Diagnostic Delay of Tuberculosis in Isiolo Referral Hospital in Kenya: A comparison of associated factors between binary and survival analyses

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Summary

BACKGROUND

Tuberculosis (TB) is one of the leading causes of mortality worldwide. Early identification of factors associated with delayed TB diagnosis forms an effective strategy for minimising the transmission of the disease in the community. This study aimed to investigate factors associated with diagnostic delay of tuberculosis.

MATERIALS AND METHODS

The study employed a cross-section cohort design from 154 TB patients between January 2018 and January 2019 at Isiolo County referral hospital, Northern Kenya. Cox regression analysis was performed to determine the association between predictive variables and survival outcome at Hazard Ratios (95% CI). Further analysis was conducted to determine patients' epidemiological characteristics, health-seeking behaviour and clinical factors associated with diagnostic delay. We used Kaplan–Meier plots and logrank tests to evaluate the survival pattern, and used median to describe delays of TB diagnosis.

RESULTS

After adjustment for covariates, HR (95% CI) aged 16-30 was (HR = 0.24, CI: 0.09, 0.63; P = 0.00), >45 years old (HR = 1.68, CI: 1.06, 2.67; P = 0.03), male gender (HR = 1.64, CI: 0.99, 2.72; P = 0.05), diagnosis at dispensary (HR = 2.00, CI: 1.12, 3.58; P = 0.02), productive cough (HR = 5.67, CI: 1.54, 20.85; P = 0.01), and chest pain (HR = 0.39, CI: 0.19, 0.81 P = 0.01).

CONCLUSION

Our binary results demonstrated that TB patients' health-seeking behaviour, health facility of diagnosis, occupation, and education levels were associated with delayed TB diagnosis. Meanwhile, survival analysis indicated age, gender, health facility of diagnosis, productive cough, and chest pain to be associated with delayed TB diagnosis. This affirms the need to strengthen health education in the community.

Keywords: *Factors, Survival Analysis, Binary, Comparison, Isiolo, Northern Kenya*

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Introduction

Tuberculosis (TB) is a communicable disease among the top ten global causes of death. Caused by *Mycobacterium tuberculosis*, the disease is spread by an infected person expelling bacteria into the air by droplets [1]. In 2018, the global estimate of new TB infection stood at 10 million people. The global TB estimates for people who fell ill in the same year ranged from 9.0 to 11.1 million, varying from one country to another from less than five to over 500 new cases per 100,000 people annually [2]. The TB burden accounted for 1.2 million deaths among HIV-negative people globally in 2018 and 251,000 deaths among HIV-positive people [2].

The highest regional numbers of TB cases reported in 2018 were from South-East Asia (44%), Africa (24%), and the Western Pacific (18%); the Eastern Mediterranean (8%), the Americas (3%), and Europe (3%) accounted for similar numbers. These are some of the 22 countries included in the WHO's list of 30 high TB burden countries that account for 87% of the world's cases [2].

The TB burden in Kenya remains high, with a prevalence survey conducted in 2015-2016 showing 426 per 100,000 population with annual incidence of 169,000 cases. However, the annual decrease was noted at only 4%, representing 156,000 people who fell ill with TB. An estimated 96,478 (64%) cases were reported in 2018, while 36% of the estimated number of cases were not diagnosed, treated, or notified [3].

In September 2018, the United Nations (UN) held its first high-level meeting regarding TB, to discuss the status of the TB epidemic and compare strategies to prevent its transmission at the level of heads of state and government. One strategy, focused on SDG Target 3.3, involved ending the TB epidemic by 2030 and reducing TB cases and deaths by 2035, with targets for 2030 as 90% reduction in the number of TB deaths, and 80% reduction in the TB incidence rate. Another strategy also included a 2020 milestone that TB patients and their households would not be subjected to high costs as a result of TB disease [2].

The global notification of new TB cases in 2018 reached 7.0 million, demonstrating a slight increase from the 6.4 million reported in the previous year. In spite of a rise in TB notifications, it remains necessary to address the difference between the number of new cases reported (7.0 million) and the estimated 10.0 million (range, 9.0–11.1 million) incident cases. This difference is due to the underreporting of detected cases and under diagnosis, meaning that people do not receive a timely diagnosis [2].

Early TB diagnosis is an integral part of the control and prevention strategy for protecting healthy individuals from contracting the disease [4]. Delayed diagnosis can be attributed to health-seeking behaviour, incorrect diagnostic procedures by healthcare providers, and inadequate diagnostic capacities at health care facilities [5]. Undiagnosed TB cases in the community may transmit *Mycobacterium tuberculosis* to 10-15 people per annum [6]. Tuberculosis diagnosis is determined by passive case detection using case definitions upon the patient's presentation to the healthcare provider at the health facility, leading to delayed diagnoses of TB in Kenya [7]. This study aimed to investigate factors associated with a diagnostic delay of TB and time to event (delayed diagnosis of TB), and perform a comparison between binary [8] and survival analysis.

Various factors that contribute to the delayed diagnosis of TB have been identified worldwide [9]. This study assessed sociodemographic, socioeconomic, and clinical characteristics, and performed time-to-event analysis using epidemiological data obtained from the patients' histories; that is, the data at the endpoint when the patient first sought help from the healthcare provider due to signs and symptoms suggestive of TB, and the time at which a diagnosis was made (an event occurs). In this respect, our events were delayed diagnosis (>21 days) and censored cases (<21 days).

Seeking innovative approaches to employing existing information and data to reduce the incidence of TB should be a public health priority, particularly in high-TB burden and resource-constrained countries such as Kenya.

Materials and Methods

The study employed a cross-section cohort design from 154 TB patients between January 2018 and January 2019 at Isiolo county referral hospital, Northern Kenya. We assessed factors to which patients were exposed prior to diagnosis (time to event), reviewed the epidemiologic histories of patients and contacted the patients for interview. For survival analysis, censoring was established by analysing the number of days from the patient's first request for care from the healthcare system to diagnosis of TB.

Delayed diagnosis was dichotomized into ≤21 days and ≥21 days, in which ≥21 days became the event and ≤ 21 days became the censored. Cox regression analysis was used for the multivariate analysis to determine the association between predictive variables and survival outcome at Hazard Ratios (95% CI). The P value was set at 0.05 and the log likelihood ratio test at 0.05. Further analysis was performed of the patients' epidemiological characteristics, health-seeking behaviour, and clinical factors associated with diagnostic delay. We used Kaplan–Meier plots and logrank tests to evaluate the survival pattern. Median was used to describe delays of TB diagnosis, and data analysis was performed using SPSS version 20.

Results

A total of 154 TB patients participated in this study, comprising of 84 (54.5%) male and 70 (45.5%) female patients. Participants aged 31-44 years were 50 (32.5%) with patients aged over 45 years old being 48 (31.2%), while patients aged 0-15 years and aged 16-30 years accounted for 13 (8.4%) and 43 (27.9%) of all patients, respectively.

Patients' marital status indicated that a total of 88 (57.1%) were married, 44 (28.6%) were single, 13 (8.4%) were widowed, while 9 (5.8%) were divorced.

In terms of education level, a majority 97 (63.0%) had attained primary-level education only. 43 (27.9%) patients, or less than half of the total sample, had attained secondary-level education, while those who had attained tertiary-level education were a minority at 14 (9.1%).

Eighty seven (56.5%) patients were of Muslim faith while 67 (43.5%) were Christian. Employment status revealed that 52 (33.8%) patients were unemployed, 48 (31.2%) were self-employed, 42 (27.3%) were employed, and 12 (7.8%) were casual labourers.

Regarding family size, 75 (48.7%) patients' households consisted of 3-5 members, 51 (31.8%) had 6-8 members, 15 (9.7%) had a family size of 8, and 13 (8.4%) had families of only 0-2 members. Patients' areas of residence showed that over half, 101 (65.6%), were living in rural areas while slightly below half, or 53 (34.3%), were living in urban areas. 77 (50.0%) of the patients earned ≤Kshs 5700 per month while a similar number of 77 (50.0%) earned more than ≥ Kshs 5700.

Health facility of diagnosis showed that 56 (36.4%) were diagnosed at the public health facility, 54 (35.1%) at the dispensary, and 44 (28.6%) at private health facilities. Distance to the nearest health facility showed that 99 (64.3%) patients walked ≤5km, while 55 (35.7%) covered a distance of ≥5km to reach the nearest health facility (Table 1). All tables are presented in the appendix.

The result of descriptive statistics of covariates (Table 3) with survival time (ST) demonstrated that females had a longer ST compared to males, with a mean ST of 39 days compared to that of 36 days for males. Out of 48 (31.2%) TB patients aged >45, 19 (39.6%) were censored while 29 (40.4%) had an event. Out of 50 (32.5%) patients aged 31-44, 21 (42.0%) were censored while 29 (58.0%) had an event. Out of those aged 16-30, 18 (41.9%) were censored and 25 (58.1%) experienced an event. Out of those aged 0-15, 7 (53.8%) were censored and 6 (46.2%) had an event. We plotted the survival curve function of the age categories on the Kaplan Meier (KM) graph.

As illustrated in Figure 1 below, the graph showed that the survival curves of those aged >45, 31-44, and 16-30 were lower than that of those aged 0-15, thus inferring that patients in the previous age groups had a higher probability of survival than those aged 0-15. The overall median ST was 37 days (CI: 35.47, 38.53; logrank = 0.00). However, the (adj, HR = 1.68; CI: 1.06, 2.67, P = 0.03), 16-30 age group (adj. HR = 0.24; CI: 0.09, 0.63; P = 0.00), indicating that this age group was more likely to experience an event (delayed diagnosis of TB) than the 31-44 age group (adj. HR = 1.10; CI: 0.67, 1.79; P = 0.71).

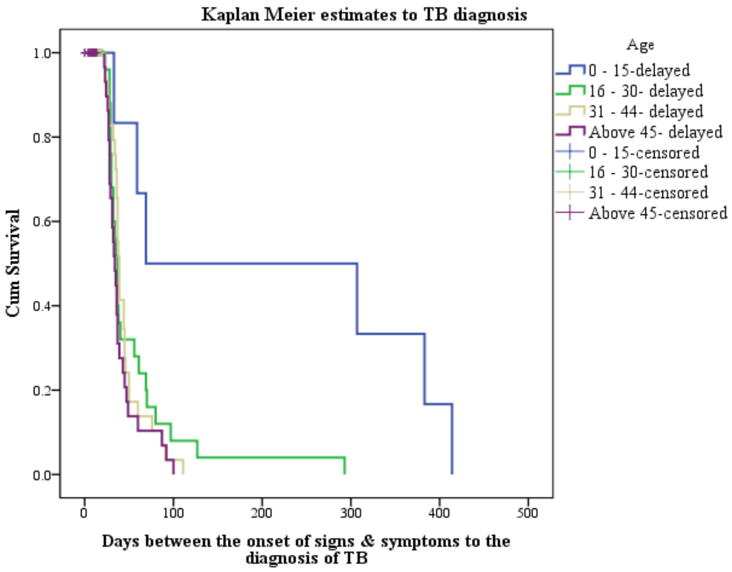

Figure 1: Age Category of TB Patients from Onset of Signs and Symptoms to Diagnosis of TB

The results of the descriptive statistics for the survival data showed that 89 (57.8%) of the TB patients had an event while 65 (42.2%) were censored cases. Out of 84 male patients, 50 (59.5%) had an event while 34 (40.5%) were censored. Meanwhile, out of 70 (45.5%) female patients, 39 (55.7%) had an event while 31 (44.2%) were censored. We compared the survival function of the subjects according to gender by plotting the Kaplan–Meier (KM) graph. The KM graph shows the cumulative survival function on a linear scale by gender (Fig. 2). The survival curve of males was lower than that of females, implying that males had a higher probability of surviving (not experiencing delayed TB diagnosis) than females. The overall median survival time was 37 days (CI: 35.0-38.53, P=0.17). However, (adj. HR = 1.64, CI: 0.99, 2.72; P = 0.05) indicated that males were more likely to delay (experiencing an event) in seeking TB diagnosis compared to females (Table 2).

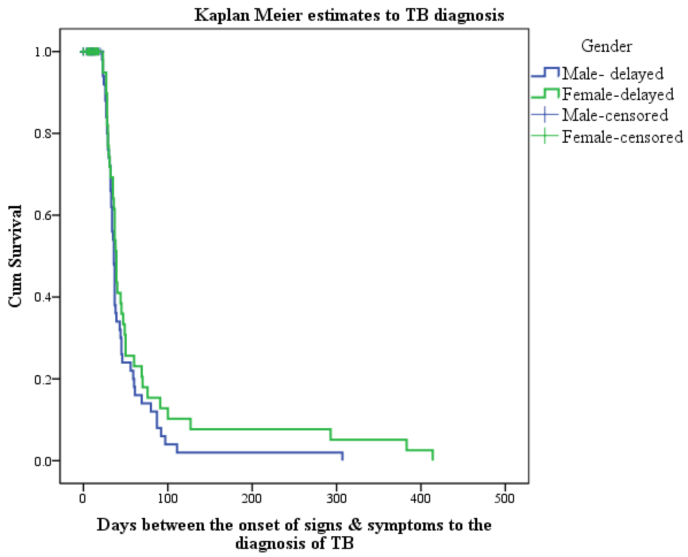

Figure 2: Gender Category of TB Patients from Onset of Signs and Symptoms to Diagnosis of TB

The association of all other covariates with ST and significance level were as shown in Table 3. We also compared the survival function by level of factor. Comparisons of survival curves for different education levels were performed using the logrank test, to test the hypothesis that there was no difference between population survival curves according to education level (Table 3).

The graph shown in Figure 4 indicates that patients who had attained secondary- and tertiary-level education had a higher probability of not experiencing delayed TB diagnosis. Patients who had attained primary-level education exhibited the highest survival curve, meaning that they were more likely to experience delayed TB diagnosis. The overall median ST was 37 days (CI: 35.47, 38.53; logrank = 0.11). We failed to reject the hypothesis and concluded that the curve is identical across the population since the score showed no significant difference (p value >0.05).

Figure 5 demonstrates a lower survival curve for casual labourers and self-employed patients, suggesting that high probability of ST (not experiencing delayed diagnosis of TB) while employed and unemployed makes these groups more likely to experience the event (delayed diagnosis of TB). The diagnosis of patients at public health facilities is shown at the lower survival curve (Figure 6), indicating that patients who sought care at these health facilities had a high probability of not experiencing delayed diagnosis of TB; meanwhile, dispensary and private health facilities were more likely to experience delayed TB diagnosis

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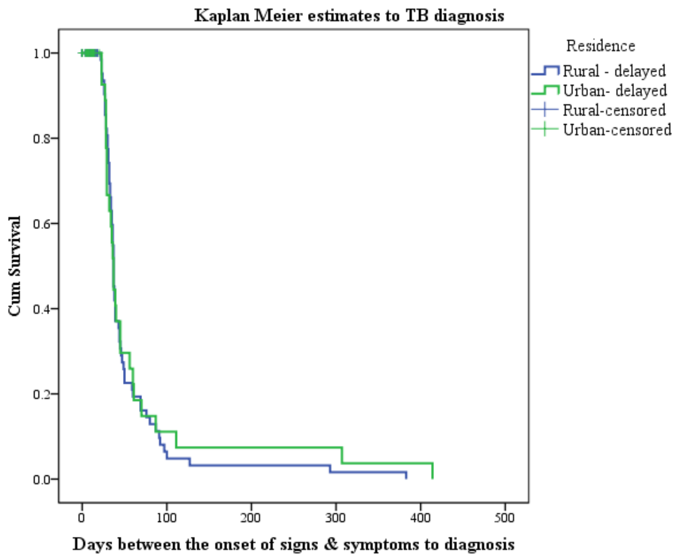

Figure 3: Showing Residence of TB Patients from Onset of Signs and Symptoms to Diagnosis of TB

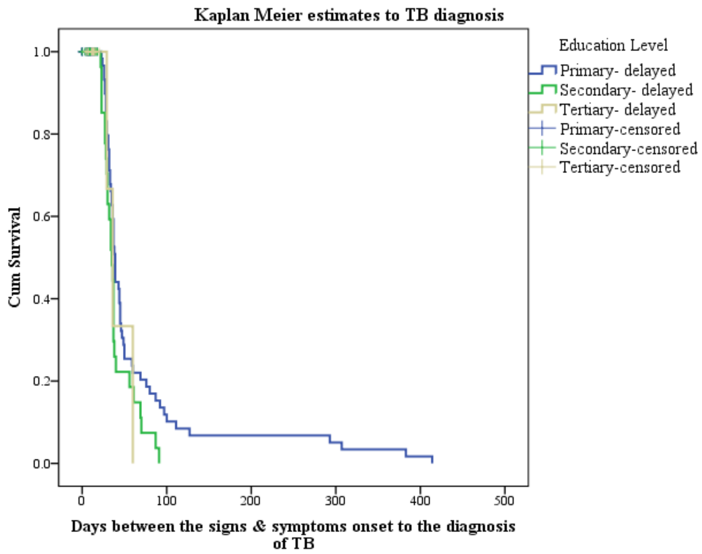

Figure 4: Showing Education Level of TB Patients from Onset of Signs and Symptoms to Diagnosis of TB

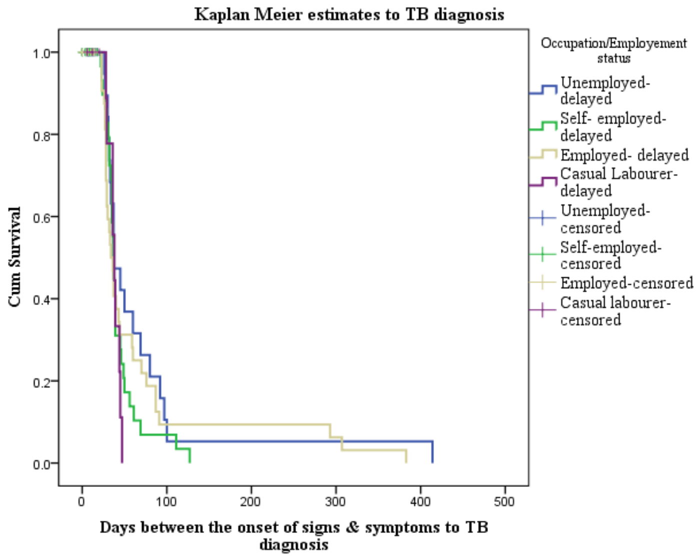

Figure 5: Showing Employment Status of TB Patients from Onset of Signs and Symptoms to Diagnosis of TB

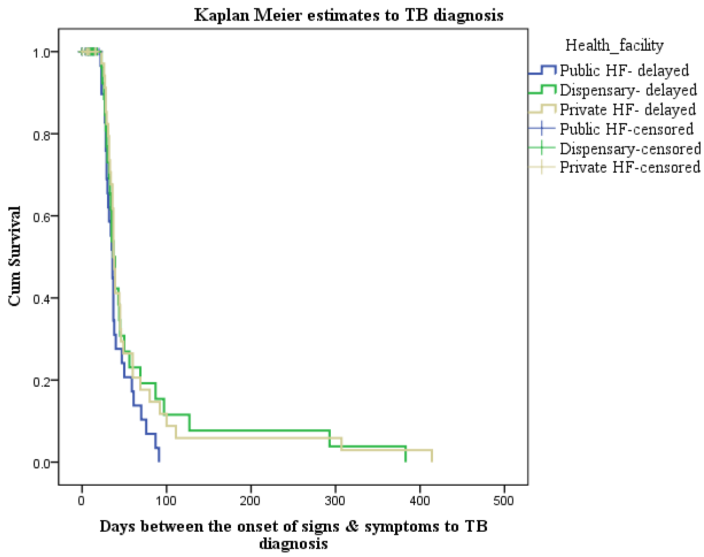

Figure 6: Showing Health Facility of TB Patients' Diagnosis from Onset of Signs and Symptoms to Diagnosis of TB

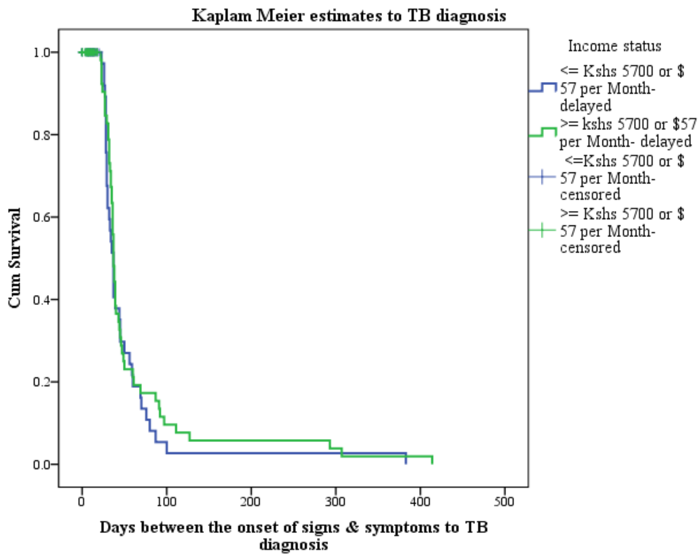

Figure 7: Showing Income Level of TB Patients from Onset of Signs and Symptoms to Diagnosis of TB

To determine the difference between different groups' survival times, we described the potential association between covariates and survival time using the Cox proportional-hazards model. The dependent variable was the 'hazard'. The hazard was the probability of experiencing delayed diagnosis of TB (event), given that the patient had sought help from the healthcare system without diagnosis at first contact, up to a given point in time (diagnosis time) or the risk of delayed diagnosis.

Discussion

This study's primary objective was to determine the time to event among TB patients, estimate survival function including the median survival time, and compare the survival curves by factors associated with delayed diagnosis of TB. The Kaplan Meier (KM) survival curves in our study showed lower KM curves in male patients; those who had attained secondary- and tertiary- level education; casual labourers; and those who had been diagnosed at a public health facility. This indicates a high survival probability of not experiencing delayed TB diagnosis (not experiencing the event).

We established that females were more likely to experience delayed TB diagnosis than males. This study also indicated that the median delay time for TB is higher in females than in males. However, our study additionally showed a hazard of delayed diagnosis of TB higher in males. These results are consistent with the findings of a study conducted in Egypt, which reported longer median delay in women compared to men [10]. This is most likely due to the difference in seeking medical attention between men and women [11].

Females are affected by factors such as a lack of finances and health literacy; sociocultural factors; religious beliefs; and higher levels of stigma compared to men [12-15]. In a binary study of the factors associated with delays in TB diagnoses, men postponed seeking care longer than women [8, 16-17]. Moreover, females are dependent on their partners to grant them permission to seek healthcare, hence patients' delayed diagnoses [12].

Our study established that rural residents had a non-significant higher median delayed time, and marginal non-significant higher hazard ratio of experiencing delays in diagnosis compared to urban residents. This can be attributed to poorer access to healthcare services, low socioeconomic status, and a lack of awareness regarding the symptoms of TB [16]. Our study agrees with previous studies regarding the greater risk for rural residents of experiencing diagnostic delays [17-19]. A study, conducted in Bangladesh, reported a higher rate of diagnostic delay that was attributed to insufficient awareness of the disease and low income in rural areas [19]. However, our study contradicts with a study conducted in Egypt, whose application of survival analysis showed urban residents to have a longer median delayed time than rural residents [10].

This study revealed that age had a higher median delay time in diagnosis of TB, with individuals older than 45 years exhibiting a significant hazard ratio. However, individuals aged 0-15 and 16-30 years showed a significantly lower hazard ratio. On the other hand, persons aged 31-44 years had a non-significant higher hazard ratio. A study conducted in Ethiopia showed that those aged >45 were associated with diagnostic delays [20]. These findings are consistent with the results of the study conducted by [21], which stated that TB patients older than 47 years were likely to experience delays in diagnosis.

In Australia, a study that compared persons younger and older than 45 years reported that the latter are more likely to be diagnosed late [22]. The likely explanation is that coughs in the elderly population are not prominent, which makes it difficult to get sputum samples from patients [23]. Other underlying conditions such as asthma, bronchitis, and lung cancer are associated with delayed diagnosis of TB in persons aged above 45 years [24, 25]. In a binary analysis of the study conducted in Northern Kenya [8], age exhibited no significant association with delayed TB diagnosis.

In our study, there was a significant association between primary-level education and delayed diagnosis of TB. Delays in TB diagnosis are reduced in more highly educated patients, who may have been more aware of symptoms [26, 27]. In a binary analysis assessing the delays in TB diagnosis [8], secondary and tertiary levels of education were protective towards delayed diagnosis of TB while primary-level education was linked to delayed diagnosis [8]. However, there was no significant association between other sociodemographic and socioeconomic determinants such as marital status, religion, family size, distance from the health facility, and income.

In other studies, association between delays in TB diagnosis and sociodemographic and socioeconomic factors have been reported by different researchers, as no single measure of socioeconomic status can encompass all the aspects of social vulnerabilities and health inequities that determine delayed diagnosis [26]. The binary study of the factors associated with delayed TB diagnosis revealed that employed and self-employed individuals were associated with delayed diagnosis of TB. The likely reason could be that self-employed and employed patients dedicate their limited time to attending to income-earning activities [28, 29]. This current survival analysis found no significant association with these factors; however, the hazard ratio of experiencing an event (delayed diagnosis of TB) was higher in employed and self-employed individuals.

Conclusion

In our binary results, TB patients' health-seeking behaviour, health facility of diagnosis, occupation, and education level were associated with delayed diagnosis of TB. It further revealed signs and symptoms were associated with delayed diagnosis of TB which did not come out clearly in binary analysis of delay factors. Survival analysis meanwhile showed age, gender, and health facility of diagnosis to be associated with delayed diagnosis of TB. This affirms the need to strengthen health education in the community and consolidate healthcare workers; knowledge regarding the early detection of TB.

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Authors' contributions

Conceptualisation: David Kunjok. Data curation: David Kunjok, Salome Kairu-Wanyoike, John Gachohi. Formal analysis: David Kunjok, Salome Kairu-Wanyoike, John Gachohi. Investigation: David Kunjok. Methodology: David Kunjok, John Gachohi, Salome Kairu-Wanyoike, Susan Mambo. Supervision: John Gachohi, Susan Mambo, Salome Kairu- Wanyoike. Validation: John Gachohi, Susan Mambo, Salome Kairu-Wanyoike. Writing: David Kunjok. Review & editing: John Gachohi, Susan Mambo, Salome Wanyoike.

Conflict of interest:

There were no conflicts of interest.

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Appendix

Table 1: Distribution of Socio-Demographic, Socioeconomic, and Clinical Characteristics among TB Patients at Isiolo County Referral Hospital, Hospital, Northern Kenya, 2020

Variable	**N (%)**	**Censored TB cases ≤ 21 days n = 65 (42.2)**	**Delayed diagnosis of TB ≥ 21 days n = 89 (57.8)**	**P - value**
Age				
0-15	13 (8.4)	7 (53.8)	6 (46.2)	0.01
16-30	43 (27.9)	18 (41.9)	25 (58.1)	0.00
31-44	50 (32.5)	21 (42.0)	29 (58.0)	0.19
>45	48 (31.2)	19 (39.6)	29 (40.4)	0.09
Gender				
Male	84 (54.5)	34 (40.5)	50 (59.5)	
Female	70 (45.5)	31 (44.2)	39 (55.7)	
Religion				
Muslim	87 (56.5)	44 (50.6)	43 (49.4)	
Christian	67 (43.5)	21 (31.3)	46 (68.7)	
Marital Status				
Married	88 (57.1)	34 (48.9)	54 (61.4)	0.747
Single	44 (28.6)	21 (47.7)	23 (52.3)	0.674
Widowed	13 (8.4)	6 (46.2)	7 (53.8)	0.866
Divorced	9 (5.8)	4 (44.4)	5 (55.6)	0.748
Education Level				
Primary	97 (63.0)	38 (39.2)	59 (60.8)	0.13
Secondary	43 (27.9)	16 (37.2)	27 (62.8)	0.52
Tertiary	14 (9.1)	11 (78.6)	3 (21.4)	0.88
Residence				
Rural	101 (65.6)	39 (38.6)	62 (61.4)	0.24
Urban	53 (34.3)	26 (49.1)	27 (50.9)	

Table 2: Distribution of Socio-Demographic, Socioeconomic, and Clinical Characteristics among TB Patients at Isiolo County Referral Hospital, Hospital, Northern Kenya, 2020 Continued

Variable	N (%)	Censored TB cases ≤ 21 days n = 65 (42.2)	Delayed diagnosis of TB ≥ 21 days n = 89 (57.8)	P - value
Employment				
Unemployed	52 (33.8)	33 (63.5)	19 (36.5)	0.12
Self Employed	48 (31.2)	19 (39.6)	29 (60.4)	0.12
Employed	42 (27.3)	10 (23.8)	32 (76.2)	0.86
Casual	12 (7.8)	3 (25.0)	9 (75.0)	0.11
HF of Diagnosis				
Public HF	56 (36.4)	27 (48.2)	29 (51.8)	0.14
Dispensary	54 (35.1)	27 (51.9)	26 (48.1)	0.09
Private HF	44 (28.6)	27 (22.7)	34 (77.3)	0.97
Family Size				
3-5	75 (48.7)	29 (38.7)	46 (61.3)	0.73
6-8	51 (31.8)	22 (43.1)	29 (56.9)	0.34
>8	15 (9.7)	7 (46.7)	8 (53.3)	0.62
0-2	13 (8.4)	7 (53.8)	6 (46.2)	0.60
Income				
≤Kshs 5700	77 (50.0)	40 (51.9)	37 (48.1)	
≥Kshs 5700	77 (50.0)	25 (32.5)	52 (67.5)	
Distance from HF				
≤5km	99 (64.3)	43 (43.4)	56 (56.6)	
≥5km	55 (35.7)	22 (40.0)	33 (60.0)	

Table 3: Distribution of Hazard Ratios at 95% Confidence Interval of Survival Adjacent for Covariates at Isiolo County Referral Hospital, Nothern Kenya, 2020

Variable	Unadjusted hazard ratio (95% CI)	P-value	Adjusted Hazard ratio (95% CI)	P- value
Age				
0-15		0.23		0.01
16-30	0.25 (0.06, 1.01)	0.05	0.24 (0.09, 0.63)	0.00
31-44	1.09 (0.56, 2.14)	0.80	1.10 (0.67, 1.79)	0.71
>45	1.70 (0.90, 3.20)	0.10	1.68 (1.06, 2.67)	0.03
Gender				
Male	1.56 (0.86, 2.84)	0.14	1.64 (0.99, 2.72)	0.05
Female				
Education Level				
Primary		0.09		0.01
Secondary	0.41 (0.08, 2.11)	0.28	0.33 (0.09, 1.23)	0.10
Tertiary	1.11 (0.22, 5.62)	0.90	0.78 (0.21, 2.95)	0.72
Residence				
Rural	1.87 (0.93, 3.78)	0.08	1.46 (0.83, 2.57)	0.19
Urban				
Employment				
Unemployed		0.38		0.38
Self Employed	0.38 (0.12, 1.24)	0.11	0.38 (0.12, 1.24)	0.11
Employed	0.69 (0.23, 2.10)	0.52	0.69 (0.23, 2.10)	0.52
Casual	0.59 (0.20, 1.72)	0.34	0.59 (0.20, 1.72)	0.34
HF of Diagnosis				
Public HF		0.14		0.05
Dispensary	1.84 (0.82, 4.15)	0.14	2.00 (1.12, 3.58)	0.02
Private HF	0.84 (0.34, 2.03)	0.69	1.25 (0.68, 2.31)	0.47
Productive cough	11.6 (1.73, 77.50)	0.01	5.67 (1.54, 20.85)	0.01
Chest Pain	0.42 (0.18, 0.99)	0.04	0.39 (0.19, 0.81)	0.01
Fever	1.31 (0.63, 2.72)	0.48	1.40 (0.79, 2.48)	0.26
Income				
≤Kshs 5700	1.82 (0.98, 3.40)	0.06	1.46 (0.91, 2.33)	0.12
≥Kshs 5700				

Table 4: Comparison of Median Delay among TB Patients at Isiolo County Referral Hospital,, Northern Kenya, 2020

Variable	Median Delay Estimate	SE	95% CI Lower Bound	Upper Bound	P-Value (Log. Rank)
Age	37.0	0.78	35.47	38.53	0.00
0-15	69.0	151.87	0.00	366.66	
16-30	37.0	1.84	33.40	40.60	
31-44	39.0	1.33	36.40	41.60	
>45	34.0	2.69	28.73	39.27	
Gender	37.0	0.78	35.47	38.53	0.17
Male	36.0	1.18	33.69	38.31	
Female	39.0	1.33	36.40	41.60	
Religion	37.0	0.78	35.47	38.53	0.99
Muslim	37.0	0.54	35.94	38.06	
Christian	36.0	3.39	29.35	42.65	
Marital Status	37.0	0.78	35.47	38.53	0.17
Married	37.0	0.66	35.71	38.29	
Single	37.0	3.99	29.17	44.82	
Widowed	39.0	7.86	23.60	54.40	
Divorced	39.0	14.24	11.09	66.91	
Education Level	37.0	0.78	35.47	38.53	0.11
Primary	39.0	1.27	36.51	41.49	
Secondary	35.0	2.60	29.91	40.09	
Tertiary	36.0	5.72	24.80	47.20	
Residence	37.0	0.78	35.47	38.53	0.64
Rural	37.0	1.07	34.91	39.10	
Urban	37.0	1.72	33.63	40.37	
Employment	37.0	0.78	35.47	38.53	0.27
Unemployed	37.0	5.99	25.27	48.73	
Self Employed	37.0	0.89	35.25	38.75	
Employed	34.0	2.83	28.46	39.54	
Casual Labourer	38.0	2.98	32.16	43.84	
HF of Diagnosis	37.0	0.78	35.47	38.53	.117
Public HF	36.0	1.79	32.50	39.50	
Dispensary	37.0	2.55	32.00	41.10	
Private HF	37.0	1.25	34.551	39.449	
Family Size	37.0	0.78	35.47	38.53	.716
3-5	37.0	0.66	35.70	38.30	
6-8	37.0	2.68	31.75	42.25	
>8	43.0	11.31	20.83	65.18	
0-2	38.0	22.05	0.00	81.21	
Income	37.0	0.78	35.47	38.53	0.44
< = Kshs 5700	37.0	1.99	33.10	40.90	
> = Kshs 5700	37.0	1.20	34.65	39.35	
Distance from the HF	37.0	0.78	35.47	38.53	0.74
< = 5km	37.0	0.82	35.39	38.61	
> = 5km	37.0	2.30	32.50	41.50	