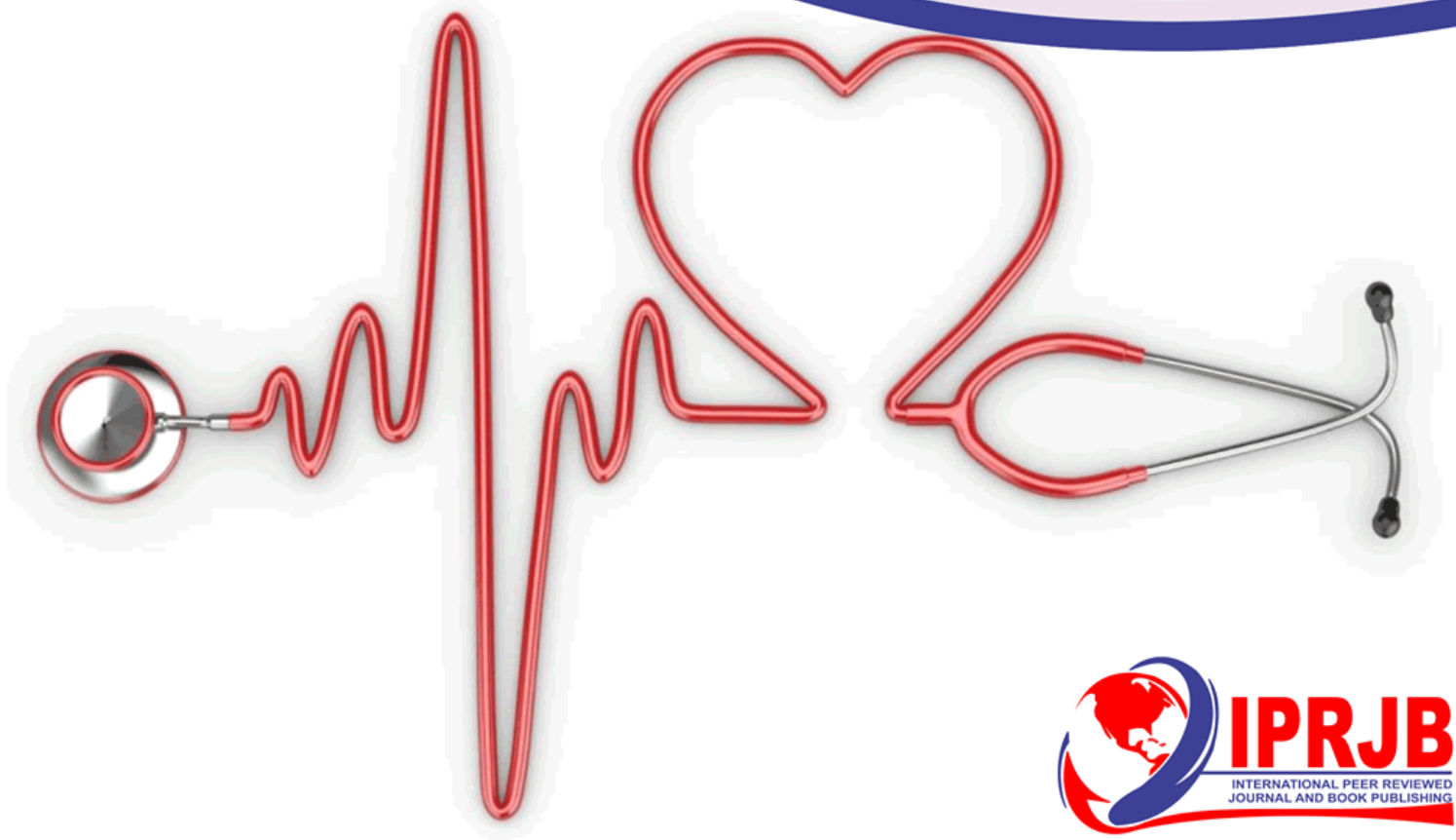


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## **FACTORS AFFECTING TREATMENT COMPLIANCE AMONG TYPE 2 DIABETES PATIENTS ON FOLLOW-UP AT MOI TEACHING & REFERRAL HOSPITAL**

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**FACTORS AFFECTING TREATMENT COMPLIANCE AMONG TYPE 2  
DIABETES PATIENTS ON FOLLOW-UP AT MOI TEACHING & REFERRAL  
HOSPITAL**

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**Abstract**

**Purpose:** this cross sectional study sought to identify the factors associated with diabetic treatment compliance among type 2 diabetes patients on follow up at Moi Teaching and Referral Hospital, Eldoret Kenya.

**Methodology:** Data was collected using self administered questionnaire consisting of closed ended questions was used during the interviews together with Morisky's eight question instrument was used. Test of significance were at 95% confidence level.

**Findings:** A total of 137 self-administered questionnaires were given to patients who were on follow-up at MTRH diabetic clinic during the study period and there was 100% response rate. 51.8% were female while 48.2% were male. Majority were aged 25 – 39 years (48.2%). 65% were single and 22.6% were married. Over 46% had attained diploma and above in education and about half (48.2%) were unemployed while 40.9% were employed. Income shows that 43.1% were earning between KSh. 10,000 – 49,999. Except for occupation that was with statistically significant difference ( $\chi^2=7.0$ ;  $p = 0.03$ ), there were no significant differences between patients with low and medium/high adherence for the remaining socio-demographic variables.

**Unique contribution to theory, practice and policy:** The research recommends that health care workers should enhance health education whereas Hospitals should have guidelines in patient teaching.

**Keywords:** *Adherence, Compliance, Diabetes Mellitus, Factors, Treatment.*

## **1.0 INTRODUCTION**

Diabetes type two occurs when the body is not able to produce enough insulin to enable it function properly, or the body's cells do not react to insulin. This means that glucose remains in the blood and is not used as fuel for energy. Most studies on diabetes have taken place in Kenya's teaching and national referral hospitals, Moi Teaching and Referral Hospital in Eldoret and Kenyatta National Hospital (KNH) in Nairobi. These studies have focused mainly on the complications of diabetes. As the Ministry of Health devolves the management, planning and implementation of health policy to the Counties, the need for rural health facility-based research has become a necessity to guide health policy at the local level. With the devolution of Kenya's Ministry of Health (MOH) there should be clear guidelines on standards of diabetes care in the delivery of health services and the interventions need to be laid down according to evidence-based guidelines and best practices to improve outcomes of diabetic patients. This study sought to identify both met and unmet standards in diabetes care.

### **1.1 Specific Objectives**

- i. To establish the association between individual factors and mean adherence levels.
- ii. To determine the mean effect of factors on anti diabetic drug compliance.
- iii. To determine the predictors of adherence to anti diabetic treatment.

## **2.0 METHODS AND MATERIALS**

A descriptive cross-sectional design was used in this study. Data was collected from patients who had type 2 diabetes mellitus on factors affecting treatment compliance. Information on both the independent and dependent variables were collected at the same point in time. All patients with a diagnosis of diabetes type 2 who presented at Moi Teaching and Referral Hospital diabetic clinic during the period of study constituted the study population.

This was a cross-sectional study. The study population was all the 2160 patients attending the diabetic out-patient clinic at Moi Teaching and Referral Hospital (MTRH) Eldoret, Kenya. A sample size of 137 patients participated in the study and convenience sampling procedure was used. In this case subjects are selected from the MTRH diabetic clinic, because it was easily accessible to the researcher. Patients who were attending the diabetic clinic at MTRH were picked continuously as they tripled in to the clinic from 8:00am through 2:00pm on Monday, Thursday and Friday for the period of study. The sample size was achieved after on the fourth week and all the 137 participants had filled the questionnaire. Those who could not respond due to one reason or the other were

replaced with the next immediate patient until the desired sample size was achieved.

### **2.1 Data Collection and Analysis**

Prior to conducting the study, approval was sought from the Institutional Ethical Review Committee (IERC) of Masinde Muliro University of Science and Technology, where logistical and ethical considerations were included, as well as from the Administration of Moi Teaching and Referral Hospital in which the study was conducted. Furthermore, approvals were sought from the National Commission for Science, Technology and Innovation (NACOSTI).

Data was collected by the researcher and one assistant trained on data instruments. A questionnaire consisting of closed ended questions was used during the interviews together with Morisky's eight question instrument (MMAS-8) was used. The structured data collection instrument information regarding patient's social demographic characteristics was used. The estimated time used to complete one form was approximately 15 minutes; data was collected within a period of one month at MTRH diabetic clinic during clinic days i.e., Tuesdays, Wednesdays and Fridays.

The data collection tools were personally distributed to the respondents by the researcher and his assistant. Data collection started with self-introduction and overview of the research including the study objectives. Explanations were given to respondents as required and the questionnaires were administered after signing the consent form. After entry into a data base, SPSS version 21.0 was used to analyze the data. Descriptive statistics i.e., mean, mode, median, range, standard deviation and frequency distributions were used to summarize the data. Generalized linear model (GLM) was used for categorical independent variable (with two or more categories) and a normally distributed interval dependent variable (calculated mean of adherence to treatment).

## **3.0 FINDINGS AND DISCUSSIONS**

### **3.1 Response Rate**

A total of 137 self-administered questionnaires were given to patients who were on follow-up at MTRH diabetic clinic during the study period. All the questionnaires were filled completely giving 100% response rate. The response rate was sufficient and represents the whole population and therefore the response rate of 100% in this study was quite reliable.

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

This section identifies the demographic information of the respondents which include age, gender, marital status, level of education, occupation and income. These characteristics

are important for the fact that they are known to influence the variables of any given study.

The gender of the participants should be considered because diabetes can cause erectile dysfunction in men. Age is an important factor since the young see themselves as still productive and need to do more in the society hence positive adherence. Marital status is also important factor since a spouse can remind the partner to take medicine and to attend clinics when needed. Level of education, education and income can influence medication adherence since it informs the respondent's suitability to answer questions, knowledge on diabetes and prevention of complications and ability to purchase prescribed drugs.

Table 1 below shows patient characteristics by medication adherence. The participant response rate was 100% (137/137). All the participants completed MMAS-8 questionnaires. Slightly more than half (51.8%) were females compared to 48.2% males. Most of the participants were aged 25 – 39 years (48.2%). Almost two-thirds (65%) were single. This was followed by 22.6% who were married. According to patient's level of education, the leading had attained diploma level (46%) closely followed degree level (40.9%). Regarding their occupation, about half (48.2%) were unemployed while 40.9% were employed. Results on range of income shows that 43.1% were earning between KSh. 10,000 – 49,999.

Except for occupation that was with statistically significant difference ( $\chi^2=7.0$ ;  $p = 0.03$ ), there were no significant differences between patients with low and medium/high adherence for the remaining socio-demographic variables. Majority of those who were employed (89.3%) were categorized under low adherence in contrast to 10% with medium/high adherence for the same category.

**Table 1 Patient characteristics according to medication adherence categories**

Patient characteristics	Total number of patients (%)	Medication adherence score (%)		$\chi^2$	p value
		Low (MMAS-8) <6	Medium and High (MMAS-8) $\geq 6$		
<b>Gender</b>					
Male	66 (48.2)	52 (78.8)	14 (21.2)	0.0001	0.99
Female	71 (51.8)	56 (78.9)	15 (21.1)		
<b>Age group (years)</b>					
18 - 24	35 (25.6)	28 (80.0)	7 (20.0)	0.05	0.97
25 - 39	66 (48.2)	52 (78.8)	14 (21.2)		
$\geq 40$	36 (26.3)	28 (77.8)	8 (22.2)		
<b>Marital status</b>					
Single	89 (65.0)	67 (75.3)	22 (24.7)	2.0	0.36
Married	31 (22.6)	26 (83.9)	5 (16.1)		
Other (Widow, divorced)	17 (12.4)	15 (88.2)	2 (11.8)		
<b>Level of education</b>					
Secondary	18 (13.1)	15 (83.3)	3 (16.7)	0.26	0.88
Diploma	63 (46.0)	49 (77.8)	14 (22.2)		
Degree	56 (40.9)	44 (78.6)	12 (21.4)		
<b>Occupation</b>					
Unemployed	66 (48.2)	46 (69.7)	20 (30.3)	7.0	0.03
Self-employed	15 (10.9)	12 (80.0)	3 (20.0)		
Employed	56 (40.9)	50 (89.3)	6 (10.7)		
<b>Income (KSh.)</b>					
<5000	26 (19.0)	19 (73.1)	7 (26.9)	2.4	0.5
5000 - 9999	29 (21.2)	21 (72.4)	8 (27.6)		
10000 - 49999	59 (43.1)	48 (81.4)	11 (18.6)		
$\geq 50000$	23 (16.8)	20 (87.0)	3 (13.0)		

### 3.3 Relationship between socio-demographic characteristics and mean adherence levels

Mean adherence measurement was calculated by adding up all the eight (8) items in the Morisky's Measurement questionnaire and the total figure was divided by eight. A mean

of 0.0 was considered as high adherence while a mean of 1 or 2 was considered as medium level of adherence and a mean greater than 2 was considered as low adherence. Results show that the difference in mean adherence to treatment is not statistically significantly different for each of the socio-demographic variables except for occupation where the difference between the mean MMAS-8 treatment for the unemployed patients was statistically significantly higher ( $0.49 \pm 0.22$ ) than that of those who were either self-employed or employed ( $0.38 \pm 0.26$ ) with a p value of 0.011. Although significantly higher, the MMAS-8 adherence level is still low.

**Table 2 Generalized Linear Model analyses on socio-demographic characteristics and mean adherence levels**

Patient characteristics	Total number of patients	Mean MMAS-8	SD	F	p value
<b>Gender</b>					
Male	66	0.47	0.24	0.8	0.37
Female	71	0.43	0.26		
<b>Age group (years)</b>					
18 – 39	101	0.44	0.24	0.02	0.88
≥40	36	0.45	0.27		
<b>Marital status</b>					
Single	89	0.41	0.25	1.44	0.23
Others (Married, Widow, divorced)	48	0.46	0.24		
<b>Level of education</b>					
Secondary or Diploma	81	0.45	0.27	0.07	0.79
Degree	56	0.44	0.22		
<b>Occupation</b>					
Unemployed	56	0.49	0.22	6.59	0.011
Others (Self-employed or Employed)	81	0.38	0.26		
<b>Income (KSh.)</b>					
< 10000	55	0.47	0.27	0.71	0.40
≥10000	82	0.43	0.23		

### 3.4 Generalized Linear Model analysis on treatment factors and blood sugar levels and MMAS-8

Generalized linear models were used with MMAS-8 total score as the outcome variable. There was no significant difference in the mean MMAS-8 treatment score for duration of diabetes mellitus, type of treatment, glycated hemoglobin level. Notably, all the mean score for each of the dichotomous variables on treatment factors suggest low level of adherence as the means are all below 0.6.

**Table 3 Generalized Linear Model analyses on treatment factors and blood sugar levels and MMAS-8**

<b>Treatment factors</b>	<b>Total number of patients</b>	<b>Mean MMAS-8</b>	<b>SD</b>	<b>F</b>	<b>p value</b>
<b>Duration with DM</b>					
<1 year	58	0.47	0.24	0.6	0.44
≥1 year	79	0.43	0.26		
<b>Type of treatment</b>					
Pills	78	0.44	0.24	0.09	0.77
Injectable or both	59	0.45	0.26		
<b>Glycated Hemoglobin Level (mmol/L)</b>					
≥10.2 (uncontrolled)	20	0.51	0.20	1.36	0.24
<10.2 (controlled)	117	0.43	0.26		

### 3.5 Comparison of mean values of low and medium/high treatment adherence by domains

Results show a statistically significant difference between MMAS-8 mean score for external environment. This suggests that external environment significantly influences treatment adherence by increasing levels of adherence. On the contrary, health care system ( $p = 0.51$ ), internal environment ( $p = 0.48$ ) and medication system ( $p = 0.70$ ) resulted in non-statistically significant difference between the mean MMAS-8 score. Thus, there is insufficient evidence to suggest that health care system, internal environment and medication system do change the mean MMAS-8 score on treatment adherence.



**Table 4 Comparison of mean values of low and medium/high treatment adherence by domains**

Domain	MMAS-8	N	Mean of domain				t	p value
			Mean	Minimum	Mean	SD		
External environment	Low <6	108	1.8	1.70	1.84	0.4	2.5	0.01
	Medium or High $\geq 6$	29	2.0	1.83	2.07	0.3		
Health care system	Low <6	108	1.7	1.64	1.78	0.4	0.7	0.51
	Medium or High $\geq 6$	29	1.8	1.64	1.88	0.3		
Internal environment	Low <6	108	1.8	1.76	1.90	0.4	-0.71	0.48
	Medium or High $\geq 6$	29	1.8	1.64	1.91	0.3		
Medication system	Low <6	108	1.7	1.64	1.78	0.3	-0.39	0.70
	Medium or High $\geq 6$	29	1.7	1.55	1.81	0.3		

### 3.6 Multiple linear regression analysis on factors influencing MMAS-8

Regression model was fitted to assess the relationship between external environment, health care system, internal environment, medication system and MMAS-8 score on adherence to treatment. Each predictor was tested while holding other predictors in the model constant. This statistical control that regression provides is important because it isolates the role of one variable from all of the others in the model. The equation shows that the coefficient for external environment is 0.14 which implies that for every additional unit in external environment (being encouraged by family to take medicine, work/home/hospital environmental) adherence level increases by an average of 0.14 with the relationship being statistically significant ( $p = 0.02$ ). Health care system ( $b=0.12$ ) is marginally significantly ( $p = 0.08$ ) associated with adherence to treatment. For every additional unit in health care system mean score (accessibility to hospital, long waiting time, difficulties in getting physician, being not satisfied with clinic visits) adherence level increases by an average of 0.12.

On the other hand, age, level of education, attitude and marital status which are considered as internal environment ( $b=-0.01$ ) had no effect on treatment compliance ( $p = 0.83$ ). Similarly, domain on medication system ( $b=0.01$ ) which includes route of administration of anti-diabetics, storage methods, side effects of medications, duration of treatment and treatment complexity is not a predictor of treatment adherence ( $p = 0.87$ ).

**Table 5 Predictors of treatment adherence among diabetes mellitus type 2**

Independent variables	Estimate	t value	p value
External environment	0.14	2.29	0.02
Health care system	0.12	1.78	0.08
Internal environment	-0.01	-0.22	0.83
Medication system	0.01	0.17	0.87

#### **4.0 SUMMARY, CONCLUSSION AND RECOMMENDATIONS**

##### **4.1 Summary**

This study focused on the factors affecting treatment compliance among type 2 diabetes patients on follow-up at Moi Teaching and Referral Hospital, Eldoret.

##### **4.2 Conclusion**

Majority of the patients (72%) had poor drug compliance. While this might point to lack of attention the patients with diabetes give to their condition, it may also imply limitations in the diabetes care or services in MTRH, and most likely the methods used in patient education and counseling on the importance of strict adherence to their treatment regimen. The study findings of non-adherence are also most likely to be due to patients being conservative due to the fact that this was based on patient recall which is prone to errors. Finding on external environment adherence level increases by an average of 0.14 with the relationship being statistically significant ( $p = 0.02$ ).

##### **4.3 Recommendations**

MTRH doctors, nurses, clinical officers and other officers should target especially the employed patients and enhance health education them on the need for treatment compliance including the effects of non-compliance to the overall health outcomes. External factors (being encouraged by family to take medicine, work/home/hospital environmental) should be enhanced since it has shown positive impact on compliance. Further studies need to be conducted with a much larger sample size in several other hospitals within Uasin Gishu County.

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