

Hygienic conditions and quality of the dishes cooked by the women traders in the town of Korhogo.

ABSTRACT

The aim of this study is to evaluate the hygienic quality of the dishes sold by the women traders in the town of Korhogo. The study was carried out with 45 restaurants in the town of Korhogo. It consisted on the one hand of a survey based on the Ishikawa diagram in order to assess the hygiene conditions and on the other hand of microbiological analyses of the ready-to-serve meals. 90 samples were taken, including 2 dishes per restaurant respectively consisting of one hot and one cold dish. From the results obtained, it appears that the hygiene on the whole is unsatisfactory. From a microbiological point of view, the meal samples were 75.2% satisfactory, 7.6% acceptable and 17.2% unsatisfactory. In view of these results, it appears essential to improve hygiene conditions by greater involvement of the official services involved in training these traders and monitoring compliance with good hygiene practices and the establishment of a program of cleaning and disinfection of premises and equipment.

Keywords: hygiene, marketed dishes, women traders, microbiological analyses

INTRODUCTION

The informal food sector has been defined as "the sector producing food and beverages ready for consumption, prepared and/or sold by vendors, especially in the streets and other similar public places"[1]. It accounts for a significant share of the daily urban food consumption of millions of low- and middle-income consumers in urban areas [2]. This is because due to the lack or inadequacy of efficient collective catering systems, such as canteens in workplaces and schools, the latter buy food in the street at low cost. Street feeding is very dynamic and growing, while the products on offer are not always of good quality [3] [4]. Indeed, despite its importance, street food poses several health problems due to Foodborne Toxins (FTIs). Especially since microbiological analyses carried out on street foods in several countries have shown insufficient microbiological quality, increasing the risk of foodborne infections [5] [6]. These toxi-infections, which are ignored, often lead to large-scale cases of

33 death as sometimes reported in the press in many countries³. According to the [7], in developed
34 countries the annual percentage of people suffering from foodborne infectious diseases is as high as
35 30%, while the problem is likely to be much more widespread in developing countries. And in Côte
36 d'Ivoire, as elsewhere in the world, bacterial toxi-infections remain a real public health problem [8]. It
37 is therefore recognized that foodborne pathogens represent a serious health hazard, the risk
38 depending mainly on the type of food, the method of preparation and conservation [9], and it is
39 therefore necessary to improve the nutritional, hygienic and organoleptic quality of these foods in order
40 to provide the population with good quality products. For this reason, food safety is everyone's
41 business, from farm to fork [3]. In Korhogo, there is a great diversity of street foods, however, they
42 cause enormous problems of safety or nutritional quality that are related to the environment, the safety
43 of the vendors and the way in which these foods are distributed. In addition, these traders have not
44 received any training in hygiene by the Ministry of Health and Public Hygiene of the city. This fact,
45 added to the various cases of intoxication that have occurred around the city, proves that this is a real
46 public health problem. Especially since the Korhogo Anti-Tuberculosis Center counted 211 patients in
47 2018 and 48 cases in the first quarter of 2018, including 17 women street sellers. As the majority of
48 these patients frequent these street selling places almost every day, it is very important to note the risk
49 of infection of these patients. It is in this logic that our topic entitled: "Hygienic conditions and quality of
50 the dishes cooked and sold by small traders in the town of Korhogo" is part of. The aim of this study is
51 to evaluate the hygienic quality of the dishes sold by the women traders in the town of Korhogo in
52 order to limit the risks linked to the consumption of foodstuffs by the population.

53 2. MATERIALS AND METHODS

54 2.1. Materials and sampling

55 This study consisted in conducting a survey in the town of Korhogo from January to February 2019
56 with survey forms developed on the basis of the Ishikawa diagram. After the survey phase, a
57 sample collection was carried out by purchasing the dishes with the women traders in order to
58 determine the different microbiological risks. These samples were collected in the morning for
59 breakfast foods, at noon for lunch and in the evening for dinner. 90 samples were taken and divided
60 into twenty-one (45) hot and twenty-one (45) cold dishes, with two (2) dishes per restaurant,
61 including one (1) hot and one (1) cold dish.

62 2.2. Enumeration of Microorganisms

63 In this study, 25g of samples were aseptically collected and introduced into a STOMACHER bag, and
64 then the volume is made up to 250 mL with pre-sterilized Buffered Peptone Water (EPT). The tenfold
65 serial dilutions were prepared and spread-plated for determination of micro-organism counts. After
66 dilutions, enumeration of total aerobic mesophile was carried out using plates of Plate Count Agar
67 (PCA, Difco 0479-17-3; Difco Laboratories, Detroit, MI, USA) which were incubated at 30°C for 2 days.
68 Lactic acid bacteria (gram positive catalase negative rods, cocci and coccoids) were enumerated by
69 pour plate on DeMan, Rogosa and Sharpe Agar (MRS, Merck 10660; Merck KGaA, Darmstadt,
70 Germany) containing 10 mg/mL cycloheximide (ICN 100183 Biomedical Inc., Aurora, OH, USA) to

71 suppress yeast growth after incubation at 30°C for 3 days in an anaerobic jar with anaerocult A
72 (Merck). Yeasts and moulds were enumerated on plates of Sabouraud Chloramphenicol agar (BIO-
73 RAD, France) which were incubated at 30°C for 3 - 5 days. Enumeration of total faecal coliforms was
74 carried out using plates of Violet Red Bile Lactose agar (VRBL, Merck 10660, Merck, Darmstadt,
75 Germany) which were incubated for 24 h at 30°C for total coliforms and 44°C for faecal coliforms.

76

77 *Microbiological criteria for ready-made meals*

78 *Mesophilic Aerobic Germs (MAG): 3.10⁵ germs/g of food*

79 *Faecal coliforms: 10³ germs/g of food*

80 *Lactic acid bacteria: 10⁶ germs/g of food*

81 *Fungal flora: 5.10² germs/g of food*

82

83 **2.4 statistical analysis**

84 The data obtained were subjected to analysis of variance (Statistica, 99 Edition, Alabama, USA) and
85 mean differences determined by Duncan's multiple range tests. Significance of variations in the
86 analyzed data was tested at 95% confidence limit.

87

88 **3. RESULTS AND DISCUSSION**

89 Tables 1, 2 and 3 show the local of the different restaurants visited. The restaurant premises of
90 Korhogo's women traders are most often located along the main roads, in or in front of schools, in
91 neighbourhoods or in courtyards. According to the results of the survey, 68.89% of the restaurants
92 have no fences, and there are no compartments or cloakrooms in the 45 restaurants. Only a few
93 restaurants have a poor handwashing system (26.66%) with handwashing products (liquid soap). Also,
94 the survey reveals that 68.89% of the restaurants have a floor covered with soil, 8.89% have a floor
95 covered with tiles and 22.22% have a floor covered with cement. Garbage is stored in front of the
96 restaurant at 68.89%, within the restaurant at 24.44% and at 6.67% at the back of the restaurant to be
97 burned or thrown away. Most of the installations are done without the opinion of the technical services
98 in charge of the establishment of these women traders and even, the establishment of the premises of
99 the women traders does not carry out any control in relation to the potential risks that the situation of a
100 premises in an unhealthy area could generate. The construction of the sheds in no way respects the
101 master plan for the construction of premises. Indeed, most of them do not benefit from fencing,
102 sanitary facilities, cloakrooms and storage rooms for raw materials, cooking equipment and cleaning
103 services. Hence the non-respect of the 5S, i.e. the separation of healthy and unclean areas. In
104 addition, the soil is mostly earth, which causes dust to be raised during the entire service. This leads
105 contaminations, especially since the bushes in the back of the restaurant or the back of the restaurant
106 provide relief to the saleswomen who do not wash their hands effectively when handling the food. As
107 regards the equipment used by women traders, all the results are recorded in Tables 4 and 5. This
108 equipment is essentially made up of aluminium-based kitchen utensils (pots, deep fryers, ladles),
109 cooking equipment (stoves, coal, bundles, gas, etc.), stainless steel tableware (spoons, forks, cups,

110 plates, tureens), and cleaning equipment (detergent, broom, mop). Most of the equipment is renewed
111 only after they have completely deteriorated (91.11). Also, the surface of the cooking equipment
112 becomes black due to lack of effective maintenance. In addition, the equipment is often stored with
113 cleaning products (80%). The results show that 93.33% of the women traders use equipment that is
114 degraded. The materials are poorly identified according to their use, resulting in the use of the same
115 equipment for several purposes. This situation causes the dilapidation of the infrastructure, especially
116 since this equipment is used without any concrete maintenance and with little renovation. Indeed, the
117 use of cooking and serving equipment is not made according to their use. Thus, the same equipment
118 can be used for cooking several foodstuffs. This leads to an accelerated degradation of the
119 equipment. Also, the use of unsuitable equipment for the cutting of animal and vegetable food leads to
120 the presence of wood debris in the cooked dishes causing physical hazards. The raw materials
121 received are tuna fish, attiéké, pork meat, eggs and bread for some women traders. The other
122 commodities are bought on the market especially on market days. The quantities to be received are
123 evaluated according to needs and cover a period of 3 to 4 days for perishable foodstuffs such as
124 attiéké, fish, tuna and pork meat. Food from Abidjan is transported in bags by the luggage trunk of the
125 buses of the various transport companies in Korhogo. 35.55% of the food purchased or received is
126 controlled by the vendors, while 64.45% is not controlled by the women traders. 57.78% of the raw
127 materials (vegetables) in a state of decomposition (chilli, fresh tomatoes, onions, etc.) are used. The
128 storage of perishable foodstuffs is done in freezers in poor condition with 11.11% ice, 13.33% with
129 coolers containing ice, 60% in basins and 15.56% on the ground. Raw materials of long duration such
130 as rice, and of medium duration such as eggs are stored 71.11% on the ground and 28.89% in basins
131 (Tables 6 and 7). Tables 8, 9, 10 and 11 provide information on the labour used in the various
132 restaurants. The qualification of staff remains the major problem in the commercial sector in Korhogo.
133 Street commerce in Korhogo employs the majority of illiterate people with no culinary training, with
134 91.11% of the actresses unaware of good hygiene practices and 8.89% who have an overview of
135 hygiene rules in collective catering. Also, only 6.67% of staff have suitable work clothes and 93.33%
136 have household clothes. Of these uniforms used for service, 4.44% are washed after each service,
137 84.45% are washed 2/3 times a week and 11.11% are changed into clean uniforms every day. 62.22%
138 of the actresses in these street restorations are ill and 35.56% are injured. As regards the wearing of
139 objects during services, 13.33% of women traders do not wear them, 35.55% wear rings, 48.9 wear
140 bracelets and 2.22% wear watches. Moreover, 48.90% of women traders do not protect their heads
141 when serving, 42.22% wear scarves. None of the 45 restaurants respect their work area, but the
142 majority of the shopkeepers have uncut and unpolished nails (84.45%). Tables 12, 13 and 14 provide
143 information on the cooking methods of the women traders in Korhogo. This cooking method is mostly
144 done in the traditional way with 35.55% for charcoal and 46.68% for wood fire. Gas is rarely used
145 (17.77%) and the water used to wash the raw materials consists of well water (44.45%), tap water
146 (20%), and spring water (35.55%). As regards the frequency of changing dish water, 28.89% is
147 changed at any time during the service, 33.33% is changed at the end of each service and 37.78% is
148 changed when it is dirty. Also, in these restorations, one observes movements in all directions. In
149 addition, the clients are in direct contact with the service area (100%) and that the most used method

150 for conservation of cooked food is trays with plastic bags (66.67%). In these restaurants, the glasses
151 used for the drinks are mostly replaced without being washed (68.89%), while 66.67% of the premises
152 are cleaned at any time during the service. The raw materials used are still not of good quality and
153 they do not serve as packaging. Indeed, the foodstuffs are received by people who have no concept of
154 hygiene. Hence the lack of control of these incoming foodstuffs. **This** leads to the sale of moldy
155 foodstuffs such as attiéké often leading to gastroenteritis. As for the foodstuffs purchased such as
156 vegetables, only those with a considerable volume at a derisory price are the most sought after. Also,
157 all raw materials are stored mostly in the same container or are exposed on the floor with cleaning and
158 disinfecting products due to the lack of compartments for their storage. In addition, the "first in first out"
159 plan is not being followed, thus constituting another source of cross-contamination. The workforce is
160 provided by people who have no qualifications in terms of compliance with hygiene rules. They are
161 recruited solely for their culinary talent or for their dedication to sales. Indeed, most of the shopkeepers
162 who make up the workforce are either from the close or distant family or an acquaintance of the
163 restaurant owner. The latter having dropped out of school either through negligence or lack of means.
164 They thus become actors in the street trade only because they have mastered a few notions about
165 cooking. As they do not have any training in good hygiene practices to make up for their lack of
166 knowledge in this area, these actresses therefore represent a serious danger to the health of the
167 consumer. Indeed, due to their ignorance of good hygiene practices, employees of street restaurants
168 work without respecting the rules of hygiene. Also the lack of training and information for street
169 vendors and those installed at the roadside and in the neighbourhoods is evidence of their installation
170 in these areas not adapted for their trade. This lack of knowledge of several anomalies in this sector
171 remains dangerous for the health of the consumer. Failure to respect the work area and the
172 preservation of their nails leads to cross-contamination. Another consequence of the non-application
173 of hygiene rules in these restaurants is the lack of support from the Ministry of Commerce towards
174 these women traders. Thus, not having the necessary means to carry out their activities, these women
175 traders use the means to set up shop. This is why they use rudimentary methods for their activities
176 such as the use of traditional means of preparation like charcoal and wood fire. Also in addition to
177 using raw materials of dubious quality, they do not wash these raw materials properly or wash them
178 with unsuitable water such as undisinfected well water. Dishes are washed with the same unsuitable
179 water and are not replaced on a regular basis. This causes dirt to accumulate on the service
180 equipment, resulting in contamination. Also, after washing, systematic hand washing is not carried out
181 or is done with the dishwater containing the dirt beforehand. Hence the high risk of contamination. This
182 risk of contamination remains because most of the drinking water comes from these infected wells and
183 is served mostly in glasses that have not been washed after a client. Moreover, when cleaning the
184 premises, cooked food is not always protected despite the fact that the floor is not covered and the
185 premises are located in an unhealthy area. The clients are in permanent contact with the waitress
186 since there is almost no counter. The Kitchen is located under trees for the most part and is mostly
187 made of earth and therefore not washable. The results are similar to those of [10]. According to him,
188 the personal hygiene of the food handlers is not satisfactory. This is largely due to the lack of control
189 services. For waitresses wearing jewellery and bracelets should be reprimanded. The clothing is

190 mostly messy. This is due to contact with the premises and equipment, which are also dirty. The
191 responsibility for the employees lies with the managers of establishments that do not provide sufficient
192 spare clothing. Table 15 shows the results of the mesophilic aerobic germs loading. After enumeration,
193 80 ready-made meals, including 44 hot and 36 cold dishes, are satisfactory with a microbial load less
194 than or equal to $9 \cdot 10^5$ CFU/g, i.e. 88%. Two cold dish are acceptable with a load between $9 \cdot 10^5$ and
195 $3 \cdot 10^6$ CFU/g ($9 \cdot 10^5 \leq F \leq 3 \cdot 10^6$ CFU/g), i.e. 2.22%. 8 cold dishes are unsatisfactory with an average
196 load greater than $3 \cdot 10^6$ CFU/g, i.e. 8.89%. Concerning faecal coliforms 58 ready-made meals,
197 including 46 hot and 12 cold dishes, are satisfactory with a microbial load less than or equal to 30
198 CFU/g, i.e. a percentage of 62%. 14 cold dishes are acceptable with a load between 30 and 10^2
199 CFU/g ($30 \leq F \leq 10^2$ CFU/g), (15.56%). 18 cold dishes are unsatisfactory with an average load greater
200 than 10^2 CFU/g (20%) (Table 16). Table 17 shows the load of lactic acid bacteria counted in the
201 different dishes. For the 46 dishes analysed, 60 ready-made meals, including 34 hot and 26 cold
202 dishes are satisfactory with a microbial load less than or equal to $3 \cdot 10^5$ CFU/g, i.e. 64%. Thirty ready-
203 made meals, including 10 hot and 20 cold meals, are unsatisfactory with a microbial load of less than
204 or equal to 10^6 CFU/g, i.e. 33.33%. For yeasts and moulds, 58 ready-made meals including 40 hot and
205 18 cold dishes are satisfactory with a microbial load less than or equal to $1.5 \cdot 10^3$ CFU/g, (62%). Eight
206 ready-made meals, including 2 hot meal and 14 cold meals are satisfactory with a microbial load of
207 between $1.5 \cdot 10^3$ and $5 \cdot 10^3$ CFU/g ($1.5 \cdot 10^3 \leq F \leq 5 \cdot 10^3$ CFU/g), (17.78%). Eight cooked dishes,
208 including 2 hot dish and 14 cold dishes are unsatisfactory with a microbial load of more than $5 \cdot 10^5$
209 CFU/g, (17.78%) (Table 18). For the dishes analysed, an unsatisfactory level of contamination (17.2%)
210 was observed, while the dishes with a satisfactory level of contamination were (75.2%). The heat used
211 to cook the dishes could explain this low rate of non-compliance. This rate of non-compliance is mainly
212 attributable to cold ready meals that are poorly preserved. The samples concerned are cold dishes
213 (14.28%), generally cooked with raw vegetables, fish, meat, seafood, mayonnaise and spices. Also,
214 after cooking, these dishes are poorly packaged, especially since they are either poorly sealed or not
215 sealed at all. These results are inferior to those obtained in Tunis by [11] who had conducted a study
216 in the same sense as ours, where appetizers accounted for 72.5% of non-compliance in restaurants
217 without an HACCP system. Moreover, similar studies conducted between 1990 and 1995 showed that
218 67.7% of the foods analyzed were satisfactory versus 33.3% unsatisfactory. The total flora provides
219 information on the cleanliness of handling, storage conditions, the effectiveness of heat treatments
220 and the freshness of products. It remains the best indicator of the application of good hygienic
221 practices. Here, mesophilic aerobic germs are responsible for 10% of unsatisfactory samples and are
222 attributable to cold ready meals. This can be explained by the preponderance of non-compliance with
223 hygiene rules and the poor preservation of these foodstuffs in these premises. Indeed, it is not
224 uncommon to see women in dirty clothes tasting different sauces or pasta which are most often
225 cooked over a low heat with dirty hands. Also the material used for tasting does not act as an effective
226 wash and at the same time is used for serving. In addition, there is undercooking when re-cooking
227 dishes and pasta. Similarly, these foods are stored under non-regulatory conditions, i.e. in trays, jars,
228 boxes or uncovered bowls. The results obtained are similar to those of [12] in Dakar with a sample
229 size of 100. In addition, [10] and [13] having respectively worked in the same area with the 100 and

230 440 samples found the percentages of 4% and 35%. According to them, the different rates of
231 microorganisms could be explained by a significant contamination of foodstuffs in poorly maintained
232 storage premises, but also by the geographical location of the restaurant. Enterobacteriaceae do not
233 present an unsatisfactory result, but are present in 57% of the samples. However, our study shows
234 that 21% of the non-compliant dishes due to *E. coli* are from cold dishes only. Indeed, Escherichia Coli
235 is part of total coliforms, however it is often sought separately, because it is considered to be the best
236 indicator of faecal contamination of food. This rate would indicate a fecal contamination of food by
237 these traders at the time of cooking but especially during the service of cooled food. This
238 contamination would be related to a lack of hygiene by kitchen staff handling cold food ready to be
239 served. In fact, systematic hand washing is not observed in these restaurants after their toilets, which
240 are most often carried out in the bush not far from the restaurant premises or in public toilets. In
241 addition, most of them have uncut nails that act as a germ deposit, including *E. Coli*. For similar work
242 [14] and [9] obtained results of 35% and 20.73% with samples of 143 for [14] and 240 for [9].
243 According to them, this contamination is linked to several causes, the main ones being the lack of
244 personal hygiene of the staff, considered as the main source of faecal contamination, the absence of
245 sanitary facilities at the sales points and also the presence of kitchens under trees, which leads to
246 contamination by bird and fly faeces. Lactic acid bacteria are naturally present in plants (leaves, fruits
247 and vegetables), dairy products and the digestive tracts of humans and animals. Their presence on a
248 food is therefore a sign of poor environmental hygiene, raw materials and handling. Indeed, in this
249 study, the results show that they are **concerned** in 36% of the unsatisfactory samples, including
250 23.81% in cold dishes. This high rate is due in particular to the presence of trees in kitchens, services
251 and restaurants. Indeed, our prospecting shows the poor geographical location of the restaurants'
252 premises, all the more so as they are always located in unhealthy areas. Moreover, their design does
253 not respect the mass plan of a restaurant building. All this encourages the proliferation of lactic acid
254 bacteria. Also, this rate could be explained by the use of poor quality raw materials as well as the poor
255 handling of these restorers. Indeed, the vegetables used to accompany certain meals that do not
256 require cooking are sometimes in a state of decomposition and insufficiently washed or washed with
257 unhealthy water. Yeasts and moulds are brought in by the environment and carried by the air. The
258 results of the analyses show that the fungal flora is observed in both hot and cold meals giving 19% of
259 unsatisfactory meals. This is due to the fact that the fungal flora is thermoresistant and not very
260 sensitive to antiseptics. Nevertheless, this percentage reflects the unhealthy environment of the points
261 of sale, which are mainly located in depressed areas. Also the environment of the city favours the
262 growth of these germs especially as it does not benefit from enough bitumen. This generates a cloud
263 of dust when the slightest wind blows. Moreover, in our work we have noticed that the restaurant
264 owners conserve the raw materials with food additives and even those already cooked that have to be
265 kept for re-use the next day. The results observed in our microbiological analyses are superior to
266 those of [12] (0% unsatisfactory) **and**¹⁰ (6% unsatisfactory) who both conducted studies following the
267 same idea with samples of 100. According to them, yeasts and moulds can be brought into meals that
268 have received food additives that have been left open too long and also foods exposed to humidity.

269

270 CONCLUSION

271 The street food trade is one of the most important economic activities in the city of Korhogo. However,
272 the growth of this activity reflects many consequences such as the relaxation of basic hygiene
273 measures in the preparation of food leading to the exposure of consumers to the risk of toxi-infections.
274 It is therefore important that particularly strict hygiene rules are observed in the kitchens where meals
275 are prepared for consumers. Of the 90 meal samples analysed, 75.2% of the samples were
276 satisfactory, 7.6% were acceptable and 17.2% were unsatisfactory. It is therefore clear that the level of
277 bacterial contamination of the meals is quite high for lactic acid bacteria. In order to improve the quality
278 of these meals, there is an urgent need for corrective measures to be taken to remedy this both from
279 the point of view of the design of the premises and the organisation of work. The prevention of food-
280 borne diseases will therefore require improved product safety, while ensuring the increased
281 involvement of health services at all stages. But there is also a need for continuous monitoring of
282 contaminants in these foods and the promotion of food quality control, education and information of
283 personnel in food hygiene and product safety.

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320 **Table 1: The environment in which women traders work**

	Locked restaurant		Inspection of traders' facilities		Presence of compartment		Presence of cloakroom	
	Yes	No	Yes	No	Yes	No	Yes	No
Total	14	31	0	45	0	45	0	45
Proportion (%)	31.11	68.89	0	100	0	100	0	100

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322

323 **Table 2: The environment in which women traders work**

	The floor in restaurants			Toilet facilities in restaurants			Restaurant sewage disposal system	
	Earth	Tiles	Cement	No	In the restaurant	Far from the restaurant	Gutter	On the floor
Total	31	4	10	28	6	1	6	39
Proportion (%)	68.89	8.89	22.22	84.45	13.33	2.22	13.33	86.67

324

325 **Table 3: The environment in which women traders work**

	Hand washing system		System location		Location of garbage		
	Tap barre l	Water containin g basin	In front of the restauran	Inside the restauran	In front of the restauran	Inside the restauran	Far from the restauran

			t	t	t	t	t
Total	16	29	12	33	31	11	3
Proportion (%)	35.55	64.45	26.66	73.34	68.89	24.44	6.67

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329 **Table 4: Work equipment in restaurants**

Identification of equipment according to use			Identification mode		
	Yes	No	Color	Shape and size	Permanent marker
Total	19	26	4	36	5
Proportion (%)	42.22	57.78	8.89	80	11.11

330

331 **Table 5: Work equipment in restaurants**

Renewal of front equipment complete breakdown		Storage of equipment with cleaning products		Use of degraded material for cooking and serving		
	Yes	No	Yes	No	Yes	No
Total	4	41	26	19	42	3
Proportion (%)	8.89	91.11	60	40	93.33	6.67

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334 **Table 6: Raw materials used in restaurants**

Control of the raw material on purchase or reception			Storage place for perishable raw material				
	Yes	No	Freezer in good condition	Freezer in poor condition	Cooler with ice	Bowl	Floor
Total	16	29	0	5	6	26	7
Proportion (%)	35.55	64.45	0	11.11	13.33	60	15.56

335

336 **Table 7: Raw materials used in restaurants**

Use of raw material in a state of	Long-term raw material storage location
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degradation					
	Yes	No	Floor	Pallet	Bowl
Total	26	19	32	0	13
Proportion (%)	57.78	42.22	71.11	0	28.89

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339 **Table 8 : Labour Used in Restaurants**

Dressing used in restaurants			Maintenance of the clothing		
	Service uniform	Housekeeping	Dress washed after the service	Washed 2 to 3 times a week	Clean change of clothes per day
Total	3	42	2	38	5
Proportion (%)	6.67	93.33	4.44	84.45	11.11

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341 **Table 9 : Labour Used in Restaurants**

Knowledge of hygienic rules by women traders			Dress used for service		Maintenance of the uniform	
	Yes	No	Yes	No	Yes	No
Total	4	42	28	17	16	29
Proportion (%)	8.89	91.11	62.22	37.78	35.55	64.45

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344 **Table 10 : Labour Used in Restaurants**

Carrying an object during service					Head protection during operation			
	No	Ring	Bracelet	watch	No	With a scarf	With a cap	With a hat
Total	6	16	22	1	22	19	2	2

Proportion(%)	13.33	35.55	48.90	2.22	48.90	42.22	4.44	4.44
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347 **Table 11 : Labour Used in Restaurants**

Respect for work areas			Cleanliness of the nails			
	Yes	No	Cutting without varnish	Cutting with varnish	Uncut without varnish	Uncut with varnish
Total	0	45	2	0	38	5
Proportion(%)	0	100	4.44	0	84.44	11.11

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350 **Table 12: Method of working in restaurants**

Means of preparation				Water for washing raw materials before preparation		
	Charcoal	Gas	Wood fire	Well water	Tap water	Spring water
Total	16	8	21	20	9	16
Proportion(%)	35.55	17.77	46.68	44.45	20	35.55

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352 **Table 13: Method of working in restaurants**

Client contact with the service area			Method of conserving foodstuffs			Frequency of water replacement for washing kitchen utensils		
	Yes	No	Glass box	Tray with plastic bag	Jar with lid	At any time during service	At the end of each service	When water is dirty
Total	45	0	3	30	12	13	15	17
Proportion(%)	100	0	6.67	66.67	26.66	28.89	33.33	37.78

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354 **Table 14: Method of working in restaurants**

Frequency of replacing drinking glasses				Frequency of room cleaning		
	After washing	Without washing	Unused glass	At any time during service	At the end of each service	The next day
Total	14	31	0	30	12	3
Proportion(%)	31.11	68.89	0	66.67	26.66	6.67

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356 **Table 15: Level of contamination by mesophilic aerobic germs**

Microbial load (CFU/g)	Number of samples		Accumulated results	Proportion(%)
	Hot dishes	Cold dishes		
Absence	16	0	16	17.78
$F \leq 9.10^5$	28	36	64	71.11
$9.10^5 \leq F \leq 3.10^6$	0	2	2	2.22
$F > 3.10^6$	0	8	8	8.89

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359 **Table 16: Level of contamination by *E. Coli***

Microbial load (CFU/g)	Number of samples		Accumulated results	Proportion(%)
	Hot dishes	Cold dishes		
Absence	26	0	26	28.89
$F \leq 30$	20	12	32	35.56
$30 \leq F \leq 10^2$	0	14	14	15.56
$F > 10^2$	0	18	18	20

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363 **Table 17: Level of contamination by Lactic acid bacteria**

Microbial load (CFU/g)	Number of samples		Accumulated results	Proportion(%)
	Hot dishes	Cold dishes		
Absence	12	0	12	13.33
$F \leq 3.10^5$	22	26	48	53.33
$3.10^5 \leq F \leq 10^6$	0	0	0	0
$F > 10^6$	10	20	30	33.33

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365 **Table 18: Level of contamination by yeasts and moulds**

Microbial load (CFU/g)	Number of samples		Accumulated results	Proportion(%)
	Hot dishes	Cold dishes		
Absence	4	0	8	8.89
$F \leq 1.5 \cdot 10^3$	36	18	50	55.56
$1.5 \cdot 10^3 \leq F \leq 5 \cdot 10^3$	2	14	16	17.78
$F > 5 \cdot 10^3$	2	14	16	17.78

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