The Prevalence of Syphilis Infection and its Associated Factors among Psychiatric Patients at Mankweng Hospital, Limpopo Province

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Declaration

By submitting this mini-dissertation to The University of Limpopo, I hereby declare that ***The Prevalence of Syphilis Infection and its Associated Factors among Psychiatric Patients at Mankweng Hospital, Limpopo Province*** is my own work. All materials contained herein have been dully acknowledged by means of complete referencing and none of the work has been previously submitted for any degree at this or any other institution.

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Matholwane Salminah Lebotsa **Date**

Table of Contents

Declaration ii

Table of Contents iii

Acknowledgements vii

Abstract viii

List of Figures ix

List of Tables x

Definition of Key Concepts xi

List of Abbreviations xiii

Chapter 1: Orientation to the Study 1

1.1. Introduction and background 1

1.2. Research problem 3

1.3. Purpose of the study 4

1.4. Research questions 4

1.5. Method 4

1.6. Significance of the study 5

1.7. Outline of the study 5

Chapter 2: Literature Review 6

2.1. Introduction 6

2.2. The natural history of syphilis infection and an overview of signs and symptoms 6

2.3. General burden of syphilis infection 8

2.4. Prevalence of syphilis infection in psychiatry 9

2.4.1. Global prevalence of syphilis infection 9

2.4.2. Prevalence of syphilis infection in Africa 9

2.4.3. Prevalence of syphilis infection in South Africa 9

2.5. Associated factors for syphilis infection 10
2.5.1. Non-Modifiable factors 10
2.5.2. Modifiable factors 11
2.5.3. Other factors 12
2.6. Screening and diagnostic methods 13
2.6.1. History taking 13
2.6.2. Laboratory tests 14
2.6.3. Neurosyphilis diagnosis 16
2.7. Interventions to prevent STI in psychiatry 17
2.8. Summary 18
Chapter 3: Research Methodology 19
3.1. Introduction 19
3.2. Research methods and design 19
3.3. Study site 20
3.4. Population and sampling 21
3.4.1. Population 21
3.4.2. Sampling 21
3.4.3. Inclusion and exclusion criteria 22
3.4.4. Sample Size 23
3.5. Data collection instrument 23
3.6. Data collection procedure 24
3.7. Data analysis 25
3.8. Reliability and Validity 26
3.8.1. Reliability 26
3.8.2. Validity 26
3.9. Ethical considerations 27

3.10. Summary 27
Chapter 4: Data Analysis and Interpretation of Findings 29
4.1. Introduction 29
4.2. Demographic characteristics of the patients in the records 29
4.2.1. Gender 29
4.2.2. Age 31
4.2.3. Marital status 31
4.2.4. Number of children 31
4.2.5. Level of education 31
4.2.6. Employment status 31
4.2.7. Religion 32
4.2.8. Race 32
4.3. Clinical characteristics of patients in the records 32
4.3.1. Psychiatric diagnosis 32
4.3.2. Substance use 33
4.3.3. History of risky sexual behaviour 34
4.3.4. Symptoms of syphilis 34
4.3.5. HIV status 34
4.4. Prevalence of syphilis infection 35
4.5. Factors associated with syphilis infection 35
4.5.1. Demographic variables 35
4.5.2. Clinical characteristics 38
4.6. Summary of research findings 39
Chapter 5: Discussion, Conclusion and Recommendations 40
5.1. Introduction 40
5.2. Prevalence of syphilis infection 40

5.3. Associated factors of syphilis infection 41
5.4. Strengths and limitations of the study 43
5.5. Conclusion 43
5.6. Recommendations 44
5.6.1. Policies 44
5.6.2. Health facility 44
5.6.3. Mental health practitioners 44
References 45
Appendix A: Data Collection Form 53
Appendix B: Ethical Clearance 55
Appendix C: Permission to Carry out the Study 56
Appendix D: Permission to Conduct the Study 57

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Abstract

Syphilis is a sexually transmitted infection that is prevalent among the sexually active age group of 15 to 49 years. In psychiatry, neurosyphilis may cause or aggravate mental illness, however data relating to the infection prevalence is scarce in this population. As a result, the current study was aimed at determining the prevalence of and factors associated with syphilis infection in psychiatric patients. A quantitative cross-sectional descriptive study was conducted where data was collected from clinical files, using data collection forms. The non-treponemal RPR, CSF-VDRL and treponemal TPHA tests were used to make the diagnosis of syphilis infection. Four hundred (400) case files were reviewed and descriptive statistics were used to analyse the data where a p-value of <0.05 was considered statistically significant. An overall syphilis infection prevalence of 1.8% was found. Syphilis was more prevalent in females than males. Significant factors associated with syphilis infection included age, marital status, level of education and negative HIV status. Findings from the study support the routine screening of syphilis infection among psychiatry patients and emphasize the need to intensify prevention strategies in this population.

Keywords: Syphilis infection; Prevalence; Associated factors

List of Figures

Figure 2.1: History of untreated Syphilis infection 7

Figure 2.2: Testing algorithm for suspected patients..... 15

Figure 3.1: Map of Limpopo Indication Capricorn District..... 21

List of Tables

Table 2.1: Diagnostic Criteria of Neurosyphilis 17

Table 4.1: Demographic profile of the sample 30

Table 4.2: Clinical profile 33

Table 4.3: Association between gender and high-risk behaviour (n=400) 34

Table 4.4: Syphilis test results 35

Table 4.5: Association between socio-demographic characteristics and RPR Test . 35

Table 4.6: Association between socio-demographic characteristics and TPHA test 37

Table 4.7: Association between clinical factors and RPR test 38

Table 4.8: Association between clinical factors and TPHA test 39

Definition of Key Concepts

Prevalence is defined as the proportion of the number of persons with a disease at a time in a population divided by the population at risk (Brink, Van der Walt, & Van Rensburg, 2012). In this study, prevalence referred to the proportion of psychiatric patients diagnosed with syphilis infection out of the whole population of patients attending the outpatient clinic at Mankweng hospital.

Syphilis infection is a systemic disease caused by the spirochete *Treponema Pallidum* (Issa, Fadeyi, Durotoye, Yussuf, Salami, *et al*., 2013). *T. pallidum* is a slim spirochete 5 to 15 mm long with regular spirals whose wavelength and amplitude resemble a corkscrew (Ryan, 2017). In this study, syphilis infection referred to active disease or previous exposure to *T. pallidum* based on the history, physical examination and laboratory findings.

Neurosyphilis refers to an infection of the central nervous system caused by the spirochete *T. pallidum* resulting in insidious, chronic meningeal inflammation (Blazekovic, Ozretic, Habek, Bilic, & Borovecki, 2018). It is defined as a case with a history of primary, secondary, or latent syphilis history, clinical manifestations involving the central nervous system (CNS), and laboratory confirmation (with either a reactive cerebrospinal fluid-veneral disease research laboratory (CSF-VDRL) test or a CSF white blood cells (WBC) count of more than 20 cells (Tang, Huang, Chen, Yang, tucker et al. 2017). In that context, this study defined neurosyphilis as syphilis of any stage with a reactive VDRL test in the CSF.

Psychiatric patient refers to a person who has been diagnosed with mental illness. Mental illness means a positive diagnosis of a mental health-related illness in terms of accepted diagnostic criteria made by a mental health care practitioner authorised to make such diagnosis (South Africa. Government Gazette, 2002). In this study, a psychiatric patient referred to a person who had been diagnosed with mental illness according to the Diagnostic and Statistical Manual of Mental Disorders, 5th edition (DSM-V) criteria.

Association: An association refers to an identifiable relationship between an exposure and disease. Measures of association refer to a wide variety of statistics that quantify the strength and direction of the relationship between exposure and outcome

variables, enabling comparison between different groups (Roberts, Ashrafzadeh & Asgari, 2019). In this study, factors associated with syphilis infection were looked at and statistical tests were used to measure the strength of the association.

List of Abbreviations

CIA	Chemiluminescence immunoassays
CNS	Central nervous system
CSF	Cerebrospinal fluid
DFM	Dark field microscopy
DSM V	Diagnostic and Statistical Manual of Mental Disorders, 5th Edition
EIA	Enzyme immunoassay
FTA-ABS	Fluorescent treponemal antibody absorption
HIV	Human Immunodeficiency Virus
IHC	Immunohistochemistry
NTT	Non-treponemal tests
OPD	Outpatient department
PCR	Polymerase chain reaction
RPR	Rapid plasma reagin
SMI	Severe mental illness
SPSS	Statistical package for social sciences
STI	Sexually transmitted infection
T. pallidum	Treponema pallidum
TPHA	Treponema pallidum haemagglutination assay
TPPA	Treponema pallidum particle agglutination
TT	Treponemal tests
VDRL	Venereal disease research laboratory
WBC	White blood cell
WHO	World Health Organisation

Chapter 1: Orientation to the Study

1.1. Introduction and background

A whole range of diseases can affect patients through neuropsychiatric manifestations, including syphilis (Blazekovic et al., 2018). The public health crisis caused by syphilis, which affects more than 30 million people globally, is of significant concern to those living in Africa (Moolla & Abdul, 2016). The mode of transmission can either be congenital, where the infection occurs via the placenta and hematogenously from contact with fluids that contain the bacteria at any gestational age or acquired, in which transmission takes place predominantly through sexual contact, mainly affecting the genital and anal area, and also through blood transfusion (Ryan, 2017).

Historically, the term *syphilis* was initially coined by the Italian poet and physician Giralomo Fracastro in his epic noted poem titled *"Syphilis sive morbus gallicus*". The initial case of syphilis occurred in Europe in 1493 and the first well-recorded syphilis outbreak occurred in the same continent in 1494. Since then, a worldwide spread of the disease has been observed. In 1906, the earliest test for syphilis, the Wassermann Test, was developed (Friedrich & Aigner, 2011). This brought a major advance in the prevention of the infection; however, it also yielded false positive results. This led to development of new analytical methods which have superseded this early test (Mandal, 2019). Between 1932 and 1972, a Tuskegee experiment study, was conducted in the United States which observed the natural course of untreated syphilis. The study was later criticised for violation of ethical principles as the participants experienced negative outcomes from the study which ranged from paralysis of the limbs, neuronal damage and death (Adebayo, 2011). Penicillin was found to be effective in the treatment of syphilis and was widely used after World War II (Mandal. 2019).

Neurosyphilis was initially observed in scientific reports around the nineteenth century. It was grouped under the multicausal term 'paralytic dementia' which was a syndrome that included a variety of disorders such as alcoholism, head trauma, stroke, syphilis, Chorea Huntington and multiple sclerosis. Although many patients were admitted to

psychiatric hospitals due to this syndrome, the number of patients who suffered neurosyphilis remained unclear (Friedrich & Aigner. 2011).

Currently, syphilis is described as a multistage course of disease, in which symptomatic and asymptomatic phases occur. It is classified into various stages which include primary, secondary, latent and tertiary syphilis. Most symptoms arise in the primary and secondary stages, considered the longest period of exposure (Ryan, 2017). Of more relevance to psychiatry is neurosyphilis, which occurs in the tertiary stage. This can cause or aggravate a variety of psychiatric syndromes, including major neurocognitive disorder, psychosis, mood disorder, and personality changes, making it difficult to differentiate neurosyphilis from a primary psychiatric disorder (Henning, Kruger & Fletcher, 2012). Neurosyphilis usually occurs in 25 to 40 percent of people who have had untreated chronic syphilis, and it develops ten to twenty years after infection, but may occur as early as five years (Ekejindu, Nwadialor, Ochiabuto, Obeagu, Okwuanoaso et al., 2020).

The mode of transmission of syphilis makes it easy for the same individual to acquire HIV infection. Henning et al. (2012) showed that HIV and syphilis co-infection is common, and that HIV infection has been shown to be associated with a rapid progression of neurosyphilis. This is significant as both HIV and syphilis infection have been shown to have severe neuropsychiatric complications, which can increase the already high burden of disease due to mental disorders.

It has been estimated that annually there are six million new cases of syphilis worldwide (WHO, 2016). These infections are most prevalent among people aged 15 to 49 years. In Africa, the predicted prevalence of syphilis was 0,2 percent in 2012, with a high number among pregnant women and blood donors (Banong-le, Ofosu, & Anto. 2019). The prevalence and incidence of syphilis have been found to be higher in rural populations than in urban communities (Todd, Munguti, Grosskurth, Mngara, Changalucha et al., 2001). In South Africa, a prevalence rate of 0,50 percent has been found among females, and 0,97 percent among males (Kularatne, Niit, Rowley, Kufa-Chakezha, Peters et al., 2018). The prevalence rates from this study had declined compared to the previous years. However, the data were collected from antenatal clinics and surveys in key populations. The prevalence of syphilis in Limpopo has been

estimated to be 0,5 percent among pregnant women, with 0,6 percent found in the Capricorn district. This had slightly increased from the 0,3 percent which was estimated in 2009 (South Africa. National Department of Health, 2010)

Globally there have been a few published studies addressing sexually transmitted diseases among patients with psychiatric illness (Dutra, Campos & Guimaraes, 2014). The epidemiology of neurosyphilis remains poorly understood in Africa (Marks, Jarvis, Howlett, & Mabey, 2017). Inadequate diagnostics have been found to be a major barrier in understanding the epidemiology of this disease. Issa et al. (2013) reported a high prevalence of syphilis among psychiatric patients compared to voluntary blood donors in Nigeria. In South Africa, there has been a paucity of available data regarding the prevalence of neurosyphilis among psychiatric patients (Moolla & Abdul, 2016).

The present study investigated the prevalence of syphilis infection by evaluating the records of psychiatry outpatients treated at Mankweng Hospital in Limpopo, South Africa. There has been limited research on this topic in South Africa. This study was important to investigate as it would add to the data-bank on the available seroprevalence studies on syphilis in psychiatric patients so that interventions can be put in place to address neurosyphilis as well as its impact on mental health.

1.2. Research problem

Psychiatric patients are at increased risk of sexually transmitted infections (STI) since they may lack knowledge about contraceptive methods and may make poorer health decisions regarding sexual practices (Meade & Sikkema, 2005). As a result, they often engage in behaviours that predispose them to STIs such as having multiple sexual partners, sexual intercourse with unfamiliar partners, homosexual anal intercourse, and refusal to use condoms (Issa et al., 2013). Syphilis is a spirochaetal infection that has been shown to have neuropsychiatric complications. It may either cause various psychiatric disorders or aggravate an existing disorder (Henning et al., 2012). Syphilis is a treatable disease if detected early. Nitrini et al. (2010) showed that clinical improvement of neurosyphilis occurs mainly when the treatment is administered in the first few months after the onset of the mental disturbance. Due to the diversity of its clinical manifestations, routine screening for the infection remains vital in the psychiatric field (Friedrich & Aigner, 2011).

There has been a scarcity of published studies with representative data of syphilis infection in psychiatric patients (Dutra et al., 2014). The unavailability of information could be related to several factors, including variations in screening and diagnostic practices (Voux, Kidd & Torrone, 2018). Syphilis has been underdiagnosed in these patients perhaps because the disease may remain asymptomatic for a long period (Issa et al., 2013). In this context, it is possible that syphilis has been underdiagnosed in psychiatric patients in Limpopo. Detecting the seropositivity in asymptomatic patients may go a long way towards reducing the morbidity of syphilis in psychiatric patients. This would also help to define the importance of syphilis in psychiatry and guide recommendations on testing. Thus, the current study investigated the prevalence and risk factors associated with syphilis infection in psychiatric patients.

1.3. Purpose of the study

This study aimed to determine the prevalence of syphilis infection and its associated factors among psychiatric outpatients at Mankweng Hospital.

The objectives were:

- To determine the prevalence of syphilis infection among psychiatric outpatients at Mankweng Hospital; and
- To evaluate the factors associated with syphilis infection among psychiatric outpatients at Mankweng Hospital.

1.4. Research questions

Based on the objectives, the research questions were:

- What is the prevalence of syphilis infection among psychiatric outpatients at Mankweng Hospital?
- What are the factors associated with syphilis infection among psychiatric outpatients at Mankweng Hospital?

1.5. Method

A cross-sectional descriptive study design was used to help address the research question posed in this study and to determine the relationship between risk factors

and syphilis infection in psychiatric patients. Clinical records of patients diagnosed with mental illness treated at Mankweng hospital in 2019 were reviewed. Convenience sampling was used. Data was collected from the outpatient department's database at Mankweng Hospital.

1.6. Significance of the study

Syphilis rates and patterns differ by population and subgroups. In this context, estimation of the prevalence of infection and identification of the main risk factors for syphilis acquisition enabled practitioners to focus on prevention strategies (Da Motta, Sperhacke, Adami, Kato, Vanni et al., 2018). This study highlighted the prevalence of syphilis infection in psychiatric patients at Mankweng Hospital and the common risk factors associated with this infection.

This study could inform public health policy development with respect to syphilis infection in psychiatric patients, as well as encourage hospital management on improvement of existing guidelines leading to improved patient outcomes. The study would guide mental health practitioners on strategies to reduce the risk of syphilis in psychiatric patients who will benefit from better clinical care.

Results from this study could be compared with other studies done and this may be useful as a baseline for a cohort study in the future.

1.7. Outline of the study

This mini-dissertation consists of five chapters. Chapter 1 has provided an overview of this study. Chapter 2 is the literature review that was done to highlight previous world-wide research on this research topic. Relevant literature that supports and critiques the association between syphilis and mental illness was reviewed. Chapter 3 presents the research methods used. Chapter 4 deals with the presentation of the study's research results. Chapter 5 presents a summary of this study as well as recommendations arising from the results of this study.

The next chapter is the literature review.

Chapter 2: Literature Review

2.1. Introduction

This chapter provides an analysis of what other researchers have found regarding the prevalence of syphilis infection in psychiatric patients. The chapter discusses the themes derived from the literature, and the conclusion and recommendations of the findings. It looks at the prevalence of syphilis infection in psychiatric patients and the factors associated with syphilis infection in psychiatric patients. It begins by looking at the natural history of syphilis infection, then looks at the global burden of syphilis infection. After this it reviews the prevalence of syphilis infection in psychiatry, followed by associated factors of syphilis infection in psychiatry, screening and diagnostic methods used. It finishes with interventions to prevent the infection.

2.2. The natural history of syphilis infection and an overview of signs and symptoms

After infection, the causative agent of syphilis disseminates systematically within hours to days (Ghanem, 2010). The average incubation period of syphilis is three weeks, but may range from ten to ninety days. During the incubation period, serologic test results will continue to be negative and the patient is not considered to be infectious. In untreated cases, the progression of syphilis is divided into primary, secondary, latent and tertiary stages, as illustrated in Figure 2.1.

The primary stage presents as one or multiple lesions at the site of infection which heals spontaneously within one to six weeks. The secondary stage is characterised by a rash, typically involving the palms and soles, wart-like growths, mucous patches, and alopecia. These skin observations often come with generalised, non-tender lymphadenopathy and non-specific system symptoms such as fever, headache, muscle aches and fatigue. With no treatment, patients then progress to a latent stage where no clinical manifestations are visible, and the infection can generally be detected by serologic screening (Ghanem, Ram, & Rice, 2020). Patients remain at this stage until cure or the onset of tertiary syphilis.

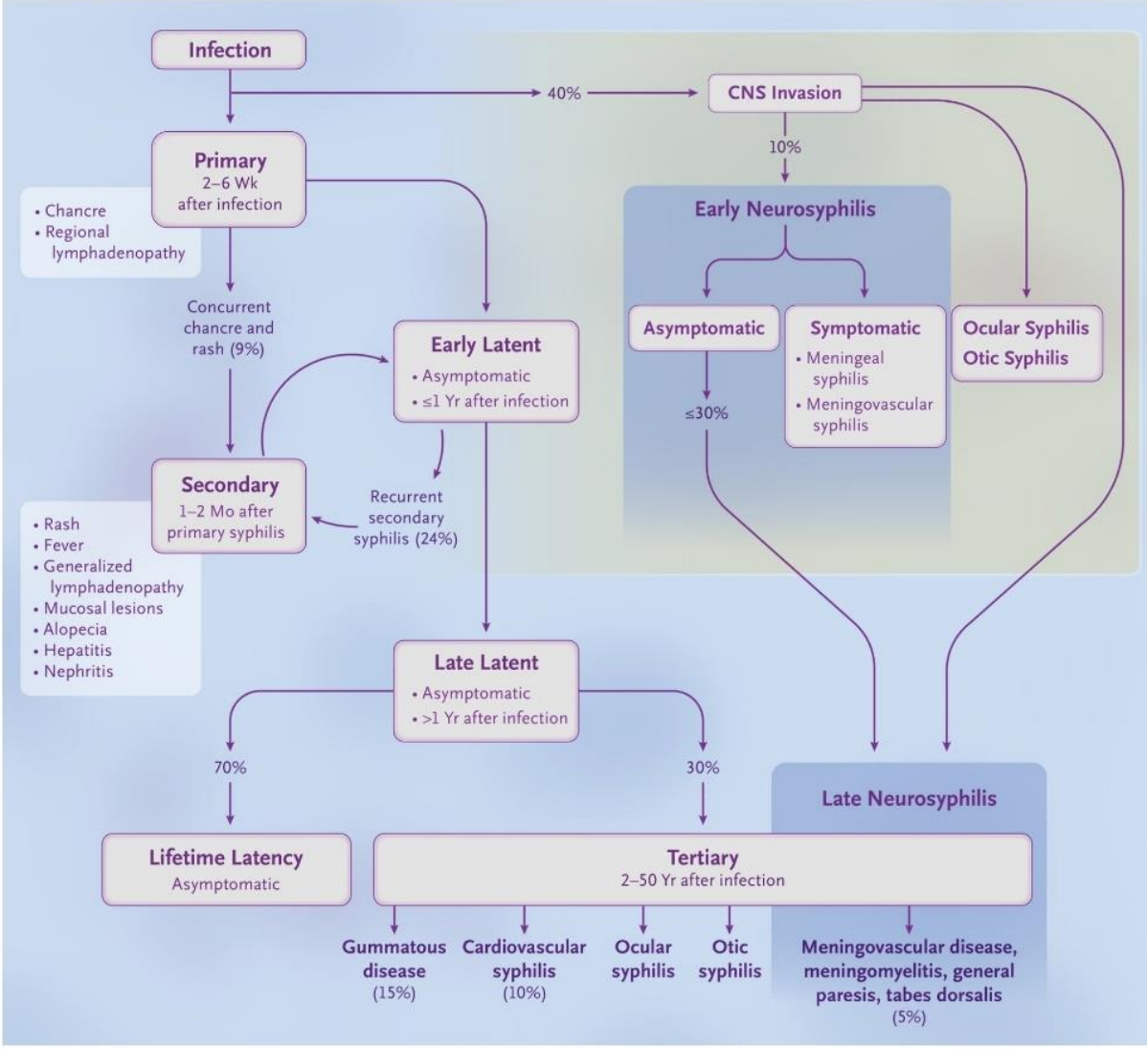

Figure 2.1: History of untreated Syphilis infection

***Source**: Adapted from Ho and Lukehart (2011)*

Tertiary syphilis consists of neurological, cardiovascular and gummatous manifestations secondary to generalised vasculitis (Goh, 2005). However, central nervous system, ocular and otic manifestations can occur at any stage of the infection (Ghanem et al., 2020). The patient in this stage may either remain asymptomatic or present with various neurological or psychiatric, visual-ocular, or auditory-vestibular signs and symptoms. The most common presentations of neurosyphilis include meningovascular disease, general paresis and tabes dorsalis (Rubin, Espiridion, Truong & Lofgren, 2018). The meningovascular disease can occur at any time between the first few months to several years after the initial infection. It commonly affects the young adult population causing stroke-like symptoms due to its endarteritis

with perivascular brain inflammation. General paresis takes longer to develop, about three to thirty years after infection. It may get worse twenty-five years after first exposure. The clinical manifestations include personality changes, hyperreflexia, Argyll-Robertson pupils, delusions, hallucinations and changes in speech. These symptoms are due to progressive frontotemporal meningoencephalitis with diffuse cortical atrophy. Tabes dorsalis also takes longer to occur, from five to fifty years after infection and typically manifest around twenty years after infection. It is caused by demyelination of the spinal cord posterior roots and columns that is slowly progressive. Individuals may present with excruciating pain and sensory ataxia.

2.3. General burden of syphilis infection

Sexually transmitted infections are common and a major public health problem worldwide. Syphilis continues to cause an impact on health due to its systemic manifestations and long-term neurological sequelae (Ramachandran, Baird, Markey, Singleton, Lowe et al., 2020). It affects over 30 million people, the majority of whom are from Africa and south-east Asia (Moolla & Abdul, 2016).

The incidence of syphilis declined after the introduction of penicillin treatment and contact tracing. However, there has been a rise in the number of cases since the era of HIV. The growing burden of syphilis could potentially increase the number of people who develop neurosyphilis. However, due to a lack of large-scale population studies regarding neurosyphilis, the ability to assess the epidemiological trends accurately has been hindered (Ghanem. 2010). In addition, diagnostic difficulties and the need for complex laboratory tests for neurosyphilis may lead to misdiagnosis, particularly in resource limited settings (Tang et al., 2017).

Neurosyphilis continues to be reported as a manifestation of early and late syphilis in Africa. Future well-designed prospective studies are needed to delineate the incidence better and to define its interaction with HIV in these settings (Marks et al*.,* 2017). In the meantime, a high level of suspicion and awareness of the various clinical presentations of neurosyphilis is essential in the approach to this treatable infection.

2.4. Prevalence of syphilis infection in psychiatry

There are few studies worldwide that have investigated the prevalence of infectious diseases in psychiatric populations. These studies have focused on adults with severe mental illness (SMI), which is the term used to describe a group of psychiatric disorders such as schizophrenia, bipolar disorder and major depression with psychotic features (Campos, Guimaraes, Carmo, Melo, De Oliveira, et al., 2008).

2.4.1. Global prevalence of syphilis infection

A cross-sectional study conducted in Brazil in 2009 found a syphilis prevalence of 1,1 percent. This point prevalence was higher when compared to other Brazilian studies, with the suspected probability of the non-psychiatric population included in the study (Guimaraes, Campos, Melo, Carmo, Machado et al., 2009). Zhang and Xie (2008) found a prevalence rate of 3,3 percent among 1586 inpatients in China. Carey, Ravi, Chandra, Desai, & Neal (2007) studied 948 inpatients with psychiatric disorders in India and found a similar proportion of 3,3 percent of syphilis prevalence.

2.4.2. Prevalence of syphilis infection in Africa

The prevalence of syphilis in psychiatric patients (5,4%) was found to be significantly higher than among voluntary blood donors (1,1%) in a cross-sectional study carried out at a teaching hospital in Nigeria (Issa et al., 2013). This high prevalence advocates for routine screening of syphilis in psychiatric patients. Another cross-sectional study carried out in a psychiatric hospital in Nigeria showed that 1,9 percent of psychiatric patients were infected with neurosyphilis (Ekejindu et al., 2020).

2.4.3. Prevalence of syphilis infection in South Africa

An increased prevalence of self-reported STI (77,1%) has been found among psychiatric patients attending primary health care facilities in Gauteng (Mokgatle, 2021). Earlier, Henning et al. (2012) conducted a study among 195 inpatients at Weskoppies, a state psychiatric hospital in the same province, and found a syphilis prevalence rate of 11,7 percent. This was higher than anticipated as the Treponema pallidum haemagglutination assay (TPHA) test was used to diagnose syphilis.

2.5. Associated factors for syphilis infection

2.5.1. Non-Modifiable factors

The non-modifiable factors are gender and age. Generally, neurosyphilis has been found to be more prevalent in males and this has been attributed to unhealthy sexual behaviour found in this group (Li, Jiang, Xu, Kou, Zhang et al., 2019). High-risk sexual behaviour such as men who have sex with men, earlier sexual experiences and more partner changes than females could explain this higher prevalence (Wong, Singh, Mann, Hansen & McMahon, 2004).

In psychiatry, the gender difference in the prevalence of syphilis has been investigated in a number of studies, with mixed results. The female gender was found to be a risk factor for contracting STI in patients with schizophrenia and bipolar disorder (Chen, Chiang, Hsu, & Shen, 2018; Lee, Hu, Hung, Yang, Tsai et al., 2018). In a study conducted among psychiatric inpatients, Henning et al. (2012) found seropositive TPHA results in 14 percent of women and 10 percent of men. In contrast, Issa et al. (2013) found a higher prevalence of syphilis in male psychiatric patients than females. Ekejindu et al. (2020) also noted more males to have a positive status of syphilis than females in their study. Multiple sexual partners and alcohol-driven sex in males were reported as factors contributing to the high risk of STI in a study conducted among psychiatric patients seeking treatment in primary health care facilities in Gauteng. Females were reported to be frequently forced to engage in sexual acts (Mokgatle, 2021). This concurs with findings from a cross-sectional study conducted in Ghana which found forced sex to be a significant predictor for syphilis infection (Banong-le et al., 2019).

With respect to age, syphilis infection affects all ages but is more common among the sexually active age group of 15 to 49 years (Banong-le et al., 2019). An age over 45 years has been found to be an important risk factor for neurosyphilis, especially in HIV-negative patients (Shi, Peng, Gao, Zhang, Lu et al., 2016). Li et al. (2019) also found an age over 45 years to be an independent risk factor for symptomatic

neurosyphilis. This is possible because older adults may have been infected with syphilis for a longer duration than younger people.

2.5.2. Modifiable factors

Modifiable factors include HIV comorbidity and mental disorders. HIV co-infection has been associated with the increased prevalence of syphilis (Henning et al., 2012). A retrospective study in Spain reported that 49,3 percent of HIV-positive patients had syphilis (Gonzalez-Lopez, Gurrero, Lujan, Tostado, De Gorgolas et al., 2009). A study in the United States found that patients with HIV/AIDS were 77 times more likely to have syphilis than HIV-negative patients (Yu, Shi, Wan, Li, Shao et al*.,* 2021). In other studies, syphilis was found to be a significant factor in the transmission of HIV, and individuals with syphilis were more likely to contract HIV. (Henning et al., 2012)

The prevalence of HIV-syphilis comorbidity is attributed to shared risk factors associated with sexual behaviour and pathological changes caused by both diseases. The genital tract inflammation or ulceration due to syphilis may hinder the innate defences against HIV (Henning et al., 2012). The immune system's damage by HIV can accelerates the development of syphilis, leading to a short incubation period, atypical symptoms and increased incidence of neurosyphilis. Meningeal lesions caused by this condition can make it easier for *T. Pallidum* to cross the blood brain barrier (Hobbs, Vera, Marks, Barrit & Ridha. 2018). As a result, neurosyphilis is a potential consequence in HIV patients when they are co-infected with *T. pallidum.* Therefore, it is essential to exclude both syphilis and HIV in a patient presenting with a neuropsychiatric disorder (Henning et al., 2012).

Neurosyphilis risk is also heightened in HIV patients by the low CD4 cell count and the high HIV viral load. Syphilis infection can reduce the CD4 cell count thus allowing the HIV virus to replicate more easily. Hence, the presence of CD4 cell count of less than 200 cells and serum RPR/VDRL titre of more than 1:32 indicate a significant rise in the neurosyphilis incidence, which must be addressed by additional lumbar puncture examination (Yu et al., 2021).

Mental disorders may present with symptoms which may increase the sexual risk behaviour. These include instabilities in affect, impaired judgment and reality testing,

low impulse control as well as increased sexual activity during illness episodes (Mokgatle, 2021). Currently, SMI accounts for approximately twelve percent of the global burden of disease and in 2014 was predicted to reach fifteen percent by 2020 (Magidson, Blashill, Wall, Balan, Wang et al., 2014).

The sexual risk behaviour of patients with SMI is attributed to cognitive processing difficulties, poor social skills and lack of planning. Knowledge about the transmission and prevention of STI may lack due to cognitive impairment (Senn and Carey, 2008). Additional explanations in this population have been linked to the outcomes of having a SMI. Due to inability to work, poverty and lack of privacy, individuals with SMI are unable to afford condoms and discuss safer sex with partners (McKinnon, Cournos & Herman.2002).

Lastly, individuals with SMI frequently engage in substance use, which has been linked to risky sexual behaviour. Substance use may impair decision making, especially during intoxication, hence contributing to high-risk behaviour (Carey, Carey, Maisto, Gordon & Schroder, 2004). There is a lack of specific research on the connection between substance use and high-risk behaviour for STI in individuals with psychiatric disorders. This is limited by the inability to establish a cause and effect relationship (Campos et al., 2008). A low-risk perception for STI has also been reported in various studies among psychiatric patients, resulting in risky sexual behaviour and poor health seeking (Mokgatle, 2021)

2.5.3. Other factors

Other factors include having first sexual encounter at a young age, and having a history of other STIs, both of which have been associated with a greater risk of syphilis infection (Da Motta et al., 2018). Marital status, number of sexual partners, religion and educational level have not been observed to have significant associations with syphilis infections.

2.6. Screening and diagnostic methods

Screening of individuals for STI is necessary to prevent them from developing the disease. The purpose of screening is to recognise individuals who are at risk and minimize those risks as much as possible (Levy, Gunta & Edemekong, 2019). Levy et al. (2019) stated that secondary prevention involves screening appropriate populations for potential treatment, primary prevention involves prevention of foetal abnormalities and the spread of infection to others.

Neurosyphilis can imitate all neuropsychiatric disorders, and this poses a diagnostic challenge to psychiatrists and neurologists (Bran, Ghergu & Davidescu, 2019). It is often described as a great imitator due to its varied clinical manifestations. Patients are sometimes diagnosed with neuropsychiatric disorders and subsequently treated with psychiatric medication, when in fact, the treatment of choice should be penicillin which is the first-line treatment for syphilis (National Department of Health, South Africa. 2019) This is why screening for neurosyphilis is warranted in all patients presenting with psychiatric symptoms (Bran et al.,2019). Syphilis infection can be diagnosed through a history, physical examination and interpretation of laboratory tests (Luo, Xie & Xiao, 2021)

2.6.1. History taking

Many sexually transmitted infections are highly infectious despite the lack of symptoms. Therefore, sexual history serves as a foundation for treatment, prevention, education, and sexual health promotion. It determines the choice of examination, laboratory investigations, diagnosis and follow up (Jones & Barton, 2004). However, the idea that patients should be reassured and kept completely confidential regarding their sexual history has an impact on this process.

Identification of sexual health concerns sometimes lacks in psychiatry outpatient settings (Coverdale, Balon, & Roberts, 2011). This lack may be due to lack of comprehension regarding the significance of sexual health in general health or because clinicians' and patients are reluctant to address an area that is deeply personal and highly sensitive.

Hegde et al. (2018) pointed out that taking sexual history as part of mental health screenings presented several challenges. These included clinician- and patient-related factors in addition to environmental and language-related barriers. Clinician- and patient-related factors included the patient's age and gender, the clinician's sexual orientation, and different socio-cultural backgrounds. The doctor-patient confidentiality is necessary for an adequate sexual history to be obtained. Therefore, the difficulty of taking a sexual history may be due to a combination of crowded outpatient settings and lack of privacy, which can hinder the development of therapeutic relationships. The lack of understanding between the clinician and patient can result in various challenges in obtaining an appropriate sexual history (Hegde, Sreedharan & Pradeep, 2018). The nature of the psychiatric illness may limit the amount of information that can be obtained from the patient. Due to depressive and psychotic illnesses, the most common conditions that are seen, patients may not be free or able to give a detailed or honest sexual history.

2.6.2. Laboratory tests

The growth of *T. pallidum* in culture is challenging, however, there are direct and indirect tests conducted to identify the spirochete (Luo et al., 2021). Various detection methods have been developed and these include dark field microscopy (DFM), polymerase chain reaction (PCR), immunohistochemistry (IHC) and serology tests (treponemal and non-treponemal tests).

Syphilis infection is largely diagnosed through serologic tests as chancre specimens are often difficult to obtain because the lesion site may resolve spontaneously. The serological tests are grouped into non-treponemal and treponemal tests and they evaluate the presence of antibodies to *T. pallidum*. The tests have revealed that they are highly sensitive and specific during both secondary and early latent stages (Luo et al.,2021).

The non-treponemal tests (NTT) comprises of venereal disease research laboratory (VDRL) and rapid plasma reagin (RPR) (Levy et al., 2019). These tests measure levels of immunoglobulin M and immunoglobulin G antibodies directed at non-specific antigens, such as lipoidal substances released from damaged host cells and lipoprotein-like material released from the treponemes (Henning et al., 2012). Both

tests have a sensitivity ranging between 44 percent and 77 percent depending on the stage of the disease, with the specificity of 85 percent (Levy et al., 2019). The presence of pregnancy, autoimmune diseases, infections and other factors can result in false positive outcomes. Nevertheless, NTTs are commonly employed due to their effectiveness, affordability, ease of use and speediness. RPR titres can also be used as indicators for treatment efficacy (Luo et al., 2021).

The treponemal tests (TT) include *T. pallidum* haemagglutination assay (TPHA) test, *T. pallidum* particle agglutination (TPPA), fluorescent treponemal antibody absorption (FTA-ABS) test, syphilis enzyme immunoassays (EIA) and chemiluminescence immunoassays (CIA) (Luo et al., 2021). These tests are capable of detecting antibodies against *T.* pallidum protein, and they have high sensitivity (82%-100%) and specificity (99%). The most commonly used tests are *T. pallidum* haemagglutination assay and *T. pallidum* particle agglutination and they remain positive for life once someone has been diagnosed (Henning et al., 2012; Levy et al., 2019). As a result, they are incapable of distinguishing between an active phase and subsequently treated infection, making them ineffective for measuring treatment effectiveness.

Various algorithms are used to diagnose syphilis infection. Figure 2.2 outlines the testing algorithm for a suspected patient.

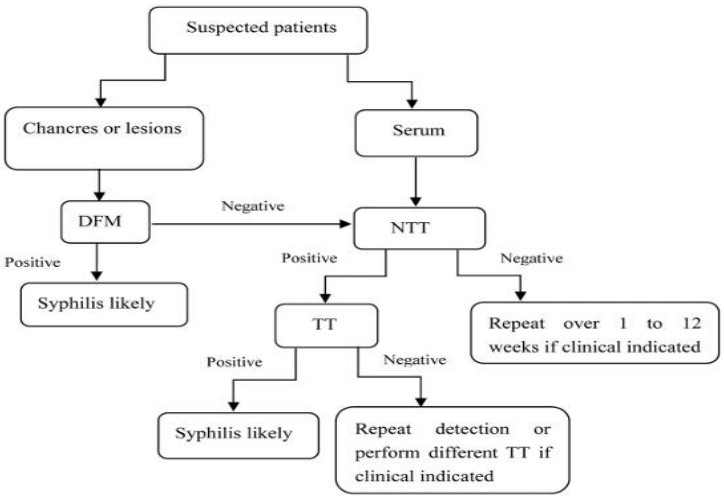

Figure 2.2: Testing algorithm for suspected patients

***Source**: Adapted from Luo et al. (2021)*

DFM = dark field microscopy, NTT=non-treponemal test, TT= treponemal test

Traditionally, an NTT such as RPR or VDRL is followed by a specific TT. However, some regions such as America and Europe have changed this approach due to its limitations. The subjective decision of the operator for NTT affects this customary algorithm. Moreover, the prozone effect can produce false-negative NTT results, and many laboratories do not follow the traditional algorithm is, particularly in resource-limited settings, leading to missed cases. In contrast, the other algorithms, such as the reverse screening algorithm, may overcome these limitations, however, they are associated with high costs. The reverse algorithm uses a TT to screen suspected samples, then positive samples are followed by NTT. In the case of discrepancies between the two methods, the specimen is retested using another TT (Luo et al., 2021). Janier et al. (2014) reported that the use of TT in screening algorithms led to high levels of positive results, which increased clinician workload. Therefore, the diagnosis of syphilis cannot be made solely through serology tests, clinical presentation must be included in all results.

2.6.3. Neurosyphilis diagnosis

There is still a major challenge in the diagnosis of neurosyphilis. The use of CSF-RPR, CSF-TPPA/FTA-ABS, CSF-VDRL, CSF white blood cell counts and CSF protein concentration is crucial for laboratory diagnostics as shown in Table 2.1. Although the CSF-VDRL is typically found in neurosyphilis, it has limitations in terms of sensitivity and specificity. Hence, neurosyphilis necessitates additional CSF testing. (Park, Tran, Pereira & Fakile, 2020). Neurosyphilis cases have been classified into confirmed and probable forms. The definition of confirmed neurosyphilis encompasses infection with reactive NTT in CSF, regardless of stage. Syphilis that is probable can present as any stage with negative CSF-NTT, elevated CSF protein (>500mg/L) and/or leukocyte count (>10 cells) and clinical symptoms or signs of neurosyphilis, but without other known causes (Xiao, Tong, Liu, Lin, Chen et al., 2017).

Table 2.1: Diagnostic Criteria of Neurosyphilis

***Source**: Adapted from Luo et al., 2021*

CSF=cerebrospinal fluid, WBC= white blood cell, CD4= cluster of differentiation 4

Types	Diagnostic criteria
Asymptomatic patients	Positive serum TT results and Reactive CSF VDRL (or CSF TPPA ≧1:640 when the CSF VDRL is nonreactive) and Pleocytosis (CSF-WBC >5 cells/mL) or CSF-protein >45mg/dL in Non-HIV infected patients. Positive serum TT results and Reactive CSF VDRL (or CSF TPPA ≧1:640 when the CSF VDRL is nonreactive) AND CD4 cell count (CD4 <350 cells/mm^3) and Pleocytosis (CSF-WBC >10 cells/mL) for HIV infected patients on antiretroviral therapy OR CD4 cell count (CD4 >350 cells/mm^3) and Pleocytosis (CSF-WBC >20 cells/mL) in those not on antiretroviral therapy.
Symptomatic patients	Neurological symptoms and Positive serum TT results and Reactive CSF VDRL and Pleocytosis (CSF WBC >5 cells/mL) or CSF protein >45mg/dL.

2.7. Interventions to prevent STI in psychiatry

The use of sexual health and prevention strategies has been generally absent in mental health care settings (Satriano, McKinnon & Adoff, 2007). Numerous interventions have been designed to reduce the rates of sexual risk behaviour in individuals with SMI in the United States (Senn & Carey, 2008). The interventions have ranged from the provision of information to motivational and behavioural skills components. The aim of motivational programmes is to promote patients' awareness of risks and foster positive attitudes towards condom use or sexual risk reduction. Skills interventions have emphasized the development of skills like self-management skills, condom use skills, and assertiveness or communication skills.

The majority of professionals who work with patients living with a SMI understand that they engage in sexual activity and may resort to risky sexual behaviours. Despite their efforts, these professionals may not regularly include sexual health services in their practice due to significant caseloads, limited contact time and other obstacles. (Senn & Carey, 2008). As a result, it is crucial to incorporate sexual health care into the provision of services for mentally ill patients.

In the developing world, intervention strategies could be affected by the pattern of treatment seeking in psychiatric patients. These patients are subjected to severe stigma and mistreatment. Community values and beliefs continue to impact treatment-seeking behaviour, treatment outcomes, and even how mental health is practised. Therefore, this may affect the course and management of neurosyphilis (Girma & Tesfaye, 2011).

2.8. Summary

Syphilis continues to cause a major burden of disease and its incidence and prevalence has been increasing in the general population. There have been limited studies on the infection prevalence in psychiatric patients. Male gender, age over 45 years, and HIV comorbidity have been generally associated with increased risk for the infection. Psychiatry-related risk factors include cognitive deficits, low impulse control and poor judgment and planning. Future research is still needed on intervention and preventative strategies for the infection in psychiatry patient.

The next chapter describes the method used in the current study.

Chapter 3: Research Methodology

3.1. Introduction

Research methodology is a set of systemic techniques that are used to guide the design and execution of the study (Igwenagu.2016). This chapter outlines the research method, research design, sampling and methods of data collection, data analysis and internal & external validity of the study.

3.2. Research methods and design

Research methods are the strategies, processes or techniques utilised in the collection of data or evidence for analysis in order to uncover new information or create a better understanding of a topic (Brink et al., 2012). This study adopted a quantitative research method to determine the prevalence of syphilis infection and its associated factors among psychiatric patients at Mankweng hospital. Quantitative research is concerned with elucidating an issue or phenomenon by collecting numerical data and analysing it using statistical methods. The task involves testing a hypothesis, investigating the cause and effect and making foreseeable predictions (Apuke. 2017). The advantage of using quantitative research methods is the fact that they facilitate comparison between two groups or organisations. They also allow for comparison of the same population between two different times. However, their shortcoming is that they do not offer a comprehensive report on the state of the affected population's experience (Prasad. 2017).

A research design is a set of logical steps taken by the researcher to answer the research question. The blue-print of the study is established and outlines the method used by the researcher to access sources of information (Brink et al., 2012). This study used a non-experimental cross-sectional descriptive design by reviewing medical records of psychiatric patients to determine the prevalence of syphilis infection and its associated factors. The challenges with non-experimental designs are that they cannot find the cause-effect-relationship and cannot manipulate predictor variables. However, the author used this design to get a baseline of syphilis infection among psychiatric patients as there is scarcity of these data in South Africa. This would add to existing studies and serve as a base for future studies.

The study was cross-sectional descriptive study as data was collected at a specific point in time. The advantages of cross-sectional studies are that they are cost effective and more manageable as well as less time consuming. They avoid the confounding variable of maturation resulting from elapsed time. However, these types of studies cannot determine causality and cannot bring changes in the social process. They can only bring changes regarding the period during which data was collected (Brink et al*.,* 2012).

3.3. Study site

The study was conducted at the Mankweng hospital psychiatry outpatient department (OPD). This is one of the tertiary hospitals in Limpopo which has a psychiatric unit and has a service area of 19 clinics. The staff complement in the department of psychiatry includes two specialist psychiatrists, eight registrars at various level of training, four medical officers of whom three have diplomas in mental health, eight medical interns, twenty nursing staff for the psychiatry unit as well as the outpatient department, two occupational therapists, two social workers, and one dietician. The hospital provides clinical services, research and academic training to the population of Limpopo as well as the students affiliated to the University of Limpopo.

Mankweng hospital is located 30km east of Polokwane city and falls under the Polokwane municipality in the Capricorn district. Capricorn is one of the five districts in Limpopo. It is situated in the centre of the province and shares its borders with the other four districts, namely Sekhukhune, Vhembe, Mopani and Waterberg. This may be seen in Figure 3.1.

The district has eight hospitals, including two tertiary hospitals, Mankweng and Pietersburg, and one Specialized Psychiatric Hospital, Thabamoopo. There is no regional hospital so patients are referred from the district hospitals directly to the mental health hospital after 72 hours of observation. However, those with other medical conditions may be referred to Mankweng Hospital so that they can also be co-managed by other non-psychiatry disciplines.

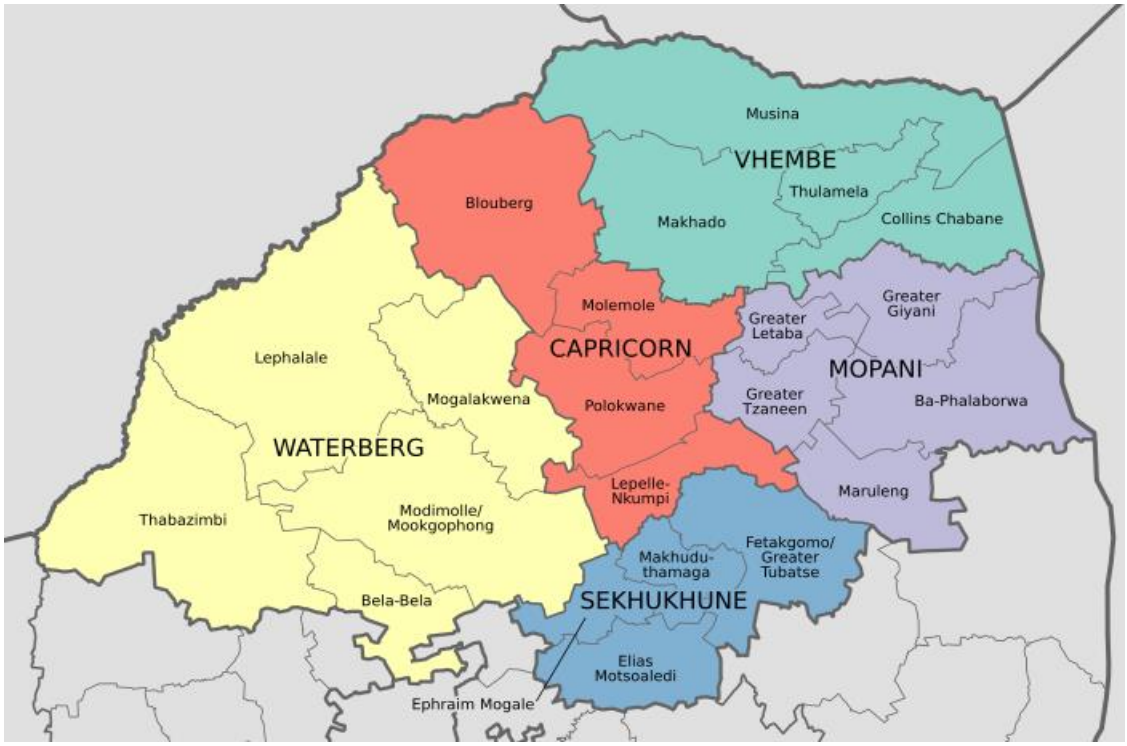

Figure 3.1: Map of Limpopo Indicating Capricorn District

***Source**: https://upload.wikimedia.org/wikipedia/commons/8/81/Map_of_Limpopo_with_municipalities_named_and_districts_shaded_%282016%29.svg*

3.4. Population and sampling

3.4.1. Population

A study population is defined as a group of persons or objects that meets the criteria that the researcher is interested in studying (Brink et al., 2012). The population in this study referred to all psychiatric patients seen at Mankweng outpatient department in the year 2019. The average number of patients seen on a monthly basis was used to estimate the population size. An estimated 100 patients are seen each month, giving about 1200 clinical records as the population for the study.

3.4.2. Sampling

A sample is defined as a part or fraction of a whole or a subset of a larger set, selected by the researcher to participate in a research study (Brink et al. 2012). The process of sampling involves selecting a population sample to gather information about occurrences that accurately represent the population being studied (Brink et al., 2012).

Convenience sampling method was used to select the medical records of patients. This is a non-probability sampling procedure where participants are selected based on their availability. It involves the choice of readily available participants or objects for the study (Brink et al., 2012). All available case files that met the inclusion criteria and had relevant information were included in the study.

The major disadvantages of convenience sampling are its inability to aid in generalisation and the potential for bias due to the inestimable amount of sampling error. In addition, the sample may not represent the population studied. However, the sampling technique is economical and more convenient (Brink et al., 2012). The current study was not interested in the generalisability of results. Instead, the researcher was more concerned with understanding the prevalence of syphilis infection in psychiatric patients at Mankweng hospital and its associated factors. Limited access to medical records was anticipated in the study, hence the use of the convenience sampling method. This may have resulted from storage challenges, thus affecting the representativeness of sample.

3.4.3. Inclusion and exclusion criteria

The study included all available clinical records of adult psychiatric patients seen at the OPD at Mankweng hospital in the year 2019. Demographic, geographic and clinical characteristics associated with syphilis infection were looked at. Only records of adult patients were included as per protocol, screening for syphilis infection is mandatory in this population.

The clinical records of patients who were seen multiple times during the study period were only counted once.

Certain clinical records were excluded. These were the clinical records of adult psychiatric outpatients seen prior to January 2019 and after December 2019 as well as the clinical records of patients less than 18 years old as screening for syphilis infection is not routinely done in this population. Also excluded were the clinical records with incomplete or insufficient information.

3.4.4. Sample Size

In a quantitative research, generalizability and reliability are highly valued, making it necessary to select a sample representative of the population. Small sample sizes could produce inconclusive results and be considered unethical, thus affecting the generalization of the findings (Brink et al*.,* 2012). Purposive sampling is limited by selection bias; however, this sampling method could be ethically appropriate where recruitment is done in resource limited settings. In anticipation of limited access to medical records, every available case file was considered for participation in the study. Although some medical records were excluded due to insufficient information, this highlights that the record of every psychiatric patient seen in the year 2019 had an equal chance of being included into the sample regardless of their educational or socioeconomic status.

In this study, a sample size was not estimated as purposive sampling was used. Out of 1200 case files, only 400 (33%) files were reviewed. There were 800 (67%) files not used, and this was attributed to limited access to some files due to storage issues and missing information from some records.

3.5. Data collection instrument

Data collection is the systemic approach to gathering data about relevant variables, which enables the resolution of research questions, testing hypothesis, and measuring outcomes (Kabir. 2016). A data entry form was used to collect data from the medical records of patients. There were no participants as such there was no interaction between the researcher and patients. A data entry form was selected due to its affordability and the ease of arranging and analysing results. This data entry form comprised of sections which the researcher completed using the patient's medical records. However, the method was limited by insufficient information from some medical records.

The data entry form was developed by the researcher, guided by the European guidelines on the management of syphilis (Janier, Hegyi, Dupin, Unemo, Tiplica et al., 2014). The data entry form was subjected to an external trial before it was administered to the medical records. A pilot study is a small-scale experiment that

evaluates different aspects of method intended for invasive, rigorous or confirmation investigation (Arain, Campbell, Cooper & Lancaster. 2010). This allowed for the variables in the tool to be rephrased. It also ensured that the tool measured what it was intended to measure. The researcher included 5 files in the pilot study. The findings from the pilot study were excluded from this study as the pilot was done to assess the reliability of the data entry form.

The data collection form had three sections. Section A covered socio-demographic data such as age, gender, race, marital status, number of children, level of education, employment status and religion. Section B covered psychiatric history including psychiatric diagnosis and substance history. Section C covered medical history, focusing on a history of syphilis or other sexually transmitted infections, and HIV status. A copy of the data collection form may be seen in Appendix A.

3.6. Data collection procedure

A list of all the patients seen at the OPD from January 2019 to December 2019 was collected from the patient registry, and the files were requested from the filing clerks in batches of twenty at a time. The researcher signed for the removal of the files and their safe return. These files were not collected on days on which the OPD was in session so that the patients were not inconvenienced by missing files. The files were kept under lock and key at the psychiatry ward for their safety during data collection. The researcher looked at medical records to uncover demographic information and identify potential triggers for syphilis in the participants. The researcher also recorded the status of syphilis infection of the participants and which test was used to diagnose the infection. A separate log sheet of the participants was created which linked their file numbers with the study numbers, in case the researcher wanted to go back and check on a specific participant’s data. The log sheet was stored securely away from the data.

3.7. Data analysis

Data were first entered on to a Microsoft Excel spreadsheet and were later imported into the IBM SPSS Statistics software Version 28.

The data collected were categorical or continuous variables. The categorical values included gender, marital status, race, religion, level of education, employment status, substance use, and history of STI. The continuous variables included age and the number of children.

Descriptive statistics were used to summarise the data on frequency tables and a Chi-square test was computed to compare associations between the categorical variables.

The prevalence of syphilis infection was calculated as the number, proportions, or percentages of patients with syphilis divided by the total number of psychiatric patients seen at the outpatient department during the study period. The results were analysed with assistance from the statistician at the University of Limpopo.

A statistician from the university, who specializes in quantitative research, provided assistance to the researcher. The specialist was involved in multiple aspects of the research. Firstly, the statistician provided instructions on the appropriate research design and the construction of the data collection instrument. When the data were ready for analysis, the statistician gave recommendations on the most effective data analysis methods and the appropriate use of SPSS software for analysis.

Furthermore, the statistician was instrumental in verifying the accuracy of the researcher's interpretations. After the datasheets were returned, they were inspected to eliminate any that did not meet the required criteria. The process was immediately followed by recording the data on a Microsoft Excel spreadsheet. The spreadsheet was then loaded into the IBM SPSS Statistics Version 28 package and coded in preparation for data analysis. The data was subjected to a variety of rigorous statistical tests including reliability tests, descriptive statistics and inferential statistics**.** Frequencies were determined as positive, negative or unknown using syphilis test results, and proportions were used to determine the prevalence of syphilis infection. The infection was linked to various factors using a Chi-square tests. A p-value of below 0,05 was considered statistically significant.

3.8. Reliability and Validity

3.8.1. Reliability

The reliability of a measurement instrument is determined by its ability to provide accurate and consistent results over time (Swartz, De la Rey, Duncan, Townsend & O'Neill. 2016). The supervisor double-checked the answers provided on the data entry form to ensure that the results were consistent with the measuring instrument employed.

3.8.2. Validity

Validity refers to the ability of an instrument to measure the variable that it is intended to measure (Brink et al., 2012). The researcher utilized appropriate guidelines to create the data entry form and test the instrument before administering it as part of the study, ensuring that it met its intended measurement. Validity can be sub-categorised as internal and external validity.

The internal validity of the study is determined by the degree to which it can be assumed that the results were manipulated rather than any uncontrolled external factors (Brink et al., 2012). Internal validity may be compromised by variations in the methods of selecting participants, particularly when there is variation in recruitment and group allocation. The internal validity of this study was threatened by not randomly selecting the medical records, thus no conclusions about causal relationships between the variables could be made. Nevertheless, the data entry form used was checked by the research supervisor to ensure validity and a pilot study was done to ensure that the data entry form measured what it intended to measure.

External validity is the measure of the extent to which a study's findings can be extended to other individuals and situations (Brink et al., 2012). The extent to which the sample accurately represent the population is usually a factor. The sample size of this study provided good external validity as the size was representative of psychiatric patients with syphilis infection in the population. However, the selection of a convenience sample may have compromised external validity as it was not randomly selected. This implies that not every case file had an equal chance of being included into the sample.

3.9. Ethical considerations

Ethical clearance to carry out this study was obtained from the University of Limpopo Turfloop Research Ethics Committee, Project Number TREC/17/2022PG. This may be seen in Appendix B. Approval to carry out the study was granted by the Limpopo Department of Health, please see Appendix C. Permission to access records at Mankweng hospital may be seen in Appendix D.

The fundamental aspects of clinical research include informed consent, confidentiality, privacy, privileged communication, respect and responsibility. Informed consent is a process where delegates provide voluntarily consent to participate in research studies with complete knowledge of the predicted results before the study begins. This differs from assent which is an agreement by an individual who cannot provide legally valid informed consent for research purposes. In such cases, informed consent should still be obtained from a parent or legal guardian (Brink et al., 2012). This study was non-experimental, it posed minimal risks to the participants because of the anonymised nature of the data. As a result, no consent was obtained from the participants; instead, a consent waiver was requested from the Mankweng hospital CEO.

The researcher is responsible for ensuring that confidentiality of their data during the study prevents its association with individual participants, divulgence to others, or publication. Anonymity is the act of the researcher to conceal the respondents' identities in relation to their participation in the study (Brink et al., 2012). The researcher used file numbers to track the files from the recording registry and stored them in secure lockers that were only accessible to the researcher. The participants were granted anonymity by assigning computer numbers to the file numbers, which allowed them to keep their personal information confidential. The researcher was the sole individual to access information about the participants, and no one was informed of their specifics or disclosed them in the research report.

3.10. Summary

This chapter has described the research method employed in the study. A cross-sectional chart review of 400 psychiatric patients seen in 2019 was carried out. Demographic and clinical information was collected, as well as data relating to syphilis.

The next chapter presents the research results.

Chapter 4: Data Analysis and Interpretation of Findings

4.1. Introduction

This chapter discuss the data analysis and the interpretation of the research findings, guided by the research question posed in the study. The aforementioned findings, interpretations, and discussions are based on quantitative data collected from the records of psychiatric outpatients at Mankweng Hospital in order to determine the prevalence of syphilis infection and its associated factors among them. First the demographic characteristics from the patient records are reported, followed by the clinical characteristics from the patient records. Next, the prevalence of syphilis infection is presented. Finally, the factors associated with syphilis infection are presented.

4.2. Demographic characteristics of the patients in the records

Demographic information is important in research as it allows the sample to be representative and provide knowledge and understanding of universals and variations that exist among populations (Hammer.2011). Socio-demographic variables such as gender, age, marital status, number of children, level of education, employment status, religion and race of psychiatric outpatients at Mankweng Hospital were evaluated in order to determine the prevalence of syphilis infection and its associated factors among them.

The demographic characteristics of the sample may be seen in Table 4.1.

4.2.1. Gender

Gender characteristics of the records were critical in understanding gender participation and contribution of the different genders towards determining the prevalence of syphilis infection. The study established that 64% of the records were those of males and 36% of the records were those of females, indicating that the majority of the records in this study were those of males and females were a minority. This highlights the fact that males and females were not equally represented in the study to determine the prevalence of syphilis infection and its associated factors among psychiatric outpatients at Mankweng Hospital.

Table 4.1: Demographic profile of the sample

Variable	N	%
Gender		
Male	256	64.0
Female	144	36.0
Age		
Under 20 years	6	1.5
20 - 29 years	107	26.8
30 - 39 years	102	25.5
40 - 49 years	99	24.8
50 - 59 years	54	13.5
60 years and over	32	8.0
Marital status		
Single	323	80.8
Married	56	14.0
Divorced	9	2.3
Widowed	12	3.0
Number of children		
No children	230	57.5
One child	41	10.3
2 to 5 children	114	28.5
More than 5 children	15	3.8
Level of education		
None	4	1.0
Special school	4	1.0
Primary	56	14.0
Secondary	224	56.0
Tertiary	84	21.0
Unknown	28	7.0
Employment status		
Unemployed	332	83
Employed	31	7.8
Self-employed	12	3.0
Pensioner	25	6.3
Religion		
Christian	216	54.0
Traditional	1	0.3
Hindu	1	0.3
Unknown	182	45.5
Race		
White	2	0.5
Indian	1	0.3
African	397	99.3

4.2.2. Age

The age characteristics of the records were critical in understanding the influence of credibility of the findings and determination of the most active age group among psychiatric outpatients seen at Mankweng Hospital during the study period. The study established that 1,5% of the patients were less than 20 years, 26.8% were aged between 20 and 29 years, 25.5% were aged between 30 and 39 years, 24.8% were aged between 40 and 49 years, 13.5% were aged between 50 and 59 years, and 8% were aged 60 years and over. The majority of the patients were between 20 and 29 years of age, implying that the majority of the psychiatric patients seen at Mankweng Hospital are in this age group.

4.2.3. Marital status

Marital status in the records was critical in understanding the support system available and its influence in the determination of the prevalence of syphilis infection among psychiatric patients at Mankweng hospital. The study established that 80,8% of patients were single, 14% were married, 2,3% were divorced and 3,0% were widowed.

4.2.4. Number of children

The majority of the records indicated patients having no children (57,5%), while 10,3% had one child, 28,5% had 2 to 5 children and 3,8% had more than 5 children.

4.2.5. Level of education

Concerning the educational background of the patients, the results showed that 21% had some form of tertiary education, 56% had secondary schooling and 14% had primary education. A very low percentage of the records (1% each) indicated no educational background or special school attendance. Educational information was not available in 7% of the records. Thus, the majority of the patients had secondary schooling or a higher level of education.

4.2.6. Employment status

The employment status was crucial in understanding the functionality of the population studied. It was found that 83% were unemployed, 7,8% were employed, 3% were self-

employed, and 6,3% were pensioners. These findings therefore indicate that the sample included a majority of patients with no employment.

4.2.7. Religion

The religious affiliations in the records were critical in understanding the belief system of the population studied and its influence on the determination of the prevalence of syphilis infection. The study illustrated that Christians were the largest religious group among psychiatric patients seen at Mankweng hospital (54%), and 45,5% were unaffiliated with any religion or such information was not available. A minority of records were traditional (0,3%) and Hindu (0,3%) with no representation of other religious groups.

4.2.8. Race

The racial group in the records is critical in understanding the differences that exist in the population studied. The results showed that 99,3% of the population were African, 0,5% were White and 0,3% were Indian. The majority of the records were of African patients, indicating a sample that was not well balanced in terms of racial groups.

4.3. Clinical characteristics of patients in the records

The clinical profile is presented in Table 4.2.

4.3.1. Psychiatric diagnosis

The psychiatric diagnosis was crucial in understanding the disease profile of the respondents and its influence in determining of the prevalence of syphilis infection among psychiatric patients at Mankweng hospital. The results indicated that the majority of patients had a diagnosis of a psychotic disorder (67,8%) and bipolar and related disorder (21,3%). Fewer patients had a depressive disorder (1,8%), neurocognitive disorder (3%), personality disorder (0,5%) or other disorders (5,8%). Other disorders included illnesses such as intellectual disability, anxiety disorders, trauma and stress-related disorders and unspecified disorders.

Table 4.2: Clinical profile

Variable	N	%
Psychiatric diagnosis		
Psychotic disorder	271	67.8
Depressive disorder	7	1.8
Bipolar and related disorder	85	21.3
Neurocognitive disorder	12	3.0
Personality disorder	2	0.5
Other disorder	23	5.8
Substance use		
Yes	201	50.2
No	169	42.3
Unknown	30	7.5
Type of substance used (n=201)		
Alcohol	28	7.0
Cannabis	31	7.8
Nicotine	34	8.5
Poly-substance use	107	26.8
Not indicated	200	50.0
Risky sexual behaviour		
Yes	11	2.8
Not known	389	97.3
Symptoms of syphilis		
None	400	100.0
HIV status		
Negative	152	38.0
Positive	64	16.0
Not known or rejected	184	46.0

4.3.2. Substance use

Regarding substance use, 50,2% of the records showed a history of using substances, 42,3% had no history whereas the history was not known in 7,5% of the records.

Concerning the type of substance used, the, majority of records showed individuals who used more than one substance (26,8%). The term polysubstance use was used in this study to classify such records. Other records showed alcohol use at 7%,

cannabis use at 7,8% and nicotine use at 8,5%. The information was not available in almost 50% of the records.

4.3.3. History of risky sexual behaviour

Looking at psychosexual history, there were eleven (2,8%) records that were documented to have a history of risky sexual behaviour in the form of multiple sexual partners. Seven of these were females and four were males. The history was unknown or not available in 389 (97,3%) records.

These frequencies were cross-tabulated and submitted to a chi-square analysis to understand gender differences regarding sexual behaviour. These results are presented in Table 4.3. It can be seen that there was no statistically significant association between gender and sexual behaviour ($p>0.05$). This indicates that gender had no effect on high-risk sexual behaviour.

Table 4.3: Association between gender and high-risk behaviour (n=400)

Chi-Square Tests	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	3.750	1	0.053		
Continuity Correction	2.618	1	0.106		
Likelihood Ratio	3.556	1	0.059		
Fisher's Exact Test				0.062	0.056
Linear-by-Linear Association	3.740	1	0.053		
Valid Cases	400				

4.3.4. Symptoms of syphilis

As shown in Table 4.2, symptoms of syphilis infection were not documented in any of the records.

4.3.5. HIV status

The HIV test was critical in understanding the risk of sexual transmitted infection and its influence on the prevalence of syphilis infection among psychiatric patients seen at Mankweng hospital. The study established that 16% of the patients had a positive HIV

test, 38% had a negative test and the information was not available in 46% of the records.

4.4. Prevalence of syphilis infection

Out of 400 case files, 22 of them had syphilis seropositivity. Three types of tests were used in this research to assess for syphilis infection, namely the RPR, TPHA, and CSF-VDRL. The overall prevalence of syphilis infection for the study was 1,8% with 0,3% diagnosed with RPR and 1.5% diagnosed with TPHA. There were no records with a positive CSF-VDRL test. These findings are presented in Table 4.4.

Table 4.4: Syphilis test results

Test	Negative n (%)	Positive n (%)	Not known or rejected n (%)
Rapid Plasma Reagin Test (**RPR**)	167 (41,8)	1 (0,3)	232 (58)
Treponema Pallidum Hemaglutination test (**TPHA**)	152 (38)	21 (5,3)	227 (56,8)
Cerebrospinal fluid- Veneral disease research laboratory test (**CSF-VDRL**)	6 (1,5)	0 (0)	394 (98,5)

4.5. Factors associated with syphilis infection

4.5.1. Demographic variables

Statistical tests were used to determine the association between demographic and clinical characteristics found in the records and syphilis infection. Table 4.5 and Table 4.6 outline the results of the association between demographic variables and the RPR and TPHA tests for syphilis infection. An association between the variables and CSF-VDRL test was not computed as there were no positive cases of neurosyphilis.

The non-parametric chi-square test was employed to assess the correlation between socio-demographic characteristics and the RPR test. Table 4.5 shows the results of the socio-demographic characteristics and RPR test.

Table 4.5: Association between socio-demographic characteristics and RPR Test

	Negative n=167		Positive n=1		Not known or rejected n=232		
Gender	**n**	**%**	**n**	**%**	**N**	**%**	**p-value**

Male	99	59.3	1	100.0	156	67.2	0.198
Female	68	40.7	0	0.0	76	32.8	
Age	**n**	**%**	**n**	**%**	**N**	**%**	**p-value**
<20 years	2	1.2	0	0.0	4	1.7	0.224
20 - 29 years	34	20.4	0	0.0	73	31.5	
30 - 39 years	48	28.7	0	0.0	55	23.7	
40 - 49 years	44	26.3	0	0.0	54	23.3	
50 - 59 years	24	14.4	1	100.0	29	12.5	
=>60 years	15	9.0	0	0.0	17	7.3	
Marital status	**n**	**%**	**n**	**%**	**N**	**%**	**p-value**
Single	133	79.6	1	100.0	189	81.5	0.983
Married	25	15.0	0	0.0	31	13.4	
Divorced	3	1.8	0	0.0	6	2.6	
Widowed	6	3.6	0	0.0	6	2.6	
Number of children	**n**	**%**	**n**	**%**	**N**	**%**	**p-value**
None	88	52.7	1	100.0	141	60.8	0.558
One child	17	10.2	0	0.0	24	10.3	
2 to 5 children	53	31.7	0	0.0	61	26.3	
More than 5 children	9	5.4	0	0.0	6	2.6	
Level of education	**n**	**%**	**n**	**%**	**N**	**%**	**p-value**
None	3	1.8	0	0.0	2	0.9	0.073
Unknown	9	5.4	1	100	18	7.8	
Special school	2	1.2	0	0.0	2	0.9	
Primary	27	16.2	0	0.0	28	12.1	
Secondary	97	58.1	0	0.0	130	56.0	
Tertiary	29	17.4	0	0.0	52	22.4	
Employment status	**n**	**%**	**n**	**%**	**N**	**%**	**p-value**
Unemployed	139	83.2	1	100.0	192	82.8	0.440
Employed	17	10.2	0	0.0	14	6.0	
Self-employed	2	1.2	0	0.0	10	4.3	
Pensioner	9	5.4	0	0.0	16	6.9	
Religion	**n**	**%**	**n**	**%**	**N**	**%**	**p-value**
Christian	95	56.9	0	0.0	121	52.2	0.646
Traditional	1	0.6	0	0.0	0	0.0	
Hindu	0	0.0	0	0.0	1	0.4	
Unknown	71	42.5	1	100.0	110	47.4	
Race	**n**	**%**	**n**	**%**	**N**	**%**	**p-value**
African	167	100.0	1	100.0	229	98.7	0.701
White	0	0.0	0	0.0	2	0.9	
Indian	0	0.0	0	0.0	1	0.4	

Statistically significant if p-value < 0.05

Table 4.5 shows that all variables tested insignificant with p>0.05, meaning that gender, age, marital status, number of children, level of education, employment status, religion, and race had no association with the RPR test. That is, these variables had no bearing on the RPR seropositive test.

Table 4.6 shows the association between socio-demographic characteristics and the TPHA test. The non-parametric chi-square test was used to examine this association.

As seen in Table 4.6, age (p=0.002) and marital status (p=0.029) had a statistically significant impact on the TPHA test. All other variables were statistically insignificant (p>0.05) meaning that gender, level of education, number of children, employment status, religion, and race had no association with the TPHA test.

Table 4.6: Association between socio-demographic characteristics and TPHA test

	Negative n=152		Positive n=21		Not known or rejected n=227		
Gender	**N**	**%**	**n**	**%**	**N**	**%**	**p-value**
Male	98	64.5	9	42.9	149	65.6	0.113
Female	54	35.5	12	57.1	78	34.4	
Age	**N**	**%**	**n**	**%**	**N**	**%**	**p-value**
<20 years	3	2.0	0	0.0	3	1.3	0.002*
20 - 29 years	50	32.9	1	4.8	56	24.7	
30 - 39 years	37	24.3	2	9.5	64	28.2	
40 - 49 years	31	20.4	6	28.6	61	26.9	
50 - 59 years	19	12.5	6	28.6	29	12.8	
=>60 years	12	7.9	6	28.6	14	6.2	
Marital status	**N**	**%**	**n**	**%**	**N**	**%**	**p-value**
Single	129	84.9	12	57.1	182	80.2	0.029*
Married	19	12.5	6	28.6	31	13.7	
Divorced	0	0.0	1	4.8	8	3.5	
Widowed	4	2.6	2	9.5	6	2.6	
Number of children	**N**	**%**	**n**	**%**	**N**	**%**	**p-value**
None	93	61.2	7	33.3	130	57.3	0.097
One child	16	10.5	5	23.8	20	8.8	
2 to 5 children	39	25.7	9	42.9	66	29.1	
More than 5 children	4	2.6	0	0.0	11	4.8	
Level of education	**N**	**%**	**n**	**%**	**N**	**%**	**p-value**
None	3	2.0	1	4.8	1	0.4	0.121
Unknown	10	6.6	2	9.5	16	7.0	
Special school	0	0.0	0	0.0	4	1.8	
Primary	18	11.8	5	23.8	32	14.1	
Secondary	83	54.6	13	61.9	131	57.7	
Tertiary	38	25.0	0	0.0	43	18.9	
Employment status	**N**	**%**	**n**	**%**	**N**	**%**	**p-value**
Unemployed	127	83.6	15	71.4	190	83.7	0.298
Employed	9	5.9	3	14.3	19	8.4	
Self-employed	4	2.6	0	0.0	8	3.5	
Pensioner	12	7.9	3	14.3	10	4.4	
Religion	**N**	**%**	**n**	**%**	**N**	**%**	**p-value**
Christian	86	56.6	12	57.1	118	52.0	0.772
Traditional	0	0.0	0	0.0	1	0.4	

Hindu	1	0.7	0	0.0	0	0.0	
Unknown	65	42.8	9	42.9	108	47.6	
Race	**N**	**%**	**n**	**%**	**N**	**%**	**p-value**
African	150	98.7	21	100.0	226	99.6	
White	1	0.7	0	0.0	1	0.4	0.766
Indian	1	0.7	0	0.0	0	0.0	

**Statistically significant (p-value < 0.05)*

4.5.2. Clinical characteristics

Statistical tests were used to determine the association between clinical characteristics found in the records and syphilis infection. The association between clinical characteristics and syphilis infection is presented in Table 4.7 and Table 4.8. An association between the characteristics and CSF-VDRL test was not made as there were no positive cases of neurosyphilis. The non-parametric chi-square test was used to examine the association between clinical factors and the RPR test. Table 4.7 shows the results of the clinical factors and the RPR test.

Table 4.7: Association between clinical factors and RPR test

	Negative n=167		**Positive n=1**		**Not known or rejected n=232**		
Psychiatry diagnosis	**N**	**%**	**n**	**%**	**N**	**%**	**p-value**
Psychotic disorder	117	70.1	1	100.0	153	65.9	
Depressive disorder	0	0.0	0	0.0	7	3.0	
Bipolar and related disorder	36	21.6	0	0.0	49	21.1	0.626
Neurocognitive disorder	6	3.6	0	0.0	6	2.6	
Personality disorder	0	0.0	0	0.0	2	0.9	
Other disorders	8	4.8	0	0.0	15	6.5	
History of substance use	**N**	**%**	**n**	**%**	**N**	**%**	**p-value**
Yes	81	48.5	1	100.0	119	51.3	
No	76	45.5	0	0.0	93	40.1	0.606
Not known	10	6.0	0	0.0	20	8.6	
HIV status	**N**	**%**	**n**	**%**	**N**	**%**	**p-value**
Negative	74	44.3	1	100.0	77	33.2	
Positive	33	19.8	0	0.0	31	13.4	0.08
Not known or rejected	60	35.9	0	0.0	124	53.4	

Statistically significant if p-value < 0.05

Table 4.7 shows that all clinical factors had a statistically insignificant association with the RPR test (p>0.05), meaning that the psychiatric diagnosis, history of substance use, and HIV test all had no association with the RPR test.

Table 4.8 shows the association between clinical factors and the TPHA test. The non-parametric chi-square test was used to examine the association between clinical factors and the TPHA test.

Table 4.8: Association between clinical factors and TPHA test

	Negative n=152		Positive n=21		Not known or rejected n=227		
Psychiatry diagnosis	**N**	**%**	**N**	**%**	**n**	**%**	**p-value**
Psychotic disorder	105	69.1	11	52.4	155	68.3	0.173
Depressive disorder	3	2.0	0	0.0	4	1.8	
Bipolar & related disorder	29	19.1	6	28.6	50	22.0	
Neurocognitive disorder	6	3.9	3	14.3	3	1.3	
Personality disorder	1	0.7	0	0.0	1	0.4	
other disorders	8	5.3	1	4.8	14	6.2	
History of substance use	**N**	**%**	**N**	**%**	**n**	**%**	**p-value**
Yes	78	51.3	8	38.1	115	50.7	0.818
No	64	42.1	11	52.4	94	41.4	
Not known	10	6.6	2	9.5	18	7.9	
HIV status	**N**	**%**	**N**	**%**	**n**	**%**	**p-value**
Negative	76	50.0	10	47.6	66	29.1	< 0.001*
Positive	23	15.1	7	33.3	34	15.0	
Not known or rejected	53	34.9	4	19.0	127	55.9	

**Statistically significant (p-value < 0.05)*

From Table 4.8 it can be seen that the HIV test and TPHA seropositivity were found to have a statistically significant association ($p<0.001$). Both other clinical factors yielded a statistically insignificant association ($p>0.05$), indicating that psychiatric diagnosis and substance use history had no association with the TPHA test.

4.6. Summary of research findings

An overall syphilis prevalence of 1.8% was found among psychiatric patients who participated in this study. A higher prevalence was diagnosed with a TPHA test than a RPR test. It was found that single females aged under 40 years, who were HIV-negative were more likely to present with a syphilis infection. There was no association found between syphilis infection and other demographic and clinical characteristics.

The next chapter focuses on discussing these findings and comparing them with previously published research.

Chapter 5: Discussion, Conclusion and Recommendations

5.1. Introduction

This chapter presents a discussion of the study findings when compared to relevant published studies. The primary objective of the study was to determine the prevalence of syphilis infection and associated factors among psychiatric patients. This chapter starts by looking at the prevalence of syphilis infection, followed by the associated factors of syphilis infection. It then discusses the strengths and limitations of the study before reaching a conclusion and making recommendations.

5.2. Prevalence of syphilis infection

The study revealed a syphilis prevalence rate of 1.8 percent. This rate was similar to the prevalence found in global studies which have ranged from 1.1 percent to 3.3 percent. However, the rate was lower to what has been found in African countries including South Africa. Syphilis prevalence in African countries has ranged from 1.9 percent to 5.4 percent with increased prevalence found among voluntary blood donors. A study by Henning et al. (2012) in South Africa showed a prevalence of 11.7 percent. The low prevalence found in this study may be explained by the fact that the researcher relied on retrospective data, which were collected at one setting over a short period of time.

A higher prevalence was diagnosed with the TPHA than the RPR test, a result similar to that found in a study conducted by Henning et al. (2012) where 11.8 percent of seropositive cases were diagnosed using the TPHA. Only one respondent tested positive for syphilis infection with the RPR test. He was an African male, aged between 50 and 59, single with no children. His level of education and religion were unknown. Regarding respondents with TPHA seropositivity, the infection was found in almost all age groups with those over 40years being most infected. Females (57.1%) were more infected than males (42.9%) and the majority of them were single (57.1%) followed by those who were married (28.6%). Thirteen (61.9%) individuals had a secondary education and 71.4% were unemployed. All the respondents were African and the dominant religion was Christianity (57.1%). Only 14 (66.7%) had children.

A higher prevalence of syphilis infection was observed among respondents with a psychotic disorder. A minority of respondents had a history of substance use and the infection was more prevalent in those with a negative HIV test result than those with a positive HIV test result.

5.3. Associated factors of syphilis infection

Several factors were identified in earlier studies to be associated with syphilis infection in psychiatric patients. These included the age group of 15 to 49 years, with those over the age of 45 years at risk for neurosyphilis, as well as male gender, high risk sexual behaviour, HIV seropositivity, and a psychiatric diagnosis of schizophrenia or bipolar disorder.

Although syphilis infection was found across all age groups in this current study, individuals over the age of 40 years were found to be at an increased risk. This concurs with a study done by Wurong et al. (2019) which highlighted the age group over 45 to be an independent risk factor for neurosyphilis. The study found age to have statistically significant association with TPHA seropositivity, thus indicating an older age to be associated with past syphilis infection.

The syphilis prevalence was more prevalent in females than males in the current study. This was in contrast with earlier studies that found a higher prevalence in males (Li et al., 2019). However, other studies have indicated mixed results regarding the role of gender as an associated factor for syphilis infection in psychiatric patients (Ekejindu et al., 2020; Lee et al., 2018). Findings from the current study regarding gender may have been influenced by the sample used which had more males than females. These findings may not be a true reflection of the population of psychiatry outpatients at Mankweng Hospital as purposive sampling was used. The difference between the two genders was statistically insignificant and there was no association between gender and high-risk behaviour. Nevertheless, these findings could assist with future public health interventions.

Other factors that were found to have a strong association with syphilis infection in this study included the marital status and the HIV status. Single status had a significant association with TPHA seropositivity. However, conclusions about marital status

cannot be drawn as the vast majority of the records belonged to patients who were single. These findings were in contrast to earlier studies which have shown a statistically insignificant association between marital status and syphilis infection. The HIV status had a statistically significant association with the RPR and TPHA tests. The majority of patients with a syphilis seropositive test had negative HIV test results. This indicates that patients with a negative HIV status were found to be at increased risk of syphilis seropositivity. These findings were in contrast with previous studies carried out which showed syphilis infection more likely to be associated with a positive HIV status. The rising incidence of syphilis infection has been associated with HIV infection (Henning et al*.,* 2012).

Majority of patients in this study had a secondary or higher level of education, however only a minority were employed. These findings highlight the high rate of unemployment among mental health care users and the general population in the Limpopo Province. They concur with a study by Perkins and Rinaldi (2002) that found an increase in the percentage of people with long-term mental health problems who were unemployed, from 80 percent in 1990 to 92 percent in 1999. No significant association was found between employment status, race, religion, number of children and syphilis infection and these findings were similar to those from previous studies.

High risk sexual behaviour has been frequently reported among psychiatric patients. In a study conducted by Mokgatle (2019), more males than females were in a sexual relationship then, and they reported having multiple sexual partners and alcohol-driven sex. In this study, only 2.8 percent of the participants were documented to have a history of risky sexual behaviour, the majority of whom were females. The reasons for the low rate were not known, however the nature of the study and overcrowding in outpatient settings may have contributed to the low rate.

The majority of the seropositive patients in the current study were diagnosed with psychotic disorders, followed by bipolar disorder, and then neurocognitive disorder. No association was found between the psychiatric diagnosis and syphilis infection. These findings are similar to other studies where patients with schizophrenia or bipolar disorder were found to be at an increased risk of acquiring a STI (Chen et al., 2018; Lee et al., 2018).

Although 50.2 percent of the patients were found to be using substances in this study, there was no significant association with syphilis infection and this concurs with previous studies.

5.4. Strengths and limitations of the study

This study had strengths and limitations. Its strength was that there was a large enough sample used in the study to represent the population of psychiatric patients at Mankweng hospital.

One limitation was that purposive sampling was used in the study which made it difficult to avoid selection bias, thus affecting the validity of the study and the generalization of the results to the entire population. Another limitation was that the study relied on information from clinical records to make a diagnosis of syphilis infection. This could have led to information bias.

Both treponemal and non-treponemal tests were used to make the diagnosis of syphilis infection. Although the use of these tests was helpful in differentiating active from past infections, this may have led to false positives, thus resulting in high prevalence rates.

The study only used CSF-VDRL to diagnose neurosyphilis. This may have excluded or missed cases of probable neurosyphilis which could have been diagnosed with other CSF parameters such as leucocytosis and elevated protein.

A lot of demographic variables from the records were skewed. This includes the gender of the participants, marital status and race. The skewed variables showed a sample that was not symmetrically distributed which has made it difficult to draw conclusions about associated factors.

5.5. Conclusion

A lower than anticipated syphilis prevalence (1.8%) was found in this study. Nevertheless, the study provided insight into the prevalence of syphilis infection among psychiatric patients at Mankweng Hospital and its associated factors. In this study syphilis infection was associated with increasing age, single status, and negative

HIV status. Therefore, findings from this study have emphasised the recommendation of routine screening of psychiatric patients for syphilis infection.

5.6. Recommendations

5.6.1. Policies

The study highlighted the importance of excluding syphilis infection as a cause or aggravating factor for mental illness. Findings from the study recommend the development of a policy for public health facilities relating to screening of psychiatric patients, where individuals are not only screened at initial assessment but on an annual basis if they are asymptomatic. In addition, the use of both treponemal and non-treponemal tests is recommended to increase sensitivity and specificity, although this may be associated with high costs.

5.6.2. Health facility

It is recommended that the hospital management incorporate sexual health care into mental health care services. This includes conducting awareness campaigns to educate psychiatric patients about syphilis infection, risk factors and its adverse outcomes on mental health. The campaigns will enable patients to take precautionary measures, especially when they are in intimate relationships. Furthermore, it is necessary to provide more space where patients could be given more privacy to talk about sexual health related matters.

5.6.3. Mental health practitioners

Mental health practitioners are encouraged to include sexual history in the mental health assessment of patients and continue providing psychoeducation regarding syphilis infection and other sexual health related matters.

5.6.4. Future studies

Findings of this study could have been influenced by the fact that this was a retrospective study, with information bias due to missing information. Future prospective studies in more centres could contribute to more insight and information on syphilis seropositivity amongst psychiatric patients in the Limpopo Province.

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Appendix A: Data Collection Form

Participant Number:					
Section A: Socio-demographic:					
Age:	18-25		Gender:	Male	
	26-30			Female	
	31-40			Other	
	41-50				
	51-60				
	>60				
Marital status:	Single		Religion:	Christian	
	Married			Traditional	
	Divorced			Islam	
	Widowed			Hindu	
				Other	
Level of education:	None		Employment status:	Unemployed	
	Unknown			Employed	
	Special school			Self-employed	
	Primary			Pensioner	
	Secondary				
	Tertiary				
Number of children:	No children		Race:	African	
	< 2			White	
	2-5			Indian	
	>5			Other	

Section B: Psychiatric history:							
Psychiatric diagnosis:	Psychotic disorders		Substance use:	Yes		No	
	Depressive disorders			Not known			
	Bipolar & related disorders		Type of substance:	Alcohol			
				Cannabis			
	Neurocognitive disorders			Opioids			
				Stimulants			
	Personality disorders			Inhalants			
				Nicotine			
	Other			Other			
Section C: Medical history:							
History of risky sexual behaviour:	Yes		Symptoms of syphilis:	Yes			
	No			No			
	Not known			Not known			
Syphilis serology test:	RPR		Date of the test:				
	TPHA		Outcome:	Positive			
				Negative			
	CSF- VDRL			Not known/ rejected			
HIV test	Conducted		Date of the test:				
	Not conducted		Outcome:	Positive			
				Negative			
				Not known			

Appendix B: Ethical Clearance

University of Limpopo
Department of Research Administration and Development
Private Bag X1106, Sovenga, 0727, South Africa
Tel: (015) 268 3935, Fax: (015) 268 2306, Email: anastasia.ngobe@ul.ac.za

TURFLOOP RESEARCH ETHICS COMMITTEE

ETHICS CLEARANCE CERTIFICATE

MEETING: **23 February 2022**

PROJECT NUMBER: **TREC/17/2022: PG**

PROJECT:

Title:	The Prevalence of Syphilis Infection and its Associated Factors among Psychiatric Patients at Mankweng Hospital, Limpopo Province
Researcher:	MS Lebotsa
Supervisor:	Dr MM Banda
Co-Supervisor/s:	Dr PJ Mokoena-Molepo
School:	Medicine
Degree:	Master of Medicine in Psychiatry

PROF P MASOKO
CHAIRPERSON: TURFLOOP RESEARCH ETHICS COMMITTEE

The Turfloop Research Ethics Committee (TREC) is registered with the National Health Research Ethics Council, Registration Number: **REC-0310111-031**

Note:

i) **This Ethics Clearance Certificate will be valid for one (1) year, as from the abovementioned date. Application for annual renewal (or annual review) need to be received by TREC one month before lapse of this period.**

ii) **Should any departure be contemplated from the research procedure as approved, the researcher(s) must re-submit the protocol to the committee, together with the Application for Amendment form.**

iii) **PLEASE QUOTE THE PROTOCOL NUMBER IN ALL ENQUIRIES.**

Finding solutions for Africa

Appendix C: Permission to Carry out the Study

LIMPOPO
PROVINCIAL GOVERNMENT
REPUBLIC OF SOUTH AFRICA

Department of Health

Ref : LP_2022-02-015
Enquires : Ms PF Mahlokwane
Tel : 015-293 6028
Email : Phoebe.Mahlokwane@dhsd.limpopo.gov.za

DR MATHOLWANE SALMINAH LEBOTSA

PERMISSION TO CONDUCT RESEARCH IN DEPARTMENTAL FACILITIES

Your Study Topic as indicated below;

THE PREVALENCE OF SYPHILIS INFECTION AND ITS ASSOCIATED FACTORS AMONG PSYCHIATRIC PATIENTS AT MANKWENG HOSPITAL, LIMPOPO PROVINCE

1. Permission to conduct research study as per your research proposal is hereby Granted.
2. Kindly note the following:
    a. Present this letter of permission to the institution supervisor/s a week before the study is conducted.
    b. This permission is Only for Mankweng Hospital
    c. In the course of your study, there should be no action that disrupts the routine services, or incur any cost on the Department.
    d. After completion of study, it is mandatory that the findings should be submitted to the Department to serve as a resource.
    e. The researcher should be prepared to assist in the interpretation and implementation of the study recommendation where possible.
    f. The approval is only valid for a 1-year period.
    g. If the proposal has been amended, a new approval should be sought from the Department of Health
    h. Kindly note that, the Department can withdraw the approval at any time.

Your cooperation will be highly appreciated

_____ 14/03/2022

Head of Department **Date**

pp

Appendix D: Permission to Conduct the Study

LIMPOPO
PROVINCIAL GOVERNMENT
REPUBLIC OF SOUTH AFRICA

DEPARTMENT OF HEALTH

MANKWENG HOSPITAL

Ref: S5/3/1/2

Enq: Modula MC

From: HR Utilization and Capacity Development

Date: 01 APRIL 2022
TO : DR ML Lebotsa

REQUEST FOR PERMISSION TO CONDUCT RESEARCH AT MANKWENG HOSPITAL:

1. The above matter has reference.
2. This is to confirm that the CEO has granted permission to conduct research on **"The prevalence of syphilis infection and it's associated factors among psychiatric patients in Mankweng Tertiary and Academic Hospital, Capricorn District, and Limpopo Province."**
3. We wish you good luck in your research.

Yours in service delivery

Acting Chief Executive Officer
Dr Muila SL

04/04/2022
Date

DEPARTMENT OF HEALTH
CHIEF EXECUTIVE OFFICER
2022 -04- 04
PRIVATE BAG X 1117 SOVENGA 0727
LIMPOPO PROVINCE