Original article

TUBERCULOSIS KNOWLEDGE IN THE COMMUNITY: INSIGHTS AND GAPS FROM BELKOTGADHI, NUWAKOT DISTRICT, NEPAL

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ABSTRACT

Introduction:

Background: Tuberculosis (TB) is a communicable disease and a major global public health challenge. The lack of knowledge about its communicable characteristics and treatment options is the main barrier to reducing its burden. This study aims to assess TB knowledge among people in Belkotgadhi Municipality, Nuwakot District.

Methods:

Data were collected from 3352 households across 12 wards of Belkotgadhi Municipality using a convenient sampling method. The data collected and stored in the Kobo Toolbox, included information on TB and sociodemographic variables. After excluding incomplete entries, 3331 households were analysed. Frequencies and percentages were calculated, and chi-square test was conducted to examine the association between TB knowledge and sociodemographic factors.

Results:

About 48.6% of respondents were unaware that TB is communicable, and 31.4% did not know it is treatable. The main prevention method identified was wearing masks in crowded areas (30%), followed by the BCG vaccine (22.7%); however, fewer than 10.0% were familiar with DOTS. The major source of health-related information was health workers. Knowledge of TB's communicability was significantly associated with gender, age, religion, literacy, family type, and health insurance status. Lower knowledge was found among illiterate, older adults, females, Hindus, those living in joint families, and those without health insurance.

Conclusion:

Knowledge of TB is low, highlighting the need to increase awareness about its communicability, treatment, and prevention. It can be enhanced through educational interventions for various sociodemographic groups, as well as by sharing information via health service providers, television, radio, and social media.

Keywords: Knowledge, Nepal, Nuwakot, Tuberculosis

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INTRODUCTION

Tuberculosis (TB) is a communicable disease and remains a critical global health issue, particularly in low- and middle-income countries(1). Despite being treatable, TB is one of the leading causes of morbidity and mortality worldwide. Pulmonary TB significantly impacts individuals by causing

chronic respiratory damage, systemic symptoms like weight loss and fatigue, as well as long-term effects including reduced lung function and increased susceptibility to infections[2].

In 2023, approximately 8.2 million people were newly diagnosed with TB, the highest number recorded since 1995, up by 7.5 million from 2022. The estimated incident rate of TB in 2023 was 134 cases per 100,000 population, indicating nearly 10.8 million individuals suffered worldwide from TB that year. Additionally, TB-related deaths were 1.25 million, making it the leading infectious disease globally, surpassing COVID-19. The number of deaths by TB was 1.6 million in 2021 [1,3].

Asia reports approximately 55% of global TB cases, with countries like India and China exhibiting the highest incidence rates. In 2021, India alone represented about 27% of the global TB burden[4]. Among those who develop TB, around 90% are adults, with a higher prevalence in men[3]. There is a gap between the expected number of TB infections and the real number of infections due to underdiagnosis and underreporting. In 2019, the estimated incidence of TB in the SAARC region was 3.7 million, and new and relapse notified cases were just 3.1 million [5].

Particularly in rural Nepal, TB remains a major health concern. A national TB survey conducted by WHO in 2018-19 estimated that over 117,000 people currently have TB, with approximately 69,000 new cases reported—about 1.6 times more than expected, and according to a report on 2021, an estimated 40,000 new active cases reported annually and 45% of the population is infected with TB [1,4]. The higher prevalence of TB is notably found among men and older populations in the hill and Terai regions, compared to the mountainous areas[6]. Despite advancements in treatment programs like Directly Observed Treatment Short Course (DOTS), 5,000 to 7,000 people die from TB annually[1].

The dynamics of TB transmission in Nepal are affected by socio-economic factors such as population density, migration, and healthcare access. The disease remains a significant public health challenge, linked to poverty, malnutrition, and inadequate healthcare infrastructure[7]. Rural populations are at higher risk of delayed diagnosis and treatment due to limited healthcare access, poor knowledge of TB, and lower health literacy compared to urban areas[4]. However, the Ministry of Health and Population has been actively working on educational campaigns to improve the importance of early diagnosis and treatment of TB and raise awareness on its transmission[8].

The lack of knowledge of TB and its transmission can delay control efforts of the disease. Belkotgadhi Municipality in Nuwakot District represents a hilly territory with residents of all castes and ethnicities. Understanding local knowledge is crucial for developing targeted health education programs to enhance awareness and reduce TB incidence in this region. This study aims to evaluate the knowledge of TB of the residents in Belkotgadhi Municipality, focusing on their understanding of its transmission, prevention strategies, and assessing the association of sociodemographic characteristics of respondents and their knowledge about the transmissible characteristics of TB.

METHODOLOGY

Study Design:

A retrospective cross-sectional study design was applied to analyze secondary data from a population-based household survey assessing community members' knowledge regarding the transmissiblity of TB and its preventive measures.

Setting:

This study was conducted in Belkotgadhi Municipality, Nuwakot District, Nepal. Nuwakot is a hilly district located in Bagmati Province. Belkotgadhi Municipality is one of the administrative divisions in Nuwakot and is characterized by predominantly rural areas with some semi-urban settlements. The region has limited healthcare facilities and health services, primarily provided through primary health care centers and local health posts.

Study Population:

The study population consisted of people over 18 years of age with clear hearing and speaking ability residing in Belkotgadhi Municipality. The primary data were collected between August and September 2024.

Variables:

The study focused on “Pulmonary TB”, which is communicable. Participants were asked questions to assess their knowledge and awareness on

TB. The dependent variable in this study was the understanding of communicable nature of TB, determined by response to the question, "What type of disease is TB?" of the respondents. Those who correctly answered “communicable” were classified as having demonstrated knowledge. A range of sociodemographic characteristics served as the independent variables.

Data Collection, Entry, and Analysis:

This study analysed secondary data collected during a one-month community health diagnosis program conducted by first-year MBBS students at Maharajgunj Medical Campus(MMC), Institute of Medicine(IOM), Tribhuvan University(TU). The academic aspect of data was fulfilled, and the ownership of the data resides with the MMC, Department of Community Medicine and Public Health(DCMPH).

For the primary data collection, the DCMPH provided a five-day orientation on tool development, data collection, and analysis to the students. They were divided into 12 groups, each assigned a ward, except one ward inaccessible due to a logistical point of view. Households were selected conveniently and conducted face-to-face interviews with the head of the household or the oldest available member capable of communication. KoboCollect, a mobile application, was used for the data collection. The questionnaire, rigorously prepared and translated into Nepali with expert support, was pre-tested in Dhunibesi Municipality, Dhading District, and refined accordingly. It included sociodemographic variables and questions on community health topics such as disease knowledge, sanitation practices, and neonatal immunization. Data related to sociodemographic and TB information were extracted for the study.

From the compiled dataset of 3352 records, 3331 were analysed after removing missing data. Descriptive statistics (frequencies and percentages) were performed, and a chi-square test was used to examine the association between sociodemographic factors and knowledge of communicable characteristics of TB.

RESULTS

Approximately 40% of respondents were aged 31-50 or above 50 years, with a mean age of 46.82(15.89) years. The age distribution of the respondents was normal, with almost similar mean and median values. The sex ratio was 108.06 males per 100 females, and the majority(84%) were Hindus. Most respondents were literate(65.42%), married (86.13%), lived in nuclear families(62.05%), and 60% belonged to relatively advantaged ethnic groups. The primary source of health information was health personnel(64%), followed by radio and television(53.6%).

Moreover, 74.93% reported that health insurance was available in their area, and only 27.74% had done it for their family. For healthcare, 76% preferred government hospitals. **(Table-1)**

Table 1. Sociodemographic characteristics and health practices of the respondents, Belkotgadhi Municipality, Nuwakot District, Nepal 2024

Variables		Frequency (n)	Percentage (%)
Age (in years)	30 and Below	578	17.35
	31 to 50	1439	43.20
	Above 50	1314	39.45
	Mean ± SD	46.8 ± 15.9	
	Min, Max	18, 80	
Sex	Male	1730	51.94
	Female	1601	48.06
Religion	Hindu	2797	83.97
	Buddhist	446	13.39
	Other	88	2.64
Ethnicity	Marginalized groups	1324	39.75
	Relatively advantaged groups	2007	60.25
Type of Family	Nuclear	2067	62.05
	Joint and extended	1264	37.95
Literacy	Illiterate	1152	34.58
	Literate	2179	65.42
Marital Status	Married	2869	86.13
	Unmarried/ single individual	462	13.87
Source of Information*	Health personnel	2133	64.03
	Radio/TV	1785	53.59
	FCHV's	1455	43.68
	Social media	1080	32.42
	School/ Educational Institutions	346	10.39
	Posters/ Pamphlets	78	2.34
	Other	76	2.28

Health Insurance in the area	Yes	2496	74.93
	No	583	17.50
	Don't Know	252	7.57
Health insurance is done for the family members	Yes	924	27.74
	No	2407	72.26
The first choice for treatment after any illness	Governmental Health Institution	2532	76.01
	Clinic/Nursing home	548	16.45
	Dhami Jhakri	186	5.58
	FCHV	43	1.29
	Others	22	0.66

#TV- Television, #FCHV- Female Community Health Volunteer

Table 2 shows, about half (51.4%) of respondents identified TB as a communicable disease, while 33.0% were unaware of its transmissible nature, and 15.6% said it is non-communicable. Among those who recognized TB as communicable, 79.6% identified coughing and sneezing as transmission modes. Notably, 14.4% admitted they did not have an idea of TB transmission.

Regarding treatment, 31.1% were unaware that TB is treatable. For prevention measures, the major was wearing masks in crowded areas (30%), followed by receiving the Bacillus Calmette-Guerin (BCG) vaccine (22.7%) and maintaining a healthy diet (22.3%). However, nearly half of the respondents admitted they did not know how to control TB infection, and most respondents (91.5%) had never heard of the Directly Observed Treatment System (DOTS).

Table 2: Knowledge regarding tuberculosis among respondents, Belkotgadhi Municipality, Nuwakot District, Nepal 2024 (n=3331)

What type of disease is TB?	**Frequency**	**Percentage (%)**
Communicable	1713	51.43
Non-communicable	519	15.58
Don't know	1099	32.99
What are the Modes of transmission of TB from one person to another (n=1713)*		
Through the coughing and sneezing of the patients	1363	79.56
Through the blood	438	25.56
By touching the patients	318	18.56
Through the urine and faeces	204	11.91
Other	37	2.15
Don't know	247	14.42
Is the TB treatable?		
Yes	2120	63.64
No	176	5.28
Don't Know	1035	31.08
How to prevent TB infection?*		
To wear a mask in a crowded area	996	29.90
Bacillus Calmette-Guerin (BCG) Vaccine	756	22.70
To take a healthy diet	744	22.34
Do not share or exchange any materials or utensils with the infected persons	655	19.66
Living in a place where the air circulates well	612	18.37
Taking care while being near the TB-infected persons	585	17.56
Washing hands regularly with soap and water	235	7.05
Don't know	1695	50.89
Heard about DOTS		
Yes	284	8.53
No	3047	91.47

* indicates multiple response type questions

Sociodemographic factors significantly influenced knowledge about tuberculosis transmission. Males showed significantly (p-value=0.010) higher TB knowledge on TB (53.58%, 95% CI: 51.27-56.01) than females (49.09%, 95% CI: 46.66-51.53). Similarly, respondents aged 31 to 50 years had significantly higher knowledge (55.59%, 95% CI: 53.09–57.95; $p < 0.001$) compared to those aged 30 years and below (53.28%, 95% CI: 49.14–57.09) and those above 50 years (46.04%, 95% CI: 43.45–48.70). Non-Hindus demonstrated better knowledge (57.30%, 95% CI: 53.18-61.24) than Hindus (50.30%, 95% CI: 48.41-52.16), with a p-value of 0.003. Also, literate individuals showed higher knowledge (58.88%, 95% CI: 56.77-60.76) compared to illiterate respondents (37.32%, 95% CI: 34.54-40.19), $p<0.001$. Additionally, nuclear families (53.55%, 95% CI: 51.48-55.78) and those with health insurance (54.65%, 95% CI: 51.51-

Table 3. Percentage Distribution of Correct Response/Knowledge about Transmission of TB, by Sociodemographic Characteristics of the respondents in Belkotgadhi Municipality, Nuwakot District, Nepal 2024

Variables		Percentage (%)	95 % CI	p-value
Sex	Male	53.58	(51.27, 56.01)	0.010
	Female	49.09	(46.66, 51.53)	
Age (years)	30 and below	53.28	(49.14, 57.09)	<0.001
	31 to 50	55.59	(53.09, 57.95)	
	Above 50	46.04	(43.45, 48.70)	
Religion	Hindu	50.30	(48.41, 52.16)	0.003
	Non-Hindu	57.30	(53.18, 61.24)	
Caste/ Ethnicity	Marginalized groups	50.67	(47.96, 53.32)	0.484
	Relatively Advantaged groups	51.91	(49.63, 54.21)	
Literacy	Illiterate	37.32	(34.54, 40.19)	<0.001
	Literate	58.88	(56.77, 60.76)	
Occupation	Agriculture	50.65	(48.55, 52.62)	0.157
	Non-agriculture	53.36	(50.22, 56.42)	
Family type	Nuclear	53.55	(51.48, 55.78)	0.002
	Non-Nuclear	47.94	(45.26, 50.63)	
First preference for the treatment	Government health institution	52.21	(50.47, 54.06)	0.106
	Other than the governmental health institution	48.93	(45.31, 52.69)	
Health insurance is done for the family members	Yes	54.65	(51.51, 57.68)	0.021
	No	50.18	(48.19, 52.05)	

57.68) had better knowledge, with p-values of 0.002 and 0.021, respectively. **(Table-3)**

DISCUSSION

The findings of this study reflect essential insights into the sociodemographic characteristics, knowledge regarding TB, and health-seeking practices among respondents in the Belkotgadhi municipality of Nuwakot District, Nepal. The results also highlight that Gender, Age, and literacy are the major factors of concern regarding the knowledge of TB.

The demographic profile indicates a predominantly(43.20%) aged between 31 and 50 years. The sex ratio of 108.06 males per 100 females indicates a slight male predominance among the respondents, possibly due to a preference for males as respondents. The majority (84.0%) of respondents were Hindu, close to the census report of Nepal 2022(9). Additionally, a major proportion (60.3%) belonged to relatively advantaged groups (A group with better access to resources, opportunities, or power in society due to higher income, education, or social status). This disparity can influence healthcare services and health education resources, potentially exacerbating health inequalities[8,10].

Health personnel were the primary source of health information, followed by radio, TV, and social media. This highlights healthcare providers' crucial role in delivering accurate information, and the growing importance of digital platforms in health-related information and communications[8].

Despite the availability of health insurance in the area, and three-fourths know this, only 27.7% reported having insurance for their family members. According to the Nepal Demographic Health Survey (NDHS) 2022, only about 10% of individuals aged 15–49 are enrolled in the health insurance program, with varying coverage by region and socioeconomic status(4). This discrepancy highlights barriers to accessing insurance coverage and suggests a need for improved outreach regarding its benefits. [11–13]

The knowledge assessment regarding TB revealed a huge gap: only 51.4% recognized TB as a communicable disease, and about one-third were unaware that TB is treatable. This contradicts the results of the NDHS 2022, indicating more than 90% had heard about TB, and only one-fifth do not recognize that TB is curable [4]. The discrepancy may be due to the geographical and demographic variability of the respondents[8,10,14]. Maybe they heard it, but the possibility is that they are unaware of its transmissible characteristics. Among those who identified TB as communicable, 79.6% recognized coughing and sneezing as transmission modes, unlike NDHS 2022, where only 50% reported it. This highlights a significant gap in understanding TB transmission. For the effective prevention, understanding the transmissible nature of TB is essential[15]. However, the observed discrepancies may be attributed to methodological variations with NDHS, like sampling technique used (nationwide representative sample vs. municipality-based), the data collection tools (standardized vs. researcher-adapted), and the target population (only ages 15-49 vs. anyone over 18), and time variations [4,16].

About 29.9% of respondents identified wearing masks as a preventive measure against TB, followed by the BCG vaccine and a healthy diet. Still, nearly half were unaware of any such methods, highlighting significant knowledge gaps. WHO also emphasizes vaccination (BCG), maintaining good ventilation to minimize airborne transmission, and practicing good hygiene to control the spread of infection [17].

There were several sociodemographic factors influencing knowledge about TB transmission. Notably, males exhibited higher correct responses compared to females, indicating potential barriers to education and access to information for women [8]. It is similar to a study conducted in Ghana[18]. Limited access to health education for females increases the risk of disease transmission for themselves and their family members, as they are the primary caregivers in the family.

Age also played a crucial role; respondents over 50 had the lowest percentage of correct knowledge. This finding is comparable to a study conducted in Saudi Arabia, where participants over 50 demonstrated significantly lower awareness levels of TB than those aged 18-28 [19]. This may be due to limited health literacy among the older age group[20].

Literacy emerged as a crucial factor; illiterate individuals were notably less aware of the transmissible nature of TB compared to their literate counterparts. According to the NDHS, the regions with lower literacy rates often report poorer awareness of TB symptoms and preventive measures[4]. A study in India mentioned, people with a high education level know the symptoms and recognize TB as a curable disease, indicating that knowledge of TB is correlated with education [21]. The result is similar to a study done in Africa and Malawi, indicating higher TB knowledge among literate compared to illiterate [22,23].

Respondents from nuclear families were significantly more aware of the spreading characteristics of TB, compared to non-nuclear families. This suggests that family dynamics influence information dissemination within households[24]. The result is supported by studies conducted in Lalitpur, Nepal, and Bangladesh, where persons from nuclear families had good knowledge about TB, compared to those from joint families. This may be due to effective communication among family members in nuclear families, better access to health education, and other factors like the income of the family and expenditure on education[14,25]. While occupation did not show significant differences in knowledge, the relationship between occupation and TB knowledge is complex and can be influenced by various factors, like specific job roles, access to training, resources, and socioeconomic conditions [14,26,27]. According to the National TB Control Program in Bangladesh, the proportion of TB infection was higher among sales and service workers (45.4%) and other non-agricultural workers (31.3%) compared to agricultural workers (13.8%)[28].

Additionally, people without health insurance exhibited a higher rate of incorrect responses compared to those with insurance. This indicates, health insurance significantly influences health-related knowledge and behaviours by enhancing access to healthcare services, interactions with service providers, and thereby improving health literacy[26]. Policies expanding health insurance are

crucial to promote equitable health outcomes for uninsured populations by bridging the knowledge gaps.

Implications for Public Health:

Enhancing public awareness can help to reduce the burden of TB. Findings highlighted the need for educational interventions to improve awareness of TB transmission, prevention, and treatment. Healthcare personnel and platforms like social media, TV, and radio can be used for sharing information. Integrating TB education into broader health promotion campaigns can bridge knowledge gaps and improve public health outcomes.

Strengths and Limitations:

This study has a sufficient sample size. But, as a secondary data analysis, it used only available information. Its cross-sectional design cannot establish cause-effect relationships, and being an academic field activity, it lacked sufficient TB-related variables.

CONCLUSION

This study reveals low knowledge of TB among respondents, influenced by various sociodemographic factors. Key information sources include health personnel, radio, TV, and social media. Educational interventions and media-based information sharing can enhance knowledge, particularly targeting females, the illiterate and older individuals, to control TB in Nepal.

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ETHICAL CONSIDERATIONS

All participation in the study was voluntary after obtaining informed consent from the participants. The anonymity and confidentiality of the participants were maintained. Ethical approval for the secondary data analysis was obtained from the Institutional Review Committee (IRC), IOM, with reference to 527-081/082.

CONFLICT OF INTEREST

None

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