Effects of Socio-demographic Factors on Regimen Adherence among Tuberculosis Patients in Kisumu Region, Kenya

Morris Senghor Shisanya

Affiliation: Masinde Muliro University of Science and Technology (MMUST)
Email: sengomoris@gmail.com

Abstract

Introduction: Efforts to diagnose TB and patients on treatment have been very successful as per WHO targets for Kenya. However, there are still poor treatment outcomes in a significant number of the patients. These poor treatment outcomes have been significantly linked to poor adherence to TB treatment.

Methods: This was a cross sectional descriptive study that was conducted in Kisumu East District to establish the effects of socio-demographic factors on regimen adherence among tuberculosis patients aged above 18 years attending TB clinics in Kisumu region, in Western Kenya. The data was analyzed using descriptive statistics and bivariate analysis and binary logistic regression. P values, Adjusted Odds Ratios with 95% confidence interval (CI) were used to demonstrate significance and strength of association between the socio-demographic factors and adherence. Significance was assumed at P value ≤0.05.

Findings: Residence; (OR:21.8; 95% CI:5.4-87.5 ;P<0.001), number of family members(OR:5.7; 95% CI:1.7-19.1 ;P=0.005) and sex of the patient (OR:0.2; 95% CI: 0.0-0.9 ;P<0.036) were the significant socio-demographic aspects that predicted adherence.

Conclusion: Therefore some socio-demographic aspects of TB patients key predictors of adherence. These aspects can serve as a guide for flagging some patient as having potential for non-adherence thus appropriate follow-up measures instituted in time. It is important to establish the effects of socio-demographic aspects on adherence in every TB care setting for appropriate follow-up.

Key words: *Tuberculosis, adherence, socio-demographic*

Introduction

Adherence to treatment determines individual health outcomes and has far reaching ramifications on health expenditure. Tuberculosis (TB) has been known to rapidly develop drug resistant disease strains especially when medications are not adhered to as required. The efforts to improve adherence have focused primarily on therapeutics involved in the treating of TB. Public health prioritization of adherence to TB treatment is important because: TB has a high risk of transmission, non-adherence prolongs TB's infectious phase, non-adherence enhances the emergence and spread of drug-resistant organisms and the labor and financial expenses of treating drug-resistant TB are immense (Hirsch-Moverman, Daftary, Franks, & Colson, 2008). Patient's demographics, social status and economic aspects are among the several factors have been severally demonstrated to be associated with adherence to TB (Suwankeeree & Picheansathian, 2014). The association between adherence and its predictors has been found to be unpredictable across studies from different settings. These factors are known to be diverse from one setting to another or there are demonstrable differences in the way the factors interplay

with each other in determining adherence (Hirsch-Moverman et al., 2008).

Methods

The study was a cross sectional descriptive study that was conducted in Kisumu East District to establish the effects of socio-demographic factors on regimen adherence among tuberculosis patients aged above 18 years attending TB clinics in Kisumu region, in Western Kenya. Two hundred and fifty respondents were sampled. An interviewer administered structured questionnaire was used to collect data from the respondents on the social, demographic aspects of the patients and overall TB care. The data was analyzed using descriptive statistics and bivariate analysis to determine the socio-demographic factors that significantly predicted treatment adherence. The demographic aspects that demonstrated significance in the bivariate analysis were adjusted for in a binary logistic regression model. P values, Adjusted Odds Ratios with 95% confidence interval (CI) were used to demonstrate significance and strength of association between the socio-demographic factors and adherence. Significance was assumed at P value ≤0.05.

Findings

A total of 250 TB patients were sampled and their data were available for analysis. The mean age of the respondents was 32.5±10.9 with over 90% being below the age of 50. About 60% of the respondents were males. Only 13.2% were from rural areas with the remaining being from urban, periurban and informal settlements. Over 60% of the sampled population was married and those with basic education and above being more than 90%. Twenty four percent of these respondents were unemployed and about 60% of the population either earned less than 5000Ksh per month or didn't know how much their monthly income was.

Table 1.Demographic Characteristics of the Respondents

Demographic Characteristic		n	%
Age in Years	<30 Years	143	57.2
	>30 Years	107	42.8
Sex	Female	103	41.2
	Male	147	58.8
Residence	Rural	36	14.4
	Urban	214	85.6
Marital Status	Not Married	102	40.8
	Married	148	59.2
Education	Primary or Less	104	41.6
	Secondary or More	146	58.4
Employment Status	Unemployed	94	37.6
	Employed	156	62.4
Monthly Income (KSh)	0 - 10000	182	72.8
	>10000	68	27.2
No. of Family Members	3-Jan	54	21.6
	>3	196	78.4
Rooms in the House	2-Jan	158	63.2
	> 2	92	36.8

Prevalence of adherence among TB patients

Table 2 presents the distribution of the demographic characteristics of the respondents and illustration of the level of adherence in the study population. Levels of significance were assumed at *P<0.05.* A total of 250 respondents were interviewed in this study. Out of the total interviewed 226 (90.5%) were categorized as adherent to drugs while 24 (9.6%) were not adherent. There was a significant relationship between age (OR: 0.1; 95% CI 0.0-0.4; P<0.001),residence (OR: 20.6; 95% CI: 7.8-54.1; P<0.001), sex (OR:0.3 ; 95% CI: 0.1-1; P=0.033), marital status (OR:3.3; 95% CI: 1.3-7.9; P=0.007), number of family members living with the patient (OR:9.9; 95% CI: 4-24.8; P<0.001), and level of education (OR:3.1 ; 95% CI:1.3-7.6; P=0.009), employment status (OR:2.6; 95% CI:1.1-6; P=0.027) and adherence. Percentage of adherence among the females was 95.1% and among the males 87.1%.

The other variables did not demonstrate significance in determining adherence. Monthly income and number of rooms did not show any significant (*P*=0.089) and (P=0.088) respectively in predicting adherence.

Table 2: Demographic characteristics of the respondents

Variable	Grouping	Drug Adherence		Bivariate Analysis		
		Yes n(%)	No n(%)	OR	95%CI	P Value
Adherence		226(90.4)	24 (9.6)			
Age	≤30 Years	139(97.2)	4 (3.8)	0.1	0.0 - 0.4	**<0.001**
	>30 Years	87(81.3)	20(18.7)			
Sex	Male	128(87.1)	19(12.9)	0.3	0.1 - 1	**0.033**
	Female	98 (95.1)	5 (4.9)			
Residence	Rural	20(55.6)	16(44.4)	20.6	7.8-54.1	**<0.001**
	Urban	206(96.3)	8(3.7)			
Marital Status	Not Married	86(84.3)	16(15.7)	3.3	1.3 - 7.9	**0.007**
	Married	140(94.6)	8(5.4)			
Education	≤Primary	88 (84.6)	16(15.4)	3.1	1.3 - 7.6	**0.009**
	>Primary	138(94.5)	8(5.5)			
Employment Status	Unemployed	80(85.1)	14(14.9)	2.6	1.1 - 6	**0.027**
	Employed	146(93.6)	10(6.4)			
Monthly Income (KSh)	≤10000	161(88.5)	21(11.5)	2.8	0.8 - 9.8	0.089
	>10000	65(95.6)	3(4.4)			
Family members	≤3 Members	38(70.4)	16(66.7)	9.9	4 - 24.8	**<0.001**
	>3 Members	188(95.9)	8(4.1)			
Rooms	≤ 2 Rooms	139(88)	19(12)	2.4	0.9 - 6.6	0.088
	> 2 Rooms	87(94.6)	5(5.4)			

Numbers in brackets are proportions. Significance was determined by Pearson Chi-square analysis. Values in bold are statistically significant at P≤0.05. All the P values are 2 sided.

In the final binary logistic regression model some aspects that had demonstrated significance in the bivariate analysis lost their significance after being adjusted for in the regression model. These were: age (Bivariate P<0.001 and Regression P=0.066); marital status (Bivariate P=0.007 and Regression P=0.756); education (Bivariate P=0.009 and Regression P=0.116); employment status

(Bivariate P= 0.027and Regression P=0.694). Those that were positively associated with adherence were urban residence; (OR:21.8; 95% CI:5.4-87.5; P<0.001), more than 3 family members(OR:5.7; 95% CI:1.7-19.1; P=0.005) while being male (OR:0.2; 95% CI:0-0.9; P=0.036) was negatively associated with adherence. This is to mean that male patients were more likely to be non adherent to treatment regimen than their female counterparts.

Table 3. Regression Analysis of Significant Predictors from Bivariate Analysis

Variable	Grouping Characteristic	B	OR	95%C.I.	Sig.
Demographic Characteristics	Age	-1.2	0.3	0.1-1.1	0.066
	Sex	-1.6	0.2	0.0-0.9	**0.036**
	Residence	3.1	21.8	5.4-87.5	**<0.001**
	Marital Status	0.2	1.2	0.3-4.4	0.756
	Education	1	2.6	0.8-8.9	0.116
	Employment Status	0.2	1.3	0.4-4.4	0.694
	Number of family members	1.7	5.7	1.7-19.1	**0.005**

Discussion

Adherence to TB treatment is multidimensional aspect involving the interplay between sociodemographic factors, patient characteristics, treatment aspects, co-morbidity and health care system (Balbay, Annakkaya, Arbak, Bilgin, & Erbas, 2005). This study was conducted among adults on anti-tuberculosis treatment to determine adherence to treatment and the socio-demographic predictors of adherence in a Western Kenya setting, Kisumu East District which has some of the highest number of TB cases in Kenya (DLTLD, 2010).

Adherence to TB treatment in this population was at 90.5% from self reported adherence. Nackers et al., 2012 estimated overall adherence of 95.2 in adult TB patients in Homabay County, Kenya. The study by Nackers was however by INH urine test, pill count and VAS (Nackers et al., 2012). A study in Uganda by Amuha et al (2009) estimated adherence to be 75% (Amuha, Kutyabami, Kitutu, Odoi-Adome, & Kalyango, 2009). The Ugandan study was conducted only in TB/HIV co-infected people and co-morbidity is one of the confounders of adherence thus speculation that that could have been the reason for low adherence (Dworkin et al., 2005). Other studies in China and Spain estimated adherence as 84 and 93.5% respectively (Caylà et al., 2009; Zhou et al., 2013). Whereas China study was in a migrant population, the Spain one was in a general TB patients' population.

Age and marital status of the patients had no statistically significant association with adherence to medication. However, females had a higher adherence of 95.1% compared to males' 87.1% (p=0.036). These results were consistent with the findings in other studies which similarly conclusions (Amuha et al., 2009; Caylà et al., 2009; Xu et al., 2009). Other studies also showed that women were significantly (79.2 versus 58.4 p= 0.012) likely to adhere to TB medications than men (Balbay et al., 2005) and others found significance between age and adherence (Anyaike et al., 2013; Naidoo et al., 2013)

Urban residence showed a statistically significant association with adherence to medication (OR:21.8; 95% CI: 5.4-87.5; P <0.001) in the regression analysis. It is possible that periurban and urban residence

offers better physical access to care which promotes adherence (Eticha & Kassa, 2014; Tesfahuneygn et al., 2015). However, other studies did not find a significant association between residence and adherence to medication (Amuha et al., 2009; Karl Peltzer & Pengpid, 2015; Tesfahuneygn et al., 2015).

Level of education was not statistically significant (p=0.116) in predicting adherence. This could be due to the fact that all the patients were provided with adherence information (there was unanimous agreement to the fact that information was provided to the patients) at the health facility thus level of education could not serve as an undue advantage in access to information. This was in agreement with other studies that elucidated no significant relationship between level of education and adherence (Xu et al., 2009). Other studies, however established education as a significant predictor of adherence (Karl Peltzer & Pengpid, 2015).

There was no significant relationship between employment status or family's average monthly income and adherence. This is similar to other results (Anyaike et al., 2013) where income (p=0.76) and employment (p=0.66) were not significant in determining adherence. Other studies in consensus were (Eticha & Kassa, 2014; Sendagire, Schim Van der Loeff, Kambugu, Konde-Lule, & Cobelens, 2012). This could be attributed to the fact that TB treatment in Kenya is largely free therefore the earning of the patient cannot be a determining factor of adherence unless for other aspects like transport to the health facility. However, on the contrary, it is speculated that most of the homesteads within the sampled area are within the critical radius from health facilities thus transport cannot be a factor to consider. Other studies contrary to this findings were (Cherkaoui et al., 2014; Naidoo et al., 2013; Okanurak, Kitayaporn, & Akarasewi, 2008; K Peltzer & Pengpid, 2013). These studies found either or the two predictors significant in determining adherence. In another study it was however established that a steady employment was significant in determining adherence (Kendall et al., 2013).

In the current study, the number of family members of more than 3 showed significant association (OR: 5.7; 95% CI: 1.7-19.1; P=0.005) with adherence. This could be due better family structural and functional social support from family members thus enhancing adherence. In support of this were findings from a study in Ethiopia among smear positives where there was significant relationship between family size of more than 5 members and adherence (Belén & Alende, 2012; Berhe, Enquselassie, & Aseffa, 2012). Contrary findings were in study conducted in Ethiopia that showed no significance between family size and adherence (Tesfahuneygn et al., 2015).

Conclusion

Study identified the following as socio-demographic factors as predictors of adherence in this setting: residence; number of family members and sex of the patient.

Recommendation

Patients' socio-demographic characteristics may not be amenable to health care manipulation to enhance treatment. But those identified as predictors of adherence like in this case: residence, sex of the patient, and number of family members should direct the implementers of TB programs on the patients to place close tabs and any early signs of non adherence identified in the flagged groups for timely interventions to enhance adherence.

References

Amuha, M. G., Kutyabami, P., Kitutu, F. E., Odoi-Adome, R., & Kalyango, J. N. (2009). Non-adherence to anti-TB drugs among TB/HIV co-infected patients in Mbarara Hospital Uganda: prevalence and associated factors. *African Health Sciences*, *9 Suppl 1*(Suppl 1), S8-15. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/20589161

Anyaike, C., Musa, O. I., Babatunde, O. A., Bolarinya, O. A., Durowade, K. A., & Ajayi, O. S. (2013). ADHERENCE TO TUBERCULOSIS THERAPY IN UNILORIN TEACHING HOSPITAL, ILORIN, NORTH-CENTRAL NIGERIA. *International Journal of Science Technology*, *2*(6), 2278–3687. Retrieved from http://www.ijset.net/journal/222.pdf

Balbay, O., Annakkaya, A. N., Arbak, P., Bilgin, C., & Erbas, M. (2005). Which Patients Are Able To Adhere to Tuberculosis Treatment? A Study in a Rural Area in the Northwest Part of Turkey. *Japanese Journal of Infectious Diseases*, *58*, 152–158.

Belén, M., & Alende, O. (2012). Predictive factors of non-adherence to tuberculosis treatment in the metropolitan area of Buenos Aires, Argentina Factores predictivos de la no adherencia al tratamiento de la tuberculosis en municipios del Área Metropolitana de Buenos Aires, Argentina, *8*, 65–76.

Berhe, G., Enquselassie, F., & Aseffa, A. (2012). Treatment outcome of smear-positive pulmonary tuberculosis patients in Tigray Region, Northern Ethiopia. *BMC Public Health*, *12*(1), 537. http://doi.org/10.1186/1471-2458-12-537

Caylà, J. A., Rodrigo, T., Ruiz-Manzano, J., Caminero, J. A., Vidal, R., García, J. M., … Sánchez, F. (2009). Tuberculosis treatment adherence and fatality in Spain. *Respiratory Research*, *10*(1), 121. http://doi.org/10.1186/1465-9921-10-121

Cherkaoui, I., Sabouni, R., Ghali, I., Kizub, D., Billioux, A. C., Bennani, K., … Dooley, K. E. (2014). Treatment Default amongst Patients with Tuberculosis in Urban Morocco: Predicting and Explaining Default and Post-Default Sputum Smear and Drug Susceptibility Results. *PLoS One*, *9*, e93574. http://doi.org/10.1371/journal.pone.0093574

DLTLD. (2010). Tuberculosis in Kenya. *Division of Leprosy, Tuberculosis and Lung Diseases*. Retrieved from http://www.nltp.co.ke/tbkenya.html

Dworkin, M. S., Adams, M. R., Cohn, D. L., Davidson, A. J., Buskin, S., Horwitch, C., … Jones, J. L. (2005). Factors that complicate the treatment of tuberculosis in HIV-infected patients. *Journal of Acquired Immune Deficiency Syndromes*, *39*(4), 464–470. http://doi.org/10.1097/01.qai.0000152400.36723.85

Eticha, T., & Kassa, E. (2014). Bioanalysis & Biomedicine. *J Bioanalysis and Biomedicine*, *6*, 61–646. http://doi.org/10.4172/1948-593X.1000113

Hirsch-Moverman, Y., Daftary, A., Franks, J., & Colson, P. W. (2008). Adherence to treatment for latent tuberculosis infection: systematic review of studies in the US and Canada. *Int J Tuberc Lung Dis*, *12*(11), 1235–1254. Retrieved from http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Citation&list_uids=18926033

Kendall, E. A., Theron, D., Franke, M. F., van Helden, P., Victor, T. C., Murray, M. B., … Jacobson, K. R. (2013). Alcohol, hospital discharge, and socioeconomic risk factors for default

from multidrug resistant tuberculosis treatment in rural South Africa: a retrospective cohort study. *PLoS One*, *8*(12), e83480. http://doi.org/10.1371/journal.pone.0083480PONE-D-13-37002 [pii]

Nackers, F., Huerga, H., Espié, E., Aloo, A. O., Bastard, M., Etard, J.-F., … Bonnet, M. (2012). Adherence to Self-Administered Tuberculosis Treatment in a High HIV-Prevalence Setting: A Cross-Sectional Survey in Homa Bay, Kenya. *PLoS ONE*, *7*(3), e32140. http://doi.org/10.1371/journal.pone.0032140

Naidoo, P., Peltzer, K., Louw, J., Matseke, G., McHunu, G., & Tutshana, B. (2013). Predictors of tuberculosis (TB) and antiretroviral (ARV) medication non-adherence in public primary care patients in South Africa: a cross sectional study. *BMC Public Health*, *13*, 396. http://doi.org/1471-2458-13-396 [pii]10.1186/1471-2458-13-396

Okanurak, K., Kitayaporn, D., & Akarasewi, P. (2008). Factors contributing to treatment success among tuberculosis patients: a prospective cohort study in Bangkok. *The International Journal of Tuberculosis and Lung Disease : The Official Journal of the International Union against Tuberculosis and Lung Disease*, *12*(10), 1160–5. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/18812046

Peltzer, K., & Pengpid, S. (2013). Socioeconomic factors in adherence to HIV therapy in low- and middle-income countries. *J Health Popul Nutr*, *31*(2), 150–170. Retrieved from http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Citation&list_uids=23930333

Peltzer, K., & Pengpid, S. (2015). Predictors of Non-adherence to Anti-Tuberculosis Medication in Tuberculosis Patients in Thailand. *J Hum Ecol*, *52*(12), 26–31.

Sendagire, I., Schim Van der Loeff, M., Kambugu, A., Konde-Lule, J., & Cobelens, F. (2012). Urban Movement and Alcohol Intake Strongly Predict Defaulting from Tuberculosis Treatment: An Operational Study. *PLoS ONE*, *7*(5), e35908. http://doi.org/10.1371/journal.pone.0035908

Suwankeeree, W., & Picheansathian, W. (2014). Strategies to promote adherence to treatment by pulmonary tuberculosis patients: a systematic review. *Int J Evid Based Healthc*, *12*(1), 3–16. http://doi.org/10.1097/01.XEB.0000444614.17658.4601787381-201403000-00002 [pii]

Tesfahuneygn, G., Medhin, G., Legesse, M., Volmink, J., Garner, P., Dooley, K., … Lindtjørn, B. (2015). Adherence to Anti-tuberculosis treatment and treatment outcomes among tuberculosis patients in Alamata District, northeast Ethiopia. *BMC Research Notes*, *8*(1), 503. http://doi.org/10.1186/s13104-015-1452-x

Xu, W., Lu, W., Zhou, Y., Zhu, L., Shen, H., & Wang, J. (2009). Adherence to anti-tuberculosis treatment among pulmonary tuberculosis patients: a qualitative and quantitative study. *BMC Health Services Research*, *9*(1), 169. http://doi.org/10.1186/1472-6963-9-169

Zhou, C., Chu, J., Liu, J., Gai Tobe, R., Gen, H., Wang, X., … Xu, L. (2013). Adherence to tuberculosis treatment among migrant pulmonary tuberculosis patients in Shandong, China: a quantitative survey study. *PLoS One*, *7*(12), e52334. http://doi.org/10.1371/journal.pone.0052334PONE-D-12-23709 [pii]