FACTORS ASSOCIATED WITH DIETARY QUALITY AMONG PATIENTS DIAGNOSED WITH CARDIOVASCULAR DISEASES AT THE UGANDA HEART INSTITUTE, KAMPALA CITY

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DECLARATION

This research report is my original work and has not been presented for an award of a degree in any other university.

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APPROVAL

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DEDICATION

I dedicate this dissertation to the people living with cardiovascular diseases and the health workers offering them nutrition and medical management. To God be the glory.

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LIST OF ACRONYMS

CHD	Coronary Heart Disease
COVID-19	Corona Virus Disease 19
CVDs	Cardiovascular diseases
DQI-I	Dietary Quality Index International
HbA1C	Glycated Hemoglobin
HEI	Healthy Eating Index
HF	Heart Failure
IMCHB	Interactional Model of Client Health Behavior
LDL	Low Density Lipoproteins
NCDs	Non-communicable diseases
NHANES	National Health and Nutrition Examination Survey
SES	Socio Economic Status
UHI	Uganda Heart Institute
VLDL	Very Low-Density Lipoprotein
WHO	World Health Organization

OPERATIONAL DEFINITIONS

Term	Definition
Cardiovascular diseases	This term referred to a set of chronic diseases that affect the heart and blood vessels. They included; Coronary Heart Disease, cerebrovascular disease, peripheral arterial disease, rheumatic heart disease, congenital heart disease, deep vein thrombosis and pulmonary embolism and arrhythmias.
Patients	This term referred to persons diagnosed with any cardiovascular disease, and had lived with it for at least three months
Dietary quality	This term referred to the compositions of one's diet in terms of nutrients required to support bodily function, growth and protection in the context of cardiovascular disease.
Satisfactory dietary quality	Is indicated by a score exceeding 60% from DQI-I assessment. In this study, dietary quality was categorized as a binary variable with the attributes being "satisfactory" and 'unsatisfactory' basing on the DQI-I
Intrapersonal factors	This term referred to demographic and personal traits of a CVD patient, that was found to have significant relationships with dietary quality
Intra-household factors	Intra-household factors referred to the demographic, nutritional and clinical characteristics of occupants of a given household from which a CVD patient comes, that were found to have significant relationships with dietary quality
Institutional factors	This term referred to characteristics of healthcare service provision at the Uganda Heart Institute, including provider characteristics and quality of care that were found to have significant relationships with dietary quality.

ABSTRACT

Cardiovascular diseases are the leading cause of death globally, and their incidence is increasing. Proper management and treatment are crucial for their prognosis. Medications alone cannot be sufficient, as macro and micronutrients moderate their severity. Optimal dietary quality is essential for all patients with CVDs, regardless of medication quality. The main objective was to assess factors associated with dietary quality among patients diagnosed with cardiovascular diseases at the Uganda heart institute.

The study design was cross-sectional, targeting patients that had been diagnosed with cardiovascular diseases, in the previous 3 months, and seeking care from the Uganda Heart Institute. Using systematic random sampling, data were collected from 360 patients through structured interviews. Dietary quality was assessed by the dietary quality index (DQI-I). Frequency, cross tabulation distributions were generated and a log-binomial model for bivariate and multivariate analysis were performed using SPSS version 25.

Findings indicated that only 10% of the patients diagnosed with cardiovascular diseases had satisfactory dietary quality. Patients who had a high perceived risk of their CVD turning severe were three times more likely to have a satisfactory dietary quality (aPR = 3.464 [95% CI = 1.197 - 10.026], P = 0.022) compared to those who did not perceive CVD turning severe. Satisfactory dietary quality was less by 83% among CVD patients who were in households that consumed one to two meals a day (aPR = 0.172 [0.053 - 0.558] p = 0.003). Patients whose contact time with service providers per clinical visit was between 10 and 20 minutes, had higher satisfactory dietary quality (aPR = 0.459[95% CI =0.216 - 0.979], p = 0.044). Those who reported service providers endeavored to take their dietary history had lower satisfactory dietary quality (aPR = 0.435[95% CI = 0.215 - 0.882], P = 0.021).

In conclusion, dietary quality among CVD patients at the Uganda Heart Institute was low; only 1 in every 10 such patients consumed diets that were protective against any adverse cardiovascular events. Their dietary quality was associated with intrapersonal, interpersonal and institutional characteristics, although the latter exhibited more precedence. Risk education, increasing meal frequency, increasing provider-patient contact time and strengthening dietary education at the institute will increase dietary quality among the patients.

Key words: *Dietary quality, cardiovascular diseases, Uganda heart institute*

CHAPTER ONE: INTRODUCTION

1.1 Background to the study

Dietary quality has been defined in a number of ways by various scholars and institutions; however, one commonality underlines all available conceptualizations of dietary quality. That commonality is that dietary quality is denoted by the amount of nutrients present in the food consumed on daily basis, with respect to the ability of the amounts to meet daily requirements for body growth, maintenance, physiological function and protection (International Atomic Energy Agency, 2022). As such, it is only with satisfactory dietary quality that optimum health can be guaranteed, implying that dietary quality is of major health and nutritional importance given that any gaps in it can have dire health consequences (Dalwood *et al*., 2020; Nowson *et al*., 2018). Poor dietary quality is associated with a myriad of health consequences including malnutrition (International Atomic Energy Agency, 2022; Jimenez *et al*., 2022; Megersa *et al*., 2021), stress (Khaled *et al*., 2021) and physical dysfunction (Davis *et al*., 2021).

However, beyond the aforementioned health effects, the effect of dietary quality on the health status of patients with cardiovascular diseases is arguably the most disproportionate (Larson *et al*., 2020; Smith *et al*., 2020). Cardiovascular diseases include coronary heart disease (which affects blood vessels that supply the heart muscle), cerebrovascular disease (affects blood vessels supplying the brain), peripheral arterial disease (affects blood vessels supplying the arms and legs), rheumatic heart disease (heart muscle and valve damage), congenital heart disease, deep vein thrombosis and pulmonary embolism and arrhythmias (WHO, 2021b). Although all CVDs have difference pathophysiology's', they have one particular constant in their etiologies and that is, elevated blood lipids and/or blood glucose (Grosso *et al*., 2022; Shahjehan and Bhutta, 2022; Global Burden of Disease, 2019; GBD 2017).

The treatment and management of CVDs, is therefore much aligned towards ensuring that a patient follows a strict dietary intervention (Mu *et al*., 2022; Zhou *et al*., 2022; Bakre *et al*., 2022; Filippou *et al*., 2020; Filippini *et al*., Cicero *et al*., 2021; 2021; Strilchuk *et al*., 2020; Guo *et al*., 2021), meant to keep their lipid profiles and glucose levels normal. There is wide ranging evidence to the effect that good quality diets in the context of CVDs can lower blood pressure, reduce waist circumference, and lower triglyceride concentration (Guo *et al*., 2022; Mu *et al*., 2022; Filippou *et al*., 2021; Choudhry *et al*., 2022). It is not surprising that satisfactory dietary quality among patients with CVD can promote vascular health (Gibbs *et al*., 2021), uphold endothelial function (Mozos *et al*., 2021; Garate-Carrillo *et al*., 2020; Lee *et al*., 2019) and lower the risk of stroke (Micek *et al*., 2021).

Therefore, without satisfactory dietary quality, patients with CVDs can be at a very high risk of severe sequelae including stroke, kidney disease, neurological dysfunction (WHO, 2021d), heart failure, conduction arrhythmias, ventricular free wall rupture, pericarditis and death (Shahjehan and Bhutta, 2022). In addition to the potentially fatal sequelae of poor managed CVDs, patients diagnosed with CVDs have been found to have higher risks of developing severe COVID-19 (Nassereddine *et al*., 2021). The co-occurrence of CVDs and severe COVID-19 has been dubbed a syndemic (Nassereddine *et al*., 2021; (Singer and Rylko-Bauer 2021), that could further dampen global efforts to reduce deaths from NCDs.

The risk of such health outcomes remains apparent even when one is taking medication prescribed to them, for as long as their dietary quality is sub optimal. That assertion is supported by evidence that although various formulations of CVD medication exist (Hansen *et al*., 2022; Williams *et al*., 2018), with adherence being fairly high (Desta *et al*., 2022; Nakwafila *et al*., 2022), case of severe CVDs are rampant (Lee *et al*., 2022). For instance, only 1 in 4 patients with hypertension have

controlled blood pressure (Lee *et al*., 2022), despite being adherent to medication, a situation that has increased interest in the integrated management of CVDs. Such integration involves the use of both pharmacological and non-pharmacological approaches, of which the latter targets lifestyle modification (Gibbs *et al*., 2021), particularly in the form of augmenting dietary quality (Guo *et al*., 2021; Mu *et al*., 2022).

Despite the acknowledged need for satisfactory dietary quality among patients with cardiovascular disease, there are reports from various studies indicating that such patients exhibit poor dietary practices, in contravention of nutritional CVD management guidelines. Little or no documentation of dietary quality levels among CVD patients exist at the global, regional of local levels. However, in-country studies indicate high salt intake among CVD patients (Feng *et al*., 2020; Abdu *et al*., 2021), with others reporting poor dietary practices among such patients, in general (Khatun *et al*., 2021; Uysal *et al*., 2020). In Uganda, CVDs are among the leading causes of deaths (Natukwatsa *et al*., 2021). There is no documentation of dietary quality among patients with CVDs in Uganda; the increasing deaths attributed to CVDs may insinuate dietary quality gaps. At the Uganda Heart Institute (UHI), patients are reported to be sub optimally adherent to dietary advices provided to them, moreover no dietary quality regimens or quantifications are available for the patients to follow. Therefore, this study was conducted to assess factors associated with dietary quality among patients diagnosed with cardiovascular diseases at the Uganda heart institute – Kampala Uganda.

1.2 Statement of the problem

Cardiovascular diseases (CVDs) currently account for almost half of all NCD-related deaths (17.9 million), and are directly linked to 32% of all NCD related deaths (WHO, 2021d). In Uganda CVDs account for 9.85% deaths (Okello *et al*.,2020). Their mortality risk is significantly modified

by poor dietary quality, yet CVD patients have been reported to consume diets that are high in saturated fat, sodium, simple sugars, and empty calories.

Few studies have quantified the proportions of CVD patients with satisfactory dietary quality good dietary practice among CVD patients has been reported previously to range from 3.1% in Brazil (Taruna *et al*., 2014) to 56% in Oman (Zeyana *et al*., 2015). The same was presumed to be true among CVD patients at UHI. There was no explicit documentation of the proportion of patients with satisfactory dietary quality at the Uganda Heart Institute.

The institute has a dedicated web portal that offers dietary counseling for CVD patients, but still, documentation of what proportion of patients with CVDs has optimal dietary quality is still poor. Moreover, there is limited available evidence of the factors associated with dietary quality among patients attending UHI, and no study has been conducted to this effect in Uganda. Knowledge about factors associated with dietary quality of the patients is vital as it informs healthcare providers to offer treatment that is augmented with evidence-based education/ counseling on dietary quality to reduce morbidity and mortality risks among patients. Therefore, to fill that gap, this study was done to assess factors associated with dietary quality among patients diagnosed with cardiovascular diseases at the Uganda Heart Institute, Kampala.

1.3 Objectives of the study

1.3.1 General objective

The general objective of this study was to assess factors associated with the consumption of satisfactory dietary quality among patients diagnosed with cardiovascular diseases at the Uganda Heart Institute.

1.3.2 Specific objectives

The specific objectives of this study were to:

i. Determine the proportion of patients diagnosed with cardiovascular diseases at the Uganda Heart Institute, who have consumed diets of satisfactory quality

ii. Identify intrapersonal factors associated with dietary quality among patients diagnosed with cardiovascular diseases at the Uganda Heart Institute.

iii. Determine the intra-household factors associated with the consumption of satisfactory dietary quality among patients diagnosed with cardiovascular diseases at the Uganda Heart Institute.

iv. Establish the health service delivery factors associated with the consumption of satisfactory dietary quality among patients diagnosed with cardiovascular diseases at the Uganda Heart Institute.

1.4 Research questions

i. Are there patients diagnosed with cardiovascular diseases at the Uganda Heart Institute who consume diets of satisfactory quality?

ii. Is the consumption of satisfactory dietary quality among patients diagnosed with cardiovascular diseases at the Uganda Heart Institute associated with intrapersonal factors?

iii. Does the consumption of satisfactory dietary quality among patients diagnosed with cardiovascular diseases at the Uganda Heart Institute have a relationship with intra-household factors?

iv. Is there an association between the consumption of satisfactory dietary quality among patients diagnosed with cardiovascular diseases at the Uganda Heart Institute and health care factors?

1.5 Significance of the study

Given the increasing incidence and burden of cardiovascular diseases in Uganda, there is a growing need to take an interest in the study of CVDs. Whereas several studies (Ndejjo *et al*., 2020a; Ndejjo, 2020b; Kintu *et al*., 2020; Musinguzi *et al*., 2020; Okello *et al*., 2017; Natukwatsa *et al*., 2021; Kalyesubula *et al*., 2016; Musinguzi *et al*., 2018; Bahendeka *et al*., 2015) have been conducted about various dynamics of CVDs in Uganda, there was limited information related to dietary quality and its associated factors among patients diagnosed with CVDs. That was a research gap that had to be filled if CVD management is to be augmented at the Uganda Heart Institute, and perhaps Uganda as a country.

This study will be of significance to officials and service providers at the NCD department at the Ministry of Health and the Uganda Heart Institute. Given that the Ministry of Health (MOH) has a plan for the reduction of mortality from CVDs and that the Uganda Heart Institute similarly provides dietary advice to each of the CVD patients, the findings of this study may be used by both entities to develop interventions meant to foster better adoption and adherence to quality dietary practices. The findings related to the proportion of patients who have satisfactory dietary quality may indicate the magnitude of poor dietary practices among patients at the UHI. The administrators of the institute and the MOH may use these findings to develop and/or modify available dietary behavior change guidelines or interventions for the patients at UHI. The institutional correlates that will be revealed by the study may help inform facility-based interventions to improve the dietary quality of patients diagnosed with CVDs.

Healthcare workers at the UHI will benefit from this study, given that they are the ones who are mandated to interact with CVD patients who seek care from the institute and provide them with

directed nutritional education and dietary advice. With the study findings on proportions (objective 1); service providers at UHI may intensify their provision of nutritional education. This will also prompt the service providers to emphasize provision of nutrition education to patients who will be found to bear characteristics that the study will reveal as being as negatively correlated to optimal dietary quality.

To the patients, findings from the study will be of benefit to them when intrapersonal correlates of dietary quality disseminated to them. It is anticipated that the patients will be able to uphold personal characteristics and dietary practices found to be protective and of satisfactory quality and modify those found to be negatively affecting them.

This study will be of significance to academia by; stimulating interest in researchers to conduct further studies in the area of CVDs and dietary quality. In addition, the study will be a source for in-country literature for similar studies that will be conducted in future.

1.6 Conceptual framework

Figure 1 shows a conceptual framework indicating the variables that this study had as independent and dependent variables, and a conceptualization of how they interact with each other. The independent variables were: intrapersonal factors (including socio-demographic characteristics and personal traits), intra-household factors, and institutional factors (including factors of healthcare service delivery at the Uganda Heart Institute). As mentioned earlier, the choice of the three independent variables was not only informed by literature, but also the interactional model of client health behavior (IMCHB) that was developed by Cox (1982). The model suggested that health-related behavior, like dietary practices (which constitute quality) is influenced at two levels, one being the client singularity and the other being patient-provider interaction.

The model suggests that the construct of client singularity denotes factors of the CVD client/patient themselves, including socio-demographic, personal, and interpersonal factors (Cox, 1982). The construct was adapted in this study as intrapersonal and intra-household factors (objectives 2 and 3), while the construct of patient-provider interaction was adapted as institutional factors (Objective 4). The dependent variable of the study was dietary quality, which was a binary variable with attributes of "satisfactory" and "unsatisfactory," of which the former was deemed so by having a DQI-I score exceeding 60%.

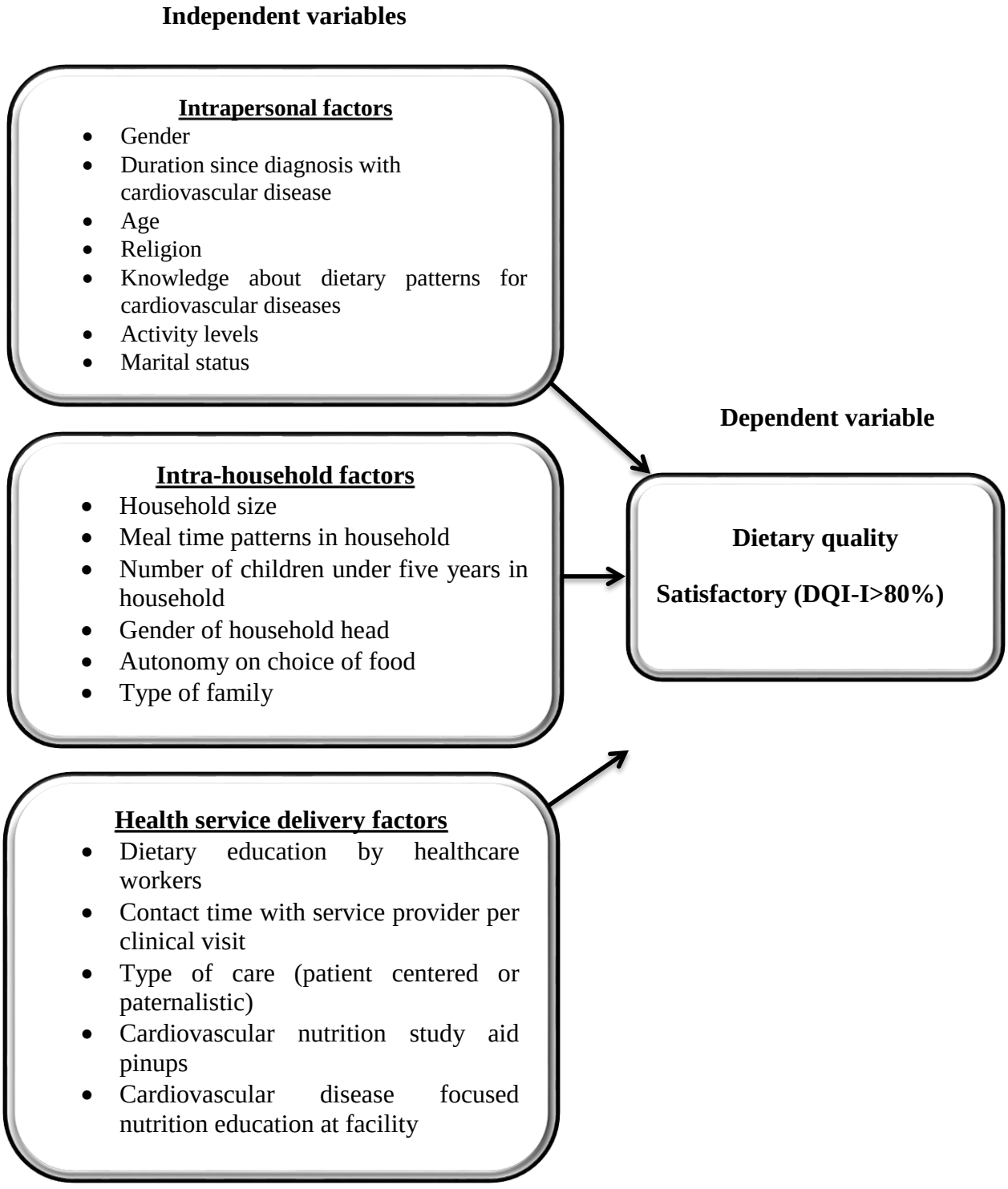

Figure 1: conceptual framework of the study

Adapted from the interactional model of client health behavior (IMCHB) by Cox (1982)

CHAPTER TWO: LITERATURE REVIEW

2.1 Cardiovascular diseases and their burden

Non-communicable diseases (NCDs) are the world's leading causes of deaths, responsible for nearly three quarters of all global deaths as of 2021 (WHO, 2021a). Each year, 41 million people die due to NCDs, representing 71% of all global deaths, and more than three quarters of those occur in low- and middle-income countries (WHO, 2021a). It came as no surprise therefore, that one of the primary targets in sustainable development goal three was the need to reduce NCD related mortality by one third, by 2030, through prevention and treatment (International Institute for Sustainable Development, 2022). However, whereas all NCDs ought to be prevented and treated as per the global health agenda, some have taken precedence over the past five years, and they include cardiovascular diseases (Tsao *et al*., 2022).

Cardiovascular diseases are disorders of blood vessels and the heart, and typically include cerebrovascular disease, coronary heart disease, coronary artery disease, aortic atherosclerosis, rheumatic heart disease, and peripheral artery disease (WHO, 2025; World Heart Federation, 2025; Lopez and Ballard, 2024). Peripheral artery disease refers to disorders of blood vessels in the limbs, cerebrovascular disease affects blood vessels leading to the head, while aortic atherosclerosis affects abdominal and thoracic arteries (Lopez and Ballard, 2024). The CVDs are caused by high consumption of sugar, saturated fats, physical inactivity, high consumption of saturated fats, high calorie diets (Benjamin *et al*., 2018; US Preventive Services Task Force, 2018; World Heart Federation 2025). Prevention and/or proper treatment of cardiovascular diseases is thus of paramount importance, and indeed, there have been numerous treatment and prevention measures developed over the years. Despite prevention efforts, the incidence of CVDs is on a gradual increase globally, with the implication that treatment is as important. Pharmacological

interventions for treating CVDs are numerous (Hansen *et al*., 2022; WHO, 2021c), and are largely adhered to by CVD patients (Desta *et al*., 2022). There is immense evidence, however, that without concurrent due attention to dietary interventions, CVD patients face higher risks of severe morbidity and mortality (Gibbs *et al*., 2021). As such, the need for adequate dietary quality among CVD patients has garnered attention over the years.

2.2 Proportion of patients with satisfactory dietary quality

Satisfactory diet quality (DQI-I>80%) is generally important for all persons, given that all body functions require particular nutrients to be optimum, of which all nutrients ought to be obtained from diet. However, among certain populations, dietary requirements are stricter, given that increments in intake of some nutrients or their deficiency can hasten progression to severe morbidity and increase mortality risk. Among such populations are those diagnosed with cardiovascular diseases, given that they have persistent elevations in blood lipids, glucose, and sodium increases mortality risk.

Dietary quality is therefore relatively more pertinent among such populations. It has been established that moderate consumption of meat, refined grain, coffee, and alcohol, fruit/vegetable, dairy (low-fat), whole grain, fish, and nuts is associated with lower CVD risk (Yu *et al*., 2018; Aune *et al*., 2017; Del Gobbo *et al*., 2015; Drouin-Chartier *et al*., 2016) and better disease prognosis. On the other hand, high potato intake and high consumption of other starchy foods increase the risk to coronary heart disease (CHD) (Muraki *et al*., 2016; Borgi *et al*., 2016; Borch *et al*., 2016), and therefore, not ideal for patients with CVDs.

To reduce severe morbidity and mortality risk among CVD patients, satisfactory dietary quality ought to be universal among them. Subhan and Chan (2019) assessed dietary intake using a food

frequency questionnaire and the Healthy Eating Index (HEI) among patients with Central obesity, hypercholesterolemia, and hypertension, and reported that 44% of them had poor HEI scores. Tadesse and Gerensea (2021), whose study included patients with hypertension (HTN) in Ethiopia, reported satisfactory dietary quality to be prevalent at about 52%.

A higher prevalence of satisfactory dietary quality was reported by Chung *et al*. (2021), among patients with heart failure (HF). They found that although none of the patients had a high diet score exceeding 80%, about 79% of them had satisfactory dietary practices (using HEI). A lower prevalence of dietary quality was reported by Long *et al*. (2022 in the United States, whose study included 10837 adults aged above 65 years, with the assessment of dietary practices using a 24-hour recall. They reported that 61% of the study participants had poor diet quality, making the proportion with satisfactory dietary quality to be 49%. That was consistent with findings by Pérez-Tepayo *et al*. (2020) whose study included adults in Mexico, South America, and reported that the majority of them had suboptimal scores of diet on the HEI scale.

In the Middle East, studies conducted therein aren't any different in their findings of what the prevalence of dietary quality was. In Pakistan, Lee *et al*. (2021), whose study was based on data from the National Health and Nutrition Examination Survey (NHANES) of the country, found that the mean score of the study participants on the HEI scale was only 55.6.

It should, however be noted that most studies related to dietary quality assessment have been done among pregnant women, and so the findings of those studies have also been reviewed as possible proxies for what the situation might be among CVD patient populations. Diddana (2019) studied 604 pregnant women in Ethiopia and found that 54.8% of them had poor dietary practice, making the proportion of those with satisfactory dietary quality to be 45%. This finding is consistent with

what was reported by Yeneabat *et al*. (2019), whose study included 804 pregnant women. They reported that dietary adequacy was prevalent at 45%, which is slightly lower than what was reported among pregnant women in the Philippines (46.4%), Yamashita *et al*. (2021).

However, that prevalence was slightly higher than what was reported two years earlier by Delil *et al*. (2021), whose study was conducted among 303 pregnant women in Southern Ethiopia. They found that the prevalence of adequate dietary practice stood at 42.6%. That was almost consistent with findings by Nana *et al*. (2018) at 40%, but significantly higher than what was recently reported by Fite *et al*. (2022). Fite *et al*. (2022) found that only 15.2% of 448 pregnant women in Eastern Ethiopia had good dietary practices. Some studies have nonetheless reported higher prevalences, at 47% (Harb *et al*., 2018) and 62% (Fasola *et al*., 2018). This is symbolic of the fact that there is a significant discrepancy in dietary quality across settings, as could be true among patients with CVDs.

Some other studies on dietary quality have been conducted among patients with type 2 diabetes and still revealed a low prevalence of dietary quality. The same could be true among patients with cardiovascular diseases. Demilew *et al*. (2020) found that only 35.9% of the diabetic patients had high dietary quality, and this was lower than the 48.6% reported by Amelmal *et al*. (2015). Another Ethiopian study by Worsa *et al*. (2021) reported a higher but still suboptimal prevalence of dietary quality of 60%, which was almost consistent (63%) with findings by Alhariri *et al*. (2017 and (63%) and Farooq *et al*. (2018). Zeleke& Charles (2020), whose study also included type 2 diabetics, reported the prevalence of satisfactory dietary practice to be 64%. Lower prevalences have been reported by Kasturia *et al*. (2018), Klinovszky *et al*. (2019) and Demilew *et al*. (2018), and Erkocho *et al*. (2022) (47%), all among diabetic patients in Ethiopia.

2.3 Intrapersonal factors associated with dietary quality among CVD patients

Several studies (Long *et al*., 2022; Choi *et al*., 2019; Yeneabat *et al*., 2019; Worsa *et al*., 2021; Wahome *et al*., 2018; Demilew *et al*., 2018; Angeles-Agdeppa *et al*., 2020; de Juras *et al*., 2022; Demilew *et al*., 2020; Diddana, 2019; de Juras *et al*., 2022) have revealed a number of intrapersonal correlates of dietary quality. The intrapersonal characteristics reported and documented range from loneliness, education, gender, perceptions, age, healthcare seeking behavior, religion, and income level to lifestyle.

Long *et al*. (2022) and Boulos *et al*. (2017) found that adults who were in self-isolation had poor eating habits and poor dietary quality. Such isolation usually results in depression, which has also been found to be an independent correlate of poor dietary practices (Worsa *et al*., 2021).

There is an agreement that education has a direct proportional relationship with dietary quality. Some studies (Choi *et al*., 2019; Li *et al*., 2017; Wahome *et al*., 2018; Demilew *et al*., 2018) reported that educated people had better dietary practices. Yeneabat *et al*. (2019) also found that non-educated women had higher risks of inadequate dietary diversity compared to their educated counterparts. Consistently, Worsa *et al*. (2021) and Saraf-Bank *et al*. (2017) found that non-attendance of formal education was associated with 3 times the risk of poor dietary quality.

Other studies (Angeles-Agdeppa *et al*., 2020; de Juras *et al*., 2022; Imamura *et al*., 2015; Souza *et al*., 2019; Demilew *et al*., 2020) have found relationships between gender and dietary quality/practices. Angeles-Agdeppa *et al*. (2020) found that a larger proportion of women had a higher dietary quality than men. Consistently, de Juras *et al*. (2022) and Souza *et al*. (2019) also found that females had higher odds of adhering to dietary patterns than males. Nationally representative systematic reviews conducted in Brazil (Imamura *et al*., 2015; Souza *et al*., 2019)

have also reported that women have higher-quality diets than men. On the contrary, Demilew *et al*. (2020), found that compared to females, males had better dietary practice and hence better dietary quality.

Age has also been found to be related to be a predictor of dietary quality. According to de Juras *et al*. (2022), older adults had better dietary practices, and this was consistent with findings of other studies: Imamura *et al*. (2015), Souza *et al*. (2019), and Daneshzad *et al*. (2019). However, Long *et al*. (2022) found that it was the older adults who had poorer dietary quality than younger adults.

Among other socio-demographic characteristics, religion and marital status were found to be associated with dietary quality. De Juras *et al*. (2022) found that being married was associated with better dietary patterns. Gonete *et al*. (2020) found that compared to people who subscribe to other religions, those who subscribe to Islam had poorer dietary practices. In one study by Teweldemedhin *et al*. (2021) there was no significant relationship between socio-demographic characteristics and dietary practice.

Health-seeking behavior has also been associated with dietary quality. Although there haven't been associations established between CVD-related care-seeking behavior and dietary quality, some studies have found that health-seeking behavior in some contexts had significant effects on dietary quality. The same could therefore be true in the context of CVD care and treatment-seeking behavior. Diddana (2019) found that non-attendance of antenatal care (ANC) increased chances of poor dietary diversity by three-fold. Ghosh-Jerath *et al*. (2015) found better protein intake among women who had attended ANC clinic, while in Nepal, Sunuwar *et al*. (2019) reported higher intake of red meat, fish and liver, vitamin C-rich fruits among pregnant women who had attended ANC.

Studies by Gonete *et al*. (2020), Yeneabat *et al*. (2019) and Gaona-Pineda *et al*. (2018) found relationships between income and dietary quality. Gonete *et al*. (2020) found higher chances of adequate dietary diversity among respondents who were wealthy. Gaona-Pineda *et al*. (2018) also concluded that healthier diets were consumed by people of higher socio-economic status (SES), and this was consistent with findings by Bruno-Fiscal *et al*. (2016) and Aburto *et al*. (2016). Long *et al*. (2022), Erkocho *et al*. (2022), and Yeneabat *et al*. (2019) found that being poor was associated with unhealthy dietary practices. The contrary was reported by de Juras *et al*. (2022); they found that participants who adhered to the healthy vegetables and corn pattern were poor

Some other studies (Miller *et al*., 2020; Murakami *et al*., 2019; Park *et al*., 2020; Worsa *et al*., 2021; Yamashita *et al*., 2021; Watanabe *et al*., 2022; Yeneabat *et al*., 2019) have found relationships between various lifestyle characteristics and dietary quality. Physical activity (Xu *et al*., 2018; Pate *et al*., 2015) and normal body mass index (BMI) (Park *et al*., 2020; Drewnowski *et al*., 2016; Pate *et al*., 2015) have been reported to have a positive effect on dietary quality. Watanabe *et al*. (2022) reported that sedentary behavior decreased dietary quality. Other studies have found meal frequency to be associated with dietary quality. Yamashita *et al*. (2021) reported that infrequent meal consumption increased odds of poor dietary diversity by twofold, consistent with findings by Yeneabat *et al*. (2019), Fite *et al*. (2021), Desta *et al*. (2019), and Shrestha *et al*. (2021)

Substance abuse has been associated with dietary quality. An inverse relationship has been found between substance abuse and dietary quality by most studies. Fite *et al*. (2022) reported that people who chewed Khat were less likely to have a good dietary quality. Consistently, alcohol consumers were found to have a higher uptake of sugar, oils, milk, and cereals (de Juras *et al*., 2022) .

2.4 Intra-household factors associated with dietary quality among CVD patients

It has been documented in various studies that the environment within which a patient lives has a bearing on their dietary practices (Auma *et al*., 2020; Chalermsri *et al*., 2020). One of those environments is the intra-household environment, given that most meals, if not all of them, are prepared within one's household setting. Studies including Baig *et al*. (2015), Pamungkas *et al*. (2017), Baig *et al*. (2015), and Erkocho *et al*. (2022) found the family environment to be important in dietary quality. Erkocho *et al*. (2022) found that having no support from family and friends increased the odds of poor dietary practice among type-2 diabetes patients by 4 times. It was reported that having family support increased chances of good dietary quality since family support comes with better self-care (Pamungkas *et al*., 2017; Baig *et al*., 2015)

Some studies have found relationships between household food security and dietary quality. Worsa *et al*. (2021) found that being a member of a secure household increased chances of satisfactory dietary practice, consistent with findings by Heerman *et al*. (2016) and Tucher *et al*. (2021)

As for the type of residence, people in urban residences have been found to have better dietary practices than their rural counterparts (Aburto *et al*., 2016), apparently premised on the greater availability of a variety of food in urban settings (Valencia-Valero RG, Ortíz-Hernández, 2016; Colchero *et al*., 2019).

Besides the location of a household, the characteristics of its inhabitants have also been found to matter in dietary quality. Fite *et al*. (2022) found that having an educated household head doubled the odds of having good dietary practices. Fite *et al*. (2021) also reported that living with an educated spouse increased odds of appropriate dietary practice, similar to findings by Alkalash *et al*. (2021), and Othoo *et al*. (2014). Consistent findings were reported by Minja *et al*. (2021), who

reported that being from a large household also increased chances of high dietary diversity. Drammeh *et al*. (2020) and Godha *et al*. (2021) reported that adolescents in larger households exhibited lower sugar consumption than those in smaller households. They also found that higher household income was associated with higher added sugar consumption, which was an indication of poor dietary quality.

2.5 Health service delivery factors associated with dietary quality among CVD patient

There are potentially numerous health service delivery factors that could determine dietary quality of patients. However, most studies that have assessed relationships between health service delivery factors and dietary quality have centered on the effect of health education, nutritional education, and dietary counseling. Sauer *et al*. (2018) concluded that dietary advice and counseling was protective of satisfactory dietary quality. Zelalem *et al*. (2018) on the other hand, showed that health education improved dietary practice from 46.8% to 83.7%, consistent with findings by Teweldemedhin *et al*. (2021), Abu-Baker *et al*. (2021), and Demilew *et al*. (2020) who found better dietary practice post-nutritional education intervention. Worsa *et al*. (2021) also reported better dietary practice among participants post the nutrition education intervention, consistent with findings by Cheikh *et al*. (2022) and Demilew *et al*. (2020).

Further still, similar findings have been reported in earlier studies; Addisu *et al*. (2014), Tol *et al*. (2014), and Parajuli *et al*. (2014) that the reception of education about diabetes fostered good dietary practices. However, Walsh *et al*. (2018) on the other hand found that it was the use of leaflets having nutritional advice that had impacted on dietary practice.

Yeneabat *et al*. (2019) also found three times the odds of inadequate diet diversity among pregnant women who hadn't received dietary counseling. Similar findings were reported by, Kaleem *et al*.

(2020) that nutrition counseling had improved the number of women who took appropriate portions of milk, cereals, vitamin D and bread. Salama (2018). On the other hand, Aşcı and Rathfisch (2016) found that guided counseling based on theoretical models was the one that had positive effect on dietary practices of pregnant women.

CHAPTER THREE: METHODOLOGY

3.1 Study design

This study adopted a cross-sectional survey design, using quantitative methods in which a representative sample of subjects is sampled and studied at one instance each (Lavrakas, 2008).

3.2 Study area

The study was conducted at the Uganda Health Institute (UHI), premised on the fact that it is the only specialized government owned treatment center for cardiovascular diseases. Uganda Heart Institute is part of Mulago National Referral hospital, located on Mulago hill, north of Kampala city. The institute provides cardiovascular services, and is currently a national referral hospital for heart diseases in Uganda. The facility provides cardiovascular care to more than 20,000 patients yearly, which makes it a suitable study area for studies involving CVD patients, given the high external validity.

3.3 Study population

The study targeted patients diagnosed with any cardiovascular disease (coronary heart disease, cerebrovascular disease, peripheral arterial disease, rheumatic heart disease, congenital heart disease, deep vein thrombosis, arrhythmias and pulmonary embolism). That is because unlike many other chronic diseases, the effective management of CVDs has to include integration of pharmacological and dietary management, implying that the patient has to have satisfactory dietary quality. Specifically, the study included adult patients aged 18 and above that had been living with a cardiovascular disease for the previous 3 months or more, before the study, and were seeking care from the Uganda Heart Institute. The study assumed that the dietary practices adopted within the last 3 months were prescribed and hence the basis to assess dietary quality.

3.4 Eligibility criteria

The study inclusion criteria were for Patients with any CVD, who had sought CVD related care and treatment from the Uganda Heart Institute more than two occasions (at least two months), premised on the fact that it was such patients that could provide valid responses regarding the patient-provider interactions at UHI, and also dietary practices that could be attributed to the knowledge they obtained from service providers at UHI.

The study exclusion criteria on the other hand was for;

i. Patients who were found to be in a lethargic state
ii. Patients who were in a health state that couldn't enable them sustain a 40 minutes' interview, as that would increase incidence of non-response

3.5 Sample size calculation

The sample size was computed using the formula by Daniel (1999), which is used when the accessible population size is less than 10,000, this is because the number of eligible patients with CVD that was accessible within a period of a month, at UHI, was less than 10,000. The formula is given by;

$n = X.N / X + (N-1)$

Where;

n is the sample size

X = Maximum sample size at a probability of 50%, given by Kish Leslie (1995) as 384, as follows;

$n = Z^2 \times P(1-P) / d^2$, where Z is the confidence interval (1.96), p is the proportion of CVD patients with satisfactory dietary quality (50%) and d is the margin of error (5%). Therefore;

$n = 1.96^2 \times 0.5 (1-0.5) / 0.05^2$

$n = 3.841 \times 0.25 / 0.0025$

$n = 348$

N = Population size = number of patients with CVD who are provided care on a monthly basis at UHI = 7234

Therefore

$n = 384 \times 7234 / 384 + (7324 - 1)$

$n = 2,777,856 / 384 + (7323)$

$n = 226176 / 7707$

n = 360 Patients with CVD

3.6 Sampling procedures

The Uganda Heart Institute provides care and treatment services to about 250 patients on a daily basis, with the implication that since the data collection exercise was to be done over a month period; it was possible to use random sampling to sample the patients. That was because over that time frame, the population size of CVD patients targeted was in excess of 5000. Therefore, the principal investigator used systematic random sampling, which was commenced by first calculating a daily sampling interval, using the formula K = N/n, where K is the sampling interval, N is the population size and n is the sample size.

The sampling interval was calculated for every day that data collect happened, since each day had

a distinct population size (Table 1). A list of CVD patients, scheduled for an appointment on a given day was accessed, and that list became the sampling frame for the day. The skip of 1 was observed and all patients sampled thereafter were the ones targeted as they came in. In case the patient earlier sampled on the list was not meeting the criteria of the study, then the sampling on the list was continued to the patient. To determine the number of patients who had to be sampled on a given day by proportionating the sample size according to the population size of patients that was expected on a given day. The formula that was used was; N1 = N2 / N3 x n, where N1 is the number of patients that were required on a given day, N2 is the number of patients available on that day, N3 is the total number of patients to access UHI over a 20-day period. The computation is shown in the table below;

Table 1: Computation of the number of respondents that had to be sampled on a given day

Day	N2	N3	N	N1	Interval
Day 1	245	4673	360	19	1
Day 2	250	4673	360	19	1
Day 3	344	4673	360	27	1
Day 4	198	4673	360	15	1
Day 5	200	4673	360	15	1
Day 6	199	4673	360	15	1
Day 7	244	4673	360	19	1
Day 8	278	4673	360	21	1
Day 9	233	4673	360	18	1
Day 10	188	4673	360	14	1
Day 11	249	4673	360	19	1
Day 12	199	4673	360	15	1
Day 13	145	4673	360	11	0
Day 14	291	4673	360	22	1
Day 15	201	4673	360	15	1
Day 16	140	4673	360	11	0
Day 17	180	4673	360	14	1
Day 18	393	4673	360	30	1
Day 19	249	4673	360	19	1
Day 20	247	4673	360	19	1
Total	**4673**			**360**	

3.7 Data collection methods

Data was collected at the institute using structured interviews, which were used so as to solicit responses from the respondents on intrapersonal, intra-household and institutional factors, in close ended, and hence inflexible manner. Each question asked had a fixed set of responses from which a respondent could choose. Those questions asked were designed in a structured questionnaire, which had close ended questions, to capture responses from the structured interviews. However, structured interviews could not solely be used to collect data given that some of it could not be validly assessed with self-reports. Therefore, medical record abstraction was also used, to particularly collect clinical data like the type of CVDs and duration of disease. Medical record abstraction is the process in which a given patients record is meticulously perused through, and any information relevant to a given study identified and captured on a data capture tool (abstraction form) earlier designed (Zozus *et al*., 2015).

3.8 Data collection tool

The study tool was a structured questionnaire (Appendix B) and was administered by interviewing and probing the respondents. The questionnaire was designed with five sections: Section A to include socio-demographic factors; Section B, dietary quality; Section C, intrapersonal factors; Section D, intra-household factors; and Section E had questions assessing health service delivery factors. Questions in Section B (Dietary quality) were adapted from the DQI-I, which was developed by Kim *et al* (2003). Several dietary quality assessment indicators have been developed (Paxton *et al*., 2011; Bloc *et al*., 2001; Lee *et al*., 2016; Teal *et al*., 2007; Rifas-Shiman *et al*., 2001; Olendzki *et al*., 1999), but the DQI-I is considered to be one of the most robust among them, given that it was developed following the merger of other dietary quality assessment tools, like the

Healthy Eating Index (HEI) (Kim *et al*., 2003). This tool is one of the most widely used indices for assessing dietary quality (Azadbakht *et al*., 2005; Saraf-Bank *et al*., 2017; Daneshzad *et al*., 2018; Asghari *et al*., 2013; Asghari *et al*., 2012; Azadbakht *et al*., 2012; Asghari *et al*., 2005). The DQI-I assesses the adequacy, moderation, and balance of a diet, implying that it can capture characteristics of nutritional adequacy even in the context of CVDs (Ebrahimi *et al*., 2020). The preference of the DQI-I in dietary quality assessment is also premised on its main strength, which is the inclusion of more food groups than other dietary quality assessment indicators, such as the Healthy Eating Index (HEI) (USDA, 2006; Newby *et al*., 2003).

It should be noted that the patients targeted were at UHI, a national referral facility, where patients from different tribes are treated. Therefore, they did not have a definitive local language that they all comprehended and that could be used. English remains the only language that they may all understand. However, in case translation to a particular language was needed for a particular patient, then direct translations were made in real time.

3.9 Quality control

3.9.1 Validity and Reliability of the study

Validity and Reliability of the study were ensured through the execution of three activities, which included: content validity testing, the training of the research assistants, and conducting a pre-test for the study. Of all the types of validity testing that can be used, content validity was chosen so that the extent to which the study tool, along with all its items, was able to achieve its intended use (obtaining data that was able to address the objectives). In computing the CVI, four persons regarded as experts in dietary assessment, especially in the context of CVDs, were selected and given a rating scale that they used to rate each of the items in the questionnaire. The scale was as

follows: 4 for a very relevant item, 3 for a relevant item, 2 for a somewhat relevant item, and 1 for a non-relevant item. They were requested to rate the relevance of each item in terms of its ability to address a corresponding objective. The two given to each of the four experts had 33 items to be rated, and their ratings were as follows: 27, 28, 30, and 31, respectively. The mean number of questions rated as 3 or 4 was therefore 29, making the CVI:;

$$CVI = \frac{29}{33} = 0.878$$

The tool was considered to be valid and therefore fit for use in data collection since its CVI is found to be in the range of 0.6 to 0.99.

3.9.2 Training of data collectors

A team of four assistants, two females and two males, all graduates, were recruited and trained in what the study is all about, and how it was conducted. Four assistants were sufficient since the study was conducted at only one locality (UHI), and yet there was a need to engage all available patients at the same time, at both entry and exit, before they left the institute's premises. Although the principal investigator himself was the lead data collector, the assistants served to enable the principal investigator to engage more patients concurrently so that none was kept waiting after receiving care. The assistants were taken through the study tool, and emphasis was put on section B, where the outcome variable was to be assessed. This training was conducted three weeks before the main data collection date, given that within those three weeks, a pre-test of the tool had to be conducted, along with the assistants.

3.9.3 Pre-test

The tool was pretested among a section of 10 patients with CVDs seeking care and related treatment services from Kiruddu National Referral Hospital. Like the Uganda Heart Institute, Kiruddu National Referral Hospital also has several CVD patients who have elevated lipids and an imbalance in nutritional blood chemistry in general. Kiruddu was thus a suitable pre-test site for this study, as it was expected to yield pre-test information that could inform the conduction the protocol of the main study. The pre-test was conducted with the main purpose of enabling the principal investigator to ascertain particular dynamic data collection that may, if necessary, adjust the study tool, improve the questioning techniques prepare better for the main data collection exercise. The pre-test gave insights into the following: the ease of sampling eligible patients diagnosed with CVDs, the length of the interviews, the comprehensibility of the questions to the patients, and whether there was a need for direct translation or the translation of the entire tool to the local dialect. Thus, after the pretest, a few modifications were made to the tool, including the addition of two more questions in the intra-household characteristics assessment section and the modification of response options to question 32, to make them easier for respondents to understand. It was also determined that there was a need for direct translation of the tool during interviews, since the patients were from different ethnic backgrounds.

3.9.4 Hawthorne effect prevention

To avoid the Hawthorne effect, the principal investigator affirmed the fact that this study was very confidential, conducted in a private and anonymous manner. The respondents were also emphatically told that this study was meant to generate findings to be used to better their quality of life as well as the quality of healthcare they received from the Uganda Heart Institute. With that, they were urged to provide factual information related to their dietary quality. In addition, medical

record abstraction was used to collect data that could not be validly collected via patient self-reports.

3.10 Data management

3.10.1 Data cleaning

All the questionnaires that were filled during the survey were each scrutinized for evidence of complete response to all the questions therein. The respective responses per question were entered into a computer programme, SPSS version 25. Following the entry, each of the columns was manually checked to ensure that there were no errors in code entry, and once that was the case, data analysis was conducted.

3.10.2 Data analysis

After data entry, univariate analysis was conducted for all variables, using descriptive statistics of frequency distributions and testing for normality of data distribution. That analysis yielded frequencies and valid percentages for each of the variables to answer the first research question. The next step of analysis included cross-tabulation analysis, which was also descriptive to determine the distributions of each independent variable into the dependent variable. The cross tabulations were then followed by bivariate analysis, using the Chi-square test statistic, although that was done for only variables whose cross tabulations did not have a null integer.

All variables whose p-values were less than 0.2, at the bivariable level, were screened out and considered for multivariable analysis using a log-binomial model, which is one of the ideal analytical models used in inferential analysis, since it provides accurate p –p-values (Martinez *et al*., 2017). The choice of a log-binomial model was particularly informed by the fact that the magnitude of the outcome of this study exceeded 10%, hence meeting the assumptions of its use

(Martinez *et al*., 2017). The model yielded adjusted prevalence ratios (aPR) where statistical significance was set at 5% and all variables that had a p value less than 0.05 were considered significant at multivariable analysis and considered to be the factors associated with dietary quality among patients diagnosed with CVDs at the Uganda Heart Institute.

3.11 Measurement of variables (Dietary quality)

Dietary quality was measured using the Dietary Quality Index International (DQI-I), which, as shown in Table 1, covers three main areas, including the overall food group variety, adequacy, moderation, and balance. Food group variety includes assessment of the number of food groups consumed from the variety, including meat/poultry/fish/eggs; dairy/beans; grain; fruit; vegetable. The adequacy category assesses whether a person consumes enough of vegetables, fruits, grains, fiber, protein, (Iron, Calcium, and Vitamin C). The moderation category, on the other hand, covers the intake of foods that ought to be taken in moderation, especially in the context of CVDS. The food groups in this category included: Total fat, Saturated fat, Cholesterol, Sodium, and empty calorie foods like alcohol.

Each of the groups ' consumption characteristics was scored in terms of points, with the total maximum number of points being 85. However, as earlier justified, the cut-off for optimal dietary quality was set at 60%, as opposed to the usual 80% set for adequacy of practices, unlike dietary quality. Therefore, given that the maximum score from the DQI-I is 85, a patient was considered as having a satisfactory dietary quality if they scored 51 of the 85 DQI-I points (60%). (Appendix B).

The tool (DQI-I) has a maximum possible score of 85 for optimality of dietary quality, however, given that the tool has multiple food groups (Fruit, Grains, Vegetable group), some of which may

not be concurrently consumable on a single given day, due to comorbidities including type II diabetes that is common among patients with CVDs (Ma *et al*., 2022; Einarson *et al*., 2018), the cut-off for optimal dietary quality was set at 60%, as opposed to the usual 80% usually set for adequacy of practices unlike dietary quality. Therefore, given that the maximum score from the DQI-I was 85, a patient was considered as having a satisfactory dietary quality if they scored >=51 of the 85 maximum DQI-I points (60% of 85).

Table 2: Dietary Quality Index-International scoring system

Categories	Amount ranges	Points
Variety	**0–20 points**	
Overall food group variety (meat/poultry/fish/eggs; dairy/beans; grain; fruit; vegetable)	>1 serving from each food group/day	15 points
	Any 1 food group missing/day	12 points
	Any 2 food groups missing/day	9 points
	Any 3 food groups missing/day	6 points
	>4 food groups missing/day	3 points
	None from any food groups	0 points
Within-group variety for protein source (meat, poultry, fish, dairy, beans, eggs)	>3 different sources/day	5 points
	Two different sources/day	3 points
	From 1 source/day	1 points
	None	0 points
Adequacy	**0–40 points**	
Vegetable group	3–5 servings/day	5 points
	0 servings/day)	0 points
Fruit group	2–4 servings/day	5 points
	0 servings/day	0 points
Grain group	6–11 servings/day	5 points
	0 servings/day	0 points
Fibre	20–30 g/day	5 points
	0 g/day	0 points

Categories	Amount ranges	Points
Variety	**0–20 points**	
Protein	10% of energy/day	5 points
	0% of energy/day	0 points
Iron	100% RDA (AI)/day	5 points
	0% RDA (AI)/day	0 points
Calcium	100% AI/day	5 points
	0% AI/day	0 points
Vitamin C	100% RDA (RNI)/day	5 points
	0% RDA (RNI)/day	0 points
Moderation	**0–30 points**	
Total fat	<20% of total energy/day	6 points
	20–30% of total energy/day	3 points
	>30% of total energy/day	0 points
Saturated fat	>7% of total energy/day	6 points
	7–10% of total energy/day	3 points
	10% of total energy/day	0 points
Cholesterol	<300 mg/day	6 points
	300–400 mg/day	3 points
	>400 mg/day	0 points
Sodium	<2400 mg/day	6 points
	2400–3400 mg/day	3 points
	>3400 mg/day	0 points
Empty-calorie foods	<3% of total energy/day	6 points
	3–10% of total energy/day	3 points
	>10% of total energy/day	0 points

3.12 Ethical considerations

The protocol was approved by Kyambogo University (Appendix C), The AIDS Support Organisation (TASO) Research Ethics Committee (Appendix D) under study reference number

TASO-2023-217, and the Uganda National Council of Science and Technology under number HS3899ES. Permission was also sought from the administration of the UHI (Appendix E) before engaging with the patients at the Institute. Each potential respondent was asked for consent and was required to sign the consent letter to be included and the study (Appendix A). When engaging each of the patients, some ethical considerations were observed, commencing with consent and self-determination. The respondents were taken through a consenting process in which they were informed about the study and its procedures, including what they were expected to, if they chose to be participants. All interviews were conducted with the observance of social distancing, and in case of any need for contact with the respondent, they would be given a mask to wear.

All the questionnaires that were filled out did not bear the respondents' names or any identifying information. Once collected from the assistants, the questionnaires were kept with the principal investigator at all times, and even when entered in software, the computer used was password-protected. All that was done to ensure confidentiality and anonymity. In addition, interviews had been conducted in an area where there was no third-party listening into the interview. All the respondents were informed about the voluntariness of their participation in this study. They were informed that they could withdraw from the study without any repercussions.

CHAPTER FOUR: RESULTS

4.1 Socio-demographic characteristics of the respondents

Table 3 shows the socio-demographic characteristics of the respondents (CVD patients). Accordingly, more than half, 218(60.6) of the CVD patients were female, although slightly more than a quarter, 94 (26.1) of them were aged 60 years. Nearly two-thirds, 232(64.4%) of the CVD patients were married/cohabiting, while more than three-quarters, 313(86.9%) of them had formal education. However, among those who were educated, slightly more than a third 128(40.9) of those who were educated had been educated at a post-secondary institution. More than a third, 128(35.7%), of the patients of the Anglican faith, and more than half, 200(55.6%), were not employed.

Table 3: Socio-demographic characteristics

Variable	Category	Frequency (%)
Sex		
	Female	218(60.6)
	Male	142(39.4)
Age		
	Less than 20 years	26(7.2)
	20 - 29 years	27(7.5)
	30 - 39 years	66(18.3)
	40 years and more	241(66.9)
Current marital status		
	Married	232(64.4)
	Single (Widow/widower, divorced)	128(35.6)
Received any formal education		
	Yes	313(86.9)
	No	47(13.1)
Level of education		
	Post-secondary	128(40.9)
	Secondary	105(33.5)
	Primary	80(25.6)
Religious denomination		
	Anglican	128(35.7)
	Catholic	111(30.9)
	Muslim	60(16.7)
	Orthodox/SDA	15(4.2)
	Traditional	7(1.9)
	Born Again	39(10.9)
Employed currently		
	Yes	160(44.4)
	No	200(55.6)

About three-quarters, 269(74.7%) of the CVD patients sampled were residents in the Central region of Uganda.

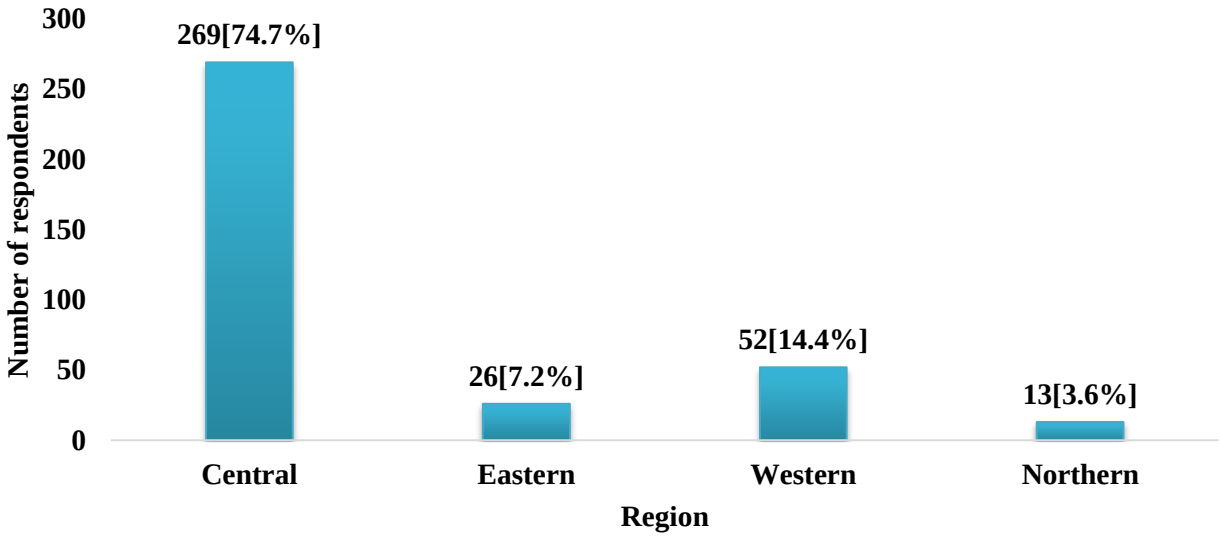

Figure 2: Distribution of regions of residence

4.2 Dietary quality among CVD patients

More than three quarters of the patients sampled did not eat of the food groups including meat 323(89.7%), Poultry 352(97.8%), Fish 313(86.9%), Egg, dairy 244(67.8%), and Beans, Grains, Fruits, Vegetables 325(90.3%) as shown in table.3. The majority of the patients had inadequate intakes of Meat, Poultry, Fish, Dairy, Beans and Eggs 291(80.8), Vegetables 159(44.2%), fruits (202[56.1%]), and grain 205(56.9%). About four-fifths of the CVD patients sampled did not meet their Recommended Dietary Intakes for fiber (290[80.6%). More than a third of them obtained 10% of their energy from protein 133(36.9%), although the majority of them did not meet their Recommended Dietary Intakes for Iron 184(51.1%), Calcium 284(78.9%), and Vitamin C 244(67.8%). Almost all the patients obtained <20% of their total energy/day from total fat 340(94.4%). More than three quarters of the patients obtained 10% of their total energy/day from saturated fat 289(80.3%), while more than two thirds of them consumed >400 mg/day of

cholesterol 253(70.3%) per day. Nearly two thirds of the respondents consumed between 2400 and 3400 mg/day of sodium 237(65.8%), while more than three-quarters of the respondents (307[85.3%) obtained more than 10% of their total energy from alcohol, table 3.

Table 4: Assessment of dietary quality

Food Groups	DQI-I scores (Points)						
	0	**1**	**2**	**3**	**4**	**5**	**6**
Meat	323(89.7)	0.0	0.0	37(10.3)	0.0	0.0	0.0
Poultry	352(97.8)	0.0	0.0	8(2.2)	0.0	0.0	0.0
Fish	313(86.9)	0.0	0.0	47(13.1)	0.0	0.0	0.0
Egg, dairy	244(67.8)	0.0	0.0	116(32.2)	0.0	0.0	0.0
Beans, Grains, Fruits, Vegetables	35(9.7)	0.0	0.0	325(90.3)	0.0	0.0	0.0
Meat, Poultry, Fish, Dairy, Beans, and Eggs	291(80.8)	0.0	0.0	69(19.2)	0.0	0.0	0.0
Vegetables (Adequacy)	159(44.2)	5(1.4)	11(3.1)	50(13.9)	27(7.5)	108(30.0)	0.0
Adequacy – Fruit (Adequacy)	202(56.1)	2(.6)	15(4.2)	37(10.3)	23(6.4)	81(22.5)	0.0
Grain (Adequacy)	205(56.9)	6(1.7)	16(4.4)	30(8.3)	31(8.6)	72(20.0)	0.0
Fiber (Adequacy)	290(80.6)	9(2.5)	18(5.0)	16(4.4)	13(3.6)	14(3.9)	0.0
Protein	133(36.9)	12(3.3)	13(3.6)	27(7.5)	36(10.0)	139(38.6)	0.0
Iron	184(51.1)	13(3.6)	15(4.2)	24(6.7)	48(13.3)	76(21.1)	0.0
Calcium	284(78.9)	3(0.8)	8(2.2)	26(7.2)	9(2.5)	30(8.3)	0.0
Vitamin C	244(67.8)	0.0	7(1.9)	31(8.6)	18(5.0)	60(16.7)	0.0
Total Fat	340(94.4)	8(2.2)	3(.8)	6(1.7)	1(.3)	2(.6)	0.0
Saturated Fat	289(80.3)	5(1.4)	19(5.3)	32(8.9)	4(1.1)	10(2.8)	1(.3)
Cholesterol	253(70.3)	4(1.1)	26(7.2)	61(16.9)	3(.8)	9(2.5)	4(1.1)
Sodium	37(10.3)	7(1.9)	44(12.2)	237(65.8)	15(4.2)	17(4.7)	3(.8)
Calorie-Dense Foods like Alcohol	307(85.3)	12(3.3)	7(1.9)	12(3.3)	6(1.7)	12(3.3)	4(1.1)

From the assessment in Figure 2 it can be concluded that the proportion of patients diagnosed with cardiovascular diseases at the Uganda Heart Institute, who have satisfactory dietary quality is only 35(10%).

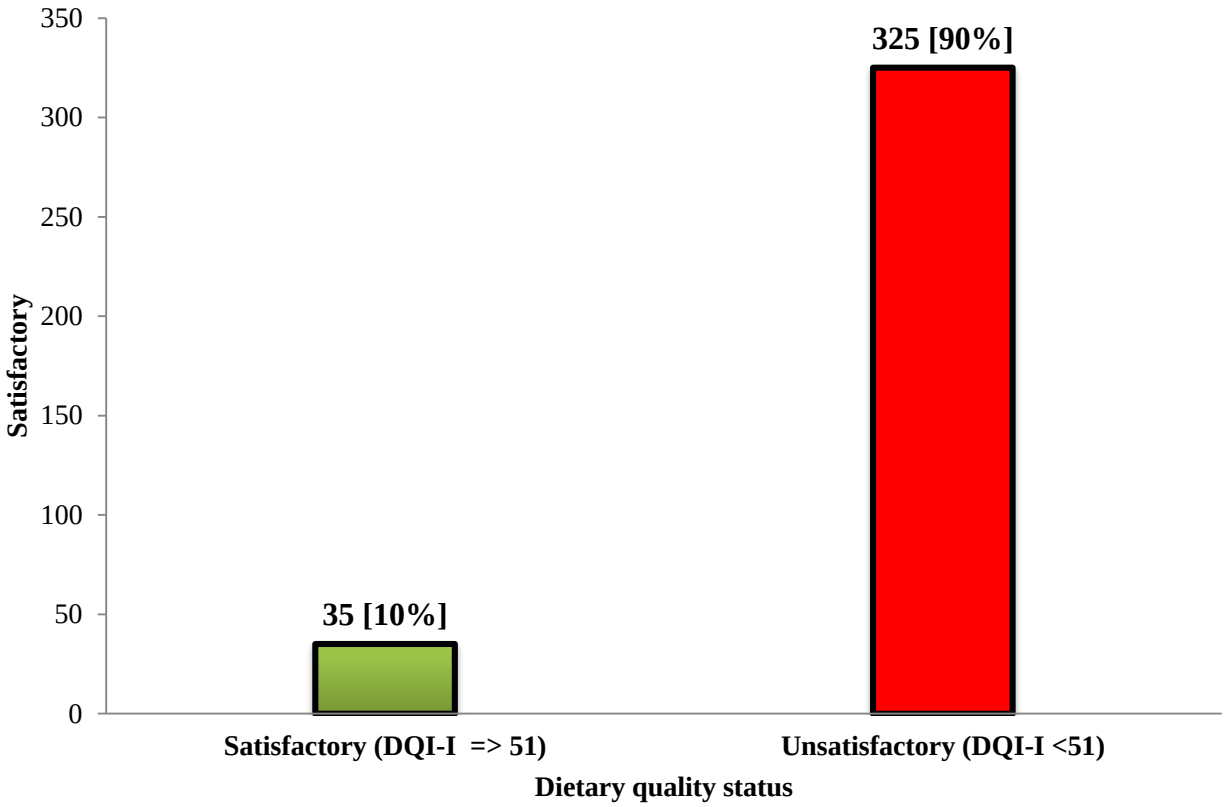

Figure 3: Respondents who had satisfactory and unsatisfactory dietary quality

4.3 Intrapersonal factors associated with dietary quality among CVD patients

According to findings in Table 5, more than half of the CVD patients had been living with their CVD condition for less than 5 years 194(53.9). Almost half of them 335(93.1%) mentioned that the type of food that should be ingested in higher quantities by CVD patients should include fruits and vegetables. More than two-thirds of the patients, 225(62.5%), pointed out that foods such as fat, sugar, and vegetables should be consumed in smaller quantities by CVD patients. Nearly half of them had a low perceived risk of their CVD turning severe 172(47.8%). Nearly two-thirds of

the respondents noted that they were currently eating so well for the proper management of the disease 229(63.6%).

Only one intrapersonal factor showed statistical significance at 5% alpha, in its association with dietary quality, and that was perceived risk of CVD turning severe (p = 0.002). The rest of the intrapersonal factors did not show a significant association with the dietary quality of the patients. The descriptive cross-tabulation analysis at the bivariate level showed that among the patients who had a high perceived risk of their CVD turning severe, almost a third (30.4%) had a satisfactory dietary quality. Inferentially, the prevalence of satisfactory dietary quality was three times as high among patients who had a high perceived risk of their CVD turning severe (aPR = 3.464 [95% CI = 1.197 - 10.026], P = 0.022) compared to those who had a low perceived risk of their CVD turning severe.

Table 5: Bivariate and multivariate associations between intrapersonal characteristics and dietary quality

Variable	N	Dietary quality		cPR (95% CI)	P-value	aPR (95% CI)	p-value
		Satisfactory	Unsatisfactory				
Duration of living with CVD							
Less than 5 years	194(53.9)	18(9.3%)	176(90.7%)	0.909(0.355 - 2.328)	0.843		
5 - 10 years	117(32.5)	12(10.3%)	105 (89.7%)	1.005(0.374 - 2.701)	0.992		
More than 10 years	49(13.6)	5(10.2%)	44(89.8%)	1.000			
Food ingested in higher quantities by CVD patients							
Fat and Sugar	25(6.9)	0(0.0%)	25(100.0%)				
Vegetables	96(26.7)	6(6.3%)	90(93.8%				
Fruits	71(19.7)	10(14.1%)	61 (85.9%)				
Fruits and Vegetables	168(46.7)	19(11.3%)	149(88.7%)				
Food ingested in lower quantities by CVD patients							
Fat	135(37.5)	13(9.6%)	122(90.4%)	0.923(0.465 - 1.832)	0.819		
Sugar	37(10.3)	2(5.4%)	35(94.6%)	0.518 (0.125 - 2.146)	0.365		
Fruits and Vegetables	22(6.1)	2(5.4%)	35(94.6%)	1.151(0.363 - 3.644)	0.812		
Fat, Sugar, vegetables	163(45.3)	17(10.4%)	146(89.6%)	1.000			
Engage in physical activity							
Yes	265(73.6)	27(10.2%)	238(89.8%)	1.210(0.570 - 2.570)	0.620		
No	95(26.4)	8(8.4%)	87(91.6%)	1.000			
Perceived risk of CVD turning severe							
High	23(6.4)	7(30.4%)	16(69.6%)	3.272(1.508 - 7.097)	0.003	3.464(1.197 - 10.026)	**0.022**
Moderate	165(45.8)	12(7.3%)	153(92.7%)	0.782(0.382 - 1.602)	0.501	1.000	
Low	172 (47.8)	16(9.3%)	156(90.7%)	1.000			
I am currently eating so well for the proper management of the disease.							
Agree	229(63.6)	25(10.9%)	204(89.1%)	1.430 (0.709 - 2.883)	0.317		
Disagree	131(36.4)	10(7.6%)	121(92.4%)	1.000			
Sex							
Female	218(60.6)	19(8.7%)	199(91.3%)	0.774(0.412 - 1.453)	0.425		
Male	142(39.4)	16(11.3%)	126(88.7%)	1.000			
Age							
Less than 20 years	26(7.2)	4(15.4%)	22(84.6%)	2.066(0.655 - 6.519)	0.216		
20 - 29 years	27(7.5)	2(7.4%)	25(92.6%)	0.995(0.219 - 4.512)	0.995		
30 - 39 years	66(18.3)	7(10.6%)	59(89.4%)	1.424(0.524 - 3.869)	0.488		
40 - 49 years	68(18.9)	8(11.8%)	60(88.2%)	1.580(0.602 - 4.148)	0.353		
50 - 59 years	79(21.9)	7(8.9%)	72(91.1%)	1.190(0.436 - 3.247)	0.734		
60 and Above	94(26.1)	7(7.4%)	87(92.6%)	1.000			
Current marital status							
Married/cohabiting	232(64.4)	23(9.9%)	209(90.1%)				
Single	105(29.2)	9(8.6%)	96(91.4%)				
Widow/widower	17(4.7)	3(17.6%)	14(82.4%)				
Divorced	6(1.7)	0(0.0%)	6(100.0%)				
Received any formal education							
Yes	313(86.9)	29(9.3%)	284(90.7%)	0.726(0.318 - 1.654)	0.446		
No	47(13.1)	6(12.8%)	41(87.2%)	1.000			
Level of education							
Graduate	61(19.5)	6(9.8%)	55(90.2%)	1.033(0.378 - 2.824)	0.950	0.991(0.362 - 2.710)	0.986
Diploma	38(12.1)	7(18.4%)	31(81.6%)	1.934(0.756 - 4.948)	0.169	1.713(0.657 - 4.470)	0.271
Certificate	29(9.3)	1(3.4%)	28(96.6%)	0.362(0.047 - 2.772)	0.328	0.377(0.049 - 2.878)	0.347
A-Level	24(7.7)	1(4.2%)	23(95.8%)	0.438(0.058 - 3.327)	0.424	0.433(0.057 - 3.289)	0.419
O-Level	77(24.6)	6(7.8%	71(92.2%)	0.818(0.297 - 2.252)	0.698	0.838 (0.305 - 2.305)	0.732
Primary	84(26.8)	8(9.5%)	76(90.5%)	1.000		1.000	
Employed currently							
Yes	160(44.4)	19(11.9%)	141(88.1%)	1.484(0.789 - 2.792)	0.220		
No	200(55.6)	16(8.0%)	184(92.0%)	1.000			
Region							
Central	269(74.7)	22(8.2%)	247(91.8%)	0.532(0.140 - 2.023)	0.354		
Eastern	26(7.2)	2(7.7%)	24(92.3%)	0.500(0.079 - 3.159)	0.461		
Western	52(14.4)	9(17.3%)	43(82.7%)	1.125(0.276 - 4.592)	0.870		
Northern	13(3.6)	2(15.4%)	11(84.6%)	1.000			

Close to half of the CVD patients who engaged in physical activity engaged in light forms of it 128(48.3%). However, the intensity of physical activity engaged in showed no statistical significance in its association with dietary quality ($p<0.05$).

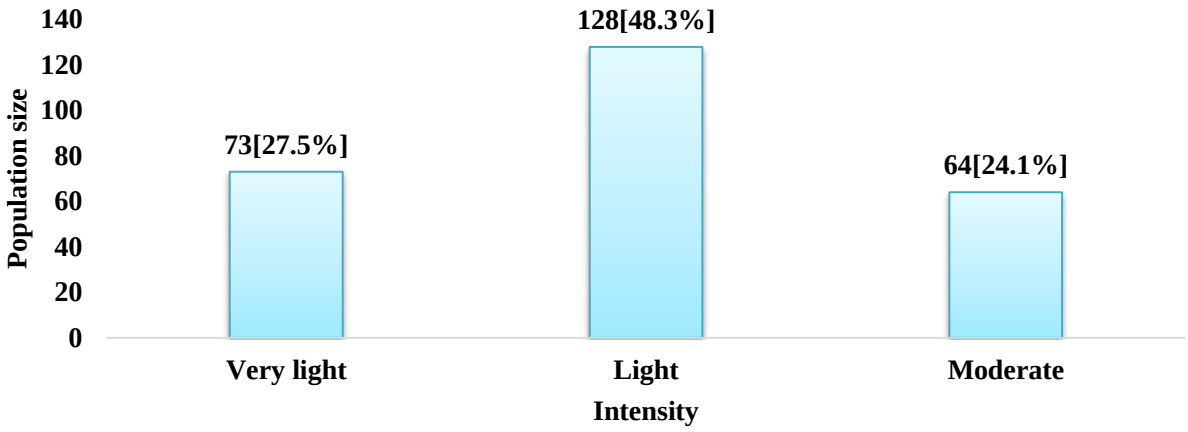

Figure 4: Intensity of activity

More than a third 140(38.9%), of the patients were overweight with a BMI ranging from 25.0 - 29.9 Kg/m2, although BMI was of no statistical significance in influencing dietary quality.

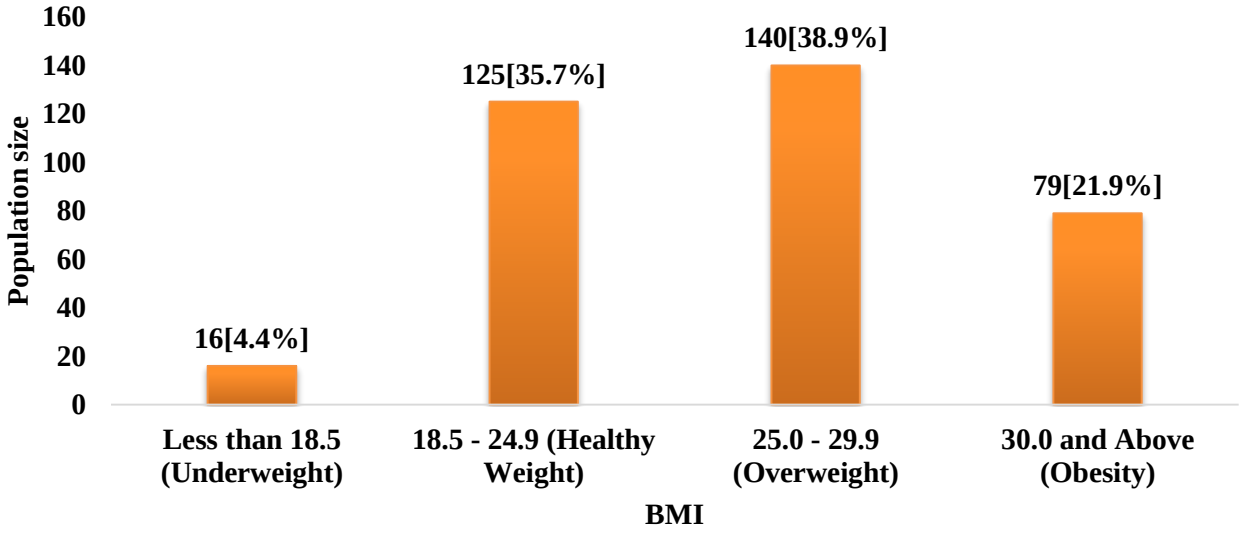

Figure 5: Distribution of body Mass Index

Additional analysis was also done to analyze the association between gender and perceived risk of having the cardiovascular disease you have turn severe. However, the interaction between the two variables was not statistically significant.

Table 6: Interaction between gender and perceived risk of CVD turning severe

Variable	n(%)	Perceived risk of having the cardiovascular disease you have turn severe				Total
		High	Moderate	Low	P value	
Sex						
Female	218(60.6)	16(7.3%)	98(45.0%)	104(47.7%)	0.646	218(100.0%)
Male	142(39.4)	7(4.9%)	67(47.2%)	68(47.9%)		142(100.0%)

4.4 Intra-household factors associated with dietary quality among CVD patients

Nearly two-thirds of the CVD patients lived in household comprised of between 5 and 10 members (222[61.7%]), and they consumed three meals a day (234[65.0%]). More than three-quarters of the CVD patients were living in households that had no other person living with CVDs in them 285, 79.2%), and almost half of them 170 (47.2%) were living in households that had no children under five years of age. Almost three-quarters of the cardiovascular disease patients sampled were residing in households headed by a male 262(72.8%), and more than three-quarters of them had autonomy on the choice of food eaten in the household 279(77.5%). The majority of the patients (196[54.4%]) were living within a nuclear type of family. Only one intra-household showed statistical significance, in relation to dietary quality, and that is meal frequency. The findings showed that the prevalence of satisfactory dietary quality was lower by 83% among CVD patients who were in households that consumed one to two meals a day (aPR = 0.172 [0.053 - 0.558] p = 0.003).

Table 7: Bivariate and multivariate associations between intra-household factors and dietary quality

Variable	n	Dietary quality		cPR (95% CI)	P-value	aPR (95% CI)	p-value
		Satisfactory	Unsatisfactory				
Household size							
Less than 5 members	107(29.7)	11(10.3%)	96(89.7%)	0.637(0.240 - 1.696	0.367	0.555(0.218 - 1.415)	0.217
5 - 10 members	222(61.7)	19(8.6%)	203(91.4%)	0.531 (0.213 - 1.319	0.173	1.000	
More than 10 members	31(8.6)	5(16.1%)	26(83.9%)	1.000			
Household meal frequency							
One to two	100(27.8)	5(5.0%)	95(95.0%)	0.260(0.081 - 0.831)	0.023	0.172 (0.053 - .558)	**0.003**
Three	234(65.0)	2510.7%	209(89.3%)	0.556 (0.233 - 1.327	0.186	0.397(0.163 - 0.964)	**0.041**
More than three	26(7.2)	5(19.2%)	21(80.8%)	1.000		1.000	
Any other persons living with CVDs in the household							
Yes	75(20.8)	10(13.3%)	65(86.7%)	1.520 (0.764 - 3.024)	0.233		
No	285(79.2)	25(8.8%)	260(91.2%)	1.000			
Children under five in the household							
One	105(29.2)	9(8.6%)	96(91.4%)	0.911 (0.418 - 1.986)	0.814		
Two	58(16.1)	7(12.1%)	51(87.9%)	1.282(0.555 - 2.961)	0.560		
Three or more	27(7.5)	3(11.1%)	24(88.9%)	1.181 (0.368 - 3.782)	0.780		
None	170(47.2)	16(9.4%)	154(90.6%)	1.000			
Gender of household head							
Female	98(27.2)	8(8.2%)	90(91.8%)	0.792(0.373 - 1.684)	0.545		
Male	262(72.8)	27(10.3%)	235(89.7%)	1.000			
Have any autonomy on choice of food eaten in the household		\					
Yes	279(77.5)	28(10.0%)	251(90.0%)	1.161(0.527 - 2.560)	0.711		
No	81(22.5)	28(10.0%)	251(90.0%)	1.000			
Type of family							
Nuclear	196(54.4)	15(7.7%)	181(92.3%)	0.628(0.332 - 1.186)	0.151	0.606(0.294 - 1.250)	0.175
Extended	164(45.6)	20(12.2%)	144(87.8%)			1.000	

4.5 Health service delivery factors associated with dietary quality among CVD patients

Almost all CVD patients sampled 346(96.1%) reported that they were provided with dietary education by healthcare workers at the Uganda Heart Institute. The majority of the patients

reported that they spent between 10 and 20 minutes of contact time with the service providers per clinical visit, at the Uganda Heart Institute 205(56.9%) (Table 7). More than three quarters of the patients rated the contact time with their service provider per clinical visit to be sufficient 305(84.7%), and also reported that the sessions were always interactive, and that they were allowed to ask questions 322(89.4%). Almost all patients mentioned that there were cardiovascular nutrition study aids and pinups at the facility 352(97.8%), and that they received CVD focused nutrition education at the facility (340(94.4%). Almost all the patients' reported that healthcare workers at the facility try to follow up their eating habits 179(49.7%), although the majority noted that service providers at the institute interface with them to take dietary history 186(51.7%) (Table 6).

At bivariable level, the findings revealed that only one variable happened to be statistically significant, and that was whether service providers interfaced with endeavor to take dietary history ($p = 0.035$). The descriptive cross tabulations show that of the patients who reported that the service providers they interfaced with did not endeavor to take dietary history, more than a tenth of them (24(12.9%) had satisfactory dietary quality. Two institutional characteristics showed statistical significance; the prevalence of satisfactory dietary quality was less by 54% among CVD patients whose contact time with service providers per clinical visit was more than 20 minutes, at the Uganda Heart Institute (aPR = 0.459[95% CI =0.216 - 0.979], p = 0.044). The prevalence of satisfactory dietary quality was less by 56% among CVD patients who reported that service providers they interfaced with endeavored to take their dietary history (aPR = 0.435[95% CI = 0.215 - 0.882], P = 0.021) compared to those those whose dietary history was not taken by service providers per interface.

Table 8: Bivariate and multivariate associations between health service delivery and dietary quality

Variable	n	Dietary quality		cPR (95% CI)	P-value	aPR (95% CI)	p-value
		Satisfactory	Unsatisfactory				
Provided with dietary education by healthcare workers at the Uganda Heart Institute							
Yes	346(96.1)	32(9.2%)	314(90.8%)	0.432 (0.150 - 1.241)	0.119	0.444 (0.154 - 1.286)	0.135
No	14(3.9)	3(21.4%)	11(78.6%)	1.000		1.000	
Contact time with service providers per clinical visit, at the Uganda Heart Institute							
Less than 10 minutes	94(26.1)	10(10.6%)	84(89.4%)	0.649(287 - 1.466)	0.298	0.659 (0.270 - 1.611)	0.361
10 - 20 minutes	205(56.9)	15(7.3%)	190(92.7%)	0.446(0.211 - 0.942)	0.034	0.459(0.216 - 0.979)	**0.044**
More than 20 minutes	61(16.9)	10(16.4%)	51(83.6%)	1.000		1.000	
Rate of contact time with service provider per clinical visit							
Sufficient	305(84.7)	29(9.5%)	276(90.5%)	0.872 (0.380 - 2.000)	0.746		
Not sufficient	55(15.3)	6(10.9%)	49(89.1%)	1.000			
Sessions always interactive, allowed to ask questions							
Yes	322(89.4)	30(9.3%)	292(90.7%)	0.708(0.292 - 1.716)	0.445		
No	38(10.6)	5(13.2%)	33(86.8%)	1.000			
Cardiovascular nutrition study aids and pinups at facility							
Yes	352(97.8)	35(9.9%)	317(90.1%)				
No	8(2.2)	0(0.0%)	8(100.0%)				
CVD focused nutrition education at the facility							
Yes	340(94.4)	33(9.7%)	307(90.3%)	0.971(0.251 - 3.760)	0.966		
No	20(5.6)	2(10.0%)	18(90.0%)	1.000			
Healthcare workers at this facility try to follow up your eating habits							
Yes	179(49.7)	16(8.9%)	163(91.1%)	0.852(0.453 - 1.602)	0.618		
No	181(50.3)	19(10.5%)	162(89.5%)	1.000			
Service providers interface with endeavor to take dietary history							
Yes	174(48.3)	11(6.3%)	163(93.7%)	0.490(0.247 - 0.970)	0.041	0.435(0.215 - 0.882)	**0.021**
No	186(51.7)	24(12.9%)	162(87.1%)	1.000		1.000	

CHAPTER FIVE: DISCUSSION

5.1 The proportion of patients diagnosed with cardiovascular diseases

The fact that the adequate management of all cardiovascular diseases requires optimal dietary quality cannot be overstated. The effectiveness of any anti-hypertensive or anti-cholesterol drug depends on the macro and micronutrients ingested (World Health Organization, 2017; Whelton *et al*., 2017; Dong, 2018; Grillo *et al*., 2019; Williams *et al*., 2018; Rust and Ekmekcioglu, 2017). No beta blocker, angiotensin converting enzyme inhibitor, or alpha blocker can effectively reduce systolic blood pressure levels or pulse rate when taken by a patient who concurrently consumes high levels of sodium, caffeine, alcohol, trans-fats, among others. Therefore, having a satisfactory dietary quality is extremely important for all patients being treated for cardiovascular illnesses. However, the finding that that a few 10% of CVD patients on treatment had satisfactory dietary quality is worrying. This means that despite accessing CVD-related care and treatment from specialized health facilities like the Uganda Heart Institute, the dietary aspect of treatment is not considered an important aspect of therapy. This implies that 90% of the patients are consuming inappropriate foods for their condition. Such is a highly concerning pattern of dietary practices, especially given that CVD medication contributes to blood pressure reduction in about 40 – 60% of patients, leaving the other reduction contribution to diet.

In other words, poor blood pressure, as well as CVD-related morbidity and mortality, will be challenging to control/ prevent, and highly inevitable among CVD patients despite the use of the most effective CVD medication. The observed proportion of CVD patients with satisfactory dietary quality (10%) in the current study could be the lowest ever recorded among CVD patients. Previous studies found significantly higher dietary quality among CVD patients; Zeyana *et al*. (2015) in Brazil, Subhan and Chan (2019), Tadesse and Gerensea (2021), Chung *et al*. (2021),

79%, Long *et al*. (2022, Pérez-Tepayo *et al*., 2020 in Mexico, Lee *et al*. (2021 in Pakistan, in India, and Diddana (2019) in North Eastern Ethiopia. They reported levels of satisfactory dietary quality to be 56%, 44%, 52%, 80%, 49%, 55.6%, and 54.8%, respectively.

Further still, studies including Yeneabat *et al*. (2019) in the Philippines, Delil *et al*. (2021) in Southern Ethiopia, Nana *et al*. (2018) in North western Ethiopia, Fite *et al*. (2022) in Eastern Ethiopia, Harb *et al*. (2018) in Syria, Demilew *et al*. (2020) in Ethiopia, Amelmal *et al*. (2015), Worsa *et al*. (2021) in Southern Ethiopia, Alhariri *et al*., 2017 and in Yemen, Farooq *et al*. (2018) in Pakistan, Zeleke & Charles (2020) in Southwest Ethiopia, Kasturia *et al*.(2018), Klinovszky *et al*. (2019) in in Ethiopia and Demilew *et al*. (2018) in Ethiopia, and Erkocho *et al*. (2022) in Ethiopia, reported dietary quality levels of 45%, 42.6%, 40%, 47%, 62%, 35.9%, 60%, 63%, 64% and 47%, respectively. However, very few of the aforementioned studies included patients with cardiovascular disease(s). That alone implies that the majority of the patients whose dietary quality was assessed in those studies had fewer restrictions on which dietary components they could consume, like fat, meats, cholesterol, and sodium. The patients assessed in the current study had more dietary limitations, given that typically, the dietary counselling and/or education package provided to them includes caution on restricting consumption of saturated fat sources, salt, sugar, and some animal protein.

Secondly, in most of the studies that reported higher levels of satisfaction with dietary quality, the assessment tool for dietary quality used was the Healthy Eating Index (HEI). This dietary quality assessment tool, although reliable, was designed for the American population (Jenkins, 2021), where the carbohydrate allowed in the diet is high, almost similar to what people without CVDs consume in Africa. The difference asserted above notwithstanding, the fact remains that dietary quality among CVD patients in general is suboptimal, but more so among patients at UHI. This

may explain why CVDs are a leading cause of mortality globally, despite the availability and high access of potent medication to treat them. It should be noted that, unlike the usual norm of setting high dietary quality at 80% or more, the cutoff for sufficiency of dietary quality was set at 60%, because of the variability in non-communicable diseases that the study population had. Therefore, had the cutoff been set at 80%, the proportion of CVD patients with satisfactory dietary scores could have been much lower. This therefore denotes that CVD patients at the UHI are at a high risk of having prolonged poor disease prognosis, poor quality of life, despite being recipients of nutrition and dietary education and counseling, regularly at the institute.

5.2 Intrapersonal factors associated with dietary quality

The only intrapersonal factor significantly associated with dietary quality in the current study was the perceived risk of severity of CVDs. The study established that the prevalence of satisfactory dietary quality was three times as high among patients who had a high perceived risk of their CVD turning severe compared to those who had a low perceived risk of their CVD turning severe. This finding implies that with a high perceived risk of severity of CVDs, there was a higher prevalence of satisfactory dietary quality. This finding is congruent with the suppositions of the interactional model of client health behavior (Cox, 1982) and with previous studies (Long *et al*., 2022; Choi *et al*., 2019; Yeneabat *et al*., 2019; Worsa *et al*., 2021; Wahome *et al*., 2018).

The positive effect of risk perception was expected, given that a high perceived risk has been associated with more positive health behaviors. In all healthcare contexts, it has been tested in (Fuchs *et al*., 2024; Li & Wang, 2023; Zhou, 2023; Sun, Leng and Xiong, 2022; Matsuura & Saito, 2022; Villac´e-Molinero *et al*., 2021; Pappas, 2021; Zheng *et al*., 2021; Kim *et al*., 2022; Mi *et al*., 2021; Zhang, Hou & Li, 2020; Lawrance *et al*., 2022). High risk perceptions of a given CVD

turning severe translate into a patient thinking that in case of any error in both medication and dietary consumption, the CVD could be aggravated. Taking the context of only the latter entity (diet), a patient would be comparatively more cautious to avoid any dietary practices that would dampen the effectiveness of the medication or cause negative physiological changes in their body, potentially leading to elevated blood pressure and blood lipids. It is such patients that are more likely to take dietary recommendations and guidance more seriously, with a target of meeting their recommended daily allowances as much as possible. In addition, risk perceptions of disease severity can modify a multitude of other intrapersonal characteristics, including engagement in physical activity, the intensity of physical activity, health eating habits, life style characteristics, and adherence to medication, all of which are independent predictors of dietary quality (Worsa *et al*., 2021; Choi *et al*., 2019; Li *et al*., 2017; Wahome *et al*., 2018; Saraf-Bank *et al*., 2017; Angeles-Agdeppa *et al*., 2020; de Juras *et al*., 2022; de Juras *et al*., 2022; Souza *et al*. (2019) and Daneshzad *et al*., 2019; Gonete *et al*., 2020; Watanabe *et al*., 2022; Yeneabat *et al*., 2019). Moreover, risk perceptions of disease severity can also modify the effects of non-modifiable characteristics like sex and age, causing females, males, or older and younger patients to adopt better quality dietary patterns.

5.3 The intra-household factors associated with dietary quality

The elements of client singularity in the interactional model of client health and behavior also cover interpersonal factors or factors in the environment of the patient. This study adapted those factors as intra-household factors and found that one of them had statistical significance about dietary quality. The findings of this study showed that the prevalence of satisfactory dietary quality was lower by 83% among CVD patients who were in households that consumed one to two meals a day. This finding implies that low food frequency reduced the odds of having a dietary quality,

consistent with findings by Murakami and Livingstone (2016a), Murakami and Livingstone (2016b), Van den Boer *et al*. (2017), Faith *et al*. (2019), Murakami and Livingstone (2016c), Murakami and Livingstone (2014), Nishi & Babio (2021), House *et al*. (2015), Jung *et al*. (2017).

A meal frequency of one or two meals per day simply suggests that the consumer of such meals can barely meet their recommended daily allowances for macro and micronutrients, at least not as laid out in the DQI-I. For instance, to meet the RDA for calcium and vitamin C, iron, protein, fiber, one has to consume sizeable amounts of fruits, dairy, meat, eggs, and vegetables, not in one sitting, but in multiple sittings (Paoli *et al*., 2019; Lesani *et al*., 2023). That is because a single cup of milk, or a serving of meat stew in a single meal, for instance, cannot be sufficient to enable the consumer to meet their daily allowances for calcium or protein. Thus, more than three meals, with snacks in between meals have to be consumed if one is to meet their daily allowances. Taking the design of the DQI-I in context, satisfactory dietary quality based on its assessment calls for the daily consumption of more than five food groups, which cannot be overtly done in two meals a day, but in more than three meals at the very minimum.

Besides providing an avenue for consuming more food groups, a high meal frequency is also synonymous with high household food security (Tsegaye *et al*., 2018). It is only in a food-secure household that a high meal frequency can be achieved, and with food security, the odds of having many food groups consumed increase. This is true in other previous studies (Worsa *et al*., 2021; Heerman *et al*., 2016; Tucher *et al*., 2021). Its other implication is that for patients who consumed 1 to 2 meals a day, chances are high that they were in food-insecure households, and hence less likely to have satisfactory dietary quality.

5.4 Health service delivery factors associated with dietary

Two institutional factors showed statistical significance, one of which was duration of contact with the healthcare service provider at UHI. The finding that the prevalence of satisfactory dietary quality was less by 54% among CVD patients whose contact time with service providers per clinical visit was between 10 and 20 minutes compared to those whose contact time was more than 20 minutes. This finding implies that with a short contact time, the risk of unsatisfactory dietary quality was higher and with a longer patient-provider contact time, satisfactory dietary quality was more likely. This finding is not surprising given that some of the most important institutional antecedents of dietary quality, including dietary counseling and nutritional education, can only be effectively delivered to a patient over at least one hour (Christiansen *et al*., 2023). (Zelalem *et al*., 2018; Sauer *et al*., 2018; Teweldemedhin *et al*., 2021; Abu-Baker *et al*., 2021; Demilew *et al*., 2020; Worsa *et al*., 2021; Cheikh *et al*., 2022; Demilew *et al*., 2020; Walsh *et al*., 2018; Yeneabat *et al*., 2019; Kaleem *et al*., 2020; Salama, 2018; Aşcı and Rathfisch, 2016). It is within that time that a healthcare provider can effectively assess a given patient's dietary history, their current dietary quality using a reliable tool like the DQI-I, and then educate them on how to improve their dietary quality.

Coupled with other general principles of patient education, including listening, interaction, and explanations, it simply follows that at least an hour would be sufficient for a health care provider to effect optimal dietary behavior change, and finally, satisfactory dietary quality. The duration of 10 – 20 minutes does not allow effective actions such as dietary assessments, dietary history taking, dietary counseling, education, and quality assessment to take place. As a result, patients are not empowered enough to change their dietary patterns to satisfy. That explains why patients who

reported a contact time of less than 20 minutes had a lower prevalence of dietary quality, compared to those who had contact times exceeding 20 minutes.

Surprisingly, the findings showed that the prevalence of satisfactory dietary quality was significantly less by 56% among CVD patients who reported that service providers they interfaced with endeavored to take their dietary history compared to those whose dietary history was not taken by service providers per interface. This finding is inconsistent with findings by Kaleem *et al*. (2020), Salama (2018) and Aşcı and Rathfisch (2016) and Sauer *et al*. (2018), and it is most certainly related to the short of duration of contact between patients and service providers. About 83% of all patients at the institute receiving contact time of less than 20 minutes with each healthcare worker, implying that in case dietary history was taken, there would virtually be no time left to engage in other activities, (tool-based assessment of dietary quality, nutritional education and dietary counseling).

These activities if performed effectively, are known to positively impact dietary diversity and quality among patients (Teweldemedhin *et al*., 2021; Abu-Baker *et al*., 2021; Demilew *et al*., 2020; Worsa *et al*., 2021; Cheikh *et al*., 2022; Demilew *et al*., 2020; Walsh *et al*., 2018). Thus, although dietary history taking is crucial, carrying it out in a duration of patient contact that is less than 20 minutes makes it have an overall negative impact on dietary quality

CHAPTER SIX: CONCLUSION AND RECOMMENDATIONS

6.1 Conclusion

The study showed that dietary quality among CVD patients at the Uganda Heart Institute is low; only 1 in every 10 patients consumes diets that are protective against any adverse cardiovascular events.

The dietary quality of cardiovascular disease patients at the Uganda Heart Institute is associated with intrapersonal, interpersonal and institutional factors, although the latter (institutional factors) exhibit relatively more precedence. Dietary quality among CVD patients at the Uganda Heart Institute was positively and significantly associated with one intrapersonal factor, and that is the perceived risk of the CVD turning severe.

Dietary quality among CVD patients at the Uganda Heart Institute is positively associated with one intra-household factor, and that is meal frequency in a given household.

Dietary quality among CVD patients at the Uganda Heart Institute was associated with two institutional factors including the duration of contact with a healthcare service provider at the Uganda Hearth Institute, and the taking of dietary history by the healthcare service providers, which was negatively associated with dietary quality.

6.2 Recommendations

Going by the findings of the study, the following recommendations are made to different stakeholders at the Uganda Heart Institute, in a bid to improve the dietary quality of cardiovascular disease patients at the institute.

The principal nutritionist and their deputy are urged to interest all cardiovascular disease care and treatment providers at the UHI in providing risk communication to all CVD patients they interface with in the course of providing them with treatment. Effort should be made by each one of them, to explicitly tell patients that unlike other forms of non-communicable disease, CVDs are comparatively more volatile to the extent that they can get adverse and cause severe morbidity unannounced, especially if one ingests what is contraindicated for them, regardless of whether they are adherent to medication. Such risk communication will certainly increase each patient's perceived risk of adverse/severe CVD, and given that such communication will be centered on the significance of diet on such severity, the patients will hopefully change their dietary habits and adopt better diets that are protective against CVD severity, leading to more satisfactory dietary quality.

The principal nutritionist and their deputy are urged to interest all cardiovascular disease care and treatment providers at the UHI in educating patients about the importance of optimal meal frequency (at least three meals a day), in ensuring satisfactory dietary quality. The patients should be cautioned against having only a single meal a day as a misguided means of losing weight or controlling lipid profiles, at the expense of ingesting all nutrients required for optimal cardiovascular health.

There is a need for all service providers (that get into contact with CVD patients) at UHI, to provide ample contact (consultation) time to all patients for purposes of not only prescribing medication but also dietetics, for a minimum of 30 minutes per patient. In case that is not possible, then a policy should be made that some activities, like dietary history taking, are exempted, to allow for the execution of other activities like nutritional counseling and education, within which the patients ought to be counseled and educated about what satisfactory dietary practices ought to be in the

CVD context. During that time, risk communication should also be provided and as well as the need for a daily meal frequency that is equal to or greater than three.

While it is in order and appropriate for the CVD care and treatment service providers at UHI to always take dietary history of each patient they interface with, it is also very important that service providers who take such history, follow it up with appropriate nutritional critic of the diet recently taken, counseling, and risk communication to the same patients, especially those found to be have taken unsatisfactory diets. To aid such a process, the principal nutritionist may consider providing the DQI-I tool to a designated person at the facility who will be tasked to assess the dietary quality of each patient, as part of taking dietary history, so that the activity is more informative and apt to inform subsequent dietary education.

6.3 Strengths and limitations

The assessment of dietary quality was based on a globally standardized and validated tool, which ensured that all data related to the outcome study were credibly collected and reliable, also making the factors identified valid. In addition, all patients included in this study had to meet a stringent inclusion timeframe (at least two months of receiving CVD-related treatment from UHI and having lived with the CVD for at least 1 month). That ensured that the dietary practices obtained from each of the patients were based on routine and consistent practices, which made the dietary quality assessment reliable.

However, the assessment of dietary quality was prone to exaggeration in some cases, especially those related to micronutrient intake estimations, since no real-time food testing could be done to obtain actual meeting or recommended daily intakes for each patient. Self-reports had to be relied on, which was subject to inflation of intakes. As a counter, the interviewer endeavored to facilitate patient estimations by illustrating to them amounts of food that could equate to an RDI of a given

nutrient, and ask them if they consumed such an amount on a given day. Moreover, the study being cross-sectional in nature could only bring out temporal association and not cause-and-effect associations.

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APENDICES

APPENDIX A: CONSENT FORM

Title: Factors associated with dietary quality among patients diagnosed with cardiovascular diseases at the Uganda heart institute – Kampala city

Principal investigator: Paul Lutaakome

Email: luweeddeann@gmail.com

Introduction: Cardiovascular diseases are the leading cause of death globally, and yet their incidence is rising. As such, there is great need to only prevent their incidence but also ensure that those diagnosed with them are well managed and treated in order to ensure good prognosis. A number of medications for the treatment of cardiovascular diseases exist, however, unlike other diseases; medications alone cannot sufficient for the proper management of CVDs since their severity depend physiology moderate by macro and micronutrients ingested by the patient. With an imbalanced dietary intake (poor dietary quality), the risk of severe disease increases and the reverse holds.

Who the study is targeting: The study is targeting people diagnosed with any cardiovascular disease and seeking related care and treatment from the Uganda Cancer institute

Why you have been approached: You have been approached because you happen to meet the inclusion criteria of this study, that is, you are one of the patients who are treated at the Uganda Hearth Institute, and have lived with the disease for at least 6 months.

What your participation will involve: If you choose to participate in the study, you will be required to participate in a structured interview, in which you will be asked about 41 multiple choice questions. The questions will be related to your socio demographic factors, dietary quality,

intrapersonal factors, intra-household, and institutional factors, and since they will all be asked in a close ended manner, we expect that the interview will last for about 40 minutes at most.

Risks of participation: Since you will only be required to participate by responding to questions in a structured interview, we do not expect any risks to accrue from your participation in the study.

Benefits of your participation: The findings related to the proportion of patients who have satisfactory dietary quality may indicate the magnitude of poor dietary practices among patients at the UHI, hence making the administrators of the institute and at the ministry of Health develop and/or modify available dietary behavior change interventions, informed by the findings on correlates. The institutional correlates that will be revealed by the study may help inform facility-based interventions to improve the dietary quality of patients diagnosed with CVD. Healthcare workers at the UHI will certainly be beneficiaries of this study, given that they are the ones that are mandated to interact with CVD patients who seek care from the institute and provide them with nutritional education and dietary advice. With the study findings on proportions (objective 1), service providers at UHI may intensify their provision of nutritional education and emphasize its provision to patients who they will find to bear characteristics that the study will reveal as being as negatively correlated to optimal dietary quality.

To the patients, the study will be empowering to them when the findings are disseminated given that part of the study findings will be aligned towards determining intrapersonal correlates of dietary quality. Findings at an intrapersonal level are those, most of which are modifiable at a personal level, and so, we anticipate that the patients will be able to uphold personal characteristics found to be protective of satisfactory quality and modify those found to be negatively correlated to it

Confidentiality, anonymity and privacy: All the responses you provide in the interviews will not be shared with any person unless your identified is concealed. Your name will not appear on the questionnaire you will respond to, or consent form, that you will append your signature on. Even if we are to share your responses with the administration at the Uganda Heart Institute, we shall conceal your identity. All data collected will be private to the principal investigator for study purposes only.

Voluntary participation: No one is going to force you to participate in this study; participation is fully at your own discretion. You can choose not to participate, and you have the right to withdraw from this study at any time with out any denial of opportunity or coersion from the Investigators.

Compensation: Your participation in this study is voluntary; you will not receive any incentive or compensation for your participation

Contact information: Contact information: if there arises a question/ concern/comment about the study, the following contacts are useful to reach;

Principle Investigator: LUTAAKOME PAUL

Tel: 0703162797

Email: luweeddeann@gmail.com

REC : TASO REC

REC Chairperson: Dr ADRIAN JJUKO

Tel: 0782169505

Email: jjuukoa2gmail.com

CONSENT

1. I confirm that I have read and understand the information sheet for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily ☐
2. I understand that my participation is voluntary and that I am free to withdraw at any time without giving any reason, without my medical care or legal rights being affected. ☐
3. I agree to take part in the above study. ☐

Initials of Participant	Date	Signature

Yours Sincerely, Lutaakome Paul (principal investigator), Student, Department of Nutrition Sciences and Dietetics, Kyambogo university.

THANK YOU

APPENDIX B: QUESTIONNAIRE

PART A: Socio demographic factors

Number	Question	Categories	Code choice
1	Gender	1. Female 2. Male	
2	Current age in years		
3	What is your current marital status	1. Married 2. Single 3. Cohabiting 4. Other……	
4	Have you received any formal education?	1. Yes 2. No	
5	If yes, what level of formal education have you received?	1. Bachelor's degree 2. Diploma 3. Certificate 4. A-Level 5. O-Level 6. PLE 7. None/others	
6	To what religious denomination do you subscribe	1. Anglican 2. Catholic 3. Muslim 4. Orthodox 5. SDA 6. Traditional 7. Other (Specify)……..…….	
7	Are you employed currently	1. Yes 2. No	
8	What is your district of residence	…… …….. ……..	

PART B: Dietary Quality assessment

Variety	Categories	Scoring	Score
Food groups			
	Meat	Each food group awarded 0 or 3 pts. 3 points awarded if at least 1 item from that group was consumed	
	Poultry		
	Fish		
	Egg, dairy		
	Beans, Grains, Fruits, Vegetables		
Protein sources			
	Meat	3 or more sources consumed: 5 pts	
	Poultry		
	Fish		
	Dairy		
	Beans		
	Eggs		
Adequacy group			
	Vegetables	Between 0 and 5 points awarded for each of the 8 adequacy groups, depending on percentage of or Recommended Daily Allowances (RDA) met	
	Fruit		
	Grain		
	Fiber		
	Protein		
	Iron		
	Calcium		
	Vitamin C		
Moderation foods			
	Total Fat	Between 0 and 6 points awarded for each of the 5 moderation groups, depending on percentage of RDA met	
	Saturated Fat		
	Cholesterol		
	Sodium		
	Empty Calorie Foods like Alcohol		

Intrapersonal factors

Number	Question	Categories	Code choice
9	What cardiovascular disease have you been diagnosed with?	1. Myocardial infarction 2. Hypertension 3. Coronary Heart Disease 4. Arrhythmia 5. Other……	
10	For how long have you been living with the cardiovascular disease you were diagnosed with	…….. …….. ……..	
11	Which of the following should be ingested in higher quantities among persons with cardiovascular diseases	1. Fat 2. Sugar 3. Vegetables 4. Fruits	
12	Which of the following should be ingested in lower quantities among persons with cardiovascular diseases	1. Fat 2. Sugar 3. Vegetables 4. Fruits	
13	Current BMI	Height…… Weight……	
14	Do you engage in physical activity?	1. Yes 2. No	
15	If yes, how would you rate the intensity of activity you engage?	1. Very light 2. Light 3. Moderate 4. Heavy	
16	How do you perceive you risk of having the cardiovascular disease you have turn severe	1. High 2. Moderate 3. Low	
17	I am currently eating so well for the proper management of the disease	1. Agree 2. Disagree	

PART C: Intra-household factors

Number	Question	Categories	Code choice
18	How many members does the household you come from have	…… ……	
19	How many meals does the household you come from usually have	1. One 2. Two 3. Three 4. More than three	
20	Are there are any other persons living with any cardiovascular diseases, in the household you come from	1. Yes 2. No	
21	How many children under five years do you have in your household	1. One 2. Two 3. Three 4. More than three	
22	What is the gender of the household head?	1. Female 2. Male	
23	Do you have any autonomy on choice of food you can eat in your household	1. Yes 2. No	
24	What type of family do you hail from?	1. Nuclear 2. Extended	

PART D: Health service delivery factors

Number	Question	Categories	Code choice
25	Are you provided with dietary education by healthcare workers at the Uganda heart institute	1. Yes 2. No	
26	How much contact time do you usually have with service providers per clinical visit, at the Uganda Heart Institute	…….. …….. ……..	
27	How would rate the contact time you usually have with service provider per clinical visit	1. Sufficient 2. Not sufficient	
28	When you interface with the healthcare service providers at this facility are the sessions always interactive, are you allowed to ask question?	1. Yes 2. No	
29	Are there cardiovascular nutrition study aids and pinups at this facility	1. Yes 2. No	
30	Is there cardiovascular disease focused nutrition education at the facility	1. Yes 2. No	
31	Do the healthcare workers at this facility try to follow up you eating habits?	1. Yes 2. No	
32	At every visit you make here, do the service providers you interface with you or endeavor to take your dietary history?	1. Yes 2. No	

END

APPENDIX C: INTRODUCTION LETTER

KYAMBOGO UNIVERSITY

P. O. BOX 1 KYAMBOGO
Tel: 041 - 4286792 Fax: 256-41-220464
Website :www.kyu.ac.ug Email: drgt@kyu.ac.ug

Directorate of Research and Graduate Training

Office of the Director

APPENDIX 8

Date:

TO WHOM IT MAY CONCERN

RE: Lutaakome Paul

Dear Sir/Madam,

This is to introduce to you the above named student Reg: No 2014/GMN/13447/NKA pursuing a Master of Science in Human Nutrition

Department of Nutritional Sciences and Dietetics, Kyambogo University.

She/he intends to carry out research on Dietary Quality and its correlates among patients diagnosed with Cardiovascular diseases at Uganda Heart Institute Kampala-Uganda in partial fulfillment of the requirements of the award of Master of Science in Human Nutrition

The purpose of this letter therefore is to request you to grant him/her permission to carry out his/her study in your institution.

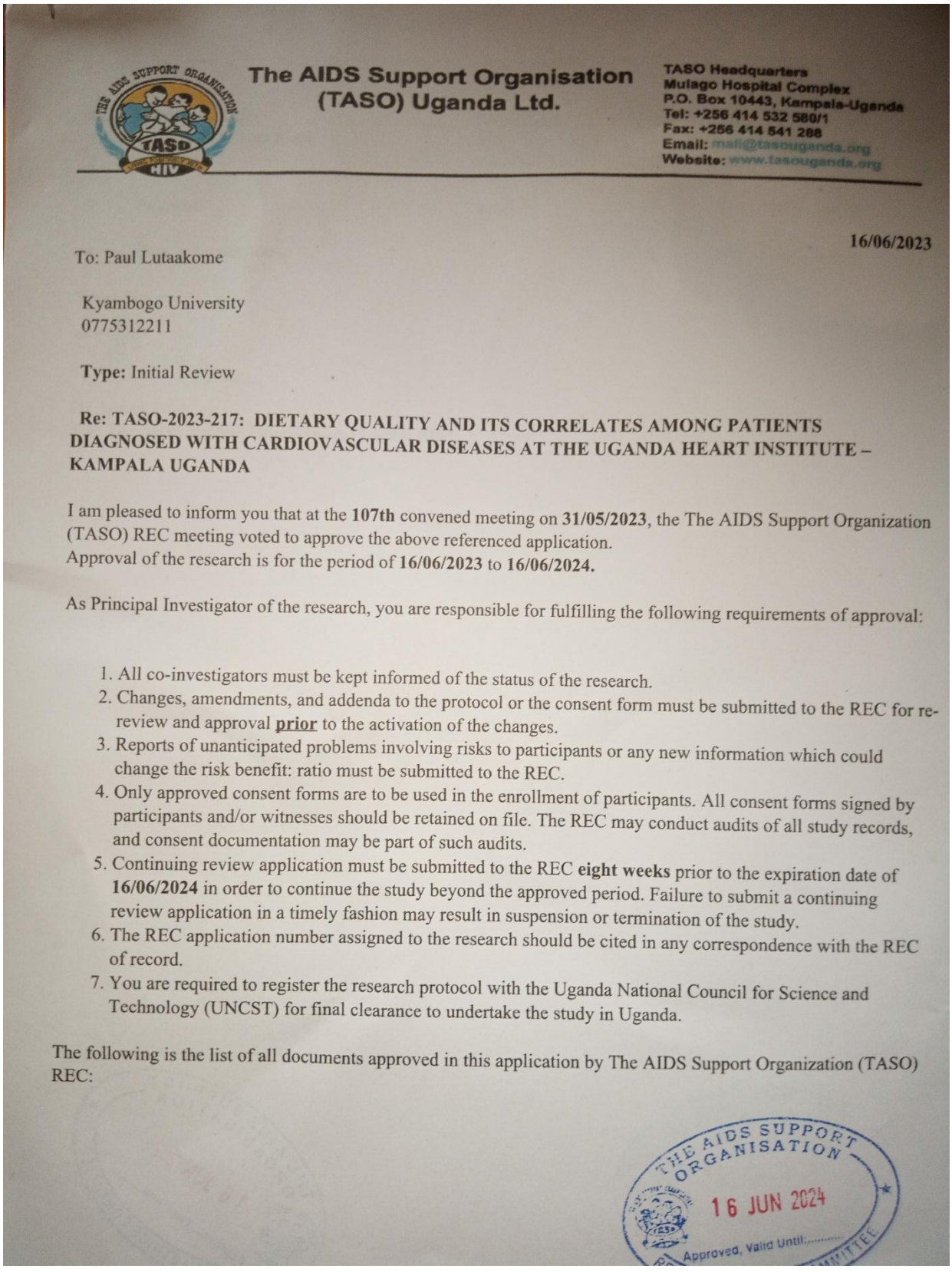
Any assistance rendered to her/him will be highly appreciated.

Yours sincerely,

Prof. Bosco Bua
AG. DIRECTOR

KYAMBOGO UNIVERSITY
★ 06 DEC 2022 ★
DIRECTOR
DIRECTORATE OF RESEARCH AND GRADUATE TRAINING

APPENDIX D: TASO REC APPROVAL LETTER



The AIDS Support Organisation (TASO) Uganda Ltd.

TASO Headquarters
Mulago Hospital Complex
P.O. Box 10443, Kampala-Uganda
Tel: +256 414 532 580/1
Fax: +256 414 541 288
Email: mail@tasouganda.org
Website: www.tasouganda.org

16/06/2023

To: Paul Lutaakome

Kyambogo University
0775312211

Type: Initial Review

Re: TASO-2023-217: DIETARY QUALITY AND ITS CORRELATES AMONG PATIENTS DIAGNOSED WITH CARDIOVASCULAR DISEASES AT THE UGANDA HEART INSTITUTE – KAMPALA UGANDA

I am pleased to inform you that at the **107th** convened meeting on **31/05/2023**, the The AIDS Support Organization (TASO) REC meeting voted to approve the above referenced application.
Approval of the research is for the period of **16/06/2023** to **16/06/2024.**

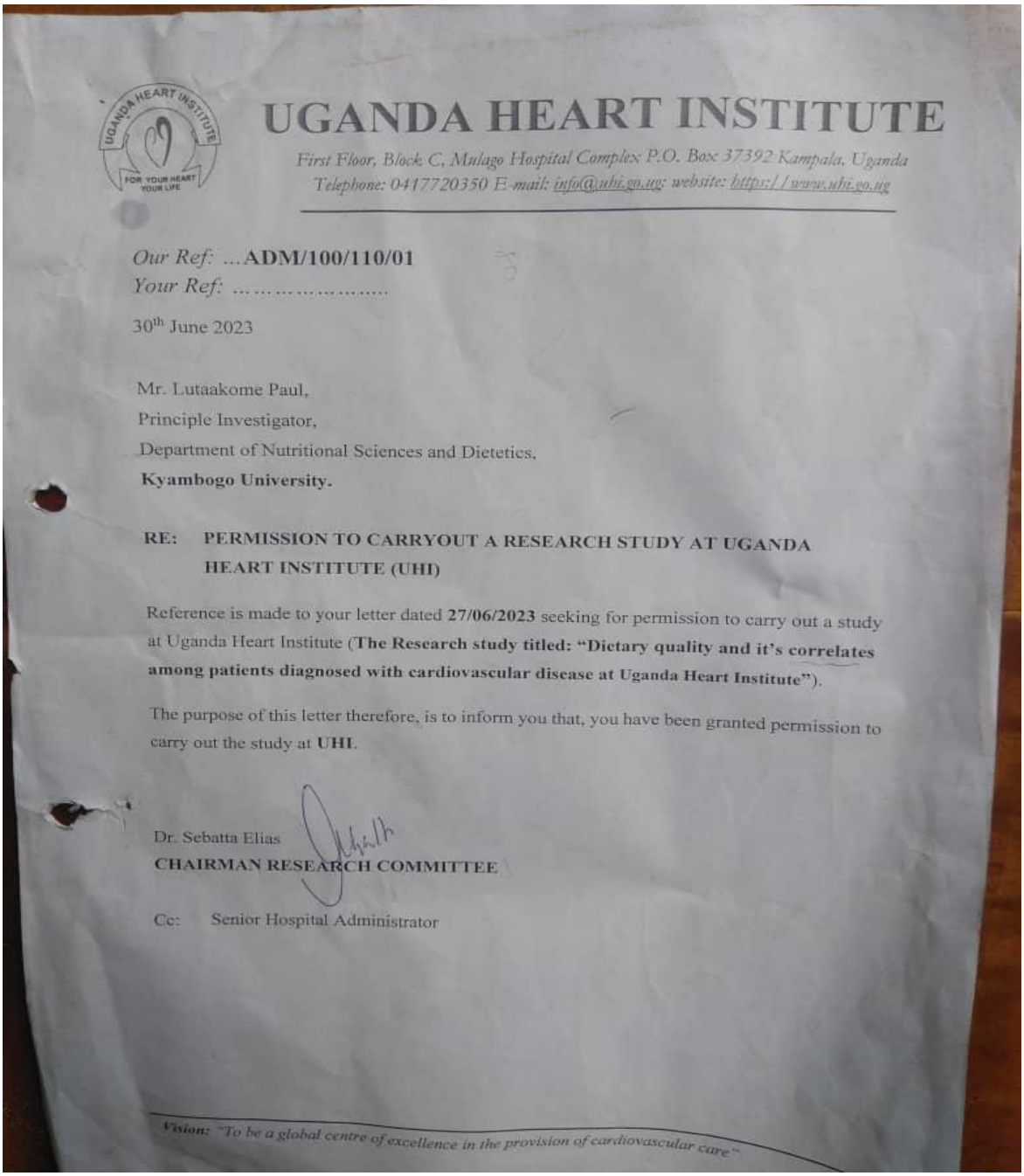
As Principal Investigator of the research, you are responsible for fulfilling the following requirements of approval:

1. All co-investigators must be kept informed of the status of the research.
2. Changes, amendments, and addenda to the protocol or the consent form must be submitted to the REC for re-review and approval **prior** to the activation of the changes.
3. Reports of unanticipated problems involving risks to participants or any new information which could change the risk benefit: ratio must be submitted to the REC.
4. Only approved consent forms are to be used in the enrollment of participants. All consent forms signed by participants and/or witnesses should be retained on file. The REC may conduct audits of all study records, and consent documentation may be part of such audits.
5. Continuing review application must be submitted to the REC **eight weeks** prior to the expiration date of **16/06/2024** in order to continue the study beyond the approved period. Failure to submit a continuing review application in a timely fashion may result in suspension or termination of the study.
6. The REC application number assigned to the research should be cited in any correspondence with the REC of record.
7. You are required to register the research protocol with the Uganda National Council for Science and Technology (UNCST) for final clearance to undertake the study in Uganda.

The following is the list of all documents approved in this application by The AIDS Support Organization (TASO) REC:

THE AIDS SUPPORT ORGANISATION
16 JUN 2024
Approved, Valid Until:.....

APPENDIX E: UHI ADMINISTRATION CLEARANCE



UGANDA HEART INSTITUTE

First Floor, Block C, Mulago Hospital Complex P.O. Box 37392 Kampala, Uganda
Telephone: 0417720350 E-mail: info@uhi.go.ug: website: https://www.uhi.go.ug

Our Ref: ...**ADM/100/110/01**
Your Ref: .....

30th June 2023

Mr. Lutaakome Paul,
Principle Investigator,
Department of Nutritional Sciences and Dietetics,
Kyambogo University.

RE: PERMISSION TO CARRYOUT A RESEARCH STUDY AT UGANDA HEART INSTITUTE (UHI)

Reference is made to your letter dated **27/06/2023** seeking for permission to carry out a study at Uganda Heart Institute (**The Research study titled: "Dietary quality and it's correlates among patients diagnosed with cardiovascular disease at Uganda Heart Institute"**).

The purpose of this letter therefore, is to inform you that, you have been granted permission to carry out the study at **UHI**.

Dr. Sebatta Elias
CHAIRMAN RESEARCH COMMITTEE

Cc: Senior Hospital Administrator

Vision: "To be a global centre of excellence in the provision of cardiovascular care"

APPENDIX F: APPROVAL LETTER OF UNCST

Uganda National Council for Science and Technology

(Established by Act of Parliament of the Republic of Uganda)

29 August 2024
Our Ref: HS3899ES

Paul Lutaakome
Kyambogo University
Kampala

Re: Research Approval: **DIETARY QUALITY AND ITS CORRELATES AMONG PATIENTS DIAGNOSED WITH CARDIOVASCULAR DISEASES AT THE UGANDA HEART INSTITUTE – KAMPALA UGANDA**

I am pleased to inform you that on **29/08/2024**, the Uganda National Council for Science and Technology (UNCST) approved the above referenced research project. The Approval of the research project is for the period of **29/08/2024** to **29/08/2025**.

Your research registration number with the UNCST is **HS3899ES**. Please, cite this number in all your future correspondences with UNCST in respect of the above research project. As the Principal Investigator of the research project, you are responsible for fulfilling the following requirements of approval:

1. Keeping all co-investigators informed of the status of the research.
2. Submitting all changes, amendments, and addenda to the research protocol or the consent form (where applicable) to the designated Research Ethics Committee (REC) or Lead Agency for re-review and approval **prior** to the activation of the changes. UNCST must be notified of the approved changes within five working days.
3. For clinical trials, all serious adverse events must be reported promptly to the designated local REC for review with copies to the National Drug Authority and a notification to the UNCST.
4. Unanticipated problems involving risks to research participants or other must be reported promptly to the UNCST. New information that becomes available which could change the risk/benefit ratio must be submitted promptly for UNCST notification after review by the REC.
5. Only approved study procedures are to be implemented. The UNCST may conduct impromptu audits of all study records.
6. An annual progress report and approval letter of continuation from the REC must be submitted electronically to UNCST. Failure to do so may result in termination of the research project.

Please note that this approval includes all study related tools submitted as part of the application as shown below:

No.	Document Title	Language	Version Number	Version Date
1	Informed Consent forms	English	CONSENT FORM	08 June 2023
2	Approved Data Collection Tool	English	VERSION 2	16 June 2023
3	Project Proposal	English	VERSION 2	
4	Approval Letter	English		
5	Administrative Clearance	English		

Yours sincerely,

Hellen Opolot
For: Executive Secretary
UGANDA NATIONAL COUNCIL FOR SCIENCE AND TECHNOLOGY

LOCATION/CORRESPONDENCE

Plot 6 Kimera Road, Ntinda
P.O. Box 6884
KAMPALA, UGANDA

COMMUNICATION

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