



Assessment of Knowledge on the Hygiene Practices of Actors in the Sector of “Dèguè”, a Milk-Based Foodstuff Produced and Consumed in Togo: Case of the Municipality of Agoè-Nyivé 1

Kwami Lumo Awaga ^{a*}, Voukey Edo Boula ^b,
Mamatchi Mélila ^a, Tètouwalla Awili ^c
and Kameni Ludovic Géraud Bonda ^d

^a Department of Biochemistry, Faculty of Sciences (FDS), University of Lomé, Togo.

^b Medical Assistant School (E.A.M), University of Lomé, Togo.

^c Faculty of Health Sciences (FSS), University of Lomé, Togo.

^d African School of Architecture and Urban Planning Professions (EAMAU), Togo.

Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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*Corresponding author: E-mail: yiawaga@yahoo.fr;

ABSTRACT

"Dèguè" is mixture of fermented milk, millet or durum wheat couscous and sugar, which is one of the foods well appreciated in Togo. This study was carried out in view to contribute to the valuation of this milk-based foodstuff produced and consumed in Togo for consumer health safety. This is a cross-sectional, descriptive study with an analytical aim, the survey of which took place from April 3 to June 30, 2023 in the municipality of Agoè-Nyivé 1 of the Autonomous District of Greater Lomé. In total, 70 "Dèguè" vendors were surveyed on their level of knowledge of good hygiene practices. The KoboCollect, Epi-info version 7.2. and Excel 2013 softwares allowed the collection and statistical processing of the data. The survey showed a predominance of women (80%) among sellers. They were between 15 and 50 years old with an average age of 30 ± 8.35 . Respectively 45% and 36% of sellers declared having received training on Good Hygiene Practices and Good Manufacturing Practices. Only 35.71% of sellers have a good level of knowledge on hygiene practices and among them 48.00% have a secondary level compared to 28.00% with a higher level. Considering the age group, the Chi square test showed that there is no significant difference between the level of knowledge on hygiene practices and the age group ($p > 0.05$). The results of this study show the need to raise awareness among all the actors involved in the "Dèguè" sector in the municipality of Agoè-Nyivé 1 for an improvement in hygiene and manufacturing practices.

Keywords: "Dèguè"; producers and distributors; hygiene practices; municipality of Agoè-Nyivé 1.

1. INTRODUCTION

Food in the world is a complex and multifaceted theme that includes social, economic, environmental, and health aspects. The health aspect becomes a question of interest to public health when it concerns a food whose consumption is constantly growing, such as milk for example.

Global consumption of dairy products continues to grow at a rate of 2.5% per year, according to the International Milk Federation (IDF) [1]. Furthermore, the situation of food hygiene practice among food sellers varies considerably across the world due to factors such as levels of economic development, food safety regulations, availability of resources and training, as well as cultural norms. In developed countries, there are usually strict regulations regarding food safety and hygiene [2].

In Africa, street foods represent a significant part of the food economy. However, due to lack of infrastructure, regulations and resources, food hygiene practices may be inadequate. This can increase the risk of foodborne illnesses among consumers [2]. Among the street foods continually growing in West African cities, is "Dèguè" which is a fermented milk dessert with cereals, a mixture of fermented milk, millet or durum wheat couscous and sugar. The consumption of "Dèguè" in the Sahelian countries dates back to ancient times and is

traditional to them. It was produced there from the abundant local cows' milk favoured by cattle breeding. However, in recent decades, it has spread to all West African countries including Togo and is more produced from imported milk powder [3].

In Togo, "Dèguè" points of sale emerged and continued to grow in street areas, markets, strategic corners for the distribution of ready-to-eat food (general food stores, supermarkets, etc.). Likewise, the consumption of this beverage which, initially was not popular in Togo, now tends to become part of the eating habits of the Togolese populations in general and of Lomé its capital in particular [4]. Certainly, the proliferation of production and marketing of "Dèguè" seems to provide solutions to the problems of unemployment and food insecurity that demographic growth in Lomé is causing. However, it can pose a problem of food safety when we consider the high level of healthiness in which dairy products must be treated, the level of education of the actors as well as the hygienic conditions in which production operations, conservation, transport and distribution of "Dèguè" take place.

The lack of data on this foodstuff in Togo requires studies to be undertaken in order to guide stakeholders and consumers. It is in this context that this study takes place, the objective of which was to evaluate the level of knowledge of stakeholders on hygiene practices around "Dèguè" in the commune of Agoè-Nyivé 1, the

2nd most populated commune in Togo and of the 13 communes of the Autonomous District of Grand Lomé (DAGL).

2. MATERIALS AND METHODS

2.1 Study Area

This study was carried out in the DAGL, in the Health District of Agoè-Nyivé and more precisely in the Municipality of Agoè-Nyivé 1 (Fig. 1) from April, 3rd to June, 30th 2023.

According to the final results of the fifth General Population and Housing Census (RGPH-5) of November 2022, the commune of Agoè-Nyivé 1 is estimated at 317,255 inhabitants and is the 2nd most populous in Togo, behind that of Golf 1 [5].

2.2 Materials

These are the interview guide and the observation grid designed in the kobotoolbox server. It generates an electronic questionnaire

in the koboCollect data collection and analysis software. The data were thus collected by the KoboCollect tool installed on Android phones and were processed in the statistical software Epi Info version 7.2 with Excel 2013.

2.3 Methods

This is a transversal, descriptive study with an analytical aim which was carried out, in addition to documentary research, through the implementation of a survey of sellers and consumers in the municipality. The survey carried out aims to assess the level of knowledge of actors in the "Dèguè" sector on hygiene practices around production and marketing. Specifically, it made it possible to identify the types of "Dèguè" marketed, the reasons for the proliferation of points of sale, possible sources of contamination by pathogenic germs, the profile of producers/distributors/consumers, the production or distribution environment of "Dèguès" and finally the reasons which motivate this important consumption of "Dèguè" these last moments. A count was then necessary in order to have a real idea of the study population.

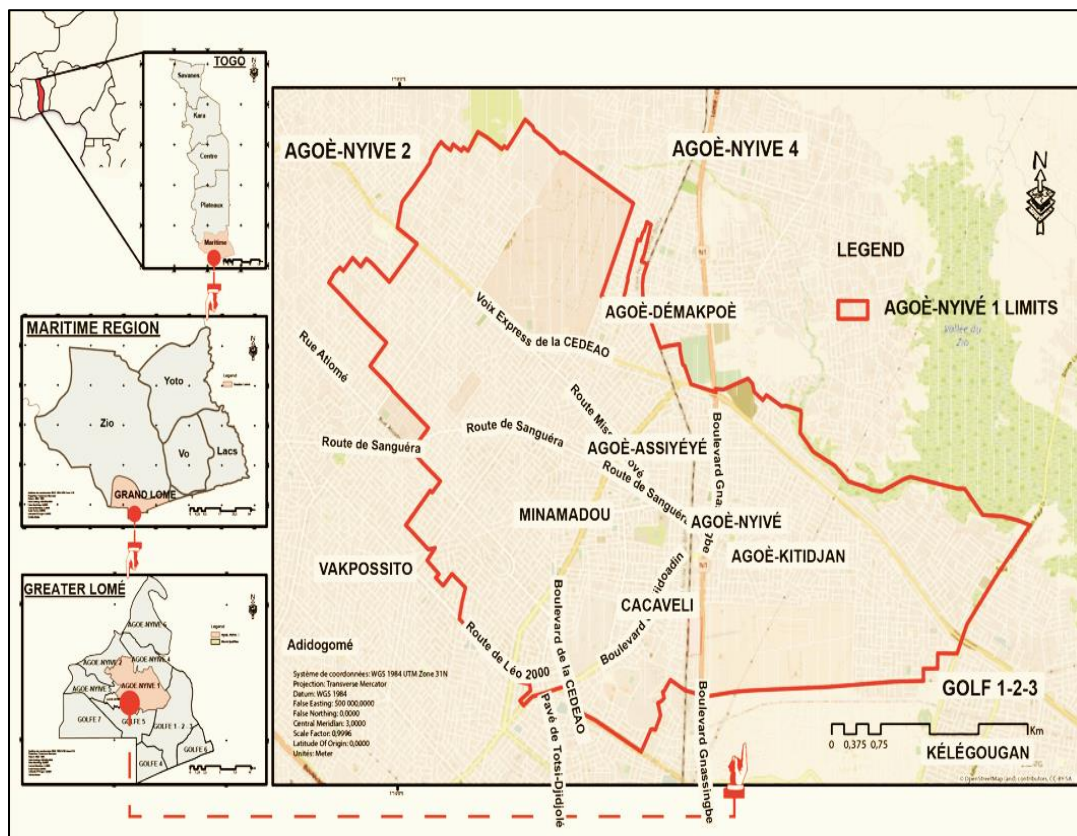


Fig. 1. Map of the commune of Agoè-Nyivé 1

2.3.1 Count of Points of Sale in the Municipality of Agoè-Nyivé 1

In order to have an exhaustive list and the geolocation of points of sale in the commune of Agoè-Nyivé 1, a count was carried out from April, 24th to May, 2nd 2023. The counting teams used the KoboCollect application for the collection of geolocation coordinates of points of sale. ArcGIS 10.8 processing software was used to generate the geolocation map of the points of sale using coordinates extracted from KoboToolbox. An exhaustive list of 136 points of sale was compiled with a view to choosing the actors to be surveyed.

2.3.2 Conduct of the Investigation

The points of sale included in the survey are those in the enumeration base of points of sale of "Dèguè" in the commune of Agoè-Nyivé 1, which were selected using the ENA (Emergency Nutrition Assessment) software and whose actors have agreed to provide the information to be collected. In addition, other actors were selected in the field to replace the actors randomly selected with ENA who refused to provide the information. Not included in this study are all actors who do not meet the conditions for inclusion. Out of a total of 136 points of sale, 70 actors were selected to be surveyed with a view to ensuring high representativeness of all actors in the sector, in addition to 30 consumers chosen randomly by quota at the points of sale.

The field trip was carried out from May, 28th to June, 7th 2023 at selected points of sale with two other electronic questionnaires on KoboCollect. The first questionnaire was intended for sellers, and the second for consumers present at the points of sale at the time of the survey. Direct and indirect questions from the survey form in KoboCollect were asked to sellers and consumers in an interview format. During this time, direct observations were carried out to collect information on the level of hygiene and the working environment. The information collected and the observations made were recorded with KoboCollect.

3. RESULTS

Two main types of information were collected, those relating to the production/distribution of "Dèguè" on the one hand and those relating to the consumption of "Dèguè" on the other hand. In addition, the result of the geolocation of the points of sale would help to have more clarification on the stages of this study.

3.1 Count of Points of Sale

3.1.1 Geolocation of Points of Sale

Fig. 2 shows the 136 points of sale of all types geolocated in the commune of Agoè-Nyivé 1 in April, 2023 during the count.

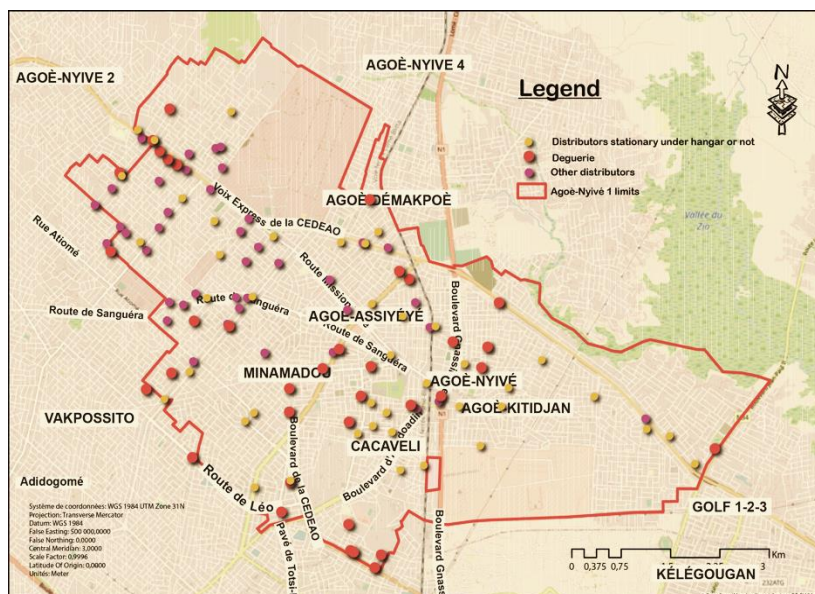


Fig. 2. Map of the geographical location of "Dèguè" points of sale in the commune of Agoè-Nyivé 1 in April, 2023

3.1.2 Types of "Dèguè" Points of Sale

In Fig. 3, the study reveals that immobile distributors with a simple table under a shed or not constitute the majority of "Dèguè" points of sale (48.57%) and are followed by "Dèguèterie" (creameries of "Dèguè") (25.71%).

3.2 Data on Producers/Distributors of "Dèguè"

3.2.1 Sociodemographic Characteristics of Sellers

Table 1 presents the sociodemographic characteristics of the 70 "Dèguè" sellers who participated in the present study. Among these subjects surveyed in the commune of Agoè-Nyivé 1, women predominated with a proportion of 80% compared to 20% of men. They ranged in age from 15 to 50 with an average age of 30 (with a standard deviation of 8.35). The median age was 30 years with an interquartile range between 23 and 35 years. The most represented age groups were that of 18 to 39 years old with a proportion of 75.71%, followed by that of 40 to 50 years old (15.71%) and the least represented

was that of sellers under 18 years old. (8.57%). Almost all of the subjects (98.57%) are of Togolese origin and the proportion of married among them was slightly more than half (51.43%). Regarding the level of school education, the study revealed that only 4.29% are not educated and more than half (54.29%) have secondary level.

The study also revealed that the activity was the main activity for 64.29% of sellers and, while a minority (7.14%) has been carrying out the activity for at least 10 years, the majority (58.57%) practices with a number of years of experience between 1 year and 5 years.

3.2.2 Location of "Dèguè" Points of Sale

In Table 2, the distribution shows that most (74.29%) of the "Dèguè" points of sale are installed near roads and streets. Nauseous odours (8.57%) and the existence of piles of garbage nearby (15.71%) are noted in a small proportion of sales sites while a proportion of sites of 22.86% shows an existence of wastewater in their environment with the presence of harmful vectors.

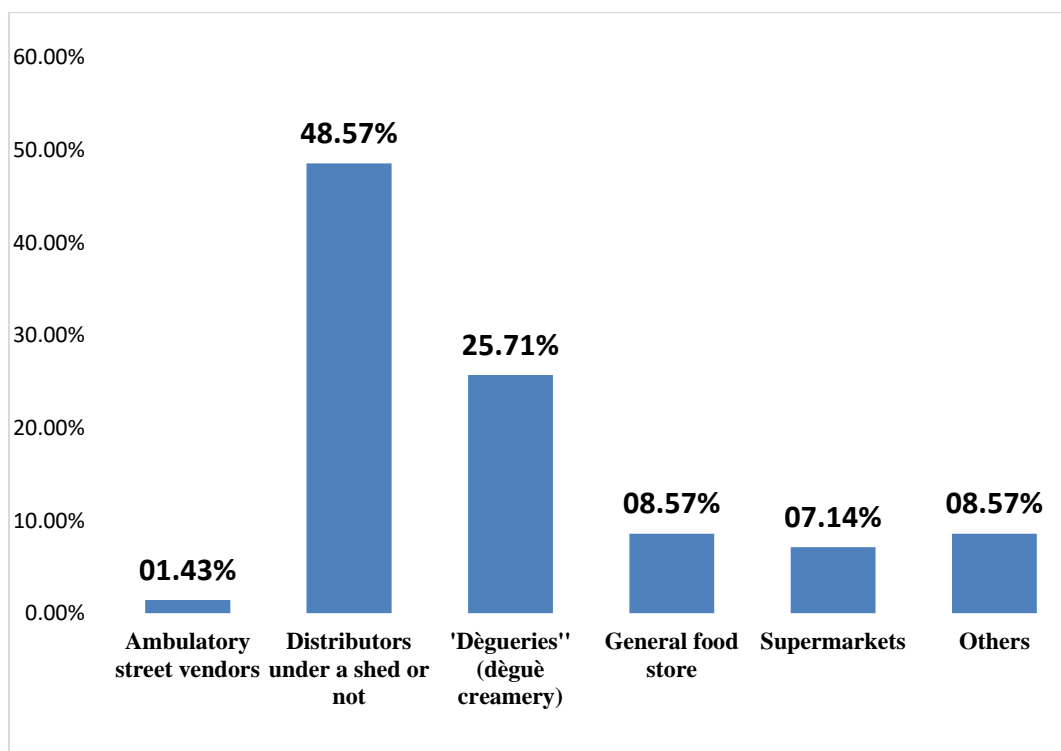


Fig. 3. Types of "Dèguè" points of sale in the commune of Agoè-Nyivé 1
Others: Money transfer kiosk, "Dèguè" house, supermarket and restaurant

Table 1. Distribution of "Dèguè" sellers according to socio-demographic characteristics in June, 2023 in the municipality of Agoè-Nyivé 1

| Variables Considered | Modalities | Number | Proportion (%) |
|----------------------------------|--------------------|--------|----------------|
| Gender | Female | 56 | 80.00 |
| | Male | 14 | 20.00 |
| | Total | 70 | 100.00 |
| Age Group | < 18 | 6 | 08.57 |
| | 18 - 39 | 53 | 75.71 |
| | 40 - 50 | 11 | 15.71 |
| | ≥ 60 | 0 | 00.00 |
| | Total | 70 | 100.00 |
| Nationality | Togolese | 69 | 98.57 |
| | Guinean | 1 | 01.43 |
| | Total | 70 | 100.00 |
| Marrital Status | Single | 33 | 47.14 |
| | Married | 36 | 51.43 |
| | Divorced | 1 | 01.43 |
| | Total | 70 | 100.00 |
| Level of School Education | Non-literate | 3 | 04.29 |
| | Primary | 14 | 20.00 |
| | Secondary | 38 | 54.29 |
| | University | 15 | 21.43 |
| | Total | 70 | 100.00 |
| Type of Activity | Main | 45 | 64.29 |
| | Secondary | 25 | 35.71 |
| | Total | 70 | 100.00 |
| Exercise Time | Less than a year | 17 | 24.29 |
| | 1 to 5 years | 41 | 58.57 |
| | 6 to 10 years | 7 | 10.00 |
| | More than 10 years | 5 | 7.14 |
| | Total | 70 | 100.00 |

Table 2. Distribution of points of sale in relation to their location and environment

| Variables Considered | Modalities | Number | Proportion (%) |
|---|------------|--------|----------------|
| Next to the Gutters | Yes | 8 | 11.43 |
| | No | 62 | 88.57 |
| | Total | 70 | 100.00 |
| Next to the Dumps | Yes | 6 | 08.57 |
| | No | 64 | 91.43 |
| | Total | 70 | 100.00 |
| At the Side of a Road | Yes | 52 | 74.29 |
| | No | 18 | 25.71 |
| | Total | 70 | 100.00 |
| Far from Particular Sources of Contamination | Yes | 39 | 55.71 |
| | No | 31 | 44.29 |
| | Total | 70 | 100.00 |
| Less than 500 m from Public Latrines | Yes | 1 | 01.43 |
| | No | 69 | 98.57 |
| | Total | 70 | 100.00 |
| Nauseous Odors | Yes | 6 | 08.57 |
| | No | 64 | 91.43 |
| | Total | 70 | 100.00 |
| Existence of Piles of Garbage Next to the Point of Sale | Yes | 11 | 15.71 |
| | No | 58 | 82.86 |
| | Others | 1 | 01.43 |
| | Total | 70 | 100.00 |
| Presence of Wastewater in the Environment of the Sales | Yes | 16 | 22.86 |
| | No | 53 | 75.71 |
| | NA | 1 | 01.43 |
| | Total | 70 | 100.00 |

| Variables Considered | Modalities | Number | Proportion (%) |
|---|------------|--------|----------------|
| Presence of Harmful Vectors at the Time of the Survey | Yes | 16 | 22.86 |
| | No | 54 | 77.14 |
| | Total | 70 | 100.00 |

NA: Not Applicable

3.2.3 Personal Hygiene

A proportion of 74.29% of "Dèguè" sellers did not wear a professional apron or sales outfit and of the small proportion (25.71%) who used it, 5.56% were not clean. The nearby latrines where the sellers' needs are met are 87.14% modern latrines and 35.71% of the latrines are located at a distance of less than 15 m from the sales stands (Table 3).

3.2.4 Presence of Hand Washing Devices (HWD) at the Sales Station and Hand Washing Practice

Fig. 4 shows that hand washing after using the toilet and before the sale of products among the subjects surveyed represents proportions of 97.14% and 85.71% respectively, while the proportion of points of sale having a HWD at the post sales is low (38.57%).

3.2.5 Type of Water Used for the Production of "Dèguè"

Only half of the "Dèguè" Producers Use Water from the "Société Togolaise des Eaux" (Table 4).

3.2.6 Visits to Health Control Services, CPS Holding, and Training Received by Investigators

A small proportion of 21.43% holds a Professional Health Card (CPS); the vast majority (71.43%) do not have one and more than half had not received any health inspection visit in a period of one year. Almost all sellers (94.29%) know that poor quality of their product can be a source of health problems. However, only a proportion of 64.29% claimed to have received training on Good Hygiene Practices. In addition, of the 48 sellers who produce their "Dèguè" themselves, a very small proportion of 16.67% benefited from an inspection of the product preparation environment (Table 5).

3.2.7 Fly Repellent System

A large majority (64.29%) of "Dèguè" sellers do not use a fly swatter system and among them, some do not find it useful (Table 6).

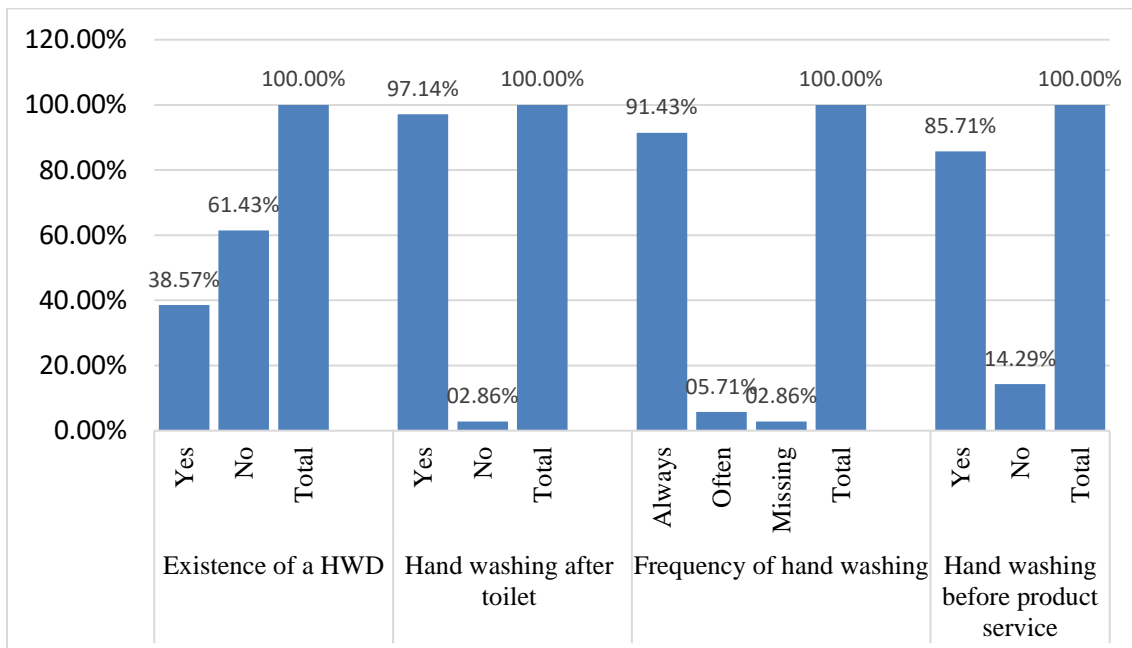


Fig. 4. Presence of HWD compared to hand washing
HWD: Hand Washing Device

Table 3. Distribution according to personal hygiene and proximity to latrines on the sites

| Variables Considered | Modalities | Number | Proportion (%) |
|---|----------------------|--------|----------------|
| Wearing a Professional Apron or Work Outfit | Yes | 18 | 25.71 |
| | No | 52 | 74.29 |
| | Total | 70 | 100.00 |
| Condition of Apron or Outfit | Clean | 17 | 94.44 |
| | Dirty | 1 | 05.56 |
| | Total | 18 | 100.00 |
| Hair Protection | Yes | 35 | 50.00 |
| | No | 35 | 50.00 |
| | Total | 70 | 100.00 |
| Nails Trimmed | Yes | 66 | 94.29 |
| | No | 4 | 05.71 |
| | Total | 70 | 100.00 |
| Lesions on the Hands | Yes | 2 | 02.86 |
| | No | 68 | 97.14 |
| | Total | 70 | 100.00 |
| Protection of Hands from cuts and Injuries by Gloves or Bandage | Yes | 0 | 00.00 |
| | No | 3 | 100.00 |
| | Total | 3 | 100.00 |
| Toilet Places | Modern latrines | 61 | 87.14 |
| | Traditional latrines | 4 | 05.71 |
| | Others | 5 | 07.14 |
| | Total | 70 | 100.00 |
| Distance of Site Toilets from Sales Support | Less than à 15 m | 25 | 35.71 |
| | Greater than 15 m | 45 | 64.29 |
| | Total | 70 | 100.00 |

Table 4. Type of water used for the production of “Dèguè”

| Variables Considered | Modalities | Number | Proportion (%) |
|----------------------|------------|--------|----------------|
| TdE | Yes | 35 | 50.00 |
| | No | 35 | 50.00 |
| | Total | 70 | 100.00 |
| Drilling | Yes | 26 | 37.14 |
| | No | 44 | 62.86 |
| | Total | 70 | 100.00 |
| Well | Yes | 1 | 01.43 |
| | No | 69 | 98.57 |
| | Total | 70 | 100.00 |
| Rainwater | Yes | 0 | 00.00 |
| | No | 70 | 100.00 |
| | Total | 70 | 100.00 |

TdE: “Société Togolaise des Eaux”

3.2.8 Packaging Materials Used

Non-biodegradable plastic bags are mainly (71.43%) used as packaging materials for “Dèguè” among the subjects surveyed (Fig. 5).

3.2.9 Level of Knowledge on Hygiene Practices

Fig. 6 presents the good level (35.71%) of knowledge of “Dèguè” sellers on hygiene and its practices.

Considering the age group, the Chi 2 test showed that there is no significant difference between the level of knowledge about hygiene practices and the age group ($p > 0.05$). As for the

level of schooling, even among those who have a good level of knowledge about hygiene and its practice, secondary school predominated with a proportion of 48.00% (Table 7).

3.2.10 Presentation and Means of Preservation of “Dèguè”

On the “Dèguè” sales sites, the actors use good means of preservation, namely refrigerators, freezers, coolers with melting ice. However, a proportion of 17.14% (7.14% + 10.00%) still uses coolers not equipped with ice, transparent plastic buckets, polypropylene plastic bags, etc. which are poor means of conservation (Table 8).

Table 5. Visit of hygiene control services, detention of cps and training in food hygiene

| Variables Considered | Modalities | Number | Proportion (%) |
|--|-------------------|--------|----------------|
| Number of Visits to Points of Sale During the Year | None | 36 | 51.43 |
| | 1 time | 18 | 25.71 |
| | 2 times | 9 | 12.86 |
| | 3 times | 2 | 02.86 |
| | More than 3 times | 5 | 07.14 |
| | Total | 70 | 100.00 |
| Inspection of Product Preparation Environment | Yes | 8 | 16.67 |
| | No | 40 | 83.33 |
| | Total | 48 | 100.00 |
| Possession of CPS | Yes and valid | 15 | 21.43 |
| | No | 50 | 71.43 |
| | Yes but expired | 4 | 05.71 |
| | valid and expired | 1 | 01.43 |
| | Total | 70 | 100.00 |
| Training on Good Manufacturing Practices | Yes | 36 | 51.43 |
| | No | 34 | 48.57 |
| | Total | 70 | 100.00 |
| Training on Good Hygiene Practices | Yes | 45 | 64.29 |
| | No | 25 | 35.71 |
| | Total | 70 | 100.00 |
| Sellers who Know that Poor Quality of their Product can be a Source of Health Problems | Yes | 66 | 94.29 |
| | No | 3 | 04.29 |
| | Missing | 1 | 01.43 |
| | Total | 70 | 100.00 |

CPS: "Carte Professionnelle de Santé"

Table 6. Layout of a fly repellent system

| Variables Considered | Modalities | Number | Proportion (%) |
|----------------------|------------|--------|----------------|
| Bleach | Yes | 23 | 32.86 |
| | No | 47 | 67.14 |
| | Total | 70 | 100.00 |
| Petroleum | Yes | 3 | 04.29 |
| | No | 67 | 95.71 |
| | Total | 70 | 100.00 |
| Coal | Yes | 0 | 00.00 |
| | No | 70 | 100.00 |
| | Total | 70 | 100.00 |
| Coal plus Petroleum | Yes | 0 | 00.00 |
| | No | 70 | 100.00 |
| | Total | 70 | 100.00 |
| None | Yes | 45 | 64.29 |
| | No | 25 | 35.71 |
| | Total | 70 | 100.00 |

3.3 Data Collected from Consumers

3.3.1 Socio-demographic Characteristics of Consumers

Table 9 presents the sociodemographic characteristics of 30 "Dèguè" consumers who participated in the present study. Among these subjects surveyed in the commune of Agoè-Nyivé 1, men and singles predominated respectively with proportions of 70.00% and

83.33%. They ranged in age from 13 to 64 years old with an average age of 27 (with a standard deviation of 10.11). The median age was 27 years with an interquartile range between 21 and 32 years. The most represented age groups were 25 to 70 years old with a proportion of 63.33%. Almost all of the subjects (93.33%) are of Togolese origin and with regard to the level of school study, the study revealed that only 26.67% have a university level of study.

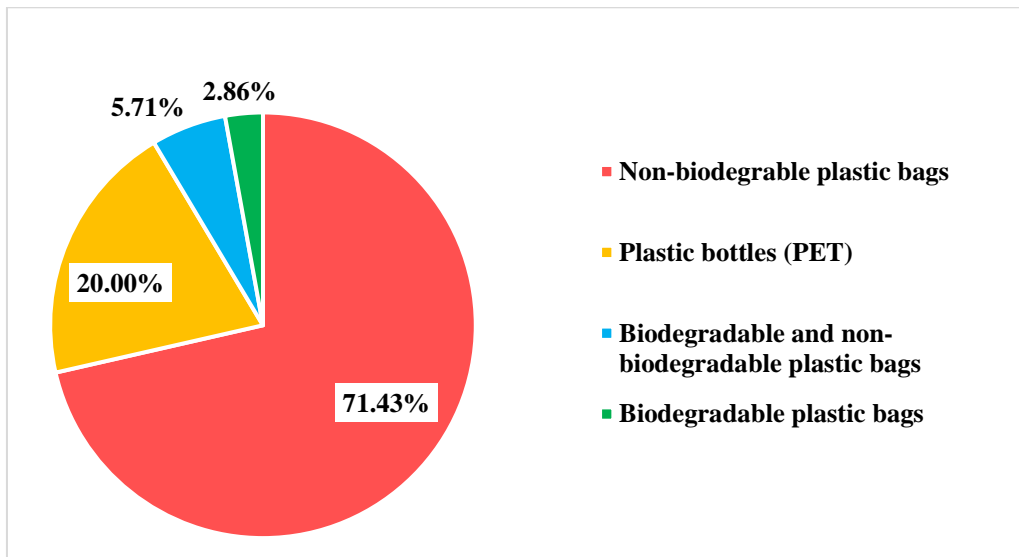


Fig. 5. Packaging material used in the sale of "Dèguè"

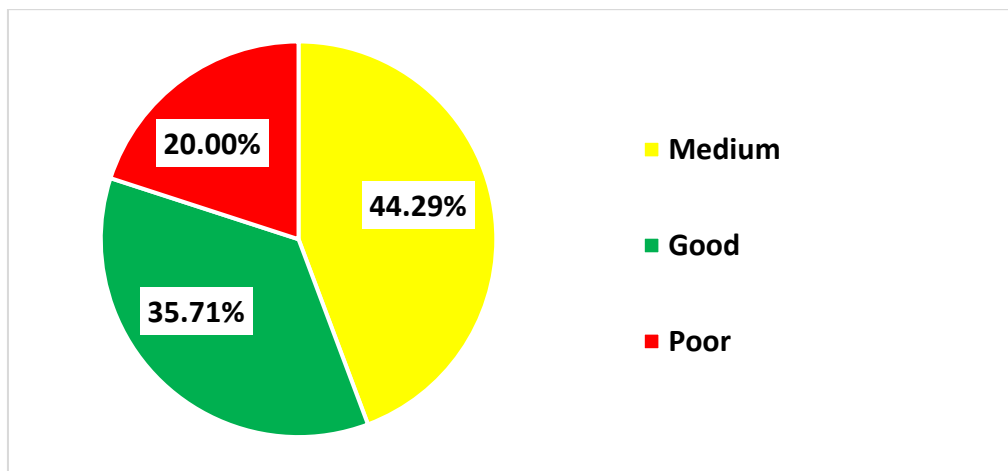


Fig. 6. Level of knowledge of the subjects surveyed on hygiene practices

Table 7. Distribution of "Dèguè" sellers in the commune of Agoè-Nyivé 1 according to the level of knowledge on hygiene practices by level of school study, gender and age group

| Variables considered | Modalities | Level of knowledge on hygiene practice | | | Total |
|----------------------------------|----------------|--|--------------------|--------------------|--------------------|
| | | Good | Medium | Poor | |
| | | n (%) | n (%) | n (%) | |
| Level of School Education | Non-literate | 0 (00.00) | 2 (06.45) | 1 (07.14) | 3 (04.29) |
| | Primary | 6 (24.00) | 6 (19.35) | 2 (14.29) | 14 (20.00) |
| | Secondary | 12 (48.00) | 18 (58.06) | 8 (57.14) | 38 (54.29) |
| | University | 7 (28.00) | 5 (16.13) | 3 (21.43) | 15 (21.43) |
| | Total | 25 (100.00) | 31 (100.00) | 14 (100.00) | 70 (100.00) |
| Gender | Female | 20 (80.00) | 24 (77.42) | 12 (85.71) | 56 (80.00) |
| | Male | 5 (20.00) | 7 (22.58) | 2 (14.29) | 14 (20.00) |
| | Total | 25 (100.00) | 31 (100.00) | 14 (100.00) | 70 (100.00) |
| Age Group | 15 to 29 years | 13 (52.00) | 9 (29.03) | 9 (64.29) | 31 (44.29) |
| | 30 to 50 years | 12 (48.00) | 22 (70.97) | 5 (35.71) | 39 (55.71) |
| | Total | 25 (100.00) | 31 (100.00) | 14 (100.00) | 70 (100.00) |

Table 8. Means of preserving “Dèguè” at the market

| Means of Preservation | Modalities | Number | Proportion (%) |
|-------------------------|----------------------------|--------|----------------|
| Cooler with Melting Ice | Yes | 14 | 20.00 |
| | No | 56 | 80.00 |
| | Total | 70 | 100.00 |
| Cooler Without Ice | Yes | 5 | 07.14 |
| | No | 65 | 92.86 |
| | Total | 70 | 100.00 |
| Refrigerator | Yes | 29 | 41.43 |
| | No | 41 | 58.57 |
| | Total | 70 | 100.00 |
| Freezer | Yes | 31 | 44.29 |
| | No | 39 | 55.71 |
| | Total | 70 | 100.00 |
| Others | Yes | 7 | 10.00 |
| | No | 63 | 90.00 |
| | Total | 70 | 100.00 |
| Accuracy on Others | Do not know | 1 | 14.29 |
| | PP plastic bag | 2 | 28.57 |
| | plastic bucket | 2 | 28.57 |
| | closed plastic bucket | 1 | 14.29 |
| | Transparent plastic bucket | 1 | 14.29 |
| | Total | 7 | 100.00 |

PP: PolyPropylene

Table 9. Distribution of “Dèguè” consumers according to socio-demographic characteristics

| Variables Considered | Modalities | Number | Proportion (%) |
|-------------------------------|---------------|--------|----------------|
| Gender | Female | 9 | 30.00 |
| | Male | 21 | 70.00 |
| | Total | 30 | 100.00 |
| Age Group | 0 - 24 years | 11 | 36.67 |
| | 25 - 70 years | 19 | 63.33 |
| | Total | 30 | 100.00 |
| Nationality | Togolese | 28 | 93.33 |
| | Beninese | 1 | 03.33 |
| | Nigerian | 1 | 03.33 |
| | Total | 30 | 100.00 |
| Marital Status | Single | 25 | 83.33 |
| | Married | 3 | 10.00 |
| | Divorced | 2 | 06.67 |
| | Total | 30 | 100.00 |
| School Education Level | Primary | 6 | 20.00 |
| | Secondary | 16 | 53.33 |
| | University | 8 | 26.67 |
| | Total | 30 | 100.00 |

3.3.2 Distribution of Consumers According to Preference, Location, Duration, Frequency of Consumption of Different Types of “Dèguè”

Among the respondents, the majority (46.67%) have consumed “Dèguè” for more than ten years and prefer the couscous type with milk. While the majority (36.67%) take it with a frequency of 2

times per week, a significant proportion of 13.33% take it more than 3 times per week, and this frequency could be explained by the availability of the sale of “Dèguè” nearby (40.00%). Furthermore, the study reveals that more than 60.00% of subjects considered good hygiene conditions (cleanliness) and the affordable cost of products when choosing the place of purchase (Table 10).

Table 10. Distribution of consumers according to preference, location, duration, frequency of consumption of different types of "Dèguè"

| Variables Considered | Modalities | Number | Proportion (%) |
|---|--------------------------------------|--------|----------------|
| "Dèguè" as Favorite Foods | Yes | 13 | 43.33 |
| | No | 17 | 56.66 |
| | Total | 30 | 100.00 |
| Number of Years of Consumption | Less than one year | 4 | 13.33 |
| | 1 to 5 years | 4 | 13.33 |
| | 5 to 10 years | 8 | 26.67 |
| | More than 10 years | 14 | 46.67 |
| | Total | 30 | 100.00 |
| Favorite Type of "Dèguè" | Couscous and milk | 14 | 46.67 |
| | Mixture of couscous, millet and milk | 9 | 30.00 |
| | Millet and milk | 2 | 06.67 |
| | No particular preference | 5 | 16.67 |
| | Total | 30 | 100.00 |
| Frequency of Consumption per Week | 1 time | 8 | 26.67 |
| | 2 time | 11 | 36.67 |
| | 3 time | 7 | 23.33 |
| | More than 3 times | 4 | 13.33 |
| | Total | 30 | 100.00 |
| Justification of the Frequency of Consumption | Availability of the food nearby | 12 | 40.00 |
| | Unavailability of food nearby | 7 | 23.33 |
| | Eating habits | 2 | 06.67 |
| | No eating habits | 6 | 20.00 |
| | Pleasure | 3 | 10.00 |
| Total | 30 | 100.00 | |
| Consumption on the Sales Site | Yes | 23 | 76.67 |
| | No | 7 | 23.33 |
| | Total | 30 | 100.00 |
| Consumption at Home | Yes | 9 | 30.00 |
| | No | 21 | 70.00 |
| | Total | 30 | 100.00 |
| Favorite Place to Buy "Dèguè" | Creamery of "Dèguè" ("Dèguèterie") | 15 | 50.00 |
| | Sellers under a shed or on a table | 14 | 46.67 |
| | No preference | 1 | 03.33 |
| | Ambulatory sellers | 0 | 00.00 |
| | General food store | 0 | 00.00 |
| | Supermarkets | 0 | 00.00 |
| | Total | 30 | 100.00 |
| Justification of Choice by Affordable Cost | Yes | 19 | 63.33 |
| | No | 11 | 36.67 |
| | Total | 30 | 100.00 |
| Justification by Good Hygienic Conditions | Yes | 18 | 60.00 |
| | No | 12 | 40.00 |
| | Total | 30 | 100.00 |

3.3.3 The Reasons of Consumption of "Dèguè"

A proportion of 56.66% of consumers say that "Dèguè" is not one of their favorite foods (Table 10); 53.33% takes it for its flavor and its refreshing effect and 36.67% take it for their nutritional and health needs (Fig. 7).

4. DISCUSSION

The objective of this study was to evaluate on the one hand the knowledge on the food hygiene

practices of the sellers of "Dèguè" and on the other hand the sanitary conditions of the sites of sale of this beverage in the commune of Agoè-Nyivé 1.

4.1 Sellers Characteristics

The high proportion (80%) of women in the sale of "Dèguè" shows the great involvement of women in this sector and the important role that women play in food security through their informal activity.

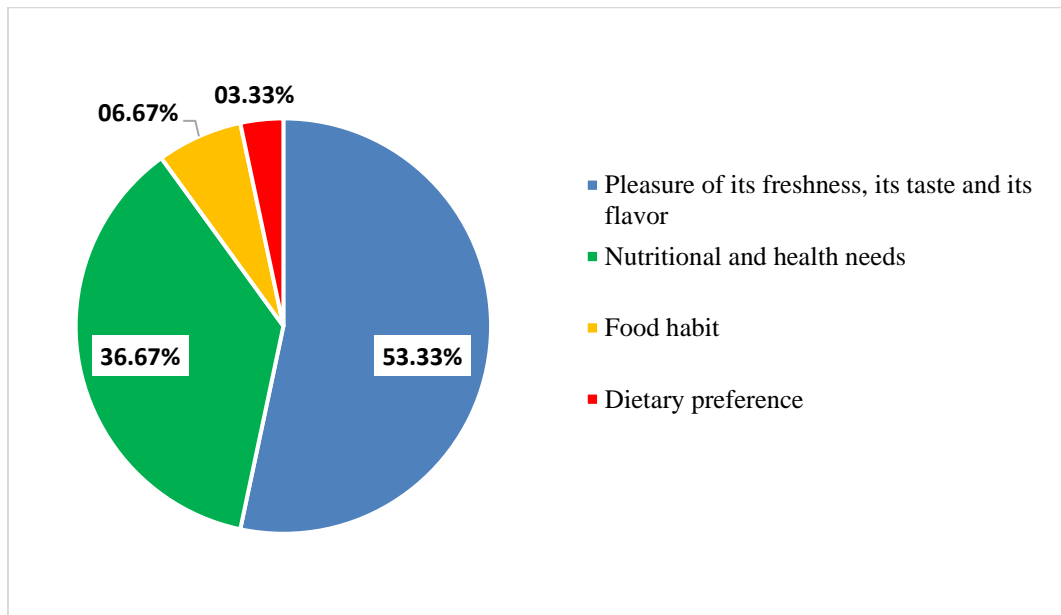


Fig. 7. Distribution of consumers according to reasons for consuming "Dèguè"

The "Dèguè" sector, just like in the Sahelian countries, has also been operational in Togo for a long time, but the proliferation of the production and sale of "Dèguè" seems to be new because the results show that a minority (7.14%) has been doing it for more than 10 years while more than half (58.57%) have been doing it with a number of years of experience of between 1 and 5 years.

This proliferation would be the logical continuation of the urgent search for a solution to the problems of unemployment and employment faced by this fringe of the active population whose age is between 18 and 59 years old who have to feed and take care of their small family and they are the majority in our study (91.42%). The majority of actors (78.58%) in the sector have a level of academic study below the higher level. This proportion agrees with that reported by Muinde and Kuria in Nairobi, Kenya, who found up to 98% of vendors below high education level [6], a level that could be detrimental to knowledge and hygiene practices in the food industry.

4.2 Knowledge of Hygiene Practices Related to the Risks of Contamination by Pathogenic Germs

Data collection from "Dèguè" sellers and observation of points of sale revealed poor procedures and poor hygiene conditions at

"Dèguè" sales sites in the commune of Agoè-Nyivé 1.

The fact that the majority of points of sale (48.57%) are made up of immobile distributors with or without a simple table under a shed, without sale infrastructures offering protection to the products sold, would be a risk of contamination of the "Dèguès" because of their exposure to sources of contamination: roads (74.29%), gutters (11.43%), dumps (8.57%), wastewater, harmful vectors (22.86%) and household waste (15.71%). This hypothesis confirms the study conducted by Kouamé and al [7] on the level of knowledge of hygiene and food safety practices among sellers of braised chicken meat in Côte d'Ivoire.

Another very high risk factor is the clothing and personal hygiene of "Dèguè" sellers. Indeed, in the present study, 74.29% of the subjects did not wear a professional apron or work clothes and 50.00% did not protect their hair. This lack of clothing hygiene of the actors could thus be at the origin of the presence of total germs. Furthermore, according to the survey, 97.14% of sellers claimed to wash their hands after using the toilet and 85.71% before the "Dèguès" service. These proportions contradict that of points of sale with HWD which is much lower (38.57%). They are not consistent with that of 10% reported by Apéti [8] from resellers of ready-made meals sold and consumed on the Togo-Benin border. This difference would be linked to

the method used. Indeed, in the present study, the actors were questioned about hand washing instead of observing this practice as in the case of the Apéti study [8]. This would have led to a bias in the proportion of handwashing because the claims do not often agree with actual practices. However, it is necessary to maintain good personal hygiene practices, including regular hand washing, wearing clean clothing and following recommended hygiene standards to minimize the risk of spreading pathogenic germs and infectious diseases.

Although the proportion of latrines located more than 15 m from points of sale (64.29%) is acceptable, it remains to be improved. The availability and use of modern latrines at 87.14% would thus be an asset for good hygienic quality of products. In addition to this advantage, good maintenance of these toilets would be necessary. For large and medium-sized production facilities, it would be difficult to ensure adequate cleaning without a dedicated cleaning agent. The risk of contamination by latrines still remains since the present study reveals that 88.57% of points of sale, including the medium-sized "Dèguèterie", do not have a cleaning agent.

Considering the proportion of drilling water (37.14%) used in the production of "Dèguè", the results of the study on the quality of drilling water from the Adakpamé quarter in district n° 2 of Lomé -commune confirm the hypothesis according to which, not only the use of drilling water but also the quality of the means of storage of any good quality water would be a risk factor for the quality of "Dèguè".

According to the said study, drilling water has a non-compliance rate of 50% and 20% respectively in relation to total and thermo-tolerant coliforms while well water is 100% contaminated by these bacteria [9]. The control of the drilling water used remains essential in order to ensure the health safety of the "Dèguè" placed on the market. In the present survey, almost all the means of storage used are protected and this represents a good practice to be encouraged.

Cleaning and disinfection are essential and reduce microbial input from the environment (wall, floor), equipment (machines, tools, tables) and workers (handles, sanitary facilities). When preparing food, it inevitably comes into contact with appliances, equipments (knives, bowls, slicers, etc.) and surfaces such as worktops and

floors. An observation regarding the cleaning and maintenance of work sites in African communities is the lack of recruitment of cleaning agents dedicated to this task. Almost all of the vendors then provide the cleaning service themselves before start-up, during and after their restoration service. This constitutes a risk factor for contamination. The recruitment of maintenance workers would be seen as a luxury reserved for individuals or large industries with large budgets. This study revealed that only 11.43% of sites have dedicated cleaning agents, a proportion which is far lower than that of all "Dèguèterie" and supermarkets (32.85%) which should not normally be missing.

Wastewater from production is discharged into nature (47.14%); nevertheless, even if efforts remain to be made, solid waste is better managed than liquids with 78.57% of those surveyed who collect it in tightly closed bins and 77.14% who have subscribed to a waste collection service. In addition, the problem of non-biodegradable plastic bags remains. This was revealed in the present survey with 71.43% of the packaging used being non-biodegradable. Waste management (solid and liquid) is a parameter on which hygiene control services must be rigorous in relation to the resulting consequences.

What can be said of the visits of the hygiene services for the health inspection of the sales sites of "Dèguè"?

A proportion of 51.43% of points of sale did not receive any hygiene inspection visits, 25.71% received one visit and 12.86% received 2 visits. Furthermore, 83.33% of producers have never benefited from an environmental inspection visit for the preparation of milk and couscous for "Dèguè". Only a small proportion of sellers have a valid CPS (21.43%) against 71.43% who do not. Here is the place to call on health control professionals and food safety authorities in Togo to find an appropriate solution for good coverage of inspections and controls of street foods in the informal sector.

4.3 Presentation and Means of Conservation of "Dèguè"

The sellers of "Dèguè" use transparent plastic buckets in which they place the fresh fermented milks to be drawn and served on plates or packaged in plastic bags when sold to customers. The same is true for couscous and

small millet. Consequently, it is during the sale that the mixing of milk and cereals (couscous and small millet) takes place. Particularly for fermented milks, some sellers, using transparent plastic bags, carry out pre-packaging just after production. For still others, which produce for distribution to shops and supermarkets, the mixture is pre-mixed and is packaged in plastic bags or in Polyethylene Terephthalate (PET) plastic bottles. These packaged milks and mixtures are placed in refrigeration for cooling and preservation. They are kept in refrigerators or in coolers containing melting ice on sales sites for sellers who do not have any. The fact for certain sellers of placing the milk in a transparent plastic bucket outside the cooler, common among street sellers and sometimes among sellers stationary on tables, is a very bad practice due to the break in the cold chain which will result in by the heating of the milk and the multiplication of the pathogenic germs which were there at the end of the production process. Most sellers use good means of preserving "Dèguè" (refrigerators, freezers, coolers equipped with melting ice). However, some still use poor means of conservation (PP plastic bags, transparent plastic buckets, etc.). What needs to be checked is the way in which these means are used; find out if storage temperatures are monitored and the cold chain is stable. This is of paramount importance because of the risk of deterioration caused by failure to control these factors. The state of the constituent elements of "Dèguè", when the temperature at purchase is at room temperature, could give clues to a possible poor conservation or break in the cold chain. In the event of a prolonged cold break before purchase, the addition of melting ice cream does not guarantee "Dèguè" health safety which will be unfit for consumption.

4.4 Consumer Characteristics and Reasons for Consumption of "Dèguè"

The results of the study reveal that the majority of consumers of "Dèguè" are male, single at least 25 years old with a secondary school education. These results are consistent with those of a similar study by Canet and N'Diaye [2] on street food consumption in urban areas of Africa. These data could be explained by the increase in people living alone with low financial income due to precarious socio-professional conditions [2]. In addition to these phenomena, the increasingly growing knowledge of the nutritional value of "Dèguè" and its affordability by the low-income citizen could be included.

Indeed, a good proportion (36.67%) of consumers of "Dèguè" take it for their nutritional and health needs. And most prefer to buy the "Dèguè" in the "Dèguèterie" and from vendors installed on the edge of the streets on tables and or under a shed. This result may be due to the fact that the selection of consumers in the present study did not include the segment of the population that gets its supplies in supermarkets and shops. Low cost, good hygienic conditions, availability are then the factors that influence the purchase and consumption of "Dèguès". This agrees with a similar study by Hamadou [10] in the town of Bobo-Dioulasso in Burkina-Fasso on the consumption of dairy products in which the same attributes were identified, in addition to packaging, ease of use and conservation capacity. It is therefore appropriate to admit the reality of this phenomenon of the proliferation of street foods and their consumption in African cities because of its ever-increasing demand due to population growth accompanied by all its socio-economic problems [2].

5. CONCLUSION

This study is a contribution to food safety through the evaluation of the level of knowledge on hygiene practices of actors in the "Dèguè" sector, a fermented milk dessert with cereal produced and consumed in the commune of Agoè-Nyivé 1, in Togo.

It appears that only 35.71% of the retailers surveyed had a good level of knowledge of hygiene practices. This constitutes a risk of food infection for consumers because this lack of knowledge can lead to inadequacies in hygiene practice concomitantly with the lack of sale structures protected from ambient air for some, the poor location of sale sites and insufficient sanitary control. It is therefore necessary in the interest of sustainable food security to raise awareness among stakeholders and promote health control in the production and distribution of this commodity, the sector of which is booming in Togo.

COMPETING INTERESTS

The authors report no declarations of interest.

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