IAA Journal of Scientific Research 10(3):1-12, 2023. ISSN: 2736-7319

Factors Influencing Adherence to Treatment among Patients Attending the Tuberculosis Clinic at Hoima Regional Referral Hospital

Kayendeke Victory Jones

Department of Medicine and Surgery, Kampala International University, Uganda.

ABSTRACT

The main obstacle to tuberculosis control in Uganda is noncompliance with treatment, with a default rate of 13%. Treatment completion rates are reported to be 70% and 29%, respectively, among patients who cure the disease. This increases the risk of treatment resistance, relapse, and death, as well as the duration of infectiousness. A cross-sectional study of 215 TB patients at Hoima Regional Referral Hospital aimed to determine factors influencing adherence to treatment. The majority of participants (43.70%) were aged 25-34, with 88.80% from rural areas. The majority of participants (54.90%) had less than a high school diploma as their highest degree of education. The majority (90.70%) were unemployed, with 85.10% having a monthly salary of less than $100,000. The level of non-adherence to treatment was 22.3%. Monthly income and health education on tuberculosis disease were found to be associated with TB disease at the multivariate level. Patients at Hoima Regional Referral Hospital's tuberculosis clinic adhered to their treatment regimens at a high rate of 77.3 percent, but this is inadequate compared to the required adherence levels of greater than 90% to assist cure.

Keywords: adherence, treatment, tuberculosis

INTRODUCTION

Tuberculosis (TB) is a communicable disease that is a major cause of ill health and one of the leading causes of death worldwide. Until the coronavirus (COVID-19) pandemic, TB was the leading cause of death from a single infectious agent, ranking above HIV/AIDS [1]. Tuberculosis (TB) is one of the oldest diseases known to humans and is a major cause of death worldwide [2, 3, 4]. Tuberculosis (TB) as a disease has been known ever since the dawn of man's history. In 1993 the World Health Organization (WHO) declared that TB was the major global public health problem [5, 6].

TB is caused by the bacillus Mycobacterium tuberculosis, which is spread when people who are sick with TB expel bacteria into the air (e.g. by coughing) [1, 7, 8, 9]. It usually affects the lungs (pulmonary TB) and is transmitted when people who are sick with pulmonary TB expel bacteria into the air but can also affect other sites (extra-pulmonary TB) [10, 11, 12]. Most people (about 90%) who develop the disease are adults, with more cases among men than women [1, 13, 14].

About 1/3 of the world's population (approximately 2 billion) is estimated to be infected with tubercle bacilli and hence at risk of developing the active disease [15, 16]. However, a relatively small proportion (5–15%) of the estimated 2-3 billion people infected with Mycobacterium tuberculosis will develop TB disease during their lifetime [17, 18]. Global reports indicate that about 10 million people were infected with TB in 2019, with some African countries among the leading nations that contributed to the newest TB cases [19, 20].

However, according to the WHO TB report 2021,the COVID pandemic caused a large global drop in the number of people newly diagnosed with TB and reported from 7.1 million in 2019 to 5.8 million in 2020, an 18% decline back to the level of 2012 and far short of the approximately 10 million people who developed TB in 2020. Furthermore, reduced access to TB

diagnosis and treatment has increased TB deaths. Best estimates for 2020 are 1.3 million TB deaths among HIV-negative people (up from 1.2 million in 2019) and an additional 214 000 among HIV-positive people [1, 21, 22].

TB is curable and preventable. About 85% of people who develop TB disease can be successfully treated [1]. TB treatment is aimed at ensuring cure, minimizing the risk of death and disability, and reducing transmission of Mycobacterium tuberculosis [23, 24]. TB treatment requires a prolonged and combined course of antibiotics for 2 months of intensive followed by 4 months continuation phase. In the treatment of patients with MDRTB, an intensive phase of at least 8 months and a total treatment duration of at least 24 months is recommended [10].Because of this, the WHO introduced the Directly Observed Treatment (DOT) short-course strategy in 1998 for case detection, management, and monitoring [17].

Patients with TB are expected to have adherence levels greater than 90% to facilitate cure [25, 26, 27]. However one of the greatest dilemmas and challenges facing most TB programs is a patient that does not complete TB treatment for one reason or another [28, 29, 30]. The complete cure requires 6 months of treatment without interruption with multiple drugs which are challenging for patients and health care workers [19].

TB treatment presents particular challenges for adherence because the treatment is long and involves taking several medications, sideeffects are common and the patient usually feels better long before treatment has been completed [2. 31, 32].

Non-adherence to TB treatment leads to delayed sputum conversion, higher relapse rates, and emerging drug resistance [2]. A previous study has shown that the risk of drug resistance in PTB patients with treatment interruption was 13 times higher than that in patients without treatment interruption, and the drug resistance rate was significantly higher than that of patients without interruption [33].

METHODOLOGY

Study Design

The study adopted a prospective cross-sectional hospital based survey.

Study area

The study was conducted at Hoima Regional Referral Hospital in the Medical department.

Study population

Patients attending the TB clinic at HRRH

Inclusion criteria

- TB patients attending TB clinic aged 18years and above who consent to participate in the study

Exclusion criteria

- Patients with TBthat are critically ill/unable to talk

Sample size determination

Daniel's formula (2009) was used to determine the Sample size as shown below;

$$n=\frac{(Z\alpha+Z\beta)2*P(1-P)}{d2}$$

Where,

n = Minimum sample size

Zα = Z-statistic at α=1.96; 95% level of confidence

Zβ = Z-statistic at β = 0.84

P = Prevalence of characteristic being estimated

d = Margin error, set at 0.05

Based on a study done in Ethiopia by [34], the value used for P was 10%. Which is the level non-adherencefor the last one month. Tanzania by [35] and the value used for P was 7.4%.Which was the incidence of referred obstetric cases

$$n = \frac{(1.96 + 0.84)^2\ 0.074(1 - 0.074)}{(0.05)^2}$$

Therefore, the sample size was **215** participants

Sampling and recruitment procedures

Using convenient sampling technique, participantswere recruited after providing consent. A simple history was taken from patient.

Data collection methods and management

Primary data was obtained using a structured questionnaire containing demographic information, social factors and health facility related factors that were obtained from the patient. The

questionnaires were administered in English or Runyoro languages. Whenever a participant/his or her caretaker agreed to be interviewed he/she was asked to provide written consent by signing or providing fingerprints.

After obtaining informed consent, patient and caretakers was interviewed using researcher administered hard copy questionnaire. The researcher entered responses given by the participant by ticking the appropriate response and entering the same number in to the coding box immediately to reduce likelihood of data loss. The process of data collection continued until every effort to contact every study participant/his or her caretaker in the sample is exhausted. Completed data collection forms were kept under lock and key to ensure safety.

Data analysis

Data was presented in tables and figures showing frequencies and proportions.

Univariate analysis was done for continuous variables to report measures of central tendency like mean, median and mode and measures of dispersion like the range, interquartile range and measures of variance like standard deviation for various independent variables.

For categorical variables, data presentation was thoroughly well summarizedin “2 by 2” tables that show frequencies (percentages) and totals.

For continuous and categorical data, bar graphs, histograms, pie charts was used where suited to present the data.

Data was analysed using STATA version 11. Analysis of data was by simple linear and logistic regression as well as multiple linear and logistic analyses for continuous and categorical variables respectively. Pearson chi-square χ^2 or Mantel hazel, logistic regression analyses were applied to determine associations. The level of significance was present at 5%.

Odds Ratios (ORs) with their respective 95% confidence intervals were used to assess for statistical associations and p-values of less than 0.05 was considered statistically significant.

Ethical considerations

The permission to conduct this study was sought from Kampala International University Research Ethics Committee, Institution Review Committee and HRRH. The study was granted an ethical clearance certificate. Participants to enrolled were requested to sign consent after thorough explanation of purpose of the study [36], risks involved and use of data to be collected. Numbers instead of names were used in all the questionnaires.

RESULTS

Table 1: Demographic data of respondents

Variable	Frequency (n)	Percent (%)
Age		
<24 years	92	42.8
25-34 years	**94**	**43.7**
≥ 35 years	29	13.5
Residence		
Urban	24	11.2
Rural	**191**	**88.8**
Religion		
Catholics	76	35.4
Protestants	**108**	**50.2**
Others	31	14.4
Marital status		
Married/Cohabiting	**191**	**88.8**
Single/divorced	24	11.2
Education		
Secondary +	97	45.1
<Secondary	**118**	**54.9**
Occupation		
Employed	20	9.3
Unemployed	**195**	**90.7**
Income		
100,000 +	32	14.9
<100,000	**183**	**85.1**

Table 1 above shows the baseline socio-demographic characteristics of the study participants. It can be observed from the table that the majority of the participants 43.70% (94/215) were in the age group of 25 – 34 years and coming from rural areas of residence 88.80% (191/215). Protestants 50.2% (108/215) comprised half of the study participants with 88.80% (191/215) being married. On the other hand, the majority of participants 54.90% (118/215) were having less than secondary education as the highest level of education attained. Regarding the occupation of study participants, the majority 90.70% (195/215) were found to be unemployed with 85.10% (183/215) having a monthly income of less than 100,000.

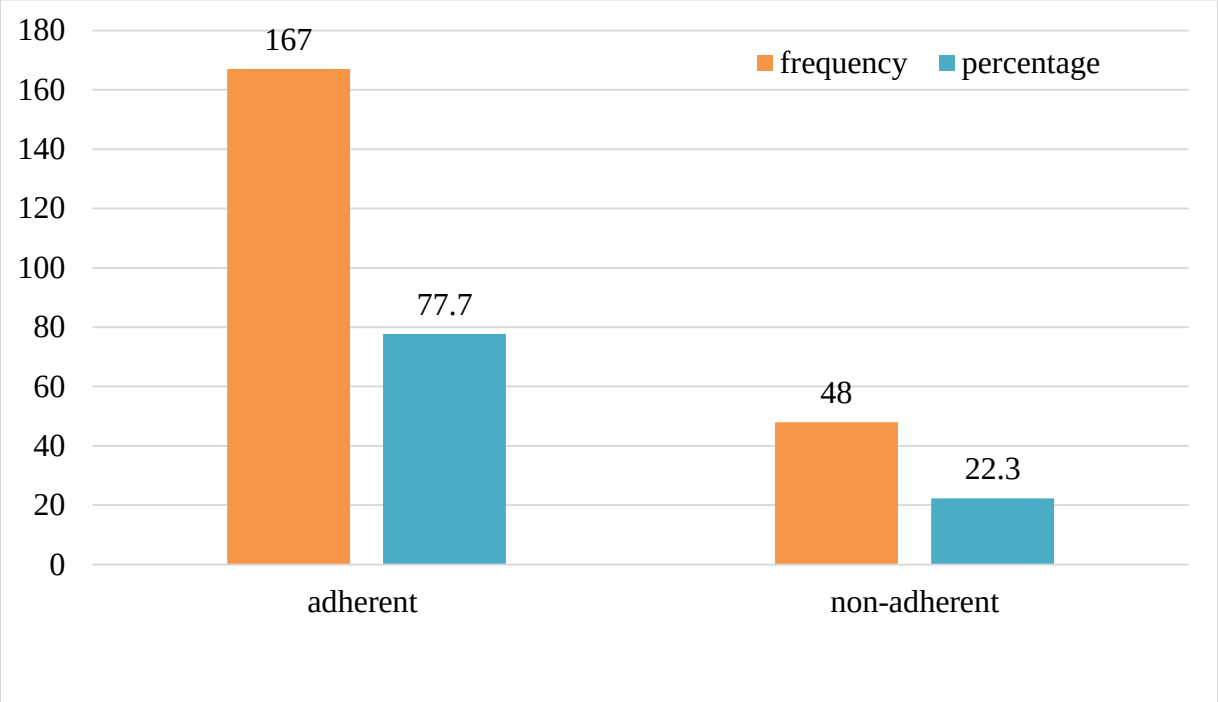

Figure 1: level of adherence to treatment among patients attending tuberculosis clinic at HRRH

According to figure 1 above,the level of adherence to treatment among patients attending the tuberculosis clinic at Hoima Regional Referral Hospital was 22.3%.

Table 2; bivariate logistic regression to determine socio-demographic factors associated with adherence to treatment among patients attending tuberculosis clinic at HRRH

Variables	Adherence		cOR	95% CI	P-Value
	Non Adherent	Adherent			
Age					
<24 years	19	75	Reference		
25-34 years	19	73	1.0	0.32-3.23	0.969
≥ 35 years	10	19	1.7	0.40-7.24	0.478
Residence					
Urban	11	13	Reference		
Rural	37	156	1.8	0.23-14.49	0.572
Religion					
Catholics	9	67	Reference		
Protestants	28	80	1.1	0.36-3.62	0.829
Others	11	20	1.0	0.18-5.34	0.981
Marital status					
Married/Cohabiting	41	150	Reference		
Single/divorced	7	17	0.5	0.07-4.38	0.572
Education					
Secondary +	9	88	Reference		
<Secondary	**39**	**79**	**3.5**	**0.97-12.95**	**0.055**
Occupation					

Employed	5	15	Reference		
Unemployed	43	152	1.5	0.18-11.80	0.717
Income					
100,000 +	12	20	Reference		
<100,000	36	147	**5.5**	**1.81-17.00**	**0.003**

P value = significant value, cOR= Crude odd ratio, CI= Confidence interval.

Shown in table 3 above is the result of the bivariate logistic regression which was run to determine socio-demographic factors associated with and adherence to treatment among the study participants. Results of the analysis revealed that education level and income level had p-values less than 0.2. Thus, education and income levels proceeded to the next stage (multivariate stage).

Table 3: bivariate logistic regression to determine health facility-related factors associated with adherence to treatment among patients attending the tuberculosis clinic at HRRH

Variables	Adherence		cOR	95% CI	P-Value
	Non-adherent	Adherent			
Availability of drugs					
Always available	33	118	Reference		
Sometimes/not available	15	49	0.5	0.10-2.17	0.337
Distance from home to hospital					
< 5 km	16	60	Reference		
≥ 5 km	**32**	**107**	**0.4**	**0.13-1.11**	**0.078**
Waiting time before being attended to					
≤ 2 hours	37	125	Reference		
More than 2 hours	11	42	1.9	0.66-5.74	0.277
Visits to hospital per month					
≤ 2 visits	14	46	Reference		
3 or more visits	34	121	0.8	0.25-2.70	0.746
Health information about TB					
Yes	19	133	Reference		
No	**29**	**34**	**18.4**	**5.12-66.0**	**0.001**
Patient-health worker relationship					
Friendly	17	116	Reference		
Unfriendly	**31**	**51**	**2.1**	**0.64-7.19**	**0.217**

P value = significant value, cOR= Crude odd ratio, CI= Confidence interval.

Shown in table 6 above is the result of a bivariate logistic regression done to health facility-related factors associated with adherence to treatment among patients attending the tuberculosis clinic at HRRH. It can be observed distance from home to hospital, Health information about TB, and Patient-health worker relationshiphad p-values less than 0.2. Thus were proceeded to the multivariate stage.

Table 4; Multivariate logistic regression to establish factors independently associated with factors associated with adherence to treatment among patients attending the tuberculosis clinic at HRRH

Variables	aRR	95% CI	P-Value
Education			
Secondary +	Reference		
<Secondary	3.4	0.81-13.94	0.095
Monthly income level			
100,000 +	Reference		
<100,000	**4.4**	**1.25-15.35**	**0.021**
Patient-health worker relationship			
Friendly	Reference		
Unfriendly	6.5	0.71-59.67	0.097
Distance from home to hospital			
<10 km	Reference		
≥10 km	0.4	0.09-1.40	0.065
Had health education about TB			
Yes	Reference		
No	**11.3**	**2.58-49.46**	**0.001**

P value = significant value, aRR= Adjusted Relative Risk, CI= Confidence interval.

Table 4 shows a multivariate logistic regression analysis of factors associated with adherence to treatment among patients attending the tuberculosis clinic at HRRH. Factors with a p-value less than 0.2 with the adherence to treatmentat bivariate logistic regression analysis were considered for multivariate analysis.

At the multivariate stage, monthly income and health education about TB disease were found to be significantly related to adherence to TB treatment that is participants who earned <100,000 Ugshs monthly were 4.4 times more at risk of non-adherence to TB treatment than participants who had earned Ugshs 100,000 + monthly (aRR 4.4, 95%CI 1.25-15.35, P=0.02). On the other hand, study participants who did not get health education about TB disease were 16.2 times more at risk of non-adherence to TB treatmentthan participants who got health education about TB disease(aRR 11.3, 95%CI 2.58-49.46, P=0.001).

DISCUSSION

Non-adherence to treatment was found to be 22.3 percent among patients attending the tuberculosis clinic at Hoima Regional Referral Hospital in this study.This is in

line with findings from a study conducted in Ghana's Eastern Region [37], which revealed a 22 percent non-adherence rate to TB treatment.In Ethiopia, a similar systematic analysis indicated that the pooled prevalence of TB treatment non-adherence was 21.3 percent [38]. According to the report, the rate of non-adherence in Sub-Saharan Africa ranges from 11.3 percent to 29.6 percent [39].This could be linked to the physical location, as people in most African countries virtually always leave and return to the same life hardships and problems.

The study's findings, however, pose a significant problem because, according to [40], patients with tuberculosis (TB) are anticipated to adhere to treatment at a rate of greater than 90% to be cured. Furthermore, according to the survey, non-adherence was higher than 15.5 percent in India [41]. An institution-based cross-sectional survey of 280 tuberculosis patients in the North Gondar zone of northwest Ethiopia found that overall non-adherence for the previous month and the four days before the survey was 10% and 13.6 percent, respectively [34], which was all lower than the rate of non-adherence in this study.Lack of social support, treatment drug side effects, forgetting to take medication, being away from home, missing date of appointment, lack of transportation cost to the treatment center, poor communication between patient and healthcare providers, and stock out of medicines could all contribute to the high rate of non-adherence in our study.

Finally, when compared the findings of a study by [42], found that around half of all TB patients globally fail to finish the treatment regimen, implying that the other half are non-adherent to TB therapy.It was also lower than Thailand's non-adherence rate of 24.7 percent, according to the study [41].

Generally, the difference in rates of non-adherence might be due to differences in Socio-demographic characteristics, sample size, study designs, settings, and time difference.

Monthly income was found to be strongly related to adherence to TB treatment in this study, with participants earning 100,000 Ugshs or less at 4.4 times the risk of non-adherence to TB therapy than those earning 100,000 Ugshs or more.This is in line with the findings of a study conducted in Southeast Nigeria by Ubajaka et al., 2015, which found that the average monthly income had a substantial impact on TB patient anti-TB medicine adherence. In addition, research has shown that the lower the income, the greater the likelihood of non-compliance [25]. Patients with lower incomes may lack the necessary means to learn about tuberculosis and understand the significance of frequent therapy, making them less likely to complete treatment [33]. As a result, low income increases the likelihood of non-compliance with TB therapy.

In this study, health education about TB disease was found to be significantly related to TB treatment adherence, with participants who did not receive health education about TB disease being 16.2 times more likely to fail to adhere to TB treatment than those who did receive health education about TB disease.It is commonly known that education boosts people's knowledge, health awareness, and treatment-seeking behavior, [43]. As a result, a patient's understanding of an illness has an impact on treatment adherence [17]. As many previous studies have shown, patient awareness of tuberculosis and its management is highly connected to adherence, suggesting that the higher the level of information, the higher the level of adherence [44].

Participants who were aware of TB symptoms were more than two and a half times more likely to adhere to medicine than those who were not aware of TB symptoms, according to a study conducted in Gandaki to evaluate the characteristics related to treatment adherence among tuberculosis patients [19].The latter echoes findings from a study in South Ethiopia, in which patients with limited knowledge of Tb and its treatment were at risk of non-adherence [43]. Patients' ignorance stems from a lack of knowledge and education on tuberculosis and the significance of treatment by DOTS providers [2].

In general, health education improves adherence to TB treatment [45].

CONCLUSION

Patients at Hoima Regional Referral Hospital's tuberculosis clinic adhere to their treatment regimens at a high rate of 77.3 percent, albeit this is inadequate when compared to the required adherence levels of greater than 90 percent to assist cure.Lack of health education regarding tuberculosis disease and poor monthly incomes significantly enhanced non-adherence to treatment among patients attending tuberculosis clinics.

REFERENCES

1. Global tuberculosis report (2021). Geneva: World Health Organization; 2021. Licence: CC BY-NC-SA 3.0 IGO.
2. Hanumaiah, V., Ranganath, D., & Kakkuppi, N. (2019). Assessment of adherence to anti tuberculosis medication for successful implementation of revised national tuberculosis programme at a tertiary care hospital, Shimoga: a cross-sectional observational study. *International Journal of Basic & Clinical Pharmacology, 8*. doi: 10.18203/2319-2003.ijbcp20194636
3. Kusimo, O. C., Olukolade, R., Ogbuji, Q., Osho, J., Onikan, A., Hassan, A. & Lawanson, A. (2018). Implementation of the active TB case finding in Nigeria; processes, lessons learnt and recommendations. *Journal of Tuberculosis Research*, *6*(1), 10-18.
4. Kusimo, O., Olukolade, R., Hassan, A., Okwuonye, L., Osinowo, K., Ogbuji, Q., & Ladipo, O. A. (2015). Perceptions of community members on tuberculosis and its effect on health-seeking behavior in Nigeria. *International Journal of Mycobacteriology*, *4*, 61.
5. Gube, A., Debalkie, M., Seid, K., Bisete, K., Mengesha, A., Zeynu, A., & Gebremeskel, F. (2018). Assessment of Anti-TB Drug Nonadherence and Associated Factors among TB Patients Attending TB Clinics in Arba Minch Governmental Health Institutions, Southern Ethiopia.
6. Oladimeji, O., Obasanya, J. O., Olusoji, J. D., Mustapha, G., Akolo, C., Oladimeji, K. E. & Onoja, M. A. (2013). Factors Associated with Treatment Success among Pulmonary Tuberculosis and HIV Co-infected Patients in Oyo State, South West-Nigeria. *Nigerian Health Journal*, *13*(2), 75-84.
7. Zürcher, K., Ballif, M., Kiertiburanakul, S., Chenal, H., Yotebieng, M., Grinsztejn, B., & Ayangma, L. (2019). Diagnosis and clinical outcomes of extrapulmonary tuberculosis in antiretroviral therapy programmes in low-and middle-income countries: a multicohort study. *Journal of the International AIDS Society*, *22*(9), e25392.
8. Carlucci, J. G., Peratikos, M. B., Kipp, A. M., Lindegren, M. L., Du, Q. T., Renner, L., & Pettit, A. C. (2017). Tuberculosis treatment outcomes among HIV/TB-coinfected children in the International Epidemiology Databases to Evaluate AIDS (IeDEA) network. *JAIDS, Journal of Acquired Immune Deficiency Syndromes*, *75*(2), 156-163.
9. Sempeera, H., & Kawooya, A. (2015). Implementation of tuberculosis directly observed treatment in a resource-limited urban setting: a case of Rubaga division, Kampala, Uganda. TROPICAL MEDICINE & INTERNATIONAL HEALTH, Volume 20, Pages 192-192.
10. Bereda, G., & Bereda, G. (2021). Determinant of, and Factors Influencing Medication Poor Adherence to Pulmonary Tuberculosis Treatment at The Tuberculosis Clinic of Mettu Karl Referral Hospital, Southwestern, Ethiopia: A Prospective Cross Sectional Study, 2021.

11. André, K. M., Moise, M. V., Jackson, K. K., Kasomo, P., Vivalya, N. M., Apollinaire, K. S., & Paulin, J. (2019). Epidemiological profile of pulmonary tuberculosis relapse cases in the city of Butembo east of the democratic republic of Congo. *The Journal of Medical Research*, *5*(5), 190-193.
12. Wayengera, M., Mwebaza, I., Welishe, J., Bayiyana, A., Kateete, D. P., Wampande, E., & Joloba, M. L. (2017). Immuno-diagnosis of Mycobacterium tuberculosis in sputum, and reduction of timelines for its positive cultures to within 3 h by pathogen-specific thymidylate kinase expression assays. *BMC Research Notes*, *10*, 1-13.
13. Wayengera, M., Mwebaza, I., Welishe, J., Nakimuli, C., Kateete, D. P., Wampande, E., & Joloba, M. L. (2017). Sero-diagnosis of active Mycobacterium tuberculosis disease among HIV co-infected persons using thymidylate kinase based antigen and antibody capture enzyme immuno-assays. *Mycobacterial diseases: tuberculosis & leprosy*, *7*(2).
14. Wallis, R. S., Kyambadde, P., Johnson, J., & Horter, L. (2004). Adjunctive treatment with etanercept in HIV-1-associated tuberculosis. *Journal of the American Academy of Dermatology*, *50*(3), 110.
15. Srisurad, M., & Phetphum, R. (2021). Factors affecting adherence to treatment among newly diagnosed pulmonary tuberculosis patients registered at community hospitals in Phitsanulok province. *Disease Control Journal, 47*(Suppl 1), 746-758. doi: 10.14456/dcj.2021.66
16. Micheni, L. N., Kassaza, K., Kinyi, H., Ntulume, I., & Bazira, J. (2021). Rifampicin and isoniazid drug resistance among patients diagnosed with pulmonary tuberculosis in southwestern Uganda. *PLoS One*, *16*(10), e0259221.
17. Dogah, E., Aviisah, M., Kuatewo, D.-A. M., Kpene, G. E., Lokpo, S. Y., & Edziah, F. S. (2021). Factors Influencing Adherence to Tuberculosis Treatment in the Ketu North District of the Volta Region, Ghana. *Tuberculosis Research and Treatment, 2021*, 6685039. doi: 10.1155/2021/6685039
18. Micheni, L. N., Deyno, S., & Bazira, J. (2022). Mycobacterium tuberculosis mixed infections and drug resistance in sub-Saharan Africa: a systematic review. *African Health Sciences*, *22*(1), 560-72.
19. Rk, Y., Kaphle, H., Yadav, D. D., & Gurung, S. (2021). Factors Associated with Treatment Adherence among Tuberculosis Patients in Gandaki Province of Nepal. *SAARC Journal of Tuberculosis Lung Diseases and HIV/AIDS, XVIII*, 8-21.
20. Okethwangu, D., Birungi, D., Biribawa, C., Kwesiga, B., Turyahabwe, S., Ario, A. R., & Zhu, B. P. (2019). Multidrug-resistant tuberculosis outbreak associated with poor treatment adherence and delayed treatment: Arua District, Uganda, 2013–2017. *BMC infectious diseases*, *19*(1), 1-10.
21. Ssemmondo, E., Mwangwa, F., Kironde, J. L., Kwarisiima, D., Clark, T. D., Marquez, C., & Chamie, G. (2016). Implementation and Operational Research: Population-Based Active Tuberculosis Case Finding During Large-Scale Mobile HIV Testing Campaigns in Rural Uganda. *JAIDS Journal of Acquired Immune Deficiency Syndromes*, *73*(3), e46-e50.
22. Obeagu, E. I., Esimai, B. N., Obeagu, G. U., Ochiabuto, O. M. T. B., Chukwurah, E. F., Ekelozie, I. S., & Ochei, K. C. (2020). Evaluation of Some Cytokines, CD4, Hepcidin, Iron Profile and Some Haematological Parameters of Pulmonary Tuberculosis Patients Coinfected with HIV in Southeast of Nigeria

23. Kimani, E., Muhula, S., Kiptai, T., Orwa, J., Odero, T., & Gachuno, O. (2021). Factors influencing TB treatment interruption and treatment outcomes among patients in Kiambu County, 2016-2019. *PLOS ONE, 16*(4), e0248820. doi: 10.1371/journal.pone.0248820
24. Olusola-Falae, B., Obeagu, E. I., Odo, M., Ochei, K. C., Solanke, E., & Idaboh, T. (2016). Impact of community based tuberculosis care interventions on TB Case detection in Nigeria–What works and what does not. *Int J Adv Multidiscip Res*, *3*, 30-39.
25. Mbuti, H., Mwaniki, E., Warutere, P., Oguya, F., & Midigo, R. (2020). Social Demographic Factors Associated with Adherence to Treatment Among Urban and Rural Tuberculosis Patients in Kenya. *4*, 111-122.
26. Ofor, I. B., Obeagu, E. I., Ochei, K. C., & Odo, M. (2016). Evaluation of lipids and protein profiles in tuberculosis (Tb) patients on antituberculosis therapy in general hospital Umuguma, Owerri. *Int. J. Curr. Res. Chem. Pharm. Sci*, *3*(2), 20-28.
27. Ochei, K. C., Obeagu, E. I., Mbajiuka, C. S., & Uzoije, N. U. (2014). Comparative assessment of five laboratory techniques in the diagnosis of pulmonary tuberculosis in Abuja. *IOSR Journal of Dental and Medical Sciences*, *13*, 73-78.
28. Aibana, O., Slavuckij, A., Bachmaha, M., Krasiuk, V., Rybak, N., Flanigan, T., & Murray, M. (2019). Patient predictors of poor drug sensitive tuberculosis treatment outcomes in Kyiv Oblast, Ukraine. *F1000Research, 6*, 1873. doi: 10.12688/f1000research.12687.3
29. Obeagu, E. I., Okoroiwu, I. L., Nwanjo, H. U., & Nwosu, D. C. (2019). Evaluation of haematological parameters of tuberculosis patients in Umuahia. *Eur. J. Pharm. Med. Res*, *6*(7), 693-699.
30. Ifeanyi, O. E. (2018). A review on iron homeostasis and anaemia in pulmonary tuberculosis. *Int. J. Healthc. Med. Sci*, *4*(5), 84-89.
31. Eteng, U. E. (2016). Laboratory diagnosis of Mycobacterium tuberculosis in resource constraint setting: Direct sputum smear microscopy is comparable with automated mycobacterium growth indicator tube (BACTEC MGIT 960). *Int. J. Curr. Microbiol. App. Sci*, *5*(6), 563-569.
32. Chinedum, O. K., Ifeanyi, O. E., Emmanuel, A., Ndidiamaka, E. I., & Stella, E. I. (2018). A review on tuberculosis in human immunodeficiency virus infection. *Int. J. Curr. Res. Med. Sci*, *4*(1), 51-80.
33. Fang, X.-H., Dan, Y.-L., Liu, J., Jun, L., Zhang, Z.-P., Kan, X., & Wu, G.-C. (2019). Factors influencing completion of treatment among pulmonary tuberculosis patients. *Patient Preference and Adherence, Volume 13*, 491-496. doi: 10.2147/PPA.S198007
34. Adane, A. A., Alene, K. A., Koye, D. N., & Zeleke, B. M. (2013). Non-adherence to anti-tuberculosis treatment and determinant factors among patients with tuberculosis in northwest Ethiopia. *PLoS ONE*;**8**:e78791. doi: 10.1371/journal.pone.0078791.
35. Pembe, A. B., Carlstedt, A., Urassa, D. P. *et al.* (2010). Quality of antenatal care in rural Tanzania: counselling on pregnancy danger signs. *BMC Pregnancy Childbirth* **10**, 35. https://doi.org/10.1186/1471-2393-10-35
36. Ugwu, C. N., Eze, V. H. U., Ugwu, J. N., Ogenyi, F. C., & Ugwu, O. P. C. (2023). Ethical Publication Issues in the Collection and Analysis of Research Data. Newport International Journal of Scientific and Experimental Sciences (NIJSES)

3(2): 132-140. https://nijournals.org/wp-content/uploads/2023/07/NIJSES-32-132-140-2023.pdf

37. Singh, K., Speizer, I., Handa, S., Boadu, R. O., Atinbire, S., Barker, P. M., & Twum-Danso, N. A. (2013). Impact evaluation of a quality improvement intervention on maternal and child health outcomes in Northern Ghana: early assessment of a national scale-up project. Int J Qual Health Care, 25(5):477-87. doi: 10.1093/intqhc/mzt054. Epub 2013 Aug 7. PMID: 23925506; PMCID: PMC3888142.
38. Zegeye, A., Dessie, G., Wagnew, F., Gebrie, A., Islam, S. M. S., Tesfaye, B., & Kiross, D. (2019). Prevalence and determinants of anti-tuberculosis treatment non-adherence in Ethiopia: A systematic review and meta-analysis. PLoS One., 14(1):e0210422. doi: 10.1371/journal.pone.0210422. PMID: 30629684; PMCID: PMC6328265.
39. Zawedde-Muyanja, S., Musaazi, J., Manabe, Y. C., Katamba, A., Nankabirwa, J. I., Castelnuovo, B., et al. (2020). Estimating the effect of pretreatment loss to follow up on TB associated mortality at public health facilities in Uganda. PLoS ONE 15(11): e0241611. https://doi.org/10.1371/journal.pone.0241611
40. Harries, A. D. (2018). Impact of antiretroviral therapy on tuberculosis control. Int J Tuberc Lung Dis., 22(4):466-467. doi: 10.5588/ijtld.17.0818. PMID: 29563000.
41. Krasniqi, S., Jakupi, A., Daci, A., Tigani, B., Jupolli-Krasniqi, N., Pira, M., Zhjeqi, V., & Neziri, B. (2017). Tuberculosis Treatment Adherence of Patients in Kosovo. Tuberc Res Treat., 4850324. doi: 10.1155/2017/4850324. Epub 2017 Nov 5. PMID: 29230326; PMCID: PMC5694566.
42. Munro, S., Kornelsen, J., Corbett, K., Wilcox, E., Bansback, N., & Janssen, P. (2017). Do Women Have a Choice? Care Providers' and Decision Makers' Perspectives on Barriers to Access of Health Services for Birth after a Previous Cesarean. Birth., 44(2):153-160. doi: 10.1111/birt.12270. Epub 2016 Dec 5. PMID: 27917532.
43. Woimo, T., Yimer, W., Gelgelu, T., & Gesesew, H. (2017). The prevalence and factors associated for anti-tuberculosis treatment non-adherence among pulmonary tuberculosis patients in public health care facilities in South Ethiopia: a cross-sectional study. *BMC public health, 17*. doi: 10.1186/s12889-017-4188-9
44. Sariem, C., Nanlir, Z., Banwat, S., & Dapar, M. (2019). Factors influencing tuberculosis medication adherence: A cognitive intervention in a resource limited setting. *World Journal of Pharmaceutical Sciences, 3*, 1912-1920.
45. Marahatta, S., Yadav, R., Giri, D., Lama, S., Rijal, K., Shrestha, A., & Adhikari, B. (2020). Barriers in the access, diagnosis and treatment completion for tuberculosis patients in central and western Nepal: A qualitative study among patients, community members and health care workers. *PLOS ONE, 15*, e0227293. doi: 10.1371/journal.pone.0227293

CITE AS: Kayendeke Victory Jones (2023). Factors Influencing Adherence to Treatment among Patients Attending the Tuberculosis Clinic at Hoima Regional Referral Hospital. IAA Journal of Scientific Research 10(3):1-12.