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NUTRITION KNOWLEDGE, ATTITUDES, PRACTICES, AND SCHOOL SANITATION CONDITIONS AMONG PRIMARY SCHOOL LEARNERS AGED 9–14 YEARS IN CHITIPA DISTRICT, MALAWI: A MIXED-METHODS STUDY

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ABSTRACT

Despite curriculum-based interventions to improve child nutrition in Malawi, primary school learners continue to demonstrate poor dietary habits and persistent misconceptions about essential nutrients, such as confusing sugary snacks with healthy energy foods, misunderstanding the role of Vitamin A, and showing limited dietary diversity. These challenges are compounded by inadequate Water, Sanitation, and Hygiene (WASH) facilities, which increase susceptibility to infections and further compromise nutrition outcomes. This study assessed the nutrition knowledge, attitudes, and practices (KAP) of learners aged 9–14 years benefiting from school feeding programmes and examined prevailing WASH conditions in primary schools in Chitipa District, Malawi. A sequential mixed-methods design was applied, with quantitative data collected from 182 learners using structured questionnaires adapted from validated KAP instruments, and qualitative insights obtained through six focus group discussions involving 72 participants. A WASH checklist further assessed sanitation facilities, water supply, and hygiene infrastructure. Descriptive statistics and thematic analysis were employed. The findings revealed that while 65% of learners demonstrated moderate nutrition knowledge, misconceptions were widespread. Many equated sugary snacks with energy-rich foods, associated frequent *nsima* consumption with health, and struggled to identify Vitamin A sources and deficiency diseases. Attitudes were generally positive, with learners expressing interest in dietary diversity and willingness to adopt healthier eating practices; however, these attitudes were often constrained by household food availability, cost, and peer influence. Only 16% consumed animal-based foods at least three times weekly, while most relied heavily on staples. WASH assessments revealed inadequate handwashing facilities, intermittent water supply, and poor waste management. Learners expressed positive attitudes towards dietary diversity but reported barriers such as high costs, household food availability, and peer influence. Overall, this study demonstrates a gap between nutrition knowledge, attitudes, and practices, and highlights how structural challenges constrain healthy behaviors. Practical interventions such as integrating school gardens, strengthening hands-on nutrition education, diversifying school meals, and improving WASH facilities are needed to correct misconceptions and enhance behavioral capability. The findings underscore the importance of integrated approaches involving schools, households, and policymakers to ensure sustainable improvements in child nutrition and health in Malawi

Key words: Nutrition KAP, School Health and Nutrition, Malnutrition, Dietary Diversity, Child Nutrition

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INTRODUCTION

School-aged children require adequate nutrition for optimal growth, cognitive development, and academic performance. Globally, malnutrition in this age group contributes to poor school attendance, reduced learning capacity, and increased susceptibility to disease [1,2]. In Malawi, malnutrition remains a public health concern, with 37% of children under five years stunted and only 8% meeting minimum dietary diversity requirements [3,4]. While these statistics primarily refer to younger children, they signal the broader nutrition challenges affecting school-aged learners as well.

The Government of Malawi, in collaboration with partners, implements the School Health and Nutrition (SHN) programme to improve child health and learning outcomes. Components include nutrition education, school feeding, deworming, micronutrient supplementation, WASH initiatives [5,6]. However, studies indicate persistent gaps in learners' nutrition knowledge, attitudes, and practices (KAP), partly due to environmental constraints such as poor access to diverse foods, limited parental nutrition knowledge, and inadequate WASH [7,8].

In addition, the current primary school curriculum faces several weaknesses that limit its effectiveness in improving nutrition behaviors. These include a lack of practical, hands-on teaching approaches such as cooking demonstrations, food preparation activities, and school gardens; insufficient teacher training on nutrition concepts; and inadequate teaching materials to reinforce classroom lessons. Moreover, poor WASH conditions such as limited access to safe water, soap, and clean latrines can undermine the benefits of nutrition education by increasing the risk of diarrheal diseases, which reduce nutrient absorption and overall health. Evidence from Malawi-based studies shows that without parallel improvements in both nutrition education and WASH infrastructure, gains in dietary knowledge are unlikely to translate into sustained healthy practices [3,9].

Existing literature on school-aged children in Malawi has largely focused on undernutrition and school feeding outcomes [2,7,10], with limited research on the integration of nutrition knowledge, attitudes, practices, and school sanitation conditions within the SHN framework. Furthermore, most studies have used either purely quantitative or purely qualitative methods, without combining the two to provide a comprehensive understanding [10].

This study addresses these gaps by using a sequential mixed-methods approach to assess the nutrition KAP of learners aged 9–14 years in primary schools implementing school feeding and to examine the prevailing WASH conditions in these schools [11,12].

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Specifically, it addressed the following research questions:

1. What is the level of nutrition knowledge, attitudes, and practices among primary school learners in Chitipa District?
2. What factors influence the food choices of primary school learners in this context?
3. What is the current water, sanitation, and hygiene conditions in the selected schools?

MATERIALS AND METHODS

Research Design

This study employed a sequential mixed-methods design, beginning with quantitative data collection through structured questionnaires, followed by qualitative data collection via focus group discussions (FGDs) to elaborate on and explain quantitative findings. The study was conducted in public primary schools implementing the SHN programme.

Study Area

The research was conducted in Chitipa District, located in Malawi's Northern Region, bordering Tanzania and Zambia. The district is increasingly commercialized due to its strategic position, with major markets such as Chitipa Boma, Misuku, and Wenya facilitating access to diverse food items. Proximity to these markets significantly influences household dietary choices by improving food availability and diversity. According to the National Statistical Office (NSO), Chitipa had an estimated population of 234,927 people and a school network comprising 185 primary schools, of which 181 were government-run [13]. For this study, twenty primary schools supported by the School Health and Nutrition (SHN) program were purposively selected.

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Figure 1: Map of Chitipa District (NSO, 2022)

Study Population and Sampling

The study population consisted of learners aged 9–14 years (Standards 5–8) from schools receiving school meals under the SHN programme. For the quantitative survey, a multistage sampling approach was used. First, schools were purposively selected to ensure representation of rural and peri-urban locations. Within each school, classes were randomly selected, and learners were randomly chosen from the class register to participate. A total of 182 learners completed the questionnaire.

For the qualitative component, 72 learners participated in 6 FGDs (each not less than 8 participants). These learners were purposively selected from among survey participants to ensure diversity in age, gender, and performance in the nutrition knowledge section of the questionnaire (low, moderate, and high scorers).

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Volume 25 No. 10
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Study Period

Data collection took place over two weeks during school days in October 2024, scheduled at convenient times to minimize disruption to class activities.

Sample Size Determination

The sample size for the quantitative component was calculated using Cochran's formula for proportion-based studies (14):

$$S = \frac{Z^2 \times P \times (1-P)}{M^2}$$

Where:
S= Desired sample size
Z= Standard normal deviate set (1.96 at 95% confidence interval)
P= estimated proportion of the attribute in the population (0.5)
M= margin of error (0.05)

Calculations yielded a sample size of 384.16. However, due to logistical and time constraints, the final sample size was reduced to 182 learners for the quantitative survey.

Data Collection Tools and Procedures

Quantitative Survey: The structured questionnaire comprised three sections. The first section focused on nutrition knowledge and included 10 multiple-choice and true/false questions. These assessed understanding of basic nutrition concepts, such as the definition of a balanced diet; knowledge of food groups and examples; awareness of the functions of specific nutrients, such as Vitamin A and protein; and understanding of the causes and prevention of nutrition-related deficiency diseases, for example, night blindness and anaemia.

The second section measured nutrition attitudes using eight statements rated on a five-point Likert scale, ranging from *strongly agree* to *strongly disagree*. These statements assessed participants' beliefs about healthy eating, perceptions of school meals, practices related to hygiene before eating, and their willingness to try new foods.

The third section examined nutrition practices through a combination of a 24-hour dietary recall and a Food Frequency Questionnaire (FFQ) covering the past week. This section focused on meal frequency, dietary diversity, and the consumption of animal-source foods, fruits, vegetables, and processed snacks.

Qualitative Component: Focus group discussions were guided by a semi-structured discussion guide exploring learners' food choices, perceptions of healthy eating, barriers to good nutrition, and experiences with school meals and WASH facilities. Discussions were conducted in a local language, Chitumbuka or Chichewa,

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depending on participants' preference, and were audio-recorded with consent, transcribed verbatim, and translated into English before analysis.

School Sanitation Assessment: A WASH checklist adapted from UNICEF guidelines was used to assess water sources, latrine type and cleanliness, availability of handwashing facilities, and soap. Observations were made during school visits and recorded systematically.

Pre-testing of Data Collection Tools

Pre-testing involved administering the questionnaire to 30 learners (approximately 16% of the sample) to assess clarity, reliability, and consistency. One FGD with 12 learners was conducted to pre-test the qualitative guide. Revisions were made based on feedback to improve the instruments before the main study.

Data Analysis

Quantitative data were entered into SPSS version 20. Nutrition knowledge scores were categorised as low (<50%), moderate (50–74%), and high (≥75%). Attitude scores were summed and categorised as negative (<50%), neutral (50–74%), or positive (≥75%). Dietary diversity was calculated from the FFQ and categorised according to FAO guidelines.

Qualitative data were coded inductively and deductively using NVivo version 12, with themes emerging on knowledge, attitudes, practices, and WASH-related barriers. Findings from the qualitative analysis were integrated with quantitative results during interpretation.

Data Quality Control

The instruments used were previously validated in similar populations and demonstrated reliability, with an internal consistency Cronbach's alpha of 0.773 in this study [15,16]. Established scales including the Healthy Eating Index (HEI), Healthy Eating Attitudes Scale (HEAS), and the General Nutrition Knowledge Questionnaire (GNKQ) were integrated to enhance measurement validity [17, 16]. Experts reviewed the research design, data collection tools, and analytical procedures to ensure methodological rigor [18].

RESULTS AND DISCUSSION

Participant Characteristics

A total of 182 learners aged 9–14 years (mean age 11.5 ± 1.3 years; 52% female) participated in the survey, while 72 learners engaged in six focus group discussions (FGDs). This sample provided both breadth and depth of understanding on nutrition and school health, consistent with earlier school-based KAP studies in Malawi [7,9].

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Nutrition Knowledge

Overall, 65% of learners had moderate knowledge scores, 16% scored high, and 19% scored low (Fig. 2). Vegetables (65%) and staples (64%) were the most recognized food groups, though 20% of learners could not identify any. FGDs revealed misconceptions such as equating satiety with nutrition. "I eat *nsima* because it makes me full, so it must be healthy." Learners also misclassified sugary snacks as healthy energy foods, reflecting poor food categorization.

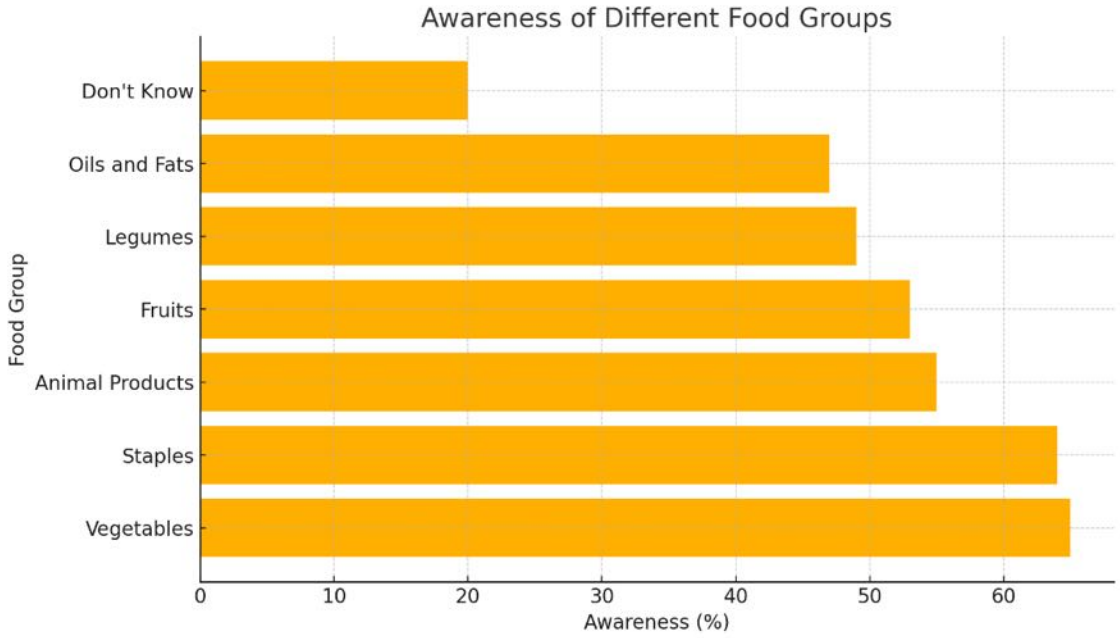

Figure 2: Awareness of Different Food Groups

Knowledge of micronutrients was weak: 55% identified Vitamin A-rich foods, yet only 21% associated deficiency with night blindness, often misattributing it to anemia. Similar findings were observed in rural Malawi, where learners showed gaps in linking nutrients with deficiency diseases [7,19]. Studies from Ghana and Kenya also confirm widespread gaps in functional nutrition knowledge among schoolchildren [20,21].

These findings highlight a persistent challenge: while children recognize broad food groups, detailed knowledge of micronutrients remains inadequate. This aligns with earlier evidence that nutrition education in schools often emphasizes general food categories without strengthening understanding of nutrient-specific roles [11].

Nutrition Attitudes

Attitudes toward dietary diversity were largely positive, with 90% agreeing that variety is important, and 62% expressed willingness to try new foods. However, 37% considered nutrition "an adult issue," 34% prioritized taste, and 32% viewed healthy foods as expensive (Fig. 2). FGDs revealed peer influence. "We like chips more than

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Volume 25 No. 10
November 2025
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vegetables because they taste better" as a determinant of choices. These results mirror earlier studies in Malawi and sub-Saharan Africa, which found socio-economic constraints and peer dynamics as critical drivers of adolescent food attitudes [7,20,21]. Contrastingly, a Nigerian study found cost to be less influential, with taste and peer pressure exerting stronger effects [28]. This suggests that affordability may play a relatively greater role in rural Malawi due to lower household incomes compared to urban West Africa.

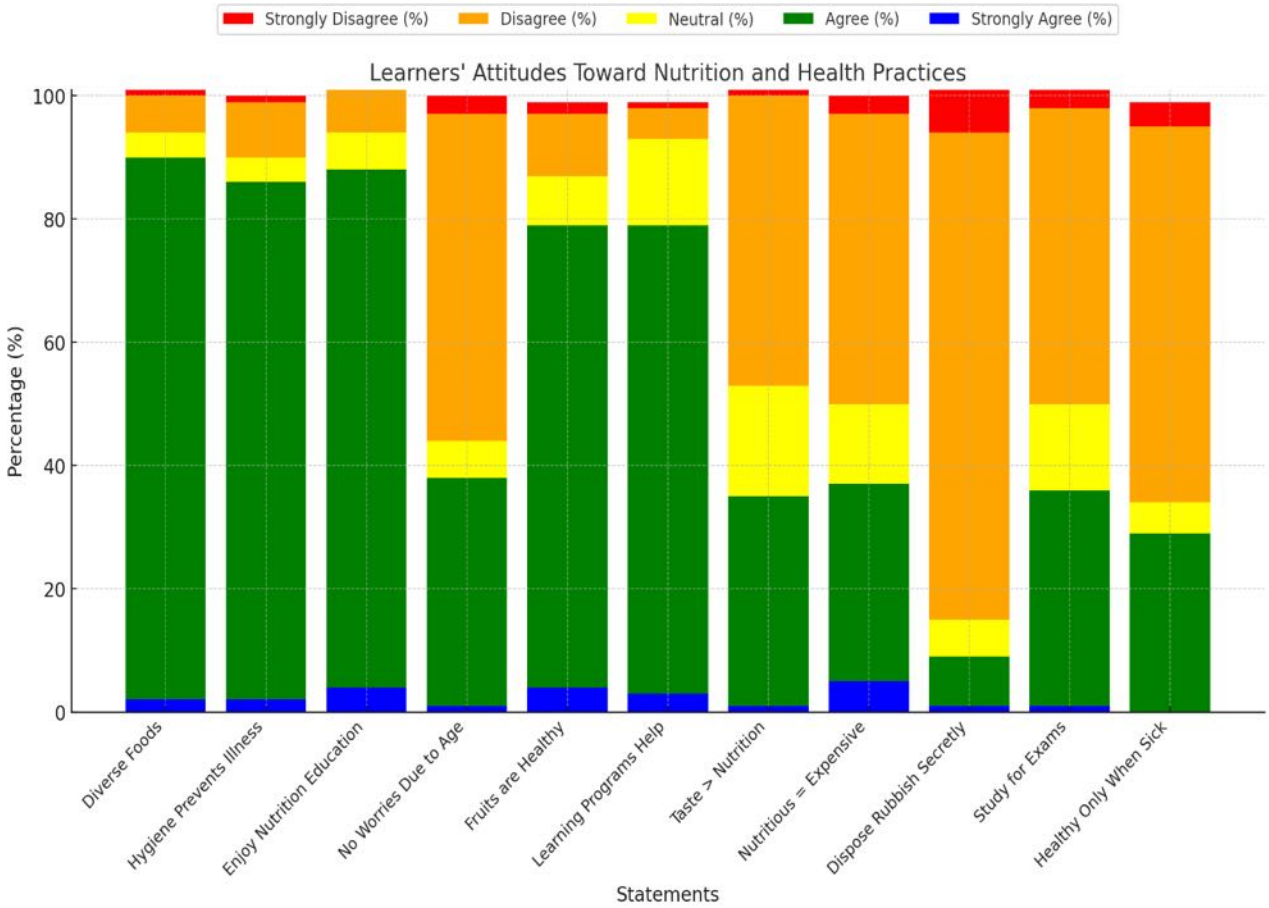

Figure 2: Learners' Attitudes Towards Nutrition and Health Practices

Nutrition Practices

Dietary patterns reflected high dependence on staples: 92% consumed maize-based meals more than four times weekly. Animal-source food consumption was low, with only 16% consuming them more than four times weekly, and 10% abstaining altogether. Fruits and legumes were moderately consumed, but unhealthy snacks were popular (45%). Only 41% achieved the minimum dietary diversity of five food groups (Fig. 3).

These results align with findings from the Malawi Demographic and Health Survey [3] and regional studies showing that school-aged children's diets remain

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November 2025
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monotonous and energy-dense [22,23]. The low intake of animal-source foods is consistent with evidence that affordability is a primary barrier in rural settings [24]. However, unlike findings from South Africa, where dietary transition is evident with high consumption of processed foods [29], Malawian learners remain highly reliant on traditional staples, though with rising snack consumption

Determinants of practices included affordability (72%), parental influence (68%), SHN clubs (78%), and peer pressure (43%). FGDs confirmed tension between home and school, with parental food choices often overriding nutrition messages from schools. This finding resonates with Bandura's Social Cognitive Theory [19], which emphasizes the role of social and environmental reinforcements in shaping behavior.

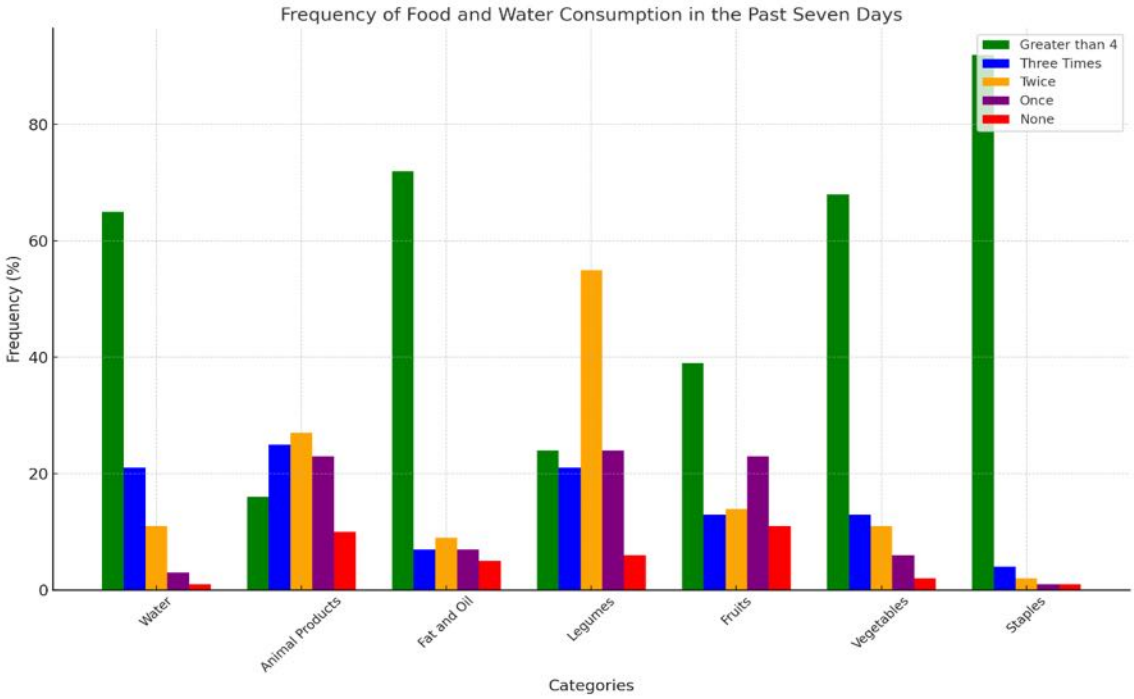

Figure 3: Food consumption in the past seven days

School Sanitation and Hygiene

Marked differences existed between schools. Model School maintained clean sanitation facilities, while Chitipa CCAP lacked adequate toilets and handwashing stations. In some cases, schools depended on untreated water sources. Despite 84% of learners linking poor hygiene to illness, actual handwashing practices were limited due to inadequate WASH infrastructure (Table 1). These findings are consistent with WHO/UNICEF standards showing that poor sanitation undermines health gains from nutrition interventions [17].

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CONCLUSION AND RECOMMENDATIONS FOR DEVELOPMENT

This study shows that primary school learners in Malawi's SHN programme have moderate nutrition knowledge and positive attitudes, but dietary practices are limited by low diversity, low animal-source food intake, and frequent unhealthy snack consumption. These challenges are driven by socio-economic constraints and limited WASH facilities.

To improve child nutrition, it is important to strengthen practical nutrition education that addresses knowledge gaps and misconceptions. Enhancing the quality and diversity of school meals by incorporating more nutrient-rich foods and collaborating with local suppliers is essential. Improving WASH infrastructure and hygiene promotion in schools will support better health practices.

Engaging families and communities can reinforce nutrition and hygiene messages beyond schools, while behaviour change communication should consider children's preferences and social influences to encourage healthier choices. Integrated efforts involving government, schools, NGOs, and communities are key to achieving sustainable improvements in child nutrition and health.

Limitations

This study's findings may not be generalized beyond the specific socio-economic and cultural context of the study area. The focus was limited to nutrition knowledge, attitudes, and practices, excluding factors like physical activity or mental health. Data collection occurred over a short period, which may not capture seasonal dietary variations. Reliance on self-reported data could introduce response bias, and the absence of direct observation limited verification of actual behaviors. Additionally, the descriptive analysis used restricts exploration of causal relationships. Future studies should employ inferential methods to better identify predictors of nutrition outcomes.

Ethical Considerations

The study was approved by the National Committee on Research in the Social Sciences and Humanities (NCRSH) in Malawi (Approval No: **NCRSH/APP/24/09/4515**). Permission was also obtained from the Chitipa District Education Office and head teachers of the participating schools. Informed consent was obtained from parents/guardians, and assent was secured from the pupils. Participants were informed of their right to withdraw at any time without any consequences. Data confidentiality and anonymity were strictly maintained. No physical or psychological harm was anticipated, and participation was entirely voluntary.

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This study was entirely self-sponsored. I acknowledge the personal commitment and resources invested to ensure the completion of this research.

CONFLICT OF INTEREST

The author declares no conflict of interest regarding this research study. The study was conducted independently, and no external funding or influences affected the objectivity of the findings. All ethical considerations were adhered to in conducting and reporting this research.

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SCHOLARLY, PEER REVIEWED
Volume 25 No. 10
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ISSN 1684 5374

Table 1: School Sanitation and Hygiene
(Key: ✅ = available, ❌ =not available)

School	Waste Disposal	Adequate Toilets	Clean Toilets	Handwashing Facilities	Clean Water Source	Treated Water Available
Chitipa CCAP	Composting	❌	❌	❌	✅	✅
Isyalikila	Composting	✅	❌	✅	✅	✅
Model	Composting	✅	✅	✅	✅	✅
Nachiwe	Open Fields	✅	❌	✅	❌	❌

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Table 2: Study Variables

Dependent Variables

Variable	Scale	Description
Nutrition Knowledge	Ordinal	Percentage of correct responses on dietary nutrients and food groups.
Nutrition Attitudes	Ordinal	Level of agreement with statements on nutrition and healthy eating.
Nutrition Practices	Ordinal	Self-reported food consumption behaviors, dietary diversity, and meal frequency.
WASH Conditions	Nominal	Availability of toilets, handwashing stations, clean water, and waste management.

Independent Variables

Variable	Scale	Description
Age	Ordinal	Categorized into 9–14 years to account for cognitive and behavioral differences.
Sex	Nominal	Male or Female, which may influence dietary preferences.
Engagement in SHN Programme	Nominal	Participation in SHN programs, impacting nutrition education and school feeding.
Food Groups Known	Ordinal	Number of food groups correctly identified from the Malawi Food Guide.
Food Groups Eaten Daily	Ordinal	Number of different food groups consumed daily, assessing dietary diversity.
Sources of Nutrition Information	Nominal	Where learners obtain nutrition knowledge (e.g., school, media, family).
WASH Practices	Nominal	Frequency of handwashing, availability of clean water, hygiene practices.
Parental Influence	Nominal	Influence of parents on food choices at home.
Peer Influence	Ordinal	Extent to which peers affect learners' food choices.

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APPENDICES

Appendix A: UNZABREC Approval Letter (Zambia)

UNIVERSITY OF ZAMBIA
BIOMEDICAL RESEARCH ETHICS COMMITTEE

Telephone: +260 977925304
Telegrams: UNZA, LUSAKA
Telex: UNZALU ZA 44370
Fax: + 260-1-250753
Ridgeway Campus
P.O. Box 50110
Lusaka, Zambia
E-mail: unzarec@unza.zm
Federal Assurance No. FWA00000338 IRB00001131 of IORG0000774 NHRAR-REC No 2021-05-0002

31st July, 2024

Your REF. No. 5382-2024

Mr. Chancy Kamwendo,
University of Zambia,
School of Public Health,
P.O Box 50110,
Lusaka.

Dear Mr. Kamwendo,

RE: THE NUTRITION KNOWLEDGE, ATTITUDES AND PRACTICE OF PRIMARY SCHOOL LEARNERS AGED 9-14 OF YEARS IN THE CONTEXT OF POOR DIETARY PRACTICES AND POOR FOOD CHOICES IN CHITIPA DISTRICT, MALAWI (REF. NO. 5382-2024)

The above-mentioned research proposal was presented to the Biomedical Research Ethics Committee on 29th July, 2024. The proposal is **approved**. The approval is based on the following documents that were submitted for review:

a) **Study proposal**
b) **Questionnaires**
c) **Participant Consent Form**

APPROVAL NUMBER : REF. No. 5382-2024.

This number should be used on all correspondence, consent forms and documents as appropriate.

i. **APPROVAL DATE : 30th July 2024**
ii. **TYPE OF APPROVAL : Standard**
iii. **EXPIRATION DATE OF APPROVAL : 29th July 2025**
iv. After this date, this project may only continue upon renewal. For purposes of renewal, a progress report on a standard form obtainable from the UNZABREC Offices should be submitted one month before the expiration date for continuing review.
v. **SERIOUS ADVERSE EVENT REPORTING**: All SAEs and any other serious challenges/problems having to do with participant welfare, participant safety and study integrity must be reported to UNZABREC within 3 working days using standard forms obtainable from UNZABREC.

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Appendix B: NHRC Approval Letter (Malawi).

Telephone: +265 1 789 400
Facsimile: +265 1 789 431
E-mail:
research@health.gov.mw
All Communications should be addressed to: The Secretary for Health

In reply please quote No. MED/4/36c
Ministry of Health
P.O. Box 30377
Lilongwe 3
Malawi

8th November, 2024

Chancy Kamwendo
University of Zambia

Dear Sir/Madam

Protocol # 24/09/4515: Nutrition Knowledge Attitudes and Practices of Primary School Learners aged 9-14 Years in the Context of Poor Dietary Practices and Poor Food Choices in Chitipa District Malawi

Thank you for the above titled proposal that researcher submitted to the National Health Sciences Research Committee (NHSRC) for review. Please be advised that the NHSRC has **reviewed** and **approved** the above named study.

- **APPROVAL NUMBER :4515**
- The above details should be used on all correspondences, consent forms and documents as appropriate.
- **APPROVAL DATE :08/11/2024**
- **EXPIRATION DATE :07/11/2025**
  This approval expires on **07/11/2025**. After this date, this project may only continue upon renewal. For purposes of renewal, a progress report on a standard form obtainable from the NHSRC Secretariat should be submitted one month before the expiration date for continuing review.
- **SERIOUS ADVERSE EVENT REPORTING:** All serious problems having to do with subject safety must be reported to the NHSRC within 10 working days using standard forms obtainable from the NHSRC Secretariat.
- **MODIFICATIONS**: Prior NHSRC approval using forms obtainable from the NHSRC Secretariat is required before implementing any changes in the protocol (including changes in the consent documents). You may not use any other consent documents besides those approved by the NHSRC.
- **TERMINATION OF STUDY**: On termination of a study, a report has to be submitted to the NHSRC using standard forms obtainable from the NHSRC Secretariat.
- **QUESTIONS**: Please contact the NHSRC on phone number *+265 999397913* or by email on mohdoccentre@gmail.com.
- **OTHER**: Please be reminded to send in copies of your final research results for our records (Health Research Database).

Kind regards from the NHSRC Secretariat.

National Health Sciences Research Committee
00 NOV 2024
APPROVED

.....
FOR CHAIRPERSON, NATIONAL HEALTH SCIENCES RESEARCH COMMITTEE

1

Executive Committee: Dr M. Joshua (Chairperson), Dr F. Sinyiza (Vice-Chairperson)
Registered with the USA Office for Human Research Protections (OHRP) as an International IRBIRB Number IRB00003905 FWA00005976

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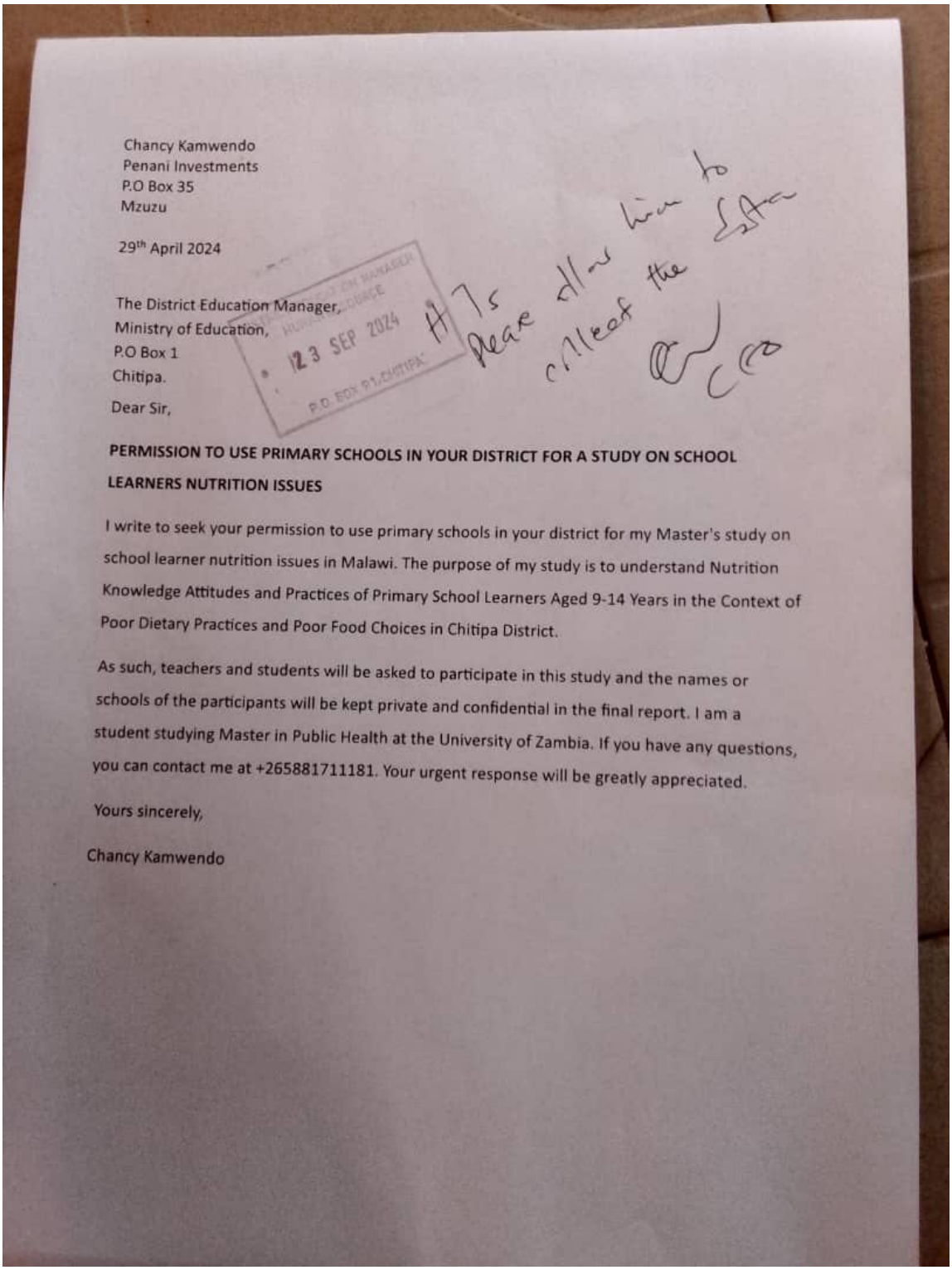
Appendix C: District Education Manager Consent (Malawi)



Chancy Kamwendo
Penani Investments
P.O Box 35
Mzuzu

29th April 2024

The District Education Manager,
Ministry of Education,
P.O Box 1
Chitipa.

23 SEP 2024

Please allow him to collect the

Dear Sir,

PERMISSION TO USE PRIMARY SCHOOLS IN YOUR DISTRICT FOR A STUDY ON SCHOOL LEARNERS NUTRITION ISSUES

I write to seek your permission to use primary schools in your district for my Master's study on school learner nutrition issues in Malawi. The purpose of my study is to understand Nutrition Knowledge Attitudes and Practices of Primary School Learners Aged 9-14 Years in the Context of Poor Dietary Practices and Poor Food Choices in Chitipa District.

As such, teachers and students will be asked to participate in this study and the names or schools of the participants will be kept private and confidential in the final report. I am a student studying Master in Public Health at the University of Zambia. If you have any questions, you can contact me at +265881711181. Your urgent response will be greatly appreciated.

Yours sincerely,

Chancy Kamwendo