Determination Of Treatment Outcomes And Trend For Multidrug Resistant Tuberculosis Among Refugees In Dadaab Refugee Camps In Garissa County, Kenya

Abdirashid Diney Mohamed
Department of Public Health, Mount Kenya University Box 342-01000, Thika, Kenya

Dr. Jackson Onyuka, PhD
Department of Medical Laboratory Sciences, Mount Kenya University, P.O. Box 342-01000, Thika, Kenya

Dr. Samwel Odiwuor, PhD
Department of Medial Laboratory Sciences, Mount Kenya University, P.O. Box 342-01000, Thika, Kenya

Researchjournali.com
Exclusive Journal publishing house

ABSTRACT

Objective: To determine treatment outcomes and trend of Multidrug resistant Tuberculosis among refugees in Dadaab refugee camps.

Research Design: Descriptive retrospective and cross-sectional study designs

Location of the study: Dadaab Refugee Camps in Garissa County, Kenya.

Target Population: 350,000

Sample population: 116 patients' records who completed treatment and 74 patients who are on treatment.

Data Collection Instrument: Forms for collecting secondary data and questionnaires for patients' interview.

Results: The study revealed that more males are affected than females. Males were 45(61%) while females were 29(39%), (t = -2.398; p =0.019).The population proportion in the refugee camps is 49.4% males and 50.6% females .Females are slightly more than males in the refugee camps. The study also found out that MDR- TB affects more the younger people and adults between age group 15-54 years of the refugee population which represents 66 percent ($X2 = 4.526; P = 0.000$).It also found out that most of the patients were previously treated for TB. This shows that previous treatment for TB is a risk factor for developing MDR- TB (91%), ($X2 = 25.42; P = 0.000$). There is significant difference in education and MDR- TB transmission. MDR-TB transmission mostly occurred in those with none or little education according to this research finding. The uneducated (64%) have knowledge gap in TB/MDR-TB transmission and prevention measure, (t = -16.024; p = 0.000). HIV was not a risk factor for developing MDR- TB in the refugee camps. The study revealed that there was good treatment outcome for those completed treatment as the treatment success rate was over 90 percent. The trend of MDR-TB was increasing over the years from 3 in 2009 to 67 in 2015.

Conclusion: Psychological, financial and other social support is important for patients during their course of treatment. The findings illustrate that efforts should be made to prioritize the development and implementation of effective MDR-TB screening and treatment protocols for the high risk groups e.g. previously treated patients, failures, return after defaulting treatment (RAD) and those who come in to contact with MDR- TB patients, to improve treatment outcome and minize the emergence of Extensive Drug-Resistant TB (XDR-TB).

Key words: Dadaab refugee camp, Garissa, Multi-drug resistant TB, treatment outcomes and trend.

1. INTRODUCTION

Tuberculosis (TB) is a major global health problem. Globally, the absolute number of TB cases are increasing slowly, although the number of cases per capita (usually expressed as the number of cases per 100 000 population) is falling by around 1% per year.

Drug resistant TB is the resistance form of the TB bacilli to anti- TB medications. Drug-resistant tuberculosis has been reported since the early days of the introduction of chemotherapy. It develops. In 2013 the WHO estimated that there are 350,000- 610,000 MDR TB cases around the World (WHO Global TB report 2013) as a result of mismanagement of drug susceptible TB.MDR- TB is a growing public health problem all over world but most in countries with civil strives and broken health system and countries with high incidence of HIV.

In Africa, South Africa has the highest rate of MDR TB followed by Nigeria and Somalia. Somalia has MDR TB prevalence of 5.6% among the new patients and 45.8% among the previously treated patients (WHO, 2011). In Kenya WHO estimate that Kenya has over 3400 MDR- TB cases (WHO global TB report 2012) but so far only about 500 patients have been put on treatment. In Garissa county 233patients have been diagnosed and put on treatment in IFO 1 MDR -TB centre since 2009 (Garissa County annual TB reports 2015).

2. BACKGROUND INFORMATION

Tuberculosis (TB) is a major global health problem worldwide (Sloan and Lewis 2016). Globally, the absolute number of TB cases are increasing slowly, although the number of cases per capita (usually expressed as the number of cases per 100 000 population)is falling by around 1% per year. It continues to be a public health concern in the world (WHO Annual TB reports 2013). It is the biggest killer of younger people and adults in the world today claiming an estimated 800 people a day i.e. 2-3 million people each year (WHO 2005). More than 100,000 children die from tuberculosis (TB) every year and 25% of avoidable adult deaths in the developing world due to TB (WHO Global TB reports 2013). Kenya is among the 22 high TB burden countries that collectively contribute 80% of the world burden (WHO Global TB reports 2013). In 2013 the WHO estimated that there are 350,000- 610,000 MDR TB cases around the World (WHO Global TB report 2013). In Africa, South Africa has the highest rate of MDR TB followed by Nigeria and Somalia. Somalia has MDR TB prevalence of 5.6% among the new patients and 45.8% among the retreatment cases according to prevalence survey carried out by WHO and Somalia National TB Program in 2011 (WHO 2011).

In Kenya WHO estimate that Kenya has over 3400 MDR- TB cases (WHO global TB report 2012) but so far only about 500 patients have been put on treatment. Refugees make 18-20% of drug resistant TB cases (DR TB) in Kenya (NTLD-P report 2015). In Garissa county over 200 patients both local and refugees have been diagnosed and put on treatment in IFO 1 MDR-TB centre since 2009.

The eradication of tuberculosis (TB) has been made more difficult with emergence of Multi drug resistant tuberculosis (MDR-TB) which the World Health Organization (WHO) estimates to be650, 000 cases (WHO report, 2012). The actual number of cases may be a lot higher since surveillance for MDR-TB is difficult due to lack of laboratory resources around the world for testing drug sensitivity which affect both developed and developing nations.

MDR- TB is a growing public health problem all over world but most in countries with civil strives and broken health system and countries with high incidence of HIV.

3. MATERIALS AND METHODS

3.1 STUDY SUBJECTS

The study was conducted in Dadaab Sub County in Garissa County where the IFO Refugee camp MDR- TB centre is located. This centre serves the 5 refugee camps which are IFO 1, IFO 2, Dagahley, Hagadera and Kambios. These refugee camps have a population of about 350,000 according to the Kenya Housing and Population census in 2009.

All the patients from these camps are managed in one centre. The studies participants will be drawn from this centre which is a representative of the camps .The sample population were MDR- TB patients who completed treatment and treatment outcome were assigned and those who were currently on treatment. Those who completed treatment were116 patients from 2009 to 2013 whom an outcome is assigned and currently 74 patients were on treatment (Garissa County TB reports 2015).

3.2 RESEARCH DESIGN

A descriptive retrospective and cross-sectional study design was adopted. The study applied purposive technique where all the records of patients who completed treatment were reviewed and data collected while patients who are currently on treatment were interviewed.

Data was collected using schedule forms for secondary data and structured questionnaires for primary data. The data was edited, classified, summarized, coded, and stored in a Microsoft Excel. Data was analyzed using Statistical Package for Social Sciences (SPSS) version 23. It is presented in tables, graphs and figures in line with the research objectives.

4. RESULTS

4.1 DEMOGRAPHIC CHARACTERISTICS

Gender of Respondents

Demographic characteristic in relation to Multi drug resistant Tuberculosis is presented in table 1. The results indicated that 61 percent of the respondents were males while 39 percent were females. One sample t-test was used to investigate whether the number of male and female MDR-TB cases was significantly different ($t = -2.398$; $p = 0.019$).

Age of respondents

Respondents were asked to indicate their age in years. Results were presented in Table 1 and Figure 1. These results indicate that most of the patients suffering from MDR TB were the younger and adults. These age brackets from 0 to 54 years are mostly affected 70/74 (95%).

Age as a risk factor for developing MDR-TB and category of MDR -TB was tested using cross tabulation and chi square. The results in Table 1 indicate that age and category of MDR- TB were not associated ($\chi^2 = 4.526$; p = 0.606). These results were not significant as the p value was above 0.05 indicating that age was not associated with the category of MDR- TB.

Level of education

These results revealed that generally, the respondents had low level of education. The study also tested the association between MDR-TB and education level using t-test. The median level of education in the study (secondary) was used as the focal point. The results in Table 1 indicate that education was associated with MDR-TB where most of those who had MDR-TB had lower or no education at all (t = -16.024; p = 0.000). This indicates that education helps the patient understand the necessity of self-care and care for the others to minimize spread of the disease among the community members.

Daily income

These results indicated that most of the respondents had little or no daily income. The association between average income per day and MDR TB was also sought. T-test was used where the median income of KES 500 (rated at 2) was used (t –11.191; p = 0.000). The results in Table 1is significant as poverty and MDR-TB are associated.

Table 1: Demographic characteristics of MDR-TB patients

Variable	Classification	Frequency	t-(p-value)	x^2-(p-value)
Gender(N=74)				
	Male	45(61%)	-2.398 (0.019)	
	Female	29 (39%)		
Age (N=74)				
	<14	5(6.7%)		
	15-24	23(31.1%)		
	25-34	25(33.8%)		
	35-44	11(14.9%)		
	45-54	6(8.1%)		4.526(0.606)
	55-64	3(4.1%)		
	>65	1(1.3%)		
Level of Education (N=74)				
	None	47(63.5%)		
	Primary	20(27%)		
	Secondary	5(6.7%)	-16.024(0.000)	
	Tertiary	1(1.4%)		
	University	1(1.4%)		
Daily Income (N=74)				

	None	38(51.4%)	-11.191(0.000)	
	<500	27(36.4%)		
	501-600	4 (5.4%)		
	601-700	4 (5.4%)		
	701-800	0 (0%)		
	>800	1 (1.4%)		

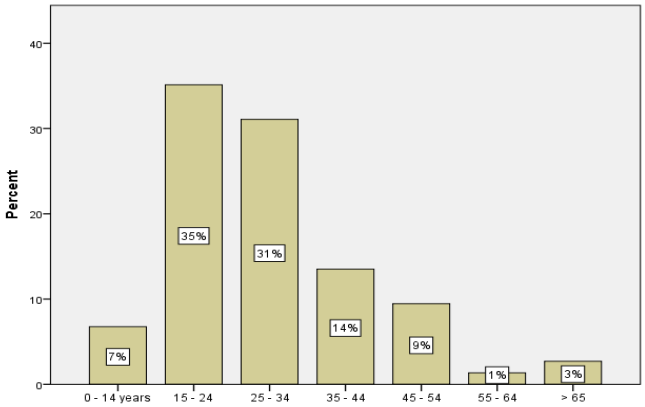

Figure 1: Age of respondents in years

4.2 RISK FACTORS FOR DEVELOPING MDR-TB

Whether there is any member of the family who was treated for TB before

These results indicated that most of those who had developed MDR- TB had at least one family member who had suffered from TB before. The association between Family History of TB and Category of MDR- TB using chi square tests. The results in Table 2 indicated that there was no significant association between family history of TB and category of MDR TB ($\chi^2 = 0.126$; $p = 0.939$).

Previous treatment for TB for the respondent

Results in Table 2 indicate that 91 percent had previously been treated for TB before with only 9 percent having not been previously treated for TB. Chi square test was conducted to establish whether there was any association between previous treatment for TB for the respondent and category of MDR- TB. Results in Table 1 indicates that history of TB treatment and category of MDR- TB were significantly associated ($\chi^2 = 25.42$; $p = 0.000$). These results indicated that being previously treated for TB was a major risk factor of MDR- TB.

Number of times previously treated for TB

The results are presented in Table 2. It indicates that 54 percent of the respondents had been treated more than two times before with only 12 percent indicating that they had been treated once. The findings indicate that there was significant difference between the number of patients who were previously treated for TB and those who were not.

The study also tested the association between the number of times that the respondents had been previously treated for TB and the category of MDR- TB. This was done through cross tabulation and chi square statistics. The results presented in table 4. 21 indicated that there was no association between the number of time the respondents had been previously treated for TB and their category of MDR TB ($\chi^2 = 1.299$; $p = 0.729$).

Observation while taking the Anti-TB drugs

Results in table 2 indicate that 61 percent who had previously taken anti-TB drugs had been under observation while 39percent indicated that they were under no observation. The study also tested the association between observation when the respondent was taking drugs and the category of MDR- TB. This was done through cross tabulation and chi square statistics. The results in Table 1 indicated that there was no association between observation when taking TB medication and Category of MDR TB ($\chi^2 = 0.221$; $p = 0.638$).

Community or family support during initial TB treatment

Respondents who had previously been treated for TB were asked to indicate whether there was any community or family support during their initial TB treatment. The results presented in table 2 indicates that 54 percent did not get any community or family support during initial TB treatment while 46 percent indicated that they had community or family support. Family support was found to be a contributing factor in increasing the cure rate of the cases. This could be due to psychological, financial and other social support the patients were getting from their relatives that increased their feeling of belonging.

The study also tested the association between community or family support during initial TB treatment and the category of MDR-TB. This was done through cross tabulation and chi square statistics. The results in Table 2 indicated that there was significant association between community and family support during initial TB treatment and category of MDR- TB ($\chi2 = 15.02$; $p = 0.015$). These results implied that those who have no community or family support are more prone to relapsing than those who have community or family support.

Missing of TB Drugs during initial TB treatment

Respondents were also required to indicate whether they missed TB medicines during their initial TB treatment. Results in Table 2 indicate that 59 percent had not missed their drugs while 41 percent had missed their drugs during their initial TB treatment. The study also tested the association between missing of TB drugs during initial treatment and category of MDR- TB. This was done through cross tabulation and chi square statistics. The results in Table 2 indicated that there was no significant association between missing of TB drugs during prior treatments and category of MDR- TB ($\chi2 = 1.669$; $p = 0.434$).

Reason for missing anti- TB medicines

Those who had missed TB drugs were also required to indicate the reason behind their missing the medication. The results in Table 3 indicate that 43 percent of those who missed TB medicine were due to drugs unavailability while 24 percent indicated that the prices of the drugs were too high thus making them unaffordable. Those who missed because of side effects were 18 percent, 6 percent said they missed due to expired drugs while 9 percent reported long distance to health facility. Missing the drugs reduces the cure rates and compliance of MDR-TB patients. Continuity of supplies is the most important aspect of concern for TB program all over the world.

Close contact with MDR TB patient before developing MDR-TB

The respondents were also required to indicate whether they had any close contact with people suffering from MDR-TB before they themselves developed MDR-TB. Results are presented in Table 2. The results indicate that 69 percent of the respondents had close contact with somebody with MDR-TB before they developed MDR- TB themselves. Those who had no contact with somebody with MDR-TB were 5 percent while 26 percent indicated that they did not know. These findings indicate that having close contact with a person suffering from MDR-TB is a risk factor of developing MDR-TB.

The study also tested the association between close contact with MDR-TB patients before acquiring MDR- TB by the patient and the category of MDR- TB. The association was tested through cross tabulation and chi square statistics. The results in Table 2 indicated that there was significant association between close contact with MDR-TB patient prior to acquiring TB and category of MDR TB of the respondent ($\chi 2 = 8.108$; $p = 0.017$). These results implied that those who had close contact with MDR -TB patients were at a higher risk of acquiring MDR- TB than those who did not.

Table 2: Risk factors for developing MDR-TB

Variable	Classification	Frequency	X^2(p-value)
Family member previously treatment(N=74)			
	Yes	41(55.4%)	0.126 (0.939)
	No	27 (36.5%)	
	Don't Remember	6 (8.1%)	
Patient previously treatment(N=74)			
	Yes	67(90.5%)	25.42 (0.000)
	No	7 (9.5%)	
No. of times previously treated(N=74)			
	Once	9(12.1%)	1.299 (0.279)
	2 Times	18 (24.3%)	
	> 2times	40 (54.1%)	
	Not treated before	7 (9.5%)	
DOTS (N=74)			
	Yes	45 (61%)	0.221 (0.638)
	No	29 (39%)	
Support during initial treatment (N=74)			

	Yes	34 (45.9%)	15.02 (0.015)
	No	40 (54.1%)	
Ever missed Anti-TB medicines(N=74)			
	Yes	33(44.6%)	1.669 (0.434)
	No	41 (55.4%)	
Contact with MDR-TB case(N=74)			
	Yes	50(67.6%)	
	No	5 (6.8%)	8.108 (0.017)
	Don't Know	19 (25.6%)	

Table 3: Reason for missing Anti-TB medicines

Reason	Frequency	Percent
Drugs unavailability	14	43
Long distance to health facility	3	9
Price too high	8	24
Drugs expired	2	6
Side effects	6	18
Total	33	100

HIV Status

All the respondents were asked to indicate whether they had been tested for HIV. All of them indicated that they had been tested. When asked about their status 95 percent indicated that they were HIV negative, 4 percent indicated that they did not know while 1 percent declined to disclose (Table 4). These results indicating that most of the respondents were HIV negative implied that HIV status is not a risk factor of MDR-TB among the refugee population. The same was also for retrospective study where all the 116 patients whose records were reviewed were HIV negative (100%). Other factors contribute to MDR-TB.

Table 4: HIV Status of MDR-TB patients

HIV Status	Frequency	Percent
Negative	70	95
I don't know	3	4
Declined	1	1
Total	74	100

4.3 CATEGORIES OF MDR-TB PATIENTS

Which category of MDR TB do you fall in?

The respondents were also asked to indicate the category of MDR TB they belonged to. Results in Table 4 indicated that there were various categories of MDR patients in the refugee camp. The results indicate that the majority were those who had failed first line of treatment (42 percent) while those who had a relapse were 24 percent. Those who had failed treatment were 15 percent while those that were new patients were 12 percent. Only 7 percent had returned after default. These results indicated that most of the MDR-TB patients were those

who had been subjected to a prior form of treatment. New cases were very few. The retreatment cases represent the largest category 65/74 (87.8%).

Table 5: Treatment category of MDR-TB patients

Category of MDR TB	Frequency	Percent
New	9	12
Relapse	18	24
Return after default	5	7
Failure of first line treatment	31	42
Failure of retreatment	11	15
Total	74	100

Knowledge on length of treatment course

Respondents were also asked to indicate whether they knew how long they would be on treatment. Results are presented in Figure 4. The results indicate that 86 percent were aware of the length of time they would be on medication whereas 14% percent were not aware. This implied that most of the respondents were well informed of their treatment schedule and duration.

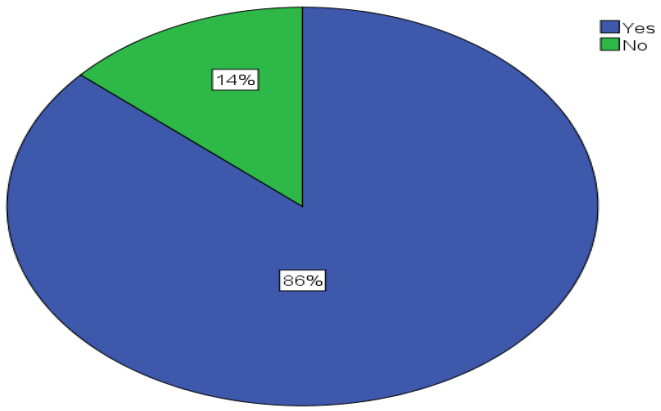

Figure 2: Knowledge on length of treatment course

Treatment outcomes of MDR-TB

The treatment outcomes were assessed from 2009 to 2013 for those patients who completed treatment and an outcome was assigned. In 2009 there were 3 patients and all successfully got cured. In 2010 there were 4 patients and 3 successfully completed treatment and got cured while 1 patient died. In 2011 there were 14 patients registered, 6 got cured (became sputum and culture negative), 6 completed treatment (extra pulmonary cases), 1 defaulted treatment and 1 died. The results are shown in table 5.

Table 6: Treatment outcomes of MDR- TB patients from 2009 – 2013.

Year	Outcome							
	Cured	TC	F	LFTU	Died	Total		TSR (%)
2009	3	0	0	0	0	3		100
2010	4	0	0	0	1	4		75

2011	6	6	0	1	1	14		85.7
2012	21	3	0	0	2	26		92.3
2013	65	2	0	3	2	72		93.1
Total	98	11	0	4	6	119		

Trend of MDR-TB in Dadaab refugee camp

A retrospective study was conducted on the medical records of MDR -TB patients from 2009 to 2015. The trend was first sought and it is presented in Figure 4.5 indicate that the numbers had been increasing from a low of three in 2009 to a high of 72 in 2013. The numbers reduced in 2014 to 47 but increased in 2015 to 67. This indicates a rising trend of MDR TB patients in the refugee camp.

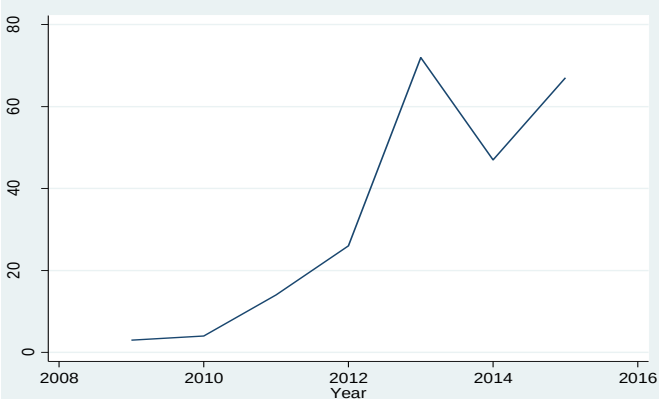

Figure 3: Trend of MDR- TB in the refugee camps over the year

5. DISCUSSION

MDR-TB affected males more than females according to this study. These results are similar to those that were reported by Molly et al (2008) in a study carried out in Peru. Stronger association of being a male sex as a risk factor for MDR-TB is found in other studies such as those undertaken by Faustini et al (2006). WHO (2010) corroborate male gender was associated with the risk of becoming ill with MDR-TB.

In this study, males were 61percent while females were 39 percent. This means that males were at risk for developing MDR-TB than were females due to being out of home most of the time and in overcrowded social places like *miraa (Catha edulis)* chewing dens in the refugee camps.

Age of the respondents was sought and the results indicate that most of the patients suffering from MDR-TB were young and middle age. It is the biggest killer of younger people and adults in the world who are economically productive (WHO report 2013). This is so because the age bracket; 15 to 54 years go out to the markets, farms, learning institutions, offices and travel a lot hence intermingle with the general population more frequently than all others. This exposes them to sources of infection.

Education level of the patients was found to be significant as it helps him/her understand the necessity of self-care and care for the others to minimize spread of the disease among the community members. Individuals with no or low levels of education for example, do not cover their mouths when coughing, spit around and sometimes wipe saliva/sputum on their clothes. These bad habits, which are very common among the Somali community, tend to increase the spread of the condition among and between community members.

Family support was found to play a significant role in the management of MDR-TB cases. Those who indicate received family support during initial TB treatment were less than those with no family support. This means families offer psychosocial support and support treatment schedules of the patients during the course of treatment. Lack of family support has a negative impact on treatment compliance.

The income of the patients was found to be significant among the MDR-TB cases. Most of them had little or no daily income. The income of the individual determines his purchasing power. This could influence the affordability of the drugs and availability of food to boost immunity and recovery of patients.

The study indicates that there was significant difference between the number of patients who were previously treated for TB and those who were not. This implies that previous infection was a precursor to a current infection. A plausible reason for that could be that previous infections lower the individual's resistance to a similar infection in the future. This contradicts the popular belief that active infection plays a role in the development of immunity. This study revealed that 67 percent of patients were previously treated. This study was in agreement with previous study done by Heffner which showed that a history of TB was a strong risk factor of MDR-TB with overall value of 93.8 percent probability. This supports a study conducted by D, Souza.et al (2009) which found strong association of MDR-TB in those falling in TB re-treatment.

The findings indicate that observation of the patient when she/he was taking the drugs had significant importance in ensuring compliance to MDR-TB treatment. 64 percent of the patients reported that they were observed when taking drugs during their initial TB treatment. This means that, possibly, there are other underlying factors that play important roles in increasing cure rates of MDR-TB patients.

Family support was found to be a contributing factor in increasing the cure rate of the cases. This could be due to psychological, financial and other social support the patients were getting from their relatives that increased their feeling of belonging.

There was significant association between acquiring MDR-TB and non-adhering to TB treatment. These results were similar to the study reported by W.S. Law et al (2008). In this study 43 percent of patients who missed TB medicine indicated that drugs unavailability was the reason while 24 percent indicated that the prices of the drugs were too high thus making them unaffordable. Those who missed because of side effects were 18 percent.

Missing the drugs reduces the cure rates and compliance of MDR-TB patients. Continuity of supplies is the most important aspect of concern for TB program all over the world.

6. CONCLUSION

MDR-TB affected males more than females. This means that males were at risk for developing MDR-TB than were females. MDR TB affects more on the younger people and adults between the age bracket 15-54 years who economically productive.

Individuals with no or low levels of education are more prone to develop MDR-TB due to their knowledge gap in mode of transmission and preventive measures. Therefore education of the patient was found to be a significant factor in the spread and management of MDR-TB cases.

The income of the individual determines social status in the community and his purchasing power. Income dictates the type of a house an individual will live in and in which part of the town he/she resides i.e. whether in the posh part of the town or in the slums. Poverty is a predisposing factor for MDR-TB infection and transmission.

Observation of the patient during treatment course is very import to achieve a good treatment outcome. 64 percent of the patients reported that they were observed when taking drugs during their treatment for TB. This means that, possibly, there are other underlying factors that play important roles in increasing cure rates of MDR-TB patients which also need to be considered. Psychological, financial and other social support the patients were getting from their relatives that increased their feeling of belonging.

The researcher is of the opinion that this study will contribute significantly to alleviating the problem of TB and identified risk factors for developing MDR-TB.

7. RECOMMENDATIONS

Recommendation for the authorities for implementation

Since the trend of MDR TB is increasing in the refugee camps, UNCHR and County Government of Garissa have to put interventions to curb the increasing trend of TB and MDR TB in the refugee camps.

Department of health in Garissa County, UNHCR and other health partners to develop a mechanism of care for patients on treatment when repatriating refugees or those who are voluntarily going back to their country.

WHO, UNCHR and Somalia Government should establish diagnostic and treatment facilities in Somalia to stop the refugees crossing to Kenya to seek for services hence spread infection.

Recommendation to service users/beneficiaries

Eating and staying together, sharing rooms and beds between MDR-TB cases and the healthy members of the community should be discouraged. Any chronic cougher should visit a health facility and TB test done. Those who are in close contact with MDR-TB patients should be done periodic screening.

Ventilation or the lack of it plays an important role in the transmission of all air-borne diseases including TB. Majority of the cases reported to live in poor housing conditions. Educating the public on the importance of good ventilation for their houses and good hygiene practices like cough etiquette and disposal of sputum safely reduces transmission. Improving the housing quality for the MDR-TB patients was a necessity to reduce infection transmission among the infected and the healthy.

Educating the patient and family was found to be a significant factor in controlling MDR-TB spread. Therefore, the management of MDR-TB cases needs to educate the cases and their caretakers on how MDR-TB is transmitted and the control measures among the community.

Adherence to treatment protocol is paramount in curing the patient from the infection.

Recommendation for other stake holders

Conduct quarterly meetings to assess the situation in TB and MDR- TB program performance and put measures in place.

Provide resources for training of health care workers on new updates and patients management. Carry out awareness campaigns on TB/MDR- TB in the refugee camps and the host community.

MDR-TB patients need psycho-social support. This will help increase the compliance and cure rate of the patients. This will reduce the prevalence of the cases among the study community and the general population.

Recommendations for further research

Further research needs to be conducted on the following topics:

- Case-control study to assess reasons why males are more at risk of becoming ill with MDR-TB.
- Health system analysis to identify factors that favour the emergence of MDR –TB in the refugee camps.

8. REFERENCES

Ahmad S et.al (2010) .*Drug resistant Tuberculosis, causes, diagnosis and treatment* (1-58).New York. Nova science publishers.

A Faustini, A J Hall, C A Perucci (2006). Risk factors for multidrug resistant tuberculosis in Europe: a systematic review

Bowling A. (2002). Research methods in health: investigating services health and health2nd edition. Berkshire: Open University Press

Fazli Wahab et al (2009) Risk factors for Multidrug resistant Tuberculosis in patients at Tertiary Care Hospital, Peshawar. *Journal of the College of Physicians and Surgeons 2009 Vol. 19 (3): 162-164*

Mosley HW (2008).*Developing a research proposal. African dissertation workshop on population and health. Lecture 1.*Johns Hopkins University. Open course ware http://ocw.jhsph.edu/courses/dissertation.html.2008 (accessed 14 October 2015)

Andrewset.al.(2010) *predictors of multi drug resistant and extensively drug resistant tuberculosis in high prevalence communities*. PLoS ONE

Birman, D. (2009) *Ethical issues in research with migrants and refugees*.

Casal, M. et al. (2005) *"A case control study of multi drug resistant Tuberculosis, risk factor in four European counties, Microbial drug resistant 11*(1): pp 62-67.

Daniel W. editor.7th ed. New- John Wiley & Sons 1999.*Biostatistics: a foundation for analysis in the health Sciences*

Dr Robert K.(1882) *Lecture on discovery of Mycobacterium Tuberculosis*, Berlin University.

Moore et al. (2008`) the infectiousness of Tuberculosis patients co infected with HIV PLoS medicine 5(9) 188

Nguyi, S. et al. (2010) Drug resistant Tuberculosis, causes, diagnosis and a treatment (1-58). New York: Nova science publishers

Kothari (2002).*Research Methodology, methods and techniques*. New age international publishers

Kliiman, K. and Altraja, A. (2009) predictors of extensively drug resistant tuberculosis "Annal of internal medicine 150(11): 766-755

Lin et al. (2012). *identifying multi drug resistant tuberculosis transmission hot spots using routinely data "tuberculosis* 16(3): 2773-279

Richardson et al (2009), *Multi drug resistant tuberculosis in the west*. European and United States, .Epidemiology, surveillance, clinics in chest clinics 30(4) 637-665

Mugenda, A. (2003), Research methods, quantitative and qualitative approaches: Acts press, Nairobi

Fitzpatrick et al (2010*).Nationwide survey on the prevalence of MDR TB among new smear positive pulmonary patients*, WHO report 2011.

World Health Organization (1993) declaration of TB as global emergency. Geneva

WHO TB global TB report 2012www.who.int/tb/publications/global report/en/ Accessed 18/4/2016

WHO global TB reports (2013)www.who.int/tb/country/data/visualization/enAccessed 18/04/2016

Xu et al. (2012), Tuberculosis in China "*The New England Journal of Medicine* 366 (23)-2161-2170

Garissa County Annual TB reports 2015, Accessed 24/03/2016