



RESEARCH ARTICLE

TERMITE CONSUMPTION AND POTENTIAL EXPOSURE TO TRACE METALS IN DAGBATI, AKOUMAPE AND KPEME, LOCALITIES LOCATED IN THE PHOSPHATE MINING AREA OF TOGO

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ABSTRACT

This study investigates the consumption patterns of *Macrotermes* termites across three localities in Togo: Dagbati, Akoumapé, and Kpémé within the phosphate mining region, and examines the potential exposure to trace metals associated with this practice. Results reveal significant heterogeneity in entomophagy shaped by both geography and ethnicity. Consumption is nearly universal in Dagbati (100%) and Akoumapé (96.4%) but lower in Kpémé (65.7%). Paradoxically, termites are consumed more intensively in Kpémé (3.31 days/week; 52.68 g/week) than in the other sites, and a greater diversity of termite types is observed, including winged forms, queens, and mound termites, reflecting extensive ethnoecological knowledge and frequent mound exploitation (90.2%). In contrast, Dagbati and Akoumapé focus mainly on winged termites, collected primarily by light trapping. Motivations differ: taste drives consumption in Dagbati, while nutritional value is central in Akoumapé and Kpémé. Ethnicity significantly influences consumption patterns, revealing a north-south gradient: northern and central groups (Kabyè, Kotokoli, Moba) exhibit the highest frequency (4.00 days/week) and quantities (up to 70 g/week), whereas southern groups (Watchi, Ewe) consume less frequently and in smaller amounts (1.85 days/week; 23-25 g/week). Given the phosphate mining context, this study highlights the potential for trace metal exposure through termite consumption, suggesting that dietary practices and local environmental conditions jointly shape exposure risks.

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INTRODUCTION

The consumption of edible insects, particularly termites, is an important source of protein, lipids, vitamins and minerals for many populations in sub-Saharan Africa (Roldán *et al.*, 2005). In Togo, termites are traditionally harvested and consumed in several regions, particularly in rural areas, where they represent an accessible and culturally valued nutritional supplement (Pressler *et al.*, 2020). In addition to their nutritional value, termites are also appreciated for their taste and symbolic value in certain African cultures, where they are sometimes incorporated into rituals or festive events (Banjo *et al.*, 2006). Entomophagy practices vary according to ethnic groups, available species, seasons and traditional knowledge passed down within communities (Van Huis *et al.*, 2013). These differences reflect significant cultural diversity, but also suggest a variety of dietary habits depending on geographical and social contexts. However, termite consumption is probably not uniform across different localities or ethnic groups. Indeed, food preferences, species availability, technical collection and cultural perceptions can influence the frequency and quantity of edible insect consumption (Malay, 2021). In the localities of Dagbati, Akoumapé, and Kpémé, where several communities with distinct cultural identities coexist, it is plausible that these socio-cultural factors generate notable disparities

in termite consumption habits. Understanding these potential differences is essential for documenting local dietary dynamics and guiding potential strategies for the sustainable development of entomological resources. The aim of this study is to explore potential differences in termite consumption based on location and ethnicity in the Dagbati, Akoumapé and Kpémé areas.

MATERIALS AND METHODS

Presentation of the study area: The study area is part of the coastal zone. It lies between the maritime boundary of the Exclusive Economic Zone (EEZ) and the continental boundary located 50 km beyond the zone of influence of the mean tide. This continental boundary coincides with the Maritime Region, which is located between latitudes 6° 01' and 6° 05' north and longitudes 0° 70' and 1° 40' east, covering an area of 6,395 km², or 11.2% of Togo's territory (MERF, 2007). This is the area covered by the Hahotoé-Kpogamé phosphate extraction and processing activities. The project area has a sub-equatorial or Guinean climate, characterised by two rainy seasons and two dry seasons: a long rainy season from mid-March to mid-July; a short dry season from mid-July to mid-September; a short rainy season from mid-September to mid-November; and a long dry season from mid-November to mid-March. The average annual

temperature throughout the area is 27°C. The hottest period of the year is between February, March and April, with temperatures hovering around 28°C (UNIDO/TGO, 2007). The study sites and geographical coordinates are presented in the table below.

Table 1. Sample collection sites and geographical coordinates

Site	Coordinates		
	N	E	Alt (m)
Goumoukopé1	06°13'13,7"	001°32'03,0'	14
Goumoukopé2	06°13'16,7"	001°31'59,4"	13
Kpémé1	06°13'04,2"	001°31'28,3"	15
Kpémé2	06°13'02,5"	001°31'26,7"	15
Kpémé3	06°12'36,2'	001°31'01,6'	10
Kpémé4	06°13'12,4"	001°29'34,2"	15
Kpémé5	06°13'13,1"	001°29'36,4"	16
Hahotoé1	06°21'11,5"	001°23'57,6"	16
Hahotoé2	06°22'14,6"	001°24'35,0"	58
Akoumapé1	06°22'39,1"	001°25'12,6"	59
Akoumapé2	06°24'14,5"	001°26'00,5"	60
Akoumapé3	06°27'06,5"	001°26'57,2"	82
Vogan	06°20'57,2"	001°31'04,4"	54

Material: The study material consisted mainly of survey forms that were pre-tested and then improved before the start of the survey on the dietary habits of *Macrotermes* termites. The biological material used in this study consisted of samples of *Macrotermes* termites collected in the three locations considered in this study for the measurement of ETMs.

Methods

Choice of study area: Choice of study areaThe choice of study area was motivated by the level of pollution observed in the localities of Dagbati, Akoumapé, and Kpémé, due to phosphate mining and processing. Considering that termites represent an alternative food source, particularly during the rainy season when hunting and fishing become difficult, it is essential to examine their sanitary quality in this phosphate extraction and processing area in Togo.

Surveys of the population in the study area: The field survey was conducted in three locations, namely Akoumapé, Dagbati, and Kpémé, with the aim of assessing the population's interest in consuming winged termites. This survey also identified other possible uses for these insects. The survey was conducted using a data collection form in the form of a questionnaire for respondents. The survey took place in May and June 2024 in the form of interviews based on the questionnaire. Exclusion criteria: The study included any adult male or female residing in the surveyed locality who freely agreed to participate in the survey. Non-inclusion criteria: Minors and persons not residing in the survey area were not included in this study. Exclusion criteria: Respondents who agreed to participate in the survey but did not have time to answer all the questions on the survey form due to insufficient data were excluded

Localities for surveying and collecting winged termite samples : This study was conducted in the phosphate mining and processing area located in the maritime region of Togo in Dagbati, Akoumapé (Vo Prefecture) and Kpémé (Lacs Prefecture). This region is the smallest and most densely populated in Togo, representing 11.2% of the country's total area, or 6,395 km². It is one of the least rainy regions in the Gulf of Guinea. Economically, it is the most industrialised region, accounting for over 90% of the country's industrial units (NSE/UNIDO, 2007). The phosphate mining area is located in the Vo Prefecture, in southern Togo, north-east of Lomé. It encompasses the villages of Dagbati and Akoumapé, located between latitudes 6°01' and 6°29'38" North and longitudes 0°70' and 1°41' East (Figure 4). In this area, the phosphate deposit extends along a strip running from south-west to north-east, from Avéta on the Kpogamé plateau to Dagbati on the Vogan-Attitogon plateau, with a length of 36 km and a maximum width of 3.5 km (Adjoussi and Awade, 2018). Geologically, this site is located in the coastal sedimentary basin, formed during the Pan-African orogeny and post-

Paleozoic events (Adjoussi and Awade, 2018). The cantons of Akoumapé and Dagbati, located 46 km and 50 km from Lomé respectively, along with several other villages, are significantly impacted by phosphate mining (NSE, 2007). The extracted phosphate is transported to Kpémé for enrichment. Kpémé is located on the coast, 35 km east of Lomé, between 6°13'0" N and 1°31'60" E (Adjoussi and Awade, 2018). The study area also extends to this phosphate processing zone in the Lacs Prefecture.

Sampling: The study covered a total of 65 samples of winged termites of the genus *Macrotermes*, including 21 collected in Akoumapé, 20 in Dagbati and 23 in Kpémé. The samples were collected during a seven-week campaign, with a total of 16 field trips to the three locations (five trips to Akoumapé, five trips to Dagbati and six trips to Kpémé) between May and June 2024. Once collected, each sample was placed in a zip-lock bag, labelled with the date of collection, the serial number and the number for each site, and placed in a cooler box provided for this purpose to ensure safe transport to the laboratory. This collection was carried out at household level the day after the nights of capture and before processing for consumption. This campaign to collect samples of termites, which was carried out at the same time as the surveys, confirmed the use of these edible insects for food in the phosphate extraction and processing area of Togo.

Statistical analyses: The data collected on the consumption of winged termites in different localities and according to ethnic groups was entered using Excel 2019. After verification and cleaning of the metadata base (removal of duplicates, correction of inconsistencies and management of missing values), all the information was imported into R software (version 4.4.3) for processing and analysis. Descriptive analyses were used to characterise general consumption trends within different localities and ethnic groups. Bivariate analyses were then performed to examine the relationships between socio-cultural variables and consumption practices. Finally, factor analyses were performed to identify the main axes of variation and the factors explaining the behaviours observed. The Shannon diversity index (H) was also calculated to assess the diversity of winged termite consumption practices among the different ethnic groups and geographical areas studied.

3.Results

Proportion of respondents by location and gender: Figure 1 presents an analysis of the proportion of respondents by locality and gender, highlighting a male predominance in the sample surveyed, with local variations. In Kpémé, the gap is most pronounced (62.7% men versus 37.30% women), followed by Dagbati (58.1% men), while Akoumapé shows an almost equal distribution (51.8% men). These figures suggest that the sample structure is skewed in favour of men. These differences could be attributable to two main factors: local differences in individuals' accessibility to the survey and, more significantly, differentiated gender roles in termite-related activities.



Figure 1. Distribution of respondents by gender and according to the localities surveyed

Proportion of Macrotermes consumers by locality: Figure 2 below presents an analysis of the proportion of Macrotermes consumers by locality, revealing significant variability confirmed by $\chi^2=68.19$, $p<0.001$ of this practice. Consumption is universal (100%) in Dagbati and very high (96.4%) in Akoumapé. The notable exception is Kpémé, where 34.3% of individuals do not consume termites. These figures indicate that termite consumption is a deeply rooted practice in two localities, but that it is disappearing or less accepted in Kpémé.

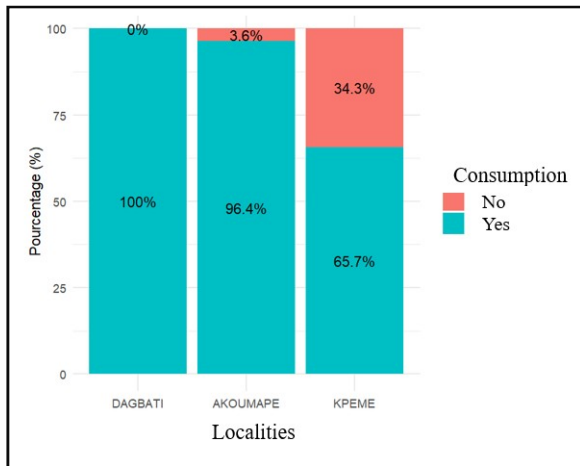


Figure 2. Termite consumption proportions in three localities

Classification hiérarchique des localités basée sur les types d'espèces consommés: Figure 3 shows a hierarchical classification of localities (Akoumapé, Dagbati, Kpémé) based on the proportion of consumers of three types of termites, visualised by a graph and a dendrogram. The data show distinct consumption profiles by locality, confirmed as statistically significant ($\chi^2=47.13$; $p<0.001$). Dagbati is characterised by high consumption of winged termites, excluding termite queens. Akoumapé shows a more balanced consumption of termites (winged and queens). Kpémé stands out with the highest proportion of consumers of termites from termite mounds, combined with a preference for winged termites.

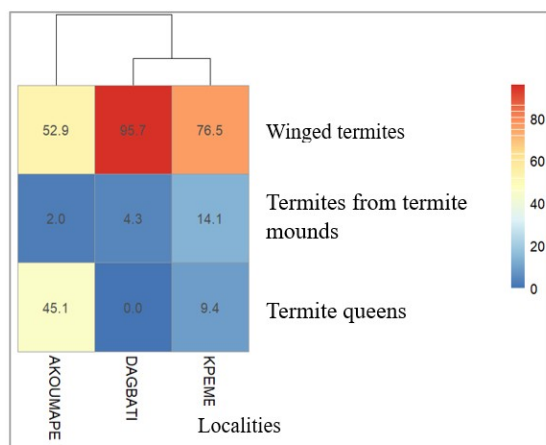


Figure 3. Consumption of termite types in the villages surveyed

Shannon diversity index in localities according to the types of termites consumed : The Shannon Diversity Index (H) applied to the types of termites consumed highlights marked differences between localities (Table 2). Dagbati ($H=0.84$) and Akoumapé ($H=0.87$) show low diversity, meaning that consumption is concentrated on one or two types (mainly winged termites). In contrast, Kpémé ($H=1.88$) has significantly higher diversity, indicating more balanced consumption including winged termites, queens and termites collected from termite mounds. Low diversity is interpreted as limited access or targeted culinary knowledge, while high diversity is linked to possible broader ethnoecological knowledge.

Table 2. Shannon diversity index in localities according to the types of termites consumed

Localities	Shannon index (H)	Interprétation
DAGBATI	0.84	Low diversity. Few types of termites are consumed, or one type dominates strongly (winged termites).
AKOUMAPE	0.87	Similar to Dagbati. Slightly higher diversity but still limited (winged termites and termite queens are consumed more).
KPEME	1.88	Significantly higher diversity. All three types of termites are consumed, and in a more or less balanced manner.

Frequency of consumption by locality: Table 3 shows the frequency of termite consumption by locality, revealing significant variation. The inhabitants of Kpémé consume termites most often (on average 3.31 days/week), followed by Akoumapé (2.03 days/week) and, lastly, Dagbati (1.66 days/week). These results suggest that termites play a differential role in the diets of the three communities. The high frequency in Kpémé is interpreted as a sign of greater availability, a more deeply rooted culinary tradition, or a stronger cultural attraction to this resource. Conversely, the low frequency in Dagbati could indicate access constraints or a preference for other sources of protein.

Table 3. Frequency of termite consumption in localities per week

Localities	Frequency of consumption (days)
DAGBATI	1,66 ± 0,06
AKOUMAPE	2,03 ± 0,07
KPEME	3,31 ± 0,09

Quantity of termites consumed by locality: Table 4 summarises the average weekly quantity of termites consumed, revealing significant variation between localities. Kpémé recorded the highest consumption (52.68 g), more than double that of Dagbati (24.81 g) and Akoumapé (22.4 g). These figures suggest that termites vary in importance in the diets of different communities. The difference in consumption in Kpémé is particularly notable, implying that this locality is more dependent on or values this food source more highly.

Table 4. Amount of termites consumed by locality

Localities	Quantité de termites consommée (g)
DAGBATI	24,81 ± 0,94
AKOUMAPE	22,4 ± 0,85
KPEME	52,68 ± 2,15

3.7. Reasons for termite consumption depending on location

Figure 4 shows the reasons for termite consumption by locality, highlighting variations in the perception of this resource. In Dagbati, the motivation is related to taste (100%). In contrast, in Akoumapé (49%) and Kpémé (53.9%), flavour is the main reason, but it is closely followed by nutritional value (51% in Akoumapé and 42.2% in Kpémé).

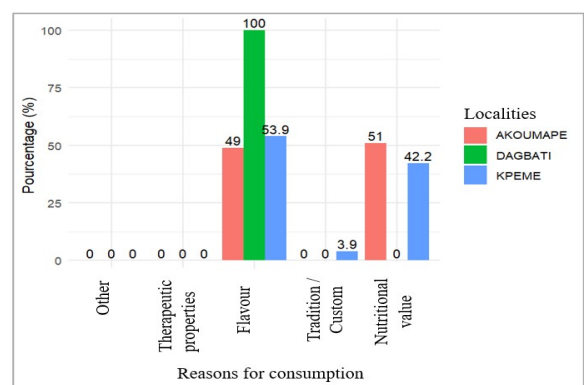


Figure 4. Reason for termite consumption

Consumption of Macrotermes according to ethnic groups
Frequency of consumption within ethnic groups: Table 5 shows the frequency of termite consumption according to ethnic group, revealing highly significant differences ($F=29.658$; $p<0.001$). The results highlight a geographical and cultural difference: Southern groups, notably the Watchi (1.88 ± 0.05 days/week) and the Ewe (1.84 ± 0.07 days/week), have the lowest consumption frequencies and low variability.

Several groups in the north and centre (Kabyè, Kotokoli, Moba, Tchamba, Lamba) are distinguished by a maximum and homogeneous frequency (4.00 ± 0.00 days/week). This contrast suggests that ethnicity is a determining factor in dietary habits, with high consumption among northern and central groups, potentially linked to distinct cultural perceptions and values.

Table 5. Frequency of termite consumption among ethnic groups

Ethnic groups	Number	Mean $\pm$ ESM	Minimum	Maximum
Adélé	1	2,00 $\pm$ 0,00	2	2
Adja	2	3,00 $\pm$ 1,00	2	4
Akposso	2	3,50 $\pm$ 0,50	3	4
Ewe	85	1,84 $\pm$ 0,07	1	3
Fon	1	3,00 $\pm$ 0,00	3	3
Guin	6	2,50 $\pm$ 0,22	2	3
Kabyè	24	4,00 $\pm$ 0,00	4	4
Kotokoli	5	4,00 $\pm$ 0,00	4	4
Lamba	1	4,00 $\pm$ 0,00	4	4
Moba	5	4,00 $\pm$ 0,00	4	4
Nawdba	2	4,00 $\pm$ 0,00	4	4
Ngangame	1	3,00 $\pm$ 0,00	3	3
Tchamba	2	4,00 $\pm$ 0,00	4	4
Watchi	141	1,88 $\pm$ 0,05	1	3

Quantity of termites consumed within ethnic groups: Table 6 shows the weekly quantity of termites consumed according to ethnicity, with highly significant differences ($F=82.63$; $p<0.001$) between groups. A north-south gradient emerges. The southern ethnic groups, Watchi (23.06 ± 0.62 g) and Ewe (24.92 ± 0.99 g), show the lowest consumption quantities and low variability, suggesting limited integration of termites. The northern and central groups (Kabyè, Kotokoli, Moba, Nawdba, Lamba) had significantly higher levels (between 63.80 g and 70.00 g). Ethnicity was therefore identified as a major explanatory factor for the quantity of termites consumed

Table 6. Amount of termites consumed by ethnic group

Ethnic groups	Number	Mean $\pm$ ESM	Minimum	Maximum
Adélé	1	43,00 $\pm$ 0,00	43	43
Adja	2	40,00 $\pm$ 5,00	35	45
Akposso	2	53,00 $\pm$ 1,00	52	54
Ewe	85	24,92 $\pm$ 0,99	14	54
Fon	1	55,00 $\pm$ 0,00	55	55
Guin	6	31,00 $\pm$ 2,62	26	43
Kabyè	24	68,71 $\pm$ 0,69	56	70
Kotokoli	5	66,20 $\pm$ 2,90	55	70
Lamba	1	70,00 $\pm$ 0,00	70	70
Moba	5	63,80 $\pm$ 3,44	54	70
Nawdba	2	69,00 $\pm$ 10,00	59	79
Ngangame	1	50,00 $\pm$ 0,00	50	50
Tchamba	2	57,50 $\pm$ 7,50	50	65
Watchi	141	23,06 $\pm$ 0,62	15	50

Quantity of termites consumed per year within ethnic groups : Table 7 shows the annual quantity of termites consumed by ethnic groups, revealing a clear disparity that reflects cultural and socio-economic differences. Ethnic groups in the north/centre (Lamba: 280 g, Nawdba: 276 g, Kabyè: 274.84 g, etc.) have the highest annual consumption levels. Meanwhile, ethnic groups in the south (Watchi: 43.35 g, Ewe: 45.85 g, Guin: 77.5 g) consume much smaller quantities (Figure 5).

Table 7. Amount of termites consumed per year by different ethnic groups

Ethnic groups	Amount consumed per year (g)
Adélé	86
Adja	120
Akposso	185,5
Ewe	45,8528
Fon	165
Guin	77,5
Kabyè	274,84
Kotokoli	264,8
Lamba	280
Moba	255,2
Nawdba	276
Ngangame	150
Tchamba	230
Watchi	43,3528

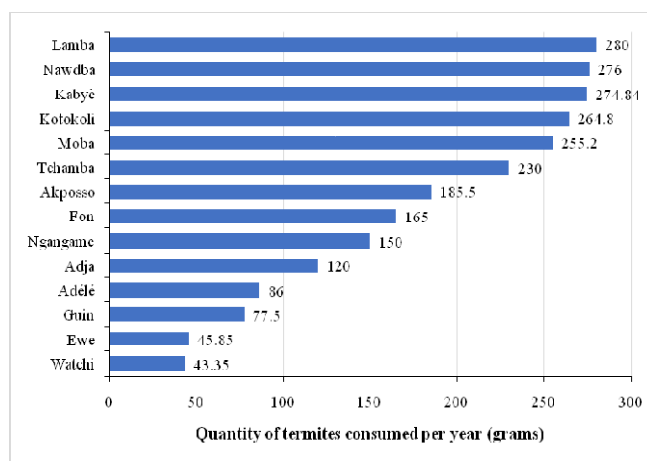


Figure 5. Quantity of termites consumed per year by different ethnic groups

How to obtain termites: Figure 6 highlights the methods used to obtain termites by location, revealing marked variations. In Kpémé, breaking termite mounds is the most widely used method (90.20%). Akoumapé and Dagbati show an almost equal split between breaking termite mounds (49.80% and 47.90% respectively) and light trapping (50.2% and 52.10% respectively). Other methods are negligible. These figures indicate that the exploitation of *Macrotermes* termites varies considerably depending on the locality.

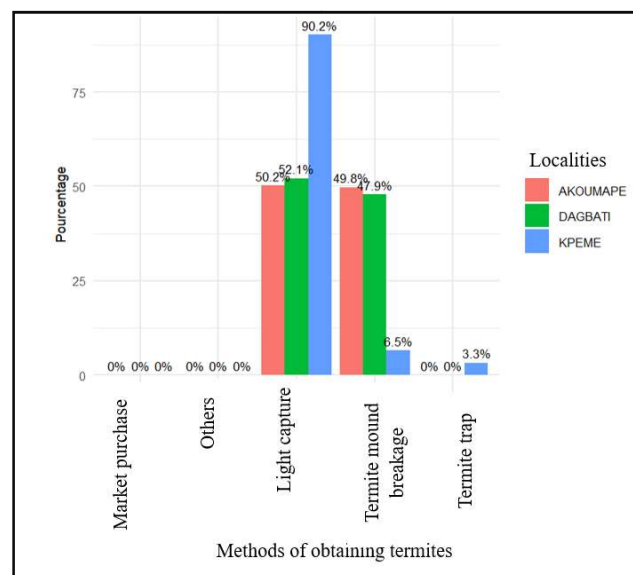


Figure 6. Variation in methods of obtaining termites in localities

DISCUSSION

Proportion of respondents by location and gender: The gender imbalance in the sample surveyed, revealing a high representation of men, is not insignificant and is consistent with studies documenting differentiated gender roles in traditional food systems in Africa (Ouellet, 2017). This disparity suggests that men may be the main actors in termite collection, or more accessible to the survey. Although the influence of gender on entomophagy varies depending on the context (Florença *et al.*, 2022), the literature confirms that social roles determine access to resources. It is therefore crucial to adopt an intersectional approach, combining gender, culture and ecological practices. This methodology is essential for deconstructing the inequalities and power dynamics that shape communities' relationship with termites.

Proportion of Macrotermes consumers by locality: The variation in termite consumption between localities confirms the predominant influence of place of residence on traditional dietary practices. This disparity is widely documented in the literature on entomophagy, where preferences are guided by socio-cultural and ethnic contexts (Boko and Angaman, 2021). The significant lack of consumption in Kpémé, unlike Dagbati, can be explained by the erosion of traditional practices or increasing urbanisation. Seasonal availability and access to insects are critical factors influencing their consumption, which may explain the differences observed (Van Huis *et al.*, 2013).

Hierarchical classification of localities based on the types of species consumed: The hierarchical classification highlights highly localised entomophagic practices and food preferences shaped by the socio-cultural and environmental context. Previous work on entomophagy in sub-Saharan Africa confirms that insect consumption is largely contextualised (Van Huis *et al.*, 2013). Differences in preferences (winged, queen, termite mound) can often be explained by seasonal availability and access to resources, but also by cultural factors (Banjo *et al.*, 2006). For example, the termite queen, often sought after for its size and nutritional value, may be subject to taboos or restrictions on consumption. The use of a dendrogram is a recognised methodological approach for mapping cultural similarity relationships in food anthropology (Van Huis *et al.*, 2013), reinforcing the idea that the differences observed are cultural and environmental signatures of communities.

Shannon diversity index in localities according to the types of termites consumed: The Shannon Index (H) proves to be a relevant tool for quantifying the complexity of entomophagy practices, revealing the richness of termite types consumed by locality. The low diversity observed in Dagbati and Akoumapé suggests dietary or cultural specialisation limiting the exploitation of different species (Illgner and Nel, 2000). Conversely, the high index in Kpémé reflects polyphagy with regard to termites, often associated with in-depth ethnoecological knowledge of insect life cycles and habitats, as evidenced by studies on traditional diets (Ramos-Elorduy, 2006). These results illustrate how cultural, environmental and economic factors shape the composition of insect-based diets.

Frequency of consumption by locality: The disparity observed in the frequency of termite consumption highlights the influence of local socio-cultural and environmental factors on entomophagy. Insect consumption is intrinsically linked to traditions, local practices and resource availability (Van Huis *et al.*, 2013). The particularly high frequency in Kpémé, compared to other localities, could indicate a strong cultural value or an important role for termites as an essential source of protein, particularly in contexts where access to conventional animal protein is limited. This consumption gradient is comparable to variations observed in other African regions, where consumption frequency varies considerably depending on the area (Banjo *et al.*, 2006).

Quantity of termites consumed by locality: Variations in the quantity of termites consumed are a strong indicator of local socio-

cultural and environmental dynamics. Previous studies confirm that the consumption of edible insects is strongly influenced by economic and cultural factors (Polepole *et al.*, 2020). The significant quantity consumed in Kpémé may reflect the more prominent role of termites as a substitute for conventional animal proteins, illustrating their nutritional and cultural importance, particularly during periods of food shortage or harvest. Conversely, the low quantities in Dagbati and Akoumapé could reflect lower availability or access constraints.

Reasons for termite consumption depending on location: The variation in consumption motivations is a central theme in the anthropology of entomophagy (Florença *et al.*, 2022). The role of termites as a pleasurable and nutritious food is well established in sub-Saharan Africa (Durst *et al.*, 2010). The exclusive emphasis on taste in Dagbati could signal a strong cultural and culinary appreciation of winged termites, a trend observed in rural contexts where habits are deeply rooted. Conversely, the emphasis on nutritional value in Akoumapé and Kpémé may reflect a greater awareness of nutritional benefits, potentially due to changing food representations or urbanisation dynamics (Van Huis *et al.*, 2013).

Consumption of Macrotermes by ethnic group

Frequency of consumption within ethnic groups: The highly significant variation in consumption frequency between ethnic groups confirms that entomophagy is a practice deeply integrated into cultural and ecological systems. The North/Centre versus South dichotomy of the country reflects differentiated ethnocultural systems with regard to termites. Northern groups (Kabyè, Kotokoli) likely place greater nutritional value on termites, potentially due to a stronger culinary tradition or historical integration of insects into their diet (Sirima *et al.*, 2018). Conversely, the low frequency among the Watchi and Ewe (South) could indicate lower value or more accessible protein alternatives. These differences highlight that insect consumption cannot be understood without considering the ethnic dynamics and cultural identities that shape food preferences and behaviours (Van Huis *et al.*, 2013).

Quantity of termites consumed within ethnic groups: Significant differences in the amount of termites consumed according to ethnicity reaffirm that entomophagy practices are deeply rooted in ethnocultural systems (Polepole *et al.*, 2020). The north-south gradient confirms that northern/central groups incorporate termites as a staple food source in large quantities, highlighting their nutritional and cultural importance (Sirima *et al.*, 2018). The low quantities consumed by the Watchi and Ewe in the south are consistent with the cultural differences and ecological variations observed. These results reinforce the idea that in order to promote edible insects, it is necessary to target the cultural dynamics and traditional knowledge specific to each ethnic group.

Quantity of termites consumed per year within ethnic groups: The variation in annual termite consumption between ethnic groups highlights the crucial role of cultural factors in the integration of insects into the diet. The strong tradition of entomophagy observed among ethnic groups in the north is consistent with the work of Ouellet (2017). Studies in Togo confirm the cultural importance and transmission of these practices from childhood onwards. Termites are also a highly prized food in the Sudano-Guinean zone due to their seasonal availability and acceptability (Lawin *et al.*, 2018). These results, which are in line with the FAO's conclusions on the potential of insects, highlight the need to integrate ethnocultural dimensions into any strategy to promote entomophagy.

How to obtain termites: The variation in methods of obtaining termites between localities highlights the influence of socio-environmental dynamics on entomophagy practices. The dominance of termite mound breaking in Kpémé suggests a greater dependence on the exploitation of these termite nests, often associated with rural or forested areas where access to termite mounds is easy and electrical infrastructure is limited (Gasco, 2023). Conversely, the importance of light trapping in Akoumapé and Dagbati is probably linked to the

better energy infrastructure in these localities, facilitating the collection of seasonal winged termites (Illgner *et al.*, 2000).

CONCLUSION

This study demonstrates that termite (*Macrotermes*) consumption in Togo is highly heterogeneous and closely shaped by socio-cultural and geographical factors. The differences between localities are striking: Kpémé shows the greatest diversity, frequency, and quantity of consumption, reflecting deep cultural integration and ethnoecological knowledge, whereas in Dagbati, taste alone drives the practice. Ethnicity emerges as the main determinant, revealing a clear north–south gradient: northern and central groups (Kabyè, Kotokoli, Moba) exhibit the highest consumption levels, while southern groups (Watchi, Ewe) consume less frequently and in smaller quantities. Beyond cultural patterns, the study highlights a crucial environmental dimension. As these localities are situated within the phosphate mining zone, termite consumption may represent a potential pathway of exposure to trace and heavy metals for local populations. Thus, the interactions between cultural food practices and environmental contamination warrant closer monitoring. Any strategy aiming at the sustainable and safe use of termites as a food resource should therefore integrate both ethnocultural specificities and environmental health considerations to ensure nutritional benefits without compromising consumer safety.

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