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Research Article

Patients' Compliance with Tuberculosis Medication in Ghana: Evidence from a Periurban Community

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Globally, an estimated 2 million deaths occur every year as a result of tuberculosis. Ghana records over 46,000 new cases annually despite numerous efforts to curb the disease. One major challenge associated with the control of the disease is patients' noncompliance with medication. Despite the noncompliance setback, not much information is available on the issue. This paper, therefore, examines patients' compliance with medication at the Suhum Kraboa Coaltar District in Ghana. A cross-sectional descriptive study was carried out using interview schedules. Data were primarily retrieved from 40 treatment supporters, in addition to 110 previously treated persons registered in 2010 and 2011 with cases of pulmonary tuberculosis. Evidence from the study indicates that 63 percent of the previously treated persons complied with medication which is below the expected national target of at least 85 percent. However, those with treatment supporters significantly complied with medication. Depression, substance abuse, financial problems, and long duration of treatment were other issues that discouraged patients' adherence to medication. Some patients also attributed supernatural explanations to the source of the disease which negatively affected compliance. Conclusively, future approaches aimed at controlling/eradicating tuberculosis in the district should consider counselling, economic empowerment packages, and detailed education for patients.

1. Introduction

One-third of the world's population is infected with tuberculosis (TB) with nearly 2 million deaths occurring each year. Among those infected annually, more than 1.5 million occur in Sub-Saharan Africa [1]. In Ghana, about 46,000 cases are reported in health facilities yearly, but the treatment of the disease had been erratic since 1900 until the introduction of TB services in 1959 [2]. Many infected people apply both homeopathic and allopathic medicines as treatment since 1900, but the World Health Organization has recommended medicines for treatment [3, 4]. After diagnosing someone with the disease, chemotherapy is administered to interrupt transmission to others [5]. Ghana adopts the directly observed treatment strategy (DOTS) when a case is identified. Initially, multiple doses were given for treatment between eight and eighteen months until the introduction of fixed dose combination (FDC) in which two or more drugs are combined to form a single tablet. FDC involves the amalgamation of first-line drugs: ethambutol, isoniazid, rifampicin, and pyrazinamide into one dosage [3]. Initial treatment duration is six months for all new cases with intensive phase of two months and continuation phase of four months. Patients are usually assigned a treatment supporter who supervises the in-take of medication to prevent cases of default [6, 7]. From 1960 to 1990, programmes designed to combat TB in the country decreased. However, in 1994, a National TB Control Programme began with the aim of eradicating the disease from the country through set of related activities and services such as free supply of drugs to patients [1, 3, 8].

Despite all efforts to eradicate the disease, TB persists in the country largely because of patients' noncompliance with medication [9–12]. Studies in New Juabeng Municipality, Tamale Metropolitan Assembly, and Agogo in Ghana identified patients' noncompliance with medication as a challenge [9–12]. With the inception of the community TB care in the Eastern Region of Ghana in the year 2007, Suhum Kraboa Coaltar District has achieved a compliance rate of 70 percent in 2009 and 71 percent in 2010 which is below the national

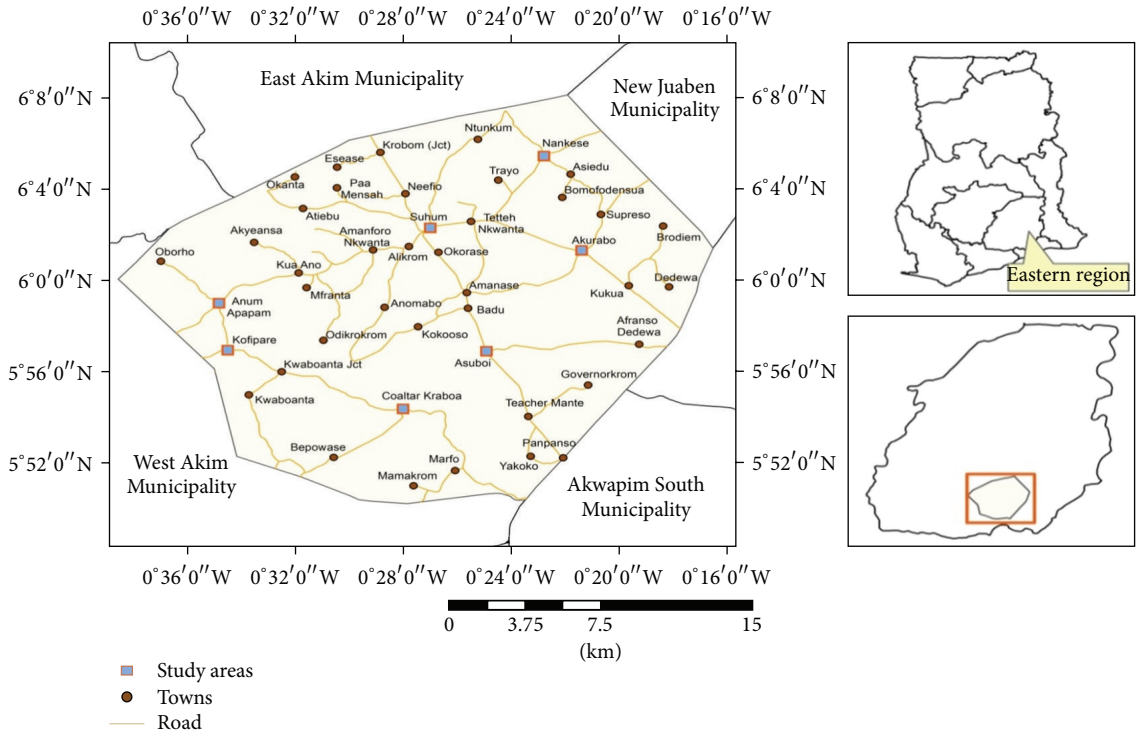

Figure 1: Map of Suhum Kraboa Coaltar District. Source: Cartographic Unit, Department of Geography and Regional Planning, UCC (2013).

target of at least 85 percent [11, 13, 14]. Patients' noncompliance with TB medication is gradually becoming a health burden in the country, but most studies focus on the medical aspects of the disease rather than looking at it from a social viewpoint [10, 13]. Patients' noncompliance with medication is a behavioural issue which requires research to generate knowledge that would help District Health Management Teams (DHMT) to design effective approaches to solving the problem. This paper, therefore, examines indices influencing patients' compliance with medication, using Suhum Kraboa Coaltar District in Ghana as the study setting.

2. Theoretical Guide

Patients' compliance with medication is well understood in the context of self-determination theory, because it considers individual and societal matrixes in explaining behaviour. Self-determination theory postulated by [15] measures a person's inherent resources for personality development and regulation of behaviour. According to the theory, society has persistent effects on the motivation and psychological well-being of an individual to perform behaviour. However, this is mostly reliant on the innate psychological needs of the person, namely, self-perceived competence, autonomy, and relatedness. An individual first perceives himself/herself as competent and gets intrinsic motivation to perform a particular behaviour. For behaviours that are not intrinsically motivated, the individual adapts to his/her existing values and needs. In the social context, an individual's feeling of relatedness to "significant others" influence behaviour. Thus people who are important to the person in question provide motivation which becomes a function of his/her innate capability to perform behaviour. For instance, a patient's family member (treatment supporter) may influence the patient to either take or neglect his/her medication depending on whether the family member is revered by the patient. Therefore, greater internalisation is associated with the ability to comply with medication given the importance of motivation in producing lasting behavioural change. Autonomy refers to the extent to which behaviour is performed under volition. The theory considers that performing behaviour is not a matter of using force, but rather a person "marries" views from revered people with his/her own values and needs before performing behaviour. It may signify a situation where patients take independent decisions to comply with medication after they have received motivation from treatment supporters [16].

3. Data and Methods

The study was conducted in the Suhum Kraboa Coaltar District in the Eastern Region of Ghana (Figure 1). The district has a population of about 167,551 people comprising 82,402 males and 85,149 females [17]. A cross-sectional descriptive study was conducted after reviewing patients' records for 2010 and 2011 in the district [13]. The total number of registered patients was 127; but 17 had died and hence were exempted from the study. The remaining 110 previously treated persons together with 40 available treatment supporters were contacted for interview schedules. The data collection instruments (interview schedules) were reviewed

by the University of Cape Coast Ethical Review Board before they were administered. Factors affecting patients' compliance with medication, roles played by treatment supporters and background characteristics of respondents were the main issues discussed in the interview schedules. Eight research assistants from the Social Science Faculty in the University of Cape Coast were recruited and trained for the collection of data. The training lasted for two days and centred on issues relating to the objectives of the study, contents of the survey instruments, recording of data, and observing community entry protocols.

Ethical considerations and translation of instruments into Twi language which was widely spoken by most respondents were discussed during the training. Pretesting of the interview schedules was conducted in the West Akim District in the Eastern Region from 16 to 18 October 2013. West Akim District was chosen because it is a Twi-speaking community and has a number of tuberculosis patients with similar characteristics as the study area. Ten tuberculosis patients were randomly selected for the pretest using the West Akim district tuberculosis register and the results showed that the content of the interview schedule was comprehensive. The actual fieldwork took place from 16 November 2013 to 7 January 2014. Right of entry into the community was gained after sending an advanced letter to the Suhum Kraboa Coaltar District Director of Health Administration. The District Tuberculosis Coordinator introduced the researchers to the subdistrict heads to assist in locating the houses of the previously treated patients for the collection of data. After establishing a rapport with the patients, informed consents were sought before the administration of the interview schedules. Patients were assured of confidentiality and the services of a counsellor were employed in case of any unexpected psychological discomfort. Data were made anonymous by using codes on the interview guides instead of names and phone numbers. Epi Info software version 3.4.2 was used to analyse the data. Frequency distribution tables for all variables were run to identify and correct missing values. Write and merge commands were used to merge patients and treatment supporters' interview schedules. Frequency tables, cross tabulations, chi-square, and independent sample t-test were the main statistical applications used in the study. One major challenge during the data collection was that most of the respondents had changed their locations. This challenge was overcome after telephone numbers were collected from neighbours and various calls were made to meet the study participants.

4. Results and Discussion

4.1. Background Characteristics of Previously Treated TB Patients and Treatment Supporters. Wide disparity in background characteristics between patients and their treatment supporters can affect acceptance of health directives provided by the treatment supporter [8, 9]. Specific background characteristics of respondents captured in the study were sex, age, educational attainment, marital status, and main occupation (Table 1). The results show that males who were previously treated (71%) were more than females (29%). This confirms the findings of [5, 11] that male TB patients are more than females in many districts in Ghana. In contrast, more than half (58%) of the treatment supporters were females (Table 1).

Table 1: Background characteristics of respondents.

Background characteristics	Previously treated patients (%) ($N = 110$)	Treatment supporters (%) ($N = 40$)
Total	73.3	26.7
Sex		
Males	71.0	42.5
Females	29.0	57.5
Age (years)		
<20	4.5	0.0
20–29	14.6	7.5
30–39	24.4	20.0
40–49	29.0	42.5
50–59	15.6	22.5
60+	11.9	7.5
Highest level of education attained		
No formal education	8.2	10.0
Primary	20	10.0
Middle/JHS/JSS	62.7	42.5
Senior secondary/SHS	9.1	15.0
Tertiary	0.0	22.5
Marital status		
Never married	28.2	12.5
Married	58.2	75.0
Divorced	9.1	0.0
Widowed	4.5	12.5
Main occupation		
Farmer	50.9	47.5
Trader	16.9	12.5
Artisan	15.5	0.0
Unemployed	16.7	15.0
Public servant	0.0	25.0

Source: fieldwork, 2013.

Their ages ranged from 18 years to 79 years and their mean age was 44 years. Similar to our findings, [11] reported a mean age of 35 years in their study in the Eastern Region of Ghana. The most populous age group among the respondents was 40–49 years. Twenty-nine percent of the previously treated TB patients were aged between 40–49 years while 43 percent of the treatment supporters were aged within the same age cohort (Table 1). This is an indication that treatment supporters were relatively older than the previously treated TB patients and hence positively influenced compliance with medication as supported by the findings of [9]. The highest percentage of the previously treated TB patients (63%) and their treatment supporters (43%) had attained at least middle/junior high/junior secondary school (Table 1). Table 1 shows that majority of the respondents were married,

but more treatment supporters (75%) were married compared with previously treated TB patients (58%). Reference [9] also found that more patients and treatment supporters are married in Ketu Municipality.

Farming was the dominant occupation among the respondents, but more previously treated TB patients (51%) were engaged in farming compared with the treatment supporters (48%). This is consistent with the 2010 Population and Housing Census of Ghana which indicate that more than half of the people in the Suhum Kraboa Coaltar District engage in agriculture [17].

5. Patients' Compliance with Tuberculosis Medication

It is often held that compliance with tuberculosis treatment is influenced by background characteristics of patients [10, 18]; but the chi-square tests show that there were no significant relationships between patients' background characteristics (sex, age, educational level, marital status, and occupation) and compliance with medication. Nonadherence to TB medication was found among a substantial proportion of the previously treated patients. In general, 63 percent complied with their medication and had been consequently declared cured while the remaining 37 percent defaulted and were being treated after failure. In a study of New Juabeng Municipality in Ghana, 62 percent of the respondents similarly complied with medication [11]. Our findings show 22 percent failure in compliance using Ghana's expected compliance rate for 2008 as the baseline. Found explanations to this are that more than three-quarters of the patients were burdened with financial problems (77%) as many had to still engage in active work (particularly farming) for survival. Sometimes, their working activities made them either miss the correct times to take their medicines or visit a health centre for injections. Claims of financial burden on households infected with TB were correspondingly reported by [19] in a study of the Western Region of Ghana. Other ramifications such as depression (46%), alcoholism (24%), smoking of cigarettes (11%), and long duration of treatment (26%) were identified as other factors affecting patients' adherence to medication. Some patients resorted to drinking of alcohol and smoking as means of managing depressions resulting from the disease. As they become intoxicated, they usually miss the indications of their medicines because treatment supporters did not have the required expertise in managing such behaviour which consequently affected adherence to medication. Others (17%) complained that the duration for treatment is too long and hence they are tempted to ignore their medicines when they begin to feel better. This emphasizes the findings of [3] that treatment period was initially too long for patients until the introduction of a fixed dose combination therapy.

Despite the point that people accept the "germ theory" of disease causation, people had spiritual explanations to why the disease occurred at that particular point in time. Slightly less than a quarter (24%) proclaimed that their infection was caused by "witchcraft" and hence 19 percent visited spiritual/fate healers for spiritual healing. Spiritual centres such as churches and shrines were consulted with the hope of finding spiritual remedies to the disease. This led to noncompliance with medication depending on their surety of cure from these spiritual sources. This confirms the works of [12, 20] in Ghana. They found that some diseases have been given supernatural explanations. In line with the self-determination theory, this group of defaulters made decisions based on their needs and beliefs.

There were variations in compliance with regard to age differences. Patients' compliance with medication increased from 56 percent among those aged 20–29 years to 71 percent among those aged 60 years and above. Our findings suggest that aged patients adhere to their medications more than young patients which echo the submissions of [11, 21] that older people comply with medication more than younger people. Education promotes good health not only by generating economic resources through better employment but also by providing knowledge and skills by which people are able to manage illnesses and diseases themselves [22, 23]. Conversely, 89 percent of patients who had no formal education complied with medication compared with those who had attained some form of formal education. Similar findings were revealed by [12] in their study of Agogo in Ghana. Possible explanation to this is that those uneducated benefited more from the services of treatment supporters.

More patients who had never married (68%) complied with medication compared with those who were married (59%). From this finding, marriage does not relatively serve as a form of social support for compliance with medication. This corresponds with findings of [24] that marital status is not a sole predictor of health behaviour. However, the findings contradict a study conducted by [9] in Ghana where marriage was found as a stimulus for compliance with medication. Reference [22] argues that females are naturally more likely to utilise health care services than males. Likewise, more females (69%) than males (63%) complied with medication, although the margin of difference was small. This conforms to findings of [25] that women make a greater use of health care resources than men. In addition, more than three-quarters of respondents who were unemployed (83%) complied with medication compared with farmers (61%), traders (55%), and artisans (65%); purporting that work negatively affects compliance with medication. The findings provide useful knowledge about socioeconomic and psychological factors affecting patients' compliance with medication. A limitation was that the previously treated patients were cases of only pulmonary tuberculosis (PTB). Subsequent studies can consider people who have experienced relapses, new episodes of TB strains, and HIV to ascertain whether there would be differences in compliance.

6. Effects of Roles Played by Treatment Supporters on Patients' Compliance with Medication

In many developing countries, tuberculosis treatment services reach a small proportion of the population because of inadequate health service infrastructure [26]. This prompted interest in assessing the contribution of Community Tuberculosis Care (CTC) to curtailing the disease. CTC which is

Table 2: Roles of treatment supporters by patients' compliance with medication.

Roles of treatment supporters and their effects on patients' compliance with medication ($N = 110$)	Mean	Standard deviation	T value	Significant level ≤0.05	Degree of freedom
Directly observed therapy by health professional***			2.619	0.010	108
Compliant	1.59	0.495			
Noncompliant	1.34	0.480			
Treatment supporter accompany patient to fetch medicine			1.977	0.065	35
Compliant	1.26	0.447			
Noncompliant	1.60	0.516			
Regular visit of patient by treatment supporter***			4.733	0.000	108
Compliant	1.13	0.339			
Noncompliant	1.51	0.506			
Treatment supporter serve patient with medication***			5.534	0.000	108
Compliant	1.32	0.469			
Noncompliant	1.80	0.401			
Treatment supporter reminds patient of clinic days***			3.258	0.001	108
Compliant	1.45	0.501			
Noncompliant	1.76	0.435			
Treatment supporter advise patient on the in-take of medication***			3.357	0.001	108
Compliant	1.32	0.469			
Noncompliant	1.63	0.488			

Source: fieldwork, 2013; *** significant.

quite an extension of DOTS envisages that when community members are trained they could provide DOT at the community level. This strategy makes TB services accessible beyond a health facility which is very crucial [14]. Therefore, we used independent sample t-test to compare significant differences between roles played by treatment supporters and patient's compliance with medication. Results in Table 2 point out that patients who were offered DOT by a health professional in a health centre significantly [$t(108) = 2.619$; $P = 0.010$] complied with their medication ($M = 1.59$, SD = 0.495) which substantiates findings of [8]. However, treatment supporters' escort of patients to a health care centre is not largely associated with compliance with medication [$t(35) = 1.977$; $P = 0.065$].

For patients who were served with medication by their treatment supporters, there is significant difference [$t(108) = 5.534$, $P = 0.000$] between those who complied with medication ($M = 1.32$, SD = 0.469) and the noncompliant group ($M = 1.80$, SD = 0.401). Similarly, [9] found that treatment supporters administering drugs to patients promote compliance. The implication is that "social support" in the form of offering medicines directly to patients promotes patients' compliance with medication as highlighted in the self-determination theory. Those who were regularly visited by treatment supporters significantly [$t(108) = 4.733$, $P = 0.000$] complied with their medication. Correspondingly, [3] found that community involvement has helped to reduce rates of default because treatment supporters within patients' immediate environment help to supervise treatment.

Reminding patients about the days for visiting a health centre significantly influenced [$t(108) = 3.258$; $P = 0.001$] compliance with medication ($M = 1.45$; SD = 0.501), suggesting that patients who are not prompted to visit health centres regularly are likely to be defaulters. Significant difference in scores [$t(108) = 3.357$; $P = 0.001$] was also identified among those who were advised and motivated by treatment supporters about the in-take of their medications. The inference is that when treatment supporters advise patients, they are likely to comply with medication and vice versa as noted by [3]. Generally, the findings show that the services of treatment supporters contributed to adherence to treatment.

7. Conclusions

Patients' compliance with tuberculosis medication is of great importance so far as the problem of tuberculosis remains a global health concern. Ghana and for that matter Suhum Kraboa Coaltar District has participated in DOTS to control the menace of tuberculosis. Yet, the target of Ghana to achieve a compliance rate of 85 percent by the year 2008 and beyond has not been accomplished within Suhum Kraboa Coaltar District which records a 22 percent failure. However, the administration of DOT by health professionals alone shows positive influence on patients' compliance with medication. Depression, patients' engagement in work for survival, substance abuse, and the long duration for treatment negatively affect adherence to TB medication. Spiritual inclinations to the disease also discourage compliance with medication. Contrary to what was expected, patients' compliance with medication is not largely influenced by their background

characteristics (sex, age, formal education, marital status, and occupation). Rather, assistance given by treatment supporters had emphatic positive effects on compliance with medication. For instance, patients who were monitored and reminded of their clinical days significantly complied with their medication and those who were offered counselling and advice on their medication also notably complied. In conclusion, treatment supporters should be galvanised more in order to ensure a better control of the disease. Patients' noncompliance with medication in the district is an issue and requires new approaches to solve the problem. Future approaches to ensuring patients' adherence to medication could consider skills training, counselling for substance abuse, and pharmacotherapy which were recommended by some respondents.

Conflict of Interests

The authors declare that there is no conflict of interests regarding the publication of this paper.

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