

## Social Demographic Factors Associated with Adherence to Treatment Among Urban and Rural Tuberculosis Patients in Kenya.

Humphrey Mbuti, Elizabeth Mwaniki, Peter Warutere, Francis Oguya, Ronnie Midigo.  
School of Health Sciences, Technical University of Kenya, Nairobi, Kenya.  
School of Public Health, Kenyatta University, Nairobi, Kenya.  
School of Health Sciences, Great Lakes University of Kisumu, Kenya.

### Abstract

**Background:** Tuberculosis is a Global Public Health concern with serious Economic and Social Burden to the Patient and the Household. Because of the long duration of Standard Treatment there is a Risk of Treatment Default by Patients. The Objective of the Study was to determine the Social Demographic Factors Associated with Adherence to Treatment among the Urban and Rural Tuberculosis Patients in Kenya. The Cross Sectional Study Design was adopted. The Study applied the Multi-Stage Sampling Technique. Random Sampling Method was used to select the TB Clinics that Participated in the Study. Simple Random Sampling according to Probability Proportionate to TB Patient's Population was preferred to select the Study Participants. Chi-Square Test determined Association between the various Social Demographic factors and the Adherence to treatment while ANOVA Test demonstrated the overall Association of Social Demographic factors and Adherence to TB Treatment. Statistical Significance was evaluated at  $p < 0.05$ . Descriptive Statistics summarized and described the data. The Study established that Demographic Factors were Associated with adherence to TB treatment. Specifically, Gender, Level of Education, Place of Residence were found to be Significant ( $P < 0.05$ ). Age, Marital Status, Primary Occupation and Household Head were not Significantly Associated with adherence to TB treatment ( $p > 0.05$ ). These Findings will persuade the TB Management Policy towards developing Intervention Programs directed at the Social-Demographic Characteristics of the TB patient for improved Treatment Outcomes.

**Keywords:** Social Demographic Factors, Adherence to treatment, Urban and Rural Tuberculosis patients. Treatment Compliance

### 1. Introduction

Despite being a Curable Disease, Tuberculosis (TB) continues to remain a major Global Public Health concern. Although effective Anti Tuberculosis agents have been available for over thirty years, the Incident Rate of the Disease is still increasing [1]. Because of the long duration of Standard Treatment (six months) there is a Risk of Treatment Default by Patients. Such problem of low treatment Adherence may result in the emergence of the Resistant Strains of Mycobacterium Tuberculosis increasing Mortality and prolonging the Treatment duration [3].

Adherence to long time treatment like Tuberculosis is very challenging because of its long term and drug related side effects. As is known Treatment Adherence is very important for effective Treatment Outcomes and Prevention of Drug resistant TB Bacilli Strain. However, TB treatment Non-Adherence has several Social Economic and Health consequences.

Occurrence of Multi Drug resistant TB (MDR-TB) is one of the serious consequences and challenging Global TB control Program. For instance the Odds of having interrupted the Treatment at least for one day among those who developed MDR-TB are 13 times than among those not interrupted at all [2]. According to evidence, several Psychosocial and Behavioral factors are responsible for TB Treatment Non-Adherence. For instance Depression, fear of Stigma and individual negative emotional condition are the main psychological factors that are associated with TB Treatment Non-Adherence.

In addition, lack of Transportation Cost and Food, lack of Social Support, Unemployment, lack of Permission from Job place and lack of Shelter are some of the Social factors that influence TB Treatment Non-Adherence. Besides Psychological factors, Individual Behavioral factors like TB Disease and its Treatment Knowledge, Feeling Better after few weeks of Treatment and Forgetfulness are factors associated with Treatment Non-Adherence [4].

In South Africa, a study by [5] whose objective was to measure adherence and determine factors with Non-adherence to Concurrent TB treatment and ART among Co-infected persons in two provinces, determined that out of the 1,252 persons receiving Concurrent treatment, 138 (11.0%) were not adherent. Non adherent persons were more likely to have extrapulmonary TB (RR: 1.71, 95% CI: 1.12 to 2.60) and had not disclosed their status (RR: 1.96, 95% CI: 1.96 to 3.76).

Another study conducted in a District hospital in KwaZulu-Natal, South Africa to establish key factors that affected adherence to TB treatment and recommend interventions that could improve adherence methods observed that from the 159 TB patients, 105 (66%) were adhered and 54 (34%) non-adherent. Non-adherence was significantly associated with level of Education, distance from the hospital, time taken to travel, method of transport and Income [6].

In Kenya, a study by [7] on factors associated with default from treatment among TB patients in Nairobi Province revealed a 16.7% Prevalence of treatment default in Nairobi. Default occurred most frequently during the initial three months of treatment. Among defaulters who were smear positive at initiation of treatment, 47.7% defaulted before conversion. Factors associated with default include the Male Sex (OR 1.43,  $p < 0.001$ ), Low Income (OR 8.67,  $p = 0.017$ ), among other factors.

In Ethiopia, a study by [8] whose aim was to assess the Prevalence of Non-adherence to anti-tuberculosis treatment, reasons and associated factors among TB patients attending Gondar town Health Centers noted that the rate of Non-adherence to anti-TB therapy was 65 (21.2%) (95% CI 17.2, 26.1). The rate was higher (47.0%) among return after default treatment category and lower (19.1%) among new category. In the Social-Demographic Characteristics with a Sample of 314 and 97.5% response rate, the Mean age was 35.94 years, 166 (54.2%) were Male, 135 (44.1%) Single, 193 (63.0%) were Orthodox Christians, 75 (24.5%) were Urban dwellers and grade 9-12 by Education. Further the study established that Income level (>3000) Ethiopian Birr and Patient provider relationship Associated Significantly with Non-adherence to TB treatment (0.004, 0.004).

In yet another study on Prevalence of and factors influencing Anti-TB treatment Non-adherence among Patients with Pulmonary TB in Anhui province, Eastern China, out of the 339 Patients, 33.63% missed Medication. Divorced and widowed Patients were more likely to miss

Medication compared with those who were Married or Unmarried ( $p < 0.01$ ). In the characteristics of the study participants, Mean age was 49 years, 259 (76.4% were Males and 80 (23.6%) were Females. In regard to Occupation, Most of them were Farmers (77.0%). For Education level 50.15% were Primary and Illiterate levels, 41.89%, 49.89% were Junior and Senior high school or Technical level. Only 7.96 % were College or above [9].

Another study to assess factors contributing to treatment adherence and knowledge of TB transmission among Patients on TB treatment in Ndola, Zambia determined that 29.8% of the TB Patients failed to comply with TB drug taking regime once they started feeling better. The study further observed that more Female (39.1%) than Male (33.9%) defaulted on Medication. Males were older and more educated than the Female respondents. However, Age, Marital status and Education levels did not associate with Compliance [10].

In a study done in Argentina by [12] on determinants of Non-adherence to TB treatment; Barriers related to access to treatment noted an increased risk of Non-adherent to treatment in Male Patients (OR=2.8; 95% CI 1.2-6.7), Patients who had Medical check-ups at hospitals (OR=3.4; 95% CI 1.1-10.0) and those who had difficulties with transportation costs (OR=2.5; 95% CI 1.1-5.9).

## **2. Methodology**

### **2.1 Study Design**

The Study adopted the Randomized Cross-Sectional Assessment of the TB Patients. The Structured Questionnaire was used to collect the Social Demographic Characteristics of the Respondent. The Morsiky Adherence Medical Scale (MMAS-8) grading was the instrument used to assess the Non-Adherence to Medication amongst Patients. The study Subjects who were in the Intensive phase of TB treatment were recruited from the TB Treatment Registers in the Sampled Health Facilities.

### **2.2 Study Setting**

The Study was carried out in Kenya. Kenya is in East Africa with 47 Semi-Autonomous Countries Governed by Elected Governors. At 580,367 Square Kilometers, Kenya is the World's 48<sup>th</sup> largest Country by Total Area. With a projected population of more than 52.2 Million People the Country is the 27<sup>th</sup> most Populous in the World. Kenya's Capital and largest City is Nairobi.

### **2.3 Study Population**

The Study Population consisted of the Sampled TB Patients who attended the Public Health Facilities for treatment in Nairobi and Murang'a Counties respectively.

### **2.4 Sample Size and Sampling Technique**

This Study had a Total Sample Size of 310. The Study adopted the Multi-Stage Sampling Technique. Kenya was purposively selected due to its large and rising TB Burden in the Region. Nairobi County was again purposively selected due to its TB Burden Nationally. Murang'a County was selected conveniently due to its Rural Setting and close proximity to Nairobi

County. Random Sampling Method was used to select the Hospitals, Health Centres and Dispensaries which Participated in the Study. Random Sampling Proportionate to TB Patient's Population was adopted in selecting the Study Participants.

### **3.5 Data Collection**

The Pre-Tested Structured Questionnaire had Social Demographic information which included Age, Gender, Patient's Income, Occupation, Residence, Education level, Employment and Household Income. Further, characteristics of TB and Anti-tuberculosis Treatment tested were reasons for interruption taking Medications, Knowledge and Attitude towards Tuberculosis and Anti-TB treatment, Patient provider relationship and Behavioral factors. Possible reasons for interruption of taking Medications were listed with additional open ended option. Questions about interruption of taking Medication were asked while Participants reported their state of Medication.

## **3. Results**

### **3.1 Introduction**

The study sought to determine the Social Demographic Factors Associated with Adherence to TB treatment among the Urban and Rural TB Patients in Kenya. To achieve this goal, the Public Health Facilities that treat TB Patients in Nairobi and Murang'a Counties were identified for the study. Below is the summary of the results;

### **3.2 Demographic Characteristics of the Respondents**

The Demographic Factors considered included Gender, Level of Education, Marital Status, Occupation, Age, Household Size and whether one was Household Head or Head. Table 1 below presents the findings;

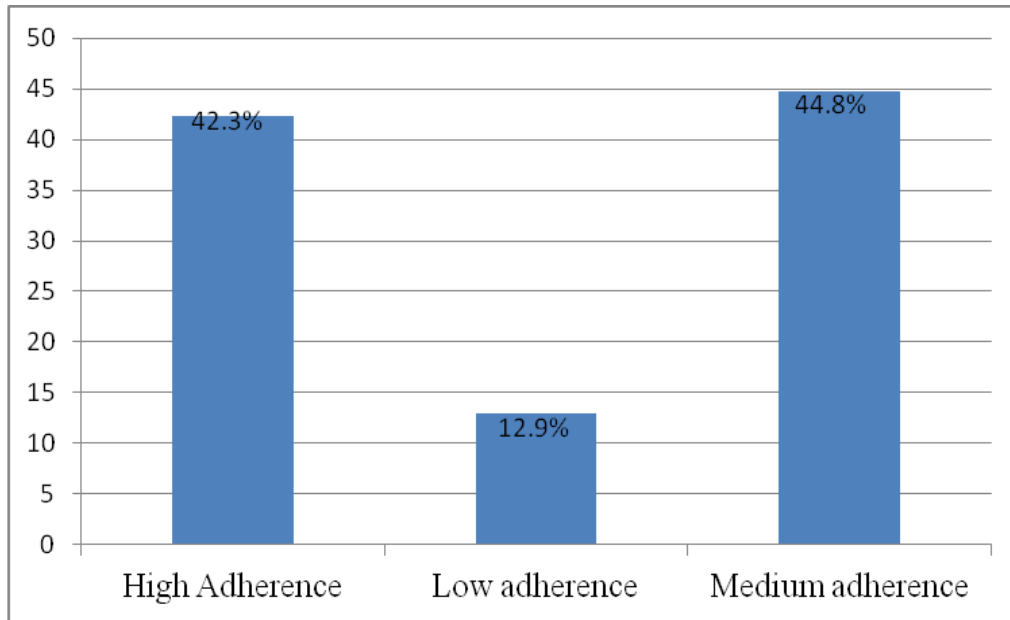
**Table 1: Demographic characteristics of the respondents**

		Frequency	Valid Percent
Gender	Male	194	62.6
	Female	116	37.4
Level of Education	No Schooling	22	7.5
	Primary	102	34.7
	Secondary	126	42.9
	Tertiary	44	15
Marital Status	Single	122	39.4
	Married	166	53.5
	Divorced	9	2.9
	Separated	13	4.2
Primary Occupation	Agriculture	19	6.3
	Formal Sector	27	9
	Informal Sector	107	35.7
	Security agency	14	4.7
	Student	30	10
	Unemployed	103	34.3
Household head	Yes	185	60.5
	No	121	39.5
Age	<= 29.00	36	20.9
	30.00 - 34.00	34	19.8
	35.00 - 39.00	34	19.8
	40.00 - 45.00	37	21.5
	46.00+	31	18
	Household Size	<= 2.00	85
3.00 - 4.00		123	41.7
5.00 - 5.00		38	12.9
6.00+		49	16.6

As indicated in Table 1 above, about 62.6 % of the respondents were males. Those with primary and secondary school levels of education were 34.7% and 42.9%. Most households had between 3-4 members (41.7%) with a mean membership of 4. The mean age for the respondents was 35.5 years with the majority of ages between 40-45 years (21.5%). Most of the respondents were household heads (60.5%) and were married (53.5%). The findings also indicate that majority of the respondents were employed in the informal sector (35.7%). Table 1 above presents a summary of the findings.

### 3.3 Levels of Adherence to TB Treatment

To ascertain Levels of Adherence, Responses in a Scale of 8 were scored and grouped into High, Low and Medium Adherence. Figure 1 below presents the findings



**Figure 1: Levels of adherence to TB treatment**

Those with Low Adherence were 12.9% while those with High Adherence were 42.3%. Figure 1 above presents a summary of the Levels of Adherence.

### **3.4 Demographic Factors Associated with Adherence to TB Treatment**

All the Demographic Factors were cross tabulated against the established levels of Adherence to TB Medication. Table 2 below presents the Demographic Factors Associated with TB Medication Adherence

**Table 2: Demographic factors associated with TB medication adherence**

Demographic Factors		Levels of adherence			P-value
		High Adherence	Low adherence	Medium adherence	
Gender	Male	98(50.5)	25(12.9)	71(36.6)	0.000
	Female	33(28.4)	15(12.9)	68(58.6)	
Level of Education	No Schooling	8(36.4)	3(13.6)	11(50.0)	0.001
	Primary	47(46.1)	5(4.9)	50(49.0)	
	Secondary	54(42.9)	16(12.7)	56(44.4)	
	Tertiary	11(25.0)	15(34.1)	18(40.9)	
Marital Status	Single	52(42.6)	12(9.8)	58(47.5)	0.251
	Married	71(42.8)	25(15.1)	70(42.2)	
	Divorced	2(22.2)	0(0.0)	7(77.8)	
	Separated	6(46.2)	3(23.1)	4(30.8)	
Primary Occupation	Agriculture	9(47.4)	4(21.1)	6(31.6)	0.832
	Formal Sector	7(25.9)	5(18.5)	15(55.6)	
	Informal Sector	49(45.8)	13(12.1)	45(42.1)	
	Security agency	6(42.9)	2(14.3)	6(42.9)	
	Student	13(43.3)	3(10.0)	14(46.7)	
	Unemployed	44(42.7)	12(11.7)	47(45.6)	
Household head	Yes	83(44.9)	26(14.1)	76(41.1)	0.34
	No	47(38.8)	14(11.6)	60(49.6)	
Age	<= 29	14(38.9)	4(11.1)	18(50.0)	0.477
	30 - 34	15(44.1)	8(23.5)	11(32.4)	
	35 - 39	10(29.4)	6(17.6)	18(52.9)	
	40 - 45	16(43.2)	3(8.1)	18(48.6)	
	46+	14(45.2)	6(19.4)	11(35.5)	
Household Size	<= 2	36(42.4)	8(9.4)	41(48.2)	0.071
	3 - 4	47(38.2)	11(8.9)	65(52.8)	
	5 - 5	17(44.7)	7(18.4)	14(36.8)	
	6 +	26(53.2)	9(18.4)	14(28.6)	
Rural/Urban	Rural	13(72.2)	0(0.0)	5(27.8)	0.021
	Urban	118(40.4)	40(13.7)	134(45.9)	

Gender, Levels of Education, and Place of Residence were Significantly Associated with Adherence to Medication ( $p < 0.05$ ). On the other hand, Marital Status, Primary Occupation, Age, Household Size and whether one was a Household Head or not was not Significantly Associated with Adherence to TB Medication ( $p > 0.05$ ). Table 2 above presents a summary of the findings.

Table 3 below presents the odds ratios for the Significant Demographic Factors

**Table 3: Odds ratio for significant demographic factors and adherence**

Demographic Factors		Levels of adherence		OR(95% CI)	P-value
		High Adherence	Low/Medium		
Gender	Male	98	96	1	0.000
	Female	33	83	2.6(1.57-4.20)	
Level of Education	No Schooling	8	14	1	0.001
	Secondary	54	72	0.8(0.30-1.95)	
	Tertiary	11	33	1.7(0.57-5.17)	
Rural/Urban	Rural	13	5	1	0.021
	Urban	118	174	3.8(1.33-11.04)	

Female Respondents were 2.6 times more likely to have High Adherence as compared to their Male counterparts (CI=1.57-4.20). The findings also indicate that Respondents with Tertiary Levels of Education were 1.7 times more likely to have High Adherence to TB Medication as compared to those with no Schooling. However, those with Secondary Levels of Education were more likely to have Low/Medium Adherence to TB Medication (OR=0.8, CI=0.30-1.95). The findings also reveal that Respondents from the Urban places were more likely to have High Adherence (OR=3.8, CI=1.33-11.04).

Regression Analysis on the Association between Demographic Factors and Adherence to TB Medication revealed a Significant Relationship. Table 4 below presents the findings.

**Table 4: Regression analysis on the relationship between demographic factors and adherence to TB medication**

Source of Variation	SS	df	MS	F	P-Value	F crit
Between Groups	11288.99	2	5644.494	8.733756	0.000	3.105157
Within Groups	54287.93	84	646.2849			

As indicated in Table 4 above, there was a Significant Relationship between Demographic Factors and Adherence to TB Medication (p=0.000). The critical F was 3.105157. The findings indicate a Positive Relationship between the Variable.

#### 4. Discussion

##### 4.1 Adherence to Tuberculosis Treatment

The Morsiky Adherence Medication Scale (MMAS-8) grading was the instrument used to assess the Non-Adherence to Medication amongst Patients. This tool assists the TB Patient to self-report Adherence. In this study a score of 0 was considered High Adherence, a score between 1



and 2 Medium Adherences and a score of more than 2 was considered Low Adherence. According to WHO, (2007) a rate of 80% and above is considered High Adherence. These study established Adherence rates of 42.3% and 44.8% for High and Medium Levels respectively. Those with Low Adherence were 12.9%. Notably, these findings did not agree with a study conducted in South Africa by [13] on Association between Health Related Quality of Life and Medication Adherence in Pulmonary Tuberculosis which reported High Adherence at all follow-up visits during treatment. However, it was noted that the study did not assess the TB Patients at the baseline contrary this study.

A similar study conducted in South Africa by [5] whose objective was to measure Adherence and determine Factors with Non-Adherence to Concurrent TB treatment and ART among Co-infected in two provinces determined that out of the 1,252 persons receiving Concurrent treatment, 138 (11.0%) were not Adherent. Another study conducted in a District Hospital in Kwazulu-Natal, South Africa by [6] to establish key Factors that affected Adherence to TB treatment and recommend interventions that could improve Adherence methods observed that from the 159 TB patients, 105 (66%) were Adhered In yet another study by [7], on factors Associated with default from treatment among TB patients in Nairobi Province revealed a 16.7% of prevalence of treatment default. The study further noted that default occurred most frequently during the initial three months of treatment. In Ethiopia, a study by [8] whose aim was to assess the prevalence of Non-Adherence to Anti-Tuberculosis treatment, reasons and Associated Factors among TB Patients attending Gondar town Health centres noted that the rate of Non-Adherence to Anti-TB therapy was 65(21.2%) (95% CI; 17.2, 26.1). The rate was higher (47.0%) among return after default treatment category and lower (19.1%) among new category.

#### **4.2 Demographic Factors Associated with Adherence to TB Treatment**

Demographic Factors that Significantly Associated with Adherence to TB Medication were established to include Gender, level of Education, and Place of Residence. Female Respondents were more likely to have High Adherence as compared to their Male counterparts. Also, Respondents with Tertiary levels of Education were more likely to have High Adherence to TB Medication as compared to those with no Schooling. The Respondents from the Urban places were established to be more likely to have High Adherence. Overall, Demographic Factors greatly influenced Adherence to TB Medication. These findings are similar to other studies conducted elsewhere to determine the relationship between Social Demographic Characteristics of the TB Patients and treatment default.

#### **4.3 Levels of Education and the Adherence to TB Treatment**

The study established that Adherence to TB treatment improved positively with the High Level of Education. Those with Highest Levels of Education were better Adhered to TB Medication than those with no Schooling. The High Level of Education may have contributed to higher levels of awareness among individual Patients. Similar studies that Significantly Associated High Levels of Education with Adherence to TB treatment include the one conducted in a District Hospital in KwaZulu-Natal, South Africa by [6]. The aim of the study was to establish key

factors that affected Adherence to TB treatment and recommend Interventions that could improve Adherence methods. The results indicated that Non-Adherence was Significantly Associated with level of Education.

#### **4.4 Gender of the Respondents and Adherence to TB Treatment**

In this study the Gender of the Respondents Significantly Associated with the Adherence to TB treatment. Female Respondents were 2.6 more likely to have High Adherence as compared to their Male counterparts. These findings agrees with a study by [7] which established that the Social Demographic Factors Associated with TB treatment default in Nairobi included the Male Sex (OR 1.43,  $p < 0.001$ ). It also agrees with the study done in Argentina by (12) on determinants of Non-Adherence to TB treatment; Barriers related to access to treatment that noted an increased Risk of Non-Adherent to treatment in Male Patients (OR=2.8; 95% CI 1.2-6.7). However, the findings contradicts with another study to assess factors contributing to treatment Adherence and knowledge of TB transmission among Patients on TB treatment in Ndola, Zambia which determined that more Female (39.1%) than Male (33.9%) defaulted on Medication [10]

#### **4.5 Place of Residence and Adherence to TB Treatment**

The findings revealed that Respondents from the Urban settings were more Adhered to TB treatment compared to the Rural Patients. Access to TB treatment due to better infrastructure in the Urban settings could have made it possible for the TB Patients to be better Adhered to TB treatment. A study in South Africa by [11] on change in Health Related Quality of Life among Pulmonary Tuberculosis Patients at Primary Health Care settings shows that residing in a permanent residence has a positive association with Health. Living in a shack or traditional dwelling is associated with overcrowding and dusty or muddy outdoor environment whereas a permanent residence is associated with less overcrowded households and a cleaner environment. Overcrowded Households particularly with vulnerable populations have been associated with the Risk of TB infection.

In Ethiopia, a study by [8] whose aim was to assess the Prevalence of Non-adherence to Anti-Tuberculosis treatment, reasons and associated factors among TB Patients attending Gondar town Health Centers noted that the Social-Demographic Characteristics with a Sample of 314 and 97.5% response rate, the Mean age was 35.94 years, 166 (54.2%) were Male, 135 (44.1%) Single, 193 (63.0%) were Orthodox Christians, 75 (24.5%) were Urban dwellers and grade 9-12 by Education.

#### **4.6 Marital Status and Adherence to TB Treatment**

Although the study did not establish Significant Association between the Marital Status of the Respondents and Adherence to TB treatment, it was noted that Divorced Respondents were more likely to Adhere with the least likely to adhere to TB treatment being the Separated. This contradicted a study on Prevalence of and factors influencing Anti-TB treatment Non-Adherence among Patients with Pulmonary TB in Anhui province, Eastern China by [9] that observed that

those Divorced and Widowed Patients were more likely to miss Medication compared with those who were Married or Unmarried ( $p < 0.01$ ).

#### **4.7 Occupation of the Respondents and Adherence to TB Treatment**

In regard to the Primary Occupation of the Respondents, the TB Patients in the Formal Sector appeared to adhere to treatment more. The patients in the Agriculture Sector adhered least. The study noted a fairly High Adherence among Students. This could be explained that people in the Formal Sector are better Educated and have higher Incomes than those from Informal Sector. Apparently, the Students were also more likely to adhere to TB treatment. Students by nature are likely to follow instructions more religiously than adults and therefore the high scores. However, this contradicted a study on Prevalence of and factors influencing Anti-TB treatment Non-Adherence among Patients with Pulmonary TB in Anhui province, Eastern China by [9] in regard to Occupation where Most of the Respondents were Farmers (77.0%).

#### **4.8 Age of the Respondents and Adherence to TB Treatment**

The study determined that there was no Significant Association between the Age of the Respondents and the Adherence to TB treatment. However, it was observed that the Age category (35-39) years had the highest Adherence. They were followed by the Respondents with the Age 29 years or less. The least Adhered was in the category (30-34) years. This can be explained that since the TB Burden is highest in the Age bracket (35-39) years [1], it is likely the Respondents were keen about information and awareness towards reducing the incidences. Meanwhile, according to a study to assess factors contributing to treatment Adherence and knowledge of TB transmission among Patients on TB treatment in Ndola, Zambia, Age, Marital Status and Education levels did not associate with compliance to TB treatment [10].

### **5. Conclusion**

The study concludes that the Social Demographic Factors are Significantly Associated with the adherence to TB treatment. Such factors include Gender, Levels of education and place of Residence. It is therefore evident from the study that TB Patients Adherence to treatment is dependent on their Social Demographic Characteristics. From this therefore, it can be understood that indirect effects of TB on Adherence to TB treatment differs based on Social Demographic Factors.

### **6. Recommendations**

The study recommends further studies to determine the direct Association between the Social Demographic factors and adherence to TB treatment among TB Patients.

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