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# Determinants of Tuberculosis Medication Adherence among TB Patients at Kiambu Level Five Hospital, Kiambu County, Kenya

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**Abstract**
The purpose of this study is to examine the determinants of Tuberculosis (TB) medication adherence at Kiambu Level Five Hospital in Kiambu County, Kenya. Despite the implementation of treatment interventions, non-adherence remains a significant challenge in the region. An analytical cross-sectional study design was used, with 141 participants selected through systematic sampling from the TB clinic. Data was collected using a semi-structured questionnaire to assess demographic, socioeconomic, and health-related factors, with TB medication adherence measured using the Morisky Medication-Taking Adherence Scale (MMAS). Descriptive and inferential approaches were conducted, with a significance level set at $p < 0.05$. The majority of participants were male (59.6%), aged 25–34 years, married (34%), and had secondary education (35.6%). Most participants (75%) reported adhering to their TB medication. A Pearson's Chi-square test revealed significant associations between medication adherence and factors such as Age, occupation, TB knowledge, and specific challenges related to adherence (e.g., forgetting medication or feeling hassled about treatment) ($p < 0.05$). Monthly income and land ownership were predictors of adherence ($p = 0.010$, $t = 2.654$; $p = 0.025$, $t = 2.293$). Knowledge about TB strongly predicted adherence (AOR: 0.182; 95% CI: 0.049–0.674; $p = 0.011$). The study concludes that socioeconomic factors and TB knowledge are key determinants of adherence and recommends community-based educational programs and further longitudinal studies to track adherence patterns over time and strengthen causal understanding.

**Key terms:** Adherence, knowledge, socioeconomic factors, tuberculosis.

## 1.0 INTRODUCTION

Tuberculosis (TB) remains a critical global health challenge despite being preventable and treatable. TB is caused by *Mycobacterium tuberculosis* and primarily affects the lungs, although it can also impact other parts of the human body. It is highly contagious and spreads through the air when an infected person coughs or sneezes. Although TB is treatable through a combination of drugs, non-adherence to prescribed medication continues to be a significant barrier to effective TB control globally and in Kenya.

In 2022, TB was the world's second leading cause of death from a single infectious agent after COVID-19 (WHO, 2023). Globally, over 10 million people are diagnosed with TB annually, with a high burden in sub-Saharan Africa, which accounts for around 25 per cent of the global TB cases (WHO, 2023). In Kenya, the Ministry of Health reports that approximately 140,000 individuals are diagnosed with TB each year; however, only half of them are successfully diagnosed and linked to treatment (Ministry of Health, 2023). Kiambu County, where this study is focused, has a TB prevalence rate of 5 per cent, the second highest in the country after Nairobi County (Ministry of Health, 2020).

Non-adherence to TB treatment is a significant contributor to the high mortality rate associated with the disease. According to the World Health Organization (WHO), approximately 1.6 million TB-related deaths occur annually, with non-adherence being one of the primary reasons for treatment failure and the development of drug-resistant strains (WHO, 2023). Studies have shown that factors such as lack of education, stigma, lack of family support, and inadequate TB knowledge contribute to non-adherence (Tirore et al., 2024; Marin et al., 2024). In Kenya, non-adherence rates are reported to be 35 per cent, which is higher than in neighbouring countries (Kenya Ministry of Health, 2018).

In response to these challenges, Kenya has adopted the WHO STOP-TB Strategy, which emphasises the empowerment of communities and individuals in TB prevention and treatment (Divan, 2018). The standard TB treatment involves a combination of drugs over a 6 to 8-month period, divided into an intensive phase of two months followed by a continuation phase of four to six months (WHO, 2023). Despite these efforts, non-adherence remains a barrier, particularly in resource-constrained settings.

This study aims to identify the determinants of TB medication adherence at Kiambu Level 5 Hospital. The findings are expected to provide valuable insights into the factors influencing adherence, which could inform strategies to improve TB treatment outcomes in Kiambu County and other regions facing similar challenges.

## 2.0 METHODOLOGY

Tuberculosis (TB) remains a critical global health challenge despite being preventable and treatable. TB is caused by *Mycobacterium tuberculosis* and primarily affects the lungs, although it can also impact other parts of the human body. It is highly contagious and spreads through the air when an infected person coughs or sneezes. Although TB is treatable through a combination of drugs, non-adherence to prescribed medication continues to be a significant barrier to effective TB control globally and in Kenya.

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This study aims to identify the determinants of TB medication adherence at Kiambu Level 5 Hospital. The findings are expected to provide valuable insights into the factors influencing adherence, which could inform strategies to improve TB treatment outcomes in Kiambu County and other regions facing similar challenges.

## 3.0 FINDINGS AND DISCUSSION

### Social Demographic Characteristics of TB Patients

The study established that more than half (59.6%) of the study participants were males, with 40.4 per cent females. The mean Age of the respondents was 33.8±12.60, with the majority (39.0%) aged between 25 and 34 years, followed by those aged between 18 and 24 years (22.0%). A few (2.8%) were aged sixty-five years and older. The study established that most of the participants were married (57.4%), about a quarter (27.0%) never married, and the rest (15.6%) were divorced or separated. Pearson's chi-square test was adopted to analyse the relationship between socio-demographic characteristics and adherence to tuberculosis medication. The analysis showed a statistically significant association between age and adherence level ($\chi2=22.873$, df=5, p=0.001). This suggests that Age is an important factor in TB medication adherence. However, sex ($\chi2=0.567$, p=0.313) and marital status ($\chi2=9.096$, p=0.280) were not significantly associated with adherence, implying these factors may not independently influence whether a TB patient adheres to medication (Table 1).

**Table 1: Demographic Characteristics and their Association with Level of Adherence**

| | Total: n=141(%) | χ2 | df | p-value |
|---|---|---|---|---|
| **Sex** | | | | |
| Male | 84(59.6%) | | | |
| Female | 57(40.4%) | 0.567 | 1 | 0.313 |
| **Age (N=141)** | | | | |
| 18 – 24 | 31(22.0%) | | | |

| | | | | |
|---|---|---|---|---|
| 25 – 34 | 55(39.0%) | 22.873 | 5 | 0.001 |
| 35 – 44 | 24(17.0%) | | | |
| 45 – 54 | 15(10.6%) | | | |
| 55 - 64 | 12(8.5%) | | | |
| 65 and above | 4(2.8%) | | | |
| **Marital status** | | | | |
| Never married | 38(27.0%) | | | |
| Married | 81(57.4%) | 9.096 | 3 | 0.280 |
| Separated/Divorced | 22(15.6%) | | | |

**Social Economic Characteristics of TB Patients**

This researcher noted that most (34.0%) of the respondents had completed secondary education, closely followed by those who had completed college or tertiary education at 31.9 per cent, with about a quarter (22.0%) having completed primary-level education and another 4.3 per cent having completed university education. The study participants reported an average monthly income of Ksh. 19,990±18,532, where the majority (46.8%) of the study participants reported an income ranging from Ksh. 10,000 to 19,000. The study found that almost a fifth (17.1%) of the participants had an income below Ksh. 10,000, and a similar percentage (17.7%) had an income over Ksh. 30,000. Most (27.7%) of them reported working in informal employment (casual), while about a quarter (24.8%) worked in formal employment, and a similar percentage (22.0%) reported being unemployed.

Pearson's chi-square test revealed that occupation ($\chi2=27.056$, df=5, p=0.001) and ownership of agricultural land ($\chi2=4.626$, df=1, p=0.031) were significantly associated with TB medication adherence. This means that individuals with stable occupations or access to agricultural land may be more likely to adhere, possibly due to economic security or access to food and healthcare resources. Furthermore, income level was significantly associated with adherence (p = 0.012). This finding suggests that individuals with higher income may have better access to healthcare and fewer barriers to consistent medication use, such as the ability to cover transportation costs or purchase related resources. Education level did not show significant associations with adherence (p>0.05), indicating that education alone may not determine adherence behaviour (Table 2).

**Table 2: Socioeconomic Characteristics and their Association with Level of Adherence**

| **Demographic Characteristics** | **n=141** | **χ2** | **df** | **p-value** |
|---|---|---|---|---|

| | n(%) | | | |
|---|---|---|---|---|
| **Highest level of education** | | | | |
| None - pre-primary | 10(7.1%) | | | |
| Primary | 31(22.0%) | 3.306 | 5 | 0.653 |
| Post-primary, vocational | 1(0.7%) | | | |
| Secondary | 48(34.0%) | | | |
| College (middle level) | 45(31.9%) | | | |
| University | 6(4.3%) | | | |
| **Income level estimates** | | | | |
| Less than Ksh. 10,000 | 24(17.1%) | | | |
| Ksh. 10,000 - 19,000 | 66(46.8%) | 5.991 | 3 | 0.012 |
| Ksh. 20,000 - 29,000 | 26(18.4%) | | | |
| Ksh. 30,000 and above | 25(17.7%) | | | |
| **Occupation** | | | | |
| Informal employment (casual) | 39(27.7%) | | | |
| Farmer | 8(5.7 %) | | | |
| Formal employment | 35(24.8%) | 27.056 | 5 | 0.001 |
| Business | 23(16.3%) | | | |
| Unemployed | 31(22.0 %) | | | |
| Domestic help | 5(3.5 %) | | | |
| **Ownership of agricultural land** | | | | |
| Yes | 22(15.6%) | 4.626 | 1 | 0.031 |
| No | 119(84.4%) | | | |

**Health-Related Characteristics of Study Participants**

An analysis was done to determine the knowledge level of Tuberculosis by the study participants, which was categorised into low knowledge (<50% score), moderate knowledge (50%–74%), and high knowledge (≥75%). In this study, the majority (41.8%) of respondents had moderate knowledge of Tuberculosis. Nearly the same number (39.0%) of participants had low knowledge, and a few (19.2%) had high knowledge of the subject. Overall, the study found that the participants' mean knowledge was 58.425±16.417. About a third (30.5%) of the respondents had experienced some recent ailment, with the most prevalent type of ailment reported being flu (32.6%), followed by diarrhoea (18.6%), vomiting (18.6%), pneumonia (16.3%), and headache (14%).

The current study reported 4.3 per cent of the study participants as tobacco/cigarette smokers, of whom both were males. Regarding alcoholism, 15.6 per cent of the study participants reported to be alcohol consumers, where 77.3 per cent were males and 22.7 per cent were females. A significant relationship was found between TB knowledge and adherence ($\chi2=10.102$, df=2, $p=0.006$), suggesting that increased awareness may enhance adherence. However, recent illness, smoking, and alcohol use did not significantly affect adherence ($p>0.05$), implying that lifestyle factors and temporary ailments may not substantially influence adherence decisions among the study participants (Table 3).

**Table 3: Health Related Practices and their Association to Level of Adherence**

| Health Related Characteristics | n=141 n(%) | $\chi^2$ | df | p-value |
|---|---|---|---|---|
| **Knowledge on Tuberculosis** | | | | |
| Low knowledge | 55(39%) | | | |
| Moderate knowledge | 59(41.8%) | 10.102 | 2 | 0.006 |
| **High knowledge** | **27(19.2%)** | | | |
| Ill in the previous two weeks | 43(30.5%) | 1.064 | 1 | 0.302 |
| Participants who were smokers | 6(4.3%) | 1.514 | 1 | 0.218 |
| Number of alcoholic participants | 22(15.6%) | 3.493 | 2 | 0.174 |

**Morisky Medication-Taking Adherence Statements Report**

The Morisky Medication-Taking Adherence Scale (MMAS) is a widely used tool for assessing patient adherence to medication regimens. It includes a set of questions designed to evaluate a patient's self-reported behaviour related to taking prescribed medications consistently and correctly. The scale is effective because it captures various dimensions of adherence, including forgetfulness, logistical barriers (e.g., carrying medication when travelling), and emotional or psychological factors that may influence medication-taking behaviour. The MMAS is commonly used in healthcare settings to identify patients at risk of non-adherence and guide interventions to improve medication compliance.

The research examined the eight Morisky Medication-Taking Adherence statements to assess the participants' responses to each statement. The study revealed that about 4.4 per cent of respondents occasionally forgot to take their TB medicine, whereas 10.2 per cent of participants did not take their prescriptions on certain days in the previous two weeks for reasons other than forgetfulness. Some respondents (4.4%) forgot to carry their medication when they travelled or left home. A few participants (1.4%) reported that they didn't take all their medication the previous day, with participants (3.7%) feeling hassled about sticking to their treatment plan and 5.2 per cent often having difficulty remembering to take all their medication.

The relationship between the Morisky medication-taking adherence statements and the level of tuberculosis medication adherence was explored. The practice of not taking medication on certain days for reasons other than forgetfulness, forgetting to carry medication when travelling, and feeling hassled about following the treatment plan were all significantly associated with the level of tuberculosis medication adherence ($p<0.05$). These findings suggest that emotional or situational factors, such as travel disruptions or feeling overwhelmed by the treatment regimen, may interfere with a patient's ability to consistently follow their prescribed regimen. This highlights the need for tailored interventions that address these specific barriers—such as providing portable medication reminders for those who travel or offering counselling to alleviate treatment-related stress.

However, behaviours such as occasionally forgetting to take TB medication, not taking all medication the previous day, and difficulty remembering to take all medication did not show a significant association with the level of tuberculosis medication adherence ($p>0.05$). While these findings are not statistically significant, they still indicate areas for further attention, particularly in designing strategies that improve memory and consistency, such as setting up medication alarms or providing visual cues to reinforce adherence (Table 4).

**Table 4: Morisky Medication-Taking Adherence Statements Report In Relation to Level of Adherence**

| **Morisky Medication-Taking Adherence statements** | **n=141** n(%) | $\chi^2$ | **df** | **p-value** |
|---|---|---|---|---|
| Those who reported to sometimes forget to take TB medication | 6(4.4%) | 0.52 | 1 | 0.471 |
| Participants who didn't take medication in some days of the past two weeks for other reasons rather than forgetting | 13(10.2%) | 32.421 | 1 | **0.001** |
| Those who forget to carry their medication when they travel or leave home | 6(4.4%) | 15.4 | 1 | **0.001** |
| Participants who didn't take all their medication the previous day | 2(1.4%) | 0.276 | 1 | 0.599 |
| Those who felt hassled about sticking to their treatment plan | 5(3.7%) | 11.407 | 1 | **0.001** |
| Those who often had difficulty remembering to take all their medication | 7(5.2%) | 0.993 | 1 | 0.319 |

**Tuberculosis Medication Adherence Level**

In this study, the majority (75.0%) of the respondents highly adhered to taking the tuberculosis medication, with 25.0 per cent reporting moderate adherence. There were no respondents who reported a low-level tuberculosis medication adherence.

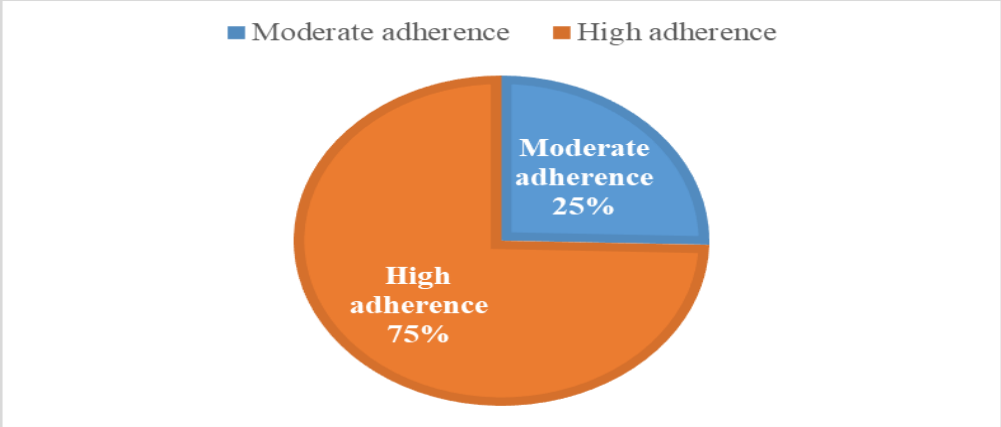


**Figure 1: Level of Tuberculosis Medication Adherence**

**Determinants of the level of Tuberculosis Medication Adherence**

The study used linear regression to analyse the relationship between demographic and socioeconomic characteristics and the level of adherence to tuberculosis medication. The results revealed that Age significantly determined adherence to tuberculosis medication ($p = 0.042$, $t = 2.071$, 0.031 to 0.704), indicating that older participants were more likely to adhere to treatment. However, the sex of the respondent had a minor positive association with adherence, but it was not statistically significant ($p = 0.641$, $t = 0.468$, -0.157 to 0.254), suggesting that gender alone does not significantly influence adherence. Similarly, marital status also showed no significant impact ($p = 0.369$, $t = 0.762$, -0.042 to 0.094), highlighting that being married or not may not independently affect treatment adherence. Education level

was positively associated with adherence, with higher education correlating with better adherence, but this relationship was not statistically significant (p = 0.932, t = 0.354, -0.093 to 0.034). This suggests that while education might play a role in promoting adherence, it may not be a strong predictor in this context.

**Table 5: Demographic and Socioeconomic Characteristics in Relation to Level of Tuberculosis Medication Adherence**

| | | | | 95.0% CI for B | |
|---|---|---|---|---|---|
| **Demographic and socioeconomic Characteristics** | **n=141 n(%)** | **t-test** | **P value** | **Lower bound** | **Upper bound** |
| **Age** | | | | | |
| 18 – 24 | 31(22.0%) | | | | |
| 25 – 34 | 55(39.0%) | 2.071 | 0.042 | 0.031 | 0.704 |
| 35 – 44 | 24(17.0%) | | | | |
| 45 – 54 | 15(10.6%) | | | | |
| 55 - 64 | 12(8.5%) | | | | |
| 65 and above | 4(2.8%) | | | | |
| **Sex** | | | | | |
| Male | 84(59.6%) | | | | |
| Female | 57(40.4%) | 0.468 | 0.641 | -0.157 | 0.254 |
| **Marital status** | | | | | |
| Never married | 38(27.0%) | | | | |
| Married/ Living together | 81(57.4%) | 0.904 | 0.369 | -0.06 | 0.161 |
| Separated/Divorced | 22(15.6%) | | | | |
| **Highest level of education** | | | | | |
| None - pre-primary | 10(7.1%) | | | | |
| Primary | 31(22.0%) | 0.932 | 0.354 | -0.093 | 0.932 |
| Post-primary, vocational | 1(0.7%) | | | | |
| Secondary | 48(34.0%) | | | | |
| College (middle level) | 45(31.9%) | | | | |
| University | 6(4.3%) | | | | |
| **Income level estimates** | | | | | |
| Less than Ksh. 10,000 | 24(17.1%) | | | | |
| Ksh. 10,000 - 19,000 | 66(46.8%) | 2.654 | 0.01 | 0.029 | 0.204 |
| Ksh. 20,000 - 29,000 | 26(18.4%) | | | | |
| Ksh. 30,000 and above | 25(17.7%) | | | | |
| **Occupation** | | | | | |
| Informal employment (casual) | 39(27.7%) | | | | |
| Farmer | 8(5.7 %) | | | | |
| Formal employment | 35(24.8%) | 1.348 | 0.182 | 0.111 | 0.021 |
| Business | 23(16.3%) | | | | |
| Unemployed | 31(22.0 %) | | | | |

| | | | | | |
|---|---|---|---|---|---|
| Domestic help | 5(3.5 %) | | | | |
| **Ownership of agricultural land** | | | | | |
| No | 119(84.4%) | 2.293 | 0.025 | 0.508 | 0.036 |
| Yes | 22(15.6%) | | | | |

A significant positive correlation was found between monthly income and adherence (p = 0.010, t = 2.654, 0.029 to 0.204), indicating that respondents with higher incomes were more likely to adhere to their medication regimen. This finding aligns with previous research that links better economic stability with improved health outcomes. On the other hand, occupation did not have a significant effect on adherence (p = 0.182, t = -1.348, -0.111 to 0.021), suggesting that employment status alone does not predict adherence behaviour. However, owning agricultural land was found to have a significant positive impact on adherence (p = 0.025, t = 2.293, 0.508 to 0.036), suggesting that land ownership might improve adherence due to increased food security and better access to resources necessary for treatment adherence. This emphasises the potential benefits of considering land ownership and economic stability in interventions aimed at improving tuberculosis medication adherence (Table 5).

**Health-Related Characteristics in Relation to Level of Tuberculosis Medication Adherence**

The current study found that knowledge of Tuberculosis (TB) was significantly associated with adherence to TB medication ($\chi^2$ = 10.102, df = 2, p = 0.006). Participants with a better understanding of TB were more likely to adhere to their treatment regimen. This highlights the importance of knowledge of Tuberculosis in enhancing treatment adherence.

Other health-related factors, such as experiencing an illness in the previous two weeks, smoking habits and alcohol use, were not significantly associated with adherence (p > 0.05) (Table 3.6). This suggests that while these factors may affect overall health, they do not appear to directly influence the likelihood of TB medication adherence in this study.

Binary logistic regression analysis further emphasised the importance of knowledge of Tuberculosis as a predictor of adherence. Respondents with moderate knowledge were 14.8 per cent more likely to adhere to TB medication compared to those with low knowledge (AOR: 0.148; CI: 0.035–0.623; p = 0.009). Additionally, those with high TB knowledge were 18.2 per cent more likely to adhere to their medication compared to those with low knowledge (AOR: 0.182; CI: 0.049–0.674; p = 0.011). These findings underscore the crucial role that knowledge of Tuberculosis plays in improving adherence to treatment.

**Morisky Medication-Taking Adherence Statement reports**

A logistic regression analysis was performed on the Morisky Medication-Taking Adherence statements that showed significant relationships with tuberculosis medication adherence. The results indicated that practices such as missing medication on certain days for reasons other than forgetfulness, forgetting to carry medication while travelling or leaving home, and feeling hassled about sticking to the treatment plan did not significantly predict adherence levels (p > 0.05).

## Discussion

### Demographic Characteristics of Tuberculosis Patients among the Households of TB Patients

**Sex of the study participants**

In this study, approximately 59.5 per cent of the participants were males, which is consistent with findings from similar studies. For example, a study in Turkana County, Kenya, involving tuberculosis patients aged 24–44 years reported that 58.4 per cent of participants were males (Nthiga et al., 2017). Similarly, a study conducted in Pokhara, India, found that 60.9 per cent of TB patients were males (Gurung et al., 2018). These results align with the 2023 WHO global tuberculosis report, which indicated that 55 per cent of individuals diagnosed with Tuberculosis globally are men, with 33 per cent women and 12 per cent children (WHO, 2023). While these findings are consistent with existing literature, it is important to note that the higher prevalence of Tuberculosis among men may be due to factors such as occupational exposure, higher smoking rates, and lower healthcare-seeking behaviour among men compared to women. In some settings, men are less likely to seek timely medical attention, which may result in delayed diagnoses and higher tuberculosis rates among this group.

**Age**

The majority of participants in this study were between the ages of 25 and 34 years, consistent with studies in Pokhara, India (Gurung et al., 2018), and a Kenyan report from 2020, which reported that 66 per cent of TB patients were aged 20–44 years (CHS, 2020). The 25-34 age group had the highest tuberculosis burden in Kenya, with a prevalence of 716 per 100,000, as per the 2017 Kenya National TB Prevalence Survey (Ministry of Health, 2016). In contrast, while the Ministry of Health's 2017 survey indicated a high prevalence of TB among those aged 65 and older, this study found a lower prevalence in this age group. This difference observed in TB prevalence among older adults could stem from differences in population characteristics, healthcare access, or even reporting methods across different studies.

**Marital status**

The study found that most participants were married, a finding consistent with studies conducted in Kiambu, Kenya, and Ethiopia, where the majority of tuberculosis patients were also married (Wambui et al., 2021:Ren et al., 2019). Similarly, a study in China reported that 69.7 per cent of tuberculosis patients were married (Ren et al., 2019). The higher prevalence of marriage in these studies may be attributed to factors such as social and cultural influences on marital status, which could differ from one country to another. However, the variation in findings regarding marital status and other factors like age group (e.g., the difference observed in TB prevalence among older adults) could stem from differences in population characteristics, healthcare access, or even reporting methods across different studies.

**Socioeconomic Characteristics of the Study Participants**

**Level of Education of the Study Participants**

This study found that most respondents had completed primary and secondary education, with fewer having attained college or university education. These findings align with the 2022 Kenya Population and Housing Census report, which indicated that the majority of respondents had completed primary education, followed by secondary education (Kenya National Bureau of Statistics, 2019). However, this contrasts with a study conducted in Vihiga County, Kenya, which reported that most participants had attained only primary education or less (Wekunda et al., 2021). The discrepancy could be attributed to regional differences in educational access and economic factors. Additionally, the findings are consistent with a study conducted at the Kaliwungu Public Health Centre in Kudus, Indonesia, where the majority of respondents had completed at least primary school (Rusnoto et al., 2020).

**Income Level of the Study Participants**

The economic status of the participants has been found as a risk factor for pulmonary Tuberculosis. A study conducted in Kudus, Indonesia, in 2020 found that respondents with lower incomes had a higher risk of developing pulmonary Tuberculosis compared to those with higher incomes (Rusnoto et al., 2020). This is consistent with findings from a study in Asia, which linked lower socioeconomic status to an increased risk of Tuberculosis (Jiamsakul et al., 2018). Similarly, the current study observed that participants had lower average monthly income levels. This could increase the risk of Tuberculosis, as lower income is often associated with challenges such as limited access to healthcare, poor living conditions, and overall reduced well-being. These social determinants of health may exacerbate susceptibility to Tuberculosis, highlighting the importance of addressing economic inequalities in TB prevention and treatment.

**Occupation of the Study Participants**

The current study revealed that the majority of participants were engaged in informal employment, particularly casual labour. This finding contrasts with a study conducted in north-eastern Uganda, which reported that most participants were subsistence farmers (Nidoi et al., 2021a). Additionally, in the current study, only a small proportion of respondents (5.7%) identified as peasant farmers. Casual labourers are more vulnerable to Tuberculosis (TB) due to several factors, including poor working conditions, unstable living situations, and limited access to healthcare. The difference between the two studies could be attributed to regional variations in employment patterns, healthcare access, and economic structures, as well as the specific socioeconomic conditions in the respective study areas. These factors may contribute to the differing risk profiles and outcomes observed in tuberculosis patients in various settings.

**Health-Related Characteristics of the Study Participants**

The current study found that the majority of participants had moderate knowledge of Tuberculosis, which is consistent with a study in Lari, Kiambu County, where most respondents also demonstrated moderate knowledge (Ruth & Kahari, 2017). These findings are in line with a study conducted in Tema Metropolis, Ghana, where participants exhibited good nutrition-related knowledge about Tuberculosis and its management (Appiah et al., 2021), as well as research in Lalitpur District, Nepal, where the majority of TB patients had a solid understanding of the disease (Gautam Id et al., 2021).

In addition, around a third of participants in the current study reported experiencing a recent illness, with common ailments including influenza, diarrhoea, vomiting, and pneumonia. The study also found that a subset of TB patients engaged in cigarette smoking and alcohol consumption. These findings align with a study in Kilifi County, Kenya, which reported that 1.3 per cent of TB patients had comorbidities, with 0.9 per cent of them smoking or drinking alcohol (Katana et al., 2022). Similarly, a Polish study investigating comorbidities among TB patients identified conditions such as diabetes, alcohol use, cancer, HIV, and smoking, all of which were associated with increased mortality risk (Nowiński et al., 2023). However, there are notable differences between this study and previous research regarding the specific comorbidities affecting TB patients. For instance, while some studies report a higher prevalence of diabetes or HIV among TB patients, the current study focused more on respiratory illnesses and alcohol or tobacco use as prominent comorbidities. These variations could be due to differences in the demographic and regional characteristics of the study populations, healthcare access, or reporting practices.

**Adherence to TB Treatment by Tuberculosis Participants**

The findings of this study indicated that a significant proportion of participants adhered to their prescribed tuberculosis medication. Among those who reported non-adherence, common reasons included forgetfulness, failure to carry medication while travelling, and challenges in maintaining the treatment routine. These findings align with a previous study conducted in Kiambu County, Kenya, which similarly reported a high level of adherence among participants. However, in that study, non-adherence was primarily attributed to a lack of knowledge about TB treatment and patient relocation (Kimani et al., 2021), suggesting that regional differences in health literacy and mobility patterns might influence adherence behaviours.

The current study also concurs with a study conducted in Gondar municipal health centres in Northwest Ethiopia, where most participants took their anti-TB medications as prescribed. In that context, common reasons for missed doses included forgetfulness, being busy with work, or being away from home (Mekonnen & Azagew, 2018). While the reasons reported in both the current and referenced studies are similar, variations in adherence levels may be influenced by differences in healthcare support systems, reminder mechanisms, or patient follow-up procedures across study locations.

**Determinants of Tuberculosis Medication Adherence**

**Demographic Characteristics**

The current study found that Age was positively associated with adherence to tuberculosis medication, with older respondents being more likely to adhere to treatment. This aligns with a study conducted in Dalian, Northeast China, which reported that older participants demonstrated higher levels of medication adherence (Du et al., 2020). Similarly, a study on medication non-adherence among community-dwelling adults found that younger adults exhibited higher rates of both unintentional and intentional non-adherence compared to their older counterparts (Ge et al., 2023). These findings suggest that factors such as increased health awareness, perceived vulnerability, or more consistent health-seeking behaviours among older individuals may contribute to better adherence. Consistent with these results, a study in Uganda also reported lower adherence among younger participants (Nidoi et al., 2021). In contrast, the current study found no significant association between sex or marital status and tuberculosis medication adherence. This suggests that these demographic characteristics may not independently influence adherence behaviours in the study population, possibly due to uniform access to care or similar support systems across these groups.

**Socioeconomic Characteristics**

In this study, socio-demographic characteristics such as the highest level of education and estimated income level were not significantly associated with adherence to tuberculosis medication. This contrasts with findings from a study in Uganda, which reported that individuals in the wealthiest income quintile were more likely to adhere to tuberculosis treatment (Nidoi et al., 2021). The difference could be attributed to variations in socioeconomic distributions, health system access, or differing thresholds for income categories across settings. However, in the current study, occupation and ownership of agricultural land were significantly associated with adherence, suggesting that practical livelihood factors may play a more immediate role in influencing treatment behaviour. These findings partly agree with Nidoi et al. (2021), who reported that unemployed individuals had lower levels of adherence. Overall, the study highlights that

certain socioeconomic characteristics, particularly those related to livelihood, are important determinants of tuberculosis medication adherence.

**Health-Related Characteristics**

Participants who reported not taking medication on some days for reasons other than forgetfulness, forgetting to carry their medication when travelling, or feeling hassled about sticking to the treatment plan were found to have varying adherence levels. However, having good knowledge of Tuberculosis emerged as a significant determinant of adherence, while morbidity, smoking status, and alcohol consumption were not significantly associated. These findings align with a study by Du et al. (2020), which reported that individuals with better knowledge of Tuberculosis and those who did not consume alcohol were more likely to adhere to treatment. However, the findings differ from a study conducted in Uganda, which identified health-related system factors such as drug stockouts as major contributors to poor TB treatment outcomes (Nidoi et al., 2021). The difference could stem from variations in healthcare system reliability and medication availability between the study settings.

## 5. CONCLUSION AND RECOMMENDATIONS

**Conclusion:** The study found that Age, level of income, and knowledge of Tuberculosis were significantly associated with adherence to tuberculosis medication. Additionally, behavioural factors such as failure to take medication for reasons other than forgetting, forgetting to carry medication when travelling or leaving home, and feeling hassled about sticking to the treatment plan also significantly influenced adherence. These findings underscore the importance of addressing both socioeconomic and behavioural barriers in TB treatment programs. Public health strategies should prioritise targeted education and counselling, particularly for younger adults and individuals with lower incomes. Moreover, patient-centred interventions that reduce practical challenges to medication adherence can enhance treatment outcomes, lower TB transmission rates, and contribute to national tuberculosis control efforts.

**Recommendations:** A community-based educational program focusing on completing tuberculosis treatment is recommended to improve adherence. Partnerships with local health workers, mobile messaging platforms, financial support for low-income patients and peer-led support groups can be used. The program's feasibility is supported by existing infrastructure and technology, and its long-term cost-effectiveness in reducing treatment failures and drug-resistant TB cases makes it a sustainable intervention for Kiambu County's TB control efforts. Additionally, the study recommends a longitudinal study to track adherence patterns over time and strengthen causal understanding.

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