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Original Article

Healing from the wild: An ethnopharmacological assessment of *Aloe ferox* in rural KwaZulu-Natal. A cross-sectional mixed-methods study.

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Abstract Background

Aloe ferox (Cape Aloe or Bitter Aloe) is one of Southern Africa's most valued medicinal plants, widely used within Indigenous Knowledge Systems (IKS) for treating digestive, dermatological, and immune-related ailments. This study investigates the traditional applications, usage patterns, and local perceptions of *A. ferox* to support the integration of Indigenous healing knowledge into public health frameworks.

Methods

A cross-sectional mixed-methods study was conducted among 140 participants from rural KwaZulu-Natal communities, selected through purposive and snowball sampling. Participants included 80 women (57%) and 60 men (43%), aged 22–78 years (mean = 46.3 years). Most participants (65%) were small-scale farmers or informal traders, while 25% were traditional healers or herbalists. Quantitative data were gathered using structured questionnaires on usage frequency and preparation methods, while qualitative data were collected through 20 semi-structured interviews with healers, elders, and community herbalists. Descriptive statistics and thematic analysis were applied.

Results

Approximately 79% of respondents used *A. ferox* for digestive cleansing and constipation, 60% for wound healing, 42% for skin infections, and 38% for immune support. Common preparation methods included boiling the leaf sap (55%) and topical gel application (35%), with 83% reporting symptom relief. Qualitative findings revealed that *A. ferox* is also perceived as a spiritual cleanser, used in rituals to remove “impurities” and restore balance. Healers emphasized its cultural symbolism and warned against overharvesting for commercial trade. Participants expressed concern over the loss of Indigenous harvesting knowledge among youth and the absence of dosage regulation in home-based use.

Conclusion

The study confirms *A. ferox* as a cornerstone of traditional healthcare and cultural identity in KwaZulu-Natal.

Recommendations

To ensure its sustainability, pharmacological validation, community-based conservation, and policy inclusion of IKS are recommended to safeguard both human health and biodiversity.

Keywords: *Aloe ferox*, Indigenous Knowledge Systems, traditional medicine, ethnobotany, rural healthcare, KwaZulu-Natal, herbal remedies, cross-sectional study, medicinal plants, community health.

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Background

Aloe ferox, commonly known as Cape Aloe or Bitter Aloe, is a robust, spiky-leaved succulent indigenous to Southern Africa and one of the most commercially and medicinally valuable aloes in traditional healing systems. Known for its laxative, anti-inflammatory, antimicrobial, and wound-healing properties, *Aloe ferox* has been widely used by Indigenous communities for generations to treat a variety of health conditions, including digestive disorders, skin

infections, fevers, and immune deficiencies. In the context of African Indigenous Knowledge Systems (IKS), *Aloe ferox* holds both medicinal and spiritual significance, often employed in cleansing rituals and holistic wellness practices. The plant's leaf sap, gel, and bitter latex are used in different forms, such as teas, tonics, and ointments, depending on the health condition being addressed. While its medicinal applications are well documented in traditional practices, there is limited

empirical data on how rural communities currently use and perceive this plant, particularly in KwaZulu-Natal. Furthermore, with increasing commercial exploitation and unregulated self-medication, concerns have emerged regarding sustainable harvesting, dosage safety, and community knowledge retention. This study was conducted under the theme “Harnessing African Indigenous Knowledge for Good Health and Well-being”, aiming to explore the relevance and application of *Aloe ferox* in community healthcare and promote the integration of traditional knowledge into sustainable public health strategies.

Research Objectives

- I. To identify the most common health conditions treated with *Aloe ferox*.
- II. To explore preparation methods and usage frequency among different community members.
- III. To examine community perceptions of the effectiveness of *Aloe ferox*.
- IV. To assess the sustainability and safety concerns related to the harvesting and self-medication of *Aloe ferox*.

Methodology

Study Design

This study employed a cross-sectional mixed-methods design, integrating both quantitative and qualitative research approaches. The mixed-methods approach allowed for the collection of complementary data, quantitative data to assess usage patterns and frequencies, and qualitative insights to explore cultural meanings, preparation practices, and perceptions of effectiveness associated with *Aloe ferox*.

Study Setting

The study was conducted in rural communities in KwaZulu-Natal, South Africa, specifically in the uMzimkhulu, Bulwer, and Harding regions, areas known for the continued reliance on traditional medicine. Data collection was carried out over four months, from January to April 2024, using community centres, local markets, and homesteads as interview venues to ensure accessibility and cultural comfort for participants.

Data Collection Method

Data were collected between January and April 2024 using a mixed-methods approach that integrated quantitative surveys and qualitative interviews to capture both measurable trends and in-depth cultural perspectives

on the use of *Aloe ferox* in rural KwaZulu-Natal communities. For the quantitative component, data were collected from 120 participants using a structured questionnaire designed to gather information on demographic characteristics, frequency of *A. ferox* use, preparation methods, ailments treated, and perceived effectiveness. The questionnaire comprised both closed- and open-ended items and was administered through face-to-face interviews conducted in isiZulu and English, depending on participants' language preference. Trained community research assistants facilitated data collection through household visits and community hall sessions, ensuring inclusivity and cultural sensitivity. Each interview lasted approximately 25 to 30 minutes.

For the qualitative component, 20 participants, including 10 traditional healers, 5 herbalists, and 5 community elders, were purposively selected for their expertise and extensive experience in Indigenous healing practices. Data were gathered through semi-structured interviews and focus group discussions, which explored traditional preparation methods, symbolic meanings, spiritual uses, and sustainability concerns related to *A. ferox*. Each interview lasted between 45 and 60 minutes, was audio-recorded with consent, and later transcribed verbatim for thematic analysis. Field notes were taken to document non-verbal cues, environmental contexts, and researcher reflections. All data were anonymized to maintain confidentiality. Triangulation of quantitative and qualitative data enhanced the credibility, validity, and reliability of the findings by allowing for cross-verification between statistical trends and narrative insights.

Participants

A total of 140 participants were included in the study. Eligible participants were required to be:

- 18 years or older,
- Residents of the study areas, and
- Have direct experience using or knowledge of *Aloe ferox* for health-related purposes.

Participants were recruited using purposive sampling to target individuals with knowledge of traditional healing, and snowball sampling to identify additional users and local experts, including traditional healers, herbalists, and elders. Individuals who had never used *Aloe ferox* or lacked knowledge about its preparation and application were excluded.

Bias

To minimize bias, data collection tools were translated into isiZulu and pre-tested for clarity and cultural sensitivity. Interviews were conducted by trained local



fieldworkers familiar with the communities to foster trust and elicit more authentic responses. Triangulation between quantitative and qualitative data further enhanced the validity of findings. To reduce interviewer bias, both structured and semi-structured tools were administered consistently using a standard protocol.

Study Size

The sample size of 140 participants was determined based on the exploratory nature of the study, guided by prior similar studies in ethnobotany. This number was sufficient to identify statistically significant trends in quantitative data while also reaching thematic saturation in qualitative interviews. The sample size allowed for a diverse representation of age, gender, and traditional knowledge roles.

Statistical Analysis

Quantitative data from structured questionnaires were analysed using descriptive statistics (frequencies, percentages, and means), processed through SPSS version 25. This included analysis of usage frequency, methods of preparation, and conditions treated. Qualitative data from semi-structured interviews were transcribed and analysed manually using thematic content analysis, focusing on patterns in cultural use, perceived effectiveness, and knowledge transmission. Missing data in the quantitative dataset were handled using case-wise deletion, ensuring only complete and analysable responses were included in the final results.

Ethical Consideration

The study was approved by the Mangosuthu University of Technology Research Ethics Committee on 11 February 2024. All participants were provided with written and verbal information about the study and signed informed consent forms before participation. Confidentiality, anonymity, and cultural respect were upheld throughout the study by ethical research standards.

Results and Findings

The participant flow diagram illustrates the recruitment, eligibility screening, and inclusion process undertaken in the *Aloe ferox* study. A total of 165 individuals were initially approached from rural communities in KwaZulu-Natal through community leaders and local herbal associations. Of these, 150 individuals were screened for eligibility based on inclusion criteria, which required prior experience or knowledge of *A. ferox* use for medicinal purposes. Ten participants were excluded for not meeting the eligibility requirements, leaving 140 eligible participants who provided informed consent and were enrolled in the study. The diagram further indicates the division of participants into two main research components. The quantitative component comprised 120 participants, who completed structured questionnaires capturing demographic data, frequency of use, preparation methods, and perceived effectiveness of *A. ferox*. The qualitative component included 20 participants, consisting of traditional healers, herbalists, and community elders, who participated in semi-structured interviews and focus group discussions to provide deeper cultural and experiential insights. All participants completed their respective stages of data collection, and **no dropouts or incomplete responses** were recorded.

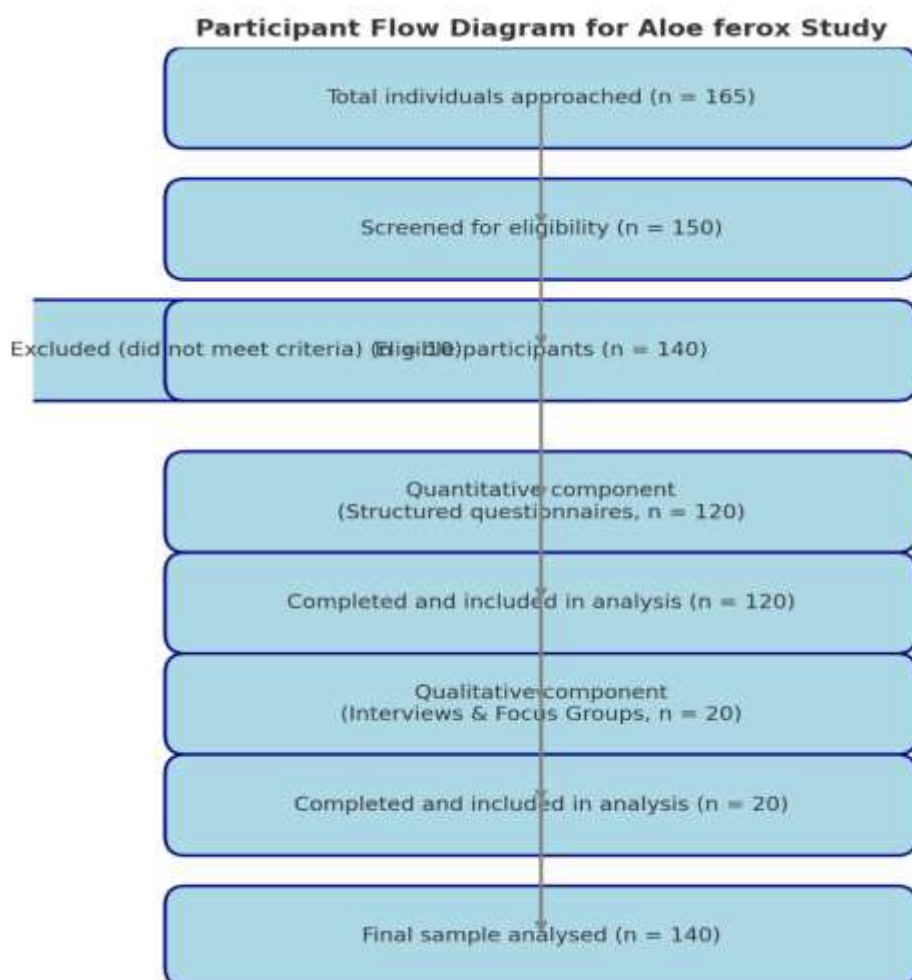


Figure 1: The graph represents a participant flow diagram for the *Aloe ferox* study, clearly showing the number of individuals approached, screened, included, and analysed across both quantitative and qualitative components

Figure 2 shows that *Aloe ferox* is most frequently used for digestive cleansing (79%), supporting its long-standing role as a natural laxative and internal detoxifying agent in traditional medicine. A significant number of participants also use it for wound healing (60%), which reflects its documented antimicrobial and skin-regenerating properties. Skin infections (42%) and immune support

(38%) were also notable, indicating the plant's multipurpose application in both topical and systemic health contexts. These findings affirm the plant's relevance in addressing common ailments in resource-limited rural settings, where access to formal medical treatments may be constrained.

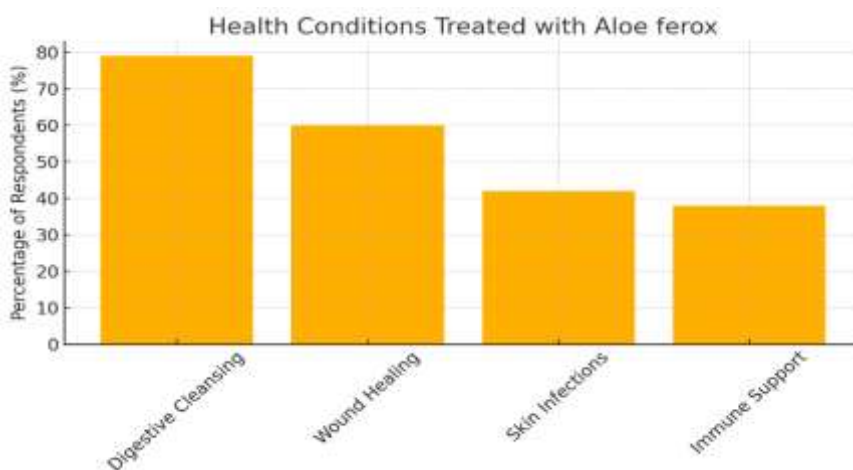


Figure 2: The graph represents the health conditions treated with Aloe ferox

Figure 3 highlights the dominant methods of preparation among users. A majority (55%) prepare *Aloe ferox* by boiling the leaf sap, particularly when using it for internal conditions like constipation and immune support. This method aligns with traditional practices for creating bitter tonics. On the other hand, 35% reported applying the fresh gel directly to the skin, mostly for treating wounds and

infections. The dual use of the plant, both internally and externally, demonstrates its versatility and the value communities place on its different therapeutic forms. The lower percentages for other methods also suggest a need for community education on alternative safe preparations that preserve medicinal potency.

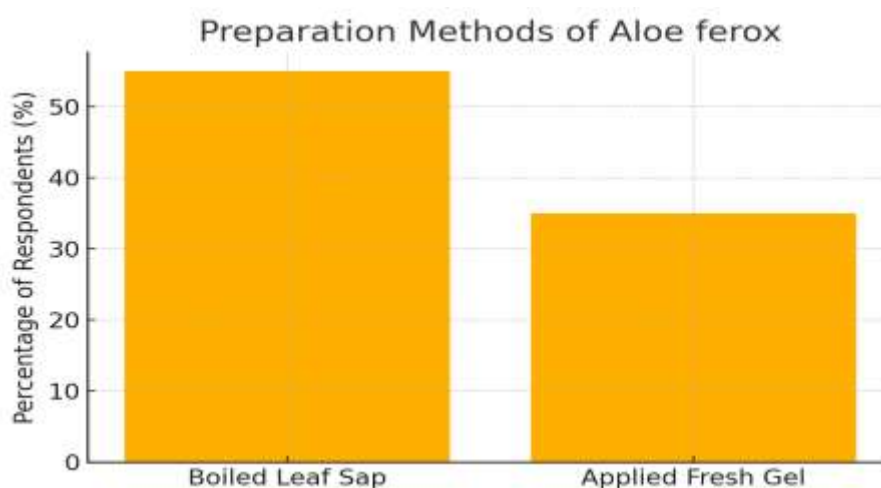


Figure 3: The graph represents the preparation method of Aloe ferox

Figure 4 provides strong evidence of user satisfaction, with 83% of respondents reporting significant symptom relief following the use of *Aloe ferox*. This high rate of perceived effectiveness reflects both the plant's therapeutic potential and the trust placed in traditional remedies within Indigenous Knowledge Systems. Only

17% reported no or minimal relief, which may be due to incorrect preparation, overuse, or individual health variations. While the overall confidence in the plant's healing capacity is encouraging, these findings also underline the need for dosage guidelines and further clinical research to optimize efficacy and reduce risks. LK

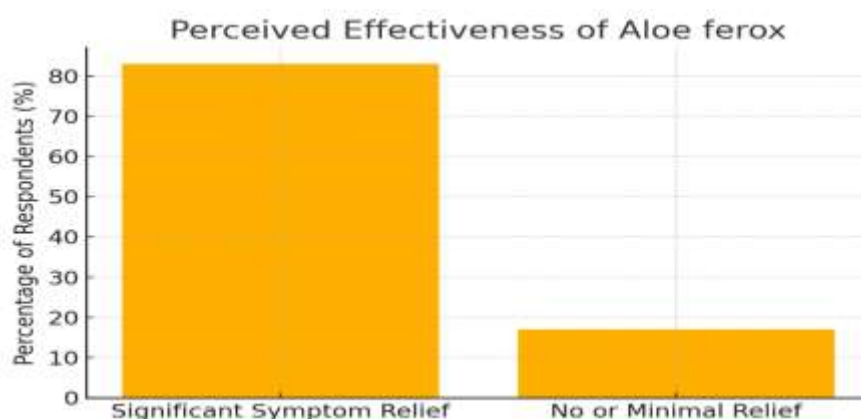


Figure 4: The graph represents the perceived effectiveness of Aloe ferox

Thematic content analysis of the 20 interview and focus group transcripts generated four major themes and ten sub-codes, capturing cultural perceptions, medicinal use, sustainability concerns, and transmission of Indigenous knowledge.

Theme	Sub-Codes	Illustrative Quotations
Healing and Health Benefits	Digestive cleansing, immune support, wound healing	"I drink Aloe every month to clean my stomach and keep my body light." (<i>Female herbalist, age 52</i>) "When my children have skin rashes, I apply the gel from the leaf, and it heals quickly." (<i>Mother, age 38</i>)
Spiritual and Cultural Symbolism	Cleansing rituals, protection, and ancestral connection	"We use <i>ikhala</i> to cleanse bad spirits. It is both medicine and a prayer." (<i>Traditional healer, age 60</i>) "Before planting Aloe, we speak to ancestors; it brings peace in the home." (<i>Elder, age 71</i>)
Sustainability and Overharvesting Concerns	Commercial exploitation, ecological impact	"Nowadays, people sell Aloe everywhere. They cut too much without letting it grow again." (<i>Healer, age 49</i>) "We see less Aloe in the hills now because of those harvesting for shops." (<i>Farmer, age 55</i>)
Transmission of Indigenous Knowledge	Loss of knowledge, intergenerational transfer	"Our children don't know these plants; they buy medicine from the pharmacy." (<i>Elder, age 68</i>) "We learned from our parents how to use Aloe, but young



		people are not interested.” (Herbalist, age 47)
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Discussion

This study examined the traditional uses, preparation methods, and perceived effectiveness of *Aloe ferox* (Cape Aloe) among rural communities in KwaZulu-Natal. The findings underscore the plant's enduring significance in Indigenous healing systems, with a focus on its internal and external therapeutic applications. The high percentage of participants (79%) using *Aloe ferox* for digestive cleansing aligns with the longstanding traditional use of the plant as a natural laxative. This is well-documented in literature, including studies by Femenia et al. (2003) and Steenkamp and Stewart (2007), who highlighted the role of anthraquinones such as aloin and barbaloin in promoting bowel movement and relieving constipation. The popularity of *A. ferox* for this purpose suggests its continued reliability in managing common gastrointestinal ailments, especially where pharmaceutical alternatives are unaffordable or inaccessible.

The use of *Aloe ferox* for wound healing (60%) and skin infections (42%) corresponds with findings by Cock (2008), who demonstrated the plant's antibacterial and anti-inflammatory properties. Communities in this study commonly applied the fresh gel topically, which is supported by Reynolds and Dweck (1999), who noted that the mucilaginous gel contains polysaccharides and glycoproteins that aid in skin regeneration and reduce microbial load on wounds. The high usage for skin conditions suggests a practical knowledge of the plant's healing capabilities, passed down through generations. The application of *A. ferox* for immune support (38%) is consistent with growing recognition of its antioxidant properties. Studies by Loots et al. (2007) reported that compounds in *A. ferox* exhibit significant free radical scavenging activity, which could explain its use for boosting general health and managing immune-related conditions. This use also overlaps with the cultural role of *A. ferox* as a spiritual cleanser, as echoed in narratives from traditional healers during the study.

In terms of preparation, the dominant method of boiling leaf sap (55%) reflects common Indigenous practices, particularly for internal use. This aligns with practices documented by Van Wyk et al. (2009), who observed that the preparation method significantly influences the concentration of active compounds. The second most

common method, applying fresh gel (35%), is similarly supported by pharmacological studies showing higher bioavailability of healing agents in raw gel compared to processed extracts. However, the study also revealed a lack of consistency in preparation techniques, reflecting a need for guidance on proper dosage and methods.

The perceived effectiveness of *Aloe ferox* was remarkably high, with 83% of users reporting significant symptom relief. This strong endorsement supports earlier ethnobotanical surveys by Grace et al. (2009), which found that community members trust traditional remedies not only for effectiveness but also for cultural identity and accessibility. However, while traditional knowledge affirms the plant's value, scholars like Benzie and Wachtel-Galor (2011) caution that unregulated use, particularly overconsumption of anthraquinone-rich sap, can lead to adverse effects such as dehydration or electrolyte imbalance. This concern was echoed by participants who highlighted the absence of dosage guidelines and the growing commercial pressure on wild populations. This study reinforces the ethnopharmacological significance of *Aloe ferox* and supports prior findings that Indigenous Knowledge offers valuable insights for modern healthcare. Yet it also brings attention to knowledge gaps, especially regarding safety, standardization, and sustainability. Bridging traditional practices with scientific validation and policy support will be crucial in ensuring that *A. ferox* continues to serve communities both as a healing resource and a cultural heritage asset.

Generalizability

While the study offers valuable insights into the local use of *Aloe ferox*, the findings may not be generalizable to all regions of South Africa or other African countries, given cultural and ecological differences. However, the themes of reliance on Indigenous knowledge, accessibility of traditional medicine, and trust in natural remedies are widely applicable across similar contexts, particularly in underserved or rural populations.

Conclusion

This study highlights the enduring role of *Aloe ferox* as a multifunctional medicinal plant within Indigenous healthcare systems in rural KwaZulu-Natal. The plant is



predominantly used for digestive cleansing, wound healing, skin infections, and immune support, with users reporting high levels of perceived effectiveness. These findings validate the cultural and therapeutic relevance of *A. ferox*, while also revealing the community's practical knowledge of preparation and administration methods. However, the lack of standardized dosages, inconsistent preparation methods, and pressures from commercial harvesting underscore the need for scientific validation and policy interventions to ensure its safe and sustainable use.

Limitations

This study had several limitations. It was geographically confined to selected rural areas of KwaZulu-Natal, which may not represent broader national or regional usage patterns. The cross-sectional design limited the ability to assess long-term health outcomes. Data were based on self-reported usage and perceived effectiveness, which may be subject to recall or social desirability bias. Furthermore, the study did not include biochemical analysis or clinical testing to objectively measure therapeutic outcomes.

Recommendations

To harness the full potential of *Aloe ferox* in promoting health and well-being, several integrated recommendations are proposed. Firstly, rigorous pharmacological and toxicological research is essential to confirm its efficacy, safety, and appropriate dosages for both internal and external use. Secondly, collaboration between policymakers, researchers, and traditional healers is critical to ensure that Indigenous knowledge is respected, validated, and formally integrated into national healthcare systems. Thirdly, public health education initiatives should inform communities about proper usage, dosages, and contraindications, particularly for vulnerable groups such as children, pregnant women, and the elderly. In addition, sustainable harvesting and cultivation practices must be promoted through regulatory frameworks to prevent ecological degradation and protect biodiversity. Lastly, ethical standards for the commercial use of *A. ferox* should be enforced to safeguard Indigenous intellectual property rights and ensure that communities benefit fairly from the commercialization of their traditional medicinal resources.

Biography

Dr. Sibonelo Thanda Mbanjwa is a dedicated lecturer in the Department of Nature Conservation at Mangosuthu University of Technology (MUT), South Africa. He holds a Ph.D. in Environmental Science and specializes in

biodiversity conservation, sustainable development, and environmental education. Dr. Mbanjwa is deeply committed to community engagement, student mentorship, and the integration of indigenous knowledge systems into conservation practices. His work bridges academia and practical application, empowering students and communities through innovative teaching, research, and outreach initiatives.

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Competing Interests

The author has no relevant financial or non-financial interests to disclose.

Author Contributions

I, the author, contributed to the study conception and design. Material preparation, data collection, and research were performed by Mbanjwa S.T. The first draft was written by Mbanjwa S.T.

Data Availability

The data supporting the findings of this study are available upon reasonable request from the corresponding author. Due to ethical considerations and confidentiality agreements, individual participant data cannot be publicly shared. However, anonymized and aggregated data may be provided for academic or research purposes upon institutional approval.

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