2.1%, 5.8% and 33.9% of the respondents reported to consume carbonated drinks, fast foods and packaged foods respectively on daily basis. While Intake in monthly basis showed the highest proportion consuming both carbonated drinks and fast foods, packaged food consumption is highest on daily basis. This was followed by once a week or less for carbonated drinks and 3-4 times a week for packaged foods. Whereas, fast food

consumption is same for both 3-4 times a week and once a week or less intake, representing 26.5%. 19.6%, 11.6% and 5.3% of the respondents reported to never consume carbonated drinks, fast foods and packaged foods respectively.

A study conducted by Kim *et al.* (2011) showed that 22 of the total respondents never consumed carbonated beverages which corresponded with the finding of our study. The same study showed that more than 50% of the respondents consumed fast foods more than once a week. Carbonated drinks consumption (p value = 0.029) was found to be statistically significant with DBP.

4.5 Physical Activity

Table 4.20 Distribution of physical activity of the respondents (n = 189)

	Frequency (189)	**Percent (%)**
Household chores		
Too much	46	24.3
Lot	72	38.1
Little	49	25.9
Very less	22	11.6
Walking or jogging		
Daily	54	28.6
Few times a week	50	26.5
Sometimes	53	28.0
Never	32	16.9
Heart racing exercises		
Daily	14	7.4
Few times a week	10	5.3
Sometimes	63	33.3
Never	102	54.0
Sitting or reclining time		
<120 min	19	10.1
>120 min	170	89.9
Total	189	100.0

Table 4.21 Distribution of duration of PA of the respondents (n = 189)

	Frequency	Percent (%)
Walking or jogging		
< 30 minutes	7	3.7
30 - 60 minutes	68	36.0
> 60 minutes	82	43.4
Total	157	83.1
Heart racing exercise		
< 30 minutes	11	5.8
30 - 60 minutes	52	27.5
> 60 minutes	24	12.7
Total	87	46.0

Table 4.20 shows the type of physical activity performed by the respondents. Out of 189 respondents, 157 (83.1%) of them had the habit of walking or jogging and only 87 (46%) performed heart racing activities. Factors like walking either in the evening or in the morning (p value = 0.035) and performing activity that increases heart rate (p value = 0.02) were found to be statistically significantly associated with SBP and DBP respectively. Increased physical exercise and physical activity have been shown to improve BP (Lundqvist *et al.,* 2017).

The amount of time spent on doing PA (walking or jogging and heart racing exercises) are depicted in **Table 4.21**. Out of 83.1% respondents engaged in walking, 43.4% reported to walk for more than 60 minutes a time, closely followed by 30-60 minutes (36%) and then less than 30 minutes (3.7%) whereas, only 46% reported to perform heart racing activities. Among them 5.8%, 27.5% and 12.7% performed for less than 30 minutes, 30-60 minutes and more than 60 minutes respectively. As per the guidelines, all adults should undertake 150-300 min of moderate-intensity, or 75-150 min of vigorous-intensity physical activity per week (Bull *et al.,* 2020).

4.6 KAP score of hypertensive respondents

4.6.1 Knowledge related score of the respondents

Questionnaires about the knowledge related to blood pressure and hypertension were asked to the respondents and then, the answers were analyzed. The frequency distribution of the knowledge answers by the respondents is shown in **Table 4.22**. The knowledge score varied between 4 and 15 points with an average of 10.85 ±2.38. The study shows that 93.7% had good knowledge whereas, 6.35% had poor knowledge regarding hypertension as shown in **Fig. 4.4**. This finding is similar with the finding of the study conducted in Bangalore, India on assessment of Knowledge, Attitude and Practice among Hypertensive Patients in a Teaching Hospital, where it was found 85.83% of the respondents had good knowledge related to hypertension (Thomas *et al.*, 2021).

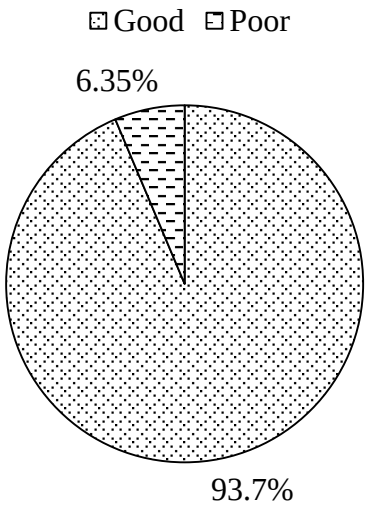

Fig. 4.4 Knowledge score of respondents

Table 4.22 Responses to knowledge questions by the respondents (n = 189)

Questions	Frequency
Do you know normal BP reading?	Yes: 143 (75.7%)
	No: 46 (24.3%)
What is HTN?	A higher level of BP than normal: 158 (83.6%)
	A lower level of BP than normal: 2 (1.1%)
	Either higher or lower BP than normal: 3 (1.6%)
	I do not know: 26 (13.8%)

Do you know the Causes of HTN?	Yes: 85 (44.9%)
	No: 104 (55.0%)
Do you know Symptoms of HTN?	Yes: 173 (91.5%)
	No: 16 (8.5%)
Do you know Symptoms of low BP?	Yes: 122 (64.6%)
	No: 67 (35.4%)
Is HTN heritable?	Yes: 104 (55.0%)
	No: 30 (15.9%)
	I do not know: 55 (29.1%)
Is HTN curable?	Yes: 42 (22.2%)
	No: 126 (66.7%)
	I do not know: 21 (11.1%)
Do you know what complications can arise if BP is not controlled?	Heart disease: 7 (3.7%)
	DM: 1 (0.5%)
	Eye problem: 2 (1.1%)
	Kidney diseases: 5 (2.6%)
	All of the above: 141 (74.6%)
	I do not know: 21 (11.1%)
Do antihypertensive medicines sometimes lower you BP below normal?	Yes: 84 (44.4%)
	No: 65 (34.4%)
	I do not know: 40 (21.2%)
Is excessive salt intake one of the risk factors for developing high BP?	Yes: 172 (91%)
	No: 10 (5.3%)
	I do not know: 7 (3.7%)
Is excessive alcohol intake one of the risk factors for developing high BP?	Yes: 178 (94.2%)
	No: 3 (1.6%)
	I do not know: 8 (4.2%)
Is being overweight one of the risk factors for developing high BP?	Yes: 174 (92.1%)
	No: 3 (1.6%)
	I do not know: 12 (6.3%)
Is regular BP measurement necessary for high BP patients?	Yes: 186 (98.4%)
	No: 1 (0.5%)
	I do not know: 2 (1.1%)

Do you have to take antihypertensive medicines for life long?	Yes: 161 (85.2%) No: 18 (9.5%) I do not know: 10 (5.3%)
What changes in life should be taken to control or prevent HTN?	Control your blood sugar: 1 (0.5%) Limit alcohol consumption and smoking: 6 (3.2%) Maintaining healthy bodyweight: 1 (0.5%) Limit salt intake: 52 (27.5%) All of the above: 127 (67.2%) I do not know: 2 (1.1%)

Note: values in parentheses are the percentage distribution of the sample.

4.6.2 Attitude related score of the respondents

Table 4.23 shows the frequency distribution of the attitude related answers by the respondents. The attitude score varied between 0 and 5 with a median of 5. As shown in **Fig. 4.5**, the study shows that 95.2% had good attitude whereas, 2.6% had moderate and 2.1% had unacceptable attitude towards hypertension. This finding is consistent with the finding of the study conducted in Bangalore, India on assessment of Knowledge, Attitude and Practice among Hypertensive Patients in a Teaching Hospital, where it was found 96.6% of the respondents had good attitude towards hypertension (Thomas *et al.*, 2021).

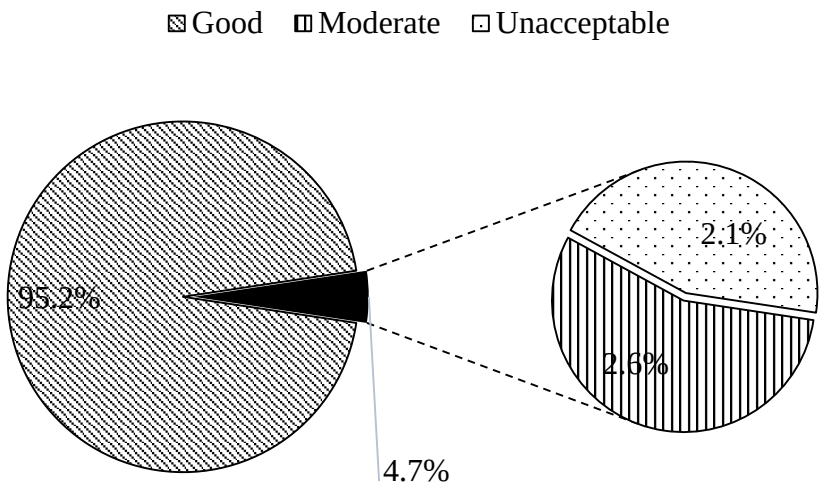

Fig. 4.5 Attitude score of respondents

Table 4.23 Responses to attitude questions by the respondents (n = 189)

Questions	Frequency
Should we reduce salt intake to prevent hypertension?	Yes: 177 (93.7%)
	No: 12 (6.3%)
Do you think regular checking of BP is important?	Yes: 183 (96.8)
	No:: 6 (3.2)
Should we keep in touch with the physician regularly?	Yes 183 (96.8)
	No: 6 (3.2)
Do you think regular medication is important in hypertension?	Yes: 187 (98.9%)
	No: 2 (1.1%)
Should we exercise regularly for healthy life?	Yes: 183 (96.8)
	No: 6 (3.2)

Note: values in parentheses are the percentage distribution of the sample.

4.6.3 Practice related score of the respondents

Table 4.24 shows the frequency distribution of the practice related answers by the respondents. The score varied between 8 and 20 with an average of 13.1 ± 2.647. The study demonstrated a proportion of 89.9% respondents reported unacceptable practice whereas, 10.1 % had acceptable practice regarding hypertension. The finding is similar with the study on KAP on hypertensive patients, conducted in Mumbai, India, where it was found that 73.2% of the respondents had unacceptable score of practice regarding hypertension (Mahajan *et al.*, 2012). The practice score of the respondents is shown in **Fig. 4.6**.

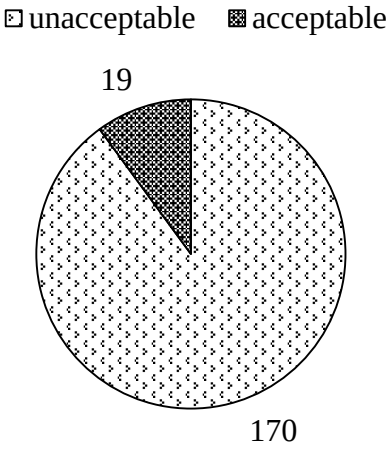

Fig. 4.6 practice score of respondents

Table 4.24 Responses to practice questions by the respondents (n = 189)

Questions	Frequency
How often do you measure your BP?	Frequently: 50 (26.5%)
	Sometimes: 139 (73.5%)
	Never: 0
How often do you moderate your salt intake?	Frequently: 138 (73.0%)
	Sometimes: 41 (21.7%)
	Never: 10 (5.3%)
How often do you avoid fatty food consumption?	Frequently: 154 (81.5%)
	Sometimes: 34 (18.0%)
	Never: 1 (0.5%)
How often do you consume alcohol?	Daily: 3 (1.6%)
	Few times a week: 10 (5.3%)
	Rarely: 75 (39.7%)
	Never: 101 (53.4%)
How often do you perform physical exercise?	Frequently: 62 (32.8%)
	Sometimes: 86 (45.5%)
	Never: 41 (21.7%)
How often do you check your body weight?	Frequently: 16 (8.5%)
	Sometimes: 169 (89.4%)
	Never: 4 (2.1%)
How often do you smoke?	Daily: 47 (24.9%)
	Few times a week: 7 (3.7%)
	Rarely: 25 (13.2%)
	Never: 110 (58.2%)
How often do you miss the dose of your medication?	Frequently: 0
	Sometimes: 90 (47.6%)
	Never: 99 (52.4%)
How often do you consult your healthcare provider?	Frequently: 21 (11.1%)
	Sometimes: 165 (87.3%)
	Never: 3 (1.6%)
How often do you check your lipids?	Frequently: 19 (10.1%)
	Sometimes: 120 (63.5%)
	Never: 50 (26.5%)

Note: values in parentheses are the percentage distribution of the sample.

4.7 Association between socio-demographic and associated factors with the knowledge regarding HTN among the adults using antihypertensive medications

4.7.1 Association between knowledge and socio-demographic variables

Table 4.25 Association between knowledge level and socio-demographic variables (n = 189)

	Knowledge level		χ^2	P value
	Good	Poor		
Age group				
18 - 30	11	0	6.96	0.326
31 - 40	37	1		
41 - 50	42	4		
51 - 60	36	1		
61 - 70	26	3		
71 - 80	19	3		
> 80	6	0		
Education level				
Illiterate	11	3	8.57	0.73
Informal	47	4		
Primary	30	1		
Secondary	56	4		
Higher secondary and above	33	0		
Duration of HTN				
6 months-1 year	19	2	2.17	0.34
1-2 years	64	2		
>2 years	94	8		
Family history				
Yes	96	6	0.8	0.78
No	81	6		

Note: p value significant at 0.05

The association between knowledge level and socio-demographic variables is shown in **Table 4.25**. No significant association was reported between the knowledge scores concerning HTN and any of the studied factors: age, educational level, duration of HTN onset, family history of HTN (all p-values >0.05). The finding of the study is consisted with the findings of the study except for age, conducted in Malaysia by Buang *et al.* (2019).

Salt intake was not significantly associated (p value = 0.42) with knowledge level. It meant that there is no difference in salt consumption among respondents with good and poor level of knowledge. A recent study found that knowledge toward healthy salt intake was significantly associated with BP (Haron *et al.*, 2021).

4.7.2 Association between knowledge and blood pressure

Table 4.26 and **Table 4.27** shows the association between knowledge with SBP and DBP respectively. The relationship between blood pressure level and knowledge, attitude and practice did not reach statistical significance (p value >0.05). This suggests that many patients fail to effectively incorporate what they know about hypertension into their lifestyles hence no significant correlation was established between patients' knowledge and their BP levels. This also means that having a thorough knowledge about blood pressure, its management strategies like medication, diet, physical exercise or stress management will not keep the blood pressure within normal range unless there is a regular practice and optimistic attitude. The finding of the study is consistent with the study in Malaysia by Haron *et al.* (2021) where attitude and practices score showed no significance difference (p value >0.05) with blood pressure. It might be due to the fact that no matter the attitude level, respondents were either sedentary or did not take their medication and looked after diet. Also, practice level might not have been enough to reduce BP in hypertensive respondents.

Table 4.26 Association between knowledge level and systolic blood pressure (n = 189)

Systolic BP	**Knowledge level**		χ^2	**P value**
	Good	**Poor**		
Normal	33	4	1.57	0.46
Hypertensive	142	8		
Crisis	2	0		

Note: p value significant at 0.05

Table 4.27 Association between knowledge level and diastolic blood pressure (n = 189)

Diastolic BP	Knowledge level		χ^2	P value
	Good	Poor		
Elevated	75	5	0.002	0.96
Hypertensive	102	7		

Note: p value significant at 0.05

4.8 Association between socio-demographic and associated factors with attitude regarding HTN among the adults using antihypertensive medications

Table 4.28 Association between attitude level and socio-demographic variables (n = 189)

	Attitude level			$\chi 2$	P value
	Good	Moderate	Unacceptable		
Education level					
Illiterate	12	0	2	9.5	0.3
Informal	49	2	0		
Primary	29	1	1		
Secondary	58	1	1		
Higher secondary and above	32	1	0		
Age group					
18 - 30	11	0	0	13.76	0.32
30 - 40	37	0	1		
40 - 50	42	3	1		
50 - 60	37	0	0		
60 - 70	28	1	0		
70 - 80	19	1	2		
> 80	6	0	0		
Duration of HTN					
6 months-1 year	21	0	0	4.34	0.36
1-2 years	61	2	3		
>2 years	98	3	1		
Family history					
Yes	96	3	3	0.86	0.66
No	84	2	1		

Note: p value significant at 0.05

The association between attitude level and socio-demographic variables is shown in **Table 4.28**. No significant association was reported between the attitude scores concerning HTN and any of the studied factors: age, educational level, duration of HTN onset, family history of HTN (all p-value >0.05). It might be due to either they did not have no knowledge or they were negligent.

The study shows that there is significant association between sodium intake and attitude level (p value <0.05). Reyhani *et al.* (2020) and Haron *et al.* (2021) found similar result. Most of the respondents believed it would indeed improve their health outcome if salt intake is low.

4.9 Association between socio-demographic and associated factors with the practice regarding HTN among the adults using antihypertensive medications

No significant association was reported between the practice scores concerning HTN and some of the studied factors: age, duration of onset of HTN, family history of HTN (all p-values >0.05).

However, there is a significant association between education level, and practice level (p value = 0.008). It might be due to much information about health can be found by educated person, and this in turn makes them better placed in making decisions or using the good health care services for themselves or others. On the other hand, an inability to read may make it difficult for clients to understand what is being talked about in counselling sessions.

The reason behind why age group association with practice did not reach significant association might be either they did not know the good practice behaviors or they did not adhere to them. As for and family history, those who had family member with HTN not following the good practices might follow in their footsteps leading to low practice level. Moreover, for duration of HTN to not reach statistical significance, it might be because the practice has not been changed from when they were not suffering from hypertension. The association between practice level and socio-demographic variables among the respondents is shown in **Table 4.29**.

Table 4.29 Association between practice level and socio-demographic variables (n = 189)

	Practice level		Chi square	P value
	Acceptable	**Unacceptable**		
Education level				
Illiterate	0	14	13.9	0.008*
Informal	3	48		
Primary	1	30		
Secondary	8	52		
Higher secondary and above	7	26		
Age group				
18 - 30	4	7	8.771	0.187
30 – 40	3	35		
40 - 50	6	40		
50 - 60	3	34		
60 - 70	2	27		
70 - 80	1	21		
> 80	0	6		
Duration of HTN			10.185	0.06
6 months-1 year	6	15		
1-2 years	3	63		
>2 years	10	92		
Family history				
Yes	10	92	0.015	0.90
No	9	78		

* denotes p value significant at 0.05 level

P value for association between salt intake and practice level was found to be 0.86. The finding is consistent with the finding of the study conducted by Haron *et al.* (2021), where though it was found that majority of the respondents had good attitude towards healthy dietary intake of salt, had poor knowledge and poor practice on healthy salt intake. High

sodium intake is significantly associated with an increased risk of obesity and metabolic syndrome, and hypertension in the general population (Oh *et al.*, 2015).

4.10 Association of salt intake with KAP

There was no significant association between knowledge, practice with salt intake whereas, it was found that attitude and salt intake were significantly associated. The finding is consistent with the finding of the study conducted in Nepal where it was found that Participants displayed a satisfactory understanding of the harmful impacts of excessive salt intake, while also expressing positive attitude regarding reducing salt consumption. Nonetheless, there was no significant practice on reducing salt intake among the respondents to actively manage their salt consumption habits (Ghimire *et al.*, 2019).

4.11 Correlation between KAP regarding hypertension

The correlation is estimated through bivariate analysis model to explore the relationship between the KAP scores. Knowledge had significant correlation with attitude as well as practice. Attitude too, had a significant correlation with attitude as shown in **Table 4.30**.

Table 4.30 Correlation between KAP

Variables	Correlation coefficient (r - value)	p-value
Knowledge and attitude	+0.191	0.008
Knowledge and practice	+0.282	< 0.001
Practice and attitude	+0.193	0.008

Part V

Conclusions and Recommendations

5.1 Conclusion

Evaluation of Knowledge, Attitudes, and Practices (KAP) concerning hypertension becomes critical because this forms basis for designing relevant intervention programs that enhance behavior change towards healthier lifestyles aiming at reducing its impacts in a given nation. In the study knowledge, attitude and practice was assessed. The conclusions that can be drawn from the study are:

1. Most of the respondents i.e. 86.77% are non-vegetarian and 87.83% are married. 54.97% of the respondents are living with HTN for over 2 years.
2. Majority of the study population had good knowledge and positive attitude toward prevention of hypertension but the level of practices was unacceptable.
3. The study population belonging to the age group between 40-50 years are shown to have significantly good knowledge in comparison to other age groups. 75.66%, 44.97%, and 74.60% of them knew Normal BP, causes and complications of HTN respectively. Whereas, only 55.03%, had the knowledge that HTN is hereditary.
4. BP (SBP and DBP) was not significantly associated with Knowledge.
5. It was found that majority of participants 84.7% consumed inadequate calories, 46.6% consumed adequate amount of protein and 73.0% consumed sodium less than 2000mg per day.
6. Majority of them (59.79%) consumed salad daily and 20.63% consumed meals more than 3 times a day. Nearly half of them i.e. 40.74% consumed red meat on monthly basis and 16.40% never consumed red meat.
7. Anxiety is significantly associated with attitude and DBP. Education level and sodium intake is significantly associated with practice level.
8. 25.93% were found to be smokers and gender was significantly associated with smoking.

5.2 Recommendations

The study can be further continued with the following recommendations:

1. Though the greater number of patients had good knowledge score but they were not found to be applying their knowledge in daily life practice which brought difficulty in HTN management. Therefore, necessary awareness programs and campaigns should be conducted in order to bring positive changes in their practical life which is the most important factor for HTN prevention, care and management.
2. Comparative study on KAP before and after an awareness campaign on hypertension can be conducted.
3. Comparative study of KAP of old hypertensive patients and newly diagnosed hypertensive patients can be done.

Part VI

Summary

The prevalence of hypertension has an increasing trend globally as well as in Nepal. Hypertension leads to many other conditions and eventual death. Management of preventive measures is crucial for managing hypertension. Hypertension is growing among the population of Nepal. A community based cross-sectional study was conducted to assess the level of knowledge, attitude and practice about hypertension among antihypertensive medication users of Urlabari Municipality, Morang. Those who were diagnosed with hypertension at least 6 months before were selected for the study. Among 9 wards, only two wards i.e. 4 and 7 were selected for sample data collection. This cross-sectional study describes the knowledge, attitude and practice among 189 hypertensive population of Urlabari. A face to face interview using a semi-structured questionnaire was carried out for data collections and anthropometric measurements were taken. Socio demographic characteristics of the participants were determined.

The study revealed that 93.70%, 95.2% and 10.1% of the patient had a good knowledge, attitude and acceptable practice score respectively. Most of the respondents knew that overweight/obesity (92.06%), alcohol consumption (94.18%) and higher salt intake (91%) as risk factors of hypertension. However, only 44.44% knew that antihypertensive medication sometimes lowered BP. However, 21.69% never performed any sorts of exercises. 24.87% and 46.56% of respondents smoked daily and never consumed alcoholic beverages. The majority of respondents (94.2%) incorporated rice into their daily dietary intake. Almost every individual of the study reported to daily consume whole dal, followed by 3-4 times a week and then, once a week or less and monthly. The study shows that 39.7% (75) of the respondents reported to consume fruits 3-4 times a week, followed by consumption on a daily basis i.e. 29.6% (56). 25.4% (48) and 5.3% (10) of the respondents of the study reported to consume fruits once a week or less and monthly respectively. Above three quarters of respondents reported to consume GLV on a daily basis. Both red meat and fish were mostly consumed on monthly basis, closely followed by consumption in once a week or less. 2.6% and 10.6% of those in study reported to consume fish and red meat 3-4 times a week respectively. out of 189 respondents, only 157 (83.1%) of them had the habit of walking or jogging and only 87 (46%) performed heart racing activities.

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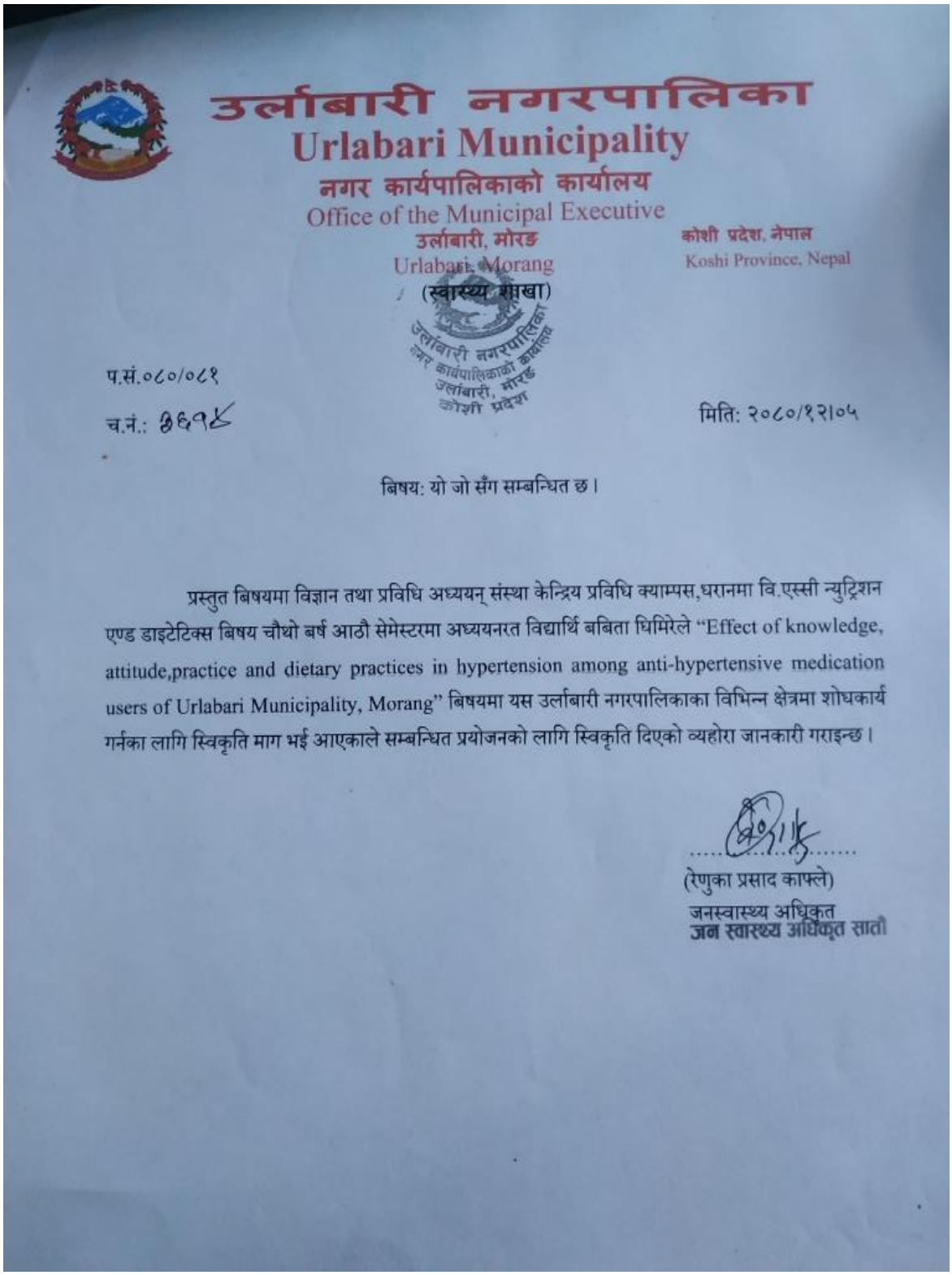
Appendices

Appendix A: Consent letter from Urlabari municipality



उर्लाबारी नगरपालिका
Urlabari Municipality
नगर कार्यपालिकाको कार्यालय
Office of the Municipal Executive
उर्लाबारी, मोरङ
Urlabari, Morang
कोशी प्रदेश, नेपाल
Koshi Province, Nepal
(स्वास्थ्य शाखा)

उर्लाबारी नगरपालिका नगर कार्यपालिकाको कार्यालय उर्लाबारी, मोरङ कोशी प्रदेश

प.सं.०८०/०८१
च.नं.: ३६९४
मिति: २०८०/१२/०५

बिषय: यो जो सँग सम्बन्धित छ।

प्रस्तुत बिषयमा विज्ञान तथा प्रविधि अध्ययन् संस्था केन्द्रिय प्रविधि क्याम्पस,धरानमा वि.एस्सी न्युट्रिशन एण्ड डाइटेटिक्स बिषय चौथो बर्ष आठौ सेमेस्टरमा अध्ययनरत विद्यार्थि बबिता धिमिरेले "Effect of knowledge, attitude,practice and dietary practices in hypertension among anti-hypertensive medication users of Urlabari Municipality, Morang" बिषयमा यस उर्लाबारी नगरपालिकाका विभिन्न क्षेत्रमा शोधकार्य गर्नका लागि स्विकृति माग भई आएकाले सम्बन्धित प्रयोजनको लागि स्विकृति दिएको व्यहोरा जानकारी गराइन्छ।

.....
(रेणुका प्रसाद काफ्ले)
जनस्वास्थ्य अधिकृत
जन स्वास्थ्य अधिकृत सातौ

Appendix B: Consent form

Date: ……

Namaste! I Ms. Babita Ghimire undergraduate student in Department of Nutrition and Dietetics conducting a dissertation work for award of bachelor's degree in Nutrition and Dietetics The topic for the study "**Effect of knowledge, attitude and practice and diet among antihypertensive medication users of Urlabari.**"

I have been told in a language that I understand about the study. I have been told that this is for a dissertation procedure, that my and my participation is voluntary and he/she reserve the full right to withdraw from the study at my own initiative at any time without having to give reason and that refresh to participate or withdraw from the study at any stage will not prejudice my/his/her rights and welfare. Confidentiality will be maintained and only be shared for academic purposes. This consent form being signed voluntarily indicates your participation in the study.

I hereby give consent to participate in the above study. I am also aware that I can withdraw this consent at any later date, if I wish to. This consent form being signed voluntarily indicates participate in the study until I decide otherwise.

Signature _____

The study procedures will be explained in the detail and I hope all questions will fully and clearly be answered.

Investigator's sign _____

Date: _____

Appendix C: Questionnaire

सहभागी नं: ……

क) सामान्य जानकारी

१. उमेर:	**२. लिङ्ग** महिला ☐ पुरुष ☐
३. जाती: **५. Height:** **Weight:** **६. BMI:**	**४. धर्म:** हिन्दु ☐ बौद्ध ☐ क्रिस्चियन ☐ मुस्लिम ☐ अन्य (खुलाउनुहोस्): …… **७. खानाको प्राथमिकता:** भेज ☐ नन् भेज ☐ भिगन ☐

ख) सामाजिक र जनसंख्याबारे जानकारी

१. परिवारको प्रकार: क. एकल ख. संयुक्त

२. शिक्षाको स्तर: क. अनपढ ख. सामान्य लेखपढ गर्न सक्ने ग. प्राथमिक तह
घ. माध्यमिक तह ङ. उच्च शिक्षा

३. पेशा-व्यवसाय: क. सरकारी ख. गैर-सरकारी ग. स्वरोजगार घ. विद्यार्थी
ङ. बेरोजगार च. अन्य (खुलाउनुहोस्): ……

४. वैवाहिक स्थिति: क. अविवाहित ख. विवाहित ग. सम्बन्ध-बिच्छेद भएको
अन्य (खुलाउनुहोस्): ……..

५. उच्च रक्तचापको पारिवारिक इतिहास: क. छ ख. छैन

६. उच्च रक्तचापको देखिएको अवधि: क. ६ महिना – १ वर्ष ख. १ – २ वर्ष ग. २ वर्ष भन्दा धेरै

७. मुटूको समस्या: क. छ ख. छैन

८. मृगौलाको समस्या: क. छ ख. छैन

९. चिनीरोग (sugar/diabetes): क. छ ख. छैन

१०. आफ्नो वर्तमान रक्तचाप: _____सिस्टोलिक _____डायास्टोलिक

११. के तपाईँलाई व्याकुलता वा डर त्रास (anxiety) छ? क. छ ख. छैन

१२. तपाईँ रातमा कति निदाउनुहुन्छ ? क. ५ घण्टा वा सो भन्दा कम
ख. ६-८ घण्टा
ग. ८ घण्टा भन्दा बढी

ग) ज्ञान (knowlwdge) बारे प्रश्नहरु

१. के तपाईँलाई सामान्य रक्तचाप कति हुनुपर्छ, थाहा छ? क. थाहा छ ख. थाहा छैन

२. उच्च रक्तचाप भनेको के होला? क. रक्तचाप सामान्य भन्दा बढी हुनु ख. रक्तचाप सामान्य भन्दा कम हुनु
ग. रक्तचाप सामान्य भन्दा बढी या कम हुनु घ. मलाई थाहा छैन

३. के तपाईँलाई उच्च रक्तचाप हुने कारणहरु थाहा छ? क. थाहा छ ख. थाहा छैन

४. के तपाईँलाई उच्च रक्तचापको लक्षणहरु थाहा छ? क. थाहा छ ख. थाहा छैन

५. के तपाईँलाई कम रक्तचापको लक्षणहरु थाहा छ? क. थाहा छ ख. थाहा छैन

६. के उच्च रक्तचाप वंशानुगत हुन्छ होला? क. हुन्छ ख. हुदैन ग. थाहा छैन

७. के उच्च रक्तचाप निको हुन सक्ने रोग हो? क. हो ख. होइन ग. थाहा छैन

८. यदि उच्च रक्तचापलाई सामान्य अवस्थामा ल्याइएन भने यसले यस्ता रोगहरु निम्त्याउन सक्छ?

क. मुटूरोग ख. चिनीरोग
ग. आखाँको रोग घ. मृगौलाको रोग
ङ. माथिको सबै च. थाहा छैन

९. के उच्च रक्तचापको औषधिले कहिलेकाहीँ रक्तचाप कम गर्न सक्छ? क. सक्छ ख. सक्दैन ग. थाहा छैन

१०. के अत्यधिक नुनको सेवन गर्नाले उच्च रक्तचापको जोखिम बढाउछ?

क. बढाउछ ख. बढाउदैन ग. थाहा छैन

११. के अत्यधिक जाडरक्सीको सेवनले उच्च रक्तचापको जोखिम बढाउछ?

क. बढाउछ ख. बढाउदैन ग. थाहा छैन

१२. के धेरै मोटो हुनु भनेको पनि उच्च रक्तचापको जोखिम बढाउनु हो?

क. हो ख. होइन ग. थाहा छैन

१३. के उच्च रक्तचापमा नियमित BP (रक्तचाप) को जाँच जरुरी छ ?

क. छ ख. छैन ग. थाहा छैन

१४. के उच्च रक्तचापको औषधि जिन्दगीभरि खानु पर्छ?

क. पर्छ ख. पर्दैन ग. थाहा छैन

१५. कुन जीवनशैलीको परिवर्तनले उच्च रक्तचापको उपचार र रोकथाम हुन सक्छ?

क. रगतमा चिनीको मात्रालाई नियन्त्रण गर्नाले
ख. धुम्रपान र मद्यपानको सेवनलाई कम गर्नाले
ग. आफ्नो तौललाई सन्तुलनमा राख्नाले
घ. नुनको सेवनलाई नियन्त्रण गर्नाले
ङ. माथिको सबै
च. थाहा छैन

घ) अभिवृत्ति (attitude) बारे प्रश्नहरु

१. के हामीले उच्च रक्तचापको रोकथाम गर्न नुनको सेवनलाई कम गर्नु पर्छ? क. पर्छ ख. पर्दैन

२. तपाईँको बिचारमा नियमित BP (रक्तचाप) जाँच जरुरी छ? क. छ ख. छैन

३. के उच्च रक्तचापको औषधि नियमित खानु जरुरी छ? क. छ ख. छैन

४. के डाक्टरसँग नियमित भेटघाट र चेकजाँच जरुरी छ? क. छ ख. छैन

५. स्वस्थ जीवनको लागि के नियमित व्यायाम गर्नु आवश्यक छ? क. छ ख. छैन

ङ) अभ्यास (practice) बारे प्रश्नहरु

१. तपाईँ आफ्नो BP (रक्तचाप) कत्तिको जाँच गर्नुहुन्छ?

क. प्रायजसो ख. कहिलेकाहिँ ग. कहिल्यै गर्दिन

२. तपाईँ नुनलाई कत्तिको नियन्त्रणगरि खानु हुन्छ?

क. प्रायजसो ख. कहिलेकाहिँ ग. कहिल्यै गर्दिन

३. तपाईँ बोसोयुक्त खानेकुराबाट कत्तिको टाढा बस्नुहुन्छ?

क. प्रायजसो ख. कहिलेकाहिँ ग. कहिल्यै बस्दिन

४. तपाईँ कसरत वा अन्य शारीरिक व्यायाम कतिको गर्नुहुन्छ?

क. प्रायजसो ख. कहिलेकाहिँ ग. कहिल्यै गर्दिन

५. तपाईँ आफ्नो तौल कत्तिको लिनुहुन्छ?

क. प्रायजसो ख. कहिलेकाहिँ ग. कहिल्यै लिदिन

६. तपाईँ आफ्नो BP को औषधि खान कत्तिको बिर्सिनु हुन्छ?

क. प्रायजसो ख. कहिलेकाहिँ ग. कहिल्यै बिर्सिन्न

७. तपाईँ आफ्नो BP बारे डाक्टरसँग कत्तिको परामर्श लिनुहुन्छ?

क. प्रायजसो ख. कहिलेकाहिँ ग. कहिल्यै लिदिन

८. तपाईँ आफ्नो रगतको बोसोको जाँच कत्तिको गर्नुहुन्छ?

क. प्रायजसो ख. कहिलेकाहिँ ग. कहिल्यै गर्दिन

९. तपाईँ धुम्रपान कत्तिको गर्नुहुन्छ?

क. दैनिक ख. हप्तामा केहि पटक ग. बिरलै घ. कहिल्यै गर्दिन

१०. तपाईँ जाडरक्सी कत्तिको खानुहुन्छ?

क. दैनिक ख. हप्तामा केहि पटक ग. बिरलै घ. कहिल्यै खाँदिन

च) खाना (diet) बारे प्रश्नहरु

१. के तपाईँ आफ्नो खानामा नियमित रुपमा सलाद राख्नुहुन्छ?

क. राख्छु ख. राख्दिन

२. तपाईँ दिनमा कति पटक खाना वा खाजा खानुहुन्छ?

क. २ पटक ख. ३ पटक ग. ३ पटक भन्दा बढी

३. तपाईँ दिनमा कति नुन खानुहुन्छ?

क. १ चिया चम्चा (५ ग्राम) ख. १ चिया चम्चा भन्दा बढी

४. के घरमा तपाईँका लागि खाना छुट्टै बन्छ?

क. बन्छ ख. बन्दैन

५. तपाईंको भान्सामा कस्तो तेलको प्रयोग हुन्छ? _____

६. तपाईं रातो मासु (जस्तै: खसी, राँगा, सुँगुर) कत्तिको खानुहुन्छ? क. हप्तामा १ पटक भन्दा बढी ख. साप्ताहिक ग. बिरलै घ. कहिल्यै खाँदिन

७. तपाईं घरदेखि बाहिर कत्तिको खाना खानुहुन्छ? क. हप्तामा १ पटक भन्दा बढी ख. साप्ताहिक ग. बिरलै घ. कहिल्यै खाँदिन

छ) पछिल्लो २४ घण्टामा आफुले खाएको खानाको स्मरण गर्नुहोस् ।

Meal	Description
बिहानको खाजा	
बिहानको खाना	
दिउसोको खाजा (यदि १ पटक भन्दा बढी भए खुलाउनुहोस्)	
रातिको खाना (यदि सुत्ने बेलामा केहि खाएको भए	

ज) खाना आवृत्ति तालिका

खाना		दैनिक	हप्तामा ३-४ पटक	हप्तामा १ पटक वा कम	मासिक	कहिल्यै खाँदिन
अन्न	भात (धान)					
	गहुँ					
	मकै/ जौं					
	कोदो / फापर					
गेडागुडी	दाल					
	चना/मटर र अन्य गेडागुडी					
हरियो सागपात						
अन्य तरकारीहरु						
जरा तथा कन्दमुल						
ताजा फलफूल						
डेरी उत्पादन	दुध					
	दही/ मही					
	घ्यू					

	पनिर/चीज					
चिसो पेय पदार्थ						
म:म, चाउमिन, थुक्पा आदि						
प्याकेटका खानेकुराहरु						
माछा मासु	अन्डा					
	कुखुरा					
	माछा					

झ) शारीरिक क्रियाकलाप

१. तपाईँ घरको शारीरिक काममा कत्तिको सक्रिय हुनुन्छ?

क. एकदम धेरै ख. धेरै ग. अलिअलि घ. खासै छैन

२. तपाईँ बिहान वा बेलुका कत्तिको हिडडुल गर्नुहुन्छ?

क. दैनिक ख. हप्तामा केहि पटक ग. कहिलेकाहीँ घ. कहिल्यै हिड्दिन

यदि हिड्नुहुन्छ भने दिनमा कति समय हिड्नु हुन्छ ? _____ घण्टा _____ मिनेट

३. तपाईँ सासको गति बढाउने खेल वा कार्य कत्तिको गर्नुहुन्छ ?

क. दैनिक ख. हप्तामा केहि पटक ग. कहिलेकाहीँ घ. कहिल्यै गर्दिन

यदि गर्नुहुन्छ भने दिनमा कति समय गर्नु हुन्छ? _____ घण्टा _____ मिनेट

४. तपाईँ दिनमा कति समय बसेर वा ढल्केर बिताउनुहुन्छ? _____ घण्टा _____ मिनेट

Note: _____

_____

_____

"तपाईँको अमूल्य समयको लागि मुरीमुरी धन्यवाद!!!"

Appendix C: Photo gallery

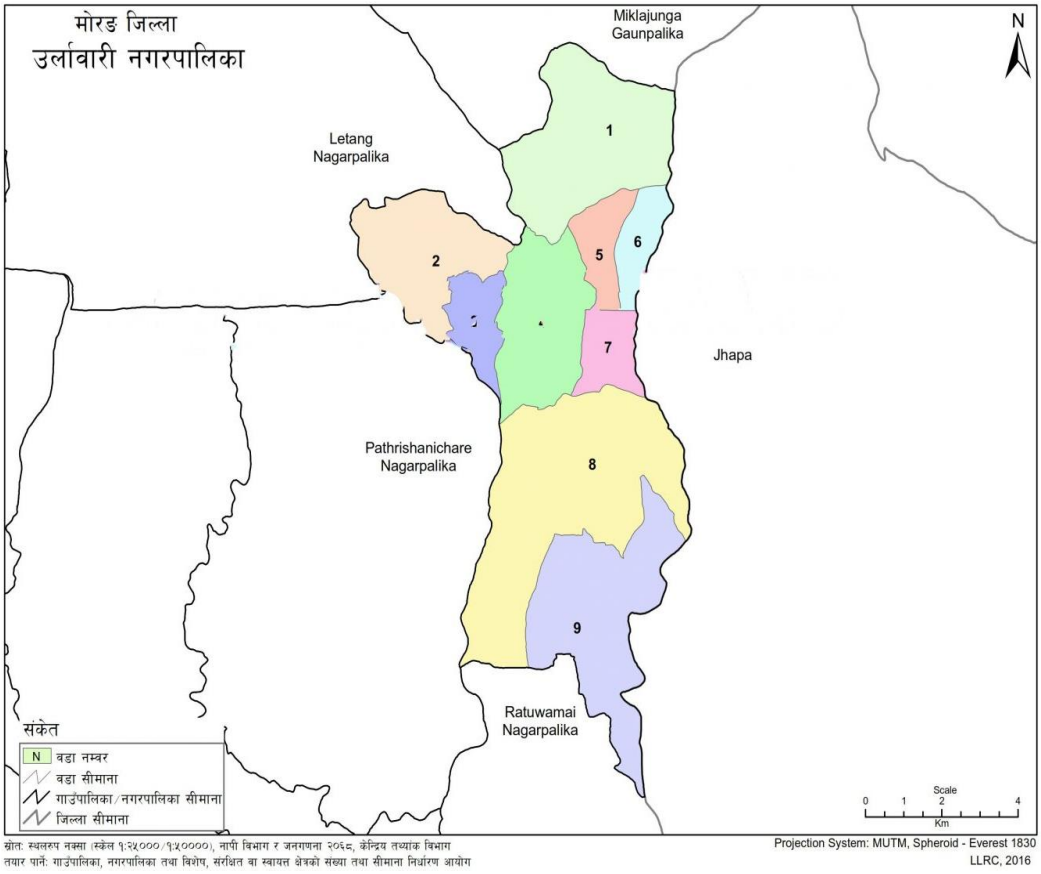
a) Measuring weight

b) Measuring height

c) Measuring BP

d) Filling up questionnaire

Appendix E: Study site



Source: MoFAGA (2017)