

**SUBSTANCE USE DISORDERS AMONG ADULT IN-PATIENTS AT THE MENTAL
HEALTH UNIT, MOI TEACHING AND REFERRAL HOSPITAL, ELDORET, KENYA**

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DECLARATION

DECLARATION BY STUDENT

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DEDICATION

This thesis is dedicated to my beloved husband Dr. Daniel Kipkemboi. His patience, guidance, and encouragement as I worked on this dissertation and pursued my postgraduate studies was invaluable.

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LIST OF ABBREVIATIONS

APA	American Psychiatric Association
ASPD	Antisocial Personality Disorder
CBD	Cannabidiol
CRS	Clinician Rating Scale
DSM	Diagnostic and Statistical Manual
DSM-IV-TR	Diagnostic and Statistical Manual fourth (4 th) edition- Text Revision
DSM-III-R	Diagnostic and Statistical Manual third (3 rd) edition- Revised
DSM-5	Diagnostic and Statistical Manual fifth (5 th) edition
HIV	Human Immunodeficiency Virus
ICD	International Classification of Disease
LSD	Lysergic acid diethylamide
MINI	Mini International Neuropsychiatric Interview
MMSE	Mini Mental State Examination
MTRH	Moi Teaching and Referral Hospital
NACADA	National Authority for the Campaign Against Drug Abuse
PCP	Phencyclidine
SCID	Structured Clinical Interview for Diagnostic and Statistical Manual Diagnoses
Δ-9-THC	Delta-9-Tetrahydrocannabinol
US	United States (of America)
WHO	World Health Organization

DEFINITION OF TERMS

Substance

The World Health Organization [WHO], (2017a) defines a substance as one with psychoactive properties including alteration of cognition or affect.

Substance use disorder

According to the Diagnostic and Statistical Manual fifth (5th) edition (DSM-5), the term refers to a maladaptive pattern of substance use characterized by cognitive, behavioral and physiological symptoms indicating significant substance related problems (American Psychiatric Association [APA], 2013). This term encompasses both substance abuse and dependence, diagnostic categories that were present in the previous versions of the DSM but are not included in the current and fifth version of the manual. The two diagnostic categories were merged into a single disorder (substance use disorder) in the DSM-5 (APA, 2013), and are measured on a continuum from mild to severe. The terms ‘dependence’ and ‘abuse’ were however used throughout this thesis as studies done earlier that employed these terminology are cited. The term ‘**poly-substance use disorder**’ was used in this study to refer to the occurrence of more than one substance use disorder diagnosis in a study participant.

Substance abuse and substance dependence

Both terms were employed in prior versions of the DSM but are no longer in use. Substance abuse referred to a maladaptive pattern of substance use mainly characterized by legal and socio-occupational problems related to substance misuse as well as the use of substances in physically hazardous situations. Substance dependence, conceptualized as more severe than abuse, was characterized by tolerance and withdrawal symptoms in the user, unsuccessful efforts at cutting down substance use, use in larger amounts and over longer periods than intended and spending a great deal of time in activities involving substance use, to the exclusion of other social and work related obligations (APA, 2000).

Mental illness/ mental disorder

The terms refer to “a syndrome characterized by clinically significant disturbance in an individual’s cognition, emotion regulation, or behavior that reflects a dysfunction in the psychological, biological and developmental processes underlying mental functioning. The disorders are usually associated with significant distress or disability in social, occupational, or other important activities” (American Psychiatric Association [APA], 2013). These terms will be used interchangeably with the term ‘psychiatric disorder’ in this study.

Co-occurring disorder

The term refers to the occurrence in an individual, of a substance use disorder and another mental disorder (Center for Substance Abuse Treatment, 2006).

Lifetime prevalence of a substance use disorder

This is the proportion of a study population that at some point in their life, up to the time of assessment, has ever had a substance use disorder.

12-month prevalence of a substance use disorder

This is the proportion of a study population that meets the criteria for a substance use disorder in the past 12-month period with the time of interview/assessment as the reference point. It is a period prevalence.

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ABSTRACT

SUBSTANCE USE DISORDERS AMONG ADULT IN-PATIENTS AT THE MENTAL HEALTH UNIT, MOI TEACHING AND REFERRAL HOSPITAL, ELDORET, KENYA

Background: Substance use disorders are often under-diagnosed among psychiatric in-patients, yet are frequent and are associated with adverse outcomes. Additionally, the provision of integrated management which is the evidence based approach for co-occurring disorders, remains the exception in most mental health treatment settings. Evidence relating to the prevalence and associated factors of substance use disorders has been shown to be beneficial in facilitating diagnosis and in planning for management of these disorders. Little is known as regards this information in our setting.

Objectives: This study aimed to determine the 12-month prevalence of substance use disorders and to establish the association between socio-demographic and clinical factors and these disorders among adult patients admitted at the Mental Health Unit, MTRH.

Methods: *Design:* The study was a descriptive cross-sectional one and employed the Mini International Neuropsychiatric Interview Version 7.0 for DSM-5 in generating substance use disorder and other mental disorder diagnoses. *Setting:* Mental Health Unit, Moi Teaching and Referral Hospital (MTRH), Eldoret, Kenya. *Subjects:* One hundred and thirty one consenting adult patients consecutively discharged from the unit between March 2015 and February 2016 were interviewed by the investigator. *Data analysis:* Descriptive statistics were used to explore the data while inferential statistics were used to assess associations.

Results: The mean age for the respondents was 34.5 years (SD=12.20 years). The most frequent mental disorder diagnoses were bipolar disorder (44.3%) and psychotic disorder (42%). Close to a half (49.6%) of the participants had at least one substance use disorder diagnosis. Alcohol (40.5%), tobacco (30.5%) and cannabis (17.6%) use disorders were the most common. Being male (OR, 5.13, 95% CI, 2-13.6, $p=0.001$), the number of suicide attempts in the preceding 12-month period (OR, 2.19, 95% CI, 1.11- 4.32, $p=0.020$) and having a higher level of education (OR, 3.41, 95% CI, 1.08-10.81, $p=0.040$) were associated with the diagnosis of a substance use disorder. Cannabis use disorder was associated with the mental disorder diagnoses of suicide behavior disorder ($p=0.001$); anxiety disorder ($p=0.002$); and antisocial personality disorder ($p=0.024$).

Conclusion: A large proportion of patients admitted to the Mental Health Unit, MTRH had a 12-month substance use disorder particularly alcohol, tobacco and cannabis use disorder. Being male, the number of suicide attempts in the preceding 12-month period and having a higher level of education were associated with the diagnosis of a substance use disorder. Cannabis use disorder was associated with the mental disorder diagnoses of suicide behavior disorder, anxiety disorder and antisocial personality disorder.

Recommendations: Based on the findings, we recommend the routine screening for substance use disorders for patients admitted at the unit in order to enhance diagnosis. The results also justify the need for an integrated management program at the unit and are applicable in the formulation and planning of such an initiative.

CHAPTER ONE: INTRODUCTION

1.1 Background

Substance use disorders have been shown to frequently occur among those with other mental disorders (Kessler et al., 1996; Regier et al., 1990), particularly among in-patient populations (Carrà & Johnson, 2009; Rush & Koegl, 2008). Mental illness and co-morbid substance use disorder, often referred to as ‘co-occurring disorder’ is associated not only with a negative clinical course (Baker et al., 2007), but also places a huge burden on health services (Kedote, Brouselle & Champagne, 2008). Studies however show an under-diagnosis of substance use disorders among hospitalized psychiatric patients (Hansen et al., 2000; Ndeti et al., 2008). Additionally, the provision of integrated management, the evidence based and effective approach for co-occurring disorder treatment, remains the exception in most mental health treatment settings (Padwa, Larkins, Crevecoeur-MacPhail & Grella, 2013; Sacks et al., 2013). Knowing the prevalence and factors associated with substance use disorders in this population has the potential to enhance substance use disorder detection rates and aid with formulation of an integrated program of management, and this would in turn improve outcome.

The World Health Organization (2017b), places the global prevalence of alcohol use disorder at 0-16% and that of other substance use disorders at 0-3%. In Kenya, the National Authority for the Campaign Against Drug Abuse (NACADA) found the 12-month prevalence of alcohol use disorder to be 11.3% and the rates of other substance use disorders to range between 0% and 8% among the general population (NACADA, 2012).

Among those with other mental illnesses, higher prevalence rates than those in the general population have been documented. In the largest co-morbidity study yet, the National Institute of Mental Health Epidemiologic Catchment Area study, Regier et al. (1990) found a lifetime prevalence of 29% of substance use disorders among both institutionalized and non-institutionalized persons with other mental disorders in the United States (US). In that study, those seen in the clinical setting had the highest rates of substance use disorders (Regier et al., 1990). Indeed, lifetime rates of substance use disorders as high as 70% have been reported among hospitalized psychiatric patients (Helseth, Lykke-Enger, Johnsen & Waal, 2009). Much lower

lifetime prevalence rates (24%) have however also been reported among psychiatric in-patients (Katz, Durst, Shufman, Bar-Hamburger & Grunhaus, 2008) revealing a wide variation in findings across studies. In the only study done on the subject in Kenya, Ndeti et al. (2008) reported a 34.4% lifetime prevalence rate of substance use disorders among psychiatric in-patients in the largest mental health facility in the country. Few studies have examined 12-month prevalence rates yet these are particularly beneficial for informing policy and programs (Pearson, Janz & Ali, 2013). One study reported a 50% 12-month prevalence rate of substance use disorders among psychotic in-patients in Norway (Helseth, et al., 2009). Higher rates of substance use disorders among those with other mental disorders compared to those in the general population have been postulated to be due to several reasons including attempts at self medicating symptoms of mental illness, overlapping brain circuitry and shared genetic basis (National Institute for Drug Abuse, 2010).

The burden imposed by substance use disorders on the health and socio-economic structures of societies is substantial (Grant et al., 2016; WHO, 2001). In the global burden of disease study 2010, substance use disorders were the second leading cause of disability among the mental disorders with 19.6% of Disability Adjusted Life Years (DALYs) being attributed to these disorders (Whiteford et al., 2013). In the year 2000, tobacco, alcohol and illicit drugs contributed together 12.4% of all deaths worldwide and 8.9% of total years of life lost due to these substances (WHO, 2017c). A poorer clinical course has been associated with substance use disorders among those with other mental illnesses (Baker et al., 2007) including increased rates of relapse of psychiatric illness (Duko, Ayano, Bekana & Assefa, 2015), more severe psychopathological symptoms (Ringgen et al., 2008), longer hospital stays (Wright, Gournay, Glorney & Thornicroft, 2000) and impaired social functioning (Mazza et al., 2009). Additionally, increased physical comorbidities, increased risk of suicide, more hostility and disruptive behavior and poor medication compliance have been documented (Buckley, 2006). Substance use disorders also place a significant drain on healthcare systems by resulting in increased utilization of health services (Kedote, et al., 2008; Wu, Gersing, Burchett, Woody & Blazer, 2011; Wu et al., 2013). Moreover, societal costs are increased through their impact on criminal justice systems, and on productivity as a result of premature death and ill health (Whiteford et al., 2013; WHO, 2001).

Despite the knowledge that substance use disorders are frequent among those with other mental disorders and are associated with adverse outcomes, under-diagnosis has been found in the clinical

setting. Kirchner, Owen, Nordquist & Fischer (1998) found that well over 50% of psychiatric in-patients with a substance use disorder went undiagnosed in the course of their hospitalization. Hansen et al. (2000) found a substantially lower prevalence of substance use diagnoses in the patients' registers (26.1%) than in the research data (50.0%). Ndeti et al. (2008) found high rates of alcohol dependence among psychiatric in-patients from survey data but this was not reflected in the patients' notes. Moreover, the provision of integrated management for those with mental disorders and co-morbid substance use disorders remains the exception in most mental health treatment settings (Padwa, et al., 2013; Sacks et al., 2013). Padwa, et al. (2013) for example found only 43% of mental health settings in California, US to have programs offering integrated treatment services for those with co-occurring disorders. Integrated management is the recommended and effective approach to managing co-occurring disorders (Mangrum, Spence, & Lopez, 2006; Van den Bosch & Verheul, 2007).

At the mental health in-patient unit, MTRH, only about 10% of patients were diagnosed with a substance use disorder in 2013 and alcohol use disorder was the only substance use disorder diagnosis made. This likely represents an underestimation of the prevalence and scope of substance use disorders in this population given much higher rates and wider range of substance use disorders documented by research in a similar setting elsewhere in the country (Ndeti et al., 2008). The lack of a protocol guiding screening of substance use disorders at the unit is a possible reason for this under-diagnosis. Additionally, there is no integrated management program catering to the needs of patients with a co-occurring disorder at the facility. Integrated management is the recommended and effective approach to managing co-occurring disorders (Mangrum, Spence, & Lopez, 2006; Van den Bosch & Verheul, 2007).

Crucial to formulating an informed and appropriate service to clients with a co-occurring disorder is the clarification of the rates of this disorder among clients within a program (Flynn & Brown, 2008). Knowledge of the prevalence of substance use disorders among psychiatric in-patients at our facility would not only enhance the capacity to make evidence based decisions about the extent of need for interventions and resources, but would also improve detection rates by raising the index of suspicion concerning the presence of these disorders. Twelve-month prevalence rates have been cited as being particularly beneficial since they "...provide information regarding current cases of a condition in the population...and are useful for informing policy and programs as well as for

comparing rates over time” (Pearson, et al., 2013, p. 1). No study has examined the 12-month prevalence rate of substance use disorders at the Mental Health Unit, MTRH or in the country.

The identification of a profile of associated socio-demographic and clinical factors for substance use problems among psychiatric patients has been suggested to be beneficial in enhancing diagnosis of substance use disorders. Known associated factors may be useful in discriminating those prone to a substance use disorder (Mueser et al., 2000). Additionally, identifying these factors may lead to interventions designed to prevent the development of substance use disorders in vulnerable patients (Mueser et al., 2000). No study has investigated factors associated with substance use disorders among psychiatric in-patients in Kenya. Studies, done elsewhere examining the clinical and socio-demographic factors and their association with substance use disorders have yielded inconsistent results. Hapangama, et al. (2013) and Weich & Pienaar (2009) for example found younger age and being male to be associated with a substance use disorder diagnosis among psychiatric in-patients in Sri Lanka and South Africa respectively. Rush & Koegl, (2008) on the other hand found no association between these demographic factors and a substance use disorder diagnosis among hospitalized psychiatric patients in the US. This is likely a reflection of the differing socio-demographic profiles of study populations and emphasizes the importance of conducting a study in our setting.

Currently in MTRH, there is no protocol guiding the screening of substance use disorders among in-patients at the Mental Health Unit and this could be contributing to the under-diagnosis of these disorders seen at the facility. Additionally, there is no integrated management service addressing the needs of patients with a co-morbid substance use disorder at the unit. Data on the prevalence and factors associated with substance use disorders among this population would facilitate creation of an evidence based screening protocol for substance use disorders as well as aid with the planning of an integrated management program.

1.2 Problem Statement

Research continues to show the rates of substance use disorders to be disproportionately higher among those with other mental disorders (Regier et al., 1990); particularly among in-patient populations (Rush & Koegl, 2008). Worse clinical outcomes have been found for patients with mental illness who have a co-morbid substance use disorder compared to those without (Baker et al, 2007). Better outcomes have been found when treatment is instituted and particularly if integrated (Mangrum, et al., 2006; Mueser, Noordsy, Fox & Wolfe, 2003). Despite acknowledged high rates, negative consequences and availability of effective treatment strategies under-diagnosis of substance use disorders among psychiatric patients, (Hansen et al., 2000; Ndetei et al., 2008) has been shown to occur in the clinical setting. Moreover the provision of integrated treatment services remains the exception in most mental health treatment settings (Padwa, et al., 2013; Sacks et al., 2013).

Up to 57% of psychiatric in-patients with a substance use disorder go undiagnosed in the course of in-patient stays (Kirchner, et al., 1998). Records at the Mental Health Unit, MTRH show that in 2013, only 1 out of 10 of the patients discharged from the unit had a substance use disorder diagnosis. This is likely an under diagnosis given that studies within the region have documented much higher rates of substance use disorders among psychiatric in-patients: 34% (Ndetei et al., 2008) and 65% (Duko, et al., 2015). Records at the unit also indicate that alcohol use disorder was the only substance use disorder diagnosed during the same period. This again is likely an under estimation of the scope of substance use disorders in this population given a wider range of substance use disorders found in research in the region (Duko, et al., 2015; Ndetei et al., 2008). A possible reason for the problem above is a lack of protocol guiding the screening of substance use disorders at the Mental Health Unit, MTRH.

Less than a half of mental health settings have programs offering integrated management services for those with co-occurring substance use disorders (Padwa, et al., 2013). At the Mental Health Unit, MTRH, there is no integrated management program catering to the needs of patients with co-occurring substance use disorders.

A quantitative study describing the 12-month prevalence and associated factors of substance use disorders among in-patients at the Mental Health Unit of MTRH, would provide information useful in creating guidelines for the screening of substance use disorders and in planning for an integrated management program for this vulnerable population. This would in turn improve patient outcome.

1.3 Study Justification

Data on the prevalence and factors associated with substance use disorders is invaluable for the diagnosis and management of substance use disorders among those with other mental illnesses. However, results of earlier research may be difficult to interpret and to apply to our current setting due to the wide variation in results seen in research on this subject. These variations likely reflect differences in study methodology, socio-demographic profiles of populations studied, as well as the fact that patterns of substance use have been shown to continually evolve over time (Davoli, et al., 2007; O’Gorman et al., 2013; Ponizovsky, Rosca, Haklai & Goldberger, 2015; Sloboda, 2002). Additionally most prior studies (Duko, et al., 2015; Mueser et al., 2000; Ndeti et al., 2008) have examined lifetime prevalence rates of substance use disorders. None has investigated the 12-month prevalence rate of substance use disorders among psychiatric in-patients in Kenya. Twelve-month rates are especially useful for informing policy and programs (Pearson, et al., 2013).

The Diagnostic and Statistical Manual IV Text Revision (DSM-IV-TR) (APA, 2000), has been updated to the current version DSM-5 (APA, 2013), with major changes to the substance use disorder section. These alterations have been shown to result in changes to the rates of substance use disorders (Peer et al., 2013). This makes it important to conduct the study utilizing current diagnostic criteria.

The present study employed the DSM-5 criteria in investigating the 12-month substance use disorder prevalence and associated factors among adult in-patients at the Mental Health Unit, MTRH.

1.4 Research Questions

1. What is the 12-month prevalence of substance use disorders among adult in-patients at the Mental Health Unit, MTRH?

2. What is the association between socio-demographic and clinical factors, and substance use disorders among adult in-patients at the Mental Health Unit, MTRH?
3. What is the association between specific substance use disorders and mental disorder diagnosis?

1.5 Research Objectives

1.5.1 Broad objective

To determine the 12-month prevalence of substance use disorders and the association between socio-demographic and clinical factors, and substance use disorders among adult in-patients at the Mental Health Unit, MTRH.

1.5.2 Specific objectives

1. To determine the 12-month prevalence of substance use disorders among adult in-patients at the Mental Health Unit, MTRH.
2. To determine whether there is an association between socio-demographic and clinical factors and the diagnosis of a substance use disorder among adult in-patients at the Mental Health Unit, MTRH.
3. To determine whether specific substance use disorders are associated with mental disorder diagnosis among adult in-patients at the Mental Health Unit, MTRH.

CHAPTER TWO: LITERATURE REVIEW

This chapter critically reviews literature by other scholars on the subject and identifies the gaps therein. It has been organized into sections based on the objectives of this study. A final section reviews various methodological approaches that have been utilized in examining this subject and provides a rationale for the methodological approach employed in the current study.

2.1 Prevalence of Substance Use Disorders among those with other Mental Disorders

In the largest co-morbidity study yet, the National Institute of Mental Health Epidemiologic Catchment Area study, Regier et al. (1990) found a lifetime prevalence of 29% of substance use disorders among those with other mental disorders. The study population included subjects in the community, in institutional settings such as prisons, and in clinical settings such as mental health and addictive disorder settings across the US. Over twenty thousand subjects, across the settings mentioned above and aged 18 years and over were interviewed face to face. In another large co-morbidity study, Kessler et al. (1996) examined data on DSM-III co-occurrence of mental and addictive disorders from the National Co-morbidity Survey by Kessler et al. (1994) which was carried out between September 1990 and February 1992 in the US. The study was nationwide and subjects were derived from the civilian non-institutionalized population as well as from students living in group housing on campus. The survey utilized a structured psychiatric interview among persons aged 15 to 54 years. In that study, where a total of 8098 interviews were completed, the lifetime prevalence of any substance use disorder was over twice (50.9%) the prevalence obtained by Regier et al. (1990), whose study had only been conducted 2 years prior.

Among psychiatric in-patients the wide variation in prevalence rates seen in the two largest co-morbidity studies described above is replicated. Estimates of the lifetime prevalence of substance use disorders among psychiatric in-patient populations range from 24% (Katz, et al., 2008) to 70% (Helseth, et al., 2009). Reporting the lowest lifetime rate, Katz, et al., (2008) documented that 24% of 470 study participants aged between 18 and 70 years and drawn from 2 psychiatric hospitals in Israel had a substance use disorder. Substance use disorder diagnoses were made using the SCID for DSM-IV. The most common psychiatric diagnoses among the study participants were schizophrenia, schizophreniform illness or schizoaffective disorder (50.4%); affective disorders

(12.6%); anxiety disorders (10.8%) and personality disorders (5.4%). Substance use history was obtained from self report and biochemical tests. The most common substance use disorder diagnoses were those related to cannabis (19.7%), opiates (5.7%) and amphetamines (3.4%). The study however did not assess for use of alcohol and tobacco which are the two most commonly used psychoactive substances globally (WHO, 2017c).

Also excluding assessment for tobacco, Mueser et al. (2000) found 58% of patients in a cohort of 325 recently hospitalized patients at a psychiatric state hospital in New Hampshire, US, to have at least one lifetime substance use disorder. Most of the participants in that study (62%) were below the age of 40 years. The most common psychiatric diagnoses within the study population were schizophrenia (27%), schizoaffective disorder (26%), bipolar disorder (22%) and major depression (16%). Substance use disorder diagnoses were assessed using the Structured Clinical Interview for DSM-III-R (SCID) and the Clinician Rating Scale (CRS) for alcohol and drug use. The authors reported using different tools for diagnosing a substance use disorder in order to improve detection rates. Patients were classified as having a lifetime substance use disorder based on either a positive SCID (lifetime substance use disorder) or a CRS rating of 3-5 for a particular substance. The most prevalent substance use disorders in that study were alcohol (51%), cannabis (25%), and cocaine use disorder (11%). Substance use history was obtained from self-report and collateral history (from family members, other health care workers and the patients' records).

One of the highest lifetime rates among in-patients was reported by a study in Norway (Helseth, et al., 2009). The study population consisted of 60 in-patients aged between 18-40 years with psychotic disorders only. In that study, 70% of the study participants had a lifetime substance use disorder based on the SCID for DSM IV. Substance use history was obtained from self report and biochemical tests. Alcohol, amphetamine and cannabis were the most common substance use disorders. Similar rates were obtained by a recent study also examining lifetime rates of substance use disorders among in-patients with a restricted range of psychiatric diagnosis. Duko, et al. (2015) using the SCID for DSM-IV, found 65% of study participants (n=524) admitted at a mental hospital in Addis Ababa, Ethiopia to have a lifetime substance use disorder. The study population comprised of patients with schizophrenia (n=260) and bipolar disorder (n=261) only. Although the rates were comparable to those seen in the Norwegian study (Helseth, et al., 2009), the pattern

of substance use was different. The most common substance use disorders were Khat use disorder (49%), alcohol use disorder (38%) and tobacco use disorder (13%) (Duko, et al., 2015).

Other studies have examined rates of substance use disorders for different reference periods making comparability difficult. Examining substance use disorders among in-patients with psychotic disorders only, Helseth, et al. (2009) found 50% of the study participants to have met criteria for a substance use disorder in the 12-month period prior to assessment. Hapangama, et al. (2013) examined for a substance use disorder employing two tools that examined substance use over 2 different reference periods. The International Classification of Diseases (ICD) 10 obtains history over the past 12-month period while the Clinician Rating Scale (CRS) does so over the previous 6 month period. Patients were considered to have a substance use disorder diagnosis if they fulfilled either or both criteria for this disorder. The most common psychiatric diagnoses were depressive disorders (33.5%), schizophrenia (29.8%) and bipolar disorder (23.4%). In that study, 43.4% of 325 adult patients with a mean age of 36 years had a substance use disorder diagnosis while 10.8% had more than one substance use disorder diagnosis. Alcohol use disorder was the most common type of use disorder (20.6%), followed by tobacco use disorder (18.2%) and cannabis use disorder (11.7%).

Investigating substance use disorders among psychiatric in-patients for the 6 month period prior to assessment, both Opsal et al. (2011) in Norway and Weich & Pienaar (2009) in South Africa reported varying rates. Opsal et al. (2011) collected data using the CRS scale from a total of 3506 admissions derived from 38 psychiatric wards located in both rural and urban areas across Norway. A third (33.2%), of all participants with a mean age of 35 years, was found to have a substance use disorder. In that study, where substance use history was obtained from self report and biochemical tests, alcohol was the most common substance use disorder (46.8%) followed by stimulant – including cocaine (11.9%), cannabis (5.2%) and sedative/hypnotics use disorder (5.2%). Weich & Pienaar (2009) did not employ a structured tool in diagnostic assessments. All diagnoses were based on a multidisciplinary team's consensus following routine clinical interviewing. The study was conducted in an acute psychiatric hospital in the Western Cape region, South Africa among participants (n=298), aged between 18-65 years who were admitted to the unit. The most common psychiatric diagnoses in that study were psychotic (38.3%) and mood disorders (32%). Substance use history was obtained from self report and from collaterals (relatives and friends) for the 6

month period prior to assessment. Biochemical tests were also done to check for recent use. In that study, 51% (n=152) had at least one substance use disorder. The most common substance use disorders were cannabis (40%), alcohol (31%) and amphetamine use disorders (20%).

In the only study done so far on this subject in Kenya, Ndeti et al. (2008) reported that 34.4% of the study participants had a lifetime substance use disorder. In that study, data was collected from 691 patients admitted at Mathari National Teaching & Referral Hospital, the largest mental health facility in the country. Substance use disorder diagnoses were obtained using the SCID for DSM-IV just as with prior studies reviewed. The most common psychiatric diagnoses among study participants were schizophrenia (34%), other psychotic disorders (29%) and mood disorders (20%). Alcohol was the most common substance use disorder (34.4%) followed by sedatives (25%) and khat use disorders (20.3%).

From the literature reviewed, a lack of data on the 12-month prevalence rates of substance use disorders among psychiatric in-patients in Kenya is observed. Additionally the documented prevalence rates and patterns of substance use disorders vary widely likely due to differences in socio-demographic and clinical characteristics across study populations as well as varying methodological approaches.

2.2 Factors Associated with a Substance Use Disorder among those with Mental Disorders

2.2.1 Socio-demographic factors

Multiple studies have found younger age and male sex to be associated with the diagnosis of a substance use disorder among hospitalized psychiatric patients. This has been documented across different geographical regions. Katz, et al. (2008) in Israel, found younger age and male gender to be associated with the diagnosis of a substance use disorder among 470 consecutively admitted patients aged between 18 and 70 years drawn from two psychiatric facilities. Hapangama, et al. (2013) in Sri Lanka also found similar results among psychiatric in and out-patients (n=325) above the age of 18 years. In South Africa, Weich & Pienaar, (2009) found being young and male to be associated with co-occurring disorders among patients admitted to an acute psychiatric unit. Closer home, Duko, et al. (2015) found similar results among 524 patients admitted to a mental health

facility in Addis Ababa, Ethiopia. The sample was composed of patients with schizophrenia and bipolar disorders only.

Ponizovsky, et al. (2015) examined trends in patterns of dual diagnosis in Israel over a period of 14 years (1996 to 2010). The authors found alcohol use disorder to be associated with older age in the earlier years of the study. This was however not so in the later years of the study. These findings exemplify the change in trends of correlates of substance use disorders over time. The study was a retrospective chart review that examined records of over 50,000 in-patients with severe mental illness aged between 15 and 64 years. Ponizovsky, et al. (2015) found male gender to be consistently associated with the diagnosis of a substance use disorder over the years.

Rush & Koegl, (2008) interestingly found age and gender not to be associated with having any substance use disorder diagnosis among in-patients in multiple centers across the US.

Other socio-demographic factors that have been associated with substance use disorders among those with other mental illnesses include education level, marital status and employment status. Results have been varied. Rush & Koegl, (2008) in the US, found no association between level of education and the diagnosis of a substance use disorder among psychiatric in-patients. Hapangama, et al. (2013) and Duko, et al. (2015) in mental in-patient facilities in Sri Lanka and Ethiopia respectively, found low levels of education to be associated with the diagnosis of a substance use disorder.

Just as with educational attainment, employment status has variously been associated with a substance use disorder diagnosis. Virgo, Bennett, Higgins, Bennet & Thomas, (2001) found unemployment to be associated with a diagnosis of a substance use disorder among adult severely mentally ill patients seen in multiple settings in the United Kingdom including in-patient units and community mental health centres. Katz, et al. (2008) in Israel, however found no association between employment status and the diagnosis of a substance use disorder.

Social isolation has been linked to the diagnosis of a substance use disorder among psychiatric in-patients. Most studies have found an association between not having a spouse, living alone or being homeless with a substance use disorder diagnosis in this population. Katz, et al. (2008) in a study in Israel, found being unmarried ($p=0.001$) to be associated with a substance use disorder diagnosis among in-patients drawn from two psychiatric hospitals in that country. Ries et al. (2000) in the

US reported that psychiatric in-patients with a substance use disorder diagnosis were likely to be homeless. Virgo, et al. (2001) in the United Kingdom, found living alone and not with family, to be associated with a diagnosis of substance use disorders among those with other mental disorders. Two studies in the US documented differing results. Rush & Koegl, (2008) found no association between marital status and having a co-occurring disorder among psychiatric in-patients while Mueser et al. (2000) also found no differences in rates of substance use disorders among those living with and those living without family.

Within Africa, in a Study in Ethiopia, Duko, et al. (2015) found those who were separated and divorced to be more likely to have a substance use disorder diagnosis compared to those who were married.

Further linking substance use disorders with social adversity among those with other mental disorders, is the finding that co-occurring disorders are associated with forensic history. Rush & Koegl, (2008) found more legal involvement among psychiatric in-patients with a substance use disorder in the US. Similar results were documented by Mueser et al. (2000) who found the number of days incarcerated to be related to the diagnosis of a substance use disorder among psychiatric in-patients in a US hospital.

2.2.2 Clinical factors

The association between the diagnosis of a substance use disorder and various clinical factors has been investigated. Results have been inconsistent. Wright et al. (2000) found no association between frequency of prior admissions and a diagnosis of a substance use disorder among psychiatric in-patients in the United Kingdom. Similarly, Ries et al. (2000) in the US found no association between rates of past hospitalizations and the diagnosis of a substance use disorder among the mentally ill. Hapangama, et al. (2013) in Sri Lanka, however found more than one admission to be associated with the diagnosis of a substance use disorder among in-patients and out-patients at a psychiatric facility ($p=0.01$).

Within the continent, Weich & Pienaar (2009) found no association between frequency of prior admissions and a diagnosis of a substance use disorder among psychiatric in-patients in South Africa. On the other hand, Duko, et al. (2015) in Ethiopia, found that the majority of those who had prior hospitalization had co-occurring substance use disorders as compared to those who had

no prior hospitalizations for schizophrenia (81.5% and 37.9%) and bipolar disorder (82.56% and 38.2%).

The mode of admission and its relation to the diagnosis of a substance use disorder has been examined by a number of studies. In most countries, the mode of admission of mentally ill patients is legally determined. Compulsory/ involuntary admissions are made when the patient is incapable of making decisions as regards their treatment by virtue of their illness. Voluntary admissions on the other hand happen when an individual willingly submits themselves for admission. In Israel, Ponizovsky, et al. (2015) found the diagnosis of substance use disorder in mental illness to be associated with compulsory admissions. Weich & Pienaar (2009) found similar results among patients admitted to a South African psychiatric hospital. Unsurprisingly, the latter authors also found a history of violence as contributing to admission to be associated with the diagnosis of a substance use disorder (Weich & Pienaar, 2009). Documenting divergent results, Opsal et al. (2011) reported no differences in substance use disorders rates between those admitted voluntarily and those admitted involuntarily. The study was conducted in a Norwegian hospital.

The association between length of hospital stay and the diagnosis of a substance use disorder in other mental illnesses has been documented and results are conflicting. Wright et al. (2000) found the diagnosis of a substance use disorder to be associated with longer hospital stays. In that study, those diagnosed with a substance use disorder were found to have spent on average over twice as long in hospital as other psychotic in-patients over the previous 2 year period. Other studies have found substance use disorders in other mental illnesses to be associated with length of hospital stay in a counterintuitive manner. Sinclair, Latifi & Latifi (2008) found alcohol misuse to be associated with shorter hospital stay. Fløvig, Vaaler & Morken (2009) examined a broader range of substances including alcohol, benzodiazepines, hypnotics, opiates and stimulants and found the presence of any substance use disorder to be associated with shorter hospital stay. Ries et al. (2000) found 30% shorter hospital stays among in-patients with schizophrenia and schizoaffective disorder who had a co-morbid substance use disorder compared to those without. Bradely & Zarkin, (1996) and Xafenias, Diakogiannis, Iacovides, Fokas & Kaprinis (2008) however found no association between the diagnosis of a substance use disorder and length of hospital stay.

Increased risk of suicide has been found among psychiatric in-patients with a co-occurring substance use disorder. Ponizovsky, et al. (2015) and Rush and Koegl, (2008) in Israel and the US

respectively, found a prior suicide attempt to be associated with a diagnosis of a substance use disorder among psychiatric in-patients.

No study has examined the socio-demographic and clinical factors associated with substance use disorders among psychiatric in-patients in Kenya. Available findings from studies conducted elsewhere exhibit variations limiting their applicability to our setting.

2.3 Association between Substance Use Disorder and Mental Disorder Diagnosis

Few studies have examined the association between specific substance use disorders and particular psychiatric diagnoses. Again, results have been inconsistent. Karam, Yabroudi & Melhem, (2002) found associations between cannabis use disorder and schizophrenia; cocaine use disorder and bipolar disorder and between tranquilizer use disorder and anxiety disorder. This was a retrospective chart review of patients admitted at a psychiatric unit in Lebanon between 1979 and 1992 (n=222). Mueser et al. (2000), found no association between psychiatric diagnoses and specific substance use disorders in a psychiatric in-patient population (n=325) in the US. This study obtained both psychiatric and substance use disorder diagnoses using the SCID for DSM-III-R.

Within Africa, Weich & Pienaar (2009), reported associations between methamphetamine use disorder and substance induced disorder; cannabis use disorder and schizophrenia & schizoaffective disorders; and between alcohol use disorder and major depression. The sample (n=298) was drawn from patients admitted to an acute psychiatric unit in the Western Cape, South Africa. In that study, substance use disorder and other mental disorder diagnoses were obtained using routine clinician assessments. No structured tools were used. Ndeti et al. (2008) in Kenya, found associations between alcohol use disorder and depression and between stimulant use disorder and depression among in-patients (n=238) at a large mental health facility in Nairobi. In that study, data on substance use disorders and other psychiatric diagnoses were obtained using the SCID for DSM-IV. This study was conducted 8 years ago and substance use patterns have likely evolved since then (Davoli, et al., 2007; O’Gorman et al., 2013; Ponizovsky, et al., 2015; Sloboda, 2002).

2.4 Review of Methodology

Other than differences in socio-demographic profiles across study populations, variation in methodological approach is a likely cause of inconsistencies in documented findings. As observed from the literature reviewed above, varying methodological approaches have been employed in studying the epidemiology of substance use disorders among those with other mental disorders. Major areas of differences are as regards data collection methods, sources of substance use history and reference periods for substance use assessment. These are reviewed below and a rationale for the methodology employed in the current study provided.

Differing methods have been utilized for the diagnostic assessments across studies. The two main methods used include structured tools and unstructured methods (diagnosis based on routine history taking by the clinicians). Ndetei et al. (2008) for example employed the SCID for DSM IV, Opsal et al. (2011) employed the CRS while Hapangama et al. (2015) utilized the ICD-10 checklist in diagnosing substance use disorders. One study made diagnostic assessments using unstructured methods i.e. diagnoses based on routine clinician assessments without employing a tool (Weich & Pienaar, 2009). Structured methods have been found to be significantly better and more accurate than the traditional unstructured diagnostic assessments (Basco et al., 2000; Miller, Dasher, Collins, Griffiths & Brown, 2001; Ghaemi, Sachs, Chiou, Pandurangi & Goodwin, 1999). In addition, structured methods are used to ensure efficient and organized data collection on substance use disorders that is essential in clinical research (Samet, Waxman, Hatzenbuehler & Hasin, 2007).

As noted above, prior studies (Duko et al., 2015; Mueser et al., 2000; Ndetei et al., 2008), have employed tools based on older diagnostic criteria currently not in use. No published study has employed the most current diagnostic criteria (DSM-5), in examining the prevalence and factors associated with substance use disorders among psychiatric in-patients.

Different studies have obtained substance use history from different sources including self report, collateral history and biochemical tests. Some have utilized combinations of these. Most studies have found self-report to be a valid measure of substance use. Calhoun et al. (2000) found self report to be valid for illicit substance use among persons with Post Traumatic Stress Disorder

(PTSD). In that study self report of substance use compared well with urine test results. Similarly, Zaldivar et al. (2009) & Del Boca & Darkes, (2003) found self report to be valid for recent illicit substance (cannabis & cocaine) use among university students and for measuring alcohol consumption respectively. Kim & Hill, (2003) however, documented under reporting of illicit substance use among an urban, African American sample, when self-report was used. The authors found that social undesirability as well as fear of consequences of substance use were the major contributors to the under reporting.

Indeed authors have argued that the question should not be whether self report is valid, but under what circumstances it is (Brown, Kranzler, Del Boca, 1992). Babor, Steinberg, Anton & Del Boca (2000) reported cognitive impairment to interfere with self report of substance use. Carey (1997) suggested assessing for substance use among the mentally ill when they are mentally stable and not in the acute setting and avoiding assessments when patients are intoxicated or are withdrawing from substances. This author also suggested assuring patients of confidentiality, building a rapport with the patient and avoiding being judgmental.

Collateral history has been suggested to be prone to bias since information given may be minimized or exaggerated or symptoms of mental illness misattributed to substance use. In addition, collaterals may not have full information about the patient's substance use, especially if this is being concealed by the patient. Collateral history may also, be unavailable for those who are socially isolated. This type of history is more likely to be accurate when the collateral is in close contact with the person (Carey, 1997).

Biochemical tests though objective have been shown to yield information about recent use only (Sharma, Murthy & Bharath, 2012) and to be associated with error rates (Gustafson et al., 2003).

Several studies have compared these three report measures with mixed results Gryczynski, Schwartz, Mitchell, O'Grady & Ondersma (2014) for example compared hair drug testing results and self-reported drug use among primary care patients with moderate-risk illicit drug use and found the sensitivity of hair testing relative to self-report to be low. Hair testing identified only 52.3% (127/243) of self-disclosed marijuana users, 65.2% (30/46) of cocaine users, 24.2% (8/33) of amphetamine users, and 2.9% (2/68) of opioid users. Other studies have found high agreement

rates between self report and biochemical tests (Desmarais, Van Dorn, Sellers, Young & Swartz, 2013; Jackson, Covell, Frisman & Essock, 2005).

Two studies have compared accuracy of self report, collateral report and biochemical tests in assessing for substance use disorders and both concluded that none showed superiority over the other (Desmarais, et al, 2013; Babor, et al., 2000). Babor, et al. (2000) found biochemical tests and collateral informant reports not to add sufficiently to self-report measurement accuracy to warrant their routine use. Desmarais, et al. (2013) and Carey & Simons (2000) in studies comparing self and collateral report of substance use, also found good agreement between these two methods. Desmarais, et al. (2013) suggested that the decision regarding the “best” approach for identifying substance use disorders be made through consideration of practical issues and assessment purpose, rather than selection of the approach that yields the most accurate diagnostic assessment. These authors also found no benefit of using multiple report measures.

It is noteworthy that Weich & Pienaar (2009) who employed all three methods, found no discrepancies between substance use history given by collaterals and by self report. The authors additionally found that urine tests detected lower rates of substance use than did self report and collateral history.

As regards reference periods for substance use assessment, substance use disorder rates have been assessed for different reference periods of the individual’s past. Lifetime rates reflect those who have met criteria for a substance use disorder at some point in their past. Current rates on the other hand reflect those who have met criteria in the recent past. Different time periods have been employed when examining current rates including 12-month and 6-month periods.

Lifetime rates overestimate the burden of substance use disorders due to the inclusion of those in remission. The DSM-5 defines persons in remission as those who previously met criteria for a substance use disorder but have not done so at any time during the past 12-month period (American Psychiatric Association, 2013). 12-month rates on the other hand are more beneficial since they “...provide information regarding current cases of a condition in the population...and are therefore useful for informing policy and programs as well as for comparing rates over time” (Pearson, et al., 2013, p. 1). A 12-month period also has the advantage of being less affected by seasonal variations in substance use (Cho, Johnson & Fendrich, 2001) compared to a shorter duration.

Recall accuracy has also been shown to decay over increasing length of time (Tourangeau, 2000). Substance use history obtained for 12-month reference periods are therefore likely to be more accurate than those obtained over the individual's lifetime.

Other differences in methodological approach likely to cause variation in results include the range of substances assessed for and the psychiatric diagnostic groups included in the study populations. Katz, et al. (2008) for example assessed for illicit substances only excluding alcohol and tobacco and obtained one of the lowest lifetime rates (24%) of substance use disorders among psychiatric in-patients. Duko, et al. (2015) & Helseth, et al. (2009) examined rates of substance use disorders among in-patients with severe mental illness only and obtained some of the highest lifetime prevalence rates (65% and 70% respectively). The study by Duko, et al. (2015), included patients with schizophrenia and bipolar disorder only while Helseth, et al. (2009) included patients with psychotic disorders only.

The present study employed a structured tool for the diagnosis of both a substance use disorder and other mental disorders based on the current diagnostic criteria (DSM-5). Substance use history was obtained from self report since it has been found to be a valid measure of substance use (Zaldivar et al. 2009; Del Boca & Darkes, 2003) and is comparable to other measures (Desmarais, et al, 2013; Babor, et al., 2000) yet easily available and cost effective. To improve self report, cognitive evaluation was done and substance use history obtained at the time of discharge from hospital when patients are mentally stable and unlikely to be intoxicated or withdrawing from substances that may have been used prior to hospitalization (Babor, et al., 2000; Carey, 1997). Substance use history was obtained for the twelve month period prior to assessment. The study aimed to collect substance use history from all in-patients at the unit regardless of their psychiatric diagnosis. Finally, the study examined for the range of substances listed in DSM-5 as potentially addictive whether licit or illicit.

CHAPTER THREE: METHODOLOGY

3.1 Study Design

A descriptive cross-sectional study design was employed.

3.2 Study Site

The recruitment of the study subjects was carried out at the in-patient Mental Health Unit of the Moi Teaching and Referral Hospital (MTRH). The hospital is the second largest in the country and is located in Eldoret town, Uasin Gishu County, in the western part of Kenya. It is a referral facility for the region as well as a teaching hospital for Moi University, College of Health Sciences. Its catchment area comprises of Nyanza and Western provinces, and the North and South Rift regions of the Rift Valley province. This region has a population altogether of about 18 million and is a culturally diverse one. It has urban, rural and suburban populations; and also enjoys ethnic and religious diversity.

The hospital has a Mental Health Department which comprises the Mental Health Clinic for the outpatients, the in-patient Mental Health Unit and the Alcohol and Drug Rehabilitation unit. The Mental Health Unit is the second largest in-patient facility admitting those with mental disorders in the country. It has a capacity of 100 beds, and accommodates both males and females above the age of 14 years. The pediatric patients with mental disorders are managed in the general pediatric wards. Admission to the unit may be in three ways in accordance with the *Mental Health Act 1989* (Kenya). Firstly, admission may be voluntary if someone above the age of 16 years wishes to submit themselves for treatment, or if the guardians of a person under that age wish to submit them for treatment for a mental disorder. Secondly, admission may be involuntary if a person suffering from a mental disorder is likely to benefit from hospitalization but is in the meantime incapable of expressing their willingness (or lack thereof) to be admitted. Thirdly, an emergency admission may be done if a police officer or other administrative officer finds within their jurisdiction, someone who is believed to be suffering from a mental disorder or is a danger to self or others. In each case, the appropriate forms are filled and filed by the stipulated persons. These forms include form 613 for voluntary admission, form 614 for involuntary admission and form 638 for emergency admission. Admissions into the Mental Health Unit at MTRH are almost always involuntary. Patients admitted to this unit are drawn from the hospital's Accident and Emergency department, the Mental Health (outpatient) Clinic, and as referrals from other in-patient wards within the hospital. The unit is staffed by consultant psychiatrists, registrars in psychiatry, psychiatric clinical officers, psychologists, psychological counselors, nurses, social workers and occupational therapists. Treatment and discharge decisions are made on a case by case basis by a

team comprising the staff above led by a psychiatrist. Patients are often discharged back into the community upon recovery.

On average, there are 450 adult discharges from the unit annually. Of these, 250 are repeat discharges while 200 are unique discharges from the unit within any given year. A unique discharge implies a first time discharge from the unit during any given year. The readmission rates within any given year are therefore high. The average length of stay at the Mental Health Unit is 30 days.

3.3 Study Population

The study population consisted of adult patients admitted at the Mental Health Unit of MTRH during the study period.

3.4 Eligibility Criteria

3.4.1 Inclusion criteria

1. All adult patients discharged from the Mental Health Unit, MTRH during the study period.

3.4.2 Exclusion criteria

Patients were excluded from the study if:

1. They had no capacity to consent as assessed by the Mini Mental State Examination (MMSE)
2. They were repeat discharges from the unit during the study period

3.5 Sampling Procedures

3.5.1 Determination of sample size

Sample size calculation was done to obtain the optimum number of participants required to be able to ethically and scientifically achieve the objectives the study (Kadam & Bhalerao, 2010). This was done using the Fisher, Laing & Strocker (1998) equation as follows:

$$\begin{aligned} n_0 &= \left(\frac{Z_{1-\alpha/2}}{\delta} \right)^2 P(1-P) \\ &= \left(\frac{1.96}{0.05} \right)^2 \times 0.43 \times 0.57 \\ &= 377 \end{aligned}$$

Where:

n = sample size

Z = Z-value corresponding to 95% confidence level (1.96)

α = level of significance (5% or 0.05)

δ = absolute precision of 5%

P = prevalence of substance use disorders among the psychiatric in-patients in a similar study done in Sri Lanka which is 43.4% (Hapangama, et al., 2013). This study was chosen since it was the latest study done on the topic and had a similar study design and population as ours (Naing, Winn & Rusli, 2006).

Since the sampling of subjects was to be done within a twelve month period, and the expected total number of unique discharges from the Mental Health Unit in one year is 200 patients (population less than 10,000), we adjusted for a finite population. A unique discharge implies a first time discharge from the Mental Health Unit during any given year and excludes any repeat discharges during the same period.

Adjustment for finite population was given by the formula:

$$n_f = \frac{n}{\quad}$$

$$1+n/N$$

Where:

n_f = sample size after adjustment for finite population

n = sample size of 377 obtained from Fisher, et al. (1998) formula as outlined above

N = population size (this will be 200 based on the annual average number of unique discharges from the Mental Health Unit)

$$n_f = \frac{377}{1 + \frac{377}{200}}$$

n_f = 131 patients

3.5.2 Sampling technique

Data was collected from consecutively discharged patients who met the eligibility criteria. This was done until the predetermined sample size of 131 was achieved. Data was collected between March 2015 and February 2016.

3.6 Measures and Instruments

A pre-tested researcher designed questionnaire was used to collect information on socio-demographic and clinical factors that would be examined for their association with a substance use disorder in line with the objectives. The socio-demographic and clinical factors selected were those likely to be routinely assessed by clinicians working in psychiatric in-patient settings and had also been documented in prior scientific literature (Walter & Tiemeier, 2009). Socio-demographic data collected included age, sex, marital status, employment status and level of education. The clinical

data collected included mode of admission, dates of admission and discharge (used to calculate the length of hospital stay), prior suicide attempts, prior hospitalizations for a mental illness, contribution of violence to the current admission, forensic history, and substances used over the past 12-month period.

A patient was considered an adult if they were the age of 18 years and above.

Marital status was classified as ‘married’, ‘never married’, ‘divorced/separated’ and ‘widowed’. The category ‘married’ included persons who were living with their opposite- or same-sex spouse whether the couple was legally married or not. ‘Separated’ implied that a respondent was previously married but was no longer living with their spouse while ‘divorced’ meant the separation had been legalized. ‘Widowed’ included persons who had lost their spouses through death and who had not remarried.

Employment was categorized as either ‘regular’, ‘temporary’, or ‘unemployed’. A patient was considered to have regular employment if they worked all year with the expectation of continued employment. They were considered to have temporary employment if the jobs held were seasonal, casual or on contract basis with no expectation of continuity beyond a year and were considered unemployed if they had no source of income and depended on others for support. This mode of classification of employment was selected since the permanency of employment or source of income has been associated with psychological well being with increasing psychological morbidity as job permanency decreases (Moscone, Tosetti, & Vittadini, 2016; Webber, Pacheco, & Page, 2015).

The education level implied the highest level of education achieved. For example a participant was considered to have primary level education if they completed standard 8 and sat for the Kenya Certificate of Primary Education Examinations (KCPE).

The mode of admission was categorized as either ‘voluntary’, ‘involuntary’ or ‘emergency’ in accordance with the *Mental Health Act 1989* (Kenya). In each case, either form 613, form 614 and form 638 respectively are filled and filed in the patients’ charts at the time of admission. For this study, the information regarding the mode of admission was obtained from the patients’ files.

The date of discharge was taken to be the day the team taking care of the patients, deemed them fit to be allowed home and the psychiatrist or psychiatric clinical officer consequently filled, signed and filed a discharge summary form.

A patient was considered to have forensic history if they had been arrested by police or had faced criminal charges in the past 12-month period. Only admissions related to a mental disorder counted while finding out the number of admissions in the prior 12-month period. Suicide attempts included acts aimed at ending one's own life and were also assessed for the 12-month period prior to participation in the study.

Violent occurrences were considered to be those involving harm/destruction to property or persons and or threats of harm including to self. Violence is defined as "the intentional use of physical force or power, threatened or actual, against oneself, another person, or against a group or community, which either results in or has a high likelihood of resulting in injury, death, psychological harm, maldevelopment, or deprivation" (Krug, Dahlberg, Mercy, Zwi & Lozano, 2002). The history of violence preceding admission was obtained for the patients' files.

The categories of substances assessed for were those listed in the DSM-5 including alcohol, cannabis, hallucinogens, inhalants, opioids, sedative hypnotics/anxiolytics, stimulants, tobacco and others. Alcohol included any ethanol containing drink both legal and illegal. Hashish was included with cannabis. Hallucinogens included Lysergic acid diethylamide (LSD), Phencyclidine (PCP), peyote, mescaline, psilocybin mushrooms and ketamine. Inhalants included a variety of substances e.g. amyl nitrate, cleaning fluids, glue and other aerosol sprays. Opioids included heroine, pethidine, morphine and cough syrups containing codeine. Stimulants included methamphetamines/amphetamines and cocaine. Some substances containing methamphetamine include *Catha edulis* ('khat'), crystal methamphetamine and 3,4-methylenedioxy-methamphetamine (MDMA). The sedatives hypnotics/anxiolytics included methaqualone and benzodiazepines. Tobacco included cigarettes, tobacco smoked in cigars and pipes (including 'shisha') and smokeless tobacco (chewed tobacco, snuff, 'kuber'). 'Kuber' is a form of smokeless tobacco sold in East Africa that often also contains slaked lime and cannabis. Other substances were listed in the 'others' section if the participant used them to alter mood, feeling and behavior but did not fit in either of the categories described above.

Psychiatric and substance use disorder diagnoses were made using the Mini International Neuropsychiatric Interview (MINI) version 7.0. The conclusions of the MINI (substance use disorder diagnosis and other mental disorder diagnosis) were recorded in the researcher designed questionnaire. The number of psychiatric diagnoses generated by the MINI was also examined for its association with the diagnosis of a substance use disorder. The MINI is a short structured diagnostic interview developed in 1990 jointly by psychiatrists and clinicians in the US and Europe, for the DSM and ICD psychiatric disorders. The tool diagnoses the major Axis I psychiatric disorders, and one Axis II disorder (Antisocial personality disorder)¹. The MINI has been validated against the Structured Clinical Interview for DSM diagnoses (SCID) and the World Health Organization World Mental Health - Composite International Diagnostic Interview (Sheehan et al., 1998). It however has a much shorter administration time, about 15 minutes. The latest version of the tool, the MINI version 7.0 for DSM-5 was employed in this study. The tool has been used in a study in Kenya, in a primary health care setting after adoption (Aillon et al., 2014).

¹ The multiaxial assessment system was utilized in prior versions of the DSM for diagnostic purposes, and included 5 dimensions. Axis I disorders included the clinical syndromes in psychiatry while personality disorders and intellectual disability were listed under Axis II disorders. The other axes III, IV and V included: medical conditions, psychosocial and environmental stressors, and Global Assessment of Functioning respectively. This system has now been replaced with a non-axial approach in the DSM-5.

3.7 Study Procedures

The principal investigator recruited two research assistants to help with the identification of adult patients who had been discharged from hospital. The time of discharge was chosen because at that time the patients were likely mentally stable and off of intoxicating or withdrawing effects of substances that may have been used prior to hospitalization. Collecting data at such a time has been suggested to improve accuracy of self-report (Babor, et al., 2000; Carey, 1997). Those who were repeat discharges during the study period were excluded at this point.

Cognitive functions of the identified adult patients were evaluated in order to ascertain the capacity to consent. This was done in line with ethical principles guiding research among vulnerable participants (Council for International Organization of Medical Sciences, 2002). Cognitive functioning has been found to be a good predictor of decision-making capacity among those with mental disorders (Palmer et al., 2005; Candilis, Fletcher & Appelbaum, 2008).

The process of determining decisional capacity was carried out by a clinical officer with experience in psychiatry and who was not part of the research team. The Mini Mental State Examination (MMSE) (Folstein, Folstein & McHugh, 1975) was used to assess for cognitive function. It is a brief test that concentrates only on the cognitive aspects of mental functions and takes about 5-10 minutes to administer. The MMSE has been found to be a valid and reliable test of cognitive function (Folstein, et al., 1975; Tombaugh & McIntyre, 1992). The clinical officer informed the patients on the purpose of the evaluation with the MMSE. Thereafter the clinical officer read out the questions to the participant and then filled out the responses in the form. A score was assigned to each response and total scores obtained for each participant. If scores were favorable (this implied a score of greater than or equal to 23), informed consent was obtained from the participants. A score of greater than or equal to 23 has been found to be strongly indicative of decision making capacity among patients (Appelbaum, 2007). Those without capacity to consent were excluded from the study. Cognitive evaluation was also done to improve accuracy of self report (Babor, et al., 2000).

The process of obtaining informed consent was carried out by the investigator and witnessed by a registrar in psychiatry who had the capacity to understand the merits, risks and procedures of the research, was independent of the research team and who may have been familiar with the participant's condition.

Once consent was obtained, a pre-tested researcher designed questionnaire containing unique patient identifiers was used to collect data on the socio-demographic and clinical characteristics of the respondents. The pretesting was done on patients at the Alcohol Drug and Rehabilitation (ADAR) Unit of MTRH and adjustments done to the wording and sequencing of the questions. The MINI version 7.0 was then administered to determine the substance use disorder diagnosis and other mental disorder diagnoses. Each participant's data was linked to the unique identifier.

Clinician discharge diagnoses (obtained from the discharge summary), for those who had no decisional capacity and for those who declined to consent were recorded.

Over the study period, there were a total of 443 discharges from the Mental Health Unit. Of these, 178 were unique discharges. Out of the 178 unique discharges, 39 patients were deemed to have no decisional capacity based on the MMSE while 8 declined to consent. The respondents interviewed were therefore 131 in number. Of those with no decisional capacity 13 had a diagnosis of a seizure disorder with psychosis; 10 had intellectual disability with psychosis or aggression; 8 had dementias of multiple causes including Human Immunodeficiency Virus (HIV) associated dementia, Alzheimer's dementia & vascular dementia; 8 had a diagnosis of schizophrenia. Of those who did not consent to the study, 3 had a diagnosis of substance induced psychosis, 2 had a diagnosis of bipolar disorder current episode manic and 2 had a diagnosis of borderline personality disorder, 1 had a diagnosis of an antisocial personality disorder.

All participants were thanked for participating in the study after termination of the interview and were advised accordingly.

3.8 Data Management

3.8.1. Data collection

The investigator administered the researcher designed questionnaire and the MINI version 7.0 to the study participants in a face to face interview. Information concerning the mode of admission, dates of admission and discharge, and whether violence contributed to the current admission were obtained from the patients' files. The rest of the data was collected entirely from the participants. No data was collected from collaterals or from other team members.

3.8.2 Data storage, analysis and presentation

Data obtained was verified and entered into a secure Ms Access database which was password protected. Confidentiality was maintained by excluding any personally identifiable information from the dataset. Data was transferred to and analyzed using STATA version 10 (StataCorp. 2007). Continuous variables were summarized using means and standard deviations or medians and the corresponding inter quartile ranges. Categorical data was summarized using frequencies and

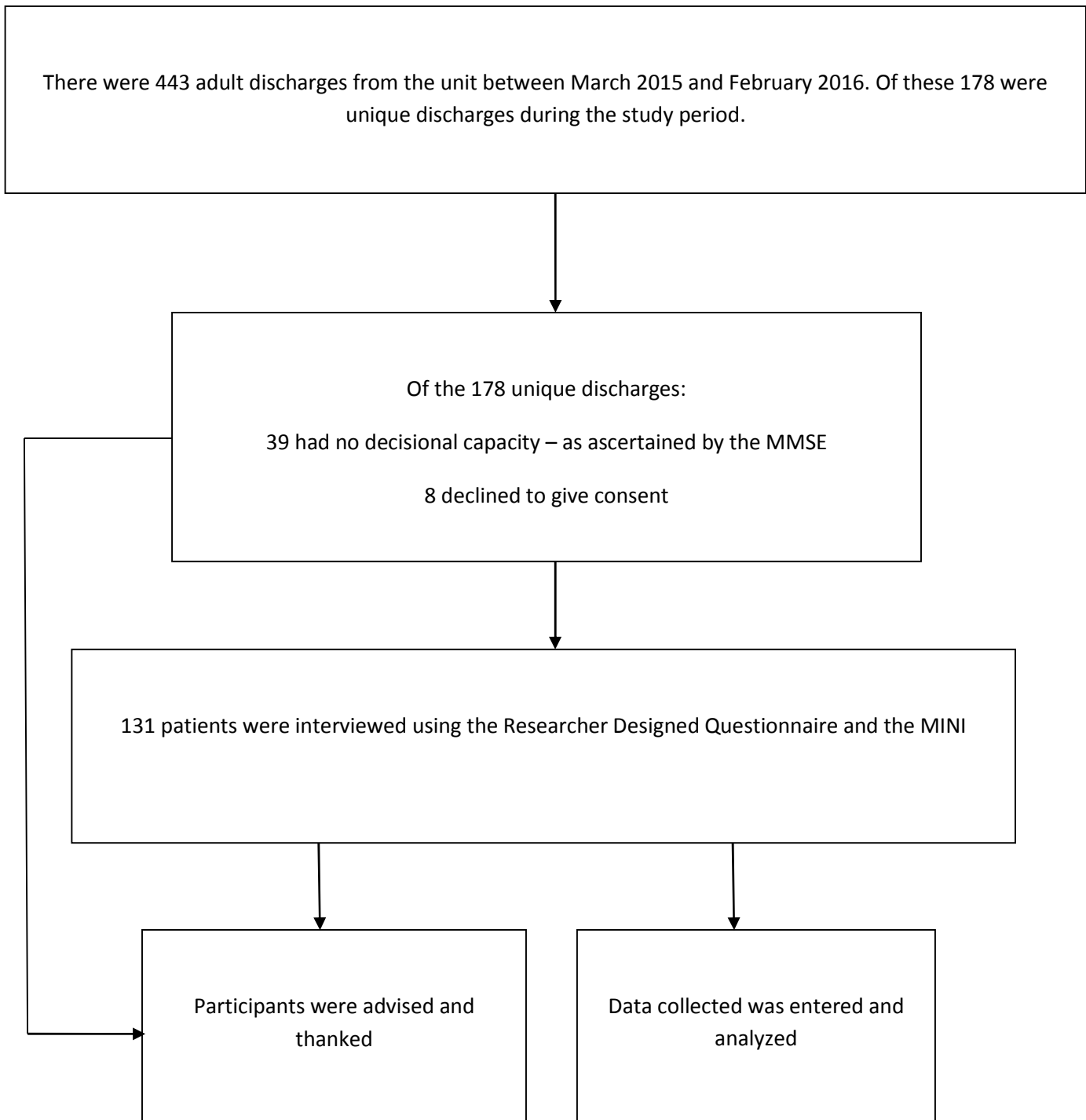
percentages and presented using frequency tables. Associations between categorical variables were assessed using chi-square test. In cases where the cell counts were below 5, the Fisher's exact test was used. T-test was used to compare means between groups. The socio-demographic and clinical factors that showed significant association with a substance use disorder at bivariate analysis were entered into a multiple logistic regression model. This was to control for confounding variables and to determine the factors associated with any substance use disorder. Adjusted odds ratios with 95% confidence intervals were reported. All analysis was carried out at the 95% level of significance.

3.8.3 Data dissemination

This thesis has been submitted to a reputable journal for possible publishing. The results will be presented at seminars and conferences. A copy will be availed to the management of MTRH to help inform protocols guiding the diagnosis and management of substance use disorders among the psychiatric in-patient population at the facility.

3.9 Ethical Consideration

Approval was sought from the Institutional Research and Ethics Committee (IREC) to carry out the study. Permission and approval was also sought from the Director Moi Teaching and Referral Hospital. Capacity of patients to consent was assessed using a cognitive evaluation tool, the Mini Mental State Examination (MMSE). Those whose capacity to consent was favorable, were fully informed on all the procedures of the study, risks and benefits and a written informed consent was sought prior to enrolment. The informed consent forms used in this study are provided in Appendix I. Those patients with no decisional capacity as determined by the MMSE were excluded from the study. Appropriate referral for management, was done for those with a substance use disorder. All patients were given appropriate and indicated care regardless of their willingness to participate in the study or their capacity to consent. All patients' records were kept confidential. Data forms with unique patient identifiers were kept in lockable cabinets and access to them restricted to the investigators only.

Fig 1: Study Recruitment Schema

CHAPTER 4: RESULTS

This chapter provides detailed analyzed results of the study. The initial section of the chapter describes the socio-demographic as well as the clinical characteristics of the study participants. Thereafter results are presented based on the objectives.

4.1 Socio-demographic Characteristics of the Participants

A total of 131 respondents participated in the study. The mean age for the respondents was 34.5 years (SD=12.20 years). Of those who responded, 78 (59.5%) were male, 62 (47.30%) had never married while 64 (48.9%) had achieved primary education as the highest level of education. As regards employment status, 80 (61%) of them had some form of employment (**Table 1**).

Table 1: Socio-demographic Characteristics of the Participants

Variable	Levels	n (%) / Mean ± SD
Age (Years)		34.5 ± 12.2
Sex	Female	53 (40.5%)
	Male	78 (59.5%)
Marital status	Married	41 (31.3%)
	Never Married	62 (47.3%)
	Divorced/Separated/Widowed	28 (21.4%)
Education level	Primary	64 (48.9%)
	Secondary	30 (22.9%)
	Tertiary	33 (25.2%)
	None	4 (3.0%)
Living situation	Alone	25 (19.1%)
	Family	103 (78.6%)
	Friends	2 (1.5%)
	Homeless	1 (0.8%)
Employment status	Regular employment	37 (28.2%)
	Temporary employment	43 (32.8%)
	Unemployed	51(39.0%)

4.2 Clinical Characteristics of the Participants

Table 2 shows the clinical characteristics of the participants. From the table we observe that all the participants were involuntarily admitted to the unit and that 75 (57.3%) of them had a history of violence as contributing to the current hospital admission. Eighty two (62.6%) participants had been admitted more than once in the preceding 12-month period, excluding the current admission. Among the respondents, 58 (44.3%) had bipolar disorder; 55 (42%) had a psychotic disorder; and 25 (19.1%) had suicide behavior disorder. These were the most common mental disorder diagnoses. The category of bipolar disorder included bipolar 1 and 2 disorder with and without psychotic features; Major depressive disorder included major depression with and without psychotic features; Anxiety disorder included generalized anxiety disorder, agoraphobia, social anxiety disorder & panic disorder. A total of 35 (26.7%) had more than one mental disorder diagnosis other than that of a substance use disorder. The median time to discharge from hospital was 22 days (IQR: 12,34).

Table 2: Clinical Characteristics of the Participants

Variable	Levels	n(%) or Mean \pm SD or Median (IQR)
Mode of admission to the unit	Voluntary	0 (0%)
	Involuntary	131 (100%)
	Emergency	0 (0%)
Mini Mental State Exam scores*		27.58 \pm 1.61
Participants with a history of violence as contributing to current admission	Yes	75 (57.3%)
	No	56 (42.7%)
Forensic history in the past 12-month period	Yes	72 (55%)
	No	59 (45%)
Number of psychiatric admissions in the past 12-month period	0	49 (37.4%)
	1	35 (26.7%)
	2 or more	47 (35.9%)
Number of suicide attempts in the preceding 12-month period	0	84 (64.1%)
	1	29 (22.1%)
	2 or more	18 (13.7%)
Mental disorder diagnosis based on the MINI version 7.0 for DSM-5**	Bipolar disorder	58 (44.3%)
	Psychotic disorder	55 (42%)
	Anxiety disorder	19 (14.5%)
	Major depression	6 (4.6%)
	Suicide behavior disorder	25 (19.1%)
	ASPD***	3 (2.3%)
	Substance-induced psychotic disorder	7 (5.3%)
Number of mental disorder diagnosis	1	96 (73.3%)
	2 or more	35 (26.7%)
Time to discharge (days)		22 (12,34)

*MMSE scores range from 0 to 30; the cut-off score employed in this study was 23 (see Appendix II).

Due to the co-occurrence of mental disorder diagnoses, the total number of mental disorder diagnoses exceeds 131. * Antisocial Personality Disorder.

4.3 Prevalence of Substance Use Disorders

The first objective of the study was to determine the 12-month prevalence of substance use disorders among in-patients at to the Mental Health Unit, MTRH. Sixty five (49.62%, [95% CI 40.77, 58.48]) of the study participants had at least one type of substance use disorder in the past 12-month period. Forty five (34.4%) had more than one substance use disorder diagnosis and this represented over two thirds (69.2%) of those with any substance use disorder. Estimates for the specific substance use disorder rates are presented in **Table 3**. The most common substance use disorders were alcohol use disorder (40.5%), tobacco use disorder (30.5%) and cannabis use disorder (17.6%). The most frequent substance use disorder combinations were those of the three most common substance use disorders (**Table 3**).

Table 3: Prevalence of Specific Substance Use Disorders and their Combinations

Substance use disorder	Frequency* (n=131)	%
Alcohol use disorder	53	40.5
Tobacco use disorder	40	30.5
Cannabis use disorder	23	17.6
Stimulant use disorder	16	12.2
Opioid use disorder	6	4.6
Inhalant use disorder	5	3.8
Sedative/hypnotics/anxiolytics use disorder	4	3.1
Hallucinogen use disorder	3	2.3
Other substance use disorders (Trihexyphenidyl)	2	1.5
Poly-substance use disorder**	45	34.4
Alcohol & Tobacco use disorder	17	13
Alcohol, Tobacco & Cannabis use disorder	6	4.6
Alcohol & Cannabis use disorder	5	3.8
Other combinations	17	13

* There was co-occurrence of substance use disorders among the participants. The frequency of the substance use disorders is therefore more than 131.

**Poly-substance use disorder represents the participants who had more than one substance use disorder diagnosis.

4.4 Association between Socio-demographic and Clinical Factors and the Diagnosis of a Substance Use Disorder

The second objective of this study was to determine the association between socio-demographic and clinical factors and the diagnosis of a substance use disorder. The socio-demographic and clinical factors that showed association with a substance use disorder diagnosis at bivariate analysis included age, marital status, sex, history of violence preceding admission, employment status, number of suicide attempts in prior year, number of psychiatric admissions in prior year, level of education and the number of mental disorder diagnoses. These were subjected to logistic regression analysis to control for confounding variables and to determine the variables associated with any substance use disorder diagnosis. The results of logistic regression analysis concluded that being male, number of suicide attempts in the preceding 12-months and level of education were significantly associated with the diagnosis of a substance use disorder. Males had a higher odds of having a substance use disorder compared to females (OR 5.13 95% CI 2-13.6 p=0.001). As the number of suicide attempts in the preceding 12 month period increased, the odds of having a substance use disorder increased by 2.2 (OR 2.19 CI 1.11- 4.32 p=0.02). Participants with tertiary level of education had a higher odds of a substance use disorder compared to those with primary education (OR 3.41 CI 1.08 –10.81 p=0.04). The associations between age, marital status, employment status, number of admissions in the past year, time to discharge, number of mental disorder diagnoses and the diagnosis of a substance use disorder were not significant (**Table 4**).

Table 4: Results of Multiple Logistic Regression Analysis of any Substance use disorder and Socio-demographic and Clinical Characteristics

Variable	Adjusted			
	Odds Ratio	P-value	95% Confidence	Interval
Age in years	1.00	0.89	0.96	1.05
Never married vs. Married	1.67	0.40	0.51	5.47
Divorced/Separated/Widowed vs. Married	0.98	0.98	0.24	3.98
Male vs. Female	5.13	0.001	2.00	13.16
Violence preceding admission (Yes vs. No)	1.53	0.36	0.62	3.75
Temporary vs. Regular employment	1.96	0.31	0.54	7.13
Unemployed vs. Regular employment	0.77	0.67	0.23	2.55
Number of suicide attempts in prior year	2.19	0.02	1.11	4.32
Number of psychiatric admissions in prior year	1.29	0.19	0.88	1.89
Time to discharge from hospital	1.02	0.19	0.99	1.05
Secondary vs. primary education	1.60	0.41	0.53	4.82
Tertiary vs. primary education	3.41	0.04	1.08	10.81
Number of mental disorder diagnosis	1.01	0.99	0.37	2.74

4.5 Association between Specific Substance Use Disorders and Mental Disorder Diagnosis

The final objective of the study was to examine whether an association existed between specific substance use disorders and mental disorder diagnoses. Bivariate analyses for mental disorders versus substance use disorders were done for the three commonest substance use disorders (**Tables 5a, b, c**). There was a statistically significant association between cannabis use disorder and suicide behavior disorder ($p=0.001$); cannabis use disorder and anxiety disorders ($p=0.002$); and cannabis use disorder and antisocial personality disorder ($p=0.024$) (**Table 5c**).

Table 5a: Bivariate Analysis of Alcohol Use Disorder and Mental Disorder Diagnosis

Mental Disorder	Alcohol Use Disorder [n (%)]		P-value
	Present	Absent	
Bipolar Disorder			
Absent	26 (35.6)	47 (64.4)	0.205
Present	27 (46.6)	31 (53.4)	
MDD*			
Absent	51 (40.8)	74 (59.2)	0.716
Present	2 (33.3)	4 (66.7)	
Anxiety Disorder			
Absent	44 (39.3)	68 (60.7)	0.507
Present	9 (47.4)	10 (52.6)	
Suicide Behavior Disorder			
Absent	40 (37.7)	66 (62.3)	0.191
Present	13 (52)	12 (48)	
Psychotic Disorder			
Absent	35 (46.1)	41 (53.9)	0.125
Present	18 (32.7)	37 (67.3)	
ASPD**			
Absent	51 (39.8)	77 (60.2)	0.349
Present	2 (66.7)	1 (33.3)	

*MDD- Major Depressive Disorder

**ASPD- Antisocial Personality Disorder

Table 5b: Bivariate Analysis of Tobacco Use Disorder and Mental Disorder Diagnosis

Mental Disorder	Tobacco Use Disorder [n (%)]		P-value
	Present	Absent	
Bipolar Disorder			
Absent	23 (31.5)	50 (68.5)	0.786
Present	17 (29.3)	41 (70.7)	
MDD*			
Absent	39 (31.2)	86 (68.8)	0.45
Present	1 (16.7)	5 (83.3)	
Anxiety Disorder			
Absent	34 (30.4)	78 (69.6)	0.915
Present	6 (31.6)	13 (68.4)	
Suicide Behavior Disorder			
Absent	30 (28.3)	76 (71.7)	0.253
Present	10 (40)	15 (60)	
Psychotic Disorder			
Absent	23 (30.3)	53 (69.7)	0.937
Present	17 (30.9)	38 (69.1)	
ASPD**			
Absent	38 (29.7)	90 (70.3)	0.169
Present	2 (66.7)	1(33.3)	

*MDD- Major Depressive Disorder

**ASPD- Antisocial Personality Disorder

Table 5c: Bivariate Analysis of Cannabis Use Disorder and Mental Disorder Diagnosis

Mental Disorder	Cannabis Use Disorder [n (%)]		P-value
	Present	Absent	
Bipolar Disorder			
Absent	12 (16.4)	61 (83.6)	0.706
Present	11 (19)	47 (81)	
MDD*			
Absent	23 (18.4)	102 (81.6)	0.247
Present	0 (0)	6 (100)	
Anxiety Disorder			
Absent	15 (13.4)	97 (86.6)	0.002
Present	8 (42.1)	11 (57.9)	
Suicide Behavior Disorder			
Absent	12 (11.3)	94 (88.7)	0.001
Present	11 (44)	14 (56)	
Psychotic Disorder			
Absent	14 (18.4)	62 (81.6)	0.76
Present	9 (16.4)	46 (83.6)	
ASPD**			
Absent	21 (16.4)	107 (83.6)	0.024
Present	2 (66.7)	1 (33.3)	

*MDD- Major Depressive Disorder

** ASPD- Antisocial Personality Disorder

CHAPTER 5: DISCUSSION

The finding that 49.6% of patients admitted to the Mental Health Unit, MTRH had at least one substance use disorder in the past 12-month period is broadly consistent with those of other studies examining the 12-month prevalence rates among psychiatric in-patient populations. Hapangama, et al. (2013) in Sri Lanka, and Helseth, et al. (2009) in Norway, found 12-month substance use disorder prevalence rates of 43.4% and 50% respectively. Earlier in Kenya, Ndeti et al. (2008) reported a lifetime prevalence rate of 34.4% among in-patients at Mathari National Teaching and Referral Hospital, the largest mental health facility in the country. This figure is much lower than that found in our study especially given that our study obtained rates for a shorter reference period. It is likely that substance use rates have increased in the underlying general population in the country since then, resulting in the higher rates seen in our study. The UNODC (2016) reported an increase in the number of illicit substance users globally between 2013 and 2014 and projected this to increase by 25% by 2050. It is also possible that amounts of substances consumed are increasing and hence substance use disorder rates are rising as well. Trends in alcohol consumption have shown a steady increase in amounts consumed over time (Monteiro, Rehm, Shield & Stockwell, 2015) and this has been projected to substantially increase over the coming years (WHO, 2014).

About a third (34.4%) of the participants had more than one substance use disorder diagnosis (This represents 69.2% of those with any substance use disorder). This finding is significantly higher than that found by Mueser et al. (2000) in the US, who reported that 11% of the study participants had more than one substance use disorder. Duko, et al. (2015) in a recent study in Ethiopia, found that 31.8% of the study participants had more than one substance use disorder diagnosis. This rate is similar to that found in our study. The higher rates of poly-substance use disorders reported in recent times compared to those seen in earlier studies could be due to a rise in rates of multiple substance use over time. This seems true particularly in light of the most recent report by the UNODC (2016) indicating a rise in poly-substance use over time. Multiple reasons for poly-substance use have been postulated including, counteracting withdrawal effects of one substance, enhancing effects of a substance by combining drugs with similar central nervous system mechanisms, experimentation and ease of accessibility or availability of substances (Connor,

Gullo, White & Kelly, 2014). Availability seems a key reason for having poly-substance use disorders in our study since the three most common combinations of substance use disorders were those of the three most frequently used substances by the general population in the region (NACADA, 2012).

The knowledge that close to a half of in-patients at the Mental Health Unit have at least one substance use disorder and that over two thirds of these have more than one substance use disorder, has implications for the management of these disorders in our institution. Firstly, it emphasizes the need for routine screening of all patients admitted to the Mental Health Unit for problematic patterns of substance use and that this should be done for multiple substances. This would improve substance use disorder detection rates. Secondly, the high rates highlight the need for integrated management for co-occurring disorders to be a key service offered at the unit and to be a core skill of practitioners offering services there. Knowing the magnitude of substance use disorders would assist in planning for an integrated management program for in-patients at the unit. Without routine screening for problematic substance use and without integrated management, many in-patients will continue to go undiagnosed and will miss receiving appropriate treatment. Such patients will continue to have poor outcomes.

The finding that alcohol use disorder was the most prevalent substance use disorder in our study is not surprising given that this is the most consumed substance in the country (NACADA, 2012). Most other studies among psychiatric in-patients have reported similar results (Mueser et al., 2000; Ndeti et al., 2008; Hapangama, et al., 2013; Charzynska et al., 2011). Others however have documented substance use disorders other than alcohol use disorder to be the most common among psychiatric in-patients. Weich & Pienaar, (2009) in South Africa reported cannabis use disorder to be the most common while in Ethiopia, Duko, et al. (2015) documented Khat (a methamphetamine) use disorder as the most prevalent. This variation in the most common substance use disorder could be due to differences in availability of substances in the underlying population as well as socio-culturally influenced preferences for certain substances. Khat for instance is widely grown all over Ethiopia, and its consumption is popular in all segments of the Ethiopian population (WHO, 2006). The findings by Duko, et al. (2015) are therefore not surprising. Weich & Pienaar, (2009) found cannabis use disorder to be the most common substance use disorder among in-patients in a South African psychiatric hospital. This is surprising since in

the same year, Van Heerden et al. (2009) found alcohol to be the most consumed substance in that country (37.8%) followed by tobacco (30.0%), cannabis (8.4%) and other substances (2.0%). In the study by Weich & Pienaar, (2009), the patients' preferred substance was documented rather than all the substances the patient used. It could then be that even though alcohol was the most consumed substance in that country at the time, most persons, or at least the ones admitted to that hospital preferred using cannabis over other substances consumed. It could also be that those who used cannabis as their preferred substance were more likely to be admitted to hospital in that setting. Indeed, Weich & Pienaar, (2009) found cannabis users to have higher admission rates and higher rates of violence preceding hospitalization compared to those using other substances.

Tobacco and cannabis were the next most common substance use disorders in our study. This finding is not surprising given that NACADA (2012) found tobacco and cannabis to be the second and third most commonly used substances (after alcohol) in the country. This finding is similar to that by Hapangama et al. (2013) in Sri Lanka. Other studies report varying patterns of the second and third most common substance use disorders. Mueser et al. (2000) in the US reported cannabis and cocaine to be the second and third most prevalent substance use disorders. Helseth et al (2009) and Charzynska et al. (2011) in Europe reported amphetamines and cannabis and cannabis and opioids respectively while Weich & Pienaar (2009) in South Africa, reported alcohol and amphetamines to be second and third most common substance use disorders. Varying patterns of the most prevalent substance use disorders across regions likely reflects availability and socio-cultural preferences for substances, and emphasizes importance of conducting local studies.

The knowledge that alcohol, tobacco and cannabis are the most common substance use disorders among in-patients at our unit is of importance. Firstly, routine screening for substance use disorders ought to be geared towards these three substance use disorders at the minimum. Also, resources could be prioritized towards the diagnosis and management of these three substance use disorders. For example priority could be accorded to providing laboratory tests and pharmacotherapy useful for the management of these three substance use disorders.

Logistic regression analysis revealed those with male gender, suicide attempts in the prior 12-month period and a higher level of education to be most likely to have a substance use disorder diagnosis.

The finding that male gender was associated with the diagnosis of a substance use disorder is consistent with prior studies among psychiatric in-patients. Mueser et al. (2000), Weich & Pienaar (2009) and Duko, et al. (2015) found this association in the US, South Africa and Ethiopia respectively. Male gender has been shown to be associated with substance use disorders because of several reasons. Firstly, men have been shown to have more opportunities to try substances as compared to women (Van Etten & Antony, 2001). Secondly, in many cultures, gender roles may prevent the development of problematic substance use, and endorsing traditional gender roles has been shown to protect women from developing substance related problems (Kubicka & Csemy, 2008) resulting in an over representation of males among those with substance use disorders. Both explanations seem possible in our setting since our society prescribes to strict gender roles where women are custodians of the care of the home and children while men remain the breadwinners (Kenya's National Gender Context and its Implications for Conservation: a Gender Analysis, 2013). This means that women spend a huge proportion of their time in the home and are therefore unlikely to access substances as compared to men. Additionally, strict cultural beliefs and values in our setting discourage women from the use of substances.

Our results showed that having a higher level of education was associated with a diagnosis of a substance use disorder. This differs from findings by other authors examining this association among in-patients. Rush & Koegl, (2008), found no association between level of education and the diagnosis of a substance use disorder among psychiatric in-patients in the US. Hapangama, et al. (2013) found lower educational attainment to be associated with the diagnosis of a substance use disorder among patients seen at the psychiatric unit of a general hospital in Sri Lanka. Similar results were documented by Duko, et al. (2015) in Ethiopia. A possible reason for the differences in results is varying socio-demographic profiles across the different settings. Another possible reason for this finding in our study is that the MMSE tool employed in assessing for decisional capacity may have introduced selection bias resulting in a sample with a relatively higher level of education. MMSE scores have been shown to be dependent on the level of education with scores reducing as the level of education decreases (Crum, Antony, Basset & Folstein, 1993). The cut-off score for decisional capacity (23) used in this study was however only a score higher (22) than that found to be the average score for a population with 0 to 4 years of education (Crum, et al., 1993). Follow-up studies would be beneficial in further clarifying the association between higher level of education and substance use disorders in our setting.

Younger age has previously been consistently associated with the diagnosis of a substance use disorder among psychiatric in-patients (Mueser et al., 2000; Weich & Pienaar, 2009; Duko, et al., 2015). The finding in our study that age was not associated with the diagnosis of a substance use disorder differs from the findings of prior studies, and suggests a fairly equal prevalence of substance use disorders among the study participants across the age groups. Studies have projected an increase in substance use among the older age groups over time and this could explain the current finding in our setting of no association between age and a substance use disorder diagnosis. This rise has been suggested to occur as a result of aging of the younger substance abusing cohorts (Blazer & Wu, 2009) or increased incidence of certain mental health and physical disorders with age (Wu & Blazer, 2011; Taylor & Grossberg, 2012; Wang & Andrade, 2013) which could predispose to substance use. Further research could be useful in examining the association between age and a substance use disorder diagnosis in our setting.

Among the clinical factors, the number of prior suicide attempts, was the only variable associated with the diagnosis of a substance use disorder with the odds of having a substance use disorder increasing as the number of suicide attempts in the preceding 12 month period increased. This finding concurs with those of other studies. Ponizovsky, et al. (2015) in Israel, found prior suicide attempts to be associated with a diagnosis of substance use disorders among in-patients. Rush and Koegl, (2008) found similar results among in-patients drawn from various facilities in the US. It has been postulated that substance use is associated with suicide attempts since both share impulsivity as a common underlying key risk factor (Dougherty, Mathias, Marsh, Moeller & Swann, 2004). Additionally, substances possess acute effects including impaired decision-making, deficits in attention and concentration, increased risk-taking and poor impulse control (Crean, Crane, & Mason, 2011; Montgomery, Ashmore, & Jansari, 2011), that are likely to increase the likelihood of attempting suicide. Furthermore, substance use can trigger suicidal behavior by contributing to psychosocial adversity e.g. unemployment, separation and divorce leading to increased risk of suicide (Preuss et al., 2002). This latter mechanism though seems unlikely in our setting since no association was found between a substance use disorder diagnosis and employment status, marital status or family support.

There is benefit in the clinical setting to knowing that being male, number of prior suicide attempts and having a higher level of education is associated with the diagnosis of a substance use disorder.

The index of suspicion concerning the presence of a substance use disorder would be raised when patients possessing these characteristics are encountered and this would necessitate screening and further assessment for a substance use disorder. Additionally, substance use disorder preventive interventions could be targeted at these groups. The knowledge that a substance use disorder diagnosis is not associated with age in our setting is also of importance. This finding raises the index of suspicion about substance use among older in-patients, and this would improve detection rates. It also emphasizes the importance of directing substance use disorder interventions at older populations and not just younger groups as has been the practice.

From our study, the length of hospital stay, the mode of admission, a history of violence as contributing to admission, the number of prior admissions, employment status, marital status, and the number of psychiatric diagnoses were not associated with the diagnosis of a substance use disorder. Results from studies examining the association between these variables and the diagnosis of a substance use disorder have been inconsistent likely reflecting differing socio-demographic profiles across study populations. This emphasizes the importance of local studies when investigating factors associated with substance use disorders.

Our results show cannabis use disorder to be associated with anxiety disorder, suicide behavior disorder and antisocial personality disorder. Different from our findings, prior studies among psychiatric in-patients have reported associations mostly between cannabis use disorder and schizophrenia (Weich & Pienaar, 2009; Karam, et al., 2002), and alcohol use disorder and major depression (Weich & Pienaar, 2009; Ndetei et al., 2008). One study reported no associations between substance use disorder diagnosis and psychiatric diagnosis (Mueser et al., 2000).

The finding that cannabis use disorder is associated with suicide behavior disorder is new among psychiatric in-patients but not surprising since similar results have been documented among community samples (Delforterie et al., 2015; Shalit, Shoval, Shlosberg, Feingold & Lev-Ran, 2016). Cannabis has been shown to possess acute effects including induction of suicidal ideation and tendencies (Karila et al., 2014). One interesting case report for example showed suicidal ideation to occur with heavy cannabis use independent of depressed mood, stressors, or life events (Raja & Azzoni, 2009). Cannabis use disorder may also be linked to suicide behavior disorder through shared underlying neurobiological and neuropsychological mechanisms. According to van Heeringen & Mann (2014), the brain changes seen among heavy cannabis users including gray

matter volume reductions in the medial temporal cortex, parahippocampal gyrus, insula and orbitofrontal regions have also been noted among those with suicide attempts. Additionally, impulsivity is a personality trait that has been shown to underlie both cannabis use and suicide behavior disorder (Lane, Cherek, Tcheremissine, Lieving & Pietras, 2005; Gvion & Apter, 2011). It is possible that this association was not documented in earlier studies among psychiatric in-patients since suicide behavior disorder was not included as a diagnostic category in these studies (Karam, et al., 2002; Mueser et al., 2000; Ndetei et al., 2008; Weich & Piennar, 2009).

The finding that cannabis use disorder is associated with anxiety disorder is new among psychiatric in-patients but not surprising since similar results have been documented among community samples (Zvolensky et al., 2006; Feingold, Weiser, Rehm & Lev-Ran, 2016; Hayatbakhsh et al., 2007). Additionally, cannabis contains psychoactive ingredients with anxiety modulating properties namely cannabidiol (CBD) and Delta -9-Tetrahydrocannabinol (Δ -9-THC) (Atakan, 2012). The finding in our setting that cannabis is associated with anxiety disorder and the lack of this finding in studies elsewhere among in-patients, could be related to differences across regions in relative proportions of anxiety modulating compounds present in cannabis consumed as well as variations in the genetic make-up of individuals across study populations.

Cannabis strains with relatively low CBD to Δ -9-THC ratios particularly *Cannabis sativa*, are more likely to induce anxiety than those with higher CBD to Δ -9-THC ratios like *Cannabis indica* (Atakan, 2012). It could be that the cannabis strain consumed in the region has relatively high CBD to Δ -9-THC ratios resulting in relatively stronger anxiety symptoms in the user, severe enough to warrant hospitalization. Indeed cannabis use has been shown to be capable of inducing panic attacks and panic disorder (Dannon, Lowengrub, Amiaz, Grunhaus & Kotler, 2004). It is also important to note that the studies that did not show any association between cannabis use disorder and anxiety disorder among psychiatric in-patients were conducted earlier (8-17 years ago) (Mueser et al., 2000; Ndetei et al., 2008; Weich & Pienaar, 2009). Studies have shown a rise in Δ -9-THC levels in cannabis consumed (hence cannabis potency), and a decrease in CBD levels over time (Cascini, Aiello & Di Tanna, 2012; Potter, Clark & Brown, 2008). This could also explain the finding of the association between cannabis use disorder and anxiety disorder in the current study and the absence of this finding in earlier research among in-patients.

Genetic factors have been suggested to predispose to anxiety disorders among cannabis users (Crippa et al, 2009). It could be that persons in our setting possess unique genetic factors that could predispose to severe and persisting forms of anxiety among cannabis users that would warrant hospitalization. This is a subject for further research.

In keeping with our results, one German study among young adult in-patients reported an association between cannabis use disorder and antisocial personality disorder (Watzke, Schmidt, Zimmerman & Preuss, 2008). Cannabis use disorder has been linked to antisocial personality disorder through several pathways. Cannabis use has been associated with interruption of education; unemployment and lower income (Fergusson & Boden, 2008) which are major risk factors for the development of antisocial behaviors (Connell, Cook, Aklin, Vanderploeg & Brex, 2011; Mobarakeh, 2015). Additionally, heavy cannabis users show deficits in the expression of empathy and in the accurate recognition of emotional expressions of others specifically the negative emotions of fear and anger. This may contribute to antisocial behaviors. These deficits are likely dependent on the dose of Δ -9-THC with greater levels resulting in more severe deficits (Troup et al., 2016).

The associations between cannabis use disorder and psychotic disorders (Weich & Pienaar, 2009; Karam, et al., 2002) and between alcohol use disorder and depressive disorders (Weich & Pienaar, 2009; Ndeti et al., 2008) have previously been documented among psychiatric in-patients but this was not so in our study. Of possible importance in explaining the finding that cannabis use disorder was not associated with psychotic disorder in our setting is the fact that genetic predisposition has influence over the biological response of an individual to the psychotogenic effects of cannabis. Polymorphisms of certain genes (Dopamine Transporter [DAT] 1 and AKT 1) have been shown to predispose individuals to the psychosis inducing effects of cannabis (Atakan, 2012; DiForti et al., 2012). It could be that persons in our setting lack these genotypes, hence are less vulnerable to the psychosis inducing effects of cannabis. It is noteworthy that Ndeti et al. (2008) in a setting almost similar to ours also did not document this association.

Depression was not related to alcohol use disorder in our study. This could be because studies have shown the association between these two disorders to be dependent on the form of alcohol use disorder with dependence being associated with depression but not abuse (Boschloo et al., 2012; Kuria et al., 2012). Our study in line with the DSM-5 criteria for diagnosing substance use

disorders did not assess for alcohol abuse or dependence. Methodological approach could offer an alternative explanation for the finding in our study that there was no association between depressive disorders and alcohol use disorder. It has been suggested that clinicians may arrive at different conclusions, concerning co-occurrence of substance use disorders and other mental disorders depending on when they conduct assessments relative to the patient's entry into treatment (Quello, Brady & Sonne, 2005). This is because most substances may produce a substance induced mood or psychotic disorder that is generally temporary and likely to improve without formal treatment in a matter of days to weeks after cessation of intoxication or withdrawal (APA, 2013). Alcohol has depressogenic effects (Hauser, Getachew, Taylor & Tizabi, 2011) and hence if diagnosis is done without a sufficient period of abstinence, the alcohol induced depression may be misdiagnosed as a major depression. In our study, a period of abstinence was allowed prior to obtaining definitive mental disorder and substance use disorder diagnoses.

Knowing that cannabis use disorder is associated with suicide behavior disorder, anxiety disorder and antisocial personality disorder is of importance. Foremost, routine screening for cannabis use disorders among those with these three mental disorders could enhance diagnosis and hence management of cannabis use disorders. Additionally, cannabis use disorder preventive measures could be instituted for those with these mental disorders. Finally, the associations could give insights into possible etiologies of the associated mental disorders and this could form basis for further research.

This study has possible limitations. Firstly, the sample was hospital based and as such the rates and patterns seen may not be generalizable to persons with mental illness in the community. The above results also do not enable us determine any causal relationships where associations were significant. Finally, the Mini Mental State Examination may have introduced selection bias as has been explained in the discussion.

CHAPTER 6: CONCLUSION & RECOMMENDATIONS

6.1 Conclusion

The results of this study show that a large proportion of patients admitted to the Mental Health Unit, MTRH have a 12-month substance use disorder particularly alcohol, tobacco and cannabis use disorders. Additionally, those with a substance use disorder are likely to be males and likely to have prior suicide attempts as well as higher level of education. Finally, cannabis use disorder is associated with three mental disorder diagnoses namely suicide behavior disorder, anxiety disorder and Antisocial Personality Disorder.

6.2 Recommendations

The information obtained from the current study has practical implications for clinical practice. This is so as regards the development of guidelines for the screening of substance use disorders among this vulnerable population and in the planning of an integrated management service:

1. The high prevalence of substance use disorders among patients admitted at the unit justifies the need for an integrated management program, which is the evidence based approach to managing substance use disorders among those with other mental disorders.
2. Routine screening for substance use disorders should be done for all in-patients at the Mental Health Unit, MTRH due to the high prevalence of substance use disorders found. This should be done particularly for alcohol, tobacco and cannabis use disorders since these were the three commonest substance use disorders and were often found to occur in combination.
3. A high index of suspicion of a substance use disorder when males, those with a history of suicide attempts and those with a higher level of education are encountered. Also a high index of suspicion of a cannabis use disorder when those with an anxiety disorder, suicide behavior disorder and antisocial personality disorder are encountered.

4. Further analytical research is recommended in the following areas:
- i. In examining the association between cannabis use disorder and suicide behavior disorder, anxiety disorder, and antisocial personality disorder in our setting.
 - ii. In examining the association between substance use disorders and being male, having prior suicide attempts, and having a higher level of education in our setting.

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APPENDIX I:

CONSENT FORM

Patient Number

Permission is requested from you for participation in a medical research study investigating the prevalence and associated factors of substance use disorders among adult in-patients at the Mental Health Unit, Moi Teaching and Referral Hospital, Eldoret, Kenya.

The study will be conducted by Dr. Jaguga M. Florence (Registrar, Mental Health) under the supervision of Dr. Daniel Kinyanjui (Lecturer, Department of Mental Health, School of Medicine, Moi University) and Dr. Ann Mwangi (Senior lecturer, Department of Behavioral Sciences, School of Medicine, Moi University).

We ask that you read this form and ask any questions you may have before agreeing to participate in the study. After reading the consent form you are free to ask any questions that will allow you to understand clearly the nature of the study.

Purpose of the study: The aim of the study is to determine the magnitude of substance use disorders as well as assess the association between socio-demographic and clinical factors and the diagnosis of a substance use disorder among adult patients admitted to the Mental Health Unit of MTRH.

Study procedure: A set of questions from two separate questionnaires will be read out to you by the investigator. The first questionnaire will ask questions concerning your age, marital status, living situation and substance use among other questions. The second questionnaire will ask about various aspects of your mental health to help determine the type of mental illness and the presence of a substance use disorder. You will be informed of the results of the interview.

Risks of participating in the study: The risks of taking part in this study are minimal. No questions will be asked beyond those asked in routine mental health care. You will not be exposed to any additional risks than in normal mental health assessment procedures. You will not incur extra costs as a result of participation in the study.

Benefits: The results of this study will be beneficial in improving detection and management of substance use disorders among patients admitted to the Mental Health Unit, MTRH. This would improve patient outcomes. You will not receive any payment for taking part in this study.

Participants: The expected number of subjects will be 131 patients.

Ethical considerations: Permission to conduct this study was sought from the Institutional Research and Ethics Committee (IREC) of Moi University/MTRH as well as from the Director, MTRH. A set of questions to determine your capability to give consent has already been read out to you by the research assistant, and your capacity deemed adequate. Participating in this study is voluntary. You are free to withdraw from the study at any time before or during the interview. Leaving the study will not result in any penalty or loss of care to which you are entitled. If you opt out, you will be given the same standard of care offered every patient admitted to the Mental Health Unit. All information collected will be kept confidential, and your name will not be used in the study or in any resulting publications.

Contacts for questions or problems: In case of need for further clarifications concerning the study please contact the investigator on this cell phone number: 0726 626 391.

In case of any questions about your rights as a research participant, complaints or concerns about the research study, please contact the Moi University/ MTRH Institutional Research and Ethics Committee (IREC) using the address below:

The Chairman IREC,
Moi Teaching and Referral Hospital
P.O. BOX 3

Eldoret

Tel: 053-203347/1/2/3/4

PARTICIPANT'S CONSENT:

I the undersigned do confirm that I have been adequately informed and that I understand the nature and purpose of this study. The investigator has also informed me that my participation in this study is voluntary and will not exclude me from routine care even if I opt out. I understand that all the information gathered will be used for purposes of the study only.

Patient's Name & Signature..... Date.....

Witness' Name & Signature Date.....

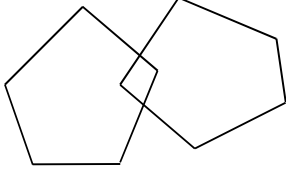
APPENDIX II: MINI MENTAL STATE EXAMINATION (MMSE)

The MMSE is a brief eleven question test used to screen for cognitive impairment. It takes about 5-10 minutes to administer and concentrates only on the cognitive aspects of mental functions.

Patient's name: _____ **Date:** _____

Instructions: Score one point for each correct response within each question or activity.

Maximum score	Patient's score	Questions
5		"What is the Year? Season? Date? Day? Month?"
5		"Where are we now? State? County? Town/City? Hospital? Floor?"
3		The examiner names three unrelated objects clearly and slowly then the instructor asks the patient to name all three of them. The patient's response is used for scoring. The examiner repeats them until the patient learns all of them if possible.
5		"I would like you to count backwards from 100 by sevens" (93, 86, 79, 72, 65...) alternatively, spell the word WORLD backwards" (DLROW)
3		"Earlier I told you the names of three things. Can you tell me what those were?"
2		Show the patient two simple objects such as a wrist watch and a pencil, and ask the patient to name them
1		"Repeat the phrase: 'no ifs, ands or buts'"
3		"Take the paper in your right hand, fold it in half and put it on the floor". (The examiner gives the patient a piece of blank paper)
1		"Please read this and do what it says" (Written instruction is 'close your eyes')
1		"Makeup and write a sentence about anything". (This sentence must contain a noun and a verb)

1		<p>“Please copy this picture”. The examiner gives the patient a blank piece of paper and asks him/her to draw the symbol below. All 10 angles must be present and 2 must intersect</p> 
30		Total

Source: Folstein MF, Folstein SE, McHugh PR. “Mini-Mental State. A practical method for grading the cognitive state of patients for the clinicians.” J psychiatr Res 1975; 12:189-198

Interpretation of the MMSE: a cut off score of 23 was used as scores equal to or above this value have been found to be strongly indicative of decision making capacity among patients (Appelbaum, 2007).

APPENDIX III: STREET & OTHER NAMES FOR SUBSTANCES

Cocaine	prama, coke, 'c', crack, candy
Cannabis	grass, pot, ganja, njaga, juala, joint, weed, dagga, marijuana, bhang
Heroin	hammer, brown sugar, horse, junk
Benzodiazepines	blues
Methamphetamine	crystal meth, crystal, ice, shabu, yaabaa, speed
Prescription medication	'wada', 'dawa'
<i>Catha edulis</i> ('khat')	'miraa'
3,4-methylenedioxy-methamphetamine (MDMA)	Ecstasy

APPENDIX IV: RESEARCHER DESIGNED QUESTIONNAIRE

Patient study number _____

Date of admission _____

Date of discharge _____

Mode of admission Voluntary Involuntary Emergency

MINI Diagnosis _____

Age (years) _____

Sex : Male Female

1. Marital status:

- i. Never married
- ii. Married
- iii. Divorced/ Separated
- iv. Widowed

2. Education level:

- i. None
- ii. Primary
- iii. Secondary
- iv. Tertiary

3. Contribution of violence to current admission:

- i. Yes
- ii. No

4. Persons patient lives with:

- i. Family (parents/partner/children)
- ii. Friends
- iii. Alone

5. Employment:

- i. Regular employment
- ii. Temporary/casual/odd jobs
- iii. Unemployed

6. Have you in the past 12 months been arrested by police or jailed?

- i. Yes
- ii. No

7. Have you had an admission to hospital for a mental illness in the past 12 months other than the current admission?

- i. Yes
- ii. No

If yes, how many times?

8. Did you in the past 12 months attempt to end your life?

- i. Yes
- ii. No

If yes, on how many occasions did this happen?

9. Substance use in the past 12 months: – tick if yes

- i. Alcohol
- ii. Cannabis
- iii. Tobacco
- iv. Opioids
- v. Methamphetamines
- vi. Inhalants
- vii. Hallucinogens
- viii. Cocaine
- ix. Sedative/hypnotics/anxiolytics
- x. Others (specify) _____

10. Substance use disorder diagnosis (diagnosis made after administration of MINI)

- i. Alcohol
- ii. Cannabis
- iii. Tobacco
- iv. Opioids
- v. Methamphetamines
- vi. Inhalants
- vii. Hallucinogens
- viii. Cocaine
- ix. Sedative/hypnotics/anxiolytics
- x. Others (specify) _____

APPENDIX V: MINI INTERNATIONAL NEUROPSYCHITRIC INTERVIEW VERSION**7.0**