ETHANOL CONCENTRATION OF TRADITIONAL ALCOHOLIC BEVERAGES IN NORTHERN TANZANIA

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In sub-Saharan Africa (SSA), the annual consumption of pure alcohol has been estimated to range from 4.9-7.1L per capita, although intake is likely to be significantly higher because of the unrecorded consumption of traditionally produced beverages (World Health Organisation, 2014). These account for an estimated 30% of pure alcohol consumption. In Tanzania, the per capita consumption of industrially produced alcoholic drinks is equivalent to about 5L of pure alcohol and the additional annual per capita amount of unrecorded consumption of locally brewed alcohol has been estimated at about 2L of pure alcohol (World Health Organisation, 2014).

Few studies from SSA have investigated the alcohol concentration of typical traditional brews (Mavioga et al., 2009; Nikander et al., 1991; Papas et al., 2010; Tusekwa et al., 2000) leading to substantial uncertainty of the estimated per capita consumption of unrecorded locally brewed alcohol. We are aware of only two studies from Tanzania that have estimated the level of alcohol in traditional alcoholic drinks (Nikander, et al., 1991; Tusekwa, et al., 2000). No study has been conducted in northern Tanzania. Our research aimed to close this information gap by assessing samples of popular locally produced beverages in Mwanza city in Northern Tanzania.

Mwanza is the second largest city in Tanzania (after the capital city of Dar es Salaam) and has a population of about 800,000 inhabitants (Tanzania National Bureau of Statistics, 2013). We identified local traditional brew outlets through a mapping exercise. We recorded local names and materials used for production of the available beverages. The investigator purchased samples of each available beverage from seven randomly selected outlets in three urban wards of Mwanza city, Tanzania. Samples were analyzed according to an internationally standardised method for the determination of ethanol concentration (Tanzania Bureau of Standards, 1992).

We found that the traditional beers had ethanol concentrations ranging from 2-8%v/v. Most had concentrations of above 4%v/v and the local spirits had the highest concentration, up to 55%v/v (Table 1). Concentrations varied widely, even for the same type of drink. Our findings were similar to those reported by the few other studies on traditional brews from other parts of Tanzania (Nikander, et al., 1991; Tusekwa, et al., 2000), and other parts of sub-Saharan Africa (Mavioga, et al., 2009; Papas, et al., 2010; Saungweme et al., 1999).

Our study had some limitations. We focused on ethanol content and did not conduct an analysis of other ingredients that can be found in traditional beverages and that may present a major health risk in their own right. Such ingredients may include toxic substances such as methanol, aflatoxin or high concentrations of ionised iron (Nikander, et al., 1991; Saungweme, et al., 1999). Alcohol concentrations found in our study may have been slightly overestimated as we cannot exclude that some further fermentation occurred after sample collection. However, our samples were stored in cold boxes at about -8°C just after collection and at -20°C soon thereafter in order to reduce or eliminate further fermentation.

We conclude that at the individual level, our findings facilitate the translation of the reported consumption of traditional beverages into estimates of the actual amount of pure alcohol taken, thus providing a prerequisite for patient care and group interventions aiming to reduce alcohol consumption and alcohol use disorders. *(Word count 539)*

Competing Interest

The authors do not report any conflict of interest.

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Table 1. General characteristics and alcohol concentration of the alcohol beverages available in northern Tanzania							
Local name of beverage	Type	Shelf life	Ingredients	Number of samples investigated	Mean Ethanol[SD](% v/v))	Ethanol (%v/v) (Min, Max)	Coefficient of variation (%)
Gongo(type 1)	Spirit	6 -12 months	Fermented (cassava and germinating maize)	5	53.3[3.1]	[47.9, 55.4]	5.8
Gongo (type 2)	Spirit	6-12 months	Fermented (cassava and germinating maize)	7	22.7[3.5]	[15.1, 26.3]	15.6
Kangara	Beer	2-3 days	husk of corn, maize, sorghum	3	6.1[1.8]	[4.9, 6.7]	16.7
Waini	Beer	1 week	sugar, black tea leaves, yeast	6	6.0[2.3]	[5.3,7.6]	15.5
Komoni	Beer	24 hours	husk of corn, maize, sorghum	9	5.4[1.6]	[4.6,6.2]	8.5
Kindi	Beer	24 hours	maize, sorghum	3	4.2[0.7]	[4.0, 4.7]	9.5
Mbege	Beer	24 hours	banana juice and sorghum	3	2.2[0.9]	[1.6,2.5]	23.6

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