Original Research Article

Nutritional knowledge and practice among Patients with non-communicable diseases attending Mbale Regional Referral Hospital in Eastern Uganda: A cross sectional study

ABSTRACT

Aims: To assess nutritional knowledge and practices among NCD patients attending Mbale Regional Referral hospital.

Study design: A mixed methods cross sectional study design was used.

Place and Duration of Study: Mbale Regional Referral Hospital among patients attending the NCD clinic from May to July 2017

Methodology: 260 clients were recruited for the study. Quantitative data was collected through structured administered questionnaires and qualitative data was collected through key informant interviews with a well-designed interview guide. Quantitative data was analyzed at univariate, bivariate and multivariate levels. Chi square test and logistic regression were used to determine the association between nutrition knowledge and utilization. Qualitative data was coded first and summarized according to the themes.

Results: Most respondents (n=156, 60%) had a high level of nutrition knowledge, however only 48.8% (n=127) were utilizing the knowledge. Hospital was the main source of nutrition information (n=243, 23. 1%). Those who had attained secondary level of education were 2.308 more likely to utilize the nutrition knowledge than those who had never studied *P* value of .028, 95CI (1.093-4.874). Those with tertiary education were even 9.261 times more likely to utilize the knowledge *P* value <.001 95CI (2.721-31.522). Those with adequate knowledge were about 1.6 times most likely to utilize the nutrition knowledge compared to those with inadequate knowledge level, however, with the adjusted odd ratio of 1.573 at 95% CI (0.923-2.868) the results were not statistically significant (*P* value .098).

Conclusion: NCD patients had adequate knowledge, with a few of them utilizing the knowledge. High education level was associated with better nutrition practices.

Keywords: Non-communicable Diseases; Nutritional Knowledge; Diabetes; Hypertension; Mbale Regional Referral Hospital

1. INTRODUCTION

Chronic non-communicable diseases (CNCDs) are defined as diseases or conditions which affect individuals over an extended period of time (years, decades or even an entire lifetime) and for which there are no known causative agents that are transmitted from one affected individual to another [1]. The main characteristic features of CNCDs include their chronic and insidious clinical manifestations and the resulting long-term disability. A report by the World Health Organization (2008) indicates that the global disease profile is changing at an astonishing rate, with deaths and disabilities from NCDs exceeding those from infectious diseases and nutritional deficiencies. The Sustainable Development Goals (SDGs) emphasize nutrition and NCDs. One of the 169 targets of the SDGs is to reduce premature deaths from NCDs by one third. Nutrition-related NCDs (NR-NCDs) stand at the intersection between malnutrition and NCDs [2].

The four (4) main types of non-communicable diseases are cardiovascular diseases, cancers, chronic respiratory diseases and diabetes. In the developing countries, non-communicable diseases are also emerging as a major public health concern [3]. The major causes of morbidity and disability in the developing countries have shifted from a predominance of nutritional deficiencies and infectious diseases to non-communicable diseases [3]. Approximately 75% of the total global individual non-communicable disease cases were recorded in developing countries, especially in sub-Saharan Africa [4].

In the past 10 years , the prevalence of NCDs has rapidly increased and currently NCDs are the among the first 25 main causes of Disability Adjusted Life Years DALYs in Uganda [5]. A survey demonstrated that NCDs and their risk factors are factors are a public health problem in Uganda. The study further revealed that there is a high prevalence of hypertension in the Ugandan population and that the majority of the people with hypertension are not aware of their hypertension status [5]. According HMIS surveillance, the NCD burden in Uganda is on the rise. In the past 10 years the prevalence of NCDs has rapidly increased and currently NCDs are among the first 25 main causes of DALYS in Uganda [5].

A survey demonstrated that NCDs and their risk factors are a public health problem in Uganda. The study further revealed that there is a high prevalence of hypertension in the Ugandan population and that the majority of people with hypertension are not aware of their hypertension status. Furthermore, the survey demonstrated that approximately one in ten have a more than 3 risk factors for NCDs and that a similar number of persons aged 40-69 years have a 10-year Cardio Vascular Disease (CVD) risk ≥ 30%, or with existing CVD. This is a relatively young age group, which still forms the core of the workforce and vital economic investment very difficult to replace [5].

Nutrition is a major modifiable determinant of non-communicable diseases, with scientific evidence supporting the view that alterations in diet and activity have effects on health throughout life. Non-communicable diseases are linked to high consumption of energy dense foods, made of animal origin and of foods processed or prepared with added fat, sugar and salt [6]. One of the clusters in the Uganda minimum health care package is prevention, management and control of non-communicable diseases. However, emphasis is more on prevention of malnutrition among mothers and children. And there seems to be little on specific nutrition information in regard to preventing NCDs and also a Challenge in the implementation and enforcement of the policies [7]. The purpose of this study therefore was to assess nutritional knowledge and practices among NCD patients attending Mbale Regional Referral hospital in Eastern Uganda so as to help bridge the above.

UNDER PEER REVIEW

2. MATERIAL AND METHODS

2.1 Study area

The study was conducted at the NCD clinic in Mbale Regional Referral Hospital (MRRH) located in the outpatient department. MRRH is the referral hospital for the districts of Budaka, Bukwo, Butaleja, Manafwa, Mbale, Pallisa, Sironko and Tororo in Eastern Uganda. The hospital also serves patients from outside the hospital's catchment area. The hospital is one of the thirteen Regional Referral Hospitals in Uganda with a bed capacity of 355. The hospital conducts special clinics for NCD patients twice a week. On average 120 patients are seen on each clinic day. The most commonly seen NCDs at the clinic are hypertension, diabetes mellitus and cardiovascular diseases.

2.2 Target population

The target population was Patients attending NCD clinics in Uganda. The study population comprised patients attending the NCD clinic at Mbale regional referral hospital during the study period. All patients above 18 years of age were included in the study. Patients were excluded if they did not consent to participate in the study and if they were very ill. The study population for the qualitative study was health workers working in the NCD clinic in Mbale Regional Referral hospital. We excluded health workers who didn't consent to participate in the study.

2.3 Study design

A mixed methods study using a cross sectional study design for the quantitative component and in-depth interviews for the qualitative component was employed.

2.4 Sampling strategy

A consecutive sampling technique was used. Study participants were identified and recruited as they came for their clinic at the triage desk. Participants who met the criteria and consented were recruited into the study. Purposive sampling was employed for the health workers that participated in the qualitative study. The qualitative study comprised health workers working at the NCD clinic.

2.5 Data Collection

Quantitative data was collected using a standardized questionnaire [8] administered by trained research assistants who were selected from Mbale Regional Referral Hospital. Four research assistants were taken through a 2 days training on the questionnaire, how to interpret the different questions and how to administer the questionnaire.

To evaluate the understandability and the applicability of the instruments one week prior to the main field work, a pre-test was done on 10% of the sample size at the NCD clinic of Mbale RRH. Following the analysis of the pretest study data, ambiguous or unclear questions were rephrased to make it more understandable.

To ensure accuracy, completeness and consistency of data, the research assistants checked for completeness and accuracy before they could interview the next person and also the principal investigator checked the questionnaires to ensure completeness and accuracy. Where they were inaccurate and incomplete the research assistants were sent back to participants to complete the interviews.

Data for the qualitative study was collected by the Principle Investigator through conducting an in-depth interview with the health workers at the NCD clinic. The discussion was guided by an interview guide that included questions on their nutrition knowledge, source of nutrition

UNDER PEER REVIEW

information and their challenges. The discussions were recorded using a recorder while a research assistant took the notes.

The Principle Investigator administered a checklist to establish the presence of enabling factors for the health workers to provide the information [8].

2.6 Data Management

After collection, data were entered into the computer using Epi Data software Version 3.1 from where it was exported to STATA Version 14 for analysis. Before analysis data were coded, value labels were defined, edited and data manipulations were done. For example age was transformed from continuous to categorical. And the principal investigator did the exploratory analysis to check for denominator consistency. Data security was ensured by having passwords the personal computers to ensure that no person accessed the data without permission. The questionnaires after data entry were arranged and kept in a safe place and data was stored on different hard discs.

2.7 Data analysis

Univariate analysis was used to summarize socio economic and demographic characteristics and was presented in tables. For the continuous variable, the mean, standard deviation, frequencies and percentages were used.

3. RESULTS AND DISCUSSION

3.1 RESULTS:

3.1.1 Socio-demographic characteristics of participants

Table 1: Distribution of demographic and socio-economic characteristics of participants.

Socio-demographic characteristic	Frequency n (N=260)	Percent
Sex		
Male	103	39.6
Female	157	60.4
Age group		
19-34	24	9.2
35-59	138	53.1
60-90	98	37.7
Average income		

UNDER PEER REVIEW

<50000	125	48.1
50001-100000	67	25.8
100001-250000	26	10.0
250001-500000	30	11.5
>500000	12	4.6
Religion		
Pentecostal	11	4.2
Protestant	110	42.3
Catholic	64	24.6
Moslem	69	26.5
Seventh Day	3	1.2
Others	3	1.2
Marital status		
Married	184	70.77
Single	17	6.54
Widow	48	18.46
Divorced	11	4.23
Education level		
Primary	118	45.4
Secondary	59	22.7
Tertiary	36	13.9
Never Studied	47	18.1

UNDER PEER REVIEW

As shown in **Table 1,** majority of the participants (n=157, 60.4%) were female. Most of the participants were in the age group of 35-59 (n=138, 53.04%). The mean age was 55 years and a standard deviation of 14. the youngest patient was 19 years and the oldest was 90 years One hundred eighteen (45.4%) had attained primary level of education. Most of the respondents (n=125, 48%) were earning below 50000ugx (less than 15 US dollars where by 1 USD=3750 UGX). Most of the respondents were Protestants by religion (n=110, 42.3%)

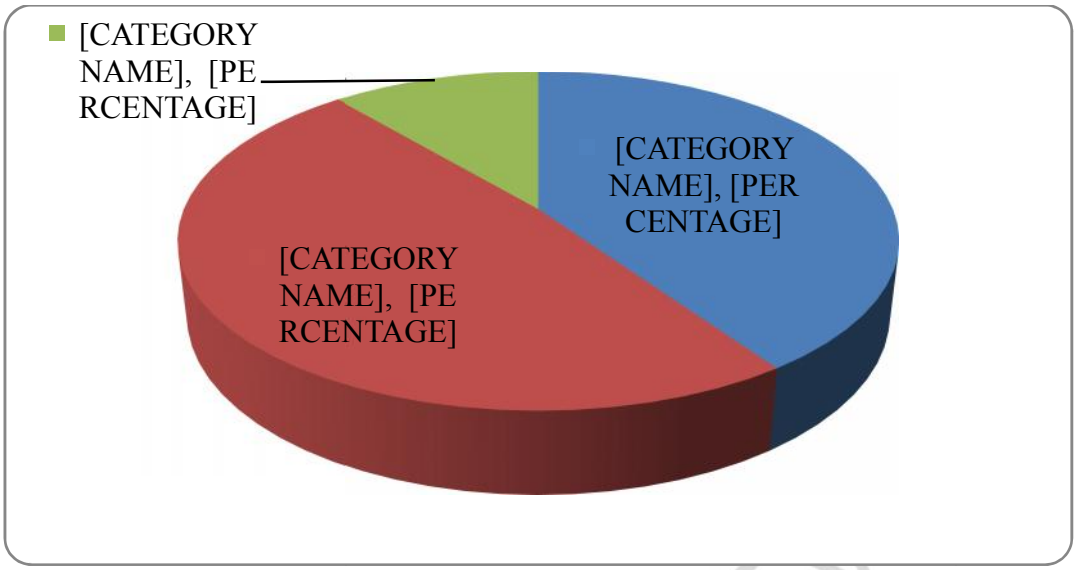

Figure 1; NCD Distribution among patients attending Mbale Regional Referral Hospital
As shown in **Figure 1**, Hypertension and diabetes mellitus were the most common NCDs among patients attending the clinic (n=105, 40.4%) and (n=126, 48.4%) respectively.

Table 2: Sex distribution among NCD patients attending MRRH

	SEX		**TOTAL**
NCD TYPE	MALE N(%)	FEMALE N(%)	
Hypertension	45 (42.9)	60 (57.1)	105 (100)
Diabetes	47 (37.3)	79 (62.7)	126 (100)
Others	11 (37.9)	18 (62.1)	29 (100)

More females 60 (57.1%) had hypertension as compared to the 45 (42.9%) male, 79 (62.7%) female had diabetes mellitus whereas only 47 (37.3%) male had diabetes.

Table 3: Level of Nutrition Knowledge among NCD patients

	Frequency (N=260)	Percentage (%)
Level of nutrition knowledge		
Inadequate knowledge	104	40
Adequate knowledge	156	60

From Table 3 above, one hundred fifty-six (60%) patients had high nutrition knowledge level where high knowledge level was defined as all those patients who passed 5 and more questions on knowledge.

UNDER PEER REVIEW

Table 4: Proportion of NCD patients attending MRRH that utilize nutrition knowledge in management of their condition

	n (N=260)	Percentage (%)
Utilized nutrition knowledge	127	48.8
Did not utilize nutrition knowledge	133	51.2

As shown in Table 4, only (n=127, 48.8 %) utilized nutrition knowledge in the management of their condition.

Table 5: Association between Patient Nutrition Knowledge and its Utilization

Patient nutrition knowledge	Utilization of Nutrition knowledge		*P*-value(chi-square)
	No	Yes	
Level of knowledge of patients on nutrition at Mbale regional referral hospital			.001(10.51)
Low Knowledge	66(49.6)	38(29.9)	
High knowledge	67(50.4)	89(70.1)	

As shown in Table 5 above, knowledge utilization was more among those with high level of knowledge 89(70.1%). There was statistical significance between patients' nutrition knowledge and utilization with a *P*-value of .001.

Table 6: Factors associated with nutrition knowledge utilization among NCD patients from multivariable logistic regression

Factors	AOR (95% CI)	*P*-valve
Sex		
Female	1.129(0.677-1.881)	.64
Age group		
35-59 years	0.559(0.284-1.101)	.09
60-90 years	0.510(0.269-0.969)	.04
Average income of respondents		

UNDER PEER REVIEW

50001-100000	0.791(0.409-1.531)	.49
1000001-250000	0.466(0.173-1.249)	.13
2500001-500000	0.764(0.249-2.336)	.64
>500000	1.081(0.182-6.429)	.93
Education level		
Secondary	2.308(1.093-4.874)	.028
Tertiary	9.261(2.721-31.522)	< .001
Never studied	0.825(0.406-1.678)	.596
Patients' Knowledge on nutrition		
Adequate knowledge	1.573(0.923-2.682)	.098

Note: COR=Crude Odd Ratio, AOR=Adjusted Odd Ratio and demographics were used cofounders.

From Table 6 above, after adjusting for confounders, those with adequate nutrition knowledge level were 1.573 times more likely to utilize the nutrition knowledge CI (0.923-2.682) however there was no statistical significance with a *P* value .098. Those who had attained secondary level of education were 2.308 more likely to utilize the nutrition knowledge than those who had never studied *P* value of .028, 95CI (1.093-4.874). Those with tertiary education were even 9.261 times more likely to utilize the knowledge *P* value < .001, 95CI (2.721-31.522).

UNDER PEER REVIEW

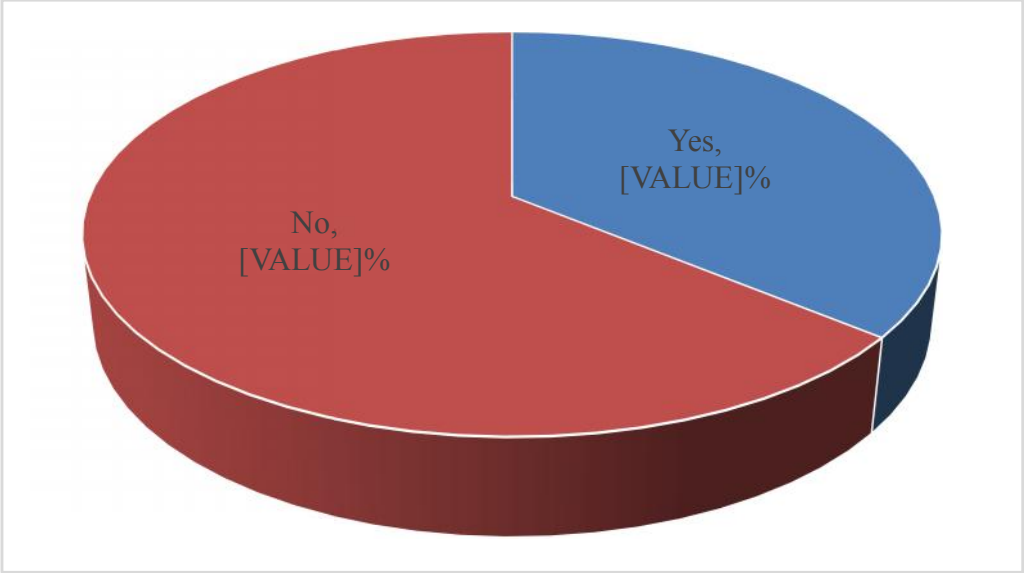

Figure 2; Proportion of NCD patients that received nutrition information from their health provider at the last clinic visit (N=156)
As shown in **Figure 2,** only fifty sixty patients (36%) had received nutrition information from the health provider at the last clinic visit.

3.1.2 Results from the In-depth interview for the health workers

Health workers nutrition knowledge

Some health workers said that the goal of nutrition therapy in management of NCDs was to reduce on the severity of the condition. Mbale RRH has one nutritionist covering all the departments. The health workers reported that he rarely visits the NCD clinic. All staff said that the training they received on nutrition while at colleges and universities was inadequate to enable them handle these patients. "I don't feel confident enough to pass on knowledge on what my patients should eat or not eat because I am not very sure" said one of the nurses. A few staff said that currently they use internet to access information on nutrition, others said newspapers, radio and TV.

Application of nutrition knowledge

When asked whether they were applying the nutrition knowledge acquired in school, most of the health workers said they had forgotten what they had learnt in college. Those who were remembering said it was not applicable in the clinic. Others said that a lot had changed since they had the training. Therefore, none of them was applying the knowledge since they said it was inadequate and new policies have come up and yet they have not been updated.

Provision of nutrition information to patients.

When asked who provides the nutrition information to patients and how often, the health workers said it's supposed to be them or the hospital nutritionist and on every visit. On most of the clinic days they are overwhelmed with the number of patients and thus they don't get time to give nutrition education. As earlier said the nutritionist does not visit the NCD clinic as

required. The hospital receives nutrition internees for about 2 months who support a lot in providing nutrition information to the NCD patients.

Human resource

The health workers said they didn't have whatever they required to provide the nutrition information to patients. For example, at the time of the study there were no IEC materials at all and no reference materials. They also said they had no dietician or nutritionist at the clinic. The clinic does not receive support supervision on nutrition assessment counseling and support for NCD patients.

Challenges faced by health workers

Health workers mentioned the following challenges in their day to day activities in providing nutrition information to patients with NCDs; no reference materials and other IEC materials, no nutritionist/dietitian, overwhelming number of patients as compared to the few staff. One of the staffs mentioned that the so many upcoming reflexology centers that are misinforming people are a challenge. There were no policies in place on nutrition management of NCDs.

The staff had no refresher courses in nutrition and no CME on nutrition management of NCD patients. There was no regular support supervision on nutrition assessment counseling and support. Health workers said that in order to improve quality nutritional care to patients with diet related NCDs, the following should be in place: The hospital should recruit more staff, MOH to supply the policies and IEC materials, regular refresher trainings and CME's should be done.

UNDER PEER REVIEW

3.2 DISCUSSION

This study had more female than male respondents (60.4% versus 39.6%). These findings are similar to other studies in Uganda that show that females have better health seeking behavior [9]. Also, MRRH being a government hospital probably the men seek for treatment elsewhere for example in private hospitals since they can afford the treatment because they control the funds in most homes.

Most of the NCD patients were in the age groups of 35 to 59 and 60 to 90 years (53.1% and 37.7 % respectively). Our findings corroborate those from Miranda's study that noted that NCDs cause more than half of deaths in adults aged 15-59 in all regions except south Asia and sub-Saharan Africa. In this study very few patients were younger than 35 years (n= 24, 9.2%), [3]. Research has shown that NCDs affect all age groups and regions and are often associated with older age groups. The age groups of 19-34 and 35-59 are age groups that can afford junk foods, consume alcohol and thus their lifestyle exposes them to develop these diseases, above 60 years the main risk factor is age. These findings are also in line with Tawa's study which revealed that increasing age is a factor significantly associated with the development of risk factors for NCDs [10]. Currently all age groups are at risk of developing NCDs. However, the elderly and those that have access to junk foods, exposed to smoking and alcohol stand a higher risk. Shakkour in his study also noted that there were many factors that affect a person's eating choices: age, gender, income levels and education level may affect a person's eating habits [11].

Most of the respondents were below the poverty line earning less than 1 Dollar per day. The national poverty line in Uganda ranges from US Dollars 0.88 to US Dollars 1.04 daily. Uganda's poverty lines are much lower so the poverty line in Uganda is perhaps too low [12]. Both the rich and poor are exposed to unhealthy exposed to harmful products, such as tobacco, or unhealthy dietary utilization, and have limited access to health services [13]. As noted, the rapid rise in NCDs is predicted to impede poverty reduction initiatives in low-income countries, particularly by increasing household costs associated with health care. Poverty is the major underlying factor for hypertension and cardiovascular diseases [14]. This corroborated WHO's report that human social and economic diets predisposing them to NCDs. There is a close link between poverty and NCDs. This finding concurs with the WHO's assertion that vulnerable and socially disadvantaged people get sicker and die sooner than people of higher social positions, especially because they are at greater risk of being consequences of NCDs are felt by all countries but are particularly devastating in poor and vulnerable populations [15].

Only 37% (n=95) of the respondents had attained secondary school level of education and above. Low level of education is one of the factors seen to be significantly associated with the development of risk factors for non-communicable diseases [10]. Those who had attained secondary level of education were 2.308 more likely to utilize the nutrition knowledge than those who had never studied, *P* value of .028, 95CI (1.093-4.874). Those with tertiary education were even 9.261 times more likely to utilize the knowledge *P* value < .001, 95CI (2.721-31.522). Education is an important factor affecting use of nutrition information and higher education levels also enhance patients' ability to understand and interpret any nutrition information given to them. Mbale RRH is a public facility where services are free and thus its mainly the lower-class people who utilize the services at this hospital. Those with better education and probably a better pay probably seek treatment in private facilities where services are better since they can afford the treatment. The higher the level of education the more access there is to the nutrition information.

A study in Tanzania by Mwana which revealed that among the supermarket customers, highly educated participants held more positive attitude towards lower consumption frequencies of energy dense foods. The study also showed that nutrition knowledge was higher among participants who had attended tertiary institution and those with health/nutritional related qualification [16]. As seen in one of the studies, nutrition behavior is significantly and positively related to use of food labels and BMI. Though nutrition information on food labels is helpful, it is only applicable among those who can read [17].

NCD clinic attends to about 120 patients per clinic day and most of them were diabetic and hypertensive as seen from the results. This is in line with the statement that cardiovascular disease and diabetes are among the NCDs that account for around 80% of the total burden of chronic disease mortality in developing countries [18]. Having more of HT and DM cases can be explained by the fact that high consumption of calories will first cause DM which in turn will predispose one to other NCDs. Distribution of sex per the most common NCDs showed there were more females with hypertension 60 (57.1%) and diabetes 79 (62.7%) as compared to their male counterparts. Our findings concur with Tawa's study which showed that more females have more risk factors to develop NCDs compared to their male counterparts [10].

Majority of the respondents (n=156, 60%) were found to have adequate nutrition knowledge, however not all of them knew that their condition was diet related. These risk factors are preventable but most patients were ignorant about this which is not good. Boutayeb noted

UNDER PEER REVIEW

that urgent preventive actions are needed and efficient strategies should deal seriously with risk factors like smoking, alcohol, physical inactivity and western diet [19]. These findings Our findings differ from a study conducted in Lilongwe-Malawi among pregnant women which showed that there was limited health and nutrition knowledge among them either due to the limited content of the information that the nurses provided or due to their own limited health and nutrition literacy skills [20].

Kavishe found that knowledge of NCDs and their risk factors was low. Educational interventions can be high-yielding, low-cost approach to combat NCDs. And yet lack of awareness can have negative impact on health outcomes and this has been documented in other studies and therefore it is a major barrier to control [21]. Thus, something has to be done about increasing awareness on nutrition among these patients. Lack of knowledge about healthy and unhealthy behaviours highlighted the importance of carrying out regular surveillance for NCD risk factors, and initiating programs for prevention of NCDs among adolescents [22].

Majority of the respondents had not smoked, however most of the respondents had consumed alcohol before, and majority were not doing exercises. Most of the respondents were ignorant about the relationship between their condition and lifestyle.

Not all the NCD patients were utilizing the nutrition knowledge much as the knowledge scale showed that most of them had high level of nutrition knowledge, only (n=127, 51.2%) were utilizing the knowledge. Muthike's study indicated that there was significant positive association between nutritional knowledge of the patients and their dietary utilizations especially for foods like fruits and vegetables and protein [23]. A study indicated that patients who proactively seek nutrition information from various sources have improved nutrition [11,23].

Patients who had adequate knowledge were about 1.6 times most likely to utilize the nutrition knowledge compared to those with inadequate knowledge level. AOR = 1.573 95%CI (0.923- 2.868) Policy makers need to pay attention to programs that will help deal with these risk factors like nutrition education and counseling. This means that there is need to empower the patients with knowledge because there is evidence that those with the knowledge utilize it. NCD patient possession of adequate knowledge is 1.65 times most likely to utilize nutrition knowledge (AOR = 1.65, 95CI 0.954-2.868).

Our findings are similar to findings from another study which indicated that there was significant positive association between nutritional knowledge of the patients and their dietary utilizations especially for foods like fruits and vegetables and protein [23]. Nani in her study on relationship between nutrition knowledge and food intake of college students also recommended that future nutrition interventions to improve dietary quality in college students should focus on improving nutrition knowledge. Nutrition knowledge among graduates has been found to be poor; not a single graduate identified with good knowledge [24,25].

Few of the respondents who said have access to nutrition information had received information from a health service provider in the last clinic visit 56 patients (36%). There is need to integrate nutrition education in the management of NCDs since it's an essential component in in improving dietary habits and food choices, in order to reverse the under nutrition and improve the nutritional diagnosis. Previous studies have shown a positive impact of nutrition education on the nutritional status of older adults has been confirmed by many studies [26]. There was no adequate personnel to offer nutrition education and yet nutrition education increases nutrition knowledge, nutrition attitudes, and dietary habits

UNDER PEER REVIEW

among patients significantly [27]. Increased nutrition knowledge among health workers improves on the management of malnourished patients [28].

Jackson reported that, nutrition information provided by medical and health-related workers is held in high regard by the general public. Sound and safe nutrition advice to the public and patients is therefore important. Since healthcare workers are to apply nutrition in clinical utilization and in prevention of disease, then nutrition should be an essential component of medical professional curriculum [29]. This therefore means that nutrition education at these clinics should be strengthened. From the in depth interview the hospital depends on one nutritionist to offer nutrition support to the patients. It was so evident that the health personnel were overwhelmed with the big numbers of patients and therefore even if they would hardly get time to give the nutrition support (nutrition information) needed.

Mbale RRH did not have the capacity to handle the NCD patients in terms of human resource, drugs and equipment as observed from the checklist. Findings from the indepth interviews revealed that the clinic had only clinical officers and nurses handling all the patients. No nutritionist to pass on the information and no physician or medical officer. And thus there is need to train these frontline health workers or to provide them with information on the diet of nutrition related diets. Many health conditions and diseases can be minimized or managed with appropriate ante nutrition education. However medical schools don't provide sufficient nutrition education to prepare future physicians to give specific dietary recommendations [30].

Only (n=35.9, 36%) of those receiving nutrition information had received nutrition information from a health worker at their last clinic visit. The in-depth interview revealed that all these workers had inadequate information on nutrition in NCDs. They expressed that they have no reference materials and they have not had refresher courses in nutrition and dietetics. Front line health workers are able to adhere to the protocols for managing stable NCD patients if equipped with knowledge. In sub-Saharan Africa there is an increasing need to leverage available health care workers to provide nutrition care for NCDs. This will therefore pave the way towards task shifting of NCD care to nurses to help relieve the significant healthcare gap in developing countries [31].

A study by Peck in Tanzania showed that most outpatient services for NCDs in are provided at hospitals, despite present policies stating that health centres and dispensaries should provide such services [31]. This explains the overwhelming numbers at the NCD clinic in Mbale RRH. Even when the lower facilities have the capacity to handle the NCDs, they don't do so, they instead refer the cases to RRH yet some of the patients are stable and they could be handled at the lower facilities. Results from in-depth interviews revealed that health workers were aware that nutrition therapy in combination with medication reduces the severity of the NCD condition. In Tanzania, front-line health-care workers (such as non-medical-doctor clinicians and nurses) didn't have knowledge and experience of NCDs [31]. This was not different from the Mbale RRH NCD clinic where it was mainly the nurses, medical student internees and clinical officers managing these patients. The senior medical officers and physicians visit the clinic once in a while. And thus, not only are the health workers inadequate in knowledge but they also lack the time to give the nutrition information. Mowe noted that the importance of nutrition education and training for healthcare professionals must not be overlooked, because the lack of nutrition knowledge among them has been reported as the most common cause for inadequate nutritional care [32]. There is need to increase the nutritional knowledge of healthcare professionals since it has been demonstrated to improve the management of malnourished patients [28] .

UNDER PEER REVIEW

Munuo *et al.,* 2014 reported in their study that nutrition knowledge was poor among healthcare workers, though they had positive attitude, they failed to practice. This study also revealed that the health workers at the clinic had inadequate knowledge. Inadequate nutrition training in medical school, lack of resources and motivation were identified as factors that influence nutrition management of Chronic Kidney Disease CKD in the study area. Nutrition knowledge strongly influences practices of healthcare workers managing patients with CKD. Health workers with higher level of education tended to practice better compare to those with low education level [33]. Like one of the nurses said *"*I don't feel confident enough to pass on knowledge on what my patients should eat or not eat because I am not very sure*".*

Most of the staff last had nutrition information while in college and yet they feel this was not adequate enough to enable them support these patients. All the health workers who were handling these patients had not had any refresher trainings or CMEs in nutrition and NCDs. This is also similar to the findings that apart from medical/ nursing schools, some of the respondents had nutrition knowledge from seminars, books and internet[33]. No one mentioned he/she had continuous medical education in nutrition [23]. It is important therefore to equip healthcare workers with facilities that will enable them to improve their knowledge. Another study showed that the health workers didn't have the required knowledge and yet research conducted by Kennelly showed that increased nutrition knowledge among the health workers improved on the management of malnourished patients [28].

As reported in the checklist there were no reference materials and I.E.C materials like job aides, counseling cards, brochures, posters which would help them during nutrition education and counseling. From observation, there was inadequate space for providing individual nutrition education/counseling. There were no nutrition related policies in place. This is similar to what Murray noted that Lower-income countries Uganda inclusive generally have lower capacity for the prevention and control of non-communicable diseases. Creating healthy public policies that promote NCD prevention and control and reorienting health systems to address the needs of people with such diseases can help us achieve a great impact[34]. Therefore, there is a gap as far as offering nutrition information to patients is concerned at the NCD clinic of MRRH thus even if there were personnel to offer the knowledge the system would not favor them to do so. While NCDs are among the Ministry of Health's (MOH) policy priorities since 2006 in Uganda when the programme for the prevention and control of NCDs was established, there is no evidence of its enforcement. No support supervision has been given to this clinic by MOH or any other body.

The country needs to design non-communicable disease programmes with focus on disease prevention and management as well as awareness activities in urban and rural settings at community level. Major efforts are needed to strengthen health services for the prevention, early detection and treatment of chronic diseases [21,35].

4. CONCLUSION

Most of the respondents had only attained primary level of education. Hypertension and Diabetes Mellitus were the most common NCDs seen at the clinic. Being more knowledgeable about nutrition increases its utilization in the management of NCDs. Health workers are the main source of nutrition information to NCD patients. Most of the NCD patients had high level of nutrition knowledge however not all of them were utilizing the nutrition knowledge. Those with adequate knowledge had a higher level of utilization as compared to those with inadequate. NCDs are not yet a priority for MOH given the lack of supportive policies and other necessary materials like reference materials. There are

UNDER PEER REVIEW

inadequate human resources in MRRH trained in NCD care and management. Health workers do not provide nutrition information to NCD patients because of inadequate knowledge, lack of reference materials, lack of space and inadequate human resource.

CONSENT

Written consent was obtained from patients' study participants. Confidentiality of the information was assured and privacy of each respondent was maintained throughout the data collection process. Confidentiality of the information was assured and privacy of each respondent was maintained throughout data collection. Codes were used on the questionnaires instead of names and the filled questionnaires were kept under lock and key.

ETHICAL APPROVAL

The study was approved by the Busitema University Faculty of Health Sciences Higher Degrees and Research Committee as well as the Mbale Regional Referral Hospital Research and Ethics Committee (Ref No. MRRH-REC-IN-COM 078/217).

REFERENCES

[1] Daar AS, Singer PA, Leah Persad D, Pramming SK, Matthews DR, Beaglehole R, et al. Grand challenges in chronic non-communicable diseases. Nature 2007;450:494–6. doi:10.1038/450494a.

[2] World Health Organization. Global Action Plan for the Prevention and Control of NCDs 2013-2020. World Health Organization; 2015.

[3] Miranda JJ, Kinra S, Casas JP, Smith GD, Ebrahim S. Non-Communicable diseases in low and middle-income countries: context , determinants and health policy. Trop Med Int Heal 2009;13:1225–34. doi:10.1111/j.1365-3156.2008.02116.x.

[4] Bloom DE, Cafiero E, Jané-Llopis E, Abrahams-Gessel S, Reddy Bloom L, Fathima S, et al. The Global Economic Burden of Noncommunicable Diseases. 2011. doi:10.1192/bjp.184.5.393.

[5] Kumar Aryal K, Mehata S, Neupane S, Vaidya A, Dhimal M, Dhakal P, et al. The Burden and Determinants of Non Communicable Diseases Risk Factors in Nepal: Findings from a Nationwide STEPS Survey. 2015. doi:10.1371/journal.pone.0134834.

[6] Steyn NP, Mann J, Bennett PH, Temple N, Zimmet P, Tuomilehto J, et al. Diet, nutrition and the prevention of type 2 diabetes. Public Health Nutr 2004;7:147–65. doi:10.1079/PHN2003586.

[7] Uganda Ministry of Health. The Second National Health Policy, July 2010. Promoting People's Health to Enhance Socio-Economic Development - Uganda. Kampala, Uganda: 2010.

[8] Nambala E, Byakika-Tusiime J, Gavamukulya Y. Data for nutritional knowledge and practice among patients with non-communicable diseases attending Mbale Regional Referral Hospital in Eastern Uganda. Mendeley Data 2019;v1. doi:10.17632/y5kdzmzj7b.1.

UNDER PEER REVIEW

[9] Schwartz JI, Guwatudde D, Nugent R, Kiiza CM. Looking at non-communicable diseases in Uganda through a local lens: An analysis using locally derived data. Global Health 2014;10:1–9. doi:10.1186/s12992-014-0077-5.
[10] Tawa N, Newlove AA, Hannah AA, World Bank. The impact of lifestyle variables and dietary patterns on non-communicable diseases. J Chem Biol Phys Sci 2013;3:264–75.
[11] Shakkour E. The Relationship Between Nutritional Knowledge and Application. Liberty University, 2007.
[12] World Bank Group. Poverty Assessment Report 2016. 2016.
[13] World Health Organization. Global status report on noncommunicable diseases 2010. Venice, Italy: 2011.
[14] Seedat Y. Why is control of hypertension in sub-Saharan Africa poor? Cardiovasc J Afr 2015;26:193–5. doi:10.5830/CVJA-2015-065.
[15] World Health Organization. Global status report on noncommunicable diseases 2014. Geneva, Switzerland: 2014.
[16] Mwana EK. Consumer attitude, knowledge and use of nutrition information in relation to energy dense foods: A case study of Dar-es-salaam, Tanzania. University of Ghent, 2013.
[17] Qamar Z. Dietary behaviours and nutrition knowledge among South Asians. Texas A&M University, 2011.
[18] Abegunde DO, Mathers CD, Adam T, Mathers C. The burden and costs of chronic diseases in low-income and middle-income countries. Lancet 2007;370:1929–38. doi:10.1016/S0140-6736(07)61696-1.
[19] Boutayeb A, Boutayeb S. The burden of non communicable diseases in developing countries. Int J Equity Health 2005;4:1–8. doi:10.1186/1475-9276-4-2.
[20] Mvula N. Investigating health and nutrition messages given to pregnant women at Bwaila hospital in Lilongwe. Akershus University College, 2010.
[21] Kavishe B, Biraro S, Baisley K, Vanobberghen F, Kapiga S, Munderi P, et al. High prevalence of hypertension and of risk factors for non-communicable diseases (NCDs): A population based cross-sectional survey of NCDS and HIV infection in Northwestern Tanzania and Southern Uganda. BMC Med 2015;13. doi:10.1186/s12916-015-0357-9.
[22] Gamage AU, Jayawardana PL. Knowledge of non-communicable diseases and practices related to healthy lifestyles among adolescents, in state schools of a selected educational division in Sri Lanka. BMC Public Health 2017;18:1–9. doi:10.1186/s12889-017-4622-z.
[23] Muthike CW. Nutritional knowledge in association with dietary practices of cancer patients: a case study of Kenyatta National Hospital cancer treatment center, Nairobi. University of Nairobi, 2013.
[24] Ng M, Fleming T, Robinson M, Thomson B, Graetz N, Margono C, et al. Global, regional, and national prevalence of overweight and obesity in children and adults during 1980-2013: a systematic analysis for the Global Burden of Disease Study 2013. Lancet 2014;384:766–81. doi:10.1016/S0140-6736(14)60460-8.
[25] Nani MO. Relationship between nutrition knowledge and food intake of college students. Kent State University, 2016.
[26] Wunderlich S. The Importance of Appropriate Nutrition Assessment and Nutrition Education for Older Adults. J Nutr Food Sci 2013;3.
[27] Brendah Cheptikai Ndiema. Status of utilization of nutrition information on processed meat products in making purchasing decisions among consumers in Nakuru town, Kenya. Kenyatta University, 2017.
[28] Kennelly. An evaluation of a community dietetics intervention on the management of malnutrition for healthcare professionals. J Hum Nutr Diet 2010;23:567–74. doi:10.1111/j.1365-277X.2010.01111.x.

UNDER PEER REVIEW

[29] Jackson AA. Human nutrition in medical practice: the training of doctors. Proc Nutr Soc 2001;60:257–63. doi:10.1079/PNS200081.
[30] Hargrove EJ. Nutrition Knowledge and Attitude Towards Nutrition Counseling Among Osteopathic Medical Students. Ohio University, 2016.
[31] Peck R, Mghamba J, Vanobberghen F, Kavishe B, Rugarabamu V, Smeeth L, et al. Preparedness of Tanzanian health facilities for outpatient primary care of hypertension and diabetes: A cross-sectional survey. Lancet Glob Heal 2014;2. doi:10.1016/S2214-109X(14)70033-6.
[32] Mowe M, Bosaeus I, Rasmussen HH, Kondrup J, Unosson M, Rothenberg E, et al. Insufficient nutritional knowledge among health care workers? Clin Nutr 2008;27:196–202. doi:10.1016/j.clnu.2007.10.014.
[33] Munuo AE, Mugendi BW, Kisanga OA, Otieno GO. Nutrition Knowledge , Attitudes and Practices Among Healthcare Workers in Management of Chronic Kidney Diseases in Selected Hospitals in Dar Es Salaam , Tanzania a Thesis Submitted in Partial Fulfillment of the Requirements for the Award of the Degree of. BMC Nutr 2014;2. doi:10.1186/s40795-016-0045-y.
[34] Murray CJL, Barber RM, Foreman KJ, Abbasoglu Ozgoren A, Abd-Allah F, Abera SF, et al. Global, regional, and national disability-adjusted life years (DALYs) for 306 diseases and injuries and healthy life expectancy (HALE) for 188 countries, 1990-2013: quantifying the epidemiological transition. Lancet 2015;386:2145–91. doi:10.1016/S0140-6736(15)61340-X.
[35] Mishra SR, Neupane D, Bhandari PM, Khanal V, Kallestrup P. Burgeoning burden of non-communicable diseases in Nepal: a scoping review. Global Health 2015;11. doi:10.1186/s12992-015-0119-7.

DEFINITIONS, ACRONYMS, ABBREVIATIONS

CNCDs	Chronic non-communicable diseases
MRRH	Mbale Regional Referral Hospital
MRRH-REC	Mbale Regional Referral Hospital Research and Ethics Committee
NCDs	Non-communicable diseases
MOH	Ministry of Health
SDGs	Sustainable Development Goals

UNDER PEER REVIEW