

# Tuberculosis Diagnostic Delay And Level Of Knowledge On Tuberculosis Among Patients With Tuberculosis In Tharaka Nithi County, Kenya

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**Abstract-** Tuberculosis (TB), despite availability of preventive and curative measures, remains a public health challenge, ranked among leading contributors of mortality globally, even with enactment of global and national control strategies. Enhancement of TB knowledge within the community may play a pivotal role in its control. Therefore, the aim of this study was to determine aspects of TB knowledge, examine sociodemographic determinants and investigate knowledge aspects influencing TB diagnostic duration among patients with tuberculosis in Tharaka Nithi County. A descriptive cross-sectional design was adopted among 154 randomly selected respondents visiting three selected hospitals in Tharaka Nithi County. A self administered questionnaire was used to collect data. Descriptive and inferential statistics were used to analyse data. The study reported that 82.78% of the respondents had inadequate knowledge, with 62.91% of them been diagnosed after recommended time. Inadequate knowledge was reported among various aspects of TB such as causative agent(71.52%), clinical presentations (83.44%), transmissibility methods (98.68%), treatment ways(70.86%) and preventive approaches(87.42%). Further analysis revealed poor knowledge on cause( $p<0.003$ ), transmissibility ( $p<0.023$ ), disease presentation( $p<0.023$ ) and curative methods( $p<0.005$ ) as aspects of TB significantly associated with delayed diagnosis of TB. Therefore, the study recommends enhancement of community health awareness as an absolute necessary approach in promoting comprehension of TB disease. Thus improving population health seeking behaviour.

**Index Terms-** Delay, Tuberculosis, Timely Diagnosis, Level of knowledge, Knowledge.

## INTRODUCTION

Tuberculosis(TB), despite availability of preventive and curative measures(Fang et al., 2019), remains a public health challenge, ranked among leading contributors of mortality globally, even with enactment of global and national control strategies(Junaid et al., 2021). Literature on TB control has reported that since the End TB strategies were implemented, a 2% annual decline on TB incidence had been reported by 2020, though at a slow rate resulting to failure in attaining set targets at 2020 (Bashorum et al., 2020., Linda et al., 2024). Many studies in both developed and developing nations have associated this with TB diagnostic delay(Abdullahi et al., 2021, Alene et al., 2020, Angelo et al., 2020). A study done in South Africa by Makgopa & Madiba, 2021, revealed an association between inadequate TB knowledge and diagnostic delay. Likewise another study done Gambia reported a relationship between delayed TB management with poor patients perception on existing health systems and inadequate knowledge on TB aspects: cause, manifestation, treatment and prevention (Bashorum et al., 2020). Similarly, a systematic review and meta analysis carried out in Ethiopia, revealed that patients with inadequate TB knowledge were two times more likely to delay in TB management compared to patients with good knowledge (Alene et al., 2020). Thus the need to address knowledge gaps of TB among high risk population.

Many studies have reported inadequate knowledge about TB and TB related services as an obstacle to eradicating TB(Gautam & Khanam, 2021;Njiru et al., 2020;Nyasulu et al., 2018), especially among high-risk population(Ohiengbomwan et al., 2022). Knowledge of TB has been associated with patients' comprehension of management option, period of management, drug side effects, benefits of drug adherence and repercussion of treatment interruption(Idris et al., 2020 & Njiru et al., 2020). More than three quarters of death cases attributed to TB disease have been associated with inadequate knowledge on TB prevention (Njiru et al., 2020), risk factors (Harstad et al., 2022), usage of anti-TB drug (Ohiengbomwan et al., 2022) and diagnostic symptoms (Abdullahi et al., 2029, Ngari et al., 2019). Another study established that patients ignorance of either symptoms or treatment as fundamental cause of disease advancement (Harstad et al., 2022 & Onyango et al., 2020).

Developing nations have lag behind in attaining set sustainable development goal target in area of TB eradication (Angelo et al., 2020). TB transmissibility, manifestation, curability and timely screening knowledge are essential in TB control(Angelo et al., 2020).

Thus TB eradication. However, the study identified various disease knowledge gaps among the participants: 90%, 50%, 60% and 70% had limited understanding on causative agent, manifestation, transmissibility modes and prevention respectively(Angelo et al., 2020). This was similar to other studies done in Nigeria(John et al., 2024, Junaid et al., 2021), Indonesia(Kaaffah et al., 2023), South Africa (Mkgopa & Madiba, 2021). In addition, studies have further revealed a relationship between overall knowledge with study respondents characteristics. For example, a study conducted in Indonesia by Kaafah et al. 2023, reported a relationship between knowledge and sociodemographic variables: age, education, occupation, wealth index, though in the study area such investigation TB have not been carried out yet. In Gambia, Ethiopia, Indonesia and Nigeria studies have reported overall TB knowledge of 70%, 56%, 56% and 44.3 % respectively(Bashorum et al., 2020, Angelo et al., 2020, Kuffah et al., 2023, Junaid et al., 2021). In the study area it still remains unclear on knowledge on various aspects of TB and the overall knowledge. Thus the need to establish patients knowledge on TB. This will provide useful information for spearheading the formulation of community awareness programmes in Tharaka Nithi County, Kenya.

### METHODOLOGY

A cross-sectional descriptive study design was adopted among 154 randomly selected patients with TB from Chuka, Muthambi and Chogoria Hospitals. Data was collected using a pre-tested researcher generated questionnaire with a reliability coefficient of 0.87 when tested using split half reliability test. Data was cleaned and coded in MS Excel and analysed using SPSS v26 with a predetermined p value of 0.05. Respondents characteristics were summarized and presented using descriptive statistics while crosstabulation was utilized to determine aspects of TB knowledge that were significantly influencing diagnostic delay. The study utilized WHO cutoff to categorize diagnostic delay(No diagnostic delay, <21 days and Diagnostic delay, >21 days) for generalizability purposes. On the other hand, level of knowledge was dichotomised in inadequate knowledge(<60 points) and adequate knowledge (>60 points). Study findings were presented using bar graphs, frequencies and percentages. Researcher sought ethical approval (NACOSTI/NBC/AC-08120) and research permit (NACOSTI/p/23/24959). Permission was also sought from relevant hospital administrators. All other ethical considerations were put into account during the process of the entire research.

### RESULTS

Out of 154 study respondents approached by the researcher, 151 respondents were included in the study after examination of the research tool for completeness, resulting in a response rate of 98.05%. Respondents mean age in the study was 38.71(SD, 13.65) years with a median and mode of 36.0 and 42.0 years respectively. Majority of the respondents were male[n=85(56.29)], aged 31-40 years[n=48(31.79)], married[n=84(55.62%)], attained secondary education[n=57(37.25%)], and self-employed[n=74(49.01%)], Table 1].

**Table 1: Respondents socio-demographic characteristics**

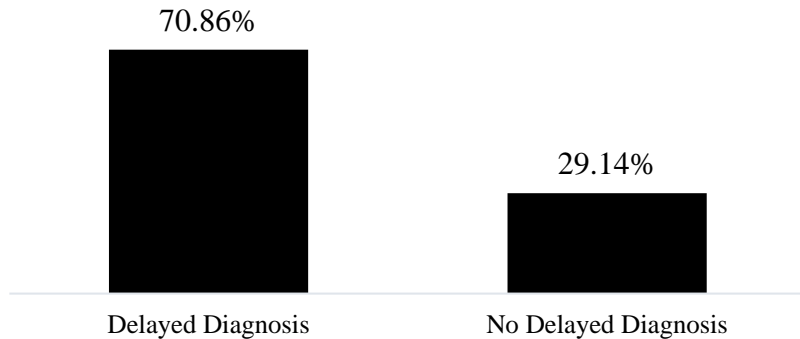
Variables	Category	Frequency	Percent
Respondents' gender	Male	85	56.29
	Female	66	43.71
	Totals	151	100.0
Respondents' Age	20-30	33	21.85
	31-40	48	31.79
	41-50	44	29.13
	Over 50	26	17.22
	Totals	151	100.0
Respondents' Marital status	Single	21	13.91
	Married	84	55.62
	Divorced	27	17.88
	Widowed	19	12.58
	Totals	151	100
Respondents' education status	Never attended school	17	11.26
	Primary	49	32.45
	Secondary	57	37.75
	Post secondary education	28	18.54
	Totals	151	100.0
Respondents' Occupation	Unemployed	47	31.13
	Self employed	74	49.01
	Government employed	30	19.86
	Total	151	100
Respondents household income	<10,000/=	88	58.28
	10,000-20,000/=	23	15.23
	>20,000/=	40	26.49

Totals	151	100.0
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**Diagnostic duration**

The study sought to establish the percentage of study participant experiencing TB diagnostic delay. Figure 1 below presents the results. It was observed that a significant number [n=107(70.86%)] of respondents experienced diagnostic delays while only 44 (29.14%) were diagnosed on time(Figure, 1).

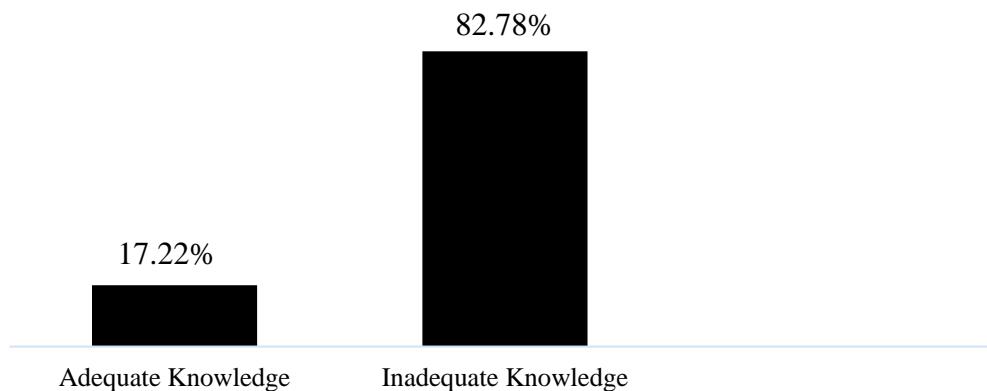
**Figure 1: A bar graph of Uptake of diagnostic Services.**



**Level of Knowledge of Tuberculosis**

The study sought to establish the level of knowledge on TB, whereby study participants were given a question with different question concerning TB disease. Their responses were rated in a scale with maximum score of 100. The results were further grouped into inadequate knowledge (<60 points) and adequate knowledge (≥60 points). The results are shown in figure 2 below.

**Figure 2: The Levels of Knowledge on Tuberculosis**



From Figure 2 above, it was observed that the level of knowledge on TB amongst the respondents was poor. Majority 125(82.78%) of the respondents had inadequate knowledge, while only 26 (17.22%) had adequate knowledge. Further analysis showed that among the respondents with inadequate knowledge, 95(62.91%) did not have timely diagnosis whereas only 14(9.27%) of those with adequate TB knowledge were diagnosed within the recommended time.

**Table 2: Association between Socio-demographic Characteristics and level of Knowledge on TB**

Variable		Knowledge Level			Statistics
		Adequate	Inadequate	Total	
Gender	Male	15(9.94)	70(46.35)	85(56.29)	$\chi^2(1, N = 151)$ = 0.025, p = 0.874
	Female	11 (7.28)	55(36.43)	66 (43.71)	
	Total	26 (17.22)	125(82.78)	151(100.0)	
Age	20-30	8(5.30)	25(16.56)	33(21.86)	$\chi^2(3, N = 151)$ = 2.341, p =0.505
	31-40	9(5.96)	39(25.83)	48 (31.79)	
	41-50	5(3.31)	39(25.83)	44 (29.14)	
	>50	4(2.65)	22(14.57)	26 (17.22)	
	Total	26 (17.22)	125(82.78)	151(100)	
Education	Informal	3(1.99)	14(9.27)	17 (11.26)	$\chi^2(3, N = 151)$ =0.603,
	Primary	10(6.62)	39(25.83)	49 (32.45)	

	Secondary	9(5.96)	48(31.79)	57(37.75)	p = 0.896
	Tertiary	4(2.65)	24(15.89)	28(18.54)	
	Total	26(17.22)	125(82.78)	151(100.00)	
Marital	Single	5(3.31)	16(10.59)	21(13.90)	$\chi^2(3, N = 151)$ = 4.602, p = 0.203
	Married	12(7.95)	72(47.68)	84(55.63)	
	Divorced	3(1.99)	24(15.89)	27(17.88)	
	Widowed	6(3.97)	13(8.61)	19(12.58)	
	Total	26(17.22)	125(82.78)	151(100.0)	
Employment	Unemployed	8(5.30)	39(25.82)	47(31.12)	$\chi^2(2, N = 151)$ = 0.216, p = 0.898
	Self-employed	12(7.95)	62(41.06)	74(49.01)	
	Government employed	6(3.97)	24(15.90)	30(19.87)	
	Total	26(17.22)	125(82.78)	151(100.0)	

From the study it was observed that age(p=0.505), marital status(p=0.203), gender(p=0.874), attained educational (p=0.896) and employment(p=0.898) status were not significant associated with knowledge levels(Table 2). It was further identified that inadequate knowledge was significantly high among respondents who were male(46.35%), aged 31-50 years(51.66%), married(47.68%) and self employed[41.66%(Table 2)].

**Table 3 Association Between aspects of Knowledge on TB and timely Diagnosis**

Variables	Diagnostics duration			Statistics
	No delay	Delay	Total	
What causes tuberculosis?				
Correct Response	5(3.31)	38(25.17)	43(28.48)	$\chi^2(1, N = 151)$ = 8.928, p = 0.003
Incorrect Response	39(25.83)	69(45.69)	108(71.52)	
Total	44(29.14)	107(70.86)	151(100.0)	
Can TB be transmitted from one individual to another?				
Yes	32(21.19)	94(62.25)	126(83.44)	$\chi^2(1, N = 151)$ = 5.162, p = 0.023
No	12(7.95)	13(8.61)	25(16.56)	
Total	44(29.14)	107(70.86)	151(100.0)	
What are ways through which TB may be transmitted from one person to another?				
Correct response	1(0.66)	1(0.66)	2(1.32)	$\chi^2(1, N = 151)$ = 0.43, p = 0.51
Incorrect Response	43(28.48)	106(70.2)	149(98.68)	
Totals	44(29.14)	107(70.86)	151(100.0)	
What increases the chances of one getting TB?				
Correct Response	36(23.84)	77(50.99)	113(74.83)	$\chi^2(1, N = 151)$ = 1.61, p = 0.20
Incorrect Response	8(5.30)	30(19.87)	38(25.17)	
Total	44(29.14)	107(70.86)	151(100.0)	
What are the signs and symptoms of Tuberculosis?				
Correct Responses	12(7.95)	13(8.61)	25(16.56)	$\chi^2(1, N = 151)$ = 5.1617, p = 0.023
Wrong Responses	32(21.19)	94(62.25)	126(83.44)	
Total	44(29.14)	107(70.86)	151(100.0)	
Can tuberculosis be cured?				
Yes	25(16.56)	85(56.29)	110(72.85)	$\chi^2(1, N = 151)$ = 8.066, p = 0.005
No	19(12.58)	22(14.57)	41(27.15)	
Totals	44(29.14)	107(70.86)	151(100.0)	
What are the method through which tuberculosis may be cured?				
Correct Response	15(9.93)	29(19.21)	44(29.14)	$\chi^2(1, N = 151)$ = 0.74, p = 0.39
Incorrect Response	29(19.21)	78(51.66)	107(70.86)	
Total	44(29.14)	107(70.86)	151(100.0)	
How is tuberculosis prevented				
Correct Response	5(3.31)	14(9.27)	19(12.58)	$\chi^2(1, N = 151)$ = 0.084, p = 0.772
Wrong Response	39(25.83)	93(61.59)	132(87.42)	
Total	44(29.14)	107(70.89)	151(100.0)	
Overall level of Tuberculosis Knowledge				
Adequate Knowledge	14(9.27)	12(7.95)	26(17.22)	$\chi^2(1, N = 151)$ = 9.2854, p = 0.002
Inadequate Knowledge	30(19.87)	95(62.91)	125(82.78)	
Total	44(29.14)	107(70.86)	151(100.0)	

Results from a crosstabulation analysis between diagnostic delay and aspects on knowledge on TB are illustrated above in table 3. From the analysis, majority [n=108(71.52%)] of the respondents were unaware of cause of TB. Further analysis revealed as significant  $\chi^2$  (1, N=151) = 8.928, p = 0.003 association between delayed diagnosis and knowledge on TB cause. Similar pattern was observed under knowledge on TB manifestation, where by majority [n=126(83.44%)] of the respondent had wrong information about TB signs and symptoms, with 94(62.25%) of them been diagnosed after the desired time. A Chi-square test for independence identified a statistical association [ $\chi^2$  (1, N=151) = 5.1617, p = 0.023] between knowledge of TB manifestation and delayed TB diagnosis. Regarding, TB transmissibility and curability, only [n=25(16.56%) and [n=41(27.15%)] of the respondents reported that TB is neither transmissible nor cured respectively. On examination of association between diagnostic delay and aspects of TB transmissibility [ $\chi^2$  (1, N=151) = 5.162, p = 0.023] and curability [ $\chi^2$  (1, N=151) = 8.066, p = 0.005], a significant association was identified (Table 3).

Out of 107(70.86%) of the respondents were unaware of TB curative method, 78(51.66%) of them experienced delayed diagnosis. However, there was no significant association [ $\chi^2$  (1, N=151) = 0.74, p = 0.39], established between knowledge on TB curative methods and delayed diagnosis. Similar trends were also reported on aspects of TB preventive methods. Whereby, majority [n=132(87.42%)] of the respondents had incorrect knowledge on TB preventive methods, with 61.59%(n=93) of them been diagnosed after the recommended time. Further analysis identified no relationship [ $\chi^2$  (1, N=151) = 0.084, p = 0.772], between knowledge on TB preventive approaches and delayed diagnosis (Table 3).

The study further revealed an association between overall TB knowledge aspects with delayed diagnosis, [ $\chi^2$  (1, N=151) = 9.2854, p = 0.002]. Out of 151 study participants, majority [n= 125 (82.78%)] of them had inadequate knowledge and only 26(17.22%) had adequate knowledge. Of those with inadequate knowledge, 95(62.91%) of them experienced diagnostic delay and only [n=30(17.87%)] were diagnosed as per guideline timelines. Generally, the results showed a gap in knowledge aspects of TB cause, transmission methods, clinical manifestation, curative and preventive approaches (Table 3).

## DISCUSSION

Majority(56.29%) of the respondents were male. This may be associated with their spouses support. The finding concurred with finding of a study in India which reported that 67% male participants seeking care(Sahu et al., 2020). Moreover, recent survey in Kenya have reported high cases of TB diagnosis among male compared to females. For instance, in 2016 a survey conducted by Enos et al. (2016), highlighted that 809(males) and 359(females) per 100,000 population were diagnosed with TB. Regarding diagnostic delay, 70.86% of the respondents experience diagnostic delay. This results mirrors finding of study done in India and South Africa which reported diagnostic delay of 87.4% and 56% respectively(Sahu et al., 2020 & Makgopa et al., 2021). The discrepancies in the delays maybe associated with study design utilized, study respondents characteristics, and analysed variables. On the other hand, the study revealed 82.98%(n=125) of the respondents to have inadequate knowledge. This findings were higher compared to findings reported in Nigeria(55.7%) and Indonesia(44%). The deviations in the finding may be due to different number of knowledge variables examined and different cutoff point.

The study revealed no significant association between respondents sociodemographic characteristics and knowledge of tuberculosis. This findings were similar to findings of a study done in South Africa(Makgopa et al., 2021). However, this study finding do not collaborate with finding of a study conducted in Indonesia which revealed a relationship between TB knowledge aspects and participants demographic characteristics(Kaaffah et al., 2023). This study reported that 71.52% of the participant were not aware of cause of TB. This finding was lower than one in a study conducted in Indonesia which reported 95% of the respondents were aware of TB cause(Kaaffah et al., 2023). This may be associated with high educational status of the study respondents. However, this findings are also nearly similar to finding reported in Nigeria were 70% of the study participants had poor knowledge on TB cause(Junaid et al., 2021). This was also mirrored in a study done by Makgopa et al. (2021). Studies have revealed that inadequate knowledge on the cause of TB to fuel myths and misconception about TB cause(Sahu et al., 2020; Ngari et al., 2019; Paramasira, et al., 2017). Consequently, resulting to seeking spiritual cleansing of alleged causative evil spirits(Alene et al., 2020). This has resulted to delayed TB diagnosis. Regarding tuberculosis transmission methods and clinical manifestation, it was reported that 98.68% and 83.44% of the respondents were unaware on methods of TB transmission and clinical presentation respectively. This was in line with finding reported by three studies conducted in Africa(John et al., 2024; Junaid et al., 2021; Makgopa & Madiba, 2021). Similarly, a study in Asia reported that 65% and 50% of the respondents believed that TB is spread through breastfeeding and viral infection, respectively(Kaaffah et al., 2023). It was further highlighted that, inadequate knowledge on transmission methods and clinical presentation of TB had agonistic effects on diagnostic delay(Makgopa & Madiba, 2021).

In this study majority (72.85%) were aware that TB can be cured, however, most (56.29%) of them were not diagnosed with the recommend time. Possibly this may be due to the beliefs that tuberculosis may be cured via religious or cultural means resulting to seeking alternatives treatment before seeking medical care. The study further established that knowledge on TB cure influenced TB timely diagnosis. This findings concurred with findings from a study in Ghana which reported that despite majority of TB patients knowing that TB is a curable disease, most engaged on alternative treatment resulting to failure of being diagnosed on time (Tabong et al., 2021).

Results of this study established that, majority i.e. 125(82.78%) of respondents had inadequate knowledge on TB. In addition 95(62.91%) of the respondents with inadequate knowledge were not diagnosed on time. This findings are similar to study findings in India, which reported that inadequate knowledge on TB resulted to poor medical seeking behavior leading to diagnostic delay (Paramasiram et al., 2017). Other studies by Gautam & Khaham, (2021) and Njuri et al., (2020) further stated that inadequate knowledge on TB and TB related services endangered set eradication measures of TB. Unfortunately, more than three quarters of the respondents were not knowledgeable about some aspects of TB such as cause, transmission modes, signs and symptoms and preventions. This clearly shows knowledge deficit amongst most of patients with TB in Tharaka Nithi County. The patients knew about tuberculosis but lacked comprehensive understanding on this tuberculosis aspects. Therefore, there is need to enhance awareness among patients and the public on this aspects. This was in line finding various study finding which reported that inadequate knowledge on cause and risk factors(Harstad et al., 2022), prevention measures(Njiru et al., 2020), diagnostic symptoms(Abdullahi et al., 2019) resulted to delayed diagnosis, increased spread and mortality of TB.

### CONCLUSION AND RECOMMENDATION

The finding of this study established that a great proportion of patients had delayed diagnosis (70.86%) and inadequate knowledge (82.78%) on TB aspects. The study revealed that more than three quarters of the respondents were not knowledgeable about some aspects of TB such as cause, disease presentation, transmission methods and curative and preventive approaches. Therefore the study suggests raising of public health literacy on TB through awareness by addressing key aspects of TB such as cause, cure and preventive methods, disease transmission and clinical presentation. In addition, vigorous awareness with high focus on men, married people, individual with informal employment, and those aged 31-50 years.

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