Diagnosis of the production and risks of consumption of artisanal refreshing drinks (Bissap, Gnamankoudji) in Haut Sassandra (Daloa department)

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ABSTRACT

*Introduction:*The production and consumption of artisanal refreshing drinks (Bissap, Gnamankoudji) in the Haut Sassandra region are anchored in local culture. These artisanal drinks are experiencingconsiderablegrowthdespitetheir artisanal and unstable production.

*Objective :*The objective of thisstudy is to diagnose the production of these artisanal drinks and to assess the potentialrisksassociatedwiththeirconsumption in the Haut Sassandra region.

*Methodology :*A cross-sectional and retrospectivesurveywascarried out withproducers to make the diagnosis and withconsumers to identifysome main conditions linked to the consumption of these drinks. 52 producerswereinvestigated, and 780 consumersweresubmitted to a questionnaire, for a total of 832 peopleaudited.

*Results :*Bissap and Gnamankoudji have manysimilar unit operations. In addition, Bissap undergoesheattreatment. The drinks are mostlypackaged in used pots. The main conditions encounteredwerediarrhea (8.3% and 8.7%),bellybloating (2.4% and 2.8%), fever (1.80% and 2.30%), nausea (1.80% and 1.90%), vomiting (0.90% and 1%) respectivelyafterconsumption of Gnamankoudji and Bissap.

*Conclusion :*Thestudycollected data on the production of artisanal drinks and the risksincurred by consumers. The consumption of these drinks represents a major risk for public health.

Keywords: artisanal drinks, consumption, Haut Sassandra, risks

1. Introduction

In sub-SaharanAfrica, the consumption of artisanal refreshing drinks is growing, due to theiraffordablecost and the manynutrientstheycontain. Theserefreshing drinks have nowbecome an integral part of people'seating habits [1] [2]. They are obtainedfrom local productsincluding fruits, vegetables and certain roots [3]. In Ivory Coast, *Bissap* and *Gnamankoudji* are among the mostcommon artisanal refreshing drinks [4]. Bissap is an artisanal drink obtainedfrom Hibiscus flowers (*Hibiscus sabdariffa*). *Gnamankoudji* is an artisanal drink obtainedfrom the rhizomes of ginger (*Zingiber officinale Roscoe*) [5].

These drinks are soldalongroadsides, in markets and denselypopulated areas such as schools and bus stations [6]. Their production is based on rudimentarytraditionalmethods. The processesimplemented are simple and requirelittleequipment and technical expertise [5] [7]. However, these manufacturing processes are not alwaysmastered, they are not standardized and thereforevaryfrom one producer to another [8]**.**

In addition, drinks are packaged in already used or recycledpots;whereasthismakeshift packaging is stronglydiscouraged [9]. It wasalsonoted that these drinks are kept for a long time during sale in uncontrolledhygienic conditions [10].From production to marketing, these drinks can besubject to contamination by variousmicroorganismsincludingpathogens.Additionally, severaldiseaseoutbreaks have been attributed to the beveragesin various parts of the world and some infections have been reported [11] [12].

Comment [AK2]: Reusable containers or packaging Materials

The large population of the Daloa departmentestimatedtoday at709,810 inhabitantsalso know this attraction to the consumption of artisanal refreshing drinks [2].However, little data exists on the production method and the illnesseslinked to the consumption of these drinks.

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This studyaims to diagnose the production of artisanal drinks in the Daloa department, and to identify the main conditions linked to theirconsumption.

2. Material and methods

2.1.Survey for the diagnosis of production of artisanal drinks

A surveywascarried out in severalneighborhoods and villages in the Daloa department. In total, 26 production sites wereinvestigated. To this end, a questionnaire wasdeveloped in order to diagnose the production of these drinks. The main information soughtwas: the manufacturing process of these artisanal drinks, the hygienic state of the production sites, the addedingredients, the packaging, as well as the marketing conditions.

2.2.Survey to identify the main conditions linked to consumption

A surveywascarried out in 26 neighborhoods and villages in the Daloa department. To carry out the survey, a questionnaire wasdeveloped and 780 volunteerswereinterviewedrandomly. The investigation lasted 3 months (June to August 2023). The essential information soughtfocused on the main conditions encountered by consumers. The respondentswere of twogenders, of all levels of study and of all social strata. The only exclusion criterionwaschildrenunder 15 years of age as well as the veryelderly. The mapbelowpresents the Daloa departmentwith the different districts, villages or survey sites (Figure 1).

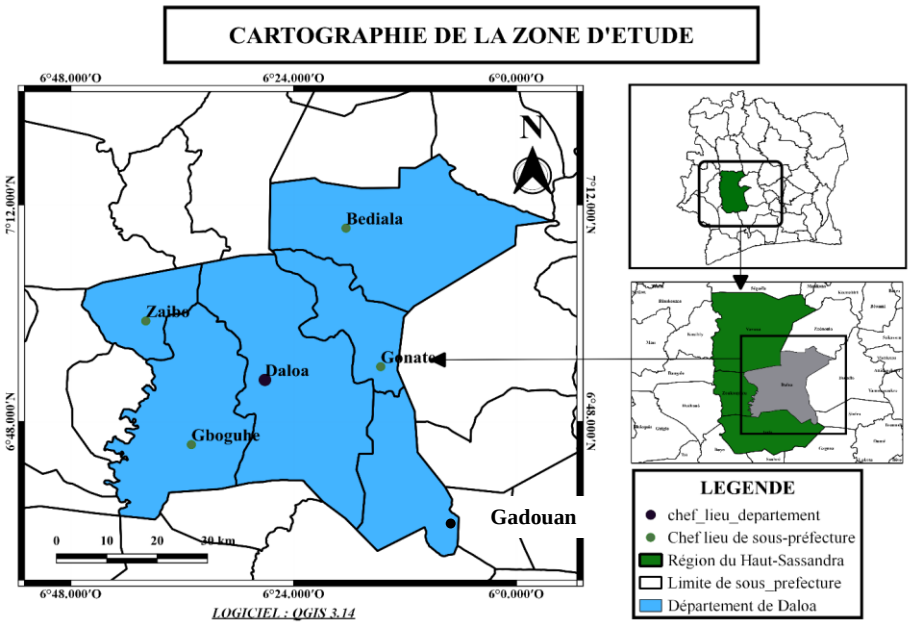

Figure 1:Map of the study area

2.3.Data analysis

The data collectedduring the surveywereprocessed by the Sphinx Lexica software and enteredusing the Excel 2013 spreadsheet.

3. Results

3.1.Diagnosis of the production process

The main unit operations of Gnamankoudji and Bissap are:washing, soaking, filtration and addingingredients (brownsugar, vanillasugar). However, to obtainGnamankoudji,thegingergoesthrough the grinding stage while the hibiscus flowersundergoheattreatment (infusion) to obtain Bissap and addingredients. The essential operations are illustrated by the production diagrambelow (Figure 2)

- **Beverage packaging and storage**

At the end of productionoperations, the drinks are packaged in used plastic packaging. These plastics were not oftensterilized, onlydetergentswere used for theirdisinfection. Once packaged, conservation wasdone in refrigerators or freezers..

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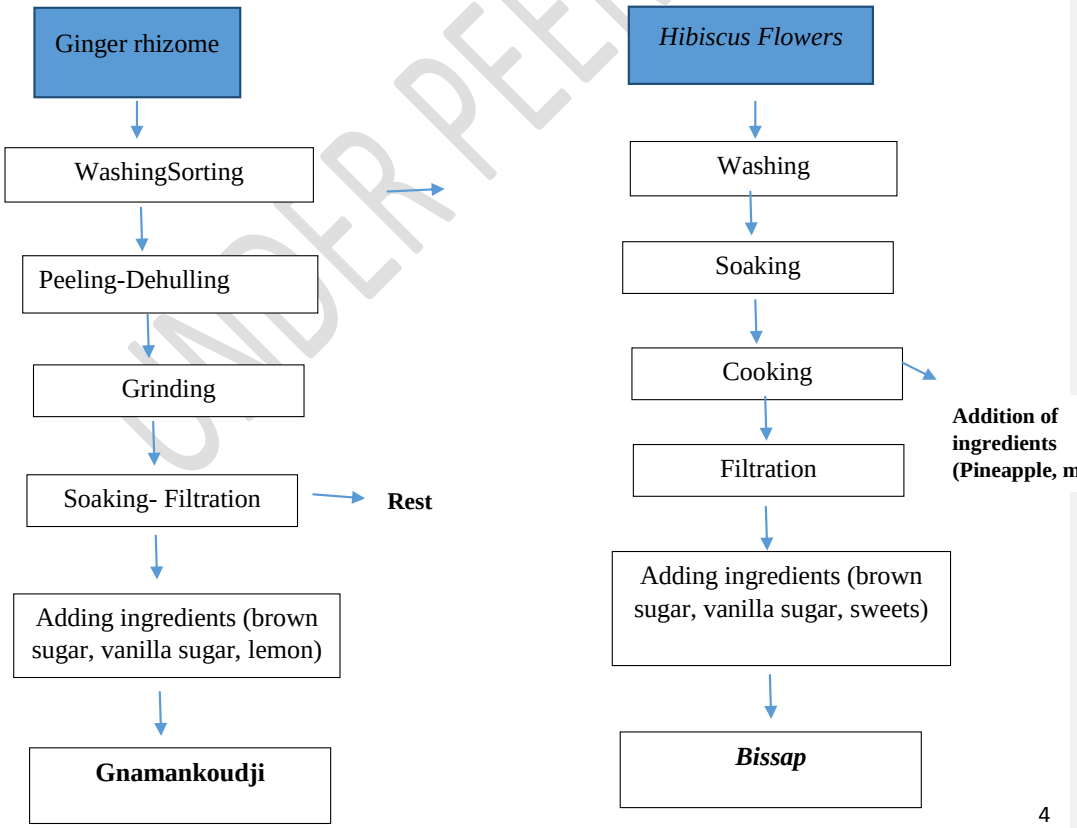

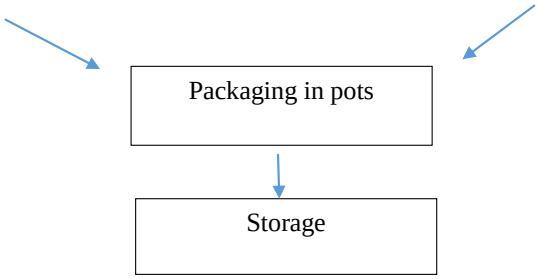

Figure 2:*Bissap* and *Gnamankoudji*manufacturingdiagram

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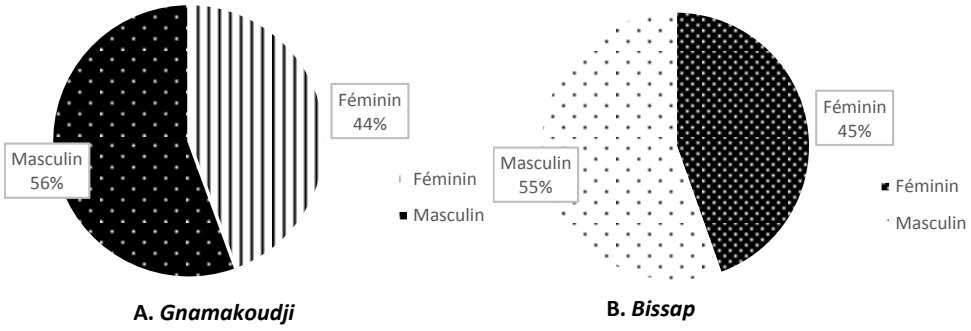
3.2.Characteristics of the consumption of artisanal drinks

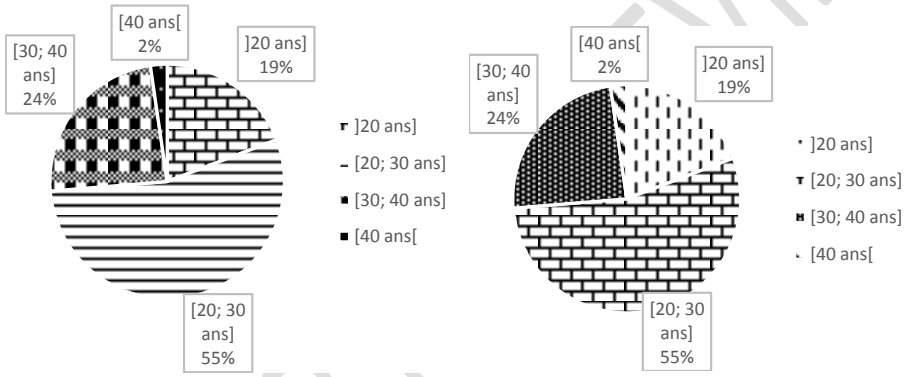
- **Consumer profile**

The surveyrevealed that the consumption of Gnamankoudji and Bissap drinks wasdominated by men (55.6% and 55.4%) compared to (44.6% and 44.4%) for women (Figure 3). Consumersaged 20 to 30 represent the mostconsumingage group (55%) (Figure 4). Regarding the level of education, the vastmajority of consumerswereilliterate (59%), a proportion of (31%) hadhighereducation and secondaryeducation (10%) (Figure 5). The majority of consumerswere made up of traders (51%), pupils (17%), civil servants (15%), students (11%) (Figure 6). Additionally, the data revealed that consumerswere single (68%; 67%), married (5%), and others in relationships (27%; 28%) (Figure 7). The ethnic group of the region (Krou) represented the ethnicity of the majority of consumers (29.1%; 29%) followed by the Akan (27.1%; 27.2%), the Gour (21.8%; 21.7%), the Mandé (20.6%; 20.8%) and 1.4% for the others (Guinean, Burkinabe) (Figure 8).



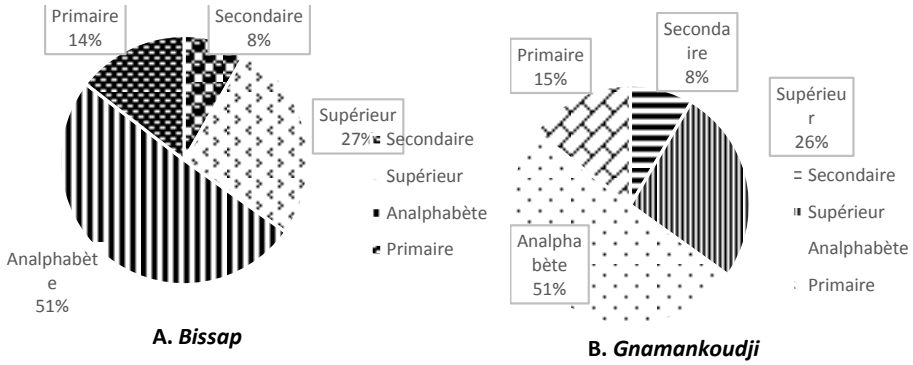
A. *Gnamakoudji* **B. *Bissap***

Figure 3: **Distribution of consumersaccording to gender**



A. Gnamankoudji ***B. Bissap***

Figure 4: Distribution of consumers according to age



A. *Bissap* **B. *Gnamankoudji***

Figure 5: Distribution of consumersaccording to level of study

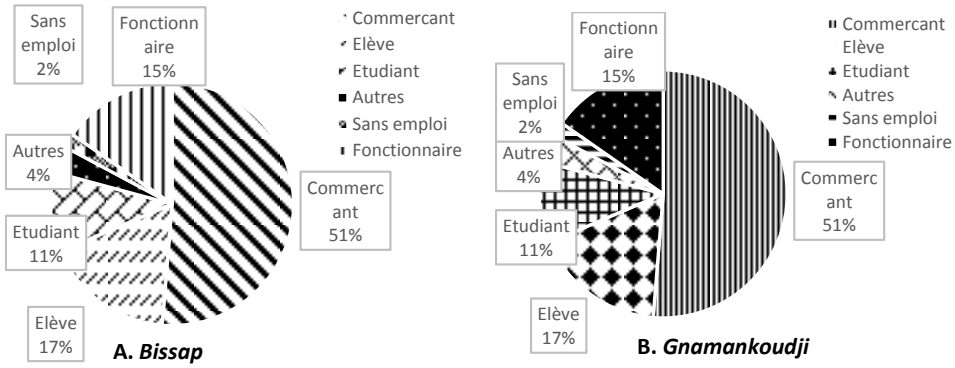


Figure 6:**Distribution of consumersaccording to profession**

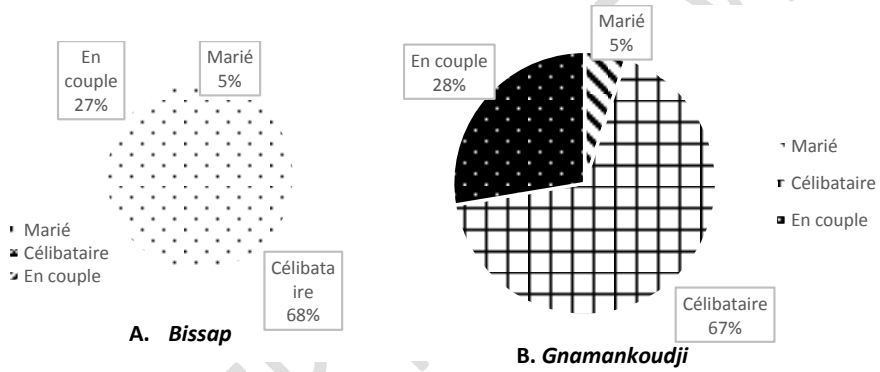


Figure 7: Distribution of consumersaccording to marital status

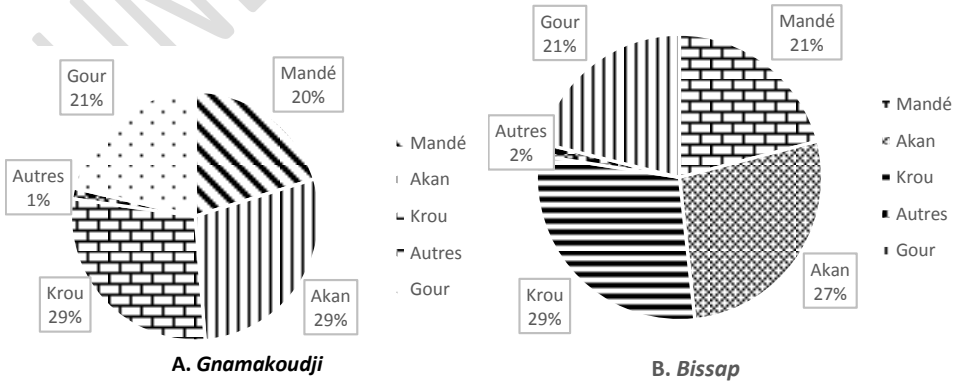
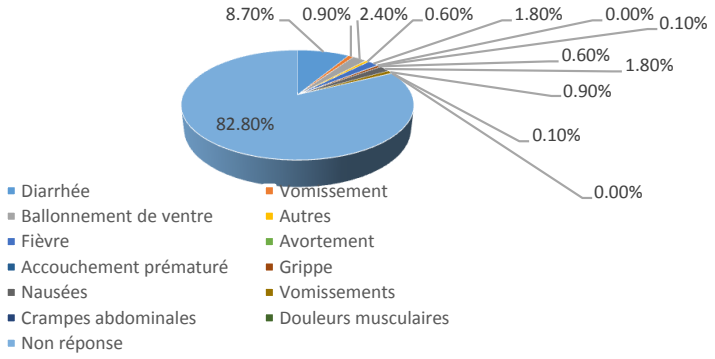


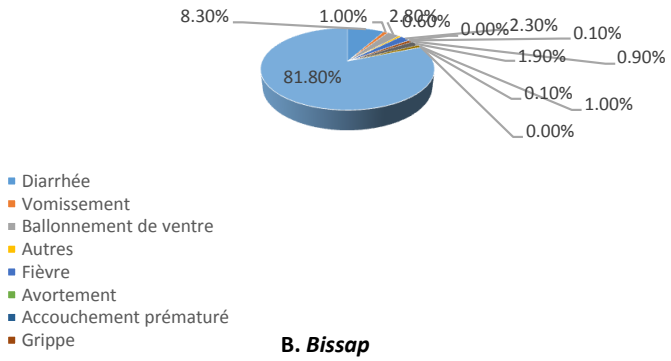
Figure 8:**Distribution of consumersaccording to ethnic group**

- **Main conditions encounteredafterconsumption**

According to consumers, the main ailmentsencounteredfollowing the consumption of artisanal drinks werediarrhea (8.3%; 8.7%), stomachbloating (2.8%; 2.4%), fever (2.30% ; 1.8%), nausea (1.9%; 1.8%), vomiting (1%; 0.9%), flu (0.9%; 0.6%) (Figure 9). However, the consumption of Bissap causedslightly more illnesses (18.3%; 17.3%) (Figure 10). The conditions were more commonamongwomen (17.90%; 20.10%) compared to (16.90%; 16.60%) (Figure 11). Younger consumers (under 20 yearsold) presented more conditions thanolder people (40 yearsold) (Figure 12). The conditions were more commonamonguneducated people thanamongthosewith a high level of education (Figure 13).

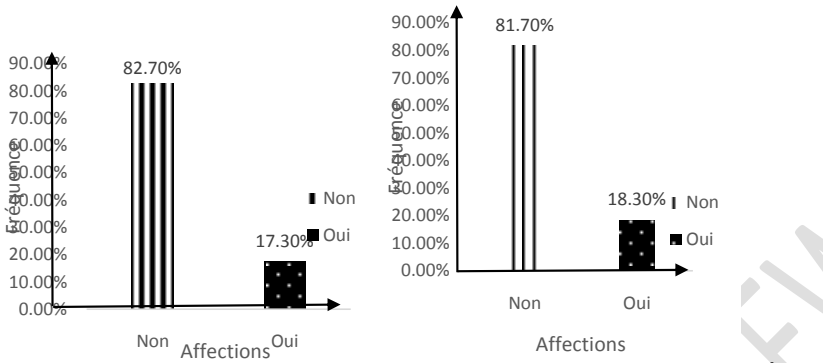


A. *Gnamankoudji*



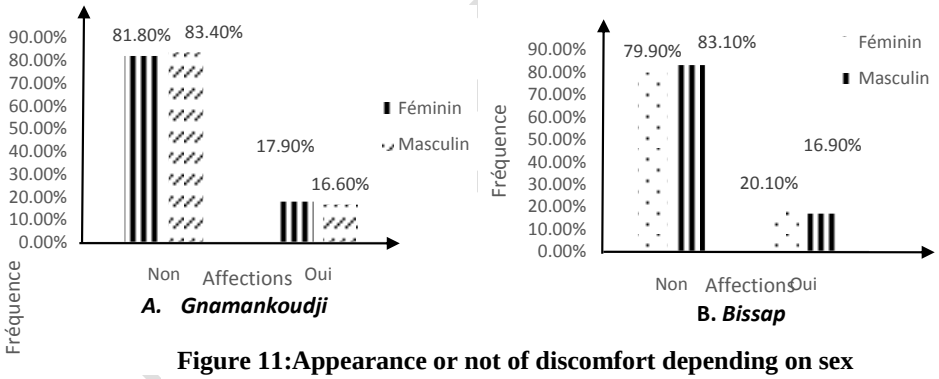
B. *Bissap*

Figure 9: Conditions observed after consumption



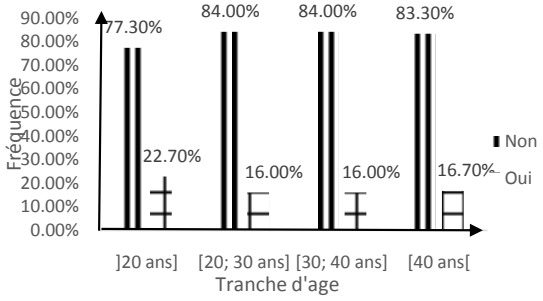
A. Gnamankoudji **B.** ***Bissap***

Figure 10:Frequency of consumershavingexperienceddiscomfortafterconsumption

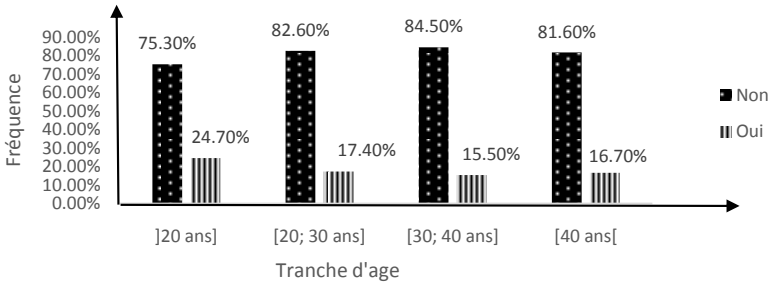


A. Gnamankoudji **B.** ***Bissap***

Figure 11:Appearance or not of discomfort depending on sex

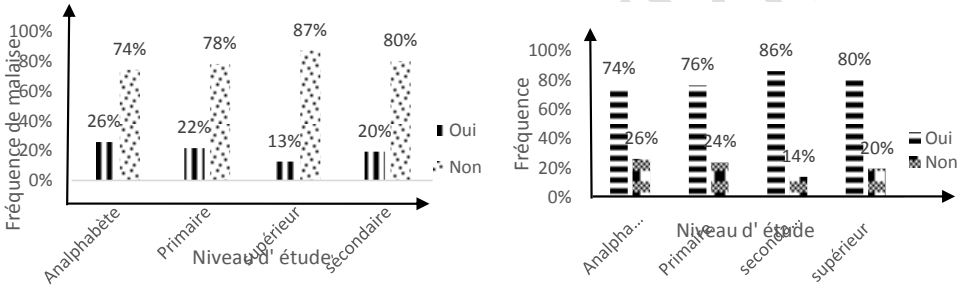


A. Gnamankoudji



B. *Bissap*

Figure 12:**Appearance or not of conditions depending on the age group**



A. Gnamankoudji ***B. Bissap***

Figure 13:Appearance or not of according to the level of study

4. Discussion

Artisanal drinks (*Bissap* and *Gnamankoudji*) sold in the Daloa department are increasinglyconsumed by the population. All the people interviewed (780) know *Bissap* and *Gnamankoudji*and consume themregularly. They consume them at least once a day. Furthermore, 18.3% and 17.3% of people consuming*Bissap* and *Gnamankoudji*respectivelyhadillnessesfollowing the consumption of these drinks. These conditions, generallycharacterized by diarrhea, stomachbloating, fevers and nausea, are attributed to the ingestion of uncooked or poorlypreservedfood or that has been subject to defective handling, as is the case with the artisanal drinks studied. .Theseresults are in agreement withthose of Farthing whoestablished a linkbetween the appearance of discomfort and the injection of drinks [13]. Artisanal drinks are more consumed by students and traders in the Daloa department. Theseresultscorroboratethose of Daniel whohighlighted a

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stronglinkbetweenfoodconsumption and occupation of the populations of Ouagadougou (Burkina Faso) [14].

The majority of producerswere not in a satisfactoryhygienic state. In fact, more thanhalf of the beverage production sites were in an unsanitary state. Also, the producerscarried out a simple washing of the raw materials, no disinfectionoperationwasundertaken. This couldincrease the risk of contamination by microorganisms, particularlypathogens in these drinks. Somework has indicated that poorhygienewouldadd contaminants to drinks [15]. The hygienic conditions of the points of sale have also been described [16]. The prolongedstorage of drinks, the lack of use of appropriatedisinfectants, the lack of sterilization of containers and the unhygienicenvironment all contribute to thesediscomfortsencounteredamongconsumers [10]. The majority of producerswereilliterate. According to studies by Somda and hiscolleagues, the ignorance of actors in the informalfoodsectorrepresents a riskfactor; source of foodborneillnesses [17].

In addition, the hygienic condition of mechanicalgrinders in communitymarkets used for grindinggingerwas not under control. In addition, the multiplicity of productscrushed by these machines couldbeconsidered as a major risk factor for consumers. Also, the beverage extraction operation is commonlycarried out withbare hands by producers. As hands are not always clean, thiscouldincreasehealthrisks. It shouldbenoted, however, that the drinks obtainedwerealwayspackaged in already used or recycledpots;whichdoes not guaranteetheirhygienicquality. In addition, the processing techniques currently used are traditional and do not makeit possible to present a quality product on the market. Manufacturing processesgreatly influence the quality of craft drinks [3]. Furthermore, in a study on food packaging, recycled packaging is stronglydiscouragedbecauseitconstitutes a source of food contamination.

5. Conclusion

This study made it possible to diagnose the production of artisanal drinks in the Daloa department, and to identify the main conditions linked to theirconsumption. The main unit operations of *Gnamankoudji* are washing of ginger rhizomes, grinding, soaking, filtration and addition of ingredients. *Bissap* are washing of *Hibiscusflowers*, decoction, filtration and addition of 'ingredients.The production process for these drinks is traditionallyrudimentary andproduction conditions do not respect hygienerules. The main conditions encounteredaftertheirconsumption arediarrhea, stomachbloating,fever, nausea and

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vomiting.The consumption of these drinks thereforerepresents a danger for the health of consumers.It is thereforeimperative to initiate corrective actions to remedy the problemsidentified, promoteresponsible production practices that respect quality and safety standards, in order to preserve public health.

6. References

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