fortune Journals

Original Article

ARCHIVES OF MICROBIOLOGY & IMMUNOLOGY

ISSN: 2572-9365

Social-demographic characteristics, Dietary intake pattern and Nutritional status of Tuberculosis Patients seeking Health Care Services at 250 Bedded TB Hospital, Bangladesh

Saiful Islam[1], Mohammad Abdus Salam[2], Mohammad Anwar Hossain[3], Pronoy Kumer Sarker[4], Debash Chandra Poddar[5], Mst. Papiya Sultana[6], Oliour Rahman[7], Md Anisur Rahman[8], Md. Al Amin[9], Kohely Ahamed Sorovy[*,10]

Abstract

Background: Tuberculosis (TB) remains a major public health problem in Bangladesh and is closely associated with malnutrition. Poor nutritional status compromises immune function, adversely affects treatment response, and increases the risk of morbidity and mortality among TB patients.

Objective: To assess the socio-demographic characteristics, dietary intake patterns, and nutritional status of tuberculosis patients seeking health care at a tertiary-level hospital in Dhaka, Bangladesh.

Methods: A descriptive cross-sectional study was conducted among 81 confirmed tuberculosis patients at the 250 Bedded TB Hospital, Shyamoli, Dhaka, from October 2019 to March 2020. Data were collected using a structured questionnaire, food frequency questionnaire (FFQ), 24-hour dietary recall, and anthropometric measurements. Nutritional status was assessed using body mass index (BMI).

Results: The mean age of participants was 44.67 ± 18.06 years, with the highest proportions in the 31–40 and 51–60 year age groups (each 19.7%). Males accounted for 58.0% of patients, and 77.8% were married. Low socioeconomic status was common, with 60.5% reporting a monthly personal income ≤5000 BDT and 45.7% of households experiencing a financial deficit. Nearly half of the patients (49.4%) were underweight, with a mean BMI of 18.9 kg/m². Mean body weight was 47.31 ± 11.44 kg. Dietary intake showed heavy reliance on cereals, while 38.3% consumed no fruits and 75.3% did not consume milk or milk products. Mean daily energy intake (1530.6 kcal) was lower than mean total daily energy expenditure (1626.9 kcal), and mean protein intake was low (35.4 g/day).

Conclusion: Undernutrition is highly prevalent among tuberculosis patients and is strongly linked with poverty, poor dietary diversity, and unfavorable living conditions. Integrating routine nutritional assessment, targeted dietary support, and socioeconomic interventions into tuberculosis care programs is essential to improve treatment outcomes and reduce TB-related morbidity and mortality in Bangladesh.

Keywords: Tuberculosis; Malnutrition; Dietary intake; Nutritional status; Bangladesh

Introduction

Tuberculosis (TB) remains one of the most persistent global public health challenges, particularly in low- and middle-income countries, where it

Affiliation:
[1]CRL Diagnostics, Dhaka, Bangladesh
[2]Bangladesh Medical University, Dhaka, Bangladesh
[3]Bangladesh Medical University, Dhaka, Bangladesh
[4]Popular Diagnostic Centre Limited, Dhaka, Bangladesh
[5]Sakib Hospital & Diabetes Center, Chandpur, Bangladesh
[6]Shaheed Tajuddin Ahmed Medical College Hospital, Gazipur, Bangladesh
[7]The United Hospital and Diagnostic Center, Brahmanbaria, Bangladesh
[8]Bangladesh Fertility Hospital Ltd, Dhaka, Bangladesh.
[9]Islamia Diagnostic and Consultant Center, Cumilla, Bangladesh.
[10]Ashiyan Medical College, Dhaka, Bangladesh

***Corresponding author:**
Kohely Ahamed Sorovy, Assistant Professor, Department of Microbiology, Ashiyan Medical College, Dhaka, Bangladesh.

Citation: Saiful Islam, Mohammad Abdus Salam, Mohammad Anwar Hossain, Pronoy Kumer Sarker, Debash Chandra Poddar, Mst. Papiya Sultana, Oliour Rahman, Md Anisur Rahman, Md. Al Amin, Kohely Ahamed Sorovy. Social-demographic characteristics, Dietary intake pattern and Nutritional status of Tuberculosis Patients seeking Health Care Services at 250 Bedded TB Hospital, Bangladesh. Archives of Microbiology and Immunology. 9 (2026): 47-55.

Received: February 17, 2026
Accepted: February 28, 2026
Published: April 18, 2026

Islam S, et al., Arch Microbiol Immunology 2026
DOI:10.26502/ami.936500239

disproportionately affects socioeconomically disadvantaged populations. Despite the availability of effective chemotherapy, TB continues to cause substantial morbidity and mortality worldwide, largely due to delayed diagnosis, poor treatment adherence, and the presence of coexisting conditions such as malnutrition[1]. The World Health Organization has consistently emphasized that TB is not merely a biomedical disease but one that is deeply rooted in social, economic, and nutritional determinants[2]. Malnutrition and tuberculosis are linked through a well-established bidirectional relationship. On one hand, undernutrition significantly increases susceptibility to TB infection and progression from latent to active disease by impairing cell-mediated immunity, the primary host defense mechanism against *Mycobacterium tuberculosis*[3]. Protein-energy malnutrition and deficiencies of essential micronutrients such as iron, zinc, and vitamins A and D compromise immune responses, thereby increasing the risk of infection and poor treatment outcomes[4]. On the other hand, active TB exacerbates malnutrition through reduced appetite, increased metabolic demands, malabsorption of nutrients, and systemic inflammation, leading to progressive weight loss and wasting[5].

Evidence from diverse settings consistently demonstrates a high prevalence of undernutrition among TB patients at the time of diagnosis. Low body mass index (BMI) has been shown to be strongly associated with delayed sputum conversion, increased risk of treatment failure, relapse, and mortality[6]. Studies from Asia[7] and Africa[8] indicate that between one-third to two-thirds of TB patients are underweight at treatment initiation, highlighting undernutrition as both a risk factor and a consequence of TB. Importantly, nutritional recovery during TB treatment has been associated with improved clinical outcomes, reinforcing the role of nutrition as a modifiable determinant in TB management. Socio-demographic and household-level factors further compound the nutritional vulnerability of TB patients. Poverty, food insecurity, low educational attainment, unemployment, substandard housing, and inadequate access to safe water and sanitation are commonly observed among TB-affected households[9]. These factors not only limit dietary quantity and quality but also influence health-seeking behavior and treatment adherence. In densely populated urban settings of developing countries, such as Dhaka, these structural determinants remain critical yet underexplored contributors to poor nutritional status among TB patients[10].

Bangladesh is among the high TB burden countries, where TB coexists with widespread undernutrition and socioeconomic inequality. Although the national TB control program has made significant progress in expanding diagnosis and treatment coverage, nutritional assessment and dietary support remain inadequately integrated into routine TB care[11]. Empirical data on the socio-demographic characteristics, dietary intake patterns, and nutritional status of TB patients in tertiary healthcare settings are limited, particularly using standardized anthropometric and dietary assessment tools. The present study aimed to assess the socio-demographic characteristics, dietary intake patterns, and nutritional status of tuberculosis patients seeking health care services at a tertiary-level TB hospital in Dhaka, Bangladesh.

Materials and Methods

Study Design, Setting and Duration

A quantitative descriptive cross-sectional study was conducted at the 250 Bedded TB Hospital, Shyamoli, Dhaka-1207, a government tertiary-level specialized hospital providing diagnostic, treatment, and counseling services for tuberculosis and other chest-related diseases. The study was carried out over a period of three and a half months, from 16 December 2019 to 31 March 2020. During this period, data were collected from both outpatient and inpatient departments of the hospital.

Study Population and Inclusion Criteria

The study population consisted of confirmed tuberculosis patients attending the outpatient and inpatient departments of the study hospital. Patients aged 15 years and above with a confirmed diagnosis of tuberculosis based on clinical evaluation, laboratory investigations, and imaging were included. Patients diagnosed with multidrug-resistant tuberculosis (MDR-TB) and those who were critically ill or unable to respond to interviews were excluded from the study.

Sample Size and Sampling Technique

The required sample size was calculated using the single population proportion formula, assuming a prevalence of malnutrition among TB patients of 39.7%, 95% confidence level, and 5% margin of error. The calculated sample size was 369. However, due to time constraints, limited funding, and the nature of a student thesis, a total of 81 participants were finally included. A purposive sampling technique was applied to select eligible participants based on the inclusion criteria.

Data Collection Procedures

Data were collected using a pre-tested structured questionnaire through face-to-face interviews. The questionnaire captured socio-demographic characteristics, household information, tuberculosis-related clinical history, and dietary intake patterns. Food Frequency Questionnaire (FFQ) and 24-hour dietary recall method were used to assess dietary intake. Anthropometric measurements including weight, height, waist circumference, and hip circumference were measured using standard procedures and calibrated instruments. Medical records were reviewed using a checklist to ensure completeness and accuracy of clinical information.

Citation: Saiful Islam, Mohammad Abdus Salam, Mohammad Anwar Hossain, Pronoy Kumer Sarker, Debash Chandra Poddar, Mst. Papiya Sultana, Oliour Rahman, Md Anisur Rahman, Md. Al Amin, Kohely Ahamed Sorovy. Social-demographic characteristics, Dietary intake pattern and Nutritional status of Tuberculosis Patients seeking Health Care Services at 250 Bedded TB Hospital, Bangladesh. Archives of Microbiology and Immunology. 9 (2026): 47-55.

Islam S, et al., Arch Microbiol Immunology 2026
DOI:10.26502/ami.936500239

Data Analysis

Collected data were coded, entered, and analyzed using SPSS software (version 25). Body Mass Index (BMI) and waist–hip ratio were calculated to assess nutritional status. Descriptive statistics such as frequency, percentage, mean, and standard deviation were used to summarize socio-demographic characteristics, dietary intake patterns, and nutritional status of the participants. Where appropriate, bivariate analysis was performed.

Quality Control

Data collectors received prior training on interview techniques, dietary assessment tools, and standardized anthropometric measurements. The questionnaire was pre-tested before final data collection. Approximately 5% of collected data were randomly checked by the principal investigator to ensure consistency and quality.

Ethical Considerations

Ethical approval was obtained from the Human Research Ethics Committee (HREC) of Asia Institute of Disability and Development (AIDD). Written informed consent was obtained from all participants prior to data collection. Confidentiality and anonymity of participants were strictly maintained, and participation was voluntary.

Results

The study participants were predominantly middle-aged adults, with tuberculosis affecting individuals across a wide age range and showing clear socio-demographic disparities. The age of the tuberculosis patients ranged from 16 to 80 years, with the highest proportions observed in the 31–40 years and 51–60 years age groups (each 19.7%). The mean age of the participants was 44.67 ± 18.06 years, indicating that tuberculosis predominantly affected individuals in their economically productive years. Male participants constituted the majority (58.0%), while females accounted for 42.0%, demonstrating a male predominance among the study population. Most participants were married (77.8%), reflecting the social and family responsibilities associated with illness in this group. Educational attainment was generally low, as more than one-third of participants (35.8%) had no formal education or were illiterate, and only 22.2% had completed secondary education or higher. In terms of occupation, unemployment was the most common status (24.7%), followed by manual laborers and housewives (each 19.8%), highlighting the overall socioeconomic vulnerability of the study participants (Table 1).

Table 2 describes the household income, expenditure, and financial balance of the participants. The majority of respondents (60.5%) reported a personal monthly income of ≤5000 BDT, highlighting a high prevalence of low individual earning capacity. In terms of total family income, 30.8% of households earned between 10,001 and 15,000 BDT, while 39.6% had an income exceeding 15,000 BDT. Monthly household expenditure showed an almost equal distribution, with 50.6% spending ≤15,000 BDT and 49.4% spending more than this amount. Despite this, nearly half of the households (45.7%) experienced a monthly financial deficit, whereas only 2.5% reported a surplus, indicating substantial economic strain among TB-affected families (Table 2).

Table 1: Socio-demographic characteristics of the study participants (N = 81)

Variable	Category	Number (n)	Percentage (%)
Age group (years)	16–20	12	14.8
	21–30	10	12.4
	31–40	16	19.7
	41–50	11	13.6
	51–60	16	19.7
	61–70	12	14.8
	71–80	4	4.9
Gender	Male	47	58
	Female	34	42
Marital status	Married	63	77.8
	Unmarried	16	19.8
	Divorced/Widowed	2	2.4
Education level	No formal/Illiterate	29	35.8
	Primary incomplete	10	12.3
	Primary complete	11	13.6
	Secondary incomplete	13	16
	Secondary complete & above	18	22.2
Occupation	Unemployed	20	24.7
	Manual laborer	16	19.8
	Housewife	16	19.8
	Agriculture	10	12.3
	Others	19	23.4

Housing and living conditions are summarized in **Table 3**. Most participants lived in houses with cemented floors (60.5%), although a considerable proportion still resided in dwellings with raw soil or wooden floors (39.5%). Tin or wood roofing was predominant (91.4%), and only a small fraction had cemented or tiled roofs. The majority of houses had walls made of tin, wood, or bamboo (81.5%), reflecting substandard housing conditions. Although most households had two or more sleeping rooms (85.2%), household crowding remained evident, as over half of the households (54.4%) accommodated four to five members, and 19.8% had more than five residents. These living conditions may facilitate disease transmission and negatively affect recovery (Table 3).

Citation: Saiful Islam, Mohammad Abdus Salam, Mohammad Anwar Hossain, Pronoy Kumer Sarker, Debash Chandra Poddar, Mst. Papiya Sultana, Oliour Rahman, Md Anisur Rahman, Md. Al Amin, Kohely Ahamed Sorovy. Social-demographic characteristics, Dietary intake pattern and Nutritional status of Tuberculosis Patients seeking Health Care Services at 250 Bedded TB Hospital, Bangladesh. Archives of Microbiology and Immunology. 9 (2026): 47-55.

Islam S, et al., Arch Microbiol Immunology 2026
DOI:10.26502/ami.936500239

Table 2: Household income, expenditure and financial balance (N = 81)

Variable	Category	Number (n)	Percentage (%)
	≤5000	49	60.5
Respondent monthly income (BDT)	5001–10000	17	21
	>10000	15	18.5
	≤10000	24	29.6
Total family income (BDT)	10001–15000	25	30.8
	>15000	32	39.6
	≤15000	41	50.6
Monthly family expenditure (BDT)	>15000	40	49.4
	Surplus	2	2.5
Financial balance	Deficit	37	45.7
	Break-even	42	51.8

Table 3: Housing and living conditions of the participants (N = 81)

Variable	Category	Number (n)	Percentage (%)
	Cement	49	60.5
Floor material	Raw soil/wood	32	39.5
	Tin/wood	74	91.4
Roof material	Cement/tiles	7	8.6
	Tin/wood/bamboo	66	81.5
Wall material	Cement	15	18.5
	≤1 room	12	14.8
Sleeping rooms	≥2 rooms	69	85.2
	≤3 persons	21	25.8
Household size	4–5 persons	44	54.4
	>5 persons	16	19.8

Table 4 outlines water, sanitation, and hygiene characteristics. Tube-well water was the primary drinking water source for most households (65.4%), and 86.4% had water sources located within their own dwelling. Although three-quarters of participants perceived their drinking water as safe, nearly one-quarter reported unsafe or uncertain water quality. Among those who treated drinking water (n=20), the stand-and-settle method was the most common practice (60.0%). Sanitation facilities were largely unimproved or shared, as 71.6% used unimproved/shared toilets, and 48.1% of households shared toilet facilities with others. These findings suggest potential environmental health risks that may influence nutritional and disease outcomes (Table 4).

Smoking exposure and treatment adherence are presented in Table 5. Household exposure to smoking was reported by 61.7% of participants, indicating a high prevalence of passive smoke exposure. Among smoking households, most smokers consumed two or fewer cigarettes per day (78.0%). Treatment adherence was generally high, as 97.5% of participants reported taking TB drugs under observation, primarily in the presence of family members (97.5%). Nevertheless, 9.9% of patients admitted missing at least one dose, which could adversely affect treatment outcomes (Table 5).

Table 4: Water, sanitation and hygiene characteristics (N = 81)

Variable	Category	Number (n)	Percentage (%)
Drinking water source	Tube well	53	65.4
	Piped/tanker	26	32.1
	Others	2	2.5
Water source location	Own dwelling	70	86.4
	Outside	11	13.6
Perceived water safety	Safe	61	75.3
	Unsafe/ Unknown	20	24.7
Water treatment (n=20)	Stand & settle	12	60
	Filter/Boil	8	40
Toilet type	Improved	23	28.4
	Unimproved/ shared	58	71.6
Shared toilet	Yes	39	48.1
	No	42	51.9

Table 5: Smoking exposure and TB treatment adherence (N = 81)

Variable	Category	Number (n)	Percentage (%)
Household smoking exposure	Yes	50	61.7
	No	31	38.3
Number of cigarettes/ day (n=50)	≤2 sticks	39	78
	≥3 sticks	11	22
Takes TB drugs under observation	Yes	79	97.5
	No	2	2.5
Observed by	Family member	77	97.5
	Medical staff	2	2.5
Missed any dose	Yes	8	9.9
	No	73	90.1

Anthropometric characteristics of the participants are shown in Table 6. The mean body weight was 47.31 ± 11.44 kg, with values ranging from 25 to 82 kg. The average height was 157.74 ± 9.8 cm. Mean waist and hip circumferences were 25.0 ± 4.2 inches and 30.0 ± 3.1 inches, respectively.

Citation: Saiful Islam, Mohammad Abdus Salam, Mohammad Anwar Hossain, Pronoy Kumer Sarker, Debash Chandra Poddar, Mst. Papiya Sultana, Oliour Rahman, Md Anisur Rahman, Md. Al Amin, Kohely Ahamed Sorovy. Social-demographic characteristics, Dietary intake pattern and Nutritional status of Tuberculosis Patients seeking Health Care Services at 250 Bedded TB Hospital, Bangladesh. Archives of Microbiology and Immunology. 9 (2026): 47-55.

Islam S, et al., Arch Microbiol Immunology 2026
DOI:10.26502/ami.936500239

These measurements indicate generally low body mass and body size among TB patients, reflecting poor nutritional reserves (Table 6).

Table 6: Anthropometric characteristics of the participants (N = 81)

Measurement	Mean ± SD	Minimum	Maximum
Weight (kg)	47.31 ± 11.44	25	82
Height (cm)	157.74 ± 9.8	137.2	175.3
Waist (inch)	25.0 ± 4.2	19	43
Hip (inch)	30.0 ± 3.1	25	46

The nutritional status based on BMI is summarized in Table 7. Nearly half of the participants (49.4%) were underweight (BMI <18.5 kg/m²), while 43.2% had a normal BMI. A small proportion were overweight (6.2%) or obese (1.2%). The high prevalence of undernutrition underscores the strong association between tuberculosis and poor nutritional status in this population (Table 7).

Table 7: Nutritional status based on BMI (N = 81)

BMI category (kg/m²)	Number (n)	Percentage (%)
Underweight (<18.5)	40	49.4
Normal (18.5–24.9)	35	43.2
Overweight (25–29.9)	5	6.2
Obese (≥30)	1	1.2

Dietary intake patterns assessed using the Food Frequency Questionnaire are presented in Table 8. Consumption of cereals was relatively adequate, with 62.2% of participants consuming approximately 300 g per day. In contrast, intake of nutrient-dense food groups such as pulses, fruits, milk, and animal-source foods was limited. More than one-third of participants reported no fruit intake (38.3%), and three-quarters did not consume milk or milk products. Intake of fats, oils, and miscellaneous foods was also minimal for most participants. Overall, dietary diversity was poor, indicating insufficient intake of essential macro- and micronutrients (Table 8).

Table 9 presents daily energy and nutrient intake along with metabolic indices. The mean daily energy intake was 1530.6 kcal, which was lower than the mean total daily energy expenditure (TDEE) of 1626.9 kcal, indicating an overall energy deficit. Mean protein intake was only 35.4 g/day, which is inadequate for individuals with increased metabolic demands due to TB. The average BMI was 18.9 kg/m², further confirming widespread undernutrition. These findings highlight a mismatch between dietary intake and physiological requirements among TB patients, which may compromise treatment response and recovery (Table 9).

Discussion

In this study, tuberculosis predominantly affected middle-aged adults, with a mean age of 44.67 ± 18.06 years and nearly 40% of patients clustered within the 31–40 and 51–60 years

Table 8: Dietary intake pattern (FFQ) of the study Participants (N=81)

Food Group	Gram	Female	Male	Sub Total	% of participants
Cereals and their products	100	0	1	1	1.2
	200	16	12	28	34.6
	300	19	33	52	62.2
Pulses, legumes and their products	0	1	2	3	3.7
	50	11	11	22	27.2
	100	18	30	48	59.2
	150	5	3	8	9.9
Vegetables and their products	0	1	0	1	1.2
	50	11	25	36	44.4
	100	21	19	40	49.2
	150	2	2	4	4.9
Leafy vegetables	0	8	11	19	23.5
	50	17	25	42	51.9
	100	10	9	19	23.5
	150	0	1	1	1.2
Starchy roots, tubers and their products	0	34	43	77	95.1
	100	1	3	4	4.9
	200	0	0	0	0
	300	0	0	0	0

Citation: Saiful Islam, Mohammad Abdus Salam, Mohammad Anwar Hossain, Pronoy Kumer Sarker, Debash Chandra Poddar, Mst. Papiya Sultana, Oliour Rahman, Md Anisur Rahman, Md. Al Amin, Kohely Ahamed Sorovy. Social-demographic characteristics, Dietary intake pattern and Nutritional status of Tuberculosis Patients seeking Health Care Services at 250 Bedded TB Hospital, Bangladesh. Archives of Microbiology and Immunology. 9 (2026): 47-55.

Islam S, et al., Arch Microbiol Immunology 2026
DOI:10.26502/ami.936500239

Nuts, seeds and their	0	19	20	39	48.1
products	50	13	26	39	48.2
	100	3	0	3	3.7
Spices, condiments and herbs	0	33	44	77	95.1
	25	1	2	3	3.7
	50	1	0	1	1.2
	75	0	0	0	0
Fruits	0	14	17	31	38.3
	100	12	20	32	39.5
	200	9	9	18	22.2
	300	0	0	0	0
Fish, shellfish and their products	0	2	6	8	9.9
	60	16	21	37	45.7
	120	15	16	31	38.2
	180	2	3	5	6.2
Meat, poultry and their products	0	13	18	31	38.3
	60	19	21	40	49.4
	120	3	7	10	12.3
	180	0	0	0	0
Eggs and their products	0	6	6	12	14.8
	70	21	35	56	69.1
	140	8	5	13	16
	210	0	0	0	0
Milk and its productss	0	25	36	61	75.3
	100	10	10	20	24.7
Fat & Oils	0	31	40	71	87.7
	10	2	6	8	9.8
	20	2	0	2	2.5
Beverages	0	26	32	58	71.6
	100	8	14	22	27.2
	200	1	0	1	1.2
Miscellaneous	0	32	39	71	87.7
	10	3	6	9	11.1
	20	0	1	1	1.2

Table 9: Daily energy and nutrient intake and metabolic indices (N = 81)

Parameter	Mean	Minimum	Maximum
Energy intake (kcal/day)	1530.6	1010.8	2593.4
Carbohydrate (g/day)	250.7	140.4	420.6
Protein (g/day)	35.4	22.9	58.3
Fat (g/day)	38.5	24.4	75.4
Dietary fibre (g/day)	19.6	13.6	28.4
BMI (kg/m²)	18.9	11.2	32.5
BMR (kcal/day)	1183.2	888.9	1554
TDEE (kcal/day)	1626.9	1222.3	2136.8

Citation: Saiful Islam, Mohammad Abdus Salam, Mohammad Anwar Hossain, Pronoy Kumer Sarker, Debash Chandra Poddar, Mst. Papiya Sultana, Oliour Rahman, Md Anisur Rahman, Md. Al Amin, Kohely Ahamed Sorovy. Social-demographic characteristics, Dietary intake pattern and Nutritional status of Tuberculosis Patients seeking Health Care Services at 250 Bedded TB Hospital, Bangladesh. Archives of Microbiology and Immunology. 9 (2026): 47-55.

Islam S, et al., Arch Microbiol Immunology 2026
DOI:10.26502/ami.936500239

age groups. This pattern indicates that TB disproportionately impacts individuals in their economically productive years, potentially amplifying household financial stress. Other studies conducted in similar settings have reported mean ages ranging from the late 30s to mid-40s, suggesting a consistent age distribution of TB patients across high-burden regions. The observed male predominance (58.0%) aligns with findings from other research, where male proportions commonly range between 55% and 65%. This disparity has been attributed to occupational exposure, smoking habits, and delayed health-seeking behavior among men. However, the substantial proportion of female patients (42.0%) highlights that TB remains a significant public health concern across genders. Socioeconomic vulnerability was pronounced among the participants. More than one-third of patients (35.8%) had no formal education or were illiterate, and only 22.2% had completed secondary education or higher. Similar studies have documented illiteracy rates between 30% and 45% among TB patients, underscoring education as a persistent structural determinant. Unemployment affected nearly one-quarter of participants (24.7%), while an additional 39.6% were engaged in low-income manual labor or agriculture[12]. Comparable research has reported unemployment or informal employment rates exceeding 40% among TB populations, reinforcing the association between limited income-generating opportunities and disease burden[13].

Economic analysis further revealed severe financial constraints. A majority of respondents (60.5%) earned ≤5000 BDT per month, and nearly half of households (45.7%) reported a monthly financial deficit. Although 39.6% of families reported total household incomes exceeding 15,000 BDT, this income was often insufficient to offset expenditures, as 49.4% of households spent more than 15,000 BDT monthly. Other studies have reported deficit rates ranging from 35% to 60% among TB-affected households, suggesting that TB-related indirect costs frequently outweigh household earning capacity even when treatment is subsidized[14]. Living conditions observed in this study reflect environmental risk factors for TB transmission and poor recovery. While 60.5% of households had cemented floors, a substantial proportion still lived in dwellings with raw soil or wooden flooring (39.5%). Tin or wood roofing predominated (91.4%), and 81.5% of homes had walls constructed from non-permanent materials. Household crowding was common, with 54.4% of families housing four to five members and 19.8% housing more than five individuals. Other studies in urban South Asian contexts have reported crowding rates exceeding 60%, highlighting its role in sustained TB transmission[15].

Water, sanitation, and hygiene conditions further illustrate environmental vulnerability. Although 86.4% of households accessed water within their dwelling, nearly one-quarter (24.7%) perceived their drinking water as unsafe. Only 20 participants reported treating drinking water, and among them, 60.0% relied on stand-and-settle methods rather than more effective filtration or boiling. Moreover, 71.6% of participants used unimproved or shared sanitation facilities, and 48.1% shared toilets with other households. Comparable studies have reported shared sanitation rates between 40% and 70% among TB patients, linking poor sanitation with increased exposure to secondary infections and nutritional compromise[16]. Household exposure to smoking was notably high, with 61.7% of participants reporting smoking exposure at home. Among these households, 78.0% reported consumption of two or fewer cigarettes per day, indicating chronic low-to-moderate exposure. Other research has documented smoking exposure rates ranging from 50% to 65% in TB households, emphasizing its role in respiratory vulnerability. Treatment adherence in this study was relatively high, with 97.5% of patients taking medication under observation; however, 9.9% still reported missing doses. Studies from similar settings have reported missed-dose rates between 8% and 15%, suggesting that even with supervised treatment, adherence challenges persist[17].

Anthropometric assessment revealed marked nutritional depletion. The mean body weight was 47.31 ± 11.44 kg, and nearly half of participants (49.4%) were underweight, with a mean BMI of 18.9 kg/m². Other studies have reported underweight prevalence among TB patients ranging from 40% to over 60%, placing the current findings within the higher end of this spectrum[18]. The coexistence of overweight and obesity in 7.4% of participants suggests an emerging double burden of malnutrition, although undernutrition remains the dominant concern. Dietary intake patterns demonstrated heavy reliance on staple cereals, with 62.2% consuming approximately 300 g per day. In contrast, 38.3% of participants reported no fruit intake, 75.3% did not consume milk or milk products, and nearly half reported no intake of nuts or seeds[19]. Similar dietary patterns characterized by low dietary diversity have been observed in other TB populations, where fruit and dairy non-consumption rates frequently exceed 30–50%[20]. Energy and nutrient intake analysis further confirmed nutritional inadequacy. Mean daily energy intake was 1530.6 kcal, falling short of the mean total daily energy expenditure of 1626.9 kcal, indicating a persistent energy deficit. Mean protein intake was only 35.4 g/day, substantially lower than recommended levels for TB patients. Other studies have reported average energy intakes between 1400 and 1800 kcal/day among TB patients, often insufficient to meet increased metabolic demands[21]. This imbalance between intake and requirement likely contributes to the high prevalence of underweight observed in this study

Conclusion

In conclusion, tuberculosis in this setting is closely linked with poverty, inadequate nutrition, and unfavorable

Citation: Saiful Islam, Mohammad Abdus Salam, Mohammad Anwar Hossain, Pronoy Kumer Sarker, Debash Chandra Poddar, Mst. Papiya Sultana, Oliour Rahman, Md Anisur Rahman, Md. Al Amin, Kohely Ahamed Sorovy. Social-demographic characteristics, Dietary intake pattern and Nutritional status of Tuberculosis Patients seeking Health Care Services at 250 Bedded TB Hospital, Bangladesh. Archives of Microbiology and Immunology. 9 (2026): 47-55.

living conditions. Integrating routine nutritional assessment, targeted dietary support, and broader socioeconomic interventions into tuberculosis care programs is essential to improve treatment outcomes and reduce disease-related morbidity and mortality in Bangladesh.

Recommendations

1. Tuberculosis control programs should integrate routine nutritional assessment and structured nutritional support alongside DOTS to address the high burden of malnutrition among TB patients.
2. Ensuring access to nutritionally adequate and balanced diets, particularly for socioeconomically disadvantaged patients, is essential to improve recovery and treatment effectiveness.
3. Adequate protein intake and protein-rich foods should be emphasized, as they play a critical role in supporting immune function and resistance to tuberculosis.
4. Public health authorities should strengthen community awareness and education programs focusing on tuberculosis transmission, prevention, treatment adherence, and the importance of nutrition during illness.
5. Tuberculosis management should adopt a holistic approach, recognizing that pharmacological treatment alone is insufficient without appropriate nutritional and socioeconomic support.

References

1. Makeswaran P, Shah SA, Safian N. Exploring Barriers to Timely Diagnosis and Treatment of Tuberculosis in Selangor, Malaysia: A Qualitative Study. The American Journal of Tropical Medicine and Hygiene 111 (2024): 1280.
2. Makeswaran P, Shah SA, Safian N, et al. Determinants of delayed tuberculosis treatment among patients in Selangor: A study protocol. Plos one 17 (2022): e0266746.
3. Saha A, Shanthi FX M, Winston AB, et al. Prevalence of hepatotoxicity from antituberculosis therapy: a five-year experience from South India. Journal of primary care & community health 7 (2016): 171-4.
4. Nyatichi FO, Amimo FA, Nabie B, et al. Factors contributing to delay in seeking treatment among pulmonary tuberculosis patients in Suneka Sub-County, Kenya.
5. Kunjok DM, Mwangi JG, Mambo S, et al. Assessment of delayed tuberculosis diagnosis preceding diagnostic confirmation among tuberculosis patients attending Isiolo County level four hospital, Kenya. Pan African Medical Journal 38 (2021).
6. Guo Y, Wang Q, Liu Y, et al. Food Diversification Levels and Nutrients in Tuberculosis Patients with and Without Diabetes Mellitus. In2016 6th International Conference on Applied Science, Engineering and Technology (2016): 290-296.
7. Sampaio VD, Rodrigues MG, Silva LC, et al. Social, demographic, health care and co-morbidity predictors of tuberculosis mortality in Amazonas, Brazil: a multiple cause of death approach. Plos one 15 (2020): e0218359.
8. Hossain MB, Ahmed A, Tukade A, et al. Frequency of Tuberculous Lymphadenitis (TBLA) in Somalia: A Retrospective Study with GeneXpert PCR-Based Diagnosis.
9. Louw J, Peltzer K, Naidoo P, et al. Quality of life among tuberculosis (TB), TB retreatment and/or TB-HIV co-infected primary public health care patients in three districts in South Africa. Health and quality of life outcomes 10 (2012): 77.
10. Sarker M, Barua M, Guerra F, et al. Double trouble: prevalence and factors associated with tuberculosis and diabetes comorbidity in Bangladesh. PloS one 11 (2016): e0165396.
11. Ehsanul Huq KA, Moriyama M, Zaman K, et al. Health seeking behaviour and delayed management of tuberculosis patients in rural Bangladesh. BMC infectious diseases 18 (2018): 515.
12. Rifat M, Hall J, Oldmeadow C, et al. Health system delay in treatment of multidrug resistant tuberculosis patients in Bangladesh. BMC infectious diseases 15 (2015): 526.
13. Mondal MN, Nazrul HM, Chowdhury MR, et al. Socio-demographic factors affecting knowledge level of Tuberculosis patients in Rajshahi City, Bangladesh. African health sciences 14 (2014): 855-65.
14. Rifat M, Hall J, Oldmeadow C, et al. Factors related to previous tuberculosis treatment of patients with multidrug-resistant tuberculosis in Bangladesh. BMJ open 5 (2015): e008273.
15. Md Shamim Hossain, SM Mostafa Kamal, Asif Mahmud, et al. Detection and determination of drug resistance pattern of MTB among non-suspected TB patients admitted in a tertiary care level hospital in Bangladesh using FAST Strategy. Am J Biomed Sci & Res 27 (2025).
16. Rifat M, Milton AH, Hall J, et al. Development of multidrug resistant tuberculosis in Bangladesh: a case-control study on risk factors. PloS one 9 (2014): e105214.
17. Gautam S, Shrestha N, Mahato S, et al. Diabetes among tuberculosis patients and its impact on tuberculosis treatment in South Asia: a systematic review and meta-analysis. Scientific reports 11 (2021): 2113.

Citation: Saiful Islam, Mohammad Abdus Salam, Mohammad Anwar Hossain, Pronoy Kumer Sarker, Debash Chandra Poddar, Mst. Papiya Sultana, Oliour Rahman, Md Anisur Rahman, Md. Al Amin, Kohely Ahamed Sorovy. Social-demographic characteristics, Dietary intake pattern and Nutritional status of Tuberculosis Patients seeking Health Care Services at 250 Bedded TB Hospital, Bangladesh. Archives of Microbiology and Immunology. 9 (2026): 47-55.

Islam S, et al., Arch Microbiol Immunology 2026
DOI:10.26502/ami.936500239

18. Islam S, Hirayama T, Islam A, et al. Treatment referral system for tuberculosis patients in Dhaka, Bangladesh. Public Health Action 5 (2015): 236-40.

19. Basnyat B, Caws M, Udwadia Z. Tuberculosis in South Asia: a tide in the affairs of men. Multidisciplinary respiratory medicine 13 (2018): 10.

20. Nabi SG, Aziz MM, Uddin MR, et al. Nutritional status and other associated factors of patients with tuberculosis in selected urban areas of Bangladesh. Well Testing Journal 33 (2024): 571-90.

21. Todowede O, Afaq S, Adhikary A, et al. Barriers and facilitators to integrating depression care in tuberculosis services in South Asia: a multi-country qualitative study. BMC Health Services Research 23 (2023): 818.

Citation: Saiful Islam, Mohammad Abdus Salam, Mohammad Anwar Hossain, Pronoy Kumer Sarker, Debash Chandra Poddar, Mst. Papiya Sultana, Oliour Rahman, Md Anisur Rahman, Md. Al Amin, Kohely Ahamed Sorovy. Social-demographic characteristics, Dietary intake pattern and Nutritional status of Tuberculosis Patients seeking Health Care Services at 250 Bedded TB Hospital, Bangladesh. Archives of Microbiology and Immunology. 9 (2026): 47-55.