Ethnomycology of indigenous *Trametes* mushrooms from Northern Namibia

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Abstract

To date there is no documented data available on the Namibian indigenous *Trametes* mushrooms. The objective of this study was therefore to generate information for the first time, on the ethnomycology of *Trametes* species in Northern Namibia. A questionnaire was used and the data captured were analysed in SPSS. Results show that 83.9% of respondents included in this study knew *Trametes* mushroom but only 70.4% used it for medicinal purpose. Indigenous *Trametes* mushrooms in Namibia are mostly used as a tranquiliser to calm bereaved people who are crying hysterically at burials. Other uses include treating cattle from lung disease. These uses for *Trametes* species have not been reported before in literature.

Keywords: mushroom, Ohangwena, Omusati, Oshana, questionnaire, *Trametes* species

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1 Introduction

Traditional healing systems which use herbal remedies provide very important clues in the discovery of new antibiotics (Kothari et al. 2010; Parekh & Chanda 2006). Traditional healing systems also aid in leading to the synthesis of more potent drugs with reduced

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toxicity from the herbal remedies (Parekh & Chanda 2006). This makes traditional remedies very significant as possible therapeutic agents, especially when considering their availability and relative affordability compared to the more 'modern' medicines. This is especially true for Sub-Saharan Africa (Molefe-Khamanga et al. 2012). Furthermore, indigenous people are normally well acquainted with the habitat where different mushrooms grow, as well as the periods at which they occur (Harsh et al. 1999). Therefore, ethnomycology is an easier and more effective method compared to studying the medical relevance of all the mushrooms of the world (Okhuoya & Akpaja 2005). This said, it is crucial that the traditional knowledge of communities is recorded and published as scientific data before resources are lost with the reducing natural habitats and the passing away of older generations who possess great knowledge about these resources and their medicinal uses (Azliza et al. 2012). In this study, a questionnaire was used to capture the ethnomycology of indigenous *Trametes* mushrooms in Oshana, Ohangwena and Omusati regions of Namibia.

2 Methods

Namibia is mostly a dry and arid country with seasonal and highly variable rainfall. Annual rainfall ranges from 20 mm along the west coast and 600 mm in the far north east regions (Bethune 1996; Burke & Strohbach 2000). The study area was chosen because the Northern regions of Namibia receive significantly more precipitation and therefore there is more vegetation of trees (Rohde & Hoffman 2012). This provides a habitat for *Trametes* species which grow on dead branches, usually of broad-leaved trees in relatively dry tropical areas.

Non-probability convenience sampling was used in this study, whereby the researches drove along the main road into surrounding villages. The villages and households were selected according to accessibility by road and in each household only people above 30 years old were targeted. This method was chosen in order to reduce travel costs and time because of the vastness of the study area. An open ended questionnaire, where $N = 62$, was used to obtain indigenous knowledge of local people in Northern Namibia on the medicinal uses of indigenous *Trametes* mushrooms. The questionnaire was administered in face to face interviews in the Oshiwambo language. The questionnaire was semi-structured and allowed for dialogue with the respondents. Respondents were also shown dry fruit bodies of *Trametes* for easier identification of the mushroom. The SPSS Software was used to analyse the information obtained from questionnaires. The normality of the data was tested with Anderson-Darling normality test and distribution was normal with a confidence of 38.08%. Analysis of Variance (ANOVA) at $\alpha = 0.05$ (Appendix 1) was used to test for significant difference in ethnomycology of *Trametes* mushrooms in Oshana, Ohangwena and Omusati regions.

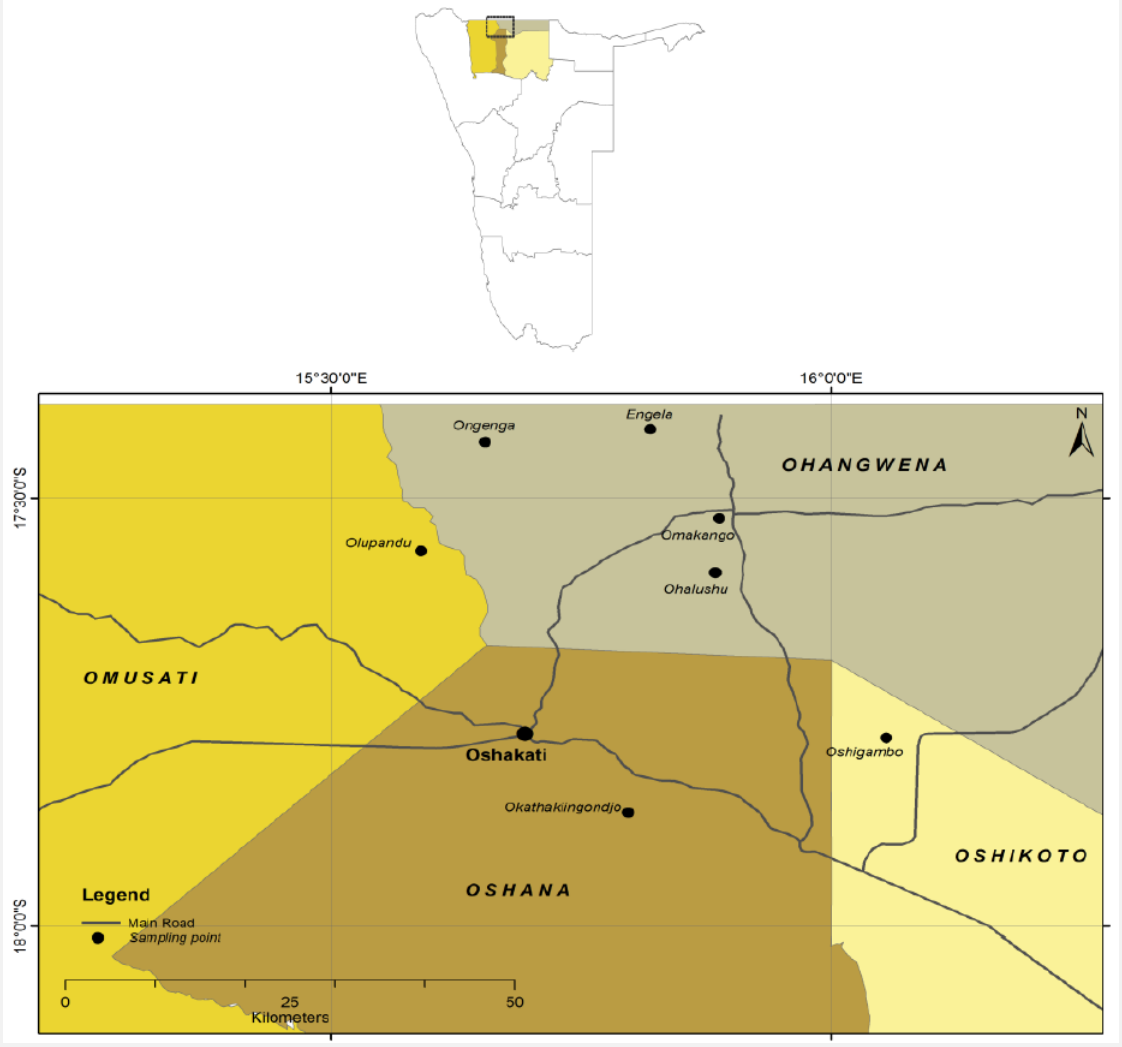

Figure 1: Study site.

2.1 Research ethics

Research ethics clearance was obtained from the School of Postgraduate Studies at the University of Namibia. A specimen collection permit (Permit number 1865/2013) was also obtained from the Ministry of Environment and Tourism in Namibia. During interviews the Headman of the village (or his representative) was approached and informed about the intentions of the study. The objective of the study was explained to the respondents who took part in the interview and their permission was obtained before commencing with the interviews.

3 Results

Interviews were conducted in Oshana, Ohangwena and Omusati region. A total of 62 people were interviewed and 64% of the total population was from Omusati region, 23% from Ohangwena and lastly 13% from Oshana region. The age group of 60-80 made up the bulk of the respondents interviewed with 55.9% followed by the 30-39 age groups with 13.6%. The 40-49 and 50-59 age groups were both represented with 11.9% and the lowest was in the 25-29 and 80+ age groups with only 3.4% representation.

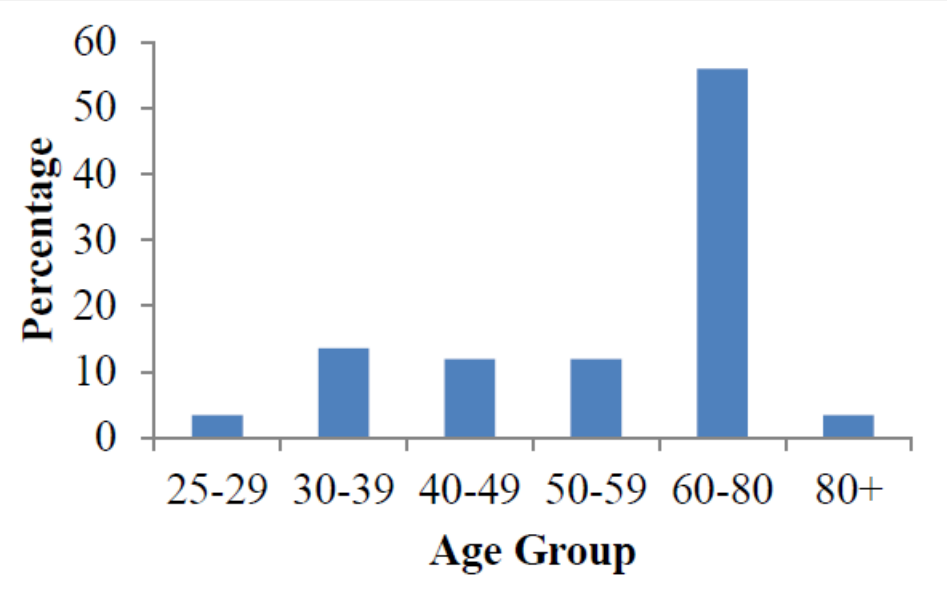

Figure 2: Age group participation in the study.

In this study, the respondents from Ohangwena region had more knowledge (92 %) of the Trametes mushroom compared to Omusati (85 %) and Oshana region (67 %). However, there is no significant difference ($\alpha = 0.05$) in *Trametes* ethnomycology of the three regions.

Of the participants who knew *Trametes* mushrooms, 76 % used it for medicinal purposes while 24 % had no medicinal application for the mushroom. A variety of conditions such as shock (23.7 %), calming the bereaved (43.1 %) and children using it as a toy by licking the pores (6.9 %) were recorded. Another use reported for *Trametes* mushrooms included inducing vomiting in cases of mushroom poisoning (Figure 3). The respondents in this study identified all *Trametes* species by looking at the hexagonal pores under the cap and substrate (dead wood mostly surrounding homesteads). The mushroom is known locally as '*okapaka*' in the Oshiwambo language.

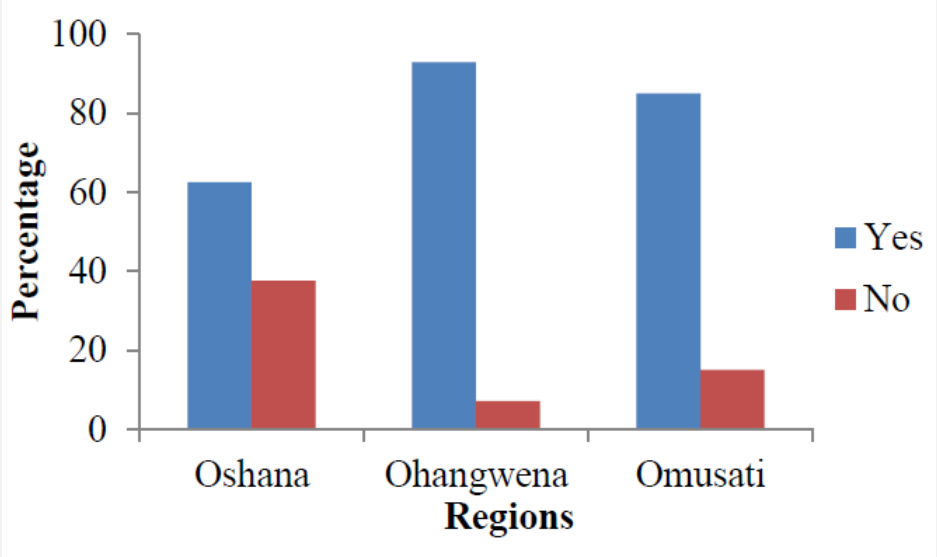

Figure 3: Percentage of people who know the *Trametes* mushroom in Ohangwena, Oshana and Omusati regions.

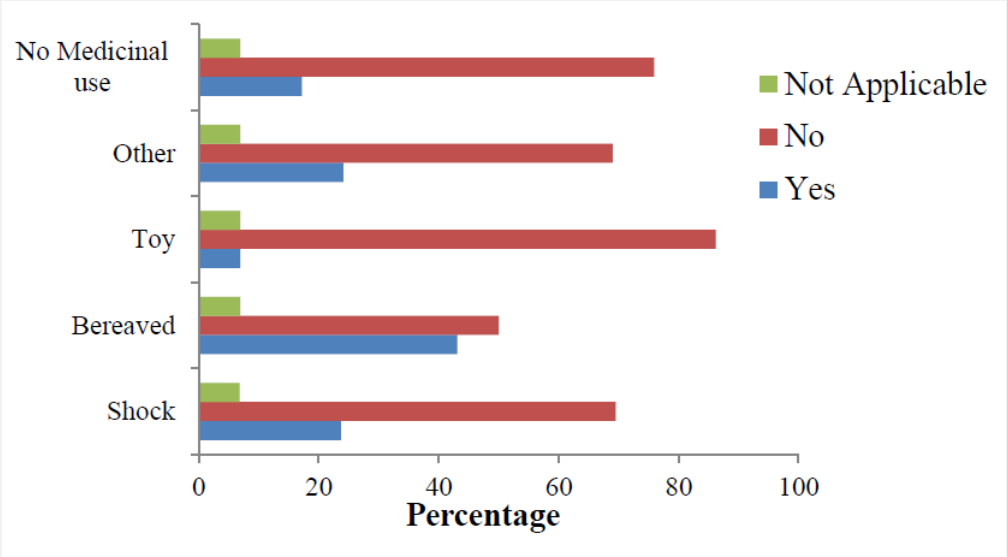

Figure 4: Different uses for *Trametes* mushrooms in Northern Namibia.

The indigenous Trametes mushroom is taken in different forms. Breaking it into pieces and making a water infusion was the most preferred method (85 %) followed by crushing it into powder (7 %) or roasting and smoking it (2 %). Other methods (3 %) were recorded

where pieces of the *Trametes* mushroom are placed into a mourner's cup from which they will take all their drinks during the mourning period (Figure 4).

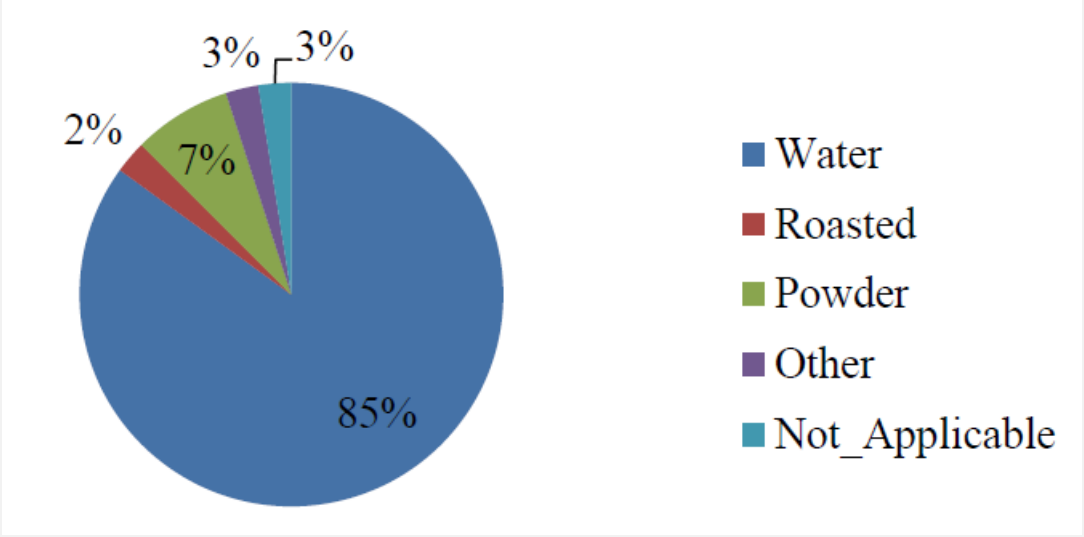

Figure 5: Forms in which *Trametes* mushroom is administered medicinally.

During this study, it was discovered that the local people had no specific prescription regarding how often the mushroom should be taken before its health benefits are noticed. Most participants take it daily (40 %), continuously until healed (23 %), or only once (19 %). Some participants (4 %) were not sure how often the mushroom is taken before an illness is healed (Figure 5).

Trametes mushrooms in Northern Namibia appear or grow during the rainy season when 37 % of people harvest them. Their tough nature however allows the fruit bodies to remain intact on their substrate and 53 % people only harvest them as the need arises. As was expected, 84 % of the participants said the common substrate for this mushroom was wood. Surprisingly, 7 % of the participants reported that they found *Trametes* species growing on live trees. The majority (48.5 %) prefer to leave them on the host substrate until needed while 33.3 % harvest and dry them before storage. The rest of the participants did not know any preservation methods (9.1 %).

4 Discussion and Conclusion

National census studies have revealed that the population in rural areas of Namibia generally consists of young people (0-14 years) and senior citizens (60+ years). The economically

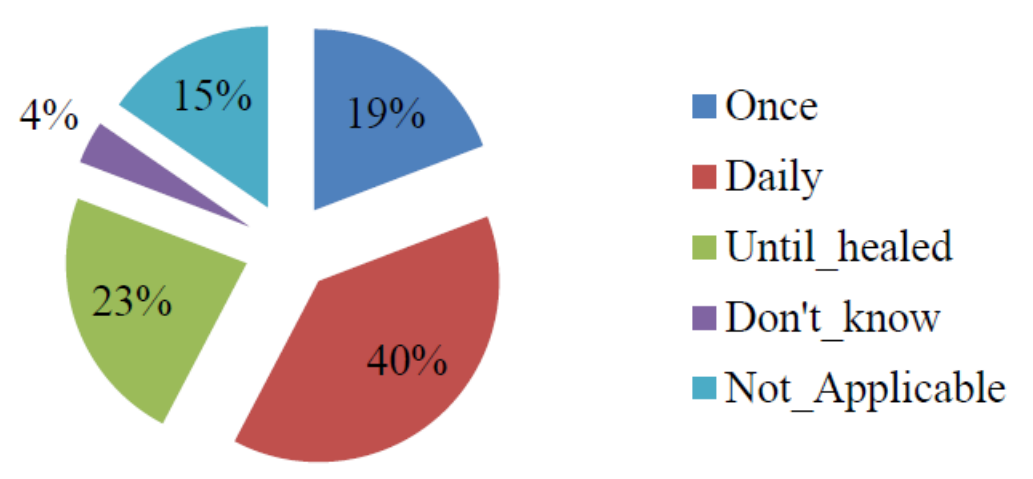

Figure 6: Prescription of the *Trametes* mushroom before improvement or healing is observed.

Figure 7: *Trametes* mushrooms growing on a wood log (L) and concentric zones visible on the basidiocarp (R).

active group (15-59 years) lives and works in urban areas (Indongo 2015; National Statistics Agency (NSA) 2013). This could be the reason why the highest participation in this study was in the older group of pensioners. In fact, the highest represented (55.9 %) age group was of participants 60 years and older while the lowest participation (3.4 %) was in the 25-29 age groups. It can be said that because the majority of respondents were older, the information

obtained from the surveys is considered more reliable. In addition, indigenous knowledge is usually found in the elderly people of a community (Ekandjo & Chimwamurombe 2012). Therefore, these results also show that the ethnomycology of the local people in Northern Namibia was held mostly by the older people.

The study revealed that although the local people were aware of the mushroom, only some knew about its medicinal quality and used it. It appears that local people, although they may recognise a certain mushroom, they do not always know about the medicinal applications of the mushroom. This observation was also reported by Ekandjo & Chimwamurombe (2012), about a different medicinal mushroom, *Ganoderma*, in the North Eastern parts of Namibia. Similar to the *Trametes* mushroom, the local people in Northeast Namibia knew about it but they did not use it for medicinal applications (Ekandjo & Chimwamurombe 2012). The need for studies such as the current one is clearly highlighted here. Literature has further shown that indigenous knowledge of African people is passed on orally from older generations to younger generations (Oyetayo 2011). This valuable information may be lost if not studied and well documented in written form. There is also a need for people to be made aware of medicinal mushrooms which are readily available in their local areas, in order to maintain good health and to keep the indigenous knowledge.

In this study, it was found that indigenous *Trametes* mushrooms are used traditionally to calm the bereaved. Further studies are needed to characterize the chemical compounds in *Trametes* mushrooms which exert this calming effect. Similar results were reported where *Ganoderma* has been used to calm stressed people and to treat lung disease in cows at the North and North-Eastern parts of Namibia (Kadhila-Muandingi & Chimwamurombe 2012). In contrast, *Trametes* mushrooms worldwide are most popular for their anticancer properties (Patel & Goyal 2012; Prasad et al. 2015; Standish et al. 2008). However, no report was made of using *Trametes* mushroom to treat cancer or cancer related symptoms such as tumors and lumps in this study.

Plant anxiolytic and mood improving effects are thought to occur through flavonoid and amino acid activity (Marsh et al., 2014). In vitro studies have also shown that some flavones such as wogonin do indeed act on different brain receptors, resulting in mood enhancement (Marsh et al. 2014). This is interesting because in work published elsewhere, the presence of flavonoids in the Namibian indigenous *Trametes* mushrooms was confirmed (Ueitele, 2016). The calming effect experienced by the local people in Northern Namibia when they ingest indigenous Trametes mushrooms might be caused by these flavonoids. Further characterization of Trametes flavonoids is needed to explore their anxiolytic properties.

During this study, it was found that there was no specific prescription regarding how often the Trametes mushroom should be taken before improvement in health is experienced. According to Wasser (2011), this is a big problem in the commercial medicinal mushroom market where the dosage of formulations prepared from medicinal mushrooms has not been

established. It has also not been established whether these formulations are safe for pregnant or lactating mothers, neither has the duration of administration been determined. This area clearly needs more dedicated study to provide sufficient safety standards and recommendations for use of medicinal mushroom formulations (Wasser 2011).

Findings from this study also show that *Trametes* mushrooms in Northern Namibia appear or grow during the rainy season. The *Trametes* mushrooms, unlike fleshy mushrooms, have a tough woody nature which dries to form a corky texture, allowing the fruit bodies to remain intact on their substrate without spoiling. People are then able to harvest them throughout the year as the need arises. Early rains in Namibia start from October to November, stretching to the full rain season in January and sometimes extending as far as April (Turner et al. 2012). It can therefore be expected that new *Trametes* fruiting bodies appear between October and April when the rains have provided sufficient moisture. Although a mushroom normally grows on wood, it can be found growing on live trees occasionally (Ekandjo & Chimwamurombe 2012). For this reason, the respondents in this study who cited live trees as a substrate for the indigenous *Trametes* mushroom may not be wrong.

4.1 Limitation of the Study

The distribution and geographical location of *Trametes* species in Northern Namibia was too large to fully explore the entire region. The results obtained in this study are therefore representative and do not necessarily depict the full picture of ethnic knowledge and use of the mushroom.

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Appendix 1: Analysis of Variance

The responses from the interviews on *Trametes* ethnomycology at Ohangwena, Oshana and Omusati
Regions were coded so that Yes = 1 and No = 0.

The results of ANOVA statistical test at $\alpha = 0.05$.

Table 1: Frequency distributions of infection types according to numbers of antibiotics per prescription and prescription appropriateness.

Source of Variation	Sum of squares	d.f.	Mean squares	F
Between	0.484	2	0.242	1.805
Error	7.904	59	0.134	
Total	8.387	61		

The probability of this result, assuming the null hypothesis, is 0.17 (p=0.17).
$F_{crit} = 3.15312326$
$H_0 : \mu_1 = \mu_2 = \mu_3$
H_a: At least two of the means are different.
$p > 0.05$ therefore, fail to reject null hypothesis. There is no significant difference in *Trametes* mushroom knowledge amongst Ohangwena, Oshana and Omusati region.