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Dietary Practices and Nutritional Status among Adult Tuberculosis Patients in Kirinyaga County, Kenya

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ABSTRACT

Background: Undernutrition remains a major challenge among adults with tuberculosis (TB), particularly in low- and middle-income countries where food insecurity and suboptimal dietary practices are common. Poor nutritional status may compromise immunity, tolerance to treatment, and recovery. This study assessed dietary practices and nutritional status among adult TB patients in Kirinyaga County, Kenya. Methods: A descriptive cross-sectional study was conducted in public health facilities with functional TB clinics across all five sub-counties of Kirinyaga County. A total of 246 adult TB patients aged 18 to 70 years were enrolled. Data were collected using interviewer-administered structured questionnaires and complemented by focus group discussions and key informant interviews. Dietary practices were assessed using meal frequency, dietary diversity scores, and a 24-hour dietary recall. Nutritional status was assessed using body mass index (BMI). Quantitative data were analyzed using descriptive statistics, and qualitative data were analyzed thematically. Results: Participants were predominantly male (60.6%) and aged 35 to 44 years (30.9%). More than half reported consuming three or more meals per day (55.3%); however, dietary diversity was largely low to medium, with 40.2% consuming three or fewer food groups. Majority (59.8%) reported skipping meals due to lack of food. About 45.5% were underweight based on BMI classification. Undernutrition, limited dietary diversity are prevalent among adult TB patients in Kirinyaga County. Integrating routine nutritional assessment, strengthened nutrition counselling, and targeted food support within TB care services may improve nutritional outcomes and support recovery.

Keywords: *dietary practices; nutritional status; tuberculosis; Kenya*

INTRODUCTION

Tuberculosis (TB) remains one of the leading infectious causes of morbidity and mortality globally, affecting an estimated 10 million people annually (World Health Organization [WHO], 2017). Pulmonary TB is the most common form of the disease and is frequently characterized by chronic cough, chest pain, hemoptysis, fever, night sweats, weakness, and weight loss. These symptoms can reduce appetite and dietary intake and may impair functional

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capacity, thereby increasing vulnerability to undernutrition, particularly in resource-limited settings.

Nutrition plays a central role in immune function and recovery from infectious diseases. Among individuals with TB, inadequate dietary intake may result from reduced appetite, nausea, general weakness, and illness-related limitations in food access and preparation. In addition, TB-related inflammation increases metabolic demands and accelerates catabolism, which can worsen nutritional depletion and weight loss (WHO, 2009). Recognizing this risk, WHO recommends routine nutritional assessment, counselling, and appropriate support for TB patients to prevent and manage undernutrition as part of comprehensive TB care (WHO, 2013).

Dietary practices, including meal frequency and dietary diversity, are important indicators of diet quality and nutrient adequacy. Low dietary diversity has been associated with micronutrient deficiencies and poorer health outcomes (Drescher et al., 2007). For TB patients, inadequate diet quality may compromise immune response, reduce physical resilience during illness, and delay nutritional recovery (Stratton et al., 2003).

The relationship between TB and undernutrition is bidirectional. Undernutrition impairs immune function and increases susceptibility to progression from latent TB infection to active disease, while TB illness contributes to nutritional depletion through reduced intake and increased energy expenditure (Lönnroth et al., 2010; WHO, 2012). Evidence from other settings also shows that low BMI is associated with increased TB risk and adverse outcomes, reinforcing the importance of nutritional status in TB-affected populations (Hanrahan et al., 2010; Bhargava et al., 2013).

In many low- and middle-income settings, food insecurity further compounds nutritional risk by limiting access to sufficient and diverse diets, especially among socio-economically vulnerable households. In Kenya, TB remains a public health concern and Kirinyaga County is considered TB endemic. However, county-level evidence describing dietary practices, food insecurity experiences, and nutritional status among adult TB patients is limited. Understanding these nutrition-related challenges is essential for informing nutrition-sensitive interventions and strengthening patient-centered TB care in Kirinyaga County.

Statement of the problem

Tuberculosis continues to be a major public health problem in Kenya, disproportionately affecting adults in economically productive age groups. Although TB treatment services are available in many public health facilities, undernutrition remains common among TB patients and may contribute to poor clinical outcomes through reduced immunity, impaired functional capacity, and slower recovery (WHO, 2012).

Evidence from sub-Saharan Africa indicates that many adult TB patients present with low body mass index (BMI) and experience substantial weight loss during illness, reflecting both disease-related nutritional depletion and constrained access to adequate diets. In Kenya, TB patients often come from socio-economically vulnerable households where food insecurity limits the quantity and diversity of foods consumed. While national guidance recommends nutritional assessment and support as part of comprehensive TB care, nutrition-related data among adult

TB patients remain inadequately documented at sub-national level.

Kirinyaga County is classified as TB endemic, yet limited evidence is available on dietary practices and nutritional status among adult TB patients in the county. Such evidence is necessary to guide nutrition counselling, food support targeting, and integration of nutrition services within TB clinics. This study therefore aimed to assess dietary practices and nutritional status among adult TB patients in Kirinyaga County, Kenya.

MATERIALS & METHODS

Study area

The study was conducted in Kirinyaga County, located in central Kenya. The county is administratively divided into five sub-counties: Kirinyaga East, Kirinyaga West, Kirinyaga Central, Mwea East (Kirinyaga South), and Mwea West (Kirinyaga North). Public health facilities offering TB diagnostic and treatment services are available across all sub-counties. The study was carried out in selected public health facilities with functional TB clinics within each sub-county.

Study design

A descriptive cross-sectional study design was adopted to assess dietary practices and nutritional status among adult TB patients at a single point in time.

Study population, sample size and sampling technique

The study population comprised adult TB patients aged 18 to 70 years receiving TB treatment under the national TB control programme in public health facilities within Kirinyaga County. Facilities were purposively selected to ensure representation from all five sub-counties. Eligible participants attending the selected facilities during the study period were consecutively recruited until the desired sample size of 246 respondents was attained.

Data collection procedure

Data were collected using interviewer-administered structured questionnaires programmed and administered through Open Data Kit (ODK). The questionnaire captured socio-demographic and socio-economic characteristics, comorbidity status, dietary practices (meal frequency, dietary diversity, and 24-hour dietary recall) and nutrition-related illness experiences such as appetite changes and reduced ability to prepare or obtain food.

Qualitative data were collected through focus group discussions (FGDs) and key informant interviews (KIIs) to explore food-related challenges, lived experiences of feeding during TB illness, household coping strategies, and perceived needs for nutrition support. The use of mixed methods enabled triangulation and strengthened interpretation of nutrition-related findings.

Data analysis

Quantitative data were entered into Microsoft Excel for cleaning and verification before analysis. Descriptive analysis was conducted using STATA version 15.0. Categorical variables

were summarized using frequencies and percentages and presented in tables. Qualitative data from FGDs and KIIs were transcribed verbatim, coded, and analyzed thematically. Emerging themes were identified, organized, and interpreted. Qualitative findings were used to complement and contextualize the quantitative results.

RESULTS

The study targeted a total of 267 adult tuberculosis patients. Of these, 246 participants completed the study, yielding a response rate of 92.1 percent.

Socio-demographic characteristics

The socio-demographic characteristics of the participants are presented in Table 1. The majority of respondents were aged 35 to 44 years (30.9%), followed by those aged 25 to 34 years (20.3%). Male participants comprised 60.6% of the sample. Regarding household composition, more than half of the respondents (56.5%) reported living in households of one to three members, while 38.2% lived in households of four to six members. Only 5.3% reported household sizes of seven or more members.

Table 1. Socio-demographic characteristics of study participants

Variable	Categories	n=246	%
Age	18 to 24	36	14.6
	25 to 34	50	20.3
	35 to 44	76	30.9
	45 to 54	39	15.9
	55 to 70	45	18.3
Sex	Female	97	39.4
	Male	149	60.6
Household Size	1 to 3	139	56.5
	4 to 6	94	38.2
	7 and above	13	5.3

Socio-economic characteristics

Table 2 summarizes the socio-economic profile of the participants. Slightly more than half

(51.2%) had attained primary education, while 32.9% had completed secondary education. A smaller proportion had college or university education (9.8%), and 6.1% reported no formal education. In terms of employment, 55.3% were self-employed din small business and 22.3% were formally employed. Unemployment was reported by 17.9% of respondents, while 4.5% were students at the time of the study.

Table 2. Socio-economic characteristics of study participants

Variable	Categories	n=246	%
Employment Status	Self-employed	136	55.3
	Employed	55	22.3
	Unemployed (casual work)	44	17.9
	Student	11	4.5
Education Level	College/University	24	9.8
	Secondary school	81	32.9
	Primary school	126	51.2
	No formal education	15	6.1

Comorbidity status

Most participants (85.4%) reported no illness other than TB, while 14.6% reported at least one comorbid condition (Table 3). Among participants with comorbidity (n = 36), HIV/AIDS was the most commonly reported (61.1%), followed by hypertension (22.2%) and diabetes mellitus (11.1%). Other conditions accounted for 5.6%.

Table 3. Comorbidity status among study participants

Variable	Categories	n=246	%
Presence of co-morbidity	Yes	36	14.6
	No	210	85.4
Type of comorbidity (n = 36)	Hypertension	8	22.2
	Diabetes	4	11.1
	HIV/AIDS	22	61.1

	Others	2	5.6

The prevalence of symptoms indicates; loss of appetite (76.0%), cough (91.1%) fever (87.0%) and weight loss (76.8%). This is a critically high prevalence, directly linking to nutritional risk (Table 4).

Table 4. Disease symptoms among study participants

Variable	**Categories**	**n=246**	**%**
Disease symptoms	Loss of appetite	187	76.0
	Cough	224	91.1
	Fever	214	87.0
	Weight loss	189	76.8

Dietary practices

Dietary practices were assessed using meal frequency, dietary diversity, and reported energy intake (Table 5). Over half of the respondents (55.3%) consumed three or more meals per day, while 30.1% consumed two meals per day and 14.6% consumed one meal per day. Dietary diversity was generally low to medium: 40.2% consumed three or fewer food groups, 51.2% consumed four to five food groups, and 8.5% consumed six or more food groups.

Reported energy intake relative to the recommended dietary allowance (RDA) indicated that 69.8% of male participants met or exceeded 2630 kcal, while 30.2% were below this threshold. Among female participants, 62.9% met or exceeded 2300 kcal and 37.1% were below the threshold.

Table 5. Dietary practices among the participants

Characteristics	**Description**	**Proportion consuming adequate (n=246)**	**%**
Number of meals consumed in a day	One	36	14.6
	Two	74	30.1
	Three and above	136	55.3
Food groups consumed	≤ 3	99	40.2
	4 to 5	126	51.2

	≥ 6	21	8.5
Male energy intake (RDA=2630 kcal)	Below RDA	45	30.2
	At or above RDA	104	69.8
Female energy intake (RDA=2300 kcal)	Below RDA	36	37.1
	At or above RDA	61	62.9

Nutritional status

Nutritional status findings are presented in Table 6. Based on BMI classification, 45.5% were underweight, 37.0% had normal nutritional status, 12.6% were overweight, and 4.9% were obese.

Table 6. Nutritional status among participants

Variable	Category	Frequency n=246	Percentage (%)
BMI status	Underweight	112	45.5
	Normal	91	37.0
	Overweight	31	12.6
	Obese	12	4.9

Correlation between dietary practices and nutrition status

There was a significant relationship between dietary diversity score ($P<0.001$), number of meals ($p=0.013$) and nutrition status (BMI). A higher DDS (consuming foods from more different food groups) was strongly associated with a higher BMI. Similarly, those who ate more frequently had significantly better BMIs than those who ate less frequently.

DISCUSSION

This study assessed dietary practices and nutritional status among adult TB patients attending public TB clinics in Kirinyaga County, Kenya. The findings demonstrate a substantial burden of undernutrition and nutrition-related vulnerability in this population. Nearly half of the participants were underweight, dietary diversity was predominantly low to medium, and meal skipping due to lack of food was common. These findings indicate widespread nutritional risk among adult TB patients in Kirinyaga County, which may compromise recovery and overall

wellbeing.

The socio-demographic profile showed that TB affected predominantly male adults, with the highest proportion in the 35 to 44-year age group. This pattern is consistent with evidence that TB disproportionately affects individuals in economically productive ages, with implications for household income stability and capacity to maintain adequate diets during illness (Engeda et al., 2016; Gamtesa et al., 2020). In this study, most participants had primary education and were self-employed, largely within informal economic activities. Informal livelihoods and limited education can increase vulnerability to food insecurity through unstable income and reduced access to health and nutrition information, which may reduce diet quality during illness (Ministry of Health, Kenya, 2017).

Dietary practices revealed that more than half of the participants consumed three or more meals per day. However, dietary diversity remained limited for many respondents, with a substantial proportion consuming three or fewer food groups. Dietary diversity is a recognized indicator of diet quality and micronutrient adequacy, and low dietary diversity is associated with higher likelihood of micronutrient deficiencies (Drescher et al., 2007). For TB patients, limited dietary diversity may reduce intake of critical nutrients needed for immune function and tissue repair, potentially slowing nutritional recovery (Stratton et al., 2003).

Food insecurity emerged as a central nutrition-related challenge. Most participants reported skipping meals due to lack of food, alongside appetite changes and reduced capacity to prepare or obtain food. These experiences are consistent with the understanding that TB can worsen household vulnerability by reducing functional capacity and income, while illness-related inflammation and catabolism increase nutritional needs (WHO, 2009). In contexts of constrained household resources, coping strategies often involve reducing meal size or frequency and relying on less diverse diets, which may further worsen nutritional depletion.

Nutritional status findings showed high prevalence of underweight. This aligns with the established bidirectional relationship between TB and undernutrition, in which undernutrition increases susceptibility to active disease and TB illness accelerates nutritional depletion through reduced intake and increased energy expenditure (Lönnroth et al., 2010; WHO, 2012). Evidence from other settings also demonstrates that low BMI is associated with increased TB risk and poorer outcomes, underscoring the clinical and public health importance of identifying and addressing undernutrition among TB patients (Hanrahan et al., 2010; Bhargava et al., 2013).

Encouragingly, most participants reported receiving nutrition counselling before initiating TB medication. However, the persistence of underweight suggests that counselling alone may be insufficient for some patients, particularly those experiencing household food shortages. WHO guidance emphasizes nutritional assessment, counselling, and appropriate support for TB patients, with targeted attention to those who are undernourished (WHO, 2013). In line with national guidance, strengthening routine nutritional screening and linking nutritionally vulnerable patients to appropriate support mechanisms, including practical dietary counselling and, where feasible, food assistance, may improve nutritional wellbeing during TB care (Ministry of Health, Kenya, 2013; WHO, 2013).

CONCLUSION

The study notes high levels of undernutrition as a result of the TB disease and associated symptoms, low social economic status and poor dietary practices. Nearly half of participants were underweight, and many experienced inadequate dietary diversity and meal skipping due to lack of food. These findings underscore the need to integrate routine nutritional assessment, strengthened nutrition counselling, and targeted food support into TB services to improve nutritional wellbeing and support recovery among adult TB patients in Kirinyaga County.

The findings highlight the need to strengthen nutrition-sensitive TB care in Kirinyaga County. Routine nutritional screening should be integrated into TB clinic workflows, including measurement of BMI. Strengthened nutrition counselling should include practical, locally appropriate guidance on improving dietary diversity, meal planning, and affordable nutrient-dense foods. For patients with severe undernutrition or those reporting frequent meal skipping, linkage to targeted food support or social protection mechanisms may be necessary, consistent with WHO recommendations and national guidance (Ministry of Health, Kenya, 2013; WHO, 2013).

Ethical Approval

Ethical approval was obtained from Kenyatta University's Ethics Review Committee. Permission to conduct the study was obtained from the National Commission for Science, Technology and Innovation (NACOSTI) and the Kirinyaga County Department of Health, as well as from participating health facilities. Written informed consent was obtained from all participants prior to data collection. Confidentiality was maintained by using unique identifiers and restricting access to study data.

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