Original Research Article

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

ABSTRACT

The aim of this study is to evaluate the hygienic quality of the dishes cooked and 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, a survey based on the Ishikawa diagram in order to assess the hygienic conditions, and on the other hand of microbiological analyses of the ready-to-serve meals. A total of 90 samples were taken, including 2 dishes per restaurant, respectively consisting of one hot and one cold dish. Generally, results showed that hygienic conditions were unsatisfactory based on the utilized guidelines. 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, cooked 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 [2]. This is due to the lack of or inadequacy of efficient collective catering systems, such as canteens in workplaces and schools. Consumers 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 such as foodborne intoxications attributed to Foodborne Toxins (FTIs). However, microbiological analyses carried out on street foods in several countries have shown insufficient microbiological quality. Hence an increased risk of foodborne infections [5] [6]. These foodborne infections, which are ignored, often lead to large-scale cases of death as sometimes reported in many countries [3]. According to the WHO [7], in developed countries the annual percentage of people suffering from foodborne infectious

diseases is as high as 30%, while the problem is likely to be much more widespread in developing countries. In Côte d'Ivoire, as elsewhere in the world, bacterial toxi-infections remain a real public health problem [8]. It is therefore recognized that foodborne pathogens represent a serious health hazard, the risk depending mainly on the type of food, the method of preparation and conservation [9], and it is therefore necessary to improve the nutritional, hygienic and organoleptic quality of these foods in order to provide the population with good quality products. For this reason, food safety is everyone's business, from farm to fork [3]. In Korhogo, there is a great diversity of street foods, however, they cause enormous problems of safety or nutritional quality that are related to the environment, the safety of the vendors and the way these foods are distributed. In addition, these traders have not received any training in hygiene by the Ministry of Health and Public Hygiene of the city. This fact, added to the various cases of intoxication that have occurred around the city, proves that this is a real public health problem, especially since the Korhogo Anti-Tuberculosis Center (ATC) recorded 211 patients in 2018 and 48 cases in the first quarter of 2018, including 17 street womens traders.. Majority of these patients frequent these street food vendors almost every day. Our study was therefore targeted towards assessing the hygienic conditions and quality of dishes cooked and sold by female food traders in the town of Korhogo. The study is aimed at limiting the risks associated with the consumption of foodstuffs by the Korhogo population.

2. MATERIALS AND METHODS

2.1. Materials and sampling

This study consisted in conducting a survey in the town of Korhogo from November 2018 to February 2019 with survey forms developed on the basis of the Ishikawa diagram. After the survey phase, samples collection was carried out by purchasing the dishes with the women traders in order to determine the different microbiological risks. Sampling was done in such a way that some samples were collected in the morning for breakfast foods, at noon for lunch and in the evening for dinner. 90 samples were taken and divided into twenty-one (45) hot and twenty-one (45) cold dishes, with two (2) dishes per restaurant, one (1) hot and one (1) cold dish.

2.2. Enumeration of microorganisms

In this study, 25g of samples were aseptically collected and introduced into a stomacher bag, and then the bag volume was made up to 250 mL with pre-sterilized Buffered Peptone Water (BPW). The tenfold serial dilutions were prepared and spread-plated for determination of microbial counts. After dilutions, enumeration of total aerobic mesophiles was carried out using plates of Plate Count Agar (PCA, Difco 0479-17-3; Difco Laboratories, Detroit, MI, USA) which were incubated at 30˚C for 2 days. Lactic acid bacteria (gram positive, catalase negative rods or cocci) were enumerated by plating unto De Man, Rogosa and Sharpe Agar (MRS, Merck 10660; Merck KGaA, Darmstadt, Germany) containing 10 mg/mL cycloheximide (ICN 100183 Biomedical Inc., Aurora, OH, USA) to suppress yeast growth after incubation at 30˚C for 3 days in an anaerobic jar with anaerocult A (Merck). Yeasts and moulds were enumerated on plates of Sabouraud Chloramphenicol agar (BIO-RAD, France) which were incubated at 30˚C for 3 - 5 days. Enumeration of total faecal coliforms was carried out

using plates of Violet Red Bile Lactose agar (VRBL, Merck 10660, Merck, Darmstadt, Germany) which were incubated for 24 h at 30˚C for total coliforms and 44˚C for faecal coliforms.

Satisfactory microbiological criteria for ready meals

Mesophilic Aerobic Germs (MAG): 3.10^5 CFU/g of food

Faecal coliforms: 10^3 CFU/g of food

Lactic acid bacteria: 10^6 CFU/g of food

Fungal flora: 5.10^2 CFU/g of food

2.3 Statistical analysis

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

3. RESULTS AND DISCUSSION

Tables 1 showed the list of the different restaurants visited. The restaurant premises of Korhogo's women traders are most often located along the main roads, in or in front of schools, in neighborhoods or in courtyards. According to the results of the survey, 68.89% of the restaurants have no fences, and there are no compartments or cloakrooms in the 45 restaurants. Only a few restaurants had handwashing systems (26.66%) with handwashing products (liquid soap). Also, the survey reveals that 68.89% of the restaurants have a floor covered with soil, 8.89% have a floor covered with tiles and 22.22% have a floor covered with cement. Garbage is stored in front (68.89%), within (24.44%) and at the back (6.67%) of the restaurants, and to be burned or thrown away. Most of the installations are done without the opinion of the technical services in charge of the establishment of these women traders and also, the establishment of the premises of the women traders does not carry out any control in relation to the potential risks that the situation of a premise in an unhealthy area could generate. The construction of the sheds did not align with the master plan for the construction of premises. Indeed, most of them do not benefit from fencing, sanitary facilities, cloakrooms and storage rooms for raw materials, cooking equipment and cleaning services. In addition, the soil is mostly earth, which causes dust to be raised during the entire service. This leads to contaminations, especially since the bushes at the back of the restaurant provide serve as water closets for the saleswomen who do not wash their hands effectively when handling the food. With regard to the equipment used by women traders, all the results were recorded in Tables 2 and 3. This equipment is essentially made up of aluminum-based kitchen utensils (pots, deep fryers, ladles), cooking equipment (stoves, coal, bundles, gas, etc.), stainless steel tableware (spoons, forks, cups, plates, tureens), and cleaning equipment (detergent, broom, mop). Most of the equipment were renewed only after they have completely deteriorated (91.11%). Also, the surface of the cooking equipment becomes black due to lack of effective maintenance. In addition, the equipment is often stored with cleaning products (80%). The results show that 93.33% of women traders use damaged equipment. The materials are poorly

identified according to their use, resulting in the use of the same equipment for several purposes. This situation causes the dilapidation of the infrastructure, especially since this equipment is used without any concrete maintenance and with little renovation. Indeed, the use of cooking and serving equipment is not made according to their use. Thus, the same equipment can be used for cooking several foodstuffs. This leads to an accelerated degradation of the equipment. Also, the use of unsuitable equipment for the cutting of animal and vegetable foods lead to the presence of wood debris in the cooked dishes causing physical hazards. The raw materials received are tuna fish, attiéké, pork meat, eggs and bread for some women traders. The other commodities are bought at the market especially on market days. The quantities to be received are evaluated according to needs and cover a period of 3 to 4 days for perishable foodstuffs such as attiéké, fish, tuna and pork meat. Food from Abidjan is transported in bags in the luggage trunks of the buses of the different transport companies in Korhogo. 35.55% of the food purchased or received is controlled, while 64.45% is not controlled by women traders. 57.78% of raw materials (vegetables) in a state of decomposition (chilli pepper, fresh tomatoes, onions, etc.) are used. The storage of perishable foodstuffs is done in freezers in poor condition with ice (11.11%), coolers containing ice (13.33%), in basins (60%) and on the ground (15.56%). Raw materials of long duration such as rice, and of medium duration such as eggs are stored on the ground (71.11% of restaurant cases) and in basins (28.89%) (Tables 4 and 5). Tables 6, 7, 8 and 9 provide information on the labour used in the various restaurants. The qualification of staff remains the major problem in the commercial sector in Korhogo. Street commerce in Korhogo employs the majority of illiterate people with no culinary training, with 91.11% of the staff unaware of good hygiene practices and 8.89% who have an overview of hygiene rules in collective catering. Also, only 6.67% of staff have suitable work clothes and 93.33% have household clothes. Of these uniforms used for service, 4.44% are washed after each service, 84.45% are washed about four times a week and 11.11% are changed into clean uniforms every day. 62.22% of the staff in these street restaurants are ill and 35.56% are injured. With regard to the wearing of objects during services, 13.33% of women traders do not wear them, 35.55% wear rings, 48.9 wear bracelets and 2.22% wear watches. Moreover, 48.90% of women traders do not protect their heads when serving, 42.22% wear scarves. None of the 45 restaurants respect their work area, but the majority of the shopkeepers have uncut and unpolished nails (84.45%). Tables 10, 11 and 12 provide information on the cooking methods of the women traders in Korhogo. This cooking method is mostly done in the traditional way with 35.55% using charcoal and 46.68% using wood fire. Gas is rarely used (17.77%) and the water used to wash the raw materials consists of well water (44.45%), tap water (20%), and spring water (35.55%). As regards the frequency of changing dish water, 28.89% is changed at any time during the service, 33.33% is changed at the end of each service and 37.78% is changed when it is dirty. Also, in these restaurants, one observes movements in all directions. In addition, the clients were in direct contact with the service area (100%), and the most used method for preservation of cooked food is trays with plastic bags (66.67%). In restaurants, the glasses used for the drinks are mostly replaced without being washed (68.89%), while 66.67% of the premises are cleaned at any time during the service. The raw materials used are still not of good quality and they do not serve as packaging. The foodstuffs are received by people who have no concept of hygiene. This leads to the sale of moldy

foodstuffs such as attiéké often leading to gastroenteritis. As for the foodstuffs purchased such as vegetables, only those with considerable volume and sold at ridiculously low prices are the most sought after. Also, all raw materials are stored mostly in the same container or are exposed on the floor with cleaning and disinfecting products due to the lack of compartments for their storage. In addition, the "first in first out" plan is not being followed, thus constituting another source of cross-contamination [10]. The workforce is made up of people who have no qualifications in terms of compliance with hygiene rules. They are recruited solely for their culinary talent or for their dedication to sales. Indeed, most of the shopkeepers who make up the workforce are either from the close or distant family or an acquaintance of the restaurant owner. The latter having dropped out of school either through negligence or lack of means. They thus become actors in the street trade only because they have mastered a few notions about cooking. As they have no training in good hygiene practices to compensate for their lack of knowledge in this field, these personnel represent a serious danger to the health of the consumer. Indeed, due to their ignorance of good hygiene practices, employees of street restaurants work without respecting the rules of hygiene. On the other hand, the lack of training of street women traders and those installed at the roadside and in neighbourhoods helps to understand their inadequate installation. This lack of knowledge, as well as the several anomalies identified in this sector remain dangerous for the health of the consumer. Failure to respect the work area, as well as food preparation and personal hygiene rules lead to cross-contamination. Another consequence of the non-application of hygiene rules in these restaurants is the lack of support from the Ministry of Commerce towards these women traders. Thus, not having the necessary means to carry out their activities, these women traders use the means to install themselves. This is why they use rudimentary methods for their activities such as the use of traditional means of preparation like charcoal and wood fire. In addition to using raw materials of dubious quality, they do not wash these raw materials properly or wash them with unsuitable water such as undisinfected well water. Dishes are washed with the same unsuitable water and are not replaced on a regular basis. This causes dirt to accumulate on the service equipment, resulting in contamination. Also, after washing, systematic hand washing is not carried out or is done with the dishwater containing the dirt beforehand. Hence the high risk of contamination. This risk of contamination remains because most of the drinking water comes from these infected wells and is served mostly in glasses that have not been washed after a client makes use of it. Moreover, when cleaning the premises, cooked food is not always protected despite the fact that the floor is not covered, and the premises are located in an unhealthy area. The clients remain in close contact with the waitress since there is almost no counter. The kitchen is located under trees for the most part and is mostly made of earth. These results are similar to those of [11]. According to [11], the personal hygiene of the food handlers is not satisfactory. This is largely due to the lack of control services. Waitresses wearing jewelry and bracelets should be reprimanded as their clothing were mostly messy. This is due to contact with the premises and equipment, which are also dirty. The responsibility for the employees lies with the managers of establishments that do not provide sufficient spare clothing. Table 13 shows the results of the mesophilic aerobic germ load. After enumeration, 80 ready-made meals, including 44 hot and 36 cold dishes were satisfactory with a microbial load less than or equal to 9.10^5 CFU/g, i.e. 88%. Two cold dish were acceptable with a load

between 9.10^5 and 3.10^6 CFU/g ($9.10^5 \leq F \leq 3.10^6$ CFU/g), that is, 2.22%. 8 cold dishes were unsatisfactory with an average load greater than 3.10^6 CFU/g, i.e. 8.89%. Concerning faecal coliforms 58 ready-made meals, including 46 hot and 12 cold dishes, were satisfactory with a microbial load less than or equal to 30 CFU/g, i.e. a percentage of 62%. 14 cold dishes are acceptable with a load between 30 and 10^2 CFU/g ($30 \leq F \leq 10^2$ CFU/g), (15.56%). 18 cold dishes are unsatisfactory with an average load greater than 10^2 CFU/g (20%) (Table 15). Table 16 showed the load of lactic acid bacteria counted in the different dishes. For the 46 dishes analyzed, 60 ready-made meals, including 34 hot and 26 cold dishes are satisfactory with a microbial load less than or equal to 3.10^5 CFU/g, i.e. 64%. Thirty ready-made meals, including 10 hot and 20 cold meals, were within the unsatisfactory range with a microbial load of less than or equal to 10^6 CFU/g, i.e. 33.33%. For yeasts and moulds, 58 ready-made meals including 40 hot and 18 cold dishes are satisfactory with a microbial load less than or equal to $1.5.10^3$ CFU/g, (62%). Eight ready-made meals, including 2 hot meal and 14 cold meals are satisfactory with a microbial load of between $1.5.10^3$ and 5.10^3 CFU/g ($1.5.10^3 \leq F \leq 5.10^3$ CFU/g), (17.78%). Eight cooked dishes, including 2 hot dish and 14 cold dishes are unsatisfactory with a microbial load of more than 5.10^5 CFU/g, (17.78%) (Table 15). For the dishes analyzed, an unsatisfactory level of contamination (17.2%) was observed, while the dishes with a satisfactory level of contamination constituted about 75.2%. The heat used to cook the dishes could explain this low rate of non-compliance. This rate of non-compliance is mainly attributable to cold ready meals that are poorly preserved [12]. The samples concerned are cold dishes (14.28%), generally cooked with raw vegetables, fish, meat, seafood, mayonnaise and spices. Also, after cooking, these dishes are poorly packaged, especially since they are either poorly sealed or not sealed at all. These results are inferior to those obtained in Tunis by [12] who had conducted a similar study where appetizers accounted for 72.5% of non-compliance in restaurants without an Hazard Analysis Control Critical Point (HACCP) system. Moreover, similar studies conducted between 1990 and 1995 showed that 67.7% of the foods analyzed were satisfactory versus 33.3% unsatisfactory [13]. The total flora provides information on the cleanliness of handling, storage conditions, the effectiveness of heat treatments and the freshness of products. It remains the best indicator of the application of good hygienic practices. Here, mesophilic aerobic germs are responsible for 10% of unsatisfactory samples and are attributable to cold ready meals. This could be explained by the preponderance of non-compliance with hygiene rules and the poor preservation of these foodstuffs in these premises. Indeed, it is not uncommon to see women in dirty clothes tasting different sauces or pasta which are most often cooked over a low heat with dirty hands. Also, the material used for tasting does not act as an effective wash and at the same time is used for serving. Similarly, these foods are stored under non-regulatory conditions, that is, in trays, jars, boxes or uncovered bowls. The results obtained are similar to those of [14] in Dakar with a sample size of 100. In addition, [11] and [15] having worked in the same area with 100 and 440 samples, respectively, found the percentages to be 4% and 35%. According to them, the different occurrence rates of microorganisms could be explained by a significant contamination of foodstuffs in poorly maintained storage premises, and the geographical location of the restaurant. *Enterobacteriaceae* did not present an unsatisfactory result but were present in 57% of the samples. However, our study showed that 21% of the non-compliant dishes had *Escherichia coli*, and from cold

dishes only. Indeed, *E. coli* is part of total coliforms, however it is often sought separately, because it is considered to be the best indicator of faecal contamination of food [16]. This would indicate a faecal contamination of food by these traders at the time of cooking but especially during the service of cooled food, and also to a lack of hygiene by kitchen staff handling cold food ready to be served. In fact, systematic hand washing is not observed in these restaurants after toilet visits, which are mostly carried out in the bush not far from the restaurant premises or in public toilets. In addition, most of them have uncut nails that act as germ deposits, including *E. coli*. Again, in similar works, [17] and [9] obtained 35% and 20.73% from 143 and 240 samples, respectively. According to them, this contamination was linked to several causes. The main source of faecal contamination was the lack of personal hygiene, the absence of sanitary facilities at the points of sale and also the presence of kitchens under trees, which led to contamination by bird and fly faeces. Lactic acid bacteria (LAB) are naturally present in plants (leaves, fruits and vegetables), dairy products and the digestive tracts of humans and animals [17]. Their presence on a food is therefore a sign of poor environmental hygiene, raw materials and handling. Indeed, in this study, the results show that they are concerned in 36% of the unsatisfactory samples, including 23.81% in cold dishes. Indeed, our prospecting shows the poor geographical location of the restaurants' premises, all the more so as they are always located in unhealthy areas. Moreover, their design does not respect the master plan of a restaurant building. All this encourages the proliferation of lactic acid bacteria. Also, this rate could be explained by the use of poor quality raw materials, as well as the poor handling of these restorers. Indeed, the vegetables used to accompany certain meals that do not require cooking are sometimes in a state of decomposition and insufficiently washed or washed with unhealthy water. Yeasts and moulds are brought in from the environment and carried by the air [15]. The results of fungal analysis show that the fungal flora was observed in both hot and cold meals resulting in 19% of unsatisfactory meals. This is due to the fact that the fungal flora is thermoresistant and not very sensitive to antiseptics [18]. Nevertheless, this percentage reflects the unhealthy environment of the outlets, which are mainly located in disadvantaged areas. In addition, the environment favours the growth of these germs, all the more so because it does not benefit from a sufficient quantity of bitumen. This generates a cloud of dust when the slightest wind blows. Moreover, in our work we have noticed that the restaurant owners preserve the raw materials with food additives and even those already cooked that have to be kept for re-use the next day. The results observed in our microbiological analyses are superior to those of [14] and [11]. According to [14], there are 0% unsatisfactory dishes and with [10] 6% are unsatisfactory. The study reported that yeasts and moulds could be introduced into meals that have received food additives, and that have been left open for long periods and exposed to humid atmospheres.

CONCLUSION

The street food trade is one of the most important economic activities in the city of Korhogo. However, the growth of this activity reflects many consequences such as the relaxation of basic hygiene measures in the preparation of food leading to the exposure of consumers to the risk of toxi-infections. It is therefore important that particularly strict hygiene rules are observed in the kitchens where meals are prepared for consumers. Of the 90 meal samples analyzed, 75.2% of the samples were

satisfactory, 7.6% were acceptable and 17.2% were unsatisfactory. It is therefore clear that the level of bacterial contamination of the meals was quite high for lactic acid bacteria. In order to improve the quality of these meals, there is an urgent need for corrective measures to be put in place with regard to the design of premises and organization of work. The prevention of food-borne diseases will therefore require improved product safety. There is also the need to ensure increased involvement of health services at all stages, as well as the continuous monitoring of contaminants in these foods and the promotion of food quality control, education and information of personnel in food hygiene and product safety.

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Table 1: The environment and the conditions in which women traders work

Locked restaurant			**Inspection of traders' facilities**		**Presence of compartment**		**Presence of cloakroom**		**The floor in restaurants**			**Toilet facilities in restaurants**			**Restaurant sewage disposal system**		**Hand washing system**		**System location**	
	Yes	No	Yes	No	Yes	No	Yes	No	Earth	Tiles	Cement	No	In the restaurant	Far from the restaurant	Gutter	On the floor	Tap barrel	Water containing basin	In front of restaurant	Inside of restaurant
Total	14	31	0	45	0	45	0	45	31	4	10	28	6	1	6	39	16	29	12	33
Proportion (%)	31.11	68.89	0	100	0	100	0	100	68.89	8.89	22.22	84.45	13.33	2.22	13.33	86.67	35.55	64.45	26.66	73.34

Table 2: Identification of 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

Table 3: Conditions of use of equipment in restaurants

Renewal of equipment before complete degradation			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

Table 4: 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

Table 5: Method of storing and using raw materials

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

Table 6: 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

Table 7: Knowledge of the rules of hygiene and the clothing of women traders

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

Table 8: Wearing metal objects and head protection during service by women traders

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

Table 9: Respect for the working area and cleanliness of the nails of women traders

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

Table 10: Method of working in restaurants

Means of cooking				Water for washing raw materials before cooking		
	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

Table 11: Working method used during service 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

Table 12: Method of cleaning glasses and restaurant premises

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

Table 13: 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

Table 14: 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

Table 15: 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

Table 16: 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
$F \leq 1.5.10^3$	36	18	50	55.56
$1.5.10^3 \leq F \leq 5.10^3$	2	14	16	17.78
$F > 5.10^3$	2	14	16	17.78