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Research Article

Exploring Caregivers' Perceptions on the Impact of Nyaope and Alcohol Use on Tuberculosis Treatment Adherence in Limpopo Province, South Africa: A Qualitative Investigation

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Background. Adherence to tuberculosis (TB) treatment is essential for curing the disease and for preventing drug resistance. Most studies report that substance abuse is associated with high discontinuation of TB treatment, which is a barrier to the effective management of the TB control and prevention program. Insufficient data exist on the effects of the nyaope drug use on TB treatment adherence among patients with the disease. Hence, the current study aimed to qualitatively explore the perceptions of caregivers regarding the influence of nyaope and alcohol use on tuberculosis treatment adherence among tuberculosis patients in Limpopo Province, South Africa. *Materials and Methods*. Qualitative, exploratory and descriptive designs were used. The non-probability purposive sampling method was used to select eight TB focal nurse and eight facility operational managers from eight selected community health centers in Limpopo Province. Data were collected through in-depth interviews, and it was guided by data saturation. Data were analyzed using Colaizzi's method. Trustworthiness was ensured, and ethical considerations were observed in the study. *Results*. The study results of the study show four individual major themes that emerged from the data analysis: (1) challenges in treatment adherence; (2) disruption of follow-up and DOT support systems; (3) reluctance toward social support; and (4) resistance to health educational and counseling interventions. *Conclusion*. The study reveals that nyaope and alcohol use significantly impede TB treatment adherence. In response, the conclusion advocates for integrating services within healthcare facilities to enhance TB treatment effectiveness. This proposed integration aims to create a cohesive and interconnected healthcare system capable of identifying, supporting, and treating TB patients with substance abuse issues more effectively. The study recommends incorporating the Alcohol Use Disorders Identification Test questionnaire for all newly diagnosed TB patients. This proactive measure will enable early identification of individuals who may be experiencing harmful or hazardous alcohol use. Following the identification process, it is advisable to offer further counseling to those in need and link them to a deaddiction center for specialized support. This approach not only aids in the comprehensive care of TB patients but also addresses underlying issues that could potentially hinder their treatment adherence and overall recovery.

1. Introduction

Substance abuse is a major and a growing devastating problem globally [1]. The increased substance abuse has been seen to be higher among relatively young people between the ages of 15 and 30 years than among older people, as shown by the Global Burden of Disease [2]. Younger people are also more likely to die from substance abuse. In 2019, alcohol use was found to be the leading risk factor in terms of the attributable burden of disease among people between the ages of 25 and 49 years. Such use was also found to be the second leading risk factor among people between the ages of 10 and 24 years, and the ninth leading risk factor among all ages, in terms of whom it has been found to account for about 2.07 million deaths of men and 374,000 deaths of women, globally [3].

South Africa has emerged as one of the most attractive and largest markets for illicit drugs in sub-Saharan Africa, with increased substance abuse having been noticed since 1994, in line with ongoing increased demand for the promotion and availability of alcohol and other substances [4]. A relatively new cocktail psychoactive drug, known as nyaope, has flooded the drug market in South Africa. Nyaope, which is a street cocktail drug that is commonly found in South Africa, is a mixture of low-grade heroin, cannabis products, antiretroviral drugs, and other materials, added as cutting agents [5]. Nyaope abuse in South Africa has increased over the years, mainly among young people from poor backgrounds. The drug has grown in popularity between 2000 and 2006, in various provinces in South Africa, with it being a very addictive cocktail of drugs, which is commonly used in poor black and colored townships in various provinces [5].

The literature shows that chronic substance abuse is associated with significant risk for medication nonadherence among patients with tuberculosis (TB) [6]. Heavy alcohol consumption, which influences patient retention in care, is associated with increased odds of loss to follow-up [7]. One study shows that alcohol addiction is a risk factor for poor TB outcomes and treatment failure, which sometimes results in death [8]. The misuse of both alcohol and illicit drugs during treatment is associated with the discontinuing of treatment, with such substances having mechanisms in common that affect TB treatment outcomes negatively, possibly leading either to saturation, or to an amplification of their effects [9]. One study conducted in Limpopo Province, South Africa, found that substance use, among both young and old, is one of the most significant public health and social problems in the province [10].

The current state of research reveals a significant gap in understanding the intricate relationship between nyaope and alcohol use and tuberculosis (TB) treatment adherence, particularly within the specific context of Limpopo Province, South Africa. While existing literature acknowledges the association of chronic substance abuse, including alcohol consumption, with medication nonadherence in TB patients globally, a dearth of studies exists concerning the distinctive challenges posed by the highly addictive nyaope drug within this geographic setting. Moreover, the perspectives of caregivers on the impact of nyaope and alcohol on TB treatment adherence remain largely unexplored in the literature. This research aims to address this research gap by qualitatively investigating caregivers' perceptions, providing insights into the nuanced factors influencing TB treatment adherence in the presence of nyaope and alcohol use.

The authors' decision to undertake this research stems from the escalating issue of substance abuse, specifically the rising prevalence of nyaope and alcohol use, within the geographic area of their work—Limpopo Province, South Africa. The problem underscores the global magnitude of substance abuse, emphasizing its disproportionate impact on younger individuals and the alarming number of deaths attributed to alcohol use. South Africa's unique context as a major market for illicit drugs, coupled with the emergence of nyaope since 1994, further underscores the complexity of the issue. Recognizing the lack of comprehensive studies on nyaope, alcohol use, and TB treatment adherence in Limpopo Province, the researchers are driven to fill this research gap. The qualitative approach was deliberately chosen to delve into the nuanced perceptions of caregivers, offering a more comprehensive understanding of the perceptions of caregivers regarding the influence of nyaope and alcohol use on tuberculosis treatment adherence among tuberculosis patients.

1.1. Aim of the Study. This study aimed to qualitatively explore the perceptions of caregivers regarding the impact of nyaope and alcohol use on tuberculosis treatment adherence among tuberculosis patients in Limpopo Province, South Africa.

2. Methodology

2.1. Theoretical Framework. The current study utilized the Health Belief Model (HBM) as the theoretical framework. The HBM provides a comprehensive framework for understanding health-related behaviors by considering individuals' perceptions of susceptibility, severity, benefits, barriers, and cues to action [11]. In the context of TB treatment adherence influenced by substance abuse, the HBM allows for an exploration of how individuals perceive their susceptibility to TB, the severity of the consequences of nonadherence, and the perceived benefits and barriers to adhering to TB treatment. The model also considers external factors, such as cues to action, which could be essential in understanding what prompts individuals to take specific health-related actions, including adhering to TB treatment.

By adopting the HBM, the study delved into the cognitive and psychological factors that influence individuals' decisions regarding TB treatment adherence in the presence of nyaope and alcohol use. This theoretical framework provided valuable insights into the interplay between individual beliefs, substance abuse, and health behaviors, contributing to a deeper understanding of the factors that shape TB treatment adherence in this specific population and context [12].

2.2. Research Team. The first author (HM) was the principal investigator of the study, and TT was a coinvestigator. HM and TT are academics, and they all hold PhD in the field of Public Health. All the investigators were trained in qualitative research methods. All the in-depth interviews were conducted by HM, with guidance provided by TT.

2.3. Study Design. The current study utilized qualitative research methods, specifically employing exploratory and descriptive designs, to examine caregivers' perceptions of the impact of nyaope and alcohol use on tuberculosis treatment adherence among patients. The qualitative reporting process was undertaken in accordance with the consolidated criteria for reporting qualitative studies (COREQ) checklist [13] to support the methodological process, analysis, and interpretation of the data. Adhering to the COREQ qualitative research reporting criteria ensured methodological transparency (*Supplementary 1*). Opting for an exploratory qualitative approach aimed at obtaining a nuanced understanding of the subject, fostering engagement with

stakeholders to share insights on how nyaope and alcohol use influence tuberculosis treatment adherence. In-depth interviews were conducted with TB focal nurses and facility operational managers from eight distinct community health centers (CHCs) in Limpopo Province, South Africa.

This approach provided a platform for key stakeholders to articulate perspectives on the effects of nyaope and alcohol use on TB treatment adherence. Grounded in the constructivist paradigm, the study anticipated that participants' experiences and reflections would illuminate their understanding of the complex interactions within their living environment. Additionally, the study incorporated a descriptive design within its qualitative research methodology, employing codes, categories, and themes to systematically analyze and present a detailed account of caregivers' perceptions regarding the impact of nyaope and alcohol use on TB treatment adherence (*Supplementary 2*). This approach aimed to provide not only exploratory but also descriptive insights, contributing to a comprehensive understanding of the challenges posed by substance abuse in the context of tuberculosis treatment.

2.4. Study Setting and Duration. The study was conducted in eight selected community health centers (CHCs) (Bungeni, Mpambo, Mutale, Thohoyandou, Rethabile, Blouberg, Mookgophong, and Thabaleshoba) within three selected districts (Waterberg, Capricorn, and Vhembe) in the Limpopo Province. The researcher selected such a study setting, since, at the time of the study, there was a dearth of data regarding the influence of nyaope drug use on TB treatment adherence among TB patients. Approximately 80% of the population in the Limpopo Province live in the rural areas. Nyaope drug usage is said to be high mainly in communities with a low social class status, such as many of the black communities living in the townships [14]. All the in-depth interviews were conducted between June and September 2020.

2.5. Study Population. The nonprobability purposive sampling method was used to sample the site TB focal nurses and facility operational managers, who were readily available at the time of data collection [15]. The total study participants consisted of eight site TB focal nurses (nurses who coordinate and provide TB services at facility level) and eight facility operational managers, working at the eight different selected CHCs. None of the participants refused to participate in the study or withdrew.

2.6. Inclusion and Exclusion Criteria. Only TB focal nurses with over 3 years' work experience each were included in the study. Only facility operation managers who were responsible for the TB programs concerned, as well as for the operation of the facility, were included in the study.

2.7. Sampling Procedure. The multistage sampling procedure employed in this study involved a systematic and intentional selection of both health facilities and participants. The process aimed to ensure a representative and comprehensive exploration of the perceptions of caregivers regarding the influence of nyaope and alcohol use on tuberculosis (TB) treatment adherence among patients in Limpopo Province, South Africa.

2.8. Sampling of the Health Facilities. Sampling of the CHCs concerned was done, using the nonprobability purposive sampling technique. The researcher sampled a minimum of two and a maximum of four CHCs in each district selected. Where the district had only two CHCs, both were sampled. The participants found at the CHCs involved were thought to be able to expose the influence of the nyaope drug and alcohol use on TB treatment adherence among patients with TB.

2.9. Sampling of the Study Participants. The nonprobability purposive sampling method was used to select eight TB focal nurses and eight facility operational managers, who were accessible at the time of data collection, at eight different selected CHCs [15]. The participants concerned possessed the information required regarding the influence of nyaope and alcohol use on TB treatment adherence.

2.10. Sample Size. Given the focus on deep, case-oriented analysis enabled by a relatively limited amount of qualitative data, the present study required a modest number of participants [16]. For the key informant interviews, a total of eight TB focal nurses (representing one from each Community Health Center or CHC) and eight TB facility operational managers (likewise, one from each CHC) were selected based on their relevant knowledge and ready availability. The participant selection aimed to ensure that key informants had comprehensive insights into the subject matter. Interviews continued until data saturation was achieved, indicated by the repetition of information even after the researcher probed, rephrased questions, and sought clarity. The decision to conclude interviews at data saturation ensured that the study reached a point where no substantially new information was emerging, enhancing the depth and richness of the case-oriented analysis within the constraints of the study's qualitative scope.

2.11. Data Collection Procedure. Data were collected through in-depth individual interviews with interview guide and were conducted in English. All the participants who signed a written consent form before the data collection started were included in the present study, during which they were interviewed. The researcher explained the purpose of the study to each participant before interviewing them. The participants were assured that confidentiality would be maintained. The interview dates and times were arranged with the participants prior to the data collection, which took place between June and September 2020. The interviews were conducted early in the morning, at a time that was suggested by the participants, before they could start with their duties, to avoid distracting them from their normal ward routine work. Separate interviews were conducted with 16 participants (14 women and two men) in private offices, with each lasting approximately 30 min. All the interviews were conducted by the researcher. The central question, which was asked per identified effects, was deliberated on as long as the participant could narrate an answer.

The research participants freely responded to open-ended questions in narrative form using their own words,

thus sharing their own perspectives with the researcher concerned. The questions were planned in a flexible manner. The questions were asked as they naturally arose, with the researcher ensuring that all relevant topics were covered and that the research focus was kept in mind. The researcher also asked probing questions to guide the participants to elaborate further upon their responses, where additional information was required or where unclear answers required clarification. All interviews were audio-recorded with prior consent from study participants. Each of the interviews was anonymized to maintain confidentiality. There were no repeat interviews. The transcripts or results were not returned to participants for any comments or corrections. The use of such a method resulted in the accessing of in-depth accounts about the influence of the nyaope drug and alcohol use on TB treatment adherence. The data obtained were collected by means of audio recordings, with field notes also being taken during the interviews.

2.12. Data Management and Analysis. The data obtained were stored, as per the university's protocols, in a password-protected computer, with access to the database concerned being restricted to the researcher and supervisors only. Any identifiable information that was collected remained confidential, with it only being accessible to the researcher and supervisors concerned. The data were analyzed in groups, rather than individually, to avoid the participants involved being able to be identified by their responses. As qualitative data analysis always takes place concurrently with data collection, the researcher attempted to gather, manage, and interpret a growing bulk of data simultaneously. In the current study, the audio-recorded interviews were promptly transcribed and coded by researchers immediately following the data collection process. Additionally, a co-coder was appointed to contribute to the coding process, enhancing the reliability and rigor of the qualitative data analysis. This collaborative approach in transcription and coding ensures a systematic and comprehensive treatment of the collected data, promoting consistency and reducing the potential for bias in the interpretation of participant responses. The use of a co-coder adds an extra layer of validation, as it involves independent perspectives in the coding process, fostering a more robust and trustworthy analysis of the qualitative data.

The data obtained were analyzed using Colaizzi's [17] methods. In the current study, each research participant's verbatim transcript was read to acquire a sense of the whole. Significant statements and phrases pertaining to the phenomenon undergoing study were extracted from each transcript. The necessary meanings, which were derived from the significant statements, were organized into themes, with the themes concerned evolved into theme clusters, and, eventually, into theme categories. These results were integrated into a rich and exhaustive description of the perceptions of caregivers. The essential structure of the phenomenon was uncovered. Validation was sought from the research participants to compare the researcher's descriptive results with caregivers' perceptions.

3. Results

After the data organization and analysis had taken place, four individual major themes were formulated based on the findings of the present study (*Supplementary 3*). The participants shared their perceptions regarding the influence of alcohol and illicit drug abuse on TB treatment adherence in Limpopo Province. The detailed description of each code has been detailed in *Supplementary 4*.

Four main themes emerged after extensive data organization and analysis of the issue of alcohol and illicit drug abuse. The individual themes concerned were developed from the comments that were made by the participants during the data collection. A discussion of findings follows the presentation of each theme, as it is asserted that integrating the findings and the discussion was an appropriate method for encapsulating the essence of the phenomenon under investigation. The existing literature was searched and used to support the findings of the present study. Participants revealed that the nyaope drug used by the TB patients was a uniquely South African street cocktail drug, consisting of a mixture of low-grade heroin that was smoked together with cannabis.

3.1. Theme: Challenges in Treatment Adherence

3.1.1. Subtheme 1.1: Forgetfulness due to Substance Use. Participants revealed that the use of nyaope and alcohol use have negative effects on treatment adherence among TB patients. Participants reported that patients using nyaope and alcohol often forget to take their TB treatment. Some patients even stop taking their treatment altogether due to the negative impact of substance use. Time spent at shebeens and on the streets limits the availability of time for medication adherence.

One TB focal nurse (Participant 9, female) noted: *"These patients do not have time to take their treatment. I think some of them get drunk to a point where they even forget that they are sick."*

3.1.2. Subtheme 1.2: Monitoring Difficulties. Participants indicated that they find it challenging to monitor patients engaged in nyaope and alcohol use while they are supposed to take their TB treatment. The social environments where substance use occurs make it difficult for healthcare providers to ensure proper medication intake.

One TB focal nurse (Participant 11, female) indicated: "*… These patients are always drunk, and they are always at the shebeens, and the way they are, it looks like they are trying to numb the pain, and it is difficult to monitor them."*

3.2. Theme 2: Disruption of Follow-Up and DOT Support Systems

3.2.1. Subtheme 2.1: Missed Follow-Up Visits and DOT Appointments. Participants indicated that TB patients with substance abuse issues are less likely to attend follow-up visits and directly observed therapy (DOT) support appointments. It was indicated that the patients' frequent absence

from home or usual spots makes it difficult for healthcare providers to track them down for necessary support. Even if the supporters find them at home or their usual spot, they tend to run away, because they do not want their friends to know that they are sick.

One facility operational manager (Participant 13, female) said: *"Bo-nyaope* [i.e. those taking the illicit drug called nyaope] *don't want to see our DOT supporters. They will agree to have home-based carers to support them, but the moment they see them, they run away. They say that their friends will laugh at them and call them weak."*

3.2.2. Subtheme 2.2: Fear of Stigma and Disclosure Avoidance. The study further identified that the patients concerned tended not to disclose their status to others, as they feared being discriminated against, or isolated. Consequently, they ended up spreading the disease in their communities, as they spent time in overcrowded areas, or in poorly ventilated homes or social venues.

Another TB focal nurse (Participant 15, male) noted: *"Some of them* [i.e. the patients], *we do not even get to see them, because they wake up very early in the morning and go to shebeens, and they come home very late at night, and they do not even communicate with home-based caregivers, and they do not bother to go for their follow-up visits."*

3.3. Theme 3: Reluctance toward Social Support

3.3.1. Subtheme 3.1: Refusal of Social Support. Social support from family, friends, and healthcare workers plays an important role for patients on treatment, as it helps them adhere to their treatment. Patients who are supported feel encouraged to take their treatment. However, the present study shows that TB patients who abuse alcohol and use nyaope refuse social support, as they fear being reprimanded for their behavior. Most patients do not even bother to disclose their TB status, so that they receive no support.

One facility operational manager (Participant 10, female) indicated that "*These nyaope boys refuse support, even from us or their family. Some are staying on the street, and they move from one place to another, the moment we know where they* are."

Another TB focal nurse (Participant 5, male) said: *"Those nyaope boys do not disclose their status, and if their family find out that they are sick, they will rather leave home, so no one can reprimand them to stop using nyaope."*

3.4. Theme 4: Resistance to Health Educational and Counseling Interventions

3.4.1. Subtheme 4.1: Nonattendance at Health Education and Counseling Sessions. TB treatment nonadherence often results from inadequate knowledge or understanding of the disease and its treatment. Adherence to the long course of TB treatment is a complex process, which requires advanced understanding of the disease and treatment involved. During the interview, participants in the study revealed that patients who use nyaope and alcohol do not want to attend health education and counseling. They are always in a hurry to leave the healthcare facility, and, if the healthcare workers are taking long, or if the queue is too long, they complain and leave the facility. Some patients only visit the facility whenever they are feeling too sick.

One facility operational manager (Participant 6, female) stated: *"… Another challenge that we have is that some patients are mostly ignorant. They do not want any counselling and health information; they only want to collect their treatment and leave. Most of the nyaope people are very impatient."*

Another TB focal nurse (Participant 14, male) indicated: *"It is too difficult to educate them. They don't listen, because they are in a hurry to leave. Sometimes we ask if they can come with someone from their family who can better understand the information. It looks like they do not want their families to be involved, as they know they will ask them to stop taking nyaope."*

4. Discussion

According to the findings of the present study, nyaope drug and alcohol use have a negative influence on TB treatment adherence among TB patients. The results of the current research revealed that TB patients who used the nyaope drug and alcohol tended to forget to take their treatment, with some even defaulting on their treatment. Patients who used the nyaope drug and alcohol were found to be spending too much time at the shebeens, with them not having enough time to take their treatment. Another study shows that, of the TB patients who interrupted their course of TB treatment, about 47.7% were heavy alcohol drinkers [18]. According to a study that was conducted by Shruthi et al. [19], elderly patients who abused alcohol tended not to be fully compliant with long-term medication. Alcohol abuse has also been associated with forgetting to take treatment (in 7.5% of the cases) and, consequently, with defaulting from the treatment [20].

The current study further showed that TB patients who use nyaope and alcohol tend neither to honor their DOT support appointments nor the treatment follow-up visits at the CHC. The literature shows that heavy alcohol use not only influences the patients' retention in care but is also associated with missed follow-up visits, as it is not easy to monitor patients who abuse alcohol [7]. Another study shows that heavy substance use is associated with missed DOT support visits, with most multidrug-resistant TB (MDR TB) patients who consumed alcohol during treatment being found to have missed an average of 18 more intensive phase doses [21].

The present study further revealed that patients who use nyaope and alcohol tend to be too afraid to disclose their status, refusing social support when taking treatment, as they are afraid of reprimand and stigmatisation. The participants alluded to the fact that family support is important, in terms of encouraging TB patients to adhere to their treatment, especially during the intensive phase. However, according to the available literature, the fear of stigmatization causes patients to be too afraid to ask for social support, thereby reducing their treatment adherence, leading to decreased treatment effectiveness and, ultimately, to increased mortality [22].

The current research shows that patients with a substance use disorder refuse to attend health education and counseling, as they are always in a hurry to leave the healthcare facility. One study shows that being aware of the potential risk of nonadherence among patients with alcohol and substance abuse issues can enable the healthcare workers involved to undertake additional educational efforts with those patients concerned, to emphasize the importance of treatment adherence [23]. The literature shows that the patients' understanding of the disease and treatment concerned, including of the duration of the treatment and the consequences of defaulting, influences their adherence to treatment [24].

4.1. Limitations of the Study. The present study did not encompass TB patients engaging in illicit drug and alcohol use, primarily due to logistical challenges. Scheduling interviews with these individuals proved difficult, with healthcare providers noting the inherent challenges in reaching out to such patients. This exclusion hampers the study's comprehensiveness and its ability to fully capture the patient perspective. Another noteworthy limitation lies in the omission of healthcare physicians, particularly respiratory medicine specialists, from the study. However, it is important to underscore that this exclusion was a deliberate choice by the researchers. They opted to concentrate on a specific subset of healthcare providers, namely, TB focal nurses and facility operational managers. This decision aimed to narrow the study's focus, facilitating a more targeted analysis of their roles and perspectives. Including respiratory medicine specialists might have expanded the scope beyond the intended focus, potentially diluting the study's primary objectives.

As the present study focused on the perceptions of the healthcare workers regarding the influence of the nyaope drug and alcohol use on TB treatment adherence among TB patients in Limpopo Province, South Africa, the findings made in the research cannot be generalized to a broader area. However, according to Smith [25], generalizability in a qualitative study is unintentional. The current study was conducted in a predominately rural province of South Africa, so it is likely that, if those from an urban setting were to have been included in the research, it could have led to the making of different data findings.

5. Conclusions

In conclusion, this study highlights the urgent need to confront the detrimental effects of nyaope and alcohol abuse on TB treatment adherence among patients in South Africa. The evidence presented reveals how substance abuse among TB patients, particularly involving nyaope and alcohol, leads to significant challenges in maintaining treatment adherence, thereby impeding the effectiveness of TB control and prevention efforts. To address this critical issue, the study advocates for a holistic and patient-centric approach within healthcare settings.

The policy recommendation calls for the seamless integration of TB treatment services with mental health and substance abuse treatment programs. Such integration is essential for providing healthcare professionals with the requisite training to identify and respond to signs of substance abuse effectively. This includes the incorporation of substance abuse screening as a standard component of patient assessments. The establishment of operational guidelines for a collaborative effort between the National TB Elimination Program and the National Program for Tobacco Control and Drug Addiction Treatment emerges as a pivotal strategy for advancing toward the elimination of TB in South Africa [26].

A key element of the proposed integration strategy is the early screening for substance abuse, exemplified by the suggestion to implement the Alcohol Use Disorders Identification Test (AUDIT) questionnaire for all newly diagnosed TB patients. This proactive approach is designed to facilitate the early detection of patients who may be engaging in harmful or hazardous alcohol use. Identifying these individuals promptly enables the provision of further counseling and their linkage to specialized de-addiction centers, offering a comprehensive support system that addresses both their TB treatment needs and substance abuse issues.

To further bolster TB treatment efficacy, the development of targeted interventions, such as counseling services and support groups, is recommended to meet the unique needs of TB patients affected by nyaope and alcohol use. The success of these interventions hinges on robust communication and collaboration across various healthcare sectors, underscored by the formation of interdisciplinary teams. This collaborative framework aims to foster a healthcare environment that is attuned to the complex relationship between TB and substance abuse, thereby enhancing treatment outcomes and reinforcing TB control and prevention initiatives in South Africa.

Data Availability

Data is available upon request by contacting the corresponding author (hmatakanye1@gmail.com).

Ethical Approval

The study was approved by the Ethics Committee of the University Higher Degrees Ethical Committee (UHDC) of the University of Venda (SHS/19/PH/28/0411). Permission to conduct the study was obtained from the Limpopo Provincial Department of Health and concerned district offices. Furthermore, permission was obtained from the facilities' operational managers concerned.

Consent

Written informed consent, including permission for the audio recording of the interviews, was obtained from all study participants who agreed to participate.

Disclosure

The manuscript was already published as a preprint based on the link https://www.medrxiv.org/content/10.1101/2023.06.08.23291161v1.full [27].

Conflicts of Interest

The authors declare that they have no conflicts of interest.

Authors' Contributions

Hulisani Matakanye was the project leader and involved in the research instrument development, the data collection and analysis, and the writing of the article. Takalani Grace Tshitangano supervised the study and the writing of the article. Both authors have read and agreed to the published version of the manuscript.

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Supplementary Materials

Supplementary 1. Consolidated criteria for reporting qualitative studies.

Supplementary 2. Coding.

Supplementary 3. Themes and subthemes for the influence of nyaope and alcohol use on TB patients.

Supplementary 4. Coding tree for the influence of nyaope and alcohol use on TB Treatment Adherence.

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