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EVALUATION OF HYGIENIC-SANITARY CONDITIONS IN THE FOOD SERVICE OF AN EDUCATIONAL CENTER IN THE CITY OF BARRANQUILLA IN THE PERIOD 2010-2022

EVALUACIÓN DE CONDICIONES HIGIÉNICO-SANITARIAS EN EL SERVICIO DE ALIMENTACIÓN DE UN CENTRO EDUCATIVO EN LA CIUDAD DE BARRANQUILLA EN EL PERIODO 2010-2022

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ABSTRACT

Foodborne illnesses (FBD) are the result of ingesting foods contaminated with pathogenic microorganisms or their toxins. ETAs are an event of public health interest due to the socioeconomic burden they represent due to the impact on the health of the community. According to estimates by the World Health Organization, children under five years of age and people with low economic resources are the most affected. Among the strategies developed for its prevention is the implementation of Good Manufacturing Practices (GMP) by food services and at the home level. Descriptive, retrospective

study. With the application of the health profile, the required items were qualified. The final score is based on evaluative criteria: Does not meet: < 60% score, partially meets: 60 to 79%, Satisfactory: 80 to 91%, and Excellent: > 91%. Microbiological analysis of the prepared foods was carried out to evaluate their conformity. During the period studied, partial compliance was evident during 2010-2016, which evolved to satisfactory for 2017-2019 and 2022. For the compliance of prepared foods, there was a trend towards decreased acceptability, which improved from the year 2017. The quality assurance and control requirement began with zero compliance and improved upon completion of the study. The results of the study showed a significant increase in compliance with the GMP, which shows the effectiveness of the implemented strategies.

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Keywords: Microbiological analysis, Good Manufacturing Practices, ETA, Food Safety.

RESUMEN

Las enfermedades trasmitidas por alimentos (ETA) son el resultado de la ingestión de alimentos contaminados con microorganismos patógenos o sus toxinas. Las ETA son un evento es de interés en salud pública debido a la carga socioeconómica que representan por la afectación a la salud de la comunidad. Según estimaciones de la Organización Mundial de Salud, los niños menores de cinco años y las personas de bajos recursos económicos son los más afectados. Entre las estrategias que se desarrollan para su prevención se encuentra la implementación de las Buenas Prácticas de Manufactura (BPM) por parte de los servicios de

alimentación y a nivel domiciliario. Estudio descriptivo, de corte retrospectivo. Con la aplicación del perfil sanitario se calificaron los ítems requeridos. La puntuación final se basa según criterios evaluativos: No cumple: < 60% de puntaje, Cumple parcialmente: 60 a 79%, Satisfactorio: 80 a 91%, y Excelente: > 91 %. Se realizó análisis microbiológico de los alimentos preparados para evaluación de su conformidad. Durante el periodo estudiado se evidenció un cumplimiento parcial durante el 2010-2016, que evolucionó a satisfactorio para el 2017-2019 y 2022. Para la conformidad de los alimentos preparados hubo una tendencia a la disminución de la aceptabilidad, que mejoró a partir del año 2017. El requisito de aseguramiento y control de calidad inició con nulo cumplimiento y mejorando a la culminación del estudio. Los resultados del estudio evidenciaron un aumento significativo en el cumplimiento de las BPM lo que manifiesta la efectividad de las estrategias implementadas.

Palabras claves: Análisis microbiológico, Buenas Prácticas de Manufactura, ETA, Seguridad alimentaria.

INTRODUCTION

Globally, one in 10 people fall ill and more than 400,000 die each year due to foodborne illness (FBD). It is anticipated that effects related to climate change Will decrease food production and increase food contamination by etiologic agents such as *Salmonella* and *Campylobacter,* two of the most common causes of invasive foodborne illness, which would increase the number of deaths. (Havelaar A, 2019).

Because of their impact on collective health, possibilities for prevention and the cost-effectiveness of interventions, FBD are considered an interesting issue in public

health in Colombia. (Ministerio de Salud, 2009)

Food contaminated by pathogenic microorganisms can become the main source of FBD and a healthiness problem, so it is necessary to promote hygienic practices for handling and preparation of food. (Vélez Castro A, 20209).

The causal dangers of FBD can come into food at any stage of the food chain that goes from primary production to the table, so it is considered that food handlers are the ones who can contribute the most to the prevention of FBD. (FAO, 2016)

In Colombia, the promotion of Good Food Handling Practices is mediated by the compliance of Resolution 2674 of 2013, which is mandatory for food services, manufacturers, importers, exporters and sellers of food.

This study addresses the activities implemented in an educational center that provides rehabilitation services to the vulnerable population in the city of Barranquilla during the period 2010-2022 oriented to the compliance of programs aimed to improvements in the provision of food service for the prevention of FBD.

Foodborne diseases have been classified as the main socioeconomic burden worldwide by the World Health Organization - Who, due to the fact that they are responsible for the loss of productivity and for producing high costs in the demand for health services and in the implementation of strategies related to food safety management in developed countries (Zarate A, 2018).

FBD are caused by the ingestion of food contaminated by microorganisms or chemical substances and are classified into infections and food poisoning. More than 70% are originated by improper handling and unhygienic handling of food. (Fernández S *et al*, (2021).

Worldwide, it is estimated that the child population is the most affected by diarrheal diseases resulting from the ingestion of food contaminated by etiological agents such as norovirus with 677 million cases per year, enterotoxigenic *E. coli* with 233 million cases per year, *Shigella spp* with 188 million cases per year and parasites such *Giardia lamblia* with 177 million cases per year, among others. (Pires S *et al*, 2015; Cabrejos-Ugaz et al., 2020).

Microorganisms can contaminate food through several sources, mainly through

utensils and equipment, man, pests, the environment and raw materials. (Garcinuño Martínez R, 2017).

The majority of FBD are due to improper food handling and preparation of food by domestic consumers; usually only a few people are affected and they are rarely reported. However, occasional outbreaks due to safety lapses in food handling and preparation of food in restaurants or production facilities and food distribution can affect many people over wide geographic areas. (Madigan M, 2015).

Worldwide, there is an estimated annual incidence of 1.500.000 cases of FBD, of which 3.000.000 are children who die from this cause. In addition, at least 250 causative agents of this event have been identified, including bacteria, viruses, parasites and fungi. In Colombia, in 2019 notified to the Epidemiological Surveillance System - Sivigila, 997 outbreaks involving 11.222 cases; 49,4 % (478) of the outbreaks occurred at home, 16,1 % (156) in restaurants. 17,9 % (2007) of the cases occurred in educational institutions. (MinSalud 2020).

In addition, in studies aimed at evaluating the microbial load of the surfaces of the kitchens of school cafeteria in the department of Boyacá, in Colombia, Suescún Carrero & Avila-Panche, found that 59,6% of the surfaces sampled were positive for total coliforms at values that exceeded the minimum permitted, which showed non-compliance of good manufacturing practices and hygienic sanitary conditions in general in these establishments, which could result in an increase in cases of FBD by the population using these services. (Suescún et al., 2017; Leal L., et al., 2018).

On the other hand, in studies conducted by Forero and Galindo in school restaurants in the eight departments of Colombia with the highest notification of cases of FBD, it was found that up to 9% of the foods sampled were positive for *B. cereus*, and in 91% of these the diarrheal toxin was detected. Of the 16 restaurants that were studied in the Department of Atlántico, *B. cereus* was isolated in food samples from 11 of them, which constitutes a risk factor for the beneficiaries of these school restaurants for contributing to a possible outbreak of FBD. (Forero A *et al*, 2018).

Likewise, in studies conducted in schools cafeterias and child development centers in the department of Tolima, it was found that 6,5% of randomly sampled foods yielded positive results for *Listeria spp* and that this

result was coherent with the non-compliance of the GMP by the institutions participating in the study. (Basto L, 2017; Niño H. et al., 2018).

Considering that the Educational Center under study offers food services to children as a support to the activities to improve the quality of life of its users, and that for this purpose these services have kitchens where they prepare, process, manufacture and serve food products that meet the basic needs of its target population. Being this vulnerable population more susceptible to suffer the consequences of potentially more susceptible to suffer the consequences of potentially harmful diseases, it is necessary to eliminate the risks of consuming contaminated food that could cause these ailments through programs that ensure the maintenance of good manufacturing practices and the consumption of safe food, based on constant monitoring of compliance with hygienic and sanitary conditions and microbiological evaluation of prepared food.

The term Good Manufacturing Practices (GMP) is understood as a ser of criteria, guidelines and standards that lead to a practice or ways of acting that allow the elaboration of food of proven safety, quality and performance that complies with the expectations of the customers. The application of GMP requires the development of standard sanitation manuals, which consist of a detailed description of hygiene and sanitation procedures and techniques for the entire plant. These manuals involve the following aspects: cleaning procedures and sanitation, personnel hygiene, pest control, water supply, waste disposal. (FAO and WHO, 1999)

In Colombia, there is a legislation that regulates the compliance of GMP by food services in order to minimize the dangers and risks of contamination to which the food is subjected from its production and served in these establishments, promoting the quality and safety of raw materials and food, as well as compliance with conditions by the personnel in charge (MinSalud, 2013), (MinSalud, 2002), (INVIMA, 2018)

The objective of the research is to evaluate the hygienic-sanitary conditions in the food service of an educational center in the city of Barranquilla in the period 2010 – 2022.

MATERIALS AND METHODS

A descriptive study, retrospective, carried out in a food service of an Educational Center in the city of Barranquilla from the year 2010 to the year 2022.

The educational center under study is an institution that is a non-profit organization located in the city of Barranquilla, whose labor is to provide activities that promote the improvement of the living conditions of the community; serves as a school institutions, which in addition to the educational processes that are taught, has a food service in which various foods are prepared for the consumption of its beneficiary population, so it is necessary to adjust the hygienic and sanitary conditions of the production of food served in accordance with the requirements of national regulations.

Techniques and instruments: Sanitary hygienic profile.

There was applied a sanitary profile through which the requires items were scored. The final score was based on evaluation criteria: Not compliant: < 60% score, Partially compliant: 60 to 79%, Satisfactory: 80 to 91%, and Excellent: > 91 %. Microbiological analysis of the food was carried out using INVIMA and ICMS, prepared for conformity assessment, in order to evaluate the hygienic-sanitary conditions.

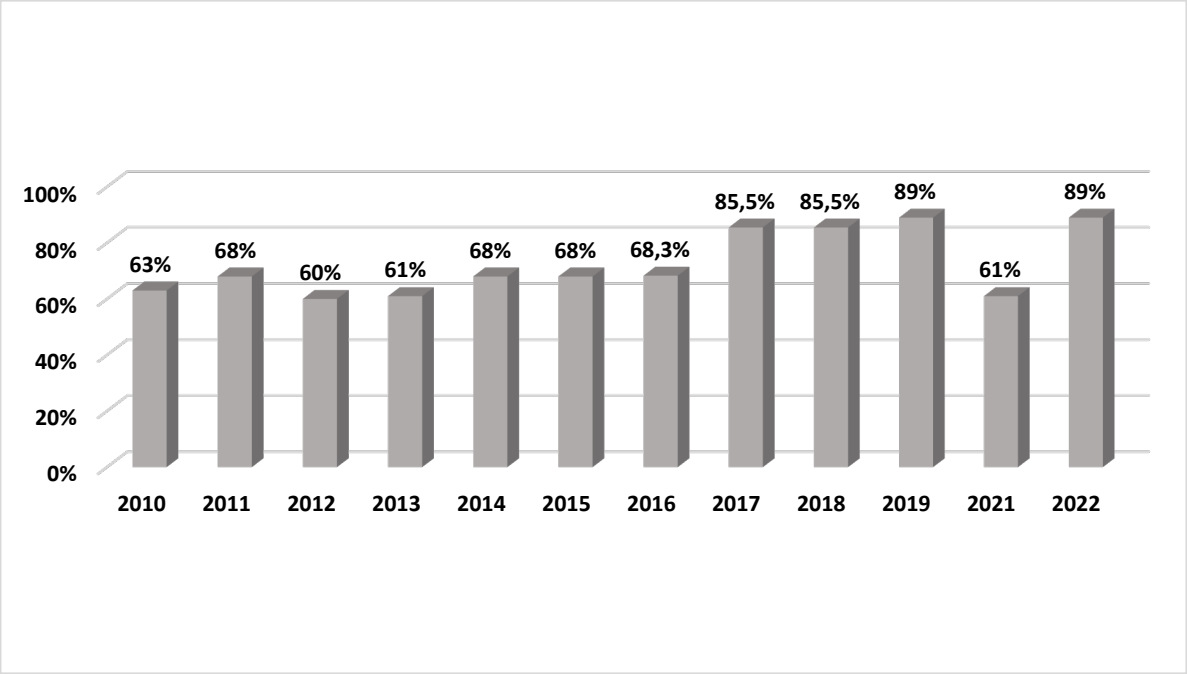
RESULTS AND DISCUSSION

In the year 2010, the project began with the diagnosis of the hygienic-sanitary conditions, which yielded results of percentage of compliance of 63% for the first period, which placed the food service in a concept of partial compliance. For the period 2011-2013 was designed an action plan that contemplated the implementation of basic sanitations programs as a fundamental requirement of the then Decree 3075, as well as a

fundamental change at the infrastructure level, which took a period of 4 years and resulted in a significant increase of 68% compliance with the hygienic-sanitary profile for the year 2014, by designing new strategies in order to control the quality assurance and safety of food preparation, which resulted for the year 2022 to obtain 89% of compliance, placing them in the satisfactory concept. It is remarkable the decrease in the rating obtained in 2021 due to the pandemic situation in which it was not possible to monitor the institution.

This goal was achieved thanks to the implementation of programs to identify critical control points, sanitation plans, programs for receiving raw materials that included monitoring temperatures and compliance with technical data sheets for raw materials received and for food storage and conservation. In addition, there was an extensive plan for compliance with the requirements for personnel handling food, training in hygienic handling and occupational examinations.

Figure 1. Rating of the Hygienic-Sanitary Profiles in the food service from 2010-2022.



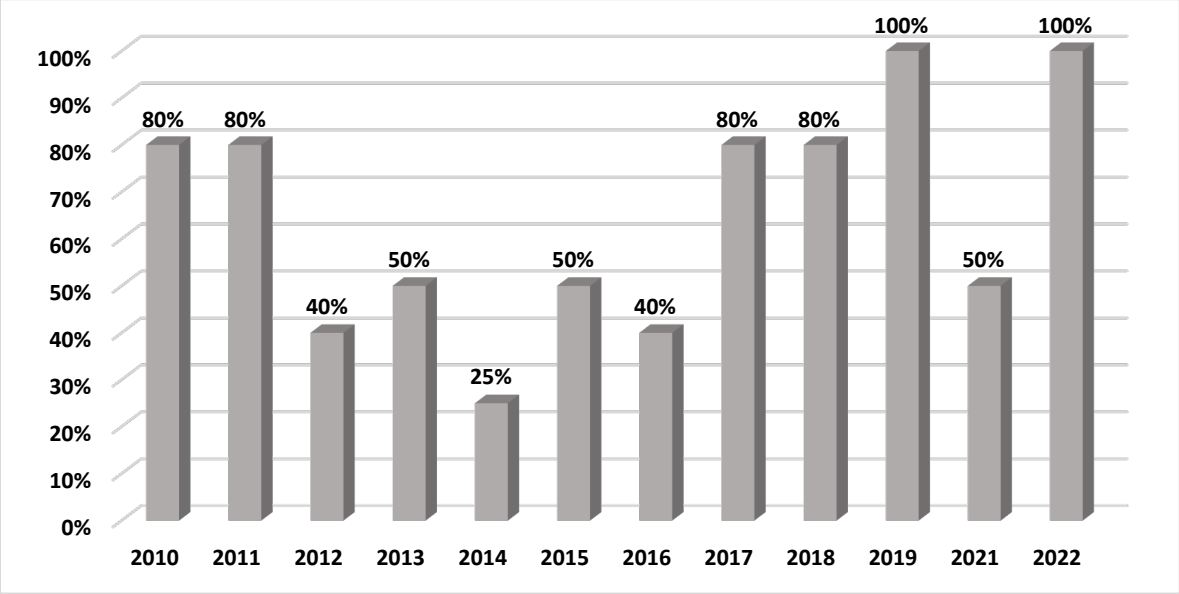
Source: Own elaboration

The food acceptability was increasing throughout the study period until reaching 100% by 2019; this is due to the implementation of the "Food Quality" program, focused on ensuring the quality and safety of food prepared from the reception and storage of raw materials, to the serving of the same.

The foods with the highest tendency to present contamination were juices, salads and soups. The most frequent non-compliant parameters were Mesophilic and total Coliforms.

The decrease in food suitability for consumption of food during the 2012-2016 interval was largely due to poor adherence to manuals for cleaning and sanitizing equipment such as blenders and cross-contamination from the use of knives for chopping vegetables and raw meats. For 2021, the absence of monitoring and follow-up due to the pandemic was noticeable with a decrease in food compliance of up to 50%. By 2022, the follow-up in the implementation of the measures and good manufacturing practices allowed the improvement of the results achieving 100%.

Figure 2. Conformity of food prepared in the food service from 2010-2022

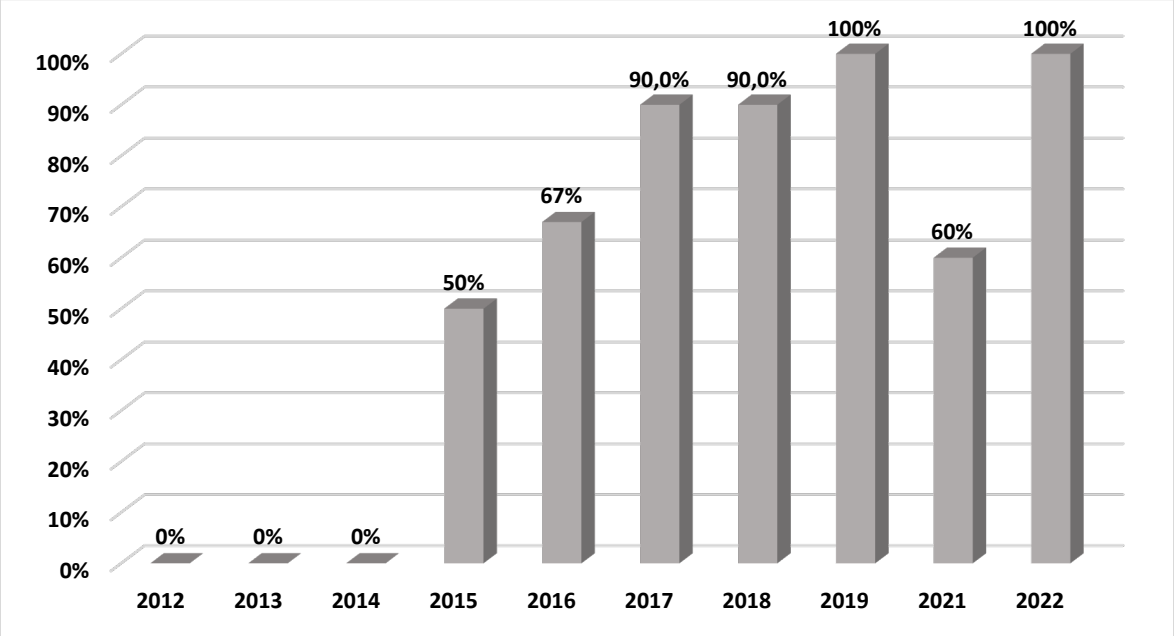


Source: Own elaboration

There was evidence of a null compliance with the requirement for the interval 2012-2014, due to the fact that measures aimed at ensuring food quality control were not implemented, such as the establishment of a preventive system covering all stages of food preparation, specifically what had to do with the reception of raw materials and refrigerators, since there was no differentiation between the one used for the storage of raw materials and the one used for finished food. Likewise, there was no risk management concerning the identification of Critical Control Points and dangers of the food.

For the year 2015 there was a significant increase in compliance with this item, achieving 100% for the year 2019, which was overshadowed by the qualification of the year 2021 in which a decrease of 60% was observed as a result of the pandemic. For the period 2022 there is a significant improvement of 100%, this is due to the implementation of sampling plans for prepared foods and taking effective measures to avoid contamination of food by direct or indirect contact with raw materials and the adoption of sanitary measures such as frequent hand washing, and the identification of physical, chemical and biological hazards of raw materials and Critical Control Points during the food preparation process.

Figure 3. Quality assurance and control of the food service from 2012-2022



Fuente: Elaboración propia

The results of this study show a tendency to improve in terms of compliance with hygienic and sanitary conditions, but it is remarkable the decrease in food conformity in the years 2012-2016 and 2021, which does not meet the requirements of the national regulations that establish that food must meet the microbiological criteria of acceptability, contrary to what happened in the period 2017-2019 and 2022 where there was an increase in food conformity, which is within the requirements of the standard.

According to the GMP compliance rating established by the standard, the results obtained were acceptable during the 2010-2016 period, with a significant improvement in the rating for the 2017-2019 and 2022 periods, giving satisfactory results for the implementation of the legislation.

Contrary to what the legislation establishes in the quality assurance and control requirement, there is no compliance in the results for the period 2012-2014, which changes progressively in the following years 2015-2019 and 2022, complying with the requirements of the national legislation.

CONCLUSIONS

The results of the verification of the hygienic and sanitary conditions for the educational center throughout the period under evaluation showed a significant increase in compliance with GMP, which demonstrates the effectiveness of the strategies implemented during the monitoring by qualified and competent personnel to carry out the work.

The positive impact on the intervention in the food service is due to the joint work of the personnel linked to the food service and the professionals in charge of leading the processes related to GMP.

The hygienic handling of food must be a continuous and permanent process in order to guarantee the quality and safety of the products served for the prevention of FBD in the beneficiary population.

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