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A DESCRIPTIVE SURVEY OF HEALTHCARE PROFESSIONALS ON TRADITIONAL COMPLEMENTARY AND ALTERNATIVE MEDICINE INTEGRATION IN PUBLIC HOSPITALS IN GAUTENG



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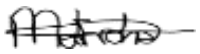
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A dissertation submitted to the Faculty of Health Science, University of the Witwatersrand, in fulfilment of the requirement for the degree of Master of Pharmacy.

Johannesburg, October 2024

Declaration

I, Mulanga Mathoho, declare that this Thesis is my own, unaided work. It is being submitted for the Degree of Master of Pharmacy at the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination at any other University.



Signature of candidate

01 day of October 20 24 in Johannesburg

Dedication

I dedicate this study to my parents, my brothers, and my sister, who have been my source of inspiration, I couldn't have done this without them.

And, I am dedicating this study to the Almighty God.

"*Trust in the LORD with all your heart, And lean not on your own understanding; In all you ways acknowledge Him, and He shall direct your paths.*" - Proverbs 3: 5-6

Presentations arising from the study

Mathoho M. Holistic healthcare: The path to Traditional, Complementary, and Alternative Medicine (TCAM) integration by pharmacists. Pharmaceutical Society of South Africa (PSSA) Southern Gauteng Branch Annual Group Meeting (AGM), 17 February 2024. [online presentation] – **Appendix A**

Publications arising from the study

Mathoho M., Shaikh, R., de Rapper-Leigh, S., Booth Z. A descriptive survey of healthcare professionals on traditional, complementary, and alternative medicine integration in public hospitals, in Gauteng [submitted March 28, 2024, to *Journal of Herbal Medicine*] – **Appendix B**

Abstract

Background: Traditional, complementary, and alternative medicine (TCAM) use varies globally. The World Health Organisation (WHO) has estimated that 80% of the African population relies on TCAM as their first healthcare source. There is thus a high estimated prevalence of TCAM use in South Africa and studies showing potential for serious interactions between TCAM and conventional medicines. A common example of a fatal interactive profile has been demonstrated between a natural product, St. John's Wort (*Hypericum perforatum*) and conventional antidepressants. Furthermore, garlic, gingko, and echinacea, are natural products that interact with conventional medicines since they can inhibit or induce cytochrome P450 liver enzymes. Medical history-taking is a vital process in the provision of healthcare, often assisting in identifying potentially such unwanted side effects or interactions.

Aim: To determine the knowledge, attitudes, perceptions, and practices (KAP) of authorised prescribing and dispensing HCPs on TCAM use among the patient population, in three public, academic hospitals in Gauteng.

Methods: A self-administered, cross-sectional survey was carried out among prescribing and dispensing HCPs working at Chris Hani Baragwanath Academic Hospital (CHBAH) in Soweto, Helen Joseph Hospital in Auckland and Charlotte Maxeke Johannesburg Academic Hospital (CMJAH). All analyses were performed using STATA version 14 (StataCorp, USA) and statistical significance was determined at the 5% level of significance. A t-test analysis, chi-square test, Spearman rank correlation, and a multiple linear regression model were used to analyse the data.

Results: A total of 233 prescribing and dispensing HCPs participated in the study surpassing the initially intended sample size of 226. However, upon analysis, only 188 responses met the inclusion criteria, of which the majority of the participants were between 18 and 30 (112, 58.9%) years of age with most respondents being females (112, 58.9%). The study identified HCP's poor knowledge (69.0%) of TCAM but positive attitudes (90.0%) towards TCAM. Most participants (104, 55.3%) in this study reported that they were aware of the prevalence of TCAM use but 98 (51.1%) participants stated that they were unaware of the potential interactions between TCAM and conventional

medicines. Participants showed a positive attitude towards TCAM incorporation in the medical curriculum and believed that TCAM incorporation into the health system would enhance patient care. With respect to practice, a few (80, 43.0%) HCPs would enquire about TCAM use during history-taking. The Spearman rank correlation revealed significant positive linear correlations between knowledge-attitudes ($p < 0.05$), knowledge-practices ($p < 0.05$), and attitudes-practices ($p < 0.05$).

Conclusion: Healthcare professionals have sub-optimal knowledge (69.0%) of TCAM and a positive attitude (90.0%) towards TCAM. There is a need for interventions to make sure that HCPs have the knowledge and tools they need to encourage the inclusion of TCAM in history- taking procedures and within the health system. Guideline recommendations are based on scientific data; therefore, there is a need for evidence-based research on TCAM. A more equitable level of healthcare can be achieved by combining several healthcare systems that now coexist in the same space.

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I would like to give thanks to my supervisors, Mrs Zelna Booth, Dr. Stephanie Leigh de Rapper, and Mrs Rubina Shaikh, for their enduring support, patience, and much-appreciated advice throughout my dissertation. Without their valuable guidance, this project would not have been possible.

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Finally, I would like to thank God. I did my best and God did the rest.

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List of Abbreviations

ADRs	Adverse Drug Reactions
AHPCSA	Allied Health Practitioners Council of South Africa
AMG	Annual Group Meeting
ART	Antiretroviral Therapy
ASU	Ayurveda, Siddha and Unani drugs
ATM	African Traditional Medicine
AYUSH	Ayurveda, Yoga and Naturopathy, Unani, Siddha and Homeopathy
CAM	Complementary and Alternative Medicine
CCIM	Central Council of Indian Drugs
CM	Complementary Medicine
HCPs	Healthcare professionals
KAP	Knowledge, Attitudes, Perceptions and Practice
LMIC	Low-and Middle-income
NHRD	National Health Research Database
NMPA	National Medical Products Administration
NPC	National Pharmacovigilance Centre
OTC	Over-The-Counter
PHC	Primary Health Care
PSSA	Pharmaceutical Society of South Africa
PV	Pharmacovigilance
SAHPRA	South African Health Products Regulatory Affair
SAPC	South African Pharmacy Council
T&CM	Traditional and Complementary Medicine
TCAM	Traditional, Complementary, and Alternative Medicine
TCM	Traditional Chinese Medicine
TCMPB	Traditional Chinese Medicine Practitioners Board
THC	Traditional Healers Council
THPs	Traditional Health Practitioners
TIM	Traditional Indian Medicine
TM	Traditional Medicine

USA	United States of America
WHO	World Health Organisation
WHO-UMC	World Health Organisation - The Uppsala Monitoring Centre

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CHAPTER 1: INTRODUCTION

1.1. Study background

The means of responding to health issues differ among individuals, which may encompass either the use of traditional, complementary, and alternative medicine (TCAM) practices alone or with allopathic treatments (Yuan et al., 2016). In allopathic health-seeking behaviours, pharmaceutical medication can be self-initiated therapy or following consultation with a conventional healthcare provider. The use of health systems outside of the standard conventional therapy includes consultations with complementary and alternative medicine (CAM) specialists, traditional medicine practitioners, diviners, spiritualists, or muthi market traders, often resulting in guidance to make use of medicinal herbal products, minerals, or animal-based products. Additionally, these remedies may be completed with practices such as massage, meditation, prayers, and rituals to mention only a few (Ndu et al., 2022).

Medicine amongst the public is most often associated with hospitals, pharmacies, and conventional healthcare professionals, however non-allopathic therapies were of relevance far before the allopathic health system arose (Lindiwe et al., 2024). Traditional medicine (TM) has gone through different stages of evolution, which Chike Ekeokpara, a professor in thedepartment of religious and cultural studies described as a process of trial and error: *"It is quite probable that man as soon as he has reached the stage of reasoning, foundout through the process of trial and error that plants can be used as food, that some might be poisonous and may lead to death when eaten while some had medicinal valueand power"* (Obika and Eke, 2019). Due to widespread accusations of witchcraft committed by colonists against traditional healers during colonization, the practice of TM was prohibited throughout much of Africa (McFarlane, 2015).

The TCAM framework is described as all medicines or healing practices that fall outside of the standard, biomedical healthcare models combining both TM and CAM. Traditional medicine specifically is defined as *"the use of theories, beliefs, and native experiences from different cultures, in the maintenanceof health as well as in the prevention, diagnosis, improvement or treatment of physicaland mental illness"* (Booth and van Vuuren, 2023) (World Health Organization, 2019). Complementary and alternativemedicines refer to a wide range of healthcare products and techniques, that are not part of a country's TM framework and are not fully incorporated into the mainstream, conventional healthcare systems either. Complementary medicine (CM) refers to medicines used together with standard treatments; whilst alternative medicine refers to practices used instead of standard care (Keene et al., 2019; World Health Organization, 2019).

People often perceive TCAM as treatment from traditional health practitioners (THPs) (diviners, herbalists, traditional birth attendants, and traditional surgeons) but this is not limited to the above-mentioned (Mothibe and Sibanda, 2019). Additionally, TCAM includes: treating a cold or flu with lemon, ginger, and honey (Chiru et al., 2020); chamomile tea for menstrual pain and sleep disorders (Murtiningsih et al., 2022); turmeric and cinnamon to treat minor skin infections and digestive issues (Fadhlizil, Moyeenul Huq and Akil, 2022); and receiving a massage or doing yoga to relieve stress or manage pain (Miake-Lye et al., 2019; Gupta et al., 2022).

Today, TCAMs are widely used and are becoming increasingly popular around the world (James et al., 2018). An estimated one-third of the population in the United States of America (USA) makes use of TCAM. European countries have prevalence rates of TCAM use among its population ranging between 20% and 50% (James et al., 2018). A report by the World Health Organization, (2019) highlights that more than 80% of the populationin developing countries, including South Africa (SA), make use of TCAM as their mainsource of healthcare. The high prevalence of use can be attributed to TCAM accessibility, availability, and affordability being more favourable than that of conventional medicine, particularly for those accessing healthcare in the overburdened public sector (World Health Organization, 2019).

1.1.1. Understanding treatment modalities: Traditional Medicine and Complementary and Alternative Medicines

Traditional medicine incorporates animal-, plant- and mineral-based medicines, spiritual therapies, manual therapy techniques, and exercises, applied singularly or in combination to treat, diagnose and prevent illnesses or maintain well-being (Tesfahuneygn and Gebreegziabher, 2019; Ebhomienlen, 2020; Rebellow, 2022), whereas, CAM encompasses a variety of treatment methods such as 1) Body therapies (e.g., Chiropractic, Osteopathic medicine, yoga, Tai Chi, massage therapy and cupping), 2) Diets and herbs (e.g., Dietary supplements herbal medicine, and nutrition/diet), 3) External energy (e.g. Electromagnetic therapy, Reiki, and Qigong, 4) Mind (e.g., Meditation, biofeedback, and hypnosis), 5) Senses (e.g., Art, dance and music; and visualization guided therapy), and 6) Whole medical systems (e.g., Naturopathic Medicine, Acupuncture, and Homeopathy) (Johns Hopkins Medicine, 2019; National Cancer Institute, 2023).

The two health systems share vast similarities, as well as comparable differences (**Table 1.1**). The similarities between these practices include accessibility, availability, and affordability (Lee et al., 2022); the perceived safety of both forms of treatment based on their 'natural' classification (Agu et al., 2019); both healthcare systems are based on superstition rather than being thoroughly understood or grounded in scientific knowledge (Adu-Gyamfi and Anderson, 2019; Mothibe and Sibanda, 2019), and that neither have been fully regulated in SA as yet, as both practices fall outside of the standard care of treatment currently offered (Lee, Harrison and Barnes, 2021). **Table 1.1** summarises the differences between TM and CAM. These differences include scientific backing, its integration within the health system, and transmission of knowledge to mention only a few.

Despite the comparable differences and similarities of these health approaches, the goals of each are the same. Both healthcare systems employ a range of techniques and procedures to treat and prevent disease in a holistic manner (Youn et al., 2022). The merging of the various healthcare systems that now coexist in the same environment will assist in getting a more balanced level of healthcare, further evidence is needed to confirm this outcome.

Table 1.1: Differences between TM and CAM.

	Traditional Medicine	Complementary and Alternative Medicine
1	There is a lack of scientific backing (Mothibe and Sibanda, 2019; Gakuya et al., 2020).	Some treatments are scientifically tested (Kemppainen et al., 2018).
2	It is deeply intertwined with religious beliefs, cultural practices, and community norms, indicatingthat its principles and treatments often stem from the collective wisdom, spiritual teachings, and societal values of a particular religious or cultural grouping (McFarlane, 2015; Marques, Freeman and Carter, 2021; Hudtohan and Zhang, 2022; Mwaka et al, 2023).	It lacks ties to religious beliefs, ancestral traditions, but has alignment of sociocultural, beliefs and needs (Frisch and Rabinowitsch, 2019; Tangkiatkumjai et al,2020).
3	Involves the transmission of knowledge from one generation to the next through oral or written means, often with an element of secrecy surrounding certain practices or information. This knowledge, deeply rooted in indigenous cultures, isguarded and preserved within communities (Che et al., 2017).	Information is freely shared among practitionersand accessible to the public, reflecting a different approach to knowledge dissemination and a greater emphasis on openness and collaboration (Steinhornet al, 2017; Frisch and Rabinowitsch, 2019).
4	It has not been thoroughly integrated or acceptedwithin modern healthcare systems (Street et al., 2019).	It is more integrated or accepted within modernhealthcare (Steinhorn et al, 2017).
5	Becoming a TM practitioners often involves a morecomplex process deeply rooted in cultural and community traditions – practitioners get a calling/learn from elders through practical training and observation (Mwaka et al, 2023).	There are generally fewer formal requirementsor regulatory barriers for individuals to becomeCAM practitioners (Pokladnikova and Telec, 2020).
6	Adopts a holistic approach, focusing on treating thepatient rather than merely addressing the symptoms or disease (Rizvi et al., 2022).	Also emphasizes holistic principles, the extent towhich it focuses on treating the patient rather than the disease may vary depending on the specific modality or practitioner, with some CAM practitioners placing greater emphasis on symptom management (Frisch and Rabinowitsch, 2019).

1.1.2. The use of TCAM for the treatment or prevention of diseases

Globally, non-communicable diseases account for 71.0% of deaths, with low- and middle-income (LMIC) nations accounting for 85.0% of these deaths (Bennett et al., 2018). Additionally, in low-income countries and marginalized groups, communicable diseases are one of the primary causes of mortality and disability (Agrebi and Larbi, 2020). Chronic, non-communicable illness prevalence is steadily adding to Africa's disease burden and straining healthcare systems already under pressure from the high incidence of infectious diseases (Idriss et al., 2020). Traditional, complementary, and alternative medicine is expected to play a significant role in the health and well-being of people who suffer from chronic and infectious diseases in Africa, given the substantial TCAM use for chronic health disorders that have been recorded (Peltzer and Pengpid, 2019). The usage of TCAM products has been associated with two or more chronic diseases (Peltzer and Pengpid, 2019). Furthermore, TCAM has been employed in the treatment of common diseases in Africa in healthcare, which includes:

a) HIV/AIDS - using ginger (*Zingiber officinale*), garlic (*Allium sativum*), Moringa (*Moringa oleifera*), African potato (*Hypoxis hemerocallidea*), acupuncture and massages (Mncengeli, Manimbulu and Panjasaram, 2016; Shiferaw et al., 2020);
b) Tuberculosis treatments with African wormwood (*Artemisia afra*), garlic; Astragalus (*Astragalus membranaceus*); Rhodiola (*Rhodiola rosea*); homeopathy; and acupuncture (Mangwani, Singh and Kumar, 2020; Obakiro et al., 2020);
c) Cancer treatment includes ginger (*Zingiber officinale*), Moringa (*Moringa oleifera*), Aloe (*Aloe vera*), Avocado leaves (*Persea americana*), yoga, and acupuncture (Kuruppu, Paranagama and Goonasekara, 2019; Hill et al., 2022) and
d) Cardiovascular disease treatment includes Moringa (*M. oleifera*), lime (*Citrus aurantiifolia*), Asteraceae, black pepper (*Piperaceae*), cinnamon (*Cinnamomum verum*), green tea (*Camellia sinensis*), meditation techniques, and acupuncture (Decena et al., 2022; Gürdal and Yesin, 2022).

The above-mentioned are a few examples where natural plant products that are used solely for medicinal purposes. Traditional, complementary, and alternative medicine covers a wider spectrum of treatment than the aforementioned, which includes the treatment of acute conditions and very often infectious diseases and associated symptoms (Ghaedi et al., 2017; Rizvi et al., 2022). Of concern for combination use with conventional therapies, is that of herbal TCAM product consumption. The use of herbal TCAM products is widespread throughout the world. Herbs are a complex mixture of phytochemicals that have pharmacological activity, as opposed to conventional medications, which are isolated, well-researched substances (Vitale et al., 2022). As a result, the likelihood of drug-herb interactions is considerably higher than that of drug-drug interactions (Mouly et al., 2017). Despite the fact that conventional medications are derived from plants, isolated compounds are used and not the crude form of the plant (Nasim et al., 2022). As a result, their interactions with any other drugs are better understood and controlled. Traditional, complementary, and alternative medicine, on the other hand, use the crude form which has a mixture of compounds and therefore, increasing the chances of interactions with other medicines as compared to conventional medicines which are more standardize and refined (Surana et al., 2021). This is crucial for patients who regularly use multiple medications and have chronic illnesses, as these patients are at a higher risk of interactions.

In 2020, WHO declared COVID-19 a global pandemic. A majority of people turned to TCAM to allegedly treat or prevent COVID-19 (Cucinotta and Vanelli, 2020). In South Africa, there was an increase in the demand for a TM named *Artemisia afra*, commonly referred to as "*umhlonyane*" in IsiZulu. It was sold in the traditional markets available in Johannesburg and street sellers (Wild, 2021). This plant is known to treat various disorders including fever, headache, malaria, and loss of appetite (du Toit and van der Kooy, 2019). Giving that TCAM plays a role even in today's healthcare frameworks, amongst people suffering from infectious and chronic diseases, suggests that TCAM can no longer be ignored in the modern healthcare sphere.

1.1.3. Drivers and barriers associated to the use of TCAM

Patients are now more knowledgeable about their health, and make use of newspapers and magazines, television, the internet, friends, and family to obtain information on

which to base their medical choices (Bujnowska-Fedak et al, 2019; Jia et al, 2021). The drivers of TCAM include accessibility; affordability; perceived safety because TCAMs are thought to be more natural; diversity; flexibility and alignment with sociocultural, beliefs and needs (Tangkiatkumjai et al., 2020; Chatterjee, 2021; Ezekwesili-Ofili and Ogbonna, 2022). Additionally, dissatisfaction with conventional medicine; inadequate medical facilities; a lack of drugs; access issues; the attitudes of medical staff; and prolonged waiting periods are further motivators for TCAM use in patients (Welz et al., 2018; Muia, 2020; Ezekwesili-Ofili and Ogbonna, 2022).

Apart from the drivers of TCAM use, there are also barriers to TCAM use. The common barrier to TCAM use is the lack of scientific evidence in support of its application. Followed by obstacles to training such as a lack of specialized research training for TCAM disciplines (Mao et al., 2022). This is due to TCAM and bio-medical fields hold different epistemological and philosophical views, and many TCAM disciplines are reluctant to do evidence-based research. Additionally, in clinical practice - a lack of incentives and time, financial disincentives, the need to ensure financial survivability, and a lack of a research culture are all factors affecting CAM practitioner engagements (Veziari et al., 2021). Other reasons for the barrier to TCAM use includedunhygienic procedures of the preparation of TCAM products which could lead to contamination, inappropriate dose administration and consistency thereof which could lead to administering dosages that are significantly high or low for the intended outcome; unregulated TCAM practitioner practice, religious beliefs, and lack of education and proper training of practitioners (Ahwinahwi and Chukwudi, 2016; James et al., 2018).

1.1.4. Integrative medicine systems

The term *integrative medicine* refers to medical systems that combine conventional medical treatments with complementary and alternative therapies to address patient's physical, emotional, and spiritual needs (Ng et al., 2023). Integrative medicine systems prioritize a holistic approach to healthcare, focusing on the whole person rather than just the symptoms or disease, aiming to provide personalized and comprehensive care (Kalariya et al., 2023). However, it is important to note that while some aspects of these systems have been validated by scientific research, others may lack robust evidence and require further study (Steinhorn et al, 2017).

With the high estimated prevalence of use, the WHO has implemented strategies for conventional healthcare facilities and HCPs to be more cognisant of TCAM. The South African government implemented initiatives aimed at aligning with the WHO TM Strategy 2014 - 2023, to facilitate the integration of TCAM in conventional healthcare setting processes. The first WHO global summit took place in August 2023. This strategy aimed to promote the safe and efficient use of Traditional and Complementary Medicine (T&CM) through the regulation of products, practices, and practitioners, as well as to support Member States in recognizing T&CM's potential value to wellness, health, and person-centered healthcare. Three strategic objectives were put into practice in order to achieve these goals: (1) laying a foundation for knowledge and developing national policies; (2) regulation: improving safety, quality, and efficacy; and (3) supporting the advancement of universal health coverage by integrating T&CM within the health systems (Cramer, 2023). The South African Health Products Regulatory Affair (SAHPRA) has also recognised the need for the SAHPRA's regulation and registration of TCAM, further supporting recognition of TCAM as a legitimate form of healthcare.

1.1.5. Role of pharmacists in the integration of TCAM

It is the role of pharmacists to ensure the safety and efficacy of pharmaceutical drugs and this should also include the safety and efficacy of TCAM products. The following are future roles that pharmacists can play in the integration of TCAM:

a) **Education and counselling**: In order to assist patients to make well-informed choices, pharmacists can provide them with information regarding TCAM options, such as dietary supplements, herbal medicines, and alternative therapies (Harnett and Lam Ung, 2023).
b) **Quality Assurance**: Pharmacists are able to ensure the efficacy, safety, and quality of TCAM medications by confirming product labelling, and monitoring for any potential TCAM-drug interactions (Harnett et al., 2023). Because TCAM pharmaceuticals are readilyavailable to the general population at the pharmacy as over-the-counter (OTC)drugs, pharmacists are in an ideal position to provide patients with support whenneeded (Ung et al, 2017). When pharmacists neglect to warn patients about potential interactions with TCAM and conventional

medicine, it isunethical because the patients could be adversely affected while utilizing TCAMproducts (Mwaka et al., 2019).

c) **Integration with Conventional Medicine**: In order to ensure the safe and efficient use of both conventional medicine and TCAMs, pharmacists can assist in integrating TCAM into patients' overall treatment plans (Harnett et al., 2023). Pharmacists can collaborate with other conventional HCPs and other THPs in this regard. Additionally, engage in interprofessional dialogue (Harnett et al, 2023).

d) **Monitoring and Follow-up**: In order to achieve optimal results, pharmacists are able to monitor how well patients are responding to TCAM treatments, follow up with patients who are making use of conventional and TCAM, provide counseling to patients using dual healthcare practices, follow up to assess for TCAM-drug interactions and encourage patients to report ADRs and provide follow-up care, and modify their treatment plans as necessary (Shraim et al., 2017). Additionally, pharmacists can collaborate with field experts in TCAM phytochemical analysis.

e) **Research and Evidence-Based Practice**: For the purpose of promoting evidence-based practice, pharmacists may engage in TCAM research by assessing the modalities' safety, efficacy, and potential interactions with prescription drugs. It is essential that pharmacists have a thorough understandingof TCAM to be able to provide productive discussion and effective disclosure on TCAM (Gall et al., 2019). Among other things, safeguard the community's general health by establishing appropriate management that is based on the best available data (Mwaka et al., 2019). Pharmacists should take the initiativeto establish and actively participate in numerous research projects involving TCAM (Kwai Ping, 2015).

f) **Developing a tool for clinical decision-making**: Formularies developed by pharmacists of interactive profiles of TCAM with conventional medicine (Rahayu et al, 2022; Mayoka and Cheuka, 2023). Research; ADR reports from the health facilities and collaboration with THPs serve as the baseline to gather information for developing a tool for clinical decision-making to determine the efficacy and safety of TCAM. The Department of Health; SAHPRA; SAPC and HPCSA are health regulatory bodies that have the right to implement this tool.

1.1.6. Potential benefits to TCAM integration with conventional healthcare systems

The integration of TCAM with conventional healthcare systems offers several potential benefits:

a) **Holistic Approach**: Providing patients with more comprehensive and personalized care (Wong et al., 2022).

b) **Expanded Treatment Options**: Patients have access to a broader range of treatment options.

c) **Patient-Centred Care**: TCAM integration can empower patients and healthcare professionals to collaborate to explore diverse treatment modalities and participate in shared decision-making (Word Health Organisation, 2023).

d) **Preventive Health Promotion**: Integrating TCAM into conventional healthcare systems can support efforts to prevent disease (Seetharaman et al, 2021), reduce healthcare costs, and improve population health outcomes.

e) **Cultural Competency**: Integrating TCAM into conventional healthcare systems demonstrates cultural sensitivity and promotes inclusivity by acknowledging and respecting patients' cultural beliefs and practices (Word Health Organisation, 2023).

f) **Research and Innovation**: Integrating TCAM with conventional healthcare systems can facilitate research collaborations and innovation in healthcare delivery. By studying the efficacy, safety, and cost-effectiveness of TCAM modalities, researchers can contribute to evidence-based practice and advance integrative healthcare approaches (Ashrafizadeh and Rassouli, 2024).

Overall, the integration of TCAM with bio-medical healthcare system offers the potential for improved patient care, achieving better medical outcomes, and encouraging greater inclusivity and cultural competency in the provision of healthcare. But it's crucial that the integration is done cautiously, considering patient preferences, safety, and efficacy into account, and that it's backed by solid research and evidence-based practice.

1.1.7. Potential interactive profiles with dual health system use

The undertaking of a full patient medical history review during any consultation in a conventional healthcare facility, is common practice to determine a diagnosis, along with factors that may be impacting patient health outcomes (Kelak, Cheah and Safii, 2018). A pharmacist's medical history-taking involves enquiry of past and current use of medicinal products, which is most often broadly worded as "other medicines". This can be a threat to therapeutic outcomes, as patients often relate the term "medicine" to conventional products received in hospitals, clinics, or pharmacies only, with TCAM products neglected to be mentioned. It has been reported that should a patient not directly be questioned specifically on their use of supplements, vitamins, or TCAMs, they are highly unlikely to disclose that use (Kelak et al., 2018). These aforementioned medicines are considered natural products which carry the connotation of safety. As such, these products often are not regarded as medicines ordrugs that could interact with any prescribed and dispensed conventional medicines amongst patients, hence not causing concern about the implications of non-disclosure. This can easily be disputed with studies that have identified potential interactive profiles between natural products and conventional medicines, some of which may prove fatal (Borse et al., 2019; Rombolà et al., 2020; Suroowan et al., 2021).

There are many *in vitro* studies surfacing on TCAMs being undertaken to scientifically evaluate efficacy (Sharma et al., 2017; Cheng, Hsieh and Tsai, 2018; Moghadam et al., 2020). Many studies are also focusing on uncovering potential interactive profiles between TCAM and conventional medicines (Borseet al, 2019; Rombolàet al., 2020; Suroowanet al, 2021). The active ingredients in natural products can contain potent chemicals which may interact with conventional medicines and according to studies, these products pose the same risks as other pharmacologically active drugs (Wainwright et al., 2022). A common exampleof a fatal interactive profile has been demonstrated between selective serotonin reuptake inhibitors (commonly prescribed and dispensed conventionalantidepressants) with a natural product, St. John's Wort (*Hypericum perforatum*), used as a TCAM, for its anti-depressive, antitumor, and antiviral activity (Dobrek and Głowacka, 2023). The neurotransmitter serotonin is increased by St. John's Wort. Serotonin syndrome occurs when it is used with conventional antidepressants (SSRIs) (Dobrek and Głowacka, 2023). If not handled immediately, this interaction can be dangerous. Other examplesinclude garlic, gingko, and echinacea, these natural products inhibit or induce cytochrome P450 enzymes (Ramos-Esquivel et al, 2017). There is a need to understand the mechanism of TCAM-

conventional drug interactions,understanding their pharmacokinetics, because these herbal medicines may interfere with the absorption, distribution, metabolism, and excretion of conventional drugs (Borse et al, 2019). The simultaneous use of TCAM with conventionalmedicines thus may enhance or oppose the effect of conventional drugs, affecting patient therapeutic outcomes.

The potential interactive profiles with dual health system use motivates the need for conventional HCPs to be more cognisant of TCAM use among their patients (Olbara et al., 2018) and warrants further investigation as to interventions that are necessary to facilitate a safe integration (Street et al., 2019). Furthermore, potential interactive profiles (Wolf et al., 2022; Rasheed, Ahmed and Sharma, 2024) between the two forms of healthcare justifies the need for research-driven to develop scientifically validated formularies or clinical decision-making tools to be consulted by HCPs. Furthermore, through more TCAM-inclusive approaches in conventional health settings, previously unnoticed or misrepresented adverse drug interactions may be identified correctly as TCAM-conventional medicine interactions for reporting purposes. A HCPs should know and comprehend the different interactions that might occur between TCAM and conventional medicine use by patients.

1.2. Problem statement

History-taking is a crucial step for prescribing and dispensing HCPs when evaluating a patient. Furthermore, it assists in identifying potentially unwanted side effects or interactions. Medical history-taking involves enquiry of past and current medications, which commonly only includes conventional medicines (Alrasheedi, 2018; Kobayashi and Ono, 2024). Traditional, complementary, and alternative medicines are considered natural products which carry the connotation of safety (Ng et al., 2016). As such, these products often are not regarded as medicines or drugs that could interact with any prescribed and dispensed conventional medicines and could possibly cause life-threatening interactions for the patient. This is worrisome, as many HCPs often exclude enquiry of TCAM use during history-taking practices before prescribing, administering, or dispensing conventional drugs. The main concern for patients' lack of disclosure of making use of TCAM was due to doctors' lack of understanding of the risks, benefits, and scientific data of herbal medicines, inexperience, - and incompetence, therefore,

causing patients to be unwilling to divulge their use of TCAM due to the belief that the physician is not well informed of these practices or will criticize about these practices (Kelak et al, 2018).

South Africa's Guidelines for patient history-taking and patient file records including the good pharmacy practice; national essential medicines list-standard treatment guidelines; WHO guidelines on rational use of medicines; and Health Professions Council of South Africa ethical guidelines to mention just a few are not inclusive of TCAM use. There is a need to address TCAM challenges to dual health system use and to address TCAM barriers including the knowledge, attitudes, perceptions, and practices (KAP) of HCPs; the regulatoryframework of TCAM; and the education and training of TCAM for HCPs. The aforementioned can assist with the challenges of dual system use and integration systems when treating patients.

1.3. Purpose of the study

Particularly since SA has such a high estimated prevalence of TCAM use, thelikelihood for patients to be presenting to conventional healthcare settings, already making use of TCAM, infers high probability. This is worrisome, as there are studies indicating possible serious TCAM-conventional drug interactions (Wolf et al., 2022; Rasheed et al., 2024).

Due to evidence exposing potentially harmful TCAM-conventional drug interactions, along with the estimated high prevalence of TCAM use in SA, TCAM is progressively being recognized as an important part of the modern healthcare sphere in SA. Therefore, the data collected from thisstudy will help determine the KAP of the prescribers and dispensers of conventional medicines on TCAM use among their patients in public, academic hospitals. This studywill further determine the current practices of prescribers and dispensers in relation toTCAM use among their patients. Information arising from this study will provide some insight into the need for interventions to ensure that conventional HCPs are equippedwith the necessary training and resources to motivate for history-taking practices to bemore inclusive of TCAM.

1.4. Research Questions

What are the levels of knowledge, attitudes, perceptions and current prescriber and dispenser practices in relation to TCAM in tertiary hospital settings in Gauteng?

1.5. Aim and Objectives

The aim of this study was to determine the KAP of prescribing and dispensing HCPs on TCAM use among patients in public, academic hospitals in Gauteng. The above aim will be achieved through the following objectives:

1. To determine, using a self-administered questionnaire, the knowledge of prescribers and dispensers on TCAM as a healthcare system and its potential implications when combined with conventional medicine.
2. To determine, using a self-administered questionnaire, the attitudes and perceptions of prescribers and dispensers on TCAM and its legitimacy as a form of healthcare, its integration into biomedical systems, and challenges or hesitancies related to this integration.
3. To determine, using a self-administered questionnaire, the current prescriber anddispenser practices in relation to TCAM, current undertaking of medical patienthistory, and their use of clinical decision-making tools.

The above aim and objectives will be met through a survey methodology study design.

CHAPTER 2: LITERATURE REVIEW

This chapter provides a summary of a literature review to determine the extent of existing studies on the integration of conventional and TCAM systems globally and to determine commonly recorded challenges to dual health system use and integration of healthcare systems when treating patients in the biomedical field. Section 2.3. provides recommendations that would encourage TCAM incorporation and recognition in SA, through the identification of challenges and potential means to attend to such.

2.1. Introduction

2.1.1. Traditional medicine

Traditional medicine is a medical practice, transferred from one generation to another, in writing but more commonly shared verbally (Ebhomienlen, 2020). Traditional medical practices encompass many branches. Healthcare practices are influenced by personal values, health philosophies, beliefs, knowledge and perceptions, sociological values, and religious backgrounds that are prevalent in that community. When seeking healthcare, members of the community take into account affordability, accessibility, and availability (Gyasi et al., 2016; Chali et al, 2021). The majority of TM systems incorporate substances that are herbal and are often sourced from the immediate environment (Sharma et al., 2020). Traditional medicine practitioners rely heavily on their knowledge of local plants and herbs to be used in treatment plans, often supplemented with spiritual practices, which have evolved over many years (Heinrich et al., 2017). Considering that the environment has a significant impact on how traditional knowledge is developed, climate change creates a great threat to TM practices; as it influences the types of plants practitioners can use locally and affects the constituency of phytochemicals (Robinson et al., 2021). Traditional medicine practices are often classified by geographical area, with the most widely known as African traditional medicine (ATM), traditional Chinese medicine (TCM), and traditional Indian medicine (TIM), where Ayurveda proves most prevalent (Abrams et al., 2020). **Table 2.1** outlines the principles of each of the most prevalent traditional medical systems.

Table 2.1: An overview of prominently practiced traditional medical systems practiced globally.

African Traditional Medicine (ATM)	Traditional Chinese Medicine (TCM)	Traditional Indian Medicine (TIM)
A system originating from Africa, which is a form of holistic healthcare system organized into three levels of specialty, namely divination,spiritualism, and herbalism. It provides healthcare based on culture, religious background, knowledge, attitude, and beliefs that are prevalent in the African community (Ndubisi and Kanu, 2021).  *Note. Image generated using freepik tool*	A system originating from China based on the belief that qi (the body's vital energy) flows along meridians (channels) in the body and keeps a person's spiritual, emotional, mental, and physical health in balance. It aims to restore the body's balance between two forcescalled yin and yang (Huang Wei Ling, 2018).  *Note. Image generated using freepik tool*	A system originating from India in which the goal is to cleanse the body and restore balanceto the body, mind, and spirit. It uses diet, herbalmedicines, exercise, meditation, breathing, physical therapy, and other methods (Ehrlich and Dhru, 2020).  *Note. Image generated using freepik tool*

2.1.2. Complementary and alternative medicine (CAM)

The definition of CAM varies widely; with recent literature defining CAM as a group of diverse medical systems, practices and products that fall outside of mainstream healthcare, known as conventional healthcare or the biomedical healthcare system. These interventions are sometimes used simultaneously with (complementary to) conventional healthcare, or instead of (alternative to) conventional healthcare (Kristoffersen et al., 2018). The definitions; terminology, classification, products, and practices included under TM and CAM are continuously evolving and vary across different studies (Lee et al, 2021). Complementary and alternative medicine encompasses a variety of treatment methods such as chiropractic care, biofeedback, art therapy, hypnosis, prayer, specialdiets, and therapeutic touch in addition to systems like Ayurvedic medicine that focus on integrating the mind, body, and spirit (Marshall, 2020). Of concern for combinationuse with conventional therapies, is that of herbal TCAM product consumption.

2.1.3. Prevalence of TCAM use

For millennia, people have applied TCAM-derived remedies for healing, resulting in the recognition of TCAM as one of the world's oldest and most diverse medical systems (Vellingiri et al., 2020). The use of TCAM has sparked increased interest around the world due to its availability, accessibility, and affordability (Agbor and Naidoo, 2016). According to Seetharaman et al., (2021), globally, there has been a notable surge in both public interest and utilization of TCAM. Nearly 50.0% of people in developed countries – the United States, 42.0%; France, 49.0%; Australia, 48.0%; and Canada, 70.0% -as well as comparable or higher percentages in developing nations-India, 70.0%; China,40.0%; Chile, 71.0%; Colombia, 40.0% and up to 80.0% of people in Africa use some kind ofTCAM (Haque et al., 2018). A study undertaken in a tertiary care centre in Kerala, India, showed that TCAM use increased from an estimated 25% in the 1970s and 1980s to over 32.0% in the 1990s and 49.0% after 2000 (Sarada et al., 2021).

The most commonly used TCAM products or procedures were traditional herbs (48,8% - (Opiyo, 2018); 79,5% - (Muoka, 2018); 56.0% - (Hill et al., 2022); faith-based healing

(48,8% - (Opiyo, 2018); 85,2% - (Hill et al., 2022); 64% - (Hill et., 2022)) and massage therapy (89.3% -(Muoka, 2018)). A study revealed that the overall TCAM utilization was 84.0%, and 60.0% of the patients mentioned that they used TCAM in combination with conventional cancer treatments (Hill et al., 2022); 52.7% was the prevalence of TCAM use amongst patients with type II Diabetes mellitus (Muoka, 2018) and the prevalence of simultaneous use of TCAM and antiretroviral therapy (ART) was 36.6% (Opiyo, 2018). According to a systematic review of studies looking at TCAM use among general populations in 15 developed or developing countries, the prevalence of using one or more TCAM approaches over the course of a year ranged from 9.8% to 76.0%, and the prevalence of seeing one or more TCAM practitioners over the course of a year ranged from 1.8% to 48.7% (Lee et al, 2021).

With TCAM widely used globally, the importance of integrating TCAM within the conventional health system should be a priority to ensure holistic treatments for all patients and the prevention of any harmful interactions. The two healthcare systems' integration is anticipated to be challenging. To fully integrate TCAM within the healthcare system, challenges that affect TCAM implementation need to be identified and overcome. In Nsaghaet al. (2020) and Ezekwesili-Ofili and Ogbonna (2022) view, understanding the social and cultural foundations of each medical system as well as the complexity of the system as a whole is necessary for the integration of the two systems.

2.2. The challenges of healthcare integration

2.2.1. Knowledge, attitudes, perceptions, and practice of HCPs on TCAM

Several studies have shown that HCPs display little or no knowledge of TCAM (Saha et al., 2017; Kisaakye, 2020; Zeighami and Soltani-Nejad, 2020; Alehegn et al., 2022). This inadequate knowledge is a limiting factor in integrating TCAM within conventional healthcare practices (Kisaakye, 2020) and indicates that HCPs are unlikely to recognize or be aware of their patients use of TCAM as part of their treatment (Gallet al., 2019). A study conducted Gall et al., (2019) aimed to explore the views of healthcare providers' concerning TCAM usage, disclosure/non-disclosure of traditional and CAM by Indigenous cancer patients. The study revealed that the reasons for the lack of knowledge was that HCPs lacked the time to research the data or believed TCAM medicine was outside the scope of their responsibilities, which further widened

the gap between the two healthcare systems. However, HCPs were willing to learn about TCAM if it benefits the patients (Aizuddin et al., 2022). Healthcare professionals showed a positive attitude towards TCAM (Alehegn et al., 2022; Soltanipour et al, 2022) because of the inquiries from patients about TCAM; widespread advertising on TCAM, and the increased use of TCAM by patients for various ailments (Soltanipouret al, 2022). Whereas some studies reported a negative attitude (Gurgel et al., 2021; Aizuddin et al., 2022) and this was mainly due to the lack of scientific evidence, lack of training on TCAM, lack of scientific platforms to source information on TACM, lack of regulatory framework, and lack of experience (Kisaakye, 2020). A study conducted in SA (van Rensburg et al, 2020)and another conducted in Trinidad and Tobago (Bahall and Legall, 2017) found that over half of the participants said they had enquired about CAM use when obtaining a patient's history and that they would be willing to refer them to a CAM practitioner.

2.2.2. Knowledge, attitudes, perceptions, and practice of patients on TCAM

TCAM is widely used by patients despite not being incorporated into the health system. Patients use TCAM because they are readily available, cheaper, they are accessible, TCAMs success in treating their minor or chronic illnesses, has cultural norms, the belief that TCAM products have fewer side effects and are safe; and lack of trust in conventional medicinal products (Raja et al., 2019; Letlhogile et al., 2020). However, a study conducted on patients in Brunei Darussalam suggests otherwise. This study showed that TCAM was perceived to be less effective and unsafe than conventional medicine and patients believed that its use should be kept under observation (Sufrianet al., 2021). Access and social norms seem to influence the first choice of treatment, whereas the success of the treatment determines whether TCAM or conventional medicine is used in the future (Hill et al., 2019). Studies demonstrate good patient knowledge of TCAM and their main source of TCAM information was from friends, family, and mainly the internet (Agu et al., 2019; Agu et al 2020; Stub et al 2020). Furthermore, studies also demonstrated a positive attitude and perception of patients towards TCAM because a minority reported side effects and encountered minor adverse effects (Sufrian et al., 2021; Stub et al., 2020; Rinihapsari et al., 2021). A study done in Nigeria to assess theKAP of TM showed that 82% of the participants would be supportive of TCAM clinics opening in primary healthcare facilities (Ohemu et al., 2021). The majority of the studies reported high usage of TCAM along with

conventional medicine without the HCP's advice (James et at., 2018; Lee et al., 2022). It revealed that patients thought that disclosing totheir HCP was crucial. The main concern was the doctors' lack of understanding of therisks, benefits, and scientific data of herbal medicines, inexperience, - and incompetence, therefore, causing patients to be unwilling to divulge their use of TCAMdue to the belief that the physician is not well informed of these practices or will criticizeabout these practices (Kelak et al, 2018). Healthcare professionals shouldeducate patients on the proper dosage of TMs, be informed of the usage of TCAM, and take into account the possibility of drug interactions caused by the use of TCAM during history-taking and treating patients. Barriers including HCPs training on TCAM, lack of research on TCAM, and HCPs perceptions limit HCPs to do the above-mentioned.

Patients use TCAM because they are readily available and cheaper; a belief that TCAM products have fewer side effects and are safe; lack of trust in conventional medicinal products and family and friends were the main source of TCAM information (Rajaet al., 2019; Letlhogile et al, 2020). However, a study conducted on patients in Brunei Darussalam suggests otherwise. This study showed that TCAM wasperceived to be less effective and unsafe than conventional medicine (Sufrian et al., 2021). A study conducted to evaluate the KAP of Botswana patients showed that most of the participants would not use TCAM with other medicines however the majority revealed that they have never disclosed their use of TCAM to their HCP (Letlhogile et al, 2020).

2.2.3. Lack of regulatory framework

The WHO released a 10-year strategy (2014-2023) to urge member states intocreating legislation to include TCAM in the development of health systems (Cramer, 2023). The strategy's objectives were to aid member states in "incorporating the potential contribution of TCAM to health, wellness, and people-centered healthcare" and "promote the safe and effective use of TM by regulating, researching, and integrating TCAM products, practitioners, and practice into modern health systems, where appropriate". Additionally, the strategy intended to support Universal Health Coverage by appropriately integrating TCAM services into national healthcare systems" (Nsagha et al., 2020). Traditional, complementary, and alternative medicine must be acknowledged and governed similarly to all conventional medicines worldwide in order to support national strategic objectives for transformation. Additionally, the twohealth

systems could mutually benefit from integration. A few nations - particularly Asian countries have made enormous efforts to fully integrate TCAM within their healthcare system. African countries continue to struggle with TCAM development and implementation in spite of such efforts (James et al., 2019). These challenges include regulatory status; lack of TCAM policy; a lack of understanding of TCAM among national drug regulatory agencies; and a lack of TCAM product and practice regulation (World Health Organization, 2019).

In China, the regulatory framework on TCM includes the National Medical Products Administration (NMPA); the state of administration of TCM; the TCM Practitioners Act 2000, and the Traditional Chinese Medicine Practitioners Board (TCMPB). In India, it includes the Drugs and Cosmetics Act, 1940 and Rules 1945; the Ministry of India such as Ayurveda, Yoga and Naturopathy, Unani, Siddha and Homeopathy (AYUSH); the central council of Indian Medicine Act and the Central Council of Indian Drugs. **Table 2.2** documents the regulatory frameworks in three different regions having prevalent TCAM use.

In India, Ayurveda is governed by a statutory body known as the Central Council of Indian Drugs (CCIM), which was established under the Indian Drugs Central Council Act of 1970. It regulates Ayurveda to decide, direct, develop, and uphold the standard of educational study programs and aims to raise it above worldwide benchmarks through the strategic use of resources, astute governance, and effective administration (Mukherjee PK, 2019). The Central Council of Indian Medicine Act, of 1970 regulates education and practitioners (Lal, 2018). For Ayurveda and other Indianmedical systems' expansion and development, the Department of AYUSH in November 2003 was established and in 2014, it was decided to elevate the Departmentof AYUSH to the status of a full-fledged Ministry of AYUSH, led by another Minister. (Mukherjee PK, 2019). To broaden the scope of the AYUSH industry, the Ministry is responsible for developing policies and implementing plans and initiatives (Katoch et al., 2017). The 1940 Drugs and Cosmetics Act establishes regulations for the production of ayurvedic medicines (Sharma and Pundarikakshudu, 2019; Biswal, 2020). The manufacture and licensing of ayurvedic medicines are governed under Rules 151 through 155 B of the Act (Remya et al, 2020).

Table 2.2: An overview of regulatory authorities and associated responsibilities of different regions.

Regulatory Authority	Major Responsibility	References
South Africa		
South African Health Products Regulatory Authority (SAHPRA)	Regulating (monitoring, evaluating, investigating, inspecting, and registering) all health products.	(Street, 2016; Katerere et al., 2019; Abrams et al., 2020)
The Medicines and Related Substances Act, 1965	Provide for the registration of drugs intended for human use and animal use. Establishment of SAHPRA.	
Interim Traditional Health Practitioners Council of South Africa	Provide a regulatory framework to ensure the efficacy, safety, and quality of traditional healthcare services; management and control over the registration, training and conduct of practitioners, students, and specified categories in the traditional health practitioners (THPs) (diviners, herbalists, traditional birth attendants and traditional surgeons).	
Traditional Health Practitioners Act 22 of 2007	Controls and regulates traditional health practitioners (THPs).	
Allied Health Professions Council of South Africa (AHPCSA)	Control all allied or complementary health professions, which includes Aromatherapy, Ayurveda, Chinese Medicine and Acupuncture, Chiropractic, Homeopathy, Naturopathy, Osteopathy, Phytotherapy, Reflexology, Therapeutic Aromatherapy, Therapeutic Massage therapy, Therapeutic reflexology and Unani-Tibb. Sets standards for the education and training on intending practitioners. Manage, administer, and set policies relating to the professions registered with the AHPCSA.	
National Department of Health (NDOH)	Implementation of TCAM policies.	
China		
National Medical Products Administration (NMPA)	Supervise the safety of drugs, regulate the registration of drugs, medical devices and cosmetics, and undertake standards management.	(Singapore Traditional Chinese Medicine Practitioners Act 2020; Li and Graham, 2020; Liang et al., 2021)

Table 2.2 cont.: An overview of regulatory authorities and associated responsibilities of different regions.

Regulatory Authority	Major Responsibility	References
China		
State of administration of TCM	Bear the overall responsibility for the regulation and development of TCMs.	(Singapore Traditional Chinese Medicine Practitioners Act 2020; Li and Graham, 2020; Liang et al., 2021)
Traditional Chinese Medicine Practitioners Act 2000	An Act to provide for the registration of traditional Chinese medicine practitioners.	
Traditional Chinese Medicine Practitioners Board (TCMPB)	TCMPB registers TCM practitioners (both acupuncturists and TCM physicians), accredits TCM institutions and TCM courses for the purpose of registration, and regulates the professional ethics and conduct of registered TCM practitioners.	
India		
Drugs and cosmetics Act, 1940 and rules 1945	An act of the Parliament of India which regulates the import, manufacture, and distribution of drugs in India. Regulates the herbal medicine (licensing, inspection, and testing).	(Katoch et al., 2017; Lal, 2018; Shi, Zhang and Li, 2021; Devi Anjana et al., 2022)
Ministry of Ayurveda, Yoga and Naturopathy, Unani, Siddha and Homeopathy (AYUSH)	Was established to work towards the optimal development and propagation of AYUSH systems of healthcare.	
Central Council of Indian Medicine Act	The Central Council has been framing on and implementing various regulations including the Curricula and Syllabii in Indian Systems of Medicine viz. Ayurveda, Siddha and Unani Tibb at Under-graduate and Postgraduate level. Governs TM education and TM practitioners.	
Central Council of Indian Drugs	It regulates Ayurveda to decide, direct, develop, and maintain the quality of educational study programs.	

In China, the TCM Practitioners Act of 2000 created the TCM Practitioners Board (TCMPB), a legislative body. Acupuncturists and TCM doctors are both recognized by the TCMPB, which also certifies TCM schools and programs for registration purposes and controls the conduct and professional ethics of registered TCM practitioners (Li and Graham, 2020). Under the TCM Practitioners Act, The Minister appoints at least 5 and no more than 11 members to the Board, including (The statutes of the Republic of Singapore Traditional Chinese Medicine Practitioners Act 2020):

- One registered medical practitioner
- One Registrar ex-officio; and
- Two must be licensed practitioners of any prescribed form of traditional Chinese medicine who have at least 10 years of experience.

The administrative branch of the Chinese government in charge of regulating drugs, medical devices, and cosmetics is called the China State Food and Drug Administration (renamed to National Medical Products Administration or NMPA China in 2018). Chinese TM/CM goods are primarily split into four registration categories: Classic Chinese medicine formulation, innovative Chinese medicines, modified new Chinese medicines, and generic Chinese medicines (identical names and formulas) (Mukherjee PK, 2019).

In South Africa (SA), TM and CAM are governed by two separate bodies concerning the education and practice of practitioners. Traditional medicine practices are regulated by the Traditional Healers Council (THC) of SA; while CAM practices are regulated by the AHPCSA (Katerere et al, 2019). The THP Council is responsible for enforcing the THPs Act 22 of 2007, which is a piece of legislation to control and regulate THPs. Under the THPs Act 22 of 2007, The Minister of Health's appointment of the Interim THPs Council should include (Street, 2016):

- Representatives of all four categories of THPs as well as THPs from each province.
- A legal expert,
- A doctor from the South African Health Professions Council (HPCSA),

- A pharmacist from the South African Pharmacy Council (SAPC),
- Community leaders, and
- Department of Health representatives.

On May 1, 2014, the council officially started operating. By establishing practice guidelines, the interim council is able to supervise the registration of THPs and regulate their practice. The THP Act provides a commonly used indigenous healthcare system with legal recognition where products used in TM must now be subject to regulatory measures.

The SAHPRA currently considers TM to be part of CM for purposes of regulation. Amendments to the General Regulations made in accordance with the Medicines and Related Substance Act, 1965 (Act 101 of 1965) were released by the Minister of Health, which created a category of medications known as CMs (Category D) and in effect created a regulatory framework for this category (Katerere et al, 2019; Ondo and Muntingh, 2019). The drugs included by this definition come from thesix main medical specialties acknowledged by the SAHPRA, namely aromatherapy, Ayurveda, homeopathy, TCAM, Unani Tibb, and Western herbal medicine (Ireland- Coetser, 2018). Following discussion with various stakeholders, the CMs category expanded to include two subcategories of Category D. These subcategories include traditional disciplines that are not indigenous to South Africa (discipline-specific medicines), as well as health supplements. Based on indication, content, and dosageform, discipline-specific drugs are categorised as high risk (where clinical evidence is required for justification of safety and efficacy) or low risk (where traditional evidence may be the justification of safety and efficacy). Only low-risk indications and compounds are permitted in health supplements, as outlined in SAHPRA's guidelines on ‘’CM – discipline-specific safety and efficacy’’, which include a list of substances, dose limits, and indications. All CMs will be allowed to continue to be sold in South Africa if:

- Application for their registration is made by the deadlines specified by the relevant authority.
- A holder of the necessary license as defined in the Medicines and Related Substances Act, 1965 manufactures, imports, exports, wholesales, or distributes.

- They meet the requirements of the Medicines and Related Substances Act, 1965.
- They must be classified as low risk which includes enhancement of general health without regard to specific disorders, health maintenance, or minor symptoms (not associated with a disease or disorder).

According to the SAHPRA-approved criteria, the manufacturing, selling, and relative risk of these drugs will all be taken into consideration when deciding whether to register them and make them widely accessible.

2.2.4. Integration and inclusivity of TCAM within the conventional healthcare system

Another term often applied is *integrative medicine* (IM, or integrative health) in the context of TCAM and describes the coordinated application of both conventional and TCAM treatments in a patient-centered manner to obtain the optimum outcomes for each patient's well-being and health (Lee et al., 2022). For the shared purposes of preserving tradition and fostering cost-effectiveness in health services, some nations-most notably China, India, and a number of other Asian countries have been working intensively to establish the TCAM sector (Rahayu et al., 2022). The integration of TCM and Western medicine in Hong Kong serves as an important example for the global advancement of integrative medicine (Zhou, 2021).

In China, the modern medical system frequently incorporates TCM (Li et al., 2020). Traditional Chinese medicine departments are present in about 90% of regular hospitals and 75% of health facilities. Since 1954, a TCM hospital network has been established by the central government of China to preserve TCM as a national treasure of that country and to offer affordable medical care. Since that time, TCM hospitals in China have remained dedicated to the social and historic cause of restoring TCM as a significant component of the Chinese cultural legacy, in addition to providing medical care (Zhou, 2021). Traditional medical practitioners are permitted to work in both public and private clinics and hospitals in China. Patients and the general public have the choice to choose TM or complementary medicine when receiving medical care, or their

physicians can counsel them on which treatments would be most appropriate for their particular medical condition. (WHO, 2018).

In India, all seven of the officially recognized traditional medical systems or modalities (Ayurveda, Yoga, Naturopathy, Unani Medicine, Siddha, Sowa Rigpa, and Homeopathy) have established educational programs and research groups. (Shrivastava, Shrivastava and Ramasamy, 2015; Baars and Hamre, 2017). People seeking primary, secondary, and tertiary care are also given the option of choosing TM. The school health program for preventative and health-promotive care services inIndia includes offering instruction on home remedies, locally accessible medicinal herbs, and yoga (WHO, 2018).

A study about the utilization of TM and its integration into the healthcare system in Qokolweni, shows how patients in SA are treated with conventional medication and TCAM separately (Mutola et al, 2021). According to this study, most locals in the Eastern Cape, SA, town of Qokolweni consulted THPs prior to or concurrently with hospital visits. **Table 2.3** displays a brief overview of a few studies inAfrica and their integration of TCAM.

The lack of training of HCPs on TCAM is clearly reflected in Table 2.3, which further delays the integration of TCAM within the health system. A review of the integration of TCAM into the curriculum of South African medical schools showed that out of the seven schools, five taught either TM or CAM, one did not teach any part of TCAM, and one taught both ATM and CAM (Chitindingu et al, 2014). South African medical schools are still not sufficiently committed to integrating TCAM into their curricula. As a result, it is imperative for all medical schools in SA to review their curricula with regard to TCAM and standardize the TCAM material across all universities (Chitindingu et al, 2014). According to Peltzer and Pengpid, (2019), TCAM inclusion in the medical curriculum will increase the knowledge of TCAM of HCPs, which will enhance the confidence of HCPs during patient consultations.

Table 2.3: A summary of studies in Africa evaluating the integrative health systems.

Title and Reference	Study Objectives	Study design	Integration challenges	Integration recommendations
Allopathic and traditionalhealth practitioners' collaboration (Van Rooyen et al., 2015).	To explore and describe the collaborative relationship betweenallopathic and THP regarding the legalisation of traditional healing, and these health practitioners' views of their collaborative and professional relationship, as role- players in the healthcare delivery landscape in SA.	A qualitative design was followed- unstructured interviews,a focus group interview and modified participantobservation	Results indicate both allopathic and THP experienced negative attitudes towards each other.	Mutual understanding (in the form of changing attitudes and communication) was consideredcrucial to effective collaboration between these two health systems.
Evidence-based recommendations to facilitate professional collaboration between allopathic and traditional health practitioners (van Rooyen et al., 2017)	To develop evidence-based recommendations aimed at facilitating professional collaboration between allopathic and THP for the benefit of patients.	Interviews with allopathic practitionersand individual interviews with THP.	Allopathic practitioners demonstrating negative attitudes by not referring patients to traditional practitioners based on lack ofknowledge and mutual understanding of each other'spractices.	Facilitating mutual understandingbased on respect and acceptance between the different practitioners. Enhance collaboration through facilitating open communication between different practitioners enhancing teamwork in a multi-professional environment and leading to improved patient care.

Table 2.3 cont.: A summary of studies in Africa evaluating the integrative health systems.

Title and Reference	Study objectives	Study design	Integration challenges	Integration recommendations
Perceptions and experiences of allopathic health practitioners on collaboration with traditional health practitioners in post-apartheid South Africa (Nemutandani, Hendricks and Mulaudzi, 2016)	The study examined the perceptions and experiences of allopathic health practitioners on collaboration withTHPs in post- apartheid SA	Group discussionsand meetings	Two health systems were not compatible with respect to the science involved and the source ofknowledge. Quality of health care will be compromised if THPsare allowed to work in public health facilities. Allopathic health practitioners do not appear readyto work with THPs, citing challenges in quality of healthcare, differences regarding concept of sciences and source of knowledge, and lack of policy on collaboration. Lack of exposure to TM seems to impede opportunities to accept and work with traditionalhealers.	Exposure and training at undergraduate levelregarding the traditional health system is recommended. Policy guidelines on collaborations are urgently required.

Table 2.3 cont.: A summary of studies in Africa evaluating the integrative health systems.

Title and Reference	Study objectives	Study design	Integration challenges	Integration recommendations
Communication Between Traditional Medical Practitionersand Western Medical Professionals (Lampiao et al., 2019)	This study aimedto explore the barriers to collaboration between TH andBPs.	Interview	While traditional healers clearly had confidence in biomedical practitioners' competencies and respect for their practice, biomedical practitioners lacked trust in traditional healers and would not refer patients to them due to several reservations, such as the lack of scientific basis for TM.	TM and complementary therapies should be taught in Medical Schools so that Biomedical Practitioners can appreciate Traditional Healers.
Collaboration Between Biomedical and Complementary and Alternative Care Providers: Barriers and Pathways (van der Watt et al., 2017)	This study provides a novel cross-national insight into the perspectives of collaboration fromfour stakeholder groups.	Group discussions	In the absence of openness, understanding,and respect for each other, efficient collaboration remains remote. A barrier to collaboration was distrust, influenced by factionalism, charlatanism, perceptions of superiority, limited roles, and responsibilities.	Pathways to better collaboration were education, formal policy recognition and regulation, and acceptance of mutual responsibility. The strongestfoundation for mutual collaboration is a shared sense of responsibility for patient well-being.

Table 2.3 cont.: A summary of studies in Africa evaluating the integrative health systems.

Title and Reference	Study objectives	Study design	Integration challenges	Integration recommendations
Effectiveness of Integrated Health Systems in Africa: A Systematic Review (Ampomah et al., 2020)	Extensively and systematically reviewthe effectiveness of integrated health systems in Africa.	Literature review	The review also highlighted relatively low levels of awareness,usage, satisfaction, and acceptance of integrated health systems among the populace.	The results indicated that the formulation and execution of health policies were the main measurestaken to integrate TM into health systems in Africa. It is critical to uncover the barriers in the health systemby exploring the perceptions and experiences of stakeholders, in order to develop solutions for better integration of the two health systems.

2.2.5. Challenges associated with Pharmacovigilance of TCAM

2.2.5.1. Definition of Pharmacovigilance

According to the WHO (2019), pharmacovigilance (PV) is the study and practice concerned with the identification, evaluation, understanding, and avoidance of side effects or any other issue with drugs or vaccines. The PV system entails systematic gathering, compiling, and analysis of reported suspected adverse drug reactions (ADRs), communication, and risk management in order to produce a signal (medicine safety hazard). It also involves promoting the efficient and safe use of pharmaceuticals. Pharmacovigilance strives to improve patient care and safety related to medication usage as well as help public health initiatives by offering trustworthy, fair information to evaluate the risk-benefit profile of medications. Its range has recently been expanded to include herbal remedies, conventional and alternative medicines, vaccines, and other healthcare items (World Health Organization, 2019).

2.2.5.2. Process of Pharmacovigilance in TCAM

The Uppsala Monitoring Centre (WHO-UMC), WHO Collaborating Centre for International Drug Monitoring, maintains a global database of reports of possible ADRs to assist in making good decisions about the advantages and disadvantages of various treatment choices for individuals taking medications (Jain, 2019). A search of this data is applied to identify signals of new ADRs in order to alert member countries' PV centres and other organizations concerned with drug safety (Scholl, 2022). The bulk of herb-drug interactions-linked ADRs documented in a study by WHO-UMC have been reported by developed nations, such as the USA and Europe, with SA serving asthe only developing nation (Awortwe et al., 2018).

Along with TM's rising popularity in India, the prevalence of reported ADRs to Ayurvedic medicines has sharply grown. Traditional medicine drugs' safety has also drawn more attention. Two clinical pharmacologists, Urmilla Thatte and Vaidya established an Ayurvedic PV strategy that was separate from the national PV system (Shi et al., 2020). The Government of India established the National PV Programme

for ASU (Ayurveda, Siddha, and Unani Drugs) (NPP-ASU) in 2007 to gather, compile, and evaluate the safety of AYUSH medications (Kalaiselvan and Ruknuddin, 2022). Numerous advancements have been made in the safety oversight of ASU medications since the formation of an independent PV system in India, including the following (Shi et al., 2020):

- For the purpose of monitoring the safety of ASU drugs, the majority of PV centres have been created in ASU medical colleges, ASU medical institutions, and ASU scientific research institutes.
- There are numerous ADR reports and causative analyses that are accessible, and more adverse responses and adverse occurrences of TMs are being regularly recorded.
- A group of teachers, doctors, and medical assistants involved in the supervision and research of traditional PV have received training through traditional PV education, greatly improving the content of PV in the curriculum of postgraduates of TM such as Ayurveda.
- To strengthen the safety of TM registration, the Indian government has mandated that the Drug Registration Agency authenticate new pharmaceuticals using PV as a guideline.

In China, around 14% of all ADR spontaneous reporting data in China are attributable to TCM (Wei et al., 2018). In December 2019, China also formally implemented a PV system. A significant date in the history of PV in China was May 13, 2021, when the NMPA promulgated Good PV Practice (Song et al., 2023).

In SA, the regulatory agencies, the pharmaceutical industry, public health efforts, and HCPs all play a significant role in determining how PV programs are carried out. South Africa has several PV systems in place, namely, SAPHRA which is responsible forthe PV regulatory aspects; the National PV Center (NPC) - is in charge of organizing PV in public health organizations, especially at the Primary Health Care (PHC) level and a few other separate entities (Schellack Natalie et al, 2018). Any new or existing quality, safety, or effectiveness concerns relating to any medicine or scheduled substance, including but not limited toADRs, and the risk management activities associated with these concerns, must be reported to SAPHRA within a specified time frame, according to the regulations to the Medicines and Related Substances Act (Act No. 101 of 1965)

(Terblanche Antoinette,2018). Category D (CM) of medicine can therefore be reported to SAHPRA concerningthe quality, safety, effectiveness, and ADRs of these practices. This excludes TM practices and a few CAM practices. With the continuous increase of TCAM use in SA, an appropriate PV system needs to be implemented for the identification, evaluation, understanding, and avoidance of side effects or any other issue with TCAMs.

2.2.5.3. Perceived safety of TCAMs

Traditional, complementary, and alternative medicine are considered to be appealing due to their more natural and therefore, perceived better safety profile as compared to conventional medicine (Radwan et al., 2020). There is a lack of evidence on herbal TCAM procedures' effectiveness, efficacy, or safety, which raises questions regarding potential dangers associated with using them and using them in conjunction with conventional drugs reference (Palileo-Villanueva et al., 2022). Traditional, complementary, and alternative medicine when compared to conventional medicine, are easily available and when traditional healers undertake consultations, there is an absence of consistency between traditional healers on the compounding and the right dosage of TMs (herbal) (Ozioma and Chinwe, 2019) and therefore compromises the safety of these medicines and might result in negative health consequences. Most people view herbal medicine as being natural, and therefore safe, and thus they do not inform their HCPs when they are using herbal medication. As a result, side effects associated with their use are often not reported (Ng et al, 2020). In addition, according to Ozioma and Chinwe, (2019), no PV activities are currently beingperformed in Africa relating to TCAM practices and therefore, ADRs that are observed are not being reported to the appropriate regulatory bodies.

2.2.5.4. TCAM-drug interactions of potential clinical relevance

It is common practice for patients that apply TCAM practices to do so alongside the use of prescription medicines, particularly in individuals with chronic conditions such as hypertension, diabetes, cancer, seizures, and depression (Pearson et al., 2018; Amegbor, 2019). This is troublesome as there have been concerns raised over the potential for TCAM to interact with the pharmacology of conventional medications

when used concurrently, especially for medications with a limited therapeutic index (Shaikh et al, 2020). A study by Awortwe et al., (2018) was undertaken to evaluate the causality of herb-drug interactions amongst TCAM users. The study showed that in most cases, patients taking statins (atorvastatin, simvastatin, and rosuvastatin) or warfarin for the treatment of cardiovascular complications also made use of TCAM products including sage, flaxseed, cranberry, goji juice, green tea, and chamomile, reporting clinically significant interactions. The risk of TCAM-drug interactions is becoming more widely acknowledged as a public health issue that frequently results in life-threatening adverse drug events, extended hospital stays, and life-threatening complications (Asokkumar and Ramachandran, 2020; Mazhar et al., 2020). Due to the growing global burden of non-communicable diseases, co-using of prescribed medications and TCAM products will continue to pose a risk to health in both developed and developing nations. A review conducted by Azizah et al., (2021) revealed that the natural remedy used most frequently in conjunction with antihypertensive medications is garlic. The following side effects were noted after the simultaneous use of prescribed antihypertensive medication and herbal medication: Shortness of breath, coughing, ulcers, diarrhoea, cramping in the knees, and abdominal discomfort.

The use of TCAM in combination with conventional, allopathic medicine is considered a growing and emerging concern of major public health importance as studies have shown serious interactive potential of TCAMs with conventional medicines. **Table 2.4** shows a few examples of TCAM-drug interactions that have been identified. However, there are far more studies that have indicated noteworthy interactive and toxicity profiles between the two forms of healthcare.

Table 2.4: Commonly documented TCAM-drug interactions.

Product	Biological source	Indication for medicinal use	Interactions with conventional drugs	Reference
Foodstuff (fruit and vegetables)				
Cranberry  Note. Image generated using wepik tool	*Vaccinium macrocarpon* (Family: Ericaceae)	Prevent urinary tract infections. Demonstrate antimicrobial activity, anti-inflammatory properties, anti-fungal properties, and even the prevention of tumour cell proliferation.	The effect of blood thinners (warfarin) increases, leading to bruising and bleeding.	(Turbitt et al., 2020; Nemzer et al., 2022)
Garlic  Note. Image generated using wepik tool	*Allium sativum* (Family: Amaryllidacea)	Garlic and its secondary metabolites have shown excellent health-promoting and disease-preventing effects on many human common diseases, such as cancer, cardiovascular and metabolic disorders, blood pressure, and diabetes, through its antioxidant, anti-inflammatory, and lipid-lowering properties.	Antiplatelet and anticoagulant drugs - Aspirin: This may increase the bleeding time. Clopidogrel: May potentiate the effect of the drug. Warfarin: This may potentiate the effect of the drug. Large doses could increase bleeding tendency. Tacrolimus may increase drug levels as a consequence of herb-induced liver injury.	(Kansara and Jani, 2017; Shang et al., 2019; Eftekhari, 2020)

Table 2.4 cont.: Commonly documented TCAM-drug interactions.

Product	Biological source	Indication for medicinal use	Interactions with conventional drugs	Reference
Ginger  Note. Image generated using wepik tool	*Zingiber officinale* (Family: Zingiberaceae)	Used for pregnancy-induced nausea and vomiting. Treatment and prevention of motion sickness, vertigo, to increase appetite, and to reduce stomach acidity.	Antacids may decrease the effectiveness of the drug. Antiplatelet and anticoagulant drugs - Phenprocoumon: May increase the effectiveness of drug. Warfarin: Increased risk of spontaneous bleeding.	(Ansary et al., 2020; Gamage et al., 2020)
Honey  *Note. Image generated using wepik tool*	*Apis mellifera* (Family: Apidae)	Honey has high antioxidant and anti-inflammatory properties and has antimicrobial capacity and anticancer activity against different types of tumours. Used to treat seasonal allergy symptoms, herpetic lesions and warts, cough, dry eye, dry mouth, eye surgery antibacterial prophylaxis, oral mucositis, and rosacea.	Warfarin potentiation has been documented with bee pollen. Allergic reactions to pollen may occur when honey is ingested.	(Cianciosi et al., 2018; Viteri et al., 2021)

Table 2.4 cont.*:* Commonly documented TCAM-drug interactions.

Product	Biological source	Indication for medicinal use	Interactions with conventional drugs	Reference
Lemon  Note. Image generated using wepik tool	*Citrus limon* (Family: Rutaceae)	Primarily used for its vitamin C nutritional value and potassium content. Antioxidant, antimicrobial, antiviral, antibacterial, anti-cancer, anti-inflammatory, and cardioprotective effects of lemon.	Citrus juice is often implicated in the worsening of gastroesophageal reflux disease symptoms.	(Hosen et al., 2020; Emon et al., 2021; Singh et al., 2021; Riaz et al., 2022)
Herbal beverages				
Black tea  Note. Image generated using wepik tool	*Camellia sinensis assamica* (Family: Theaceae)	Black tea is used for treating headaches, low blood pressure, preventing heart disease, including atherosclerosis and heart attack, preventing Parkinson's disease, reducing the risk of stomach and colon cancer, lung, ovarian and breast cancers.	The caffeine content of black tea might boost arterial pressure that might interfere with the antihypertensive effects of tea polyphenols.	(Al-Mahdi, Ewadh and Hindi, 2020; Mahdavi-Roshan et al., 2020)

Table 2.4 cont.: Commonly documented TCAM-drug interactions.

Product	Biological source	Indication for medicinal use	Interactions with conventional drugs	Reference
Green Tea  Note. Image generated using wepik tool	*Camellia sinensis* (Family: Theaceae)	Promoted for stomach disorders, to lower cholesterol, anti-diabetic, anti-inflammatory, antioxidant, antibacterial, and to lessen belly fat.	Antiplatelet and anticoagulant drugs -Aspirin: May potentiate bleeding. Warfarin: May decrease the effectiveness of drug. Citalopram (Escitalopram): May potentiate the adverse effect (bleeding). Statin drugs may affect drug level (if increased, may increase side effects).	(Albassam and Markowitz, 2017; Meyboodi et al., 2021)
Chamomile tea  Note. Image generated using wepik tool	*Matricaria chamomilla* (Family: Asteraceae)	Used for anxiety, gastric discomfort, and catarrh.	Caution with the concurrent consumption with warfarin. Caution should be exercised with regard to the consumption of CYP3A4-metabolized drugs with chamomile tea. May alter the activities of CYP3A4 are likely to affect the protective effect of tacrolimus and cyclosporine in transplant patients.	(Awortwe et al., 2018; Bertuccioli et al., 2022)

Table 2.4 cont.: Commonly documented TCAM-drug interactions.

Product	Biological source	Indication for medicinal use	Interactions with conventional drugs	Reference
Rooibos  Note. Image generated using wepik tool	*Aspalathus linearis* (Family: Fabaceae)	Alleviates oxidative stress, and has anti-mutagenic, anti-cancer, anti-diabetic, anti-obesity, cardio-protective effects and anti-inflammatory effects. Improves insulin resistance and related metabolic disturbances	When taken concomitantly with drugs, such as sulfonylureas, and specifically glyburide, could result in an exaggerated pharmacodynamic effect, thereby causing an increased risk of hypoglycaemia. May potentially cause herb-drug interactions when co-administered with substrates or drugs metabolized by these P450 enzymes. This will include chronic medications, such as hypoglycaemics (sulfonylureas) and hypolipidemics (atorvastatin and simvastatin)	(Patel et al., 2016; Sheik Abdul and Marnewick, 2021; Joubertet al., 2023; Pyrzanowska, 2023)
Culinary spices				
Cayenne pepper  Note. Image generated using wepik tool	*Capsium spp.* (Family: Solanaceae)	Boosts metabolism, improves Digestive Health, lowers Blood Pressure, can reduce pain, anti-Cancer, protects the heart, has anti-microbial properties, improves immunity, can heal toothaches, and improves skin and hair health.	ACE inhibitor- May cause drug-induced cough - Theophylline. May increase absorption and drug level. Possible interaction with MAO inhibitors and antihypertensive therapy.	(Ross, 2019; Chhabra et al., 2020)

Table 2.4 cont.: Commonly documented TCAM-drug interactions.

Product	Biological source	Indication for medicinal use	Interactions with conventional drugs	Reference
Culinary spices				
Turmeric  Note. Image generated using wepik tool	*Curcuma longa* (Family: Zingiberaceae)	Used to treat Arthritis Used for glucose and insulin regulation Has anti-viral activity against many viruses, including hepatitis, and influenza viruses.	Antiplatelet and anticoagulant drugs may potentiate the effect of the drug. Increases paclitaxel exposure at high doses.	(Singletary, 2020; Natesh et al., 2021)
Black pepper  Note. Image generated using wepik tool	*Piper nigrum* (Family: Piperaceae)	It is an antihypertensives, antiplatelets, antioxidant, analgesic, antitumor, antithyroid, anticonvulsant, antibacterial, antidiarrheal, antidepressants, antispasmodic, immunomodulatory, anti-inflammatory, hepatoprotective, and antifungal.	May enhance bioavailability/ effectiveness of chemotherapeutic agents. Increases plasma concentrations of drugs, which could enhance their effects.	(Babos et al., 2021; Emon et al., 2021)

Table 2.4 cont.: Commonly documented TCAM-drug interactions.

Product	Biological source	Indication for medicinal use	Interactions with conventional drugs	Reference
Cinnamon  Note. Image generated using wepik tool	*Cinnamomum zeylanicum* (Family: Lauraceae)	Treats diabetes and multiple sclerosis. It has antimicrobial, antiviral, antifungal, antioxidant, antitumor, antihypertensive, antilipemic, anti-diabetic, gastro protective effects.	Cinnamon can interact negatively with medication that also affects the liver, like acetaminophen or statins, increasing the risk of liver damage.	(Hajimonfaredneja d et al., 2019; Espiritu et al., 2020)
Chilli pepper  Note. Image generated using wepik tool	*Capsicum annuum* (Family: Solanaceae)	It has been used as a tonic, antiseptic, and stimulating agent, to treat dyspepsia, appetites, and flatulence, and to improve digestion and circulation	Consumption of drugs such as cephalexin, pitavastatin, and cyclosporin should be given more attention if consumed together with food containing capsaicin as these drugs are from a narrow therapeutic window, which possibly causes toxicity to patients.	(Chan et al., 2020; Mandal et al., 2022)

Table 2.4 cont.: Commonly documented TCAM-drug interactions.

Product	Biological source	Indication for medicinal use	Interactions with conventional drugs	Reference
Essential oils from medicinal plants				
Grapefruit oil  Note. Image generated using wepik tool	*Citrus paradisi* (Family: Rutaceae)	A potential benefit for certain patient populations in reducing the risk of renal stones and type 2 diabetes, as well as some cardiovascular risk factors (including improvement in systolic blood pressure, high-density lipoprotein cholesterol, and arterial stiffness).	There is still the potential for interactions when used by patients on medications such as statins, antihistamines, cough suppressants, benzodiazepines and hypnotics, erectile dysfunction drugs, HIV protease inhibitors, and certain hormones (including hormonal birth control pills). Blocks a special enzyme in the wall of the intestine that prevents many drugs from being absorbed into the body, making it easier for these medications to pass from the gut into the body, raising the blood levels of these drugs.	(Mouly et al., 2017b; Riaz et al., 2022)
Yarrow  Note. Image generated using wepik tool	*Achillea millefolium* (Family: Asteraceae)	Anti-inflammatory and Antimicrobial/Antiprotozoal activity. Stop wound bleeding. Has been reported to reduce heavy menstrual bleeding and pain it has been used to relieve gastrointestinal ailments for cerebral and coronary thrombosis, lower high blood pressure, improve circulation, and tone varicose veins.	Inhibits drugs metabolized by CYP2D6. Should be avoided by patients on any kind of antidepressant or antipsychotic medication as these can enhance the effects of these drugs.	(Masłowski et al., 2021; Mannila et al., 2023)

Table 2.4 cont.: Commonly documented TCAM-drug interactions.

Product	Biological source	Indication for medicinal use	Interactions with conventional drugs	Reference
Peppermint  Note. Image generated using wepik tool	*Mentha piperita* (Family: Lamiaceae)	Used in gastrointestinal conditions, including non-serious constipation or diarrhoea associated with irritable bowel syndrome (IBS) to reduce global symptoms of pain, and bloating; antispasmodic properties	Peppermint is a calcium channel blocker and may alter the effect as it may potentiate the medication when taken orally. Peppermint oil may inhibit cytochrome P450 (CYP-450) 3A4; use caution when administering with drugs metabolized by this enzyme.	(Clemente et al., 2021; Malekmohammad *et al.*, 2021)
Lemongrass  Note. Image generated using wepik tool	*Cymbopogon citratus* (Family: Poaceae)	Constituents of these oils may influence blood sugar levels. It is an anti-inflammatory, cough relief, digestive, anti-flu, anti-fever, anti-diabetic and anti-malarial.	Inhibits drugs metabolized by CYP2B6. If it is taken in combination with a sedative drug like pentobarbital (Nembutal), it might increase side effects and feelings of sleepiness. Taking lemongrass along with some medications that are broken down by the liver might increase the effects and side effects of some medications.	(Borges et al., 2021; Upadhyay, et al., 2021;Kiani et al., 2022)

Table 2.4 cont.: Commonly documented TCAM-drug interactions.

Product	Biological source	Indication for medicinal use	Interactions with conventional drugs	References
Lavender  Note. Image generated using wepik tool	*Lavandula angustifolia* (Family: Lamiaceae)	Reducing anxiety and promoting sleep and relaxation. Used in alternative medicine as a possibly effective aid in treating hair loss, anxiety, pain after a C-section, and to help prevent falls in older adults. Used to treat cancer-related pain, dementia, and pain around the vagina and anus.	Should not use this oil along with medications that also have sedating properties. Medicines for high blood pressure -avoid using lavender together with other herbal/health supplements that can lower blood pressure.	(Sharma et al., 2019;Hugar et al., 2022)
Eucalyptus  Note. Image generated using wepik tool	*Eucalyptus globulus* (Family: Myrtaceae)	Used for respiratory issues It is an antibacterial, antifungal, antiviral, anti-inflammatory, antioxidant, and wound healing properties	Interfere with metabolism of anaesthesia - should be avoided (both topically and via inhalation) for at least a week prior to any surgeries to prevent complications. Eucalyptus may increase how quickly the body eliminates some medications, including pentobarbital, a barbiturate used as an anaesthetic, and amphetamine, a stimulant used for narcolepsy and attention deficit hyperactivity disorder.	(Asokkumar and Ramachandran, 2020; Mieres-Castro et al., 2021)

Table 2.4 cont.: Commonly documented TCAM-drug interactions.

Product	Biological source	Indication for medicinal use	Interactions with conventional drugs	Reference
Rosemary  Note. Image generated using wepik tool	*Rosmarinus officinalis* (Family: Lamiaceae)	Used for respiratory issues Has antimicrobial, antibacterial, antifungal, and antiviral properties	Interfere with the metabolism of anaesthesia should be avoided (both topically and via inhalation) for at least a week prior to any surgeries to prevent complications. Rosemary preparations interacts with different drugs, such as antibiotics, anxiolytics and anticoagulant medicines, in terms of potentiation of their activity. People with high blood pressure, ulcers, Crohn's disease, or ulcerative colitis should not take rosemary.	(Lutfi et al., 2018; Rahbardar and Hosseinzadeh, 2020)
Natural supplements				
Sweet wormwood  Note. Image generated using wepik tool	*Artemisia annua* (Family: Asteraceae)	Treatment of COVID-19. Helps to treat a common cold, clear the respiratory tract, sore throat, coughs, asthma, and influenza.	Should be used with caution during pregnancy and in epilepsy. In high doses it may have hepato-protective effect.	(Emily Binyane and Hildah Mfengwana, 2022)

Table 2.4 cont.: Commonly documented TCAM-drug interactions.

Product	Biological source	Indication for medicinal use	Interactions with conventional drugs	Reference
African wormwood  Note. Image generated using wepik tool	*Artemisia afra* (Family: Asteraceae)	Treatment of a range of ailments including coughs, colds, headaches, chills, colic, asthma, malaria, diabetes, influenza, convulsions, fever and rheumatism.	Medications used to prevent seizures (Anticonvulsants) interact with African wormwood, it may increase the risk of seizures	(du Toit and van der Kooy, 2019; Sotenjwa et al., 2023)
Kava  Note. Image generated using wepik tool	*Piper methysticum* (Family: Piperaceae)	Used to improve sleep, decrease anxiety, and tame nervousness, stress and restlessness. Beneficial effect in euphoria, anticonvulsant, neuroprotection, and analgesia.	Interact with L-dopa by dopamine antagonism. Should not be taken with alcohol or other medications that can also cause liver toxicity.	(Prinsloo et al., 2019; Jędrejko et al., 2021; Hemaiswarya et al., 2022)

Table 2.4 cont.: Commonly documented TCAM-drug interactions.

Product	Biological source	Indication for medicinal use	Interactions with conventional drugs	Reference
Ginseng  Note. Image generated using wepik tool	*Panax ginseng* (Family: Araliaceae)	Improving fasting glucose levels as well as phytoestrogens. Boost energy, lower cholesterol levels and reduces stress.	Potentiate the effect of warfarin, resulting in longer bleeding time.	(Borse et al., 2019; Tsele-Tebakang et al., 2022)
Valerian  Note. Image generated using wepik tool	*Valeriana officinalis* (Family: Caprifoliaceae)	Used to improve sleep, treat insomnia and anxiety.	Overdose of valerian with GABA supplement that causes encephalopathy in the treatment of sleep disorder Consumption of haloperidol and valerian are reported to result in some complications in human body via increment level of some processes that can increase liver and kidney impairment	(Abushammala, 2022; Esmaeili et al., 2022)

Table 2.4 cont.: Commonly documented TCAM-drug interactions.

Traditional medicines – Traditional Chinese Medicine (TCM)				
Product	**Biological source**	**Indication for medicinal use**	**Interactions with conventional drugs**	**Reference**
Cang Zhu  (Luoet al., 2022)	*Rhizoma atractylodis* (Family: Asteraceae)	For night blindness or diminished vision. Disorders with symptoms such as headaches and body aches, fever, chills, blocked nasal passages, and an absence of sweating.	May interfere with Anti-Diabetic drugs. Should be used with caution in patients with nervous system diseases. Should be used with caution in patients with nervous system disorders.	(Zhang et al., 2021)
Che Qian Zi  (Anupama, 2018)	*Semen plantaginis* (Family: Plantaginaceae)	For painful, difficult, or hot urinary dysfunction and oedema.For diarrhoea caused by dampness in the intestines. Used for a cough and as a diuretic.	May interfere with Diuretic drugs.	(Li et al., 2022)
Chuan Xiong  (Chinese Herbs Healing, 2024)	*Rhizoma ligustici* (Family: Apiaceae)	Used to treat gynaecological disorders like irregular menses, dysmenorrhea, amenorrhea, difficult labor, and postpartum abdominal pain. Has antibiotic and antifungal effect and inhibits platelet aggregation.	Must be used with care in combination with anticoagulants or thrombocyte aggregation inhibitors; sedative effect, dilates blood vessels, in low dosages stimulates contraction of smooth muscle, and in high doses, inhibitory effect; it also causes miscarriages.	(Shi et al., 2020)

Table 2.4 cont.: Commonly documented TCAM-drug interactions.

Product	Biological source	Indication for medicinal use	Interactions with conventional drugs	Reference
Che Qian Zi  (Anupama, 2018)	*Semen plantaginis* (Family: Plantaginaceae)	For painful, difficult, or hot urinary dysfunction and oedema. For diarrhoea caused by dampness in the intestines. Used for a cough and as a diuretic.	May interfere with Diuretic drugs.	(Li et al., 2022)
Chuan Xiong  (Chinese Herbs Healing, 2024)	*Rhizoma ligustici* (Family: Apiaceae)	Used to treat gynaecological disorders like irregular menses, dysmenorrhea, amenorrhea, difficult labor, and postpartum abdominal pain. Has antibiotic and antifungal effect and inhibits platelet aggregation.	Must be used with care in combination with anticoagulants or thrombocyte aggregation inhibitors; sedative effect, dilates blood vessels, in low dosages stimulates contraction of smooth muscle, and in high doses, inhibitory effect; it also causes miscarriages.	(Shi et al., 2020)

Table 2.4 cont.: Commonly documented TCAM-drug interactions.

Product	Biological source	Indication for medicinal use	Interactions with conventional drugs	Reference
Acupuncture  Note. Image generated using wepik tool	-	Most commonly used to treat pain. Relieve discomfort associated with a variety of diseases and conditions, including: Chemotherapy-induced and postoperative nausea and vomiting Used to manage stress.	The chances of bleeding or bruising from the needles may be increased if you have a bleeding disorder or if you're taking blood thinners. Acupuncture, method of physical stimulations on the acupoint that would change the effect or their disadvantage effect of drugs (insulin, hypoglycaemic agents, steroids or volatile anaesthetics)	(Tepper, 2016; Chang, 2018)
Traditional medicines – Traditional Indian Medicine (TIM) and Ayurvedic medicines				
Ashwagandha  Note. Image generated using wepik tool	*Withania somnifera* (Family: Solanaceae)	Neurological diseases, paraplegia/chronic stiffness of thigh muscle, insomnia, general tonic in debility/weakness, growth in children, excessive emaciation, bronchial asthma, lymphadenitis, tuberculosis, rheumatism and other inflammatory diseases, oedema, cardiac disorders, suppression of urine, abdominal diseases, erysipelas, accidental wound,	Potentiate the effects of blood-glucose-lowering drugs, and may affect the reliability of digoxin assays and interfere with the control of hypo- and hyperthyroidism.	(Tandon and Yadav, 2020; Thikekar, Thomas and Chitlange, 2021)

Table 2.4 cont.: Commonly documented TCAM-drug interactions.

Product	Biological source	Indication for medicinal use	Interactions with conventional drugs	Reference
Bala  Note. Image generated using wepik tool	*Sida cordifolia* (Family: Malvaceae)	Used as an antimicrobial, anti-inflammatory agent, anti-pyretic, anti-infective and wound healing agent, and as an antidote to snake venom	May interact with caffeine and MAO inhibitors exacerbating effects and elevating blood pressure, and may reduce the efficacy of Beta blockers. Ephedrine (Sudafed, etc.) by additive sympathomimetic effects inducing further toxicity and arrhythmia and Steroids (dexamethasone) by enhancing clearance levels and thus reducing effectiveness of the drug.	(Rajeev, 2020; Iqbalet al., 2022)
Fenugreek  Note. Image generated using wepik tool	*Trigonella foenum-graecum* (Family: Fabaceae)	Has blood glucose and cholesterol lowering properties. Fenugreek is utilized for its antiulcer, antihypertensive, aphrodisiac, and hypoglycaemic activities	Modestly enhance the anti-diabetic effects of the sulfonylureas. Plasma concentration of losartan was augmented when concurrently administered decelerate the metabolism of losartan.	(Ahad et al., 2020; Visuvanathan et al., 2022)
Guggulu  Note. Image generated using wepik tool	*Commiphora wightii* (Family: Burseraceae)	Treatment of hypercholesterolemia, atherosclerosis, arthritis, gout, rheumatism, inflammation, obesity and it is an anti-inflammatory.	The absorption of diltiazem and propranolol was modestly reduced by guggulu. Have drug interaction potential when consumed along with conventional drugs which are CYP3A4 substrates.	(Sabarathinam and Thangavel, 2021; Upadhyay et al., 2021)

Table 2.4 cont.: Commonly documented TCAM-drug interactions.

Product	Biological source	Indication for medicinal use	Interactions with conventional drugs	Reference
Shankhpushpi  Note. Image generated using wepik tool	*Convolvulus pluricaulis* (Family: Convolvulaceae)	Treat neurological disorders. Rejuvenator, anti-aging, mental stimulant, anxiolytic, neuroprotective, antioxidant, analgesic, anti-microbial, anti-diabetic, cardiac disease, tranquilizer and primarily enhance memory and intellect	Reduces the antiepileptic activity of phenytoin but also lowers plasma concentration.	(Borse et al., 2019; Sharma et al., 2022)
Traditional medicines – African Traditional Medicine (ATM)				
Aloe Vera  Note. Image generated using wepik tool	*Aloe barbadensis miller* (Family: Asphodelaceae)	Treatment of psoriasis and other dermatological conditions. Treat inflammatory conditions, diabetes and hyperlipidaemia.	There is a potential herb-drug interaction between Aloe Vera and sevoflurane based on the antiplatelet effects of these 2 agents. Can interact with oral diabetes medications and cause hypoglycaemia (low blood sugar). When taken orally for prolonged periods with diuretics or digoxin, it can lead to low blood levels of potassium (hypokalaemia) due to diarrhoea.	(Izzo et al., 2016; Heng, Zulfakar and Ng, 2018)

Table 2.4 cont.: Commonly documented TCAM-drug interactions.

Product	Biological source	Indication for medicinal use	Interactions with conventional drugs	Reference
Echinacea  Note. Image generated using wepik tool	*Echinacea purpurea* (Family: Asteraceae)	Prevention of common cold. Stimulates the immune system.	When combined with drugs such as tizanidine or rasagiline, it can affect the blood levels of these drugs. It can slow down the breakdown of caffeine which could lead to side effects like headache, insomnia, and jitteriness.	(Izzo et al., 2016; Mehmood et al., 2019)
Devil's claw  Note. Image generated using wepik tool	*Harpagophytum procumbens* (Family: Pedaliaceae)	Used in managing inflammation- and oxidative stress-related diseases, including arthritis, osteoporosis, inflammatory bowel disease, low-back pain, diabetes, and neuro-degeneration.	May increase the risk of bleeding, especially if you already take blood thinners such as aspirin, warfarin, or clopidogrel. Devil's claw may lower blood sugar, must be used with caution with diabetic drugs. Devil's claw may increase the amount of stomach acid, making antacids less effective.	(Menghini et al., 2019; Brendler, 2021)

Table 2.4 cont.: Commonly documented TCAM-drug interactions.

Product	Biological source	Indication for medicinal use	Interactions with conventional drugs	Reference
St. John's Wort  Note. Image generated using wepik tool	*Hypericum perforatum* (Family: Hypericaceae)	Used for depression and relief of some symptoms in menopause. .	It's been shown to increase the removal of medicines, such as some oral contraceptives, from the body. It decreases the anticoagulant effect of warfarin. It reduces the plasma of co-administered cyclosporine, amitriptyline, digoxin, indinavir, nevirapine, theophylline or simvastatin. It is a powerful cytochrome P450 3A4 inducer and this pathway is cited as one of letrozole's metabolic routes. This suggests that the combination could lower letrozole concentration.	(Izzo et al., 2016; Gouws Chrisna, 2018; Borse et al., 2019)
Cancer bush  Note. Image generated using wepik tool	*Sutherlandia frutescens* (Family: Fabaceae)	Widely used in the treatment of diseases such as HIV/AIDS and TB.	Lower the plasma levels of the antiretroviral drug, atazanavir, to sub-therapeutic levels when they're taken together, reducing its anti-HIV efficacy.	(Katerere, 2018; Mncwangi et al., 2023)
Asafetida/Hing  (Choudhary, 2023)	*Asafoetida ferula* (Family: Umbelliferae)	Treats asthma Anti-inflammatory	Produce additive hypotensive effects. It has also been suggested that Asafetida may interact with anticoagulants.	(Hamzayeva et al., 2022; Qasim et al., 2023)

The category of TCAM registrations vary significantly amongst nations. Depending on the laws governing foods and medicines in each country, a plant, may be classified as a food, a nutrient-rich food, a dietary supplement, or as an herbal medicine (Frank et al., 2020). As a result, it is challenging to define the idea of herbal medicines for the purposes of national drug regulation. **Table 2.4** further outlines these categorized according to commonly used foodstuffs, beverages, culinary spices, essential oils, natural supplements, and a few TM from China, Africa and India.

2.2.6. Lack of history-taking practices to be inclusive of TCAM use

When treating a patient, history-taking is a vital step to direct care. History frequently reveals a diagnosis on its own. It is sometimes all that is required to make a diagnosis. Alrasheedi, (2018) showed that there are three key factors used to determine a diagnosis:

a. History obtained from the patient
b. Physical examination
c. Laboratory investigations

The history-taking process involves asking the patient about their signs and symptoms; allergies; medication they are currently taking; previous medical history; family history of chronic illness; last meal or last menstrual cycle and event history as a means to accurately select the best treatment option (Peart, 2022). It is customary to inquire about a patient's medical history during an initial consultation; however, during follow-up visits, this information might only need to be reviewed and updated to reflect any changes.

Alrasheedi, (2018) was conducted to evaluate the importance of history-taking, physical exams, and laboratory analyses. The investigated HCPs were asked to diagnose using patient history only; followed by the use of patient history along with physical examination. Of the 80 patients studied, 60 patients had an accurate diagnosis made entirely from history-taking. History-taking is one of the oldest and

most reliable diagnostic tools, and it can now be used to make between 70% and 90% of medical diagnoses, according to current estimates (Muhrer, 2014).

Pharmacists play an imperative role during history-taking, allowing them to identify possible drug-drug interactions or possible drug-herb interactions (Hassen et al., 2022). Despite the value of history-taking, patients are often only questioned about their medication history limited to over-the-counter (OTC) and chronic medicines relating to mainstream and accepted forms of therapy. This limitation is problematic, as it has been found that should a patient not directly be questioned on a supplement, vitamin, and TCAM by the healthcare professional, they are highly unlikely to willingly disclose this information (Jennifer et al., 2019).

The patient's failure to disclose their TCAM use to their HCPs and the absence of HCP inquiries on TCAM use, are the primary reasons why TCAM is not included in history-taking procedures (James et al., 2018; Agu et al., 2019; Sarada et al., 2021). Kelak et al, (2018) was conducted in 10 primary care clinics in Kuching, aimed toexplore patients' experiences and views on their decision to disclose the use of TCAMto the doctor. It revealed that patients thought that disclosing to their healthcare professional was crucial and it was their duty to let their doctors know if they use any TCAM, in turn, their doctors will know the TCAM that they are currently using or have used and will learn more about them. The main cause for concern highlighted in the study findings, was the doctor's lack of understanding of the risks, benefits, and scientific data of TM, therefore, causing patients to be unwilling to divulge their use ofTCAM due to the beliefs of their physician (Kelak et al, 2018). Another barrier observed in the study was fear of their doctors' negative feelings and perceptions on TCAM use, as well as concerns about a deteriorating doctor-patient relationship These findings were similar to a study in Lesotho and Freetown, Sierra Leone which supported the idea that the healthcare professional's negative attitude and perceived lack of understanding and support led to mistrust and stigma, which wasanother reason why TCAM usage was not disclosed (James et al., 2019; Mokhesi and Modjadji, 2022). Furthermore, the study in Lesotho report showed that patients were also reluctant to reveal their usage because

they were told not to use TCAM (26.0%), fear of HCPs (9.0%), poor communication (7.0%) and the common reason was the fear ofreceiving improper care from the healthcare professional. The percentage of TCAM use that was not disclosed to medical professionals ranged from 55.8% to 100.0%, with an average of 83.0% (Mokhesi and Modjadji, 2022). The average mentioned above is a major concern because studies have shown serious interactive potential of TCAM with conventional medicines. The potential for the combination use of TCAM with conventional drugs is worrisome.

In the majority of studies, the absence of enquiry about TCAM use by HCPs results in the assumption that disclosing such information is not necessary. This lack of disclosure has proven that possible serious TCAM-conventional drug interactions may occur amongst patients resulting in life-threatening interactions (James et al., 2018).

Clinical consultations are imperative to patient outcomes and safety. During a clinical consult, HCPs and THPs should be able to work together to review a patient's plan of care. However, there have been challenges to collaboration including negative attitudes towards each other; lack of mutual understanding; lack of knowledge of TCAM (Van Rooyen et al., 2015; van Rooyen et al., 2017; Lampiao et al, 2019).

2.3. Recommendations

Despite the above-mentioned challenges, TCAM is well-recognized globally, and demand for it is steadily rising. The following recommendations are made for TCAM integration and recognition in South African modern healthcare settings.

2.3.1. Embracing TCAM in healthcare practice and patient care

The biggest barriers to the usage of CAM were revealed to be a lack of knowledge and qualified specialists (Saha et al., 2017) therefore Studies have demonstrated a need to include TCAM in the curriculum of all programs for training health professionals

(Jamshed et al., 2016; Saha et al., 2017; Alehegn et al., 2022) - HCP's believe that learning about CAM would help them be more prepared to manage patients and are eager in doing so (Thandar et al., 2017); establishing a good communication channel with patients and feel that the future lies in the integration of TCAM within the health system (Bahall and Legall, 2017; Erchafo et al., 2022).

Studies suggest that mandatory awareness and educational campaigns for the public would be beneficial to further improve the KAP of patients on TCAM (Tawfik El-Olemy et al., 2020; Alqahtani et al., 2021).

2.3.2. Improvements to regulatory frameworks

Traditional, complementary, and alternative medicine must be acknowledged and governed similarly to all conventional medicines worldwide in order to support national strategic objectives for transformation. Governments ought to adopt laws that permit conventional health practitioners to use TCAM as an additional field of practice (Chikwari, 2019). It is imperative to take the diversity of the TCAM systems in SA and compare it with those countries with developed regulations. Conducting comparative studies of the regulatory framework of different countries would assist in the recognition and inclusion of TCAM in the National Healthcare System in SA.

The improvement of "safety, quality, and effectiveness" in the provision of TCAM care and TCAM's "integration into national healthcare systems" are among the principles promoting the WHO's regulatory recommendations. The Strategy advises that these objectives be met with a focus on "protecting the intellectual property rights of indigenous people and local communities and their healthcare heritage." (Ijaz and Boon, 2018)

2.3.3. Shared patient care

It is recommended to facilitate open communication between the two health

practitioners; a mutual understanding (represented by shifting attitudes and communication) was regarded as essential, and a shared sense of responsibility for the patient's well-being is the firmest basis for mutually beneficial collaboration (van der Watt et al., 2017; Peltzer and Pengpid, 2019).

2.3.4. TCAM pharmacovigilance

There is a need for the implementation or strengthening of PV programmes for TCAM. To overcome difficulties in implementation; workshops, and platforms for knowledge sharing should be created. A number of studies have developed some strategies for the implementation of an effective PV program for herbal medicine (Shrestha et al., 2020; Stegmann et al., 2022):

- Traditional, complementary, and alternative medicine practitioners should instruct users on how to utilize TCAM safely and effectively. The regulatory bodies will be able to assess this data to identify the risks and advantages of medicines and to decide what steps, if any, are required to improve their safe use.
- TCAM practitioners should offer a concise description of the key facts together with a critical assessment of the product's risk-benefit ratio in light of new or evolving information. This will assist in continuously updating a product's information.
- Pertinent research must be conducted on herbal medicine. Grants for research and financial incentives will promote education in the area of conventional herbal medicine and introduce PV concepts of herbals into the curriculum. The use of herbal products, their therapeutic uses, side effects, interactions with conventional drugs, and any potentially fatal cases listed should also be highlighted in educational programs aimed at all stakeholders, including Ayurvedic doctors, pharmacists, target users, and policymakers. This should be done on a regular basis as part of continuing professional development of the HCPS.
- Capacity must be improved to monitor herbal medicines at national PV centres

by ensuring access to facilities for assessing goods suspected of causing adverse reactions- and assuring access to trustworthy information.

- Expanding case reporting sources should involve all traditional and complementary/alternative medicine practitioners, enhancing the role of practitioners, including herbal medicine producers, facilitating consumer reporting, and developing information-sharing networks involving drug information centres, poison control facilities, consumer advocacy organizations, and manufacturers. Enhancing awareness and communication at all levels (global, regional, national, local, and community). Communication plays a vital role in reporting adverse drug reactions (ADR's) because patients fail to disclose their TCAM use to their HCWs and thus their HCWs are not aware of their use. Patients should be encouraged to let their doctors or pharmacists know whether they have ever previously or are now taking any herbal medications and before prescribing any medications, HCWs should be informedif their patients are using herbal supplements or for any other reason, and theyshould advise them on any potential interactions and side effects.
- History-taking practices should not be inclusive of prescription drugs and OTC drugs only but should also include TCAMs.
- The general public will benefit from having a simple and quick means to report ADRs associated with herbal products, and reporting forms should be made available online.
- The progress toward reaching the objective of safe herbal products will be enhanced by the involvement of all healthcare providers in herbal PV.
- Monitoring the results of any action taken against the reporting of ADRs is crucial for the proper implementation of the PV system. The network between PV centres, HCPs, patients, public and private healthcare facilities, and manufacturers is known as the PV system. Each of the stated facilities ought to cooperate with one another and take part in the reporting.

The mentioned recommendations would assist in the implementation of a TCAM PV system in SA however there are a few difficulties that need to be overcome. Particularly the fact that THPs are reluctant to share their knowledge because the majority of THPs

pass down their knowledge orally or written to trusted family members thus making it difficult to get a description of the key facts together with a critical assessment of the product's risk-benefit ratio. Additionally, another barrier is that people are unaware of how the reporting system currently works.

2.3.5. TCAM inclusive of history-taking practices

In the majority of the studies, the absence of enquiry about TCAM use by HCPs resulted in the assumption that disclosing such information is not necessary. There is a need to ensure that TCAM practitioners have the necessary education, training, and experience which will further assist HCPs and policymakers to take the necessary steps for history-taking guidelines or patient files to be inclusive of TCAM.

2.4. Conclusion

Given the rising incidence of TCAM usage, it is imperative to explore the challenges and opportunities that TCAM presents for healthcare. In order to fully integrate TCAM within the conventional health system, a couple of challenges need to be overcome particularly the regulatory framework of TCAMs. Comparison studies of national and international policies would enable inferences to be made and allow for future research

to be based on the differences and similarities of TCAM regulation, PV system, and the KAPs of HCPs and patients between the different countries. This would assist different countries to tackle a common issue; learn from other countries that have integrated TCAM within their healthcare system and address the gaps.

As much as TCAM and conventional medicine practices differ, they share the same goal. Both systems of medical care are aimed at treating and preventing illness and a combination of both practices would assist in achieving a more balanced level of healthcare. Healthcare professionals should actively look for symptoms that could indicate TCAM tolerance and look for signs that could indicate interactions between TCAM and conventional medicine.

CHAPTER 3: METHODOLOGY

This chapter provides a description of the study sites, research design, study population, sample size determination, sampling techniques, data collection methods, data quality control, data analysis, and ethical considerations.

3.1. Research design

A quantitative, cross-sectional, descriptive, self-administered survey method was employed to garner necessary data (KAP) from dispensing and prescribing HCPs. A descriptive study can either be quantitative or qualitative. In this study, a quantitative method was used. Setia (2016) described quantitative research as a method to produce reliable information that can be explained in detail using statistics and numerical data collected through polls, questionnaires, and surveys. According to Jones et al., (2013), surveys and questionnaires for medical research are essential instruments for learning about various perspectives in a large cohort. This is essential when a researcher is considering perceptions, beliefs, attitudes, or opinions (Siedlecki, 2020).

Participants' KAP can be determined using surveys. A KAP survey is often conducted togather data on knowledge (what is known), attitudes (what is thought), and behaviors (what is done) about general and/or particular patterns of a specific population (Sukanya et al., 2022). The purpose of a KAP study was explained above and this is in alignment with the purpose of this study which is to provide some insight into the need for interventions to ensure that conventional HCPs are equipped with the necessary training and resources to motivate history-taking practices to be more inclusive of TCAM.

A cross-sectional analysis was selected from among the numerous descriptive study types. A cross-sectional study is a type of observational study design. The participants

in a cross-sectional study are simply chosen depending on the inclusion and exclusion criteria established for the study (Setia, 2016).

3.2. Study instrument

3.2.1. Questionnaire design

"A questionnaire is more of science than art therefore is a set of questions with a space for answers used in assembling of information from respondents" (Etikan, 2017). Questionnaires could either be new or developed using other studies. Study tools documented in similar literature (Barikani et al., 2015; Qureshi et al., 2015; Bahall and Legall, 2017) were adapted for use in this study to develop the questionnaire, whereby self-administered questionnaire **(Appendix C)** was used. Due to the adaptions, it would be necessary to conduct a pilot study with the new survey tool (Cleave, 2021).

The questionnaire used close-ended questions to assess the knowledge of HCPs. These questions were either "Yes" or "No" answer type questions, or participants were required to select from a list of options. The participant had to choose one answer that most applied to them unless stated otherwise on the instruction of the specific question.

To determine the attitudes, perceptions, and practices of participants on TM use, a five-point Likert scale was used, unless stated otherwise. This method had five options of, ''strongly disagree, ''disagree'', ''neutral'', ''agree'' and ''strongly agree'' ranging from a score of one to five, respectively.

The questionnaire comprised of four sections indicated below:

- Part 1: Demographic information (where the classifications for comparative analysis was included);
- Part 2: Determining the knowledge of participants (Including questions about the participant's knowledge of TCAM, and if they had any form of training on TCAM);
- Part 3: Determining the attitudes and perceptions of participants (Including questionsabout the participants' willingness to support TCAM integration and if

they regard TCAM as safe or not);

- Part 4: Determining current practices of participants will be included (Including questions about their willingness to discuss TCAM during consultations).

The questionnaire had a clear division of these sections. An information sheet **(Appendix D)** adapted from the University of the Witwatersrand template to provide further information to those invited to participate in the study was presented alongside the questionnaire.

3.2.2. Validity of the instrument

Due to survey tool adaptation, the questionnaire was piloted for validity. A methodology's validity is determined by how precisely it captures the variable it aims to measure (Turner et al, 2017). Face validity of the questionnaire wasdetermined by subject matter experts, which included three academic staff in the Department of Pharmacy, with research experience in the field. The questionnaire used for the data collection exercise was modified according to the subject expert's comments.

3.2.3. Reliability of the instrument

According to Ahmed and Ishtiaq (2021), the consistency of a method used to measure something is referred to as reliability. If the same result can be consistently obtained using the same approach under identical circumstances, the measurement is said to be reliable. One technique to ensure the instrument's reliability is to employ recognized measures. This study therefore adopted questions from existing tools to form a questionnaire.

3.2.4. Pilot Study

According to In (2017), a pilot study is carried out on a smaller scale than the primary or comprehensive investigation. The pilot study is crucial for enhancing the effectiveness and quality of the main study. Twenty-three (10% of sample size – Viechtbauer et al., 2015) academic staff members and postgraduate students (Masters and PhD students) in the Department of Pharmacy and Pharmacology undertook the pilot study. All pilot study participants have been exposed to training to become a healthcare professional and have been exposed to subject matter in training or teaching activities.

Participants were asked to time themselves and write down how long it took to fully complete the survey. The times varied from 20 to 30 minutes, providing the estimated time it would take for study participants to complete the questionnaire during the data collection phase. The pilot study was also used to ascertain whether the items were structured in a reasonable, clear, and unambiguous manner that was easily understood by the participants. Questions flagged as unclear in the pilot study were re-worded accordingly. The final questionnaire, approved by the Human Research Ethics Committee (HREC) – medical at the University of the Witwatersrand (**AppendixE**), was then captured by the researcher on an application known as REDCap® to allowfor easier data collection and accurate downloadable captured data.

3.3. Study population and study site

3.3.1. Study population

The two groups' of study participants included that of prescribing HCPs (listed below) and dispensing HCPs (listed below), working at the selected study sites. A total of 233 prescribing and dispensing HCPs participated in the study.

Inclusion criteria

The inclusion criteria for study participants have been detailed below:

- Registered authorised prescribing HCPs: General medical practitioners; general medical practitioners in training; dentists; dentists in training; clinical associates; clinical associates in training; emergency care practitioners; emergency care practitioners in training; surgical practitioners; surgical practitioners in training; optometrists; optometrists in training; dermatologists; dermatologists in training; psychiatrists; psychiatrists in training.
- Dispensing HCPs: Pharmacists; pharmacists in training; pharmacist assistants.
- Resident and rotating staff, along with dispensing and prescribing interns under supervision; dispensers and prescribers completing community service under supervision and dispensing and prescribing students in their undergraduate.

Exclusion criteria

Exclusion criteria related to participants who were not authorised and registered as practicing prescribers or dispensers in SA with their necessary regulatory bodies. Any questionnaire that was not fully completed (or less than 80%) were excluded from the data analysis. If a participant decided to withdraw after the commencement of the survey, they were permitted to do so and the partially completed survey was excluded from analysis.

3.3.2. Study site

The study took place at three public, academic hospitals in Gauteng (Johannesburg), namely, Chris Hani Baragwanath Academic Hospital (CHBAH) in Soweto, Helen Joseph Hospital in Auckland, and Charlotte Maxeke Johannesburg Academic Hospital (CMJAH) in Parktown. These hospitals provide services to regions with a population of over a million patients, serving the medium to low-income segment of the population. The use of TCAM is often found to be more prevalent in lower-income populations, due to accessibility, availability, and affordability factors, and hence public hospitals were

selected as the ideal study sites. Furthermore, CHBAH, CMJAH, and Helen Joseph Hospital are teaching hospitals and are in close proximity to the largest muthi markets that are rapidly expanding in the Johannesburg region to support the traditional medicine needs of the population.

3.4. Sampling and study recruitment

3.4.1. Sample size estimation

The sample size was calculated using the Roasoft sample size calculator. According to the CHBAH official website, an average of 182 prescribing and dispensing HCPs are employed permanently at the public hospital. This does not include the additional rotational staff, interns, and students. Therefore, 182 was used as the baseline figure, which was multiplied by three, providing a population of 546 HCPs (either prescribers or dispensers) across all three hospitals. A sample size of 226 participants was calculated, using the online Roasoft sample size calculator (Raosoft).

$$N = \frac{z^2 p(1-p)}{d^2}$$

Equation 3.1: Sample size calculation. N = Sample population size; z = statistical level of confidence (95%); p = Expected proportion of sample with particular characteristics (p = 0.5); d = margin of error (d = 0.05).

3.4.2. Sampling method

Participants were recruited according to a non-probability, convenience sampling procedure. Sample selection was based on who was accessible on the days of data collection. Participants were chosen based on who was available at a given time, or who was willing to participate in the research. The response rate was calculated based on the number of responses received in relation to the number of participants invited to partake in the survey. There was a total of 233 complete responses garnered from

300 surveys administered, surpassing the initially intended sample size of 226. However, upon analysis, only 188 responses met the criteria for inclusion in the study administered (63.0% response rate).

3.5. Data collection procedure

Data was collected from January 2023 until the end of May 2023, with study sites visited once a week. Authorised prescribing and dispensing HCPs were made aware of the study in advance, in which they could voluntarily participate. Management of the hospitals assisted with making staff aware of the study. Appointments were also set via email or phone call or in-person to the various heads of departments, secretaries, pharmacy managers, responsible pharmacists, administrative officers, and class representatives. Once appointments were set, data collection commenced. The dispensers were approached at the different pharmacy departments including the outpatient department (OPD) pharmacy, oncology pharmacy, ARV dispensing pharmacy, paediatric pharmacy, and cardiology pharmacy at all three hospitals. Prescribing HCPs were approached at the different wards in the hospital including but not limited to the casualty, burns, intensive care units (ICU), maternity, paediatric, medical, and surgical wards.

A self-administered questionnaire was administered through the provision of a mobile tablet with the questionnaire available on REDCap® for response capturing. The participants had the option to complete the questionnaire by themselves on the device provided or alternatively, the researcher was available to assist and there were additional hard copies of the questionnaires for completion if needed. The survey was completed at the participant's own pace and took approximately 20 to 30 minutes to complete.

3.6. Ethical considerations

Clearance to conduct this study was obtained at the University of Witwatersrand

through the Human Research Ethics Committee (HREC)-medical prior to commencement of data collection **(Appendix E).** Permission from the CEO of Chris Hani Baragwanath Hospital, Helen Joseph Academic Hospital, and Charlotte Maxeke Johannesburg Academic Hospital, were obtained **(Appendix F)**. The study was also registered on the National Health Research Database (NHRD) online (Reference: GP 202207 060) **(Appendix G)**. Once all the approvals were granted from the ethics committee and the study sites, data collection commenced in accordance with ethical principles and facility COVID-19 safety protocols. A short ethics course (Research Ethics Evaluation) was completed in 2021 **(Appendix H)** to ensure complete ethical conduct throughout the research study.

i. Participants right to privacy and refusal to participate

Participation during data collection was voluntary and participants were allowed to withdraw from the study at any point in time should they need to attend to work duties and patients. Participants were also allowed to complete the questionnaire at a time most convenient to them.

ii. Participants right to anonymity and confidentiality

No personal identifiers were requested in the survey and no photographing of participants took place. Due to the anonymity of the process, no consent form was issued for signing by participants, however, consent was conferred through the voluntary completion of the survey and a tick-box consent option at the start of the digital questionnaire.

3.7. Data analysis

All questionnaires were coded and assessed for errors. For the knowledge section, there were 6 questions that required a yes or no response. “No” was scored as 0 and a “yes” was scored as a 1. A Likert scale (strongly disagree (1); disagree (2); neutral (3); agree (4); and strongly agree (5)) was used for the attitudes, perceptions and

practice sections. The total score, each for knowledge, attitudes, and practices, was generated as a sum of the responses with a total score of 6 representing the highest knowledge, a score of 70 (14 questions x 5) for attitude representing the most positive attitude, and a score of 85 (17 questions x 5) representing the most positive practice. Overall knowledge responses were determined as poor knowledge (score < 3) or good knowledge (score >3). Overall attitude responses were determined as either negative (score <35) or positive (score >35). Overall practice response was determined as either poor (score <42,5) or good (score >42,5). Furthermore, ordinal recoding was performed, combining “strongly disagree” and “disagree” into one category (disagree); “agree” and “strongly agree” into another category (agree) and relabelling “neutral” and “uncertain”, effectively transforming the 5-point Likert scale into a 3-point Likert scale (Chakrabartty, 2023). The total scores of KAP were analysed as a continuous variable and also summarised as means. As categorical variables, the questions were summarised as frequency and percent. To compare the mean values of any of the total scored between two groups, a t-test statistical analysis was used. Relationships between categorical variables were assessed using a chi-square test. A multiple linear regression model was used to assess factors associated with each of the total scores (KAP). All analyses were performed using STATA version 14 (StataCorp, USA) and statistical significance was determined at the 5% level of significance. Assistance from a qualified biostatistician Lukhanyo Nyati from Chris Hani Baragwanath Academic hospital was garnered to assist with running statistical analyses tests, as well as advising on the scoring system to be applied in the data cleaning process.

3.8. Conclusion

This chapter discussed the methodology used for the study to determine the KAP of authorised prescribing and dispensing HCPs on TCAM use among the patient populations served at the respective study sites in Gauteng. A quantitative, cross-sectional, descriptive, self-administered survey method was used to garner necessary data from study participants. The questionnaire for use in this study was adapted from previous similar studies (Bahall and Legall, 2017; Barikani et al., 2015; Qureshi et al.,

2015). Additionally, the ethical considerations were discussed to ensure complete ethical conduct throughout the research study. Data collection procedures and data analysis were also presented.

CHAPTER 4: RESULTS AND DISCUSSION

This chapter presents the results of the study and discusses findings related to the KAP of prescribing and dispensing professionals on TCAM use among patients. This study further investigates whether demographic factors are associated with the KAP of HCPs in relation to TCAM. Considering evidence showing potentially dangerous interactions between TCAM and conventional medications, as well as the estimated high prevalence of TCAM use in SA, this study determined the current practices of prescribers and dispensers concerning TCAM use among their patients. Information arising from this study would provide some insight into the need for interventions to ensure that conventional healthcare providers are equipped with the necessary training and resources to motivate for history-taking practices to be more inclusive of TCAM.

4.1. Demographic characteristics of the study participants

The demographic characteristics of study participants are presented in **Table 4.1**. There was a total of 233 complete responses garnered from 300 surveys administered, surpassing the initially intended sample size of 226. However, upon analysis, only 188 responses (n=188) met the criteria for inclusion in the study (68.0% response rate). The achieved response rate of 63.0% remains within the range typically deemed suitable for survey-based study and raises pertinent consideration regarding the representativeness and reliability of the collected data (Babbie, 2016; Wu et al, 2022). The majority of the participants were between 18 and 30 (112, 58.9%) years of age with most respondents being female (112, 58.9%), outnumberingmale participants (78, 41.1%). More than two-thirds (129, 67.9%) of the participants were black and were of Christian religious backgrounds (127, 66.8%). Considering that the study was undertaken in hospitals in Gauteng, the majority of the participants wereSouth African (182, 95.5%). The study had more dispensing HCPs (120, 63.8%) as compared to prescribing personnel. The majority of the HCPs were from the pharmacy(119, 63.3%) namely outpatient pharmacy, inpatient pharmacy, oncology pharmacy, paediatric pharmacy, cardiology pharmacy, and antiretroviral pharmacy. The university

or training facility attended by the HCPs is presented in the table below. The university or training facility attended plays a significant role in shaping HCPs KAP regarding TCAM.

Table 4.1: Demographic characteristics of the study participants (n=188).

Variable	Frequency n (%)
Age group	
18 - 30	111 (59,0)[1]
31 - 40	51 (27,1)
41 - 54	21 (11,2)
55 +	5 (2,7)
Sex	
Female	110 (58,5)
Male	78 (41,5)
Other	0 (0.0)
Ethnicity	
Black	127 (67,6)
Asian	32 (17,0)
White	29 (15,4)
Religion	
African traditional belief	17 (9,0)
Christian	125 (66,5)
Hindu	11 (5,9)
Jewish	5 (2,7)
Muslim	17 (9,0)
Other	13 (6,9)
Nationality	
South African	180 (95,7)
Other	8 (4,3)

Profession practice (scope)	
Prescribing	68 (36,2)
Dispensing	120 (63,8)
Ward	
Specialisation unit	9 (4,9)
Surgical ward	8 (4,3)
ICU	4 (2,1)
Paediatric ward	8 (4,3)
Casualty	9 (4,8)
General medical ward	13 (6,9)
Pharmacy	119 (63,3)
Psychiatric ward	4 (2,1)
Burns ward	1 (0,5)
Maternity ward	2 (1,1)
Other	11 (5,9)
University or training facility attended	
University of the Witwatersrand	68 (36,2)
University of Pretoria	6 (3,2)
University of Cape Town	5 (2,7)
Sefako Makgatho Health Sciences University	20 (10,6)
University of KwaZulu-Natal	6 (3,2)
Nelson Mandela Metropolitan University	2 (1,1)
Rhodes University	8 (4,3)
Health Sciences Academy	45 (23,9)
North-West University – South Africa	3 (1,6)
University of the Western Cape	3 (1, 6)
Tshwane University of Technology	2 (1,1)
Other	20 (10,6)

*The blue options are those reflecting the highest number of participants.

4.2. Factors associated with TCAM use

Some demographic factors are often associated with TCAM knowledge. Participant age was significantly associated with knowledge in the current study (**Table 4.2**). This finding was also reported in a similar study conducted to assess the KAP towards CAM in the United Arab Emirates (Aljawarneh et al., 2023). Older health professionals irrespective of discipline (31-to-40 years and >41 years) had significantly lower knowledge of TCAM than younger health professionals (18-to-30 years). This observation underscores the influence of age as a significant factor in shaping HCPs familiarity with TCAM. It implies that younger professionals may have been exposed to more recent education, training, or resources related to TCAM, leading to a higher level of understanding compared to older HCPs. Understanding this age-related disparity in TCAM knowledge is crucial for developing targeted educational interventions or professional development programs aimed at improving TCAM literacyamong HCPs, particularly those in older age groups. Current study findings reflected that dispensing professionals had a significantly more positive attitude towards TCAM use than prescribing professionals. This suggests a greater openness among dispensing HCPs to integrating TCAM with conventional medicine, highlighting the importance of interdisciplinary collaboration for holistic patient care. There were no significant associations with practice (**Table 4.2**).

Table 4.2: Factors associated with knowledge, attitude, and practice.

Variables	Knowledge	Attitude	Practice
Participant age (Ref: 18 – 30)			
31 – 40	**-0.468*[2]**	-1.220	-1.752
	(-0.902 - -0.0338)	(-3.162 - 0.722)	(-4.692 - 1.187)
41+	**-0.663***	-0.733	-1.755
	(-1.228 - -0.0976)	(-3.245 - 1.779)	(-5.556 - 2.047)
Sex (Ref: Female)			
Male	0.184	0.853	0.685
	(-0.210 - 0.579)	(-0.909 - 2.615)	(-1.981 - 3.352)

*The red options are those reflecting significant values.

Religion (Ref: Christian)			
African	-0.0102	-0.838	-1.330
	(-0.697 - 0.676)	(-3.959 - 2.282)	(-6.053 - 3.392)
Muslim	0.182	-1.928	4.068
	(-0.484 - 0.848)	(-4.885 - 1.030)	(-0.408 - 8.545)
Hindu, Jewish and other	-0.0741	-1.918	-0.475
	(-0.618 - 0.470)	(-4.332 - 0.496)	(-4.128 - 3.178)
Profession (Ref: Prescribing)			
Dispensing	0.212	**3.697*** **	-1.466
	(-0.191 - 0.614)	(1.907 - 5.486)	(-4.15 - 1.242)
Observations	188	186	186
R-squared	0.054	0.124	0.041

Where, ci in parentheses (e.g. under profession: the attitude of dispensing HCPs is compared to the Ref: prescribing HCP)

*** p<0.001, ** p<0.01, * p<0.05

In **Table 4.3**, the results reflect no significant differences in the total score for knowledge, estimation of the prevalence of TCAM use, and total score of practices between prescribing and dispensing HCPs. This suggests that both prescribing and dispensing HCPs have similar levels of understanding regarding TCAM, as evidenced by their comparable knowledge scores in **table 4.3**. Additionally, their practices related to TCAM revealed no significant disparity. Overall, these findings suggest a uniformity in their engagement with TCAM-related issues, highlighting the importance of considering both prescribing and dispensing roles in initiatives aimed at enhancing TCAM integration into healthcare systems. However, dispensing HCPs had a significantly more positive attitude ($p < 0.001$) towards TCAM use than prescribing HCPs. Majority of HCPs (129, 69.0%) had poor knowledge of TCAM, while 90% (n = 170) had positive attitudes, and the HCPs were considered to have good practice (123, 65.0%).

Table 4.3: Differences in knowledge, attitudes, and practices of prescribing and dispensing professionals with respect to TCAM. Results are presented as mean (±SD) and compared with t-test, unless otherwise stated.

	Prescribing	Dispensing	P-value
N	68	120	
Perceived prevalence of TCAM use	49.14 (19.30)	53.30 (19.90)	0.290
Knowledge score	1.74 (□1.22)	1.94 (□1.36)	0.286
Attitudes score	47.10 (□6.51)	50.90 (□5.26)	<0.001
Practices score	55.4 (□8.33)	53.8 (□8.91)	0.208

Overall, as shown in **Table 4.4** below the mean knowledge score for the entire study was 1.87 (□1.31); the mean attitude and perceptions score was 49.52 (□6.03); and the mean practice score was 54.39 (□8.72).

Table 4.4: Mean scores for knowledge, attitudes and perceptions, and practices of healthcare professionals at the hospitals. Data presented as mean (±SD)

Variable	Maximum Score Possible	Achieved Score
Knowledge	6	1.87 (□1.31)
Attitudes & Perception	70	49.52 (□6.03)
Practices	85	54.39 (□8.72)

The Spearman rank correlation revealed significant positive linear correlations between knowledge-attitudes ($p < 0.05$), knowledge-practices ($p < 0.05$), and attitudes-practices ($p < 0.05$) (**Table 4.5**). This finding was also reported by Alehegn et al., (2022), a KAP study of CAM among graduating medical and health sciences students at the University of Gondar which revealed significant positive linear correlations

between knowledge-attitude (r = 0.155, p < 0.001), knowledge-practice (r = 0.513, p < 0.001), and attitude-practice (r = 0.224, p < 0.001). Another KAP study towards CAM in the United Arab Emirates reported a significant correlation knowledge and attitude toward CAM (*r* = 0.149, *p* < 0.001) (Aljawarneh et al., 2023). As shown in **Table 4.5** there was no significant correlation between practice and knowledge and this finding is consistent with that of Ilori et al., (2021) whose findings showed a negative correlation between practice and knowledge, and this may be due to the lack of data supporting TCAMs' effectiveness.

The greater the HCP's knowledge, the greater the likelihood for a positive attitude and practice of HCPs towards TCAM and its' use amongst patients to be consulted. Furthermore, HCPs practices are influenced by their attitudes. The behaviours and attitudes of HCPs, which are frequently associated with religious and/or cultural beliefs or their confidence in their knowledge and skills, play a significant role in shaping the content and quality of care provided (Tumwine et al., 2020). Attitudes influence treatment choices and recommendations; shape patient-provider interactions and trust; adoption of new practices; teamwork and collaboration; cultural competence and professional development (Price, 2015; Dapaah, 2016; Kumra et al., 2020). Therefore, identifying these effects is essential for improving patient care and fostering a safe integration of TCAM with conventional medicine.

Table 4.5: Correlation between knowledge, attitudes, and practices of TCAM.

	Knowledge	**Attitudes**	**Practices**
Knowledge			
Attitudes	0.23**		
Practices	0.16*	0.16*	

*p<0.05; **p<0.01

4.3. Descriptive information on the participants' knowledge of TCAM

In **Table 4.6**, most participants (104, 55.3%) reported that they were aware of the prevalence of TCAM use among the South African population whilst 98 (51.1%) participants stated that they were unaware of the potential interactions between TCAM and conventional medicines.

Table 4.6: Assessment of knowledge pertaining to TCAM use amongst their patients being attended to (n=188).

Knowledge related questions	Yes n (%)	No n (%)
Are you aware of the prevalence of TCAM use among the South African population?	104 (55.3)	84 (44.7)
Are you aware of any potential interactions between TCAM and conventional medicines that you may prescribe or dispense?	90 (47.9)	98 (52.1)
Do you know the most commonly used traditional medicinal plants in South Africa?	62 (33.0)	126 (67.0)
Are you fully informed of the available TCAM products commercially available?	31 (16.7)	155 (83.3)
Have you had any form of training on TCAM use (undergraduate curriculum or courses)?	53 (28.5)	133 (71.5)
Do you know of any medical journals or other scientific platforms to source information on TCAM?	11 (5.9)	175 (94.1)

The findings are contrary to that of Vankova, (2023) where it was found that, 24% of the HCPs were aware and knowledgeable of CAM use, while 71.0% indicated inadequate knowledge of CAM use. The majority (126, 67.0%) of the participants knew of the most commonly used herbal products in SA. A few herbals were mentioned including cannabis (*Cannibs sativa*), *Aloe vera* (*Aloe barbadensis)*, Moringa (*Moringa oleifera*), St John's wart (*Hypericum perforatum)*, garlic (*Allium sativum)*, ginger (*Zingiber officinale*), and turmeric (C*urcuma longa*). The results of this study showed that HCPs had poor knowledge of TCAM (129, 69.0%). This finding was also reported ina study conducted at Gonabad University which showed that the medical students'

knowledge of CAM was low and considering that future roles in health facilities and hospitals will require medical university students to be aware of CAM, it is imperative that medical students are also knowledgeable about CAM treatments, as well as any associated risks, side effects, and potential consequences (Hooshangiet al., 2017). In another study conducted on nursing students registered at a large public university in Gauteng SA, reported that the majority of the nursing students had little to no knowledge of CMs (van Rensburg et al, 2020). A study aimed at assessing the KAP of Australian doctors, nurses, and pharmacists regarding CAM, revealed that the majority of respondents (68.4%) believed their knowledge of CAM was insufficient, which further leads to a lack of confidence in advising patients and issues about patient safety regarding CAM (Keene et al., 2023). On the contrary, in a study conducted on HCPs in public health facilities of Hadiya Zone, South Ethiopia, reported 65.4% of HCPs were found to have good knowledge of CAM (Erchafo et al.,2022) and a study conducted on pharmacy and nursing students in the University of Oman found that 54.4% of the pharmacy students had good knowledge of CAM (Al- Hinai et al., 2018). Each country has quite different regulations regarding the use of TCAM, the prevalence of TCAM and its integration into biomedical practice vary from one country to another, and this may be the cause of the difference in knowledge in the aforementioned studies.

Most of the HCPs (90, 52.1%) partaking in this current study were not aware of any potential interactions between TCAM and conventional medicines and this may be due to not receiving any form of prior training, either in their undergraduate degree or attending a course on TCAM-drug interactions and overall TCAM self-use. A study aimed at understanding the knowledge and beliefs about the consumption of herbs/supplements and herb/drug–supplement interactions, identified that theabsence of regulations on herbal products and supplements posed a challenge in evaluating their safety and potential for herb-drug interactions (Dores et al., 2023). Therisks of TCAM-drug interactions include toxicities, life-threatening effects, therapeutic

failure, and death (Knechtet al, 2020). Safety issues around TCAM isthe main problem in integrating TCAM within the health system, there's a need to evaluate the safety of TCAM based on reliable scientific data (Lee et al., 2022).

Furthermore, most HCPs had no form of training on TCAM (133, 71.5%) in the current study undertaken. These findings were consistent with a similar study conducted in Saudi Arabia, Jamaica and Uganda (Alfred and Kizito, 2021; Al-Yousef et al., 2022; Kwak et al., 2021). However, a study aimed to conduct a needs assessment for CAM education identifying the KAP among university students and primary care professionals, found that 84.2% physicians; 63.4% pharmacists and 66.2% medical students had received previous training on CAM (Vankova, 2023). The form of training on TCAM and the extent of the training differs greatly by country as each country has different TCAM systems in place. The majority (175, 94.1%) of HCP participants in the current study were unaware of any medical journals or other scientific platforms to source information on TCAM, to the few HCPs that agreed (11, 5.9%) The following sources were mentioned as platforms to obtain information on TCAM: MIMS Complementary Medicine, Journal of Alternative and Complementary Medicine, Himalaya handbook, Credo Mutwa books, and the Open Public Health Journal. **Figure 4.1** below highlights key findings on knowledge questions.

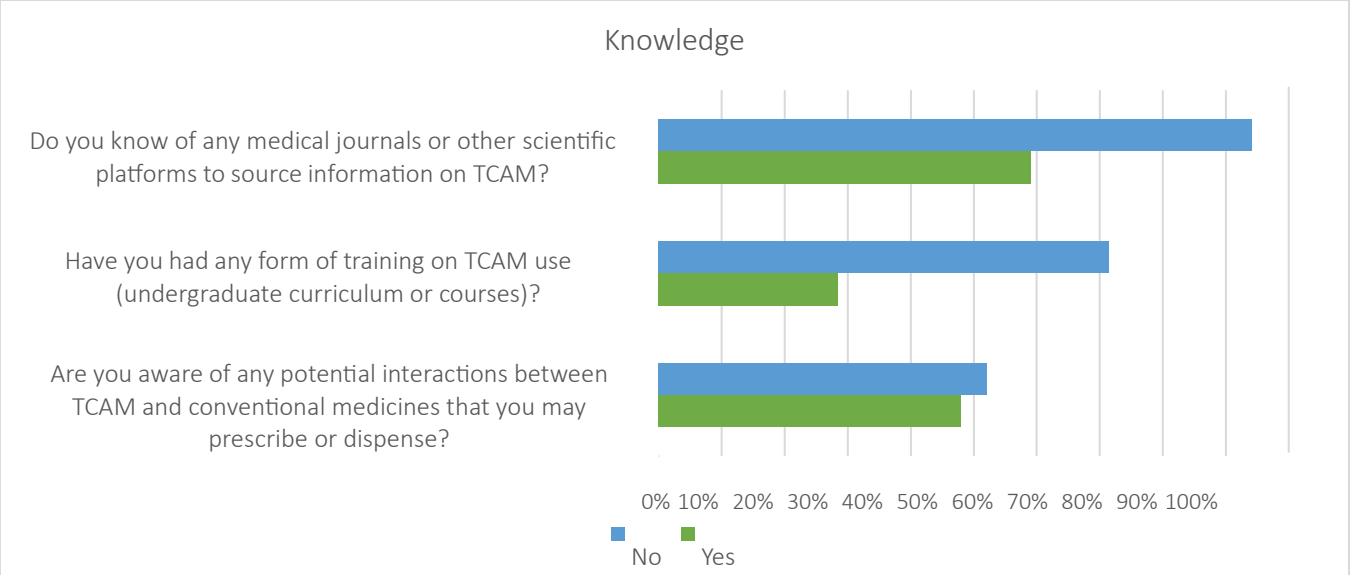


Figure 4.1: HCPs response for knowledge on TCAM(n=188)

4.4. Participants attitudes and perceptions towards TCAM

The results show that most participants found TCAM use to be acceptable in most circumstances, as shown in **Table 4.7**.

Table 4.7: Assessment of HCP's attitudes and perceptions pertaining to TCAM use.

Attitude and perceptions questions	**Agree n (%)**	**Uncertain n (%)**	**Disagree n (%)**
I feel TCAM use is regarded as being acceptable as therapeutic alternative to conventional medicines.	89 (47.8)	60 (32.3)	37 (19.9)
I feel TCAM use is regarded as being acceptable for concomitant use with conventional medicines.	83 (44.6)	43 (23.1)	60 (32.3)
I feel TCAM use is regarded as being acceptable on request by the patient.	114 (61.3)	44 (23.7)	28 (15.1)
I feel TCAM use is regarded as being acceptable not acceptable under any circumstances	23 (12.4)	41 (22.0)	122 (65.6)

Attitude and perceptions questions	Agree n (%)	Uncertain n (%)	Disagree n (%)
I believe that TCAM used by my patients is safe as it is considered “natural”.	50 (26.9)	69 (37.1)	67 (36.0)
I believe that I would treat patients referred to me by TCAM practitioners without judgement.	122 (65.6)	42 (22.6)	22 (11.8)
I feel that TCAM incorporation into the health system would enhance patient care.	116 (62.4)	49 (26.3)	21 (11.3)
I would support incorporation of TCAM in the medical curriculum.	129 (69.4)	37 (19.9)	20 (10.8)
I feel that integration of TCAM and conventional medicine will never be possible.	31 (16.7)	47 (25.3)	108 (58.1)
I feel it necessary to enquire on TCAM use in my history taking before prescribing or dispensing conventional drugs.	159 (85.5)	19 (10.2)	8 (4.3)
I feel that all healthcare professionals should question patients on their TCAM use.	158 (84.9)	20 (10.8)	8 (4.3)
I feel that guidelines for patient history taking and patient file records are not inclusive of TCAM use.	120 (64.5)	35 (18.8)	31 (16.7)
I am annoyed when I find out my patients are using TCAM without telling me.	27 (14.5)	36 (19.4)	123 (66.1)
I feel that I have sufficient knowledge on TCAM use among my patient population.	33 (17.7)	42 (22.6)	111 (59.7)

Overall, the participants showed a positive attitude and perception of TCAM use (170, 90.0%). The majority of the participants (116, 62.4%) believed that TCAM incorporation into the health system would enhance patient care. This study corroborates findings from previous studies (e.g. Ashraf et al., 2019; Belachew et al., 2017; Kwak et al., 2021). This response contradicted findings of a study conducted in Pakistan, where most participants opposed the integration of CAM and conventional medical practices (Tahir et al., 2023). This may be due to the difference in knowledge of HCPs; the difference in the regulatory framework of TCAM in countries and the uncertainty of the safety of TCAM seeing that there is a lack of an evidence-based approach to TCAM. Most HCPs agreed (129, 69.4%) to support the incorporation of TCAM in the medical

curriculum. This study supports evidence from previous observations (Agrawal et al., 2019; Ashraf et al., 2019; Tahir et al., 2023; Vankova, 2023).

Healthcare professionals were questioned if they felt annoyed when they found out that their patients were using TCAM without informing them, 123 (66.1%) of HCPs disagreed and this could be due to HCPs lack of extended understanding on TCAM use and possible interactions between TCAM and conventional medicines. This study showed that most (111, 59.7%) HCPs felt that they do not have sufficient knowledge of TCAM use among their patient population and this may further cause HCPs to be reluctant to enquire about TCAM use during history-taking practices. However, the majority (159, 85.5%) of HCPs felt that it was necessary to enquire about TCAM use in history-taking before prescribing or dispensing conventional drugs. Healthcare professionals indicated agreement (120, 64.5%) that current guidelines for patient history-taking and patient file records are not inclusive of TCAM use, which further emphasises the need for the development of policies in relation to facility-based history-taking practices and record-keeping. Furthermore, this result also highlights the need for undergraduate or other trainings to be more inclusive of TCAM content, not only for patient safety, but to equip HCPs with necessary skills to evaluate the potential for interactions with the conventional medicines that they may be dispensing or prescribing. **Figure 4.2** below highlights key findings on attitude and perception questions.

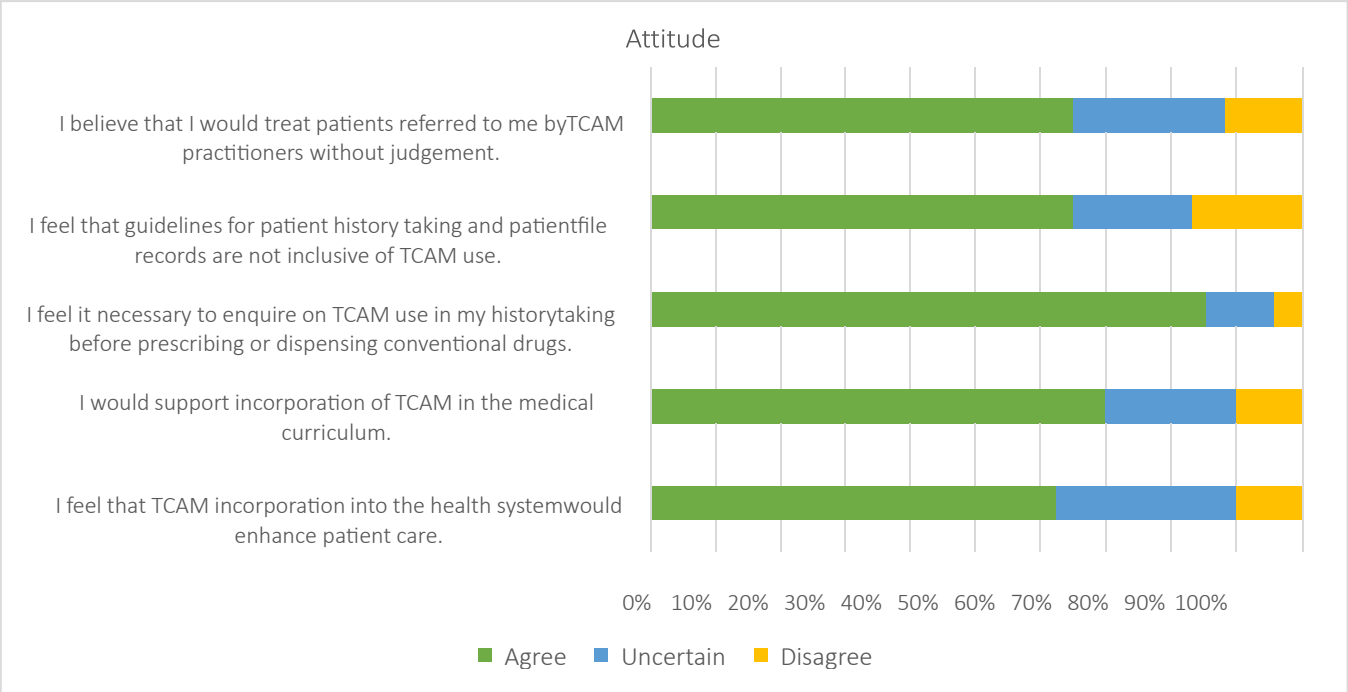


Figure 4.2: HCPs response distribution for attitude and perceptions of TCAM

4.5. Current practices of HCPs in relation to TCAM

With respect to current practices of the study participants in relation to their patients making use of TCAM, approximately half of the participants 104 (55.9%) considered the use of TCAM personally in the past (104, 55.9%), as shown in **Table 4.8**, despite being healthcare professionals practising in the conventional healthcare setting. Healthcare professionals' personal use of TCAM has been shown to influence their ability to refer patients to TCAM practitioners and their attitudes and perceptions on the integration of TCAM therapies into standard medical practices (Alfred and Kizito, 2021). A few (80, 43%) HCPs would enquire about TCAM use during history-taking practices. This finding was also reported by (Al-Yousef et al., 2022; and Kwak et al., 2021). Findings to a similar study undertaken in North Western Uganda among nurses and midwives showed that of the total respondents, 193 (72.0%) indicated the common practice of enquiring on TCM use amongst their patients when in consultations (Alfred

and Kizito, 2021). Furthermore, Alfred and Kizito (2021), found that the respondents were more concerned about the delay in their patients' seeking treatment (55.7%) rather than the drug interactions with TCM (20.8%), side effects (17.2%), and efficacy of TCM (4.7%). Healthcare professionals could be hesitant to enquire because of their poor knowledge of TCAM and inability to effectively evaluate potential for interactions between the disclosed TCAM and the conventional medicines being prescribed or dispensed (Gall et al., 2019).

Healthcare professionals from the current study (108, 58.1%) have identified cases whereby their patients are using TCAM in conjunction with conventional drugs. This is worrisome as studies are showing potential TCAM-drug interactions (Oga et al., 2016; Azizah et al., 2021; Tsele-Tebakang et al., 2023). A limited number (83, 44.6%) of HCPs responded with disagreement that they often discuss TCAM use with their patients. A study conducted in Western Saudi Arabia found that a minority (39.4%) of patients felt it important to consult their medical doctor or a pharmacist before using herbal medicines (Zaidi et al., 2022). Despite a minority agreeing, patients need to be able to discuss their use of TCAM with their HCPs and HCPs should be competent and equipped with tools needed to advise against combination use. Furthermore, a total of 104 (55.9%) of the study population did not receive any training on drug interactions between TCAM and conventional medicines and the majority of HCPs (112, 60.2%) had no access to databases pertaining to TCAMinteractions with conventional medicines.

When participants were questioned on whether patients have indicated that they had been referred to the conventional healthcare facility by a TCAM practitioner, HCPs agreed (88, 47.3%) or were uncertain (56, 30.1%). The uncertainty may be lack of purposive questioning in history-taking and hence resulting in unintended non-disclosure from patients. Alternatively, uncertainty may be the resultant factor of the stigma associated with TCAM use and fear of patients being judged by HCPs on their

choice of treatment (James et al., 2018), thereby intentionally not disclosing their use of TCAM. A few (80, 43%) HCPs disagreed that they had experienced patients freely disclosing their TCAM use during consultation. According to Zakaria et al. (2021), patients did not disclose their TCM use because they believed that their doctors would disapprove, and patients considered it was not important for their HCP to know. Healthcare professionals surveyed in the current study (119 ,64.0%) disagreed with referring patients to TCAM practitioners and this finding was consistent with that of Kwak et al. (2021), where approximately 95% of HCPs said that they would not refer their patients to an herbalist or traditional medicine provider. Patients should be treated holistically, being able to meet their physical, emotional, mental, spiritual, and social needs (Ambushe et al., 2023). Conventional HCPs and TCAM practitioners need to have a mutual referral system in place in which practitioners refer patients to colleagues with different specialties or treatment modalities when they encounter conditions beyond their scope of practice or expertise. An exemplary model on integration can be observed in China, where approximately 446 hospitals have integrated TCM and conventional medicine (Ma et al., 2021). This setup facilitates seamless communication and collaboration between TCM practitioners and conventional practitioners, allowing for coordinated patient care and shared decision-making (Ng et al., 2024). Patients benefit from access to a wider range of treatment options, while HCPs gain insights into different therapeutic approaches and cultural perspectives.

Table 4.8: Assessment of HCPs practice pertaining to TCAM use amongst the patients served.

Practice related questions	Agree n (%)	Uncertain n (%)	Disagree n (%)
I have considered the use of TCAM personally in the past.	104 (55.9)	27 (14.5)	55 (29.6)
I often ask my patients about TCAM use in my history-taking practices.	80 (43.0)	40 (21.5)	66 (35.5)
My patients freely disclose their TCAM use when in consultation with me.	49 (26.3)	57 (30.6)	80 (43.0)
I discourage TCAM use among patients.	37 (19.9)	45 (24.2)	104 (55.9)
I have identified TCAM use in conjunction with conventional drugs among my patients.	108 (58.1)	43 (23.1)	35 (18.8)
I often discuss TCAM use with my patients.	50 (26.9)	53 (28.5)	83 (44.6)
I specifically ask patients on the past and current use of OTC medication in my history taking.	138 (74.2)	25 (13.4)	23 (12.4)
I specifically ask patients on the past and current use of chronic medication in my history taking.	157 (84.4)	20 (10.8)	9 (4.8)
I specifically ask patients on the past and current use of supplements and vitamins in my history taking.	119 (64.0)	35 (18.8)	32 (17.2)
I specifically ask patients on the past and current use of complementary and alternative medicines in my history taking.	97 (52.2)	40 (21.5)	49 (26.3)
I specifically ask patients on the past and current use of traditional medicine in my history taking.	75 (40.3)	47 (25.3)	64 (34.4)
I specifically ask patients on the past and current use of all of the above.	83 (44.6)	54 (29.0)	49 (26.3)
I never ask patients on the past and current use of any of the above in my history taking.	21 (11.3)	35 (18.8)	130 (69.9)
I treat patients referred to me by a TCAM practitioner.	88 (47.3)	56 (30.1)	42 (22.6)
I often refer patients to TCAM practitioners.	23 (12.4)	44 (23.7)	119 (64.0)
I received training on potential drug interactions between TCAM and conventional medicines.	44 (23.7)	38 (20.4)	104 (55.9)
I have easy access to databases pertaining to TCAM interactions with conventional medicines.	39 (21.0)	35 (18.8)	112 (60.2)

Healthcare professionals were questioned whether they ask patients about their past and current use of the following medication during history-taking: OTC medication,

chronic medication, supplements and vitamins, CAM, and TM. Personal use has been found to translate into increased TCAM knowledge and awareness, resulting in those implementing TCAM in history-taking. As shown in **Figure 4.3** below shows that a few (75, 40.3%) HCPs agreed to enquiring about TM during history-taking as compared to the other medications. Healthcare professionals enquired about medication they were more familiar with. Stub et al. (2017) found that 18% of the medical doctors and 26% of the nurses would *often/always* ask their patients if they used complementary therapies. According to Al-Yousef et al (2022), pharmacists should enquire patients about their current and past prescription medication and should be able to advise patients of any potential adverse drug interactions and side effects when using CAM.

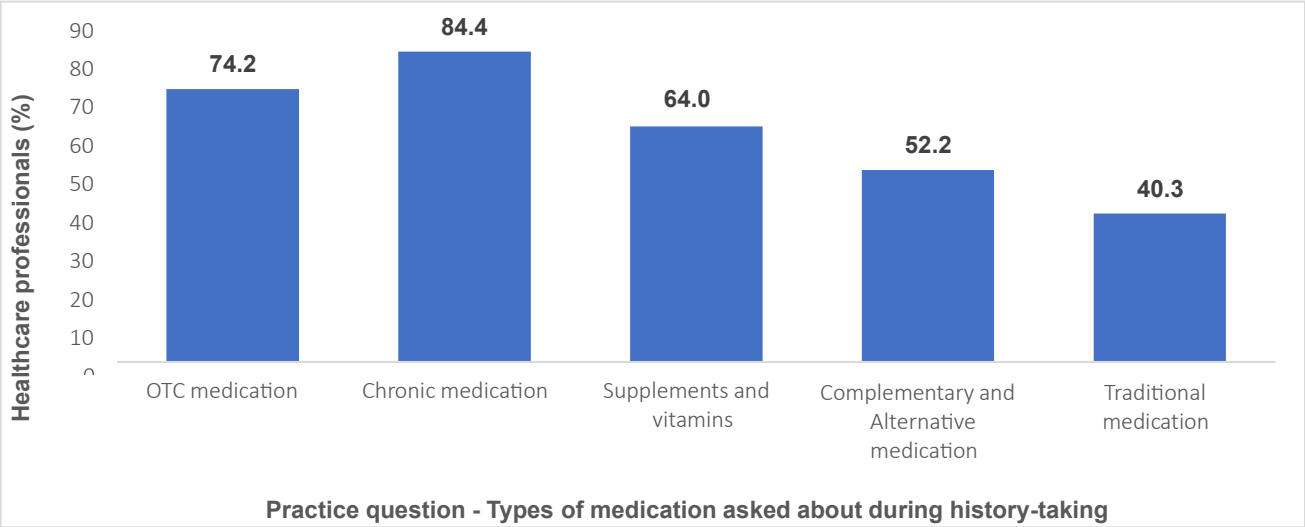


Figure 4.3: Percentage of healthcare professionals asking patients about their past and current use of the following medication during history-taking.

4.6. Chapter summary

This chapter presented the findings of the study on the knowledge, attitudes and perceptions, and practice of HCPs on TCAM use amongst their patient population presenting to the study sites. The study identified HCP's poor knowledge (69.0%) of TCAM but positive attitudes (90.0%) toward TCAM. Most participants (104, 55.3%) in this study reported that they were aware of the prevalence of TCAM use but 98 (51.1%) participants stated that they were unaware of the potential interactions between TCAM

and conventional medicines. Participants showed a positive attitude towards TCAM incorporation into the medical curriculum and believed that TCAM incorporation into the health system would enhance patient care. With respect to practice, a few (80, 43.0%) HCPs would enquire about TCAM use during history-taking. The Spearman rankcorrelation revealed significant positive linear correlations between knowledge-attitudes ($p < 0.01$), knowledge-practices ($p < 0.05$), and attitudes-practices ($p < 0.05$).

CHAPTER 5: CONCLUSION

This chapter presents the conclusion drawn from the study findings. Insights on future perspectives, recommendations and limitations of the study are also provided.

5.1. Conclusion

The aim of this study was to determine the KAP of prescribing and dispensing HCPs on TCAM use among patients tended in large, public, academic hospitals in Gauteng, using a descriptive survey-based study.

Although the HCPs generally displayed a positive attitude (90.0%) and good practice (65.0%) towards the use of TCAM amongst the patient population being served, suggesting that HCPs are demonstrating appropriate and effective utilization of TCAM with their patients. A lack of knowledge (69.0%) within HCPs regarding TCAM was identified and only 31% of the study population had some knowledge of traditional medicines. A high prevalence of the lack of knowledge among HCPs limits the possible use of TCAM in practice, despite HCPs attempts or willingness to employ its use in practice. The lack of knowledge of HCPs is attributed to a lack of prior training on TCAM use, and a lack of platforms to source information on TCAM. Healthcare professionals showed a lack of awareness of any potential interactions between TCAM and conventional medicines. Although, the current study was unable to clinically evaluate TCAM-drug interactions, it did highlight the extent of the matter for SA's policymakers.

This study shows that a few HCPs would enquire about TCAM and most of the HCPs have identified TCAM use in conjunction with conventional drugs among their patients. Therefore, HCPs should be able to look for symptoms that could indicate TCAM tolerance and look for signs that could indicate interactions between TCAM and conventional medicine. Thus, there is a need for interventions to make sure that HCPs have the knowledge and tools they need to encourage the inclusion of TCAM in history-

taking procedures and within the health system. Findings from this study show that HCPs would support the incorporation of TCAM in the medical curriculum, which shows their eagerness to learn. The incorporation of TCAM within the undergraduate medical curriculum; an elective course on TCAM; incorporation of continuing professional development (CPD) activities on TCAM for qualified HCPs; and reliable platforms to source information on TCAM would increase the confidence levels of HCPs towards TCAM and this would allow them to freely discussTCAM with their patients as they would be more knowledgeable. Institutions should assess their TCAM programs and employ standardized TCAM content and it is imperative to make an effort to avoid overwhelming the medical curriculum.

The incorporation of TCAM within the health system would encourage history-taking guidelines and patient file records to be inclusive of TCAM. The most reliable available scientific data serves as the foundation for guideline recommendations, therefore there is a need for evidence-based research on TCAM to inform these guidelines. Despite this, it does not deter patients from using TCAM. Additionally, the cautiousness of TCAM practice is further caused by a lack of policy, lack of TCAM products and practice regulation, and TCAM being considered as not within the conventional HCPs scope of practice. Although TCAM is acknowledged in South African policies, there isnot enough information available to make well-informed decisions for implementation phases. There is a need to overcome the above-mentioned challenges to assist with the direct incorporation of TCAM into the healthcare system, thereby ensuring optimaland safe treatment outcomes for patients visiting the respective facilities.

5.2. Research limitations

This study included prescribing and dispensing HCPs working at tertiary public hospitals. There was a disproportional balance between prescribing and dispensing HCPs, with majority being dispensing HCPs and this could lead to study bias. The imbalance is due to prescribers working hours that were entirely occupied with medical duties and inability to complete the questionnaires. This study's accuracy was compromised by a few questions whereby some HCPs were not entirely honest. In

attempt to avoid this, more open-ended questions shouldbe included for future studies.

A limitation for consideration includes determining the potential roles of pharmacists in TCAM integration which may be constrained by factors including lack of research, lack of training, and lack of TCAM guidelines. These limitations could affect the effectiveness of pharmacists' involvement in TCAM integration.

5.3. Future research recommendations

The findings of this study expanded our understanding of HCPs KAP with regard to TCAM and their willingness to learn about TCAM. For history-taking practices or patient file records to be inclusive of TCAM, a section for documenting TCAM use should be included in patient files. There is a need to explore THPs KAP towards a dual health system to understand their concerns, opinions, and experiences regarding TCAM integration within the health system which could be achieved through surveys or interviews on THPs. It is imperative to consider the concern regarding the translation and transfer of knowledge from THPs into the medical curriculum. Given TCAM's potential for interactions with conventional medicine, it is crucial to emphasize that the focus is on medicinal products used in TCAM practices, specifically plant-based TCAMs. Compared to cultural or spiritual acts such as rituals or incantations, information on the particular plants used and how they are harvested and prepared are typically easier to understand and translate (Bhagwan et al., 2017; Seraw et al., 2024).

A more holistic level of healthcare can be achievedby combining present healthcare systems and TCAM, that can coexist in the same space. A pre- and post- TCAM training intervention study is proposed as part of future healthcare TCAM integrative research to emanate facilitators and barriers to dual health systems. Training for HCPs should include TCAM pharmacology and interactions; education on the regulation of TCAM products and research and evidence evaluation to mention a few. The SAPC; HPCSA; collaboration with THPs would be responsible for the curriculum developments in SA and courses for qualified HCPs. Furthermore, the possibility for

interactive profiles with dual health system use encourages HCPs to be more aware of TCAM use in their patients and recommends evidence-based research into the interventions required to enable a safe integration. Studies focusing on TCAM drug profiling and clinical evaluation of TCAM-drug interactions are needed to assess TCAM safety. Record-keeping can be used as an intervention to support the safe integration on TCAM despite SA's infrastructure challenges. This is especially important since SA currently relies on paper-based systems. The repository should be a pharmacy-led initiative, with the pharmacist consulting with patients during dispensing to discuss relevant factors. Due to SA'S infrastructure problems and dependence on paper files, integrating TCAM into a common electronic system would pose a challenge. However, advancements using the fourth industrial revolution technology is possible. Gradual initiatives would aid in closing this gap.

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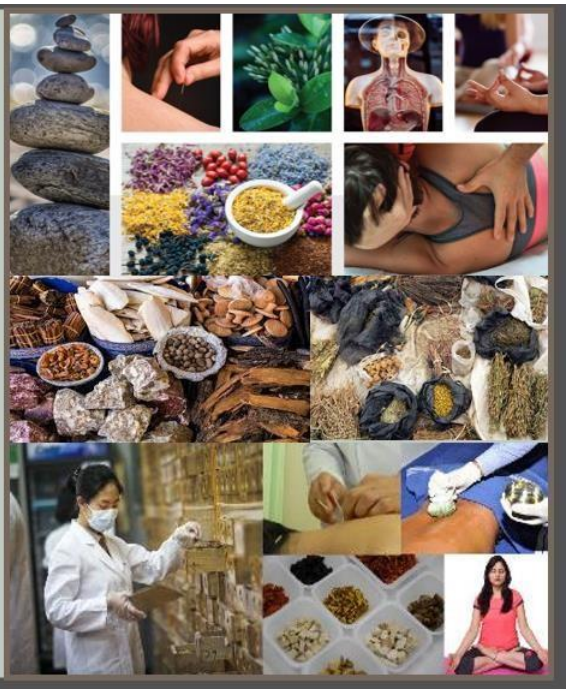
APPENDICES

Appendix A

Slides from the Pharmaceutical Society of South Africa (PSSA) Annual GroupMeeting (AGM) presentation given as a keynote speaker.

Holistic healthcare:

The path to Traditional, Complementary and Alternative Medicine (TCAM) integration by pharmacists



PRESENTED BY :

MULANGA MATHOHO (MPharm candidate - WITS)

Agenda



01 Introduction

02 Definition of TCAM

03 Challenges relating to TCAM use

04 Role of pharmacists in TCAM

05 Closing

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01 Introduction

"It is quite probable that man as soon as he has reached the stage of reasoning, found out through the process of trial and error that plants can be used as food, that some might be poisonous and may lead to death when eaten while some had medicinal value and power"

(Obika & Eke, 2019).



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- A report by the World Health Organisation (WHO) highlights that more than 80% of developing countries, including South Africa (SA), make use of traditional, complementary, and alternative medicine (TCAM) as their main source of healthcare (World Health Organization, 2019).
- For millennia, people have applied TCAM-derived remedies for healing, resulting in the recognition of TCAM as one of the world's oldest and most diverse medical systems (Vellingiri et al., 2020).



The most commonly used TCAM products or procedures are traditional herbs.

4

02 Definition of TCAM

The TCAM framework is described as all medicines or healing practices that fall outside of the standard, biomedical healthcare models (Booth & van Vuuren, 2023) combining both Traditional medicine (TM) and complementary and alternative medicine (CAM).

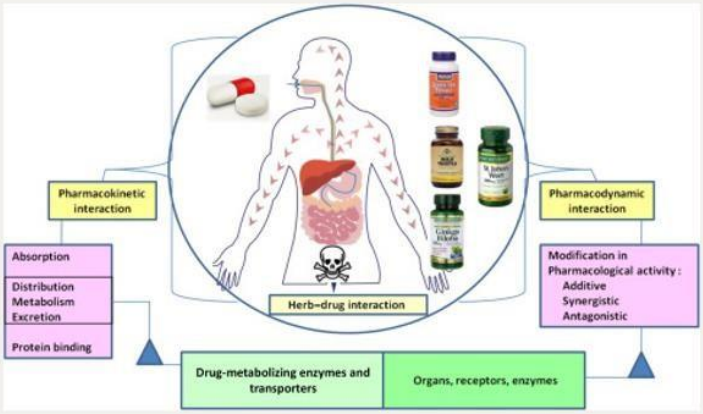
Traditional medicine specifically is defined as *"the use of theories, beliefs, and native experiences from different cultures, in the maintenance of health as well as in the prevention, diagnosis, improvement or treatment of physical and mental illness"* (World Health Organization, 2019). Traditional medicine incorporates animal-, plant- and mineral-based medicines, spiritual therapies, manual therapy techniques, and exercises, applied singularly or in combination to treat, diagnose and prevent illnesses or maintain well-being (Rebellow, 2022).

Complementary and alternative medicines refer to a wide range of healthcare products and techniques, that are not part of a country's TM framework and are not fully incorporated into the mainstream, conventional healthcare systems either. Complementary medicine (CM) refers to medicines used together with standard treatments; whilst alternative medicine refers to practices used instead of standard care (Keene et al., 2019; World Health Organization, 2019)

- In 2020, the WHO declared **COVID-19** a global pandemic. Most people turned to TCAM to allegedly treat or prevent COVID-19.
- In South Africa, there was an increase in the demand for a TM named ***Artemisia afra***, commonly referred to as "**Umhlonyane**" in IsiZulu.
- It was sold in the traditional markets available in Johannesburg and amongst street sellers (Wild, 2021).



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Particularly since South Africa has such a high estimated prevalence of TCAM use, the likelihood for patients to be presenting to conventional healthcare settings, already making use of TCAM, has high probability. This is worrisome, as there are studies indicating possible serious TCAM-conventional drug interactions.

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Name of product	Biological name	Indication	Interactions
Rosemary 	*Rosmarinus officinalis* (Family: Lamiaceae)	Used for respiratory issues Has antimicrobial, antibacterial, antifungal, and antiviral properties	Rosemary preparations interacts with different drugs, such as antibiotics, anxiolytics and anticoagulant medicines. Interfere with the metabolism of anaesthesia. (Lutfi et al., 2018)
Aloe Vera 	*Aloe barbadensis miller* (Family: Asphodelaceae	Treatment of psoriasis and other dermatological conditions. Treat inflammatory conditions, diabetes and hyperlipidaemia.	Aloe Vera and sevoflurane based on the antiplatelet effects of these 2 agents. Can interact with oral diabetes medications and cause hypoglycaemia. When taken orally for prolonged periods with diuretics or digoxin, it can lead to low blood levels of potassium (Heng et al., 2018).
Cancer bush 	*Sutherlandia frutescens* (Family: Fabaceae)	Widely used in the treatment of diseases such as HIV/AIDS and TB,	Lower the plasma levels of the antiretroviral drug, atazanavir, to sub-therapeutic levels when they're taken together, reducing its anti-HIV efficacy (Katerere, 2018).
Green Tea 	*Camellia sinensis* (Family: Theaceae)	Promoted for stomach disorders, to lower cholesterol, anti-diabetic, anti-inflammatory, antioxidant, antibacterial, and to lessen belly fat.	Citalopram (Escitalopram): May potentiate the adverse effect (bleeding). Statin drugs may affect drug level (if increased, may increase side effects)(Albassam & Markowitz, 2017)

Name of product	Biological Source	Indication	Interactions
Cayenne pepper 	*Capsium spp.* (Family: Solanaceae)	Boosts metabolism, improves Digestive Health, lowers Blood Pressure, can reduce pain, anti-Cancer, protects the heart, has anti-microbial properties, improves immunity, can heal toothaches, and improves skin and hair health.	ACE inhibitor- May cause drug-induced cough - Theophylline. May increase absorption and drug level. Possible interaction with MAO inhibitors and antihypertensive therapy (Chhabra et al., 2020).
St. John's Wort 	*Hypericum perforatum* (Family: Hypericaceae)	Used for depression and relief of some symptoms in menopause.	Increases the removal of medicines, such as some oral contraceptives, from the body. Reduces the plasma of co-administered cyclosporine, amitriptyline, digoxin, indinavir, nevirapine, oral contraceptives, theophylline or simvastatin (Borse et al., 2019).
Fenugreek 	*Trigonella foenum-graecum* (Family: Fabaceae)	Has blood glucose and cholesterol lowering properties Fenugreek is utilized for its antiulcer, antihypertensive properties, aphrodisiac, and hypoglycaemic activities	Modestly enhance the anti-diabetic effects of the sulfonylureas. Plasma concentration of losartan was augmented when concurrently administered decelerate the metabolism of losartan (Yadav et al., 2019).

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03 Commonly recorded challenges to dual health system use

- Lack of regulatory framework of TCAM
- Challenges associated with Pharmacovigilance of TCAM
- Integration and inclusivity of TCAM within the conventional healthcare system
- Lack of history-taking practices to be inclusive of TCAM use
- Knowledge, attitude, perceptions, and practices of healthcare professionals (HCPs) on TCAM
- Knowledge, attitude, perceptions and practices of patients on TCAM

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Knowledge, attitudes, perceptions, and practice (KAP) study

Title of study: A descriptive survey of healthcare professionals on traditional, complementary, and alternative medicine integration in public hospitals in Gauteng.

Aim: The aim of this study was to explore the KAP of prescribing and dispensing HCPs on TCAM use among patients in public, academic hospitals in Gauteng.

Methods: A questionnaire based cross-sectional survey was carried out among prescribing and dispensing HCPs in public academic hospitals.

Results

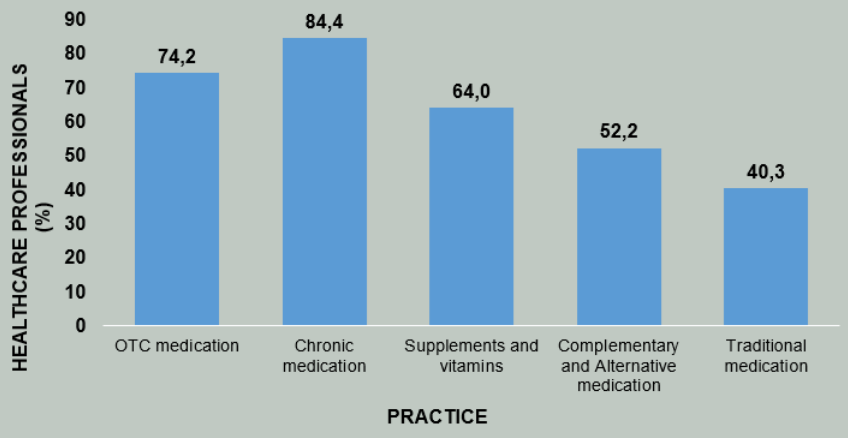


Figure 1: **Percentage of healthcare professionals asking patients about their past and current use of the following medication during history-taking.**

Results

- The study identified HCP's poor knowledge (69%) of TCAM but positive attitudes (90%) toward TCAM.
- Most participants 98 (51.1%) stated that they were unaware of the potential interactions between TCAM and conventional medicines.
- Participants showed a positive attitude towards TCAM incorporation into the medical curriculum and believed that TCAM incorporation into the health system would enhance patient care.
- With respect to practice, a few (80, 43%) HCPs would enquire about TCAM use during history-taking.
- The Spearman rank correlation revealed significant positive linear correlations between knowledge-attitudes ($p < 0.01$), knowledge-practices ($p < 0.05$), and attitudes-practices ($p < 0.05$).
- Dispensing professionals had a significantly more positive attitude towards TCAM use than prescribing professionals.

Spearman rank correlation

	Knowledge	Attitudes	Practices
Knowledge			
Attitudes	0.23**		
Practices	0.16*	0.16*	

*p<0.05; **p<0.01

The Spearman rank correlation revealed significant positive linear correlations between knowledge-attitudes ($p < 0.01$), knowledge-practices ($p < 0.05$), and attitudes-practices ($p < 0.05$).

Conclusion: There is a need for interventions to make sure that HCPs have the knowledge and tools they need to encourage the inclusion of TCAM in history-taking procedures and within the conventional health system. The most reliable available scientific data serves as the foundation for guideline recommendations, therefore there is a need for evidence-based research on TCAM.

04 Role of Pharmacists in TCAM

1. Education and Guidance
2. Quality Assurance
3. Ensuring safe integration with Conventional Medicine
4. Monitoring and Follow-up
5. Research and Evidence-Based Practice
6. Developing clinical decision-making tools









Responsibility of Pharmacists in integrating TCAM

Eight major responsibilities are frequently discussed in the literature:

1. To acknowledge the use of TCAM
2. To be knowledgeable about the TCAM products
3. To ensure safe use of TCAM products
4. To document the use of TCAM products
5. To report ADRs related to TCAM products
6. To educate about TCAM products
7. To collaborate with other health care professionals
8. To collaborate with TCAM practitioners

2/27/2024



Summary

- Traditional, complementary, and alternative medicine is rapidly growing and is in demand
- Holism is missing from modern medicine
- The greatest strength of TCAM is the understanding of the intimate links between the health of humans and our environment
- Pharmacists serve as trusted advisors, ensuring the safe integration of TCAM with conventional medicine, promoting patient education, and advocating for evidence-based practice.
- Pharmacists play a key part in enhancing patient outcomes and fostering a collaborative healthcare environment that embraces diverse therapeutic modalities.
- Blending TCAM and conventional medicine underpinned by robust evidence, innovation and new technologies and sustainability.
- To turn the promise of health for all into a reality for all.
- Dual health system to support harmony with self, societies, and nature.

05 Closing

In the ever-evolving landscape of healthcare, pharmacists stand as gatekeepers of patient safety, advocates for holistic well-being, and stewards of evidence-based practice. As we navigate the complexities of TCAM, let us remember that pharmacists are the anchor, ensuring that every patient journey is guided by knowledge, compassion, and the pursuit of optimal health.

"The trust patients put in pharmacists is a testament to the importance of their role in healthcare."

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Appendix B

Publication draft screenshot

A descriptive survey of healthcare professionals on traditional, complementary, and alternative medicine integration in public hospitals in Gauteng, South Africa.

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Abstract

Despite the high estimated prevalence of traditional, complementary, and alternative medicine (TCAM) use in South Africa and concerns for interactions with conventional medicines, TCAM use enquiry in medical history-taking is still largely excluded by healthcare professionals. This study aimed to explore the knowledge, attitudes, perceptions, and practices of authorised prescribing and dispensing healthcare professionals on TCAM use among the patient population, in three public, academic hospitals in Gauteng, South Africa. A self-administered, cross-sectional survey was carried among the study population (n=188). Quantitative data was presented as means and percentage frequencies. A t-test statistical analysis, chi-square test, Spearman rank correlation, and a multiple linear regression model was used to further analyse the data. The study identified poor knowledge (69%) of TCAM amongst healthcare professionals, but positive attitudes (90%) toward the use of TCAM amongst their patients. Most participants (51.1%) stated that they were unaware of the potential interactions between TCAM and conventional medicines. Participants showed a positive attitude towards more comprehensive incorporation of TCAM in the medical curriculum (69.4%) and believed that TCAM incorporation with the conventional healthcare system would enhance patient care (62.4%). Only 43.0% would enquire about TCAM use during history-taking with their patients. There was a significant positive linear correlation between knowledge-attitudes ($p < 0.01$), knowledge-practices ($p < 0.05$), and attitudes-practices ($p < 0.05$). This study revealed the need for interventions to ensure that healthcare professionals are equipped with necessary knowledge, skills, and frameworks for integrative medicine approaches, to encourage the inclusion of TCAM in history-taking procedures and prevent the occurrence of harmful interactions amongst those patients making use of both conventional and TCAM treatments.

Keywords: Traditional, complementary and alternative medicine; integrative medicine; interactions; prescribers, medicine dispensers.

Background

Traditional, complementary, and alternative medicines (TCAMs) are widely used and are becoming increasingly popular around the world [1]. An estimated one-third of the population in the United States of America (USA) makes use of TCAM [2]. European countries have prevalence rates of TCAM use among its population ranging between 20% and 50% [3]. A report by the World Health Organization (WHO) [4] highlights that more than 80% of the population in developing countries, including South Africa (SA), make use of TCAM as their main source of healthcare. The high prevalence of use can be attributed to TCAM accessibility, availability, and affordability being more favourable than that of conventional medicine, particularly for those accessing healthcare in an overburdened conventional healthcare system [4]

The TCAM framework is described as all medicines or healing practices that fall outside of the standard, biomedical healthcare models [5] combining both traditional medicine (TM) with complementary and alternative medicine (CAM). Traditional medicine specifically is defined as *"the use of theories, beliefs, and native experiences from different cultures, in the maintenance of health as well as in the prevention, diagnosis, improvement or treatment of physical and mental illness"* [4]. Complementary and alternative medicines refer to a wide range of healthcare products and techniques, that are not part of a country's TM framework and are not fully incorporated into the mainstream, conventional healthcare systems either. Complementary medicine (CM) refers to medicines used together with standard treatments; whilst alternative medicine refers to practices used instead of standard care [4,6].

In 2020, the WHO declared COVID-19 a global pandemic. Many turned to TCAM to allegedly treat or prevent COVID-19[7]. In South Africa, there was an increase in the demand for a TM, commonly referred to as "*umhlonyane*" amongst the population, which is a remedy prepared from the leaves of the medicinal plant, *Artemisia afra*. It was sold in traditional *muthi* markets in Johannesburg and also by street vendors [8]. This plant is well-documented for its' therapeutic effect in respiratory tract infections, as well as other

conditions, including fever, headache, malaria, and loss of appetite [9]. Given that TCAM plays a significant role even in today's healthcare frameworks, amongst people suffering from infectious and chronic diseases [1,10], suggests that TCAM can no longer be ignored in the modern healthcare sphere.

With the high estimated prevalence of TCAM use, the WHO has implemented strategies for conventional healthcare facilities and HCPs to be more cognisant of TCAM. The South African government implemented initiatives aimed at aligning with the WHO TM Strategy (2014 – 2023), to facilitate the integration of TCAM in the conventional healthcare model. The first WHO global summit took place in August 2023, where integrative medicine featured frequently in the WHO TM Strategy (2014 – 2024) discussions. The strategy aims to promote the safe and efficient use of traditional and complementary Medicine (T&CM) through the regulation of products, practices, and practitioners, as well as to support WHO Member States in recognizing T&CM's potential value to wellness, health, and patient-centred healthcare. Three strategic objectives were implemented to achieve these goals: (1) laying a foundation for knowledge and developing national policies on T&CM; (2) regulation: improving safety, quality, and efficacy of T&CM; and (3) supporting the advancement of universal health coverage by integrating T&CM within the conventional healthcare system [11]. The South African Health Products Regulatory Authority (SAHPRA) has also recognised the need for regulation and registration of TCAM, further supporting recognition of TCAM as a legitimate form of healthcare.

The integration of TCAM with conventional healthcare systems offers several potential benefits including:

- Holistic approaches to treatment by providing patients with more comprehensive and personalized care [12].
- Expanded treatment options since patients have access to a broader range of treatment options [13].
- Patient-centred care through TCAM integration can empower patients to explore diverse treatment modalities and participate in shared decision-making with their healthcare providers [13].

- Preventive health promotion through integrating TCAM into conventional healthcare systems to support efforts aimed at preventing disease, reduce healthcare costs, and improve population health outcomes [14].
- Cultural competency with integrating TCAM into conventional healthcare systems which demonstrates cultural sensitivity and promotes inclusivity by acknowledging and respecting patients' cultural beliefs and practices [13].
- Research and innovation on integrating TCAM with conventional healthcare systems which can facilitate research collaborations and innovation in healthcare delivery [15].

By researching the efficacy, safety, and cost-effectiveness of TCAM modalities, researchers can contribute to evidence-based practice and advance safe, integrative healthcare approaches [15]. Overall, the integration of TCAM with the biomedical healthcare system offers the potential for improved patient care, achieving better medical outcomes, and encouraging greater inclusivity and cultural competency in the provision of healthcare. However, the integration must be carried out cautiously, considering patient preferences, the effectiveness and safety of dual health system use, and ensuring practices are fortified by reliable research and evidence-based practice.

Several studies have shown that HCPs display little or no knowledge of TCAM products and practices [2,16–18]. This inadequate knowledge is a limiting factor in integrating TCAM within conventional healthcare practices [2] and indicates that HCPs are unlikely to recognize or be aware of their patient’s use of TCAM as part of their treatment [19]. A study conducted in Australia by Gall et al., (2019) [20] aimed to explore the views of healthcare providers’ concerning TCAM usage and their experience of disclosure or non-disclosure of TCAM by their cancer patients. The study revealed that patients’ non-disclosure could very well be attributed to the HCPs absence of knowledge on TCAM, lack of time to research and consult literature, or the HCPs own belief that TCAM was outside the scope of their responsibilities, which further widened the gap between the two healthcare systems. However, Aizuddin *et al* [21] found that HCPs were willing to learn about TCAM if it were to benefit their patients.

In further studies undertaken in Northwest Ethiopia, and North of Iran, HCPs showed a positive attitude towards TCAM [18,22] because of the inquiries from patients about TCAM; widespread advertising on TCAM, and the increased use of TCAM by patients for various ailments in their respective countries of practice [22]. However, a study conducted by Gurgel *et al* [23]reported a negative attitude reflected by HCPs toward the use of TCAM amongst their patients, attributed mainly to the insufficient scientific evidence, training on TCAM and scientific platforms to source information on TCAM, along with minimal regulatory frameworks for TCAM [2]. A study conducted in South Africa [24] and another conducted in Trinidad and Tobago [25] found that over half of the HCPs admitted to enquiring about CAM use when obtaining a patient's medical history and that they would be willing to refer them to a CAM practitioner. However, these studies did not explore traditional medicine use.

Many recent *in vitro* studies evaluate the efficacy of TCAMs [26–28]. Traditional, complementary, and alternative medicines are considered natural products, often synonymous with a perception of safety [29]. As such, these products often are not regarded as medicines or drugs that could interact with any prescribed and dispensed conventional medicines [30]. However, *in vitro* studies have alluded to potential interactions [26–28]. The active ingredients in natural products are at times potent chemicals which may interact with conventional medicines. According to studies, these products pose the same risks as other pharmacologically active drugs [31]The simultaneous use of TCAM with conventional medicines thus may enhance or oppose the effect of conventional drugs, affecting patient therapeutic outcomes, which needs to be considered by HCPs.

History-taking is a crucial step for prescribing and dispensing HCPs when evaluating a patient. Furthermore, it assists in identifying potentially unwanted side effects from interactions. Medical history-taking involves enquiry of past and current medication, which most frequently only includes conventional medicines [32,33]. The lack of evidence-based findings is worrisome, contributing to HCPs often excluding enquiry of TCAM use during history-taking practices before prescribing, administering, or dispensing conventional

drugs [34].

Due to the multitude of *in vitro* studies exposing potentially harmful TCAM-conventional drug interactions [35,36], along with the estimated high prevalence of TCAM use in developing countries [37], TCAM can no longer be ignored in the modern healthcare sphere in South Africa. Therefore, the data collected from this study aimed to determine the knowledge, attitudes, perceptions (KAP) of the prescribers and dispensers of conventional medicines on TCAM use among their patients in large public hospitals in South Africa. This study further aimed to determine the current practices of prescribers and dispensers in relation to TCAM use among their patients. Information arising from this study provides some insight into the need for interventions to ensure that conventional HCPs are equipped with the necessary training and resources to motivate for history-taking practices to be more inclusive of TCAM.

Methods

Study design and setting

A quantitative, cross-sectional, descriptive, self-administered survey method was employed to garner necessary data from participants. The study aimed to explore the KAP and current practices regarding patient TCAM use from dispensing and prescribing HCPs working at three large, public hospitals in Gauteng, South Africa, namely, Chris Hani Baragwanath Academic Hospital (CHBAH) in Soweto, Helen Joseph Hospital in Auckland, and Charlotte Maxeke Johannesburg Academic Hospital (CMJAH) in Parktown, between January 2023 until the end of May 2023.

The inclusion criteria for study participants have been detailed below:

- Registered authorised prescribing HCPs: General medical practitioners; general medical practitioners in training; dentists; dentists in training; clinical associates; clinical associates in training; emergency care practitioners; emergency care practitioners in training; surgical practitioners; surgical practitioners in training; optometrists; optometrists in training; dermatologists; dermatologists in training; psychiatrists; psychiatrists in training.

- Registered dispensing HCPs: Pharmacists; pharmacists in training; pharmacist assistants.
- Resident and rotating staff, along with dispensing and prescribing interns under supervision.
- Dispensers and prescribers completing community service under supervision.
- Dispensing and prescribing students in their undergraduate.

Study sampling

Participants were recruited according to a non-probability, convenience sampling method. The HCPs voluntary completion of the questionnaire inferred consent to participate in the study. According to the CHBAH official website (https://www.chrishanibaragwanathhospital.co.za/; accessed: 18 August 2023), an average of 182 prescribing and dispensing HCPs are employed permanently at the public hospital. This does not include the additional rotational staff, interns, and students. Therefore, 182 was used as the baseline figure, and a sample size of 226 participants was calculated, using the online Roasoft sample size calculator (Raosoft).

Pilot study and data collection

Study tools documented in similar literature [25,38,39] were adapted for use in this study to develop the questionnaire, and the self-administered questionnaire was piloted and used for data collection. The questionnaire comprised of four sections: ‘demographic information’ consisting of eight questions; ‘knowledge of participant information’ consisting of six questions ‘attitudes and perceptions of participants’ consisting of fourteen questions, and lastly, ‘current practices’ of participants’ consisting of seventeen questions.

The questionnaire used close-ended questions to assess the knowledge of HCPs. These questions were either “Yes” or “No” answer-type questions. To explore participants' attitudes, perceptions, and current practices pertaining to TCAM use amongst their patients, a five-point Likert scale was used, unless stated otherwise. This method had five options of, ‘’strongly disagree, ‘’disagree’’, ‘’neutral’’, ‘’agree’’ and ‘’strongly agree’’ ranging from a score of one to five, respectively. Questions for which “agree” or “strongly agree” represented a positive attitude or practice, the Likert scale was scored from 0 – 4, with

“strongly disagree” being coded as 0 while strongly agree was coded as 4. Furthermore, ordinal recoding was performed, combining “strongly disagree” and “disagree” into one category (disagree); “agree” and “strongly agree” into another category (agree) and relabelling “neutral” as “uncertain”, effectively transforming the 5-point Likert scale into a 3-point Likert scale [40]

The questionnaire was piloted on 23 (10% of sample size according to Viechtbauer et al., 2015) academic staff members and postgraduate students (Master of Pharmacy and PhD students in the Department of Pharmacy and Pharmacology) at the University of the Witwatersrand. All pilot study participants have been exposed to training to become a HCP and have been exposed to subject matter in training or teaching activities. The pilot study was also used to ascertain whether the items were structured in a reasonable, clear, and unambiguous manner that was easily understood by the participants. Questions flagged as unclear in the pilot study were re-worded accordingly, after which the final questionnaire, upon approval from the ethics committee, was used to collect data amongst the identified study sample, throughout the year of 2022.

Data analysis

All analyses were performed using STATA version 14 (StataCorp, USA) and statistical significance was determined at the 5% level of significance. The total scores of KAP were analysed as a continuous variable and summarised as means. As categorical variables, the questions were summarised as frequencies and percentages. To compare the mean values of any of the total scored between two groups, a t-test statistical analysis was used. Relationships between categorical variables were assessed using a chi-square test. A multiple linear regression model was used to assess factors associated with each of the total scores (KAP).

Ethical considerations

Clearance to conduct this study was obtained at the University of Witwatersrand through the Human Research Ethics Committee (HREC)-medical prior to commencement of data collection. An information sheet was provided during recruitment, ensuring participants full

understanding of the study prior to voluntary completion of the questionnaire. Participant confidentiality was maintained.

Results and discussion

Demographic characteristics of the study participants

The demographic characteristics of study participants are presented in Table 3.1. There was a total of 233 complete responses garnered from 300 surveys administered, of which only 188 responses (n=188) met the criteria for inclusion in the study (63.0% response rate). The achieved response rate of 63.0% remains within the range typically deemed suitable for a survey-based study and raises pertinent consideration regarding the representativeness and reliability of the collected data [42,43].

Table 3.1: Demographic characteristics of the study participants (n=188).

Variable	Frequency n (%)
Age group	
18 - 30	111 (59.0)
31 – 40	51 (27.1)
41 - 54	21 (11.2)
55 +	5 (2.7)
Gender	
Female	110 (58.5)
Male	78 (41.5)
Other	0 (0.0)
Race	
Black	127 (67.6)
Asian	32 (17.0)
White	29 (15.4)
Religion	
African traditional belief	17 (9.0)
Christian	125 (66.5)
Hindu	11 (5.9)
Jewish	5 (2.7)
Muslim	17 (9.0)
Other	13 (6.9)
Nationality	
South African	180 (95.7)
Other	8 (4.3)
Profession practice (scope)	
Prescribing	68 (36.2)
Dispensing	120 (63.8)
Ward	

Specialisation unit	9 (4.9)
Surgical ward	8 (4.3)
Intensive care unit	4 (2.1)
Paediatric ward	8 (4.3.)
Casualty	9 (4.8)
General medical ward	13 (6.9)
Pharmacy	119 (63.3)
Psychiatric ward	4 (2.1)
Burns ward	1 (0.5)
Maternity ward	2 (1.1)
Other	11 (5.9)
University or training facility attended	
University of the Witwatersrand	68 (36.2)
University of Pretoria	6 (3.2)
University of Cape Town	5 (2.7)
Sefako Makgatho Health Sciences University	20 (10.6)
University of KwaZulu-Natal	6 (3.2)
Nelson Mandela Metropolitan University	2 (1.1)
Rhodes University	8 (4.3)
Health Sciences Academy	45 (23.9)
North-West University – South Africa	3 (1.6)
University of the Western Cape	3 (1.6)
Tshwane University of Technology	2 (1.1)
Other	20 (10.6)

Most of the participants were between the age of 18 and 30 (112, 58.9%) and female (112, 58.9%). More than two-thirds (129, 67.9%) of the participants were black and were of Christian religious backgrounds (127, 66.8%). Considering that the study was undertaken in Gauteng public hospitals, most participants were South African (182, 95.5%). The university and training sites attended were also evaluated (Table 3.1). Healthcare professionals' universities or training sites attended can provide their educational background and receipt of TCAM undergraduate training. The study had more dispensing HCPs (120, 63.8%) as compared to prescribing personnel. Most of the HCPs were from the pharmacy (119, 63.3%) namely the out-patient department pharmacy, in-patient pharmacy, oncology, paediatric, cardiology, and antiretroviral pharmacies.

Factors associated with TCAM use and KAP findings

Some demographic factors are often associated with TCAM knowledge. Participant age was significantly associated with knowledge in the current study (Table 3.2).

Table 3.2: Factor association with knowledge, attitudes, perceptions, and practices. *** p<0.001, ** p<0.01, * p<0.05; bold = significant p-value; where, ci is in parentheses (e.g. under profession: the attitude of dispensing HCPs is compared to the Ref: prescribing HCP)

Variables	Knowledge	Attitudes and perceptions	Practices
Participant age (Ref: 18 – 30)			
31 – 40	**-0.468***	-1.220	-1.752
	(-0.902 - -0.0338)	(-3.162 - 0.722)	(-4.692 - 1.187)
41+	**-0.663***	-0.733	-1.755
	(-1.228 - -0.0976)	(-3.245 - 1.779)	(-5.556 - 2.047)
Sex (Ref: Female)			
Male	0.184	0.853	0.685
	(-0.210 - 0.579)	(-0.909 - 2.615)	(-1.981 - 3.352)
Religion (Ref: Christian)			
African	-0.0102	-0.838	-1.330
	(-0.697 - 0.676)	(-3.959 - 2.282)	(-6.053 - 3.392)
Muslim	0.182	-1.928	4.068
	(-0.484 - 0.848)	(-4.885 - 1.030)	(-0.408 - 8.545)
Hindu, Jewish and other	-0.0741	-1.918	-0.475
	(-0.618 - 0.470)	(-4.332 - 0.496)	(-4.128 - 3.178)
Profession (Ref: Prescribing)			
Dispensing	0.212	**3.697*** **	-1.466
	(-0.191 - 0.614)	(1.907 - 5.486)	(-4.15 - 1.242)
Observations	188	186	186
R-squared	0.054	0.124	0.041

This finding was also reported in a similar study conducted to assess the KAP towards CAM in the United Arab Emirates ([44]. The current study found that older healthcare professionals irrespective of discipline (31-to-40 years and >41 years) had significantly lower knowledge of TCAM than younger healthcare professionals (18-to-30 years). This observation underscores the influence of age as a significant factor in shaping HCPs familiarity with TCAM. It implies that younger professionals may have been exposed to more recent education, training, or resources [45] related to TCAM, leading to a higher level of understanding compared to older HCPs. Understanding this age-related disparity in TCAM knowledge is crucial for developing targeted educational interventions or professional development programs aimed at improving TCAM literacy among HCPs, particularly those in older age groups. Current study findings reflected that dispensing professionals had a significantly more positive attitude towards TCAM use than prescribing

professionals. This suggests a greater openness among dispensing HCPs to integrating TCAM with conventional medicine, highlighting the importance of interdisciplinary collaboration for holistic patient care. There were no significant associations with practice (Table 3.2).

In Table 3.3, the results reflect no significant differences in the total score for knowledge, estimation of the prevalence of TCAM use, and total score of practices between prescribing and dispensing HCPs. This suggests that both prescribing and dispensing HCPs have similar levels of understanding regarding TCAM, as evidenced by their comparable knowledge scores in Table 3.3. Additionally, their practices related to TCAM revealed no significant disparity. Overall, these findings suggest a uniformity in their engagement with TCAM-related issues, highlighting the importance of considering both prescribing and dispensing roles in initiatives aimed at enhancing TCAM integration into conventional healthcare systems.

Table 3.3: Differences in knowledge, attitudes, and practices of prescribing and dispensing professionals with respect to TCAM. Results are presented as mean (±SD) and compared with t-test, unless otherwise stated.

	Prescribing HCPs	Dispensing HCPs	p-value
Number of participants (n)	68	120	
Perceived prevalence of TCAM use	49.14 (19.30)	53.30 (19.90)	0.290
Knowledge score	1.74 (±1.22)	1.94 (±1.36)	0.286
Attitudes score	47.10 (±6.51)	50.90 (±5.26)	<0.001
Practices score	55.4 (±8.33)	53.8 (±8.91)	0.208

However, dispensing HCPs had a significantly more positive attitude ($p < 0.001$) towards TCAM use than prescribing HCPs. Majority of HCPs (129, 69%) had poor knowledge of TCAM, while 90% (n = 170) had positive attitudes, and the HCPs were considered to have good practice (123, 65%). Despite the overall good practice of the participants, a notable concern arose when HCPs were questioned whether they ask their patients about TCAM use during history-taking, with the majority indicating a reluctance to

enquire about TCAM use.

Overall, as shown in Table 3.4, the mean knowledge score for the entire study was 1.87 (±1.31); the mean attitude and perceptions score was 49.52 (±6.03); and the mean practice score was 54.39 (±8.72). These results reveal poor knowledge; positive attitudes and perceptions; and good practice of HCPs.

Table 3.4: Mean scores for knowledge, attitudes and perceptions, and practices of healthcare professionals at the hospitals. Data presented as mean (±SD)

Variable	Maximum Score Possible	Achieved Score
Knowledge	6	1.87 (±1.31)
Attitudes & Perception	70	49.52 (±6.03)
Practices	85	54.39 (±8.72)

The Spearman rank correlation revealed significant positive linear correlations between knowledge-attitudes ($p < 0.01$), knowledge-practices ($p < 0.05$), and attitudes-practices ($p < 0.05$) (Table 3.5). This finding was also reported by [46], a KAP study of CAM among graduating medical and health sciences students at the university of Gondar which revealed significant positive linear correlations between knowledge-attitude ($r = 0.155$, $p < 0.001$), knowledge-practice ($r = 0.513$, $p < 0.001$), and attitude-practice ($r = 0.224$, $p < 0.001$). Another KAP study towards CAM in the United Arab Emirates reported a significant correlation knowledge and attitude toward CAM ($r = 0.149$, $p < 0.001$)[47]. As shown in Table 3.5 there was no significant correlation between practice and knowledge in this study, and this finding is consistent with that of Ilori et al. (2021) [49] where findings showed a negative correlation between practice and knowledge, which was attributed to the lack of data supporting the TCAMs' effectiveness.

Table 3.5: Correlation between knowledge, attitudes, and practices of TCAM.

	Knowledge	Attitudes	Practices
Knowledge			
Attitudes	0.23**		
Practices	0.16*	0.16*	

*p<0.05; **p<0.01

The greater the HCP's knowledge, the greater the likelihood for a positive attitude and practice of HCPs towards TCAM and its' use amongst patients to be consulted (Table 3.5). Furthermore, HCPs practices are influenced by their attitudes. The behaviours and attitudes of HCPs, which are frequently associated with religious and/or cultural beliefs or their confidence in their knowledge and skills, play a significant role in shaping the content and quality of care provided [50]. Attitudes influence treatment choices and recommendation; shape patient-provider interactions and trust; adoption of new practices; teamwork and collaboration; cultural competence and professional development [51–53]. Therefore, identifying these effects is essential for improving patient care and fostering a safe integration of TCAM with conventional medicine.

Descriptive information on the participants' knowledge of TCAM

In Table 3.6, most participants (104, 55.3%) reported that they were aware of the prevalence of TCAM use among the South African population whilst 98 (51.1%) participants stated that they were unaware of the potential interactions between TCAM and conventional medicines.

The findings are contrary to that of Vankova (2023)[55], where it was found that, 24% of the HCPs were aware and knowledgeable of CAM use, while 71% indicated inadequate knowledge of CAM use. The majority (126, 67%) of the participants knew of the most used herbal products in South Africa. A few herbal products that were mentioned included cannabis (*Cannibis sativa*), *Aloe vera* (*Aloe barbadensis)*, Moringa (*Moringa oleifera*), St John's wart (*Hypericum perforatum)*, garlic (*Allium sativum)*, ginger (*Zingiber officinale*), and turmeric (*Curcuma longa*), however, this is more a reflection of knowledge on CAM as opposed to traditional medicines.

Table 3.6: Assessment of knowledge pertaining to TCAM use amongst their patients being attended to (n=188).

Knowledge related questions	Yes n (%)	No n (%)
Are you aware of the prevalence of TCAM use among the South African population?	104 (55.3)	84 (44.7)
Are you aware of any potential interactions between TCAM and conventional medicines that you may prescribe or dispense?	90 (47.9)	98 (52.1)
Do you know the most used traditional medicinal plants in South Africa?	62 (33.0)	126 (67.0)
Are you fully informed of the available TCAM products commercially available?	31 (16.7)	155 (83,3)
Have you had any form of training on TCAM use (undergraduate curriculum or courses)?	53 (28.5)	133 (71.5)
Do you know of any medical journals or other scientific platforms to source information on TCAM?	11 (5.9)	175 (94.1)

The results of this study showed that HCPs had poor knowledge of TCAM (129, 69%). A similar finding was also reported in a study conducted in Gonabad, which showed that the medical students' knowledge of CAM was low and considering that future roles in health facilities and hospitals will require medical university students to be aware of CAM, it is imperative that medical students are also knowledgeable about CAM treatments, as well as any associated risks, side effects, and potential consequences [56].

Another study conducted on nursing students registered at a large public university in South Africa, reported that most of the nursing students had little to no knowledge of CMs [24]. A study aimed at assessing the KAP of Australian doctors, nurses, and pharmacists regarding CAM, revealed that many respondents (68.4%) believed their knowledge of CAM was insufficient, which further leads to a lack of confidence in advising patients and issues about patient safety regarding CAM [57]. On the contrary, in a study conducted among HCPs in public health facilities of Hadiya Zone, South Ethiopia, 65.4% of HCPs reported a capable level knowledge of CAM [58] and a study conducted on pharmacy and nursing students in the University of Oman found that 54.4% of the pharmacy students had good knowledge of CAM [59]. Each country has quite different regulations regarding the use of TCAM, the prevalence of TCAM and its integration into biomedical practice vary from one country to another, and this may be the cause of the difference in knowledge in the studies.

Most of the HCPs (90, 52.1%) partaking in this current study were not aware of any potential interactions between TCAM and conventional medicines and this may be due to not receiving any form of prior training specifically on TCAM-drug interactions, either in their undergraduate degree or through attendance of a course on TCAM-drug interactions and overall TCAM self-use. A study aimed at understanding the knowledge and beliefs about the consumption of herbs/supplements and herb/drug–supplement interactions, identified that the absence of regulations on herbal products and supplements posed a challenge in evaluating their safety and potential for herb-drug interactions [60]. The risks of TCAM-drug interactions include toxicities, life-threatening effects, therapeutic failure, and death [61]. Safety issues around TCAM is the main barrier to the integration of TCAM within the conventional healthcare system, therefore, there is a need to evaluate the safety and interactive profiles of TCAM in combination with conventional medicines, based on reliable scientific data [62].

Furthermore, most HCPs had no form of training on TCAM (133, 71.5%) in the current study undertaken. These findings were consistent with a similar study conducted in Saudi Arabia, Jamaica and Uganda [63–65]. However, a study aimed to conduct a needs assessment for CAM education identifying the KAP among university students and primary care professionals, found that 84.2% physicians; 63.4% pharmacists and 66.2% medical students had received previous training on CAM [55]. The form of training on TCAM and the extent of the training differs greatly by country as each country has different TCAM systems in place. The majority (175, 94.1%) of HCP participants in the current study were unaware of any medical journals or other scientific platforms to source information on TCAM, to the few HCPs that agreed (11, 5.9%) The following sources were mentioned as platforms to obtain information on TCAM: MIMS Complementary Medicine, Journal of Alternative and Complementary Medicine, Himalaya handbook, and the Open Public Health Journal, indicating that majority of resources known were limited to CAM Only (number of respondents) indicated knowledge of a traditional medicine-related resource, the Credo Mutwa publications. Figure 3.1 below highlights key findings on knowledge questions.

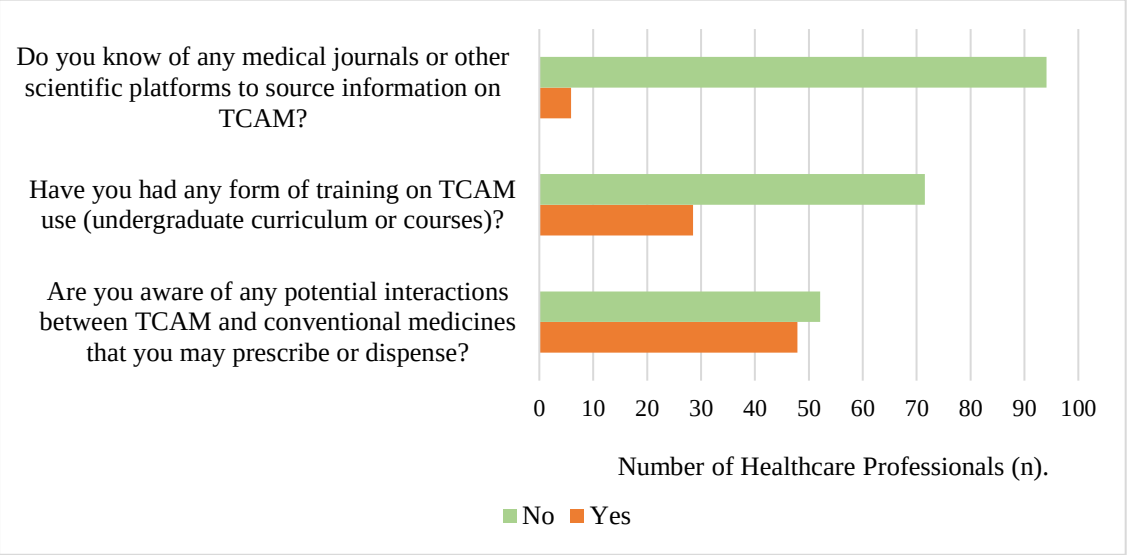


Fig.3.1 HCPs response for knowledge on TCAM (n=188).

Participants attitudes and perceptions towards TCAM

The results show that most participants found TCAM use to be acceptable in most circumstances, as shown in Table 3.7. Overall, the participants showed a positive attitude and perception of TCAM use (170, 90%). Most of the participants (116, 62.4%) believed that TCAM incorporation with the conventional healthcare system would enhance patient care. This study corroborates findings from previous studies [64,66,67].

This response contradicted findings of a study conducted in Pakistan, where most participants opposed the integration of CAM and conventional medical practices [68]. This may be due to the difference in knowledge of HCPs; the difference in the regulatory framework of TCAM in countries and the uncertainty of the safety of TCAM seeing that there is a lack of an evidence-based approach to TCAM. Most HCPs agreed (129, 69.4%) to support the incorporation of TCAM in the medical curriculum. This study supports evidence from previous observations [54,67–69].

Table 3.7: Assessment of HCP's attitudes and perceptions pertaining to TCAM use.

Attitude and perceptions questions	Agree n (%)	Uncertain n (%)	Disagree n (%)
I feel TCAM use is regarded as being acceptable as therapeutic alternative to conventional medicines.	89 (47.8)	60 (32.3)	37 (19.9)
I feel TCAM use is regarded as being acceptable for concomitant use with conventional medicines.	83 (44.6)	43 (23.1)	60 (32.3)
I feel TCAM use is regarded as being acceptable on request by the patient.	114 (61.3)	44 (23.7)	28 (15.1)
I feel TCAM use is regarded as being not acceptable under any circumstances	23 (12.4)	41 (22.0)	122 (65.6)
I believe that TCAM used by my patients is safe as it is considered "natural".	50 (26.9)	69 (37.1)	67 (36.0)
I believe that I would treat patients referred to me by TCAM practitioners without judgement.	122 (65.6)	42 (22.6)	22 (11.8)
I feel that TCAM incorporation into the health system would enhance patient care.	116 (62.4)	49 (26.3)	21 (11.3)
I would support incorporation of TCAM in the medical curriculum.	129 (69.4)	37 (19.9)	20 (10.8)
I feel that integration of TCAM and conventional medicine will never be possible.	31 (16.7)	47 (25.3)	108 (58.1)
I feel it necessary to enquire on TCAM use in my history taking before prescribing or dispensing conventional drugs.	159 (85.5)	19 (10.2)	8 (4.3)
I feel that all healthcare professionals should question patients on their TCAM use.	158 (84.9)	20 (10.8)	8 (4.3)
I feel that guidelines for patient history-taking and patient file records are not inclusive of TCAM use.	120 (64.5)	35 (18.8)	31 (16.7)
I am annoyed when I find out my patients are using TCAM without telling me.	27 (14.5)	36 (19.4)	123 (66.1)
I feel that I have sufficient knowledge on TCAM use among my patient population.	33 (17.7)	42 (22.6)	111 (59.7)

When HCPs were asked if they felt annoyed upon discovering their patients were using TCAM without informing them, HCPs said yes. Whereas, 23 (66.1%) of HCPs disagreed and this could be due to HCPs lack of extended understanding on TCAM use and possible interactions between TCAM and conventional medicines. This study showed that most (111, 59.7%) HCPs felt that they do not have sufficient knowledge of TCAM use among their patient population and this may further cause HCPs to be reluctant to enquire about TCAM use during history-taking practices. However, the majority (159, 85.5%) of HCPs felt that it was necessary to enquire about TCAM use in history-taking before prescribing or dispensing conventional drugs.

Healthcare professionals indicated agreement (120, 64.5%) that current guidelines for

patient history-taking and patient file records are not inclusive of TCAM use, which further emphasises the need for the development of policies in relation to facility-based history-taking practices and record-keeping. Furthermore, this result also highlights the need for undergraduate or other trainings to be more inclusive of TCAM content, not only for patient safety, but to equip HCPs with necessary skills to evaluate the potential for interactions with the conventional medicines that they may be dispensing or prescribing.

Current practices of HCPs in relation to TCAM

Figure 3.2 below highlights key findings on attitude and perception questions.

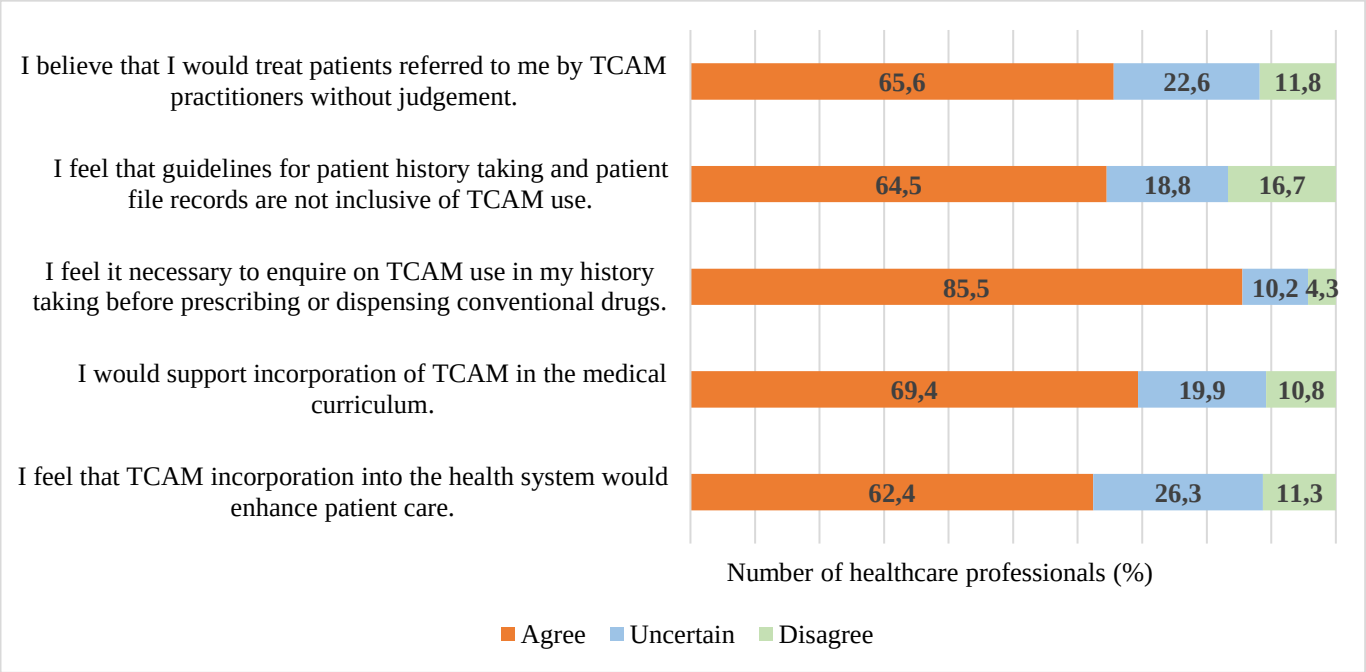


Fig.3.2 HCPs response distribution for attitude and perceptions of TCAM use amongst their patients.

With respect to current practices of the study participants in relation to their patients making use of TCAM, more than half of the participants 104 (55.9%) considered the use of TCAM personally in the past (104, 55.9%), as shown in Table 3.8, despite being healthcare professionals practising in the conventional healthcare setting.

Table 3.8: Assessment of HCPs current practices pertaining to TCAM use amongst the patients served.

Current practice related questions	Agree n (%)	Uncertain n (%)	Disagree n (%)
I have considered the use of TCAM personally in the past.	104 (55.9)	27 (14.5)	55 (29.6)
I often ask my patients about TCAM use in my history-taking practices.	80 (43.0)	40 (21.5)	66 (35.5)
My patients freely disclose their TCAM use when in consultation with me.	49 (26.3)	57 (30.6)	80 (43.0)
I discourage TCAM use among patients.	37 (19.9)	45 (24.2)	104 (55.9)
I have identified TCAM use in conjunction with conventional drugs among my patients.	108 (58.1)	43 (23.1)	35 (18.8)
I often discuss TCAM use with my patients.	50 (26.9)	53 (28.5)	83 (44.6)
I specifically ask patients on the past and current use of OTC medication in my history taking.	138 (74.2)	25 (13.4)	23 (12.4)
I specifically ask patients on the past and current use of chronic medication in my history taking.	157 (84.4)	20 (10.8)	9 (4.8)
I specifically ask patients on the past and current use of supplements and vitamins in my history taking.	119 (64.0)	35 (18.8)	32 (17.2)
I specifically ask patients on the past and current use of complementary and alternative medicines in my history taking.	97 (52.2)	40 (21.5)	49 (26.3)
I specifically ask patients on the past and current use of traditional medicine in my history taking.	75 (40.3)	47 (25.3)	64 (34.4)
I specifically ask patients on the past and current use of all the above.	83 (44.6)	54 (29.0)	49 (26.3)
I never ask patients on the past and current use of any of the above in my history taking.	21 (11.3)	35 (18.8)	130 (69.9)
I treat patients referred to me by a TCAM practitioner.	88 (47.3)	56 (30.1)	42 (22.6)
I often refer patients to TCAM practitioners.	23 (12.4)	44 (23.7)	119 (64.0)
I received training on potential drug interactions between TCAM and conventional medicines.	44 (23.7)	38 (20.4)	104 (55.9)
I have easy access to databases pertaining to TCAM interactions with conventional medicines.	39 (21.0)	35 (18.8)	112 (60.2)

Healthcare professionals' personal use of TCAM has been shown to influence their ability to refer patients to TCAM practitioners and their attitudes and perceptions on the integration of TCAM therapies into standard medical practices [65]. Less than half of HCPs (80, 43%) would enquire about TCAM use during history-taking practices in the current

study. This finding was also reported by [63,64]. Findings to a similar study undertaken in Northwestern Uganda among nurses and midwives showed that of the total respondents, 193 (72.0%) indicated the common practice of enquiring on TCAM use amongst their patients when in consultations [70]. Furthermore, Alfred and Kizito [65], found that the respondents were more concerned about the delay in their patients' seeking treatment (55.7%) rather than the drug interactions with TCAM (20.8%), side effects (17.2%), and efficacy of TCAM (4.7%). Healthcare professionals could be hesitant to enquire because of their poor knowledge of TCAM and inability to effectively evaluate potential for interactions between the disclosed TCAM and the conventional medicines being prescribed or dispensed [71]. Healthcare professionals from the current study (108, 58.1%) have identified cases whereby their patients are using TCAM in conjunction with conventional drugs. This is worrisome as studies are showing potential TCAM-drug interactions [72–74].

A limited number (83, 44.6%) of HCPs responded with disagreement that they often discuss TCAM use with their patients. A study conducted in Western Saudi Arabia found that a minority (39.4%) of patients felt it important to consult their medical doctor or a pharmacist before using herbal medicines [70]. Despite a minority agreeing, patients need to be able to discuss their use of TCAM with their HCPs and HCPs should be competent and equipped with tools needed to advise against combination use. Furthermore, a total of 104 (55.9%) of the study population did not receive any training on drug interactions between TCAM and conventional medicines and most HCPs (112, 60.2%) had no access to databases pertaining to TCAM interactions with conventional medicines.

When participants were questioned on whether patients have indicated that they had been referred to the conventional healthcare facility by a TCAM practitioner, HCPs agreed (88, 47.3%) or were uncertain (56, 30.1%). The uncertainty may be lack of purposive questioning in history-taking and hence resulting in unintended non-disclosure from patients. Alternatively, uncertainty may be the resultant factor of the stigma associated with TCAM use and fear of patients being judged by HCPs on their choice of treatment [1], thereby intentionally not disclosing their use of TCAM. A few (80, 43%) HCPs disagreed

that they had experienced patients freely disclosing their TCAM use during consultation. According to Zakaria, Mohd Noor and Abdullah (2021), patients did not disclose their traditional Chinese medicine (TCM) use because they believed that their doctors would disapprove, and patients considered it was not important for their HCP to know. Healthcare professionals surveyed in the current study (119, 64.0%) disagreed with referring patients to TCAM practitioners and this finding was consistent with that of [64] where approximately 95% of HCPs said that they would not refer their patients to a herbalist or traditional medicine provider.

Patients should be treated holistically, being able to meet their physical, emotional, mental, spiritual, and social needs [76]. Conventional HCPs and TCAM practitioners need to have a mutual referral system in place in which practitioners refer patients to colleagues with different specialties or treatment modalities when they encounter conditions beyond their scope of practice or expertise. An exemplary model on integration can be observed in China, where approximately 446 hospitals have integrated TCAM and conventional medicine [77]. This setup facilitates seamless communication and collaboration between TCM practitioners and conventional practitioners, allowing for coordinated patient care and shared decision-making [78]. Patients benefit from access to a wider range of treatment options, while HCPs gain insights into different therapeutic approaches and cultural perspectives.

With regards to HCPs current practices, HCPs were questioned whether they ask patients about their past and current use of the following medication during history-taking: OTC medication, chronic medication, supplements and vitamins, CAM, and TM. Personal use has been found to translate into increased TCAM knowledge and awareness, resulting in those implementing TCAM in history-taking. As shown in Figure 3.3, a few (75, 40.3%) HCPs agreed to enquiring about TM during history-taking as compared to the other medications.

Healthcare professionals enquired about medication they were more familiar with. Stub et al., (2017) found that 18% of the medical doctors and 26% of the nurses would often/always ask their patients if they used complementary therapies. According to [63], pharmacists should enquire patients about their current and past prescription medication and should be able to advise patients of any potential adverse drug interactions and side effects when using CAM.

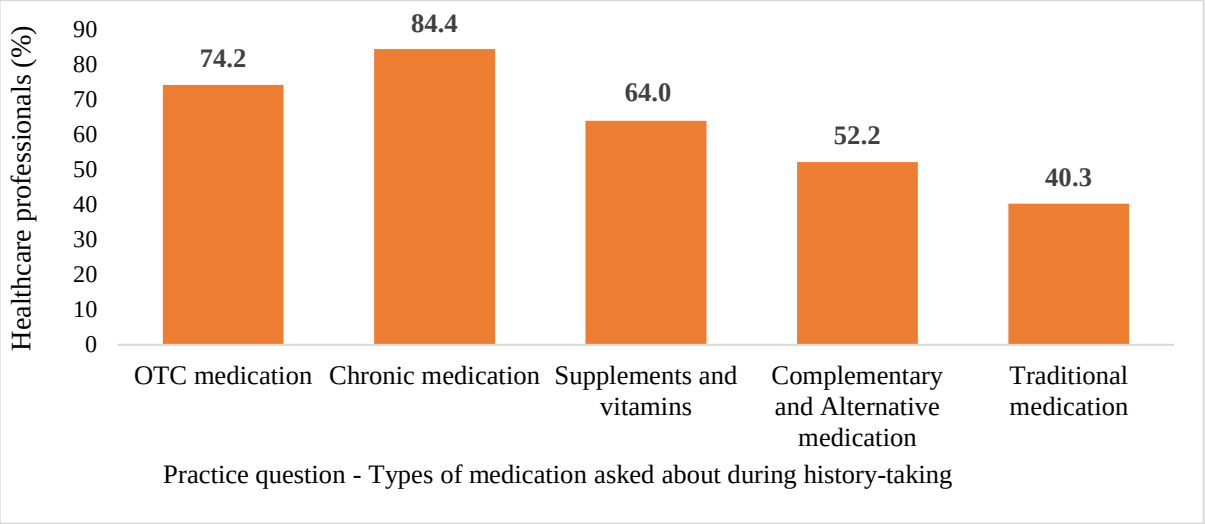


Fig. 3.3 Percentage of healthcare professionals asking patients about their past and current use of the following medication during history-taking.

Conclusion

The lack of knowledge of HCPs is attributed to a lack of prior training on TCAM use, and a lack of platforms to source information on TCAM. The incorporation of TCAM within the medical curriculum and reliable platforms to source information on TCAM would increase the confidence levels of HCPs towards TCAM and this would allow them to freely discuss TCAM with their patients as they would be more knowledgeable. Institutions should assess their TCAM programs and employ standardized TCAM content, inclusive of in-depth TCAM-drug interactions. The incorporation of TCAM within the health system would encourage history-taking guidelines and patient file records to be inclusive of TCAM. There is a need for evidence-based research on TCAM to inform these guidelines.

A more holistic level of healthcare can be achieved by combining present healthcare

systems and TCAM, that can coexist in the same space. Studies focusing on TCAM drug profiling and clinical evaluation of TCAM-drug interactions are needed to assess TCAM safety. The study's limitations included a disproportional balance between prescribing and dispensing HCPs, with majority being dispensing HCPs and this could lead to study bias. The imbalance is due to prescribers working hours that were entirely occupied with medical duties and inability to complete the questionnaires. This study's accuracy was compromised by a few questions whereby some HCPs were not entirely honest. In attempt to avoid this, more open-ended questions should be included for future studies.

Declarations

Availability of data and materials

All data analysed during this study are included in this published article. The datasets used during the current study are available from the corresponding author on reasonable request.

Competing interests

The authors have no relevant financial or non-financial interests to disclose. All authors certify that they have no affiliations with or involvement in any organization or entity with any financial interest or non-financial interest in the subject matter or materials discussed in this manuscript.

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Author contributions

Mulanga Mathoho: Conceptualization, Methodology, Validation, Formal analysis, Investigation, Writing – original draft, Visualization, Project administration, Funding acquisition. Zelna Booth: Conceptualization, Methodology, Validation, Formal analysis, Resources, Writing – review and editing, Visualization, Supervision, Project administration. Stephanie Leigh: Conceptualization, Methodology, Validation, Formal analysis, Resources, Writing – review and editing, Visualization, Supervision, Project administration.

Rubina Shaikh: Conceptualization, Methodology, Validation, Formal analysis, Resources, Writing – review and editing, Visualization, Supervision, Project administration.

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Ethical considerations

Clearance to conduct this study was obtained at the University of Witwatersrand through the Human Research Ethics Committee (HREC)-medical (M210329) prior to the commencement of data collection.

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Appendix C

Questionnaire used as the survey tool for data collection purposes.

Part 1: Demographic information

Age (years)	□ 18-30 □ 31-40 □ 41-54 □ 55+
Gender	ϒ Male ϒ Female ϒ Other
Race	ϒ Black ϒ White ϒ Coloured ϒ Indian ϒ Chinese ϒ Other (please specify):
Religion or Belief System	ϒ Christian ϒ Catholic ϒ Hindu ϒ Muslim ϒ Jewish ϒ An African belief system ϒ None ϒ Other (please specify):
Nationality	ϒ South African ϒ Other (please specify):
Professional Classification	ϒ Clinical associate ϒ Clinical associate in training ϒ Dermatologist ϒ Dermatologist in training ϒ Dentist ϒ Dentist in training ϒ Emergency care practitioner ϒ Emergency care practitioner in training ϒ General medical physician ϒ General medical physician in training ϒ Optometrist ϒ Optometrist in training ϒ Pharmacist ϒ Pharmacist in training ϒ Pharmacist assistant ϒ Psychiatrist ϒ Psychiatrist in training ϒ Surgical practitioner ϒ Surgical practitioner in training ϒ Other (please specify):

Ward of practice	ϒ Casualty ϒ Burn ward ϒ ICU ϒ Maternity ϒ Geriatrics ϒ Paediatric ϒ Psychiatric ϒ Medical ward ϒ Neuroscience ϒ Special unit ϒ Surgical ϒ Dept of emergency medicine ϒ Other (please specify):
University or training facility attended	ϒ Health Sciences Academy ϒ Nelson Mandela Metropolitan University ϒ North-West University – South Africa ϒ Rhodes University ϒ Sefako Makgatho Health Sciences University ϒ Stellenbosch University ϒ Tshwane University of Technology ϒ University of Cape Town ϒ University of KwaZulu-Natal ϒ University of Pretoria University of the Free State ϒ University of the Western Cape ϒ University of the Witwatersrand ϒ Other (Please specify): _____

Part 2: Assessment of knowledge pertaining to traditional, complementary, and alternative medicine (TCAM) use.

	Statement	Response
2.1	Are you aware of the prevalence of TCAM use among the South African population?	Yes No If yes, please indicate an approximate percentage:
2.2	Are you aware of any potential interactions between TCAM and conventional medicines that you may prescribe or dispense?	Yes No
2.3	Do you know the most used traditional medicinal plants in South Africa?	Yes No If yes, specify
2.4	Are you fully informed of the available TCAM products commercially available?	Yes No
2.5	Have you had any form of training on TCAM use (undergraduate curriculum or courses)?	Yes No
2.6	Do you know of any medical journals or other scientific platforms to source information on TCAM?	Yes No If yes, please specify:

Part 3: Statements to determine participant attitudes and perceptions towards the use of TCAM among patients.

Statement		Responses				
		Strongly disagree	**Disagree**	**Neutral**	**Agree**	**Strongly agree**
3.1	I feel TCAM use is regarded as being acceptable in the following circumstances: a. Therapeutic alternative to conventional medicines. b. Concomitant use with conventional medicines. c. On request by the patient. d. Not acceptable.					
3.2	I believe that TCAM used by my patients is safe as it is considered “natural”.					
3.3	I believe that I would treat patients referred to me by TCAM practitioners without judgement.					
3.4	I feel that TCAM incorporation into the health system would enhance patient care.					
3.5	I would support incorporation of TCAM in the medical curriculum.					
3.6	I feel that integration of TCAM and conventional medicine will never be possible.					
3.7	I feel it necessary to enquire on TCAM use in my history taking before prescribing or dispensing conventional drugs.					
3.8	I feel that all healthcare professionals should question patients on their TCAM use.					
3.9	I feel that guidelines for patient history taking, and patient file records are not inclusive of TCAM use.					
3.10	I am annoyed when I find out my patients are using TCAM without telling me.					
3.11	I feel that I have sufficient knowledge on TCAM use among my patient population.					

Part 4: Statements to determine participant practices related to TCAM use among patients.

Statement		Responses				
		Strongly disagree	**Disagree**	**Neutral**	**Agree**	**Strongly agree**
4.1	I have considered the use of TCAM personally in the past.					
4.2	I often ask my patients about TCAM use in my history taking practices.					
4.3	My patients freely disclose their TCAM use when in consultation with me.					
4.4	I discourage TCAM use among patients.					
4.5	I have identified TCAM use in conjunction with conventional drugs among my patients.					
4.6	I often discuss TCAM use with my patients.					
4.7	I specifically ask patients on the past and current use of the following products in my history taking: a. OTC medication. b. Chronic medication. c. Supplements and vitamins. d. CAM. e. Traditional medicine. f. All of the above. g. None of the above.					
4.8	I treat patients referred to me by a TCAM practitioner.					
4.9	I often refer patients to TCAM practitioners.					
4.10	I received training on potential drug interactions between TCAM and conventional medicines.					
4.11	I have easy access to databases pertaining to TCAM interactions with conventional medicines.					

Appendix D

Information sheet provided to potential study participants during study recruitment phase of study.



UNIVERSITY OF THE
WITWATERSRAND,
JOHANNESBURG

Information sheet for a survey among healthcare professionals

Department of Pharmacy and Pharmacology

School of Therapeutic Sciences, Faculty of Health Sciences

7 York Road, Parktown, 2193, South Africa ● Tel: +27 11 717 2552 ● Fax: +27 11 642

4355

Title of the study:

A descriptive survey of healthcare professionals on traditional, complementary, and alternative medicine integration in public hospitals in Gauteng.

Dear Healthcare Professional,

I am inviting you to take part in a research study. Please take the time to read the following information carefully. Please do not hesitate to ask questions if anything you have read is not clear or if you would like further information regarding the study. Take the time to decide whether you wish to take part in this research study. Taking part in this study is completely voluntary. Completion of the questionnaire will automatically imply consent to participate in the study.

Introduction

My name is Mulanga Mathoho, and I am a Master of Pharmacy (M.Pharm) student currently, in the Department of Pharmacy and Pharmacology, at the University of the Witwatersrand. As part of my study, I am conducting a survey to gain more insight about the knowledge, attitudes, perceptions and practices (KAP) of prescribers and dispensers regarding traditional, complementary, and alternative medicine (TCAM) use by patients visiting three large academic hospitals in Gauteng. In determining this,I hope to identify whether there is importance placed on traditional, complementary, and alternative medicine in conventional history-taking practices before prescribing or dispensing; whether further training on TCAM is indicated as beneficial amongst participants, which could inform undergraduate curriculums.

Right to refuse or withdraw

You do not have to take part in this research. You may also withdraw from the study at any point in time.

Participant Selection

You have been invited to participate in this research, as I have identified that you are a registered healthcare professional, who is involved directly in the prescribing or dispensing of medicines in a selected study site.

The study procedure

A self-administered questionnaire will be administered through the provision of a mobile device with the questionnaire available on REDCap® for response capturing. You can choose to complete the questionnaire yourself on the device provided, alternatively, the researcher can be available to assist and there will be additional hard copies of the questionnaires for completion if needed. The survey can be completed at your own pace, and should take approximately 20 to 30 minutes to complete. The questionnaire consists of four sections (a demographic information section, and 3 other

sections aimed at assessing your KAP). The data collected will provide necessary insight to explore the prescribers and dispenser's level of knowledge on general TCAM use, attitudes and perceptions toward TCAM as a form of healthcare and its potential to interact with conventional medicines being prescribed and dispensed. Furthermore, the study will explore current history-taking practices and potential reasons for hesitancy toward TCAM integration in history-taking. The study would also allow for further understanding as to whether there is need for interventions to facilitate conventional healthcare professional practices to be more inclusive of TCAM use.

Confidentiality and sharing of results

All data collected will be kept strictly confidential. This study will be conducted in full compliance with all relevant ethical guidelines from the Human Research Ethics Committee (HREC) at the University of the Witwatersrand. Questionnaires do not require any personal identifiers to be indicated, and no photographing of participants will take place. Results from the study will be available to all supervisors, the study site management and any participant requesting a summary of results. The results will be presented in a final dissertation, at a conference presentation and may also be published, depending on the quality and quantity of the data acquired.

Risks

There are minimal risks associated with participating in this study. Simply 20 to 30 minutes of your time would be required for completion of the questionnaire. You can withdraw at any point in time should you need to attend to your work duties and patients.

Benefits

There is no direct benefit or reimbursement related to your participation in this study. However, you would be assisting us in completing our research projects, to successfully complete a postgraduate degree. This study could potentially lead to informing policy development to have a history-taking process to be more inclusive of

traditional, complementary, and alternative medicine use and the promotion of further content to be incorporated into the various undergraduate curricula to assist one in practice upon identification of patient traditional medicine use.

Ethics

All study procedures will only be conducted upon receipt of an ethics clearance certificate from the University of the Witwatersrand Human Research Ethics Committee (HREC) - Medical, deeming the study ethically sound. The researchers will all also undertake an online ethics course. Supervisors will oversee data collection and ensure that all COVID-19 related safety protocols in accordance with the University's requirements will be maintained throughout conducting of the survey, to ensure the safety of participants, researchers, and patients at all times.

Who to contact

If you need any further information concerning this project or if you have any problems which may be related to your involvement in the project, you may contact:

1. Researchers: Mulanga Mathoho: email – 1845509@students.wits.ac.za
2. Main Supervisor: Mrs. Zelna Booth: email –Zelna.booth@wits.ac.za
3. This proposal has been reviewed and approved by the Wits Human Research Ethics Committee (Medical), which is a committee whose task it is to make sure that research participants are protected from harm. If you wish to find out more about the committee or you have any concern over the way the study is being conducted, please contact the Chairperson of this Committee, who is Professor Clement Penny, who may be contacted on the telephone number 011 717 2301, or by e-mail on Clement.Penny@wits.ac.za. The telephone numbers for the Committee secretariat are 011 717 2700/1234 and the e-mail addresses are Zanele.Ndlovu@wits.ac.za and Rhulani.Mukansi@wits.ac.za.

THANK YOU FOR READING THIS INFORMATION SHEET.

YOUR PARTICIPATION IN COMPLETING OF A SURVEY WOULD BE GREATLY APPRECIATED.

Appendix E

University of the Witwatersrand Human Research Ethics Committee (HREC) –Medical

R49 Ms M Mathoho

HUMAN RESEARCH ETHICS COMMITTEE (MEDICAL)
CLEARANCE CERTIFICATE NO. M220742

NAME: (Principal Investigator)	Ms M Mathoho
DEPARTMENT:	School of Therapeutic Sciences Department of Pharmacy and Pharmacology Medical School University
PROJECT TITLE:	*A descriptive survey of healthcare professionals on traditional, complementary and alternative medicine integration in public hospitals in Gauteng*
DATE CONSIDERED:	2022/07/29
DECISION:	Approved unconditionally
CONDITIONS:	
NOTE:	If contact information regarding student study participants is required, please contact the Registrar's office - <Nicoleen.Potgieter@wits.ac.za>
SUPERVISOR:	Miles Z Booth, R Shaikh and S Leigh de Rapper
APPROVED BY:	Dr CB Penny, Chairperson, HREC (Medical)
DATE OF APPROVAL:	2022/09/12

This Clearance Certificate is valid for 5 years from the date of approval. An extension may be applied for.

DECLARATION OF INVESTIGATORS

To be completed in duplicate and **ONE COPY** returned to the Research Office secretariat on the 3rd floor, Phillip Tobias Building, Parktown, University of the Witwatersrand, Johannesburg.

I/we fully understand the conditions under which I am/we are authorized to carry out the above-mentioned research and I/we undertake to ensure compliance with these conditions. Should any departure be contemplated from the research protocol as approved, I/we undertake to submit details to the Committee. I agree to submit a yearly progress report. When a funder requires annual re-certification, the application date will be one year after the date when the study was initially reviewed. In this case, the study was initially reviewed in July and therefore reports and re-certification will be due in the month of July each year. Unreported changes to the study may invalidate the clearance given by the HREC (Medical).

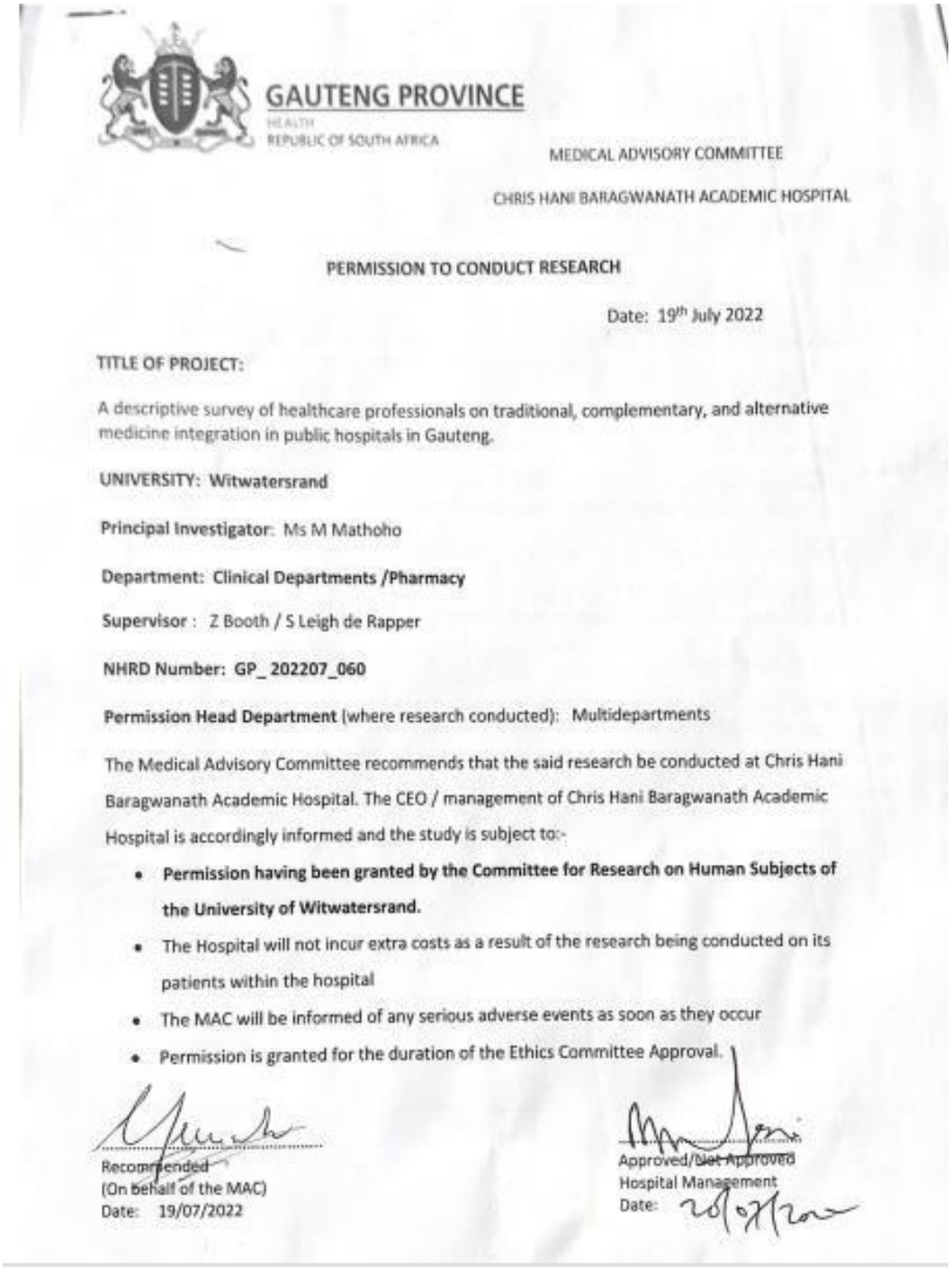
Signature of Principal Investigator

Date 2022/09/19

Appendix F

Proof of the permission garnered to conduct the study at the research studysites.

Study site 1: Chris Hani Baragwanath Academic Hospital (CHBAH)



GAUTENG PROVINCE
HEALTH
REPUBLIC OF SOUTH AFRICA

MEDICAL ADVISORY COMMITTEE

CHRIS HANI BARAGWANATH ACADEMIC HOSPITAL

PERMISSION TO CONDUCT RESEARCH

Date: 19th July 2022

TITLE OF PROJECT:

A descriptive survey of healthcare professionals on traditional, complementary, and alternative medicine integration in public hospitals in Gauteng.

UNIVERSITY: Witwatersrand

Principal Investigator: Ms M Mathoho

Department: Clinical Departments /Pharmacy

Supervisor : Z Booth / S Leigh de Rapper

NHRD Number: GP_ 202207_060

Permission Head Department (where research conducted): Multidepartments

The Medical Advisory Committee recommends that the said research be conducted at Chris Hani Baragwanath Academic Hospital. The CEO / management of Chris Hani Baragwanath Academic Hospital is accordingly informed and the study is subject to:-

- **Permission having been granted by the Committee for Research on Human Subjects of the University of Witwatersrand.**
- The Hospital will not incur extra costs as a result of the research being conducted on its patients within the hospital
- The MAC will be informed of any serious adverse events as soon as they occur
- Permission is granted for the duration of the Ethics Committee Approval.

Recommended
(On behalf of the MAC)
Date: 19/07/2022

Approved/~~Not Approved~~
Hospital Management
Date: 20/07/2022

Study site 2: Helen Joseph Hospital

GAUTENG PROVINCE
HEALTH
REPUBLIC OF SOUTH AFRICA

Gauteng Department of Health
Helen Joseph Hospital
Enquiries: Dr. R. Ncha
Chief Executive Officer
Tel :(011) 489-0306/1087
Fax :(011) 726-5425
E mail: Relebohile.Ncha@gauteng.gov.za
Date: 29 August 2022

Dear Mulanga Mathoho

STUDY: A descriptive survey of healthcare professionals on traditional, complementary, and alternative medicine integration in public hospitals in Gauteng.

RESEARCHERS: Mulanga Mathoho

GP_202207_060

The above the study was discussed at the Research Committee meeting. We recommend that permission be granted for Helen Joseph Hospital to be used as a site for the above research,
The researcher is expected to the following:

- Upon completion of the study, copy thereof should be submitted to Helen Joseph Hospital.
- It is the researcher's duty to collect the data from the relevant department after the Research Committee approved the study.

Please liaise with the HOD and Unit Manager or Sister in Charge to agree on the dates and time that would suit all parties.

Kindly forward this office with the feedback of your study on completion of the research.
Thank you

Dr. M.D Mukansi
Helen Joseph Hospital
Research Chairperson

Approved

Dr. R. Ncha
Helen Joseph Hospital
CHIEF EXECUTIVE OFFICER
DATE: 01/09/22

Study site 3: Charlotte Maxeke Johannesburg Academic Hospital (CMJAH)

GAUTENG PROVINCE
HEALTH
REPUBLIC OF SOUTH AFRICA

CHARLOTTE MAXEKE JOHANNESBURG
ACADEMIC HOSPITAL

Enquiries: *Ms N. Mzila*
Email:Nolwazi.Mzila@gauteng.gov.za
Tel: *011 488 3365*
Ref: *1/7/2*

GP_202207_060

DEAR MULANGA MATHOHO

FINAL APPROVAL OF STUDY

TITLE: A DESCRIPTIVE SURVEY OF HEALTHCARE PROFESSIONALS ON TRADITIONAL, COMPLEMENTARY, AND ALTERNATIVE MEDICINE INTEGRATION IN PUBLIC HOSPITALS IN GAUTENG

DEPARTMENT: PHARMACY AND PHARMACOLOGY

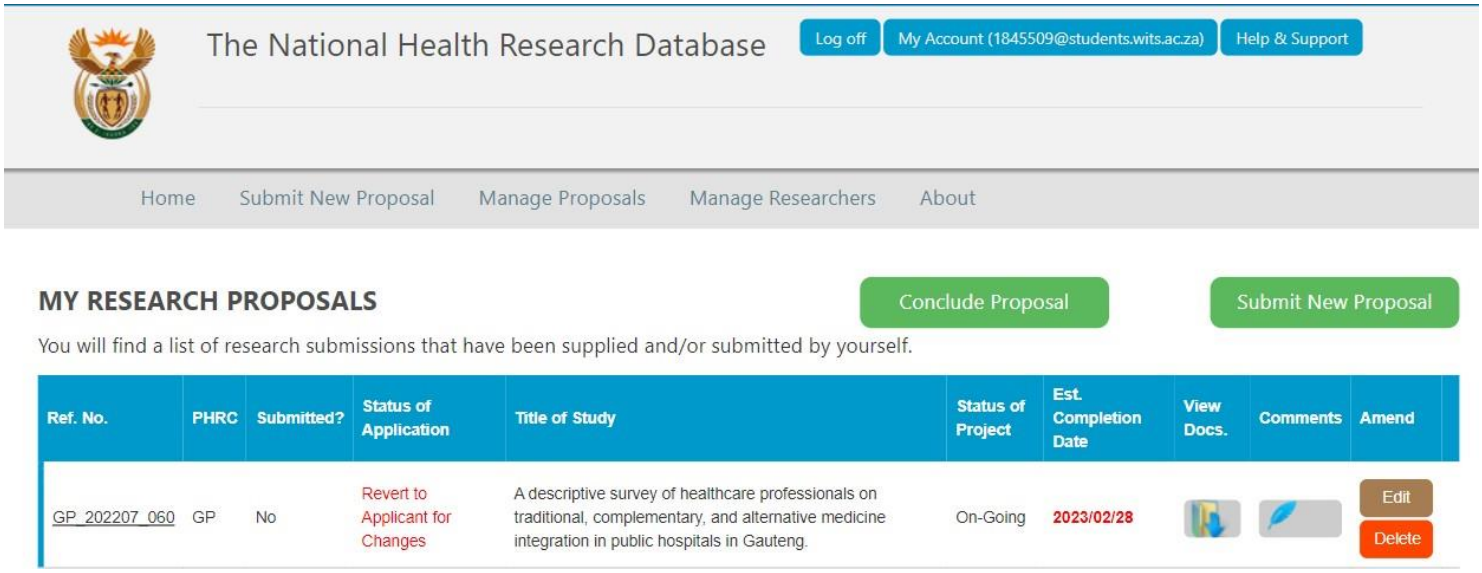
	DOCUMENTS REQUIRED FOR STUDENT RESEARCH	TICK
1.	Permission by CMJAH Cluster Review Committee	X
2.	Covering Letter from The Applicant	X
3.	Research Protocol	X
4.	Support Letter from the Head of Department	X
5.	Ethics Clearance Certificate	X
6.	NHRD Registration	X
	DOCUMENTS REQUIRED FOR COMPANY RESEARCH	
1.	Covering Letter from The Applicant/Company	
2.	Research Protocol	
3.	Support Letter from The Head of Department	
4.	Ethics Clearance Certificate	
5.	Approval From the Department of Health	

CHECKED BY: MS N. MZILA

Signed by:Octavia Nolwazi Mzila

Appendix G

Proof of submission of the study with the National Health Research Data(NHRD) base.



Note. It is not necessary to be approved on the NHRD system for the study to be undertaken, but it is good research practice to register study on the system as it was undertaken at public hospitals in Gauteng district

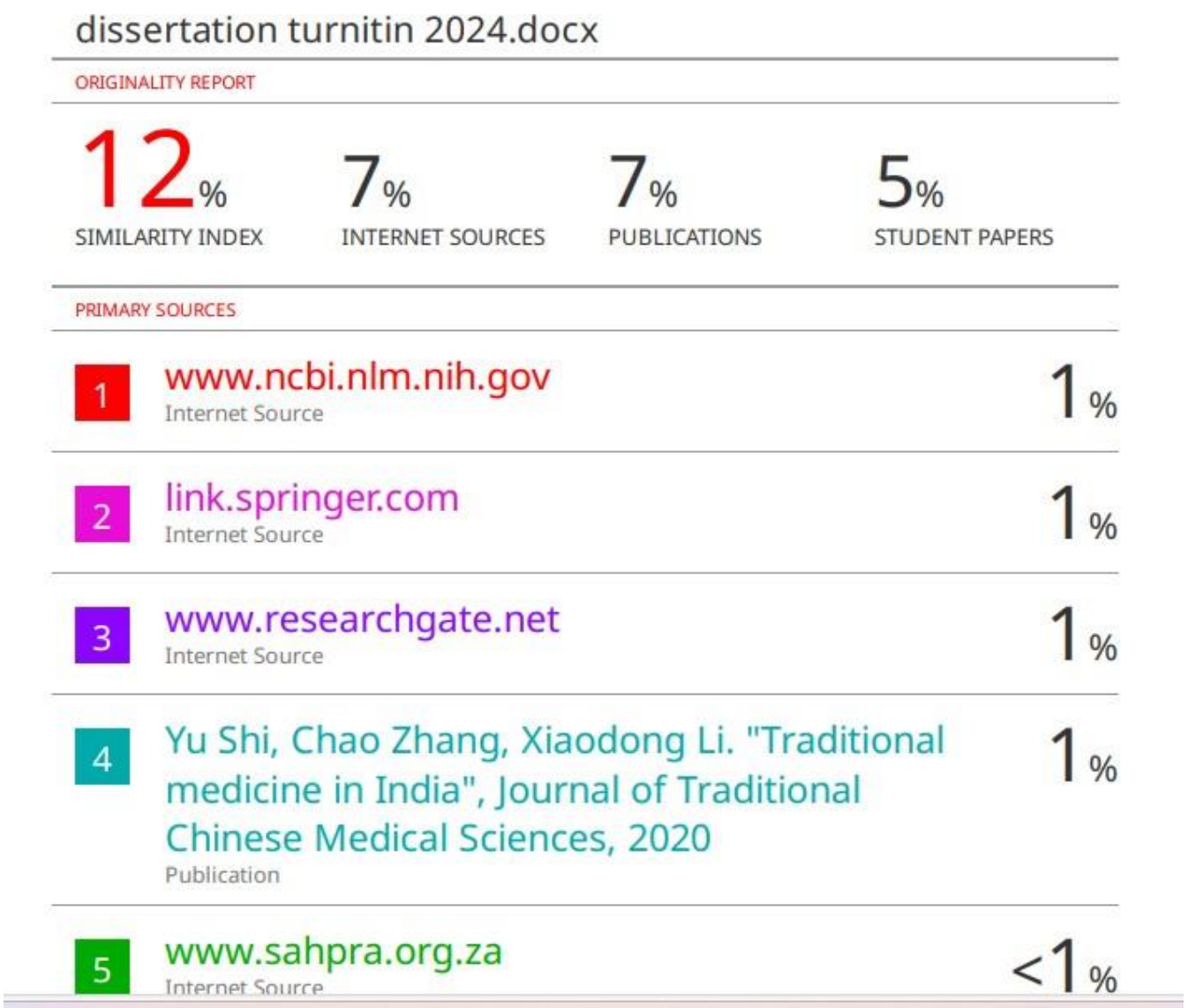
Appendix H

Proof of plagiarism report through Turnitin internet-based plagiarism detectionservice.

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