Open Access Journal of Nursing

ISSN 2639-1783

Volume 1, Issue 2, 2018, PP: 82-88

Epidemiological Behavior of Diseases Transmitted by Food, in a Department of Colombia, 2012-2015

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Abstract

***Objective:** The purpose of the study was to describe the behavior of diseases transmitted by food in the epidemiological period of 2012-2015.*

***Materials and methods:** Descriptive, retrospective study, quantitative approach, non-experimental design; performed in 2,534 cases registered in the statistical database of a Departmental Health Secretary. Sociodemographic variables, food and causal agents involved in the diseases were taken into account; the information was analyzed with the epi info program, taking into account the respective ethical considerations*

***Results:** Show that two municipalities reported the highest number of cases, the representative age groups were between 5 -14 and 15-44 years old; Regarding sex, no important differences were evident; the food most involved in the individual, effects and outbreaks of foodborne diseases (FBD) was the coastal artisan cheese, water and by-products of rice and corn; the place where the majority of cases occurred were the houses of the studied population.*

***Conclusions:** The main microorganism causing the poisonings was Escherichia Coli, followed by total coliforms, fecal coliforms and Salmonellas spp. The investigation concludes that there was no greater variability in the number of cases reported between the observed years, besides E. coli was the main causal factor.*

Keywords: *Epidemiological, Diseases, Transmission, Food.*

Introdution

Foodborne Diseases are a syndrome caused by the ingestion of food and / or water, which contains etiological agents in such quantities that affect the health of the consumer at an individual level or in population groups[1.]

The microorganisms responsible for these diseases include *fecal Coliforms, Clostridium botulinum, C. perfringens, Staphylococcus aureus, Bacillus cereus type emetic, Vibrio cholerae, V. parahaemolyticus, Yersinia enterocolitica, Shigellaspp, Salmonella spp, Listeria monocytogenes*, among others[2,3]; According to the Center for Disease Control and Prevention (CDCP)[4] of Atlanta, foodborne diseases caused 120 multi-state outbreaks during the period 2010-2014, while the World Health Organization (WHO)[5] estimates that each year around 600 million people become ill around the world, almost one of every 10 inhabitants get sick due to eating contaminated food and 420,000 die from this same cause, with the consequent loss of 33 million lives adjusted according to the function of

disability. Likewise, becoming a public health problem similar to other epidemic diseases, they also represent an economic burden for the countries[6].

The increase in its occurrence is due to the emergence of new forms of transmission, emergence of vulnerable population groups, increased resistance of pathogens to antimicrobials and the socio-economic impact they generate[7]; foodborne diseases continue to be a matter of study that focuses attention on the situation, especially in developing countries, describing the behavior of the outbreaks[6-10], and analyzing the complications caused by the causal factor, as is the case of the hemolytic syndrome caused by food contamination by *Escherichia coli*[11] in its presentation Entero Hemorrhagic[12,13].

Based on the knowledge described, the safety of food becomes a vitally important process to ensure the health of the population. However, the pollution of informal and itinerant sales, without the necessary control of the elaboration of their products and the low preparation of the community in the application of hygienic-sanitary norms, contribute with the appearance of this type of diseases. The purpose of the present study was to analyze the epidemiological behavior of foodborne diseases in the Department of Sucre, Colombia during the period 2012-2015.

Materials and Methods

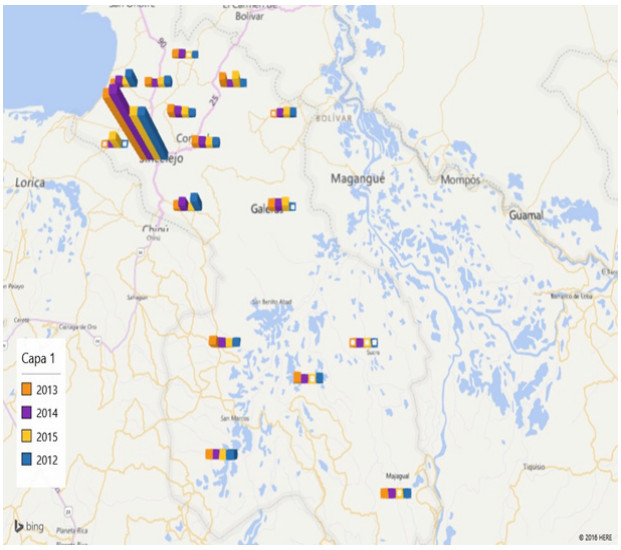
To get these results, a descriptive, retrospective, quantitative approach, non-experimental design was carried out based on the epidemiological period 2012-2015; which registered 2,530 cases that are stored in the statistical database of a Ministry of Health, with cases reported as individual and outbreaks, after elimination of duplicate records; disaggregated by municipalities, sociodemographic variables according to age and gender; aside from analyzing the type of food committed and the place of occurrence of diseases. The information was analyzed with the epi info program, which allowed the application of descriptive statistics, through the design of figures.

The study respects the ethical criteria, through the request of the Institutional endorsement for the use and analysis of the information, in accordance with the ethical considerations of Colombia and the Declaration of Helsinki[14,15].

Results and Discussion

The behavior of foodborne diseases in the selected Department (state) for the study showed that during the period from 2012 to 2015 2,530 individual cases were reported, including a total of 288 outbreaks related to the consumption of contaminated food ; the municipality of Sincelejo reported 173 outbreaks throughout the period, followed by Palmitos with 21 and San Marcos with 15.

Sincelejo also reported 1,063 cases in total, being the municipality with the highest number of foodborne diseases during all the epidemiological periods under study, noting the largest number during 2013 (314 cases), and a slight decrease in 2015 (225 cases). The municipality with the lowest report was Sucre-Sucre with two cases and Guaranda with 5.



MUNICIPIOS	2012	2013	2014	2015	TOTAL
BUENAVISTA	3	8	3	4	**18**
CAIMITO	17	41	7	3	**68**
CHALAN	3	9	9	0	**21**
COLOSO	3	0	0	0	**3**
COROZAL	19	24	21	16	**80**
COVEÑAS	43	18	54	10	**125**
EL ROBLE	14	12	18	5	**49**
GALERAS	22	0	0	3	**25**
GUARANDA	1	0	4	0	**5**
LA UNION	4	6	0	6	**16**
LOS PALMITOS	0	0	1	46	**47**
MAJAGUAL	10	6	9	0	**25**
MORROA	10	27	19	16	**72**
OVEJAS	6	38	4	43	**91**
SAMPUES	66	18	38	3	**125**
SAN BENITO	37	53	3	0	**93**
BETULIA		74	9	12	**95**
SAN MARCOS	71	29	35	51	**186**
SAN ONOFRE	3	1	1	22	**27**
SAN PEDRO	13	0	9	15	**37**
SINCE		29	32	38	**99**
SINCELEJO	225	299	314	225	**1063**
SUCRE		0	2	0	**2**
TOLU	51	7	23	18	**99**
TOLUVIEJO	21	16	6	16	**59**
TOTAL GENERAL	642	715	621	552	**2530**

Figure 1. *Distribution of Individual Cases of Diseases Transmitted by Food by Municipalities*
Source: Health Department Secretary

With respect to gender, no important differences were evident. However, in 2014 the highest number of cases was registered in 367 men while in the case of women 348 cases were reported; followed by 2012 with 310 and 332 cases respectively. During the years 2012, 2014 and 2015, the trend was towards the female gender and only in 2013 more male population was reported. The most affected age group was 5-14 years, during the period from 2012 to 2015, 647 accumulated cases were reported for a proportion of 25.34%, followed by the group of 25-44 years with 576 cases (23 %), and finally the group of 15 - 24 years old with 538 cases (21.22%), the least affected age group was represented by children under 1 year old.

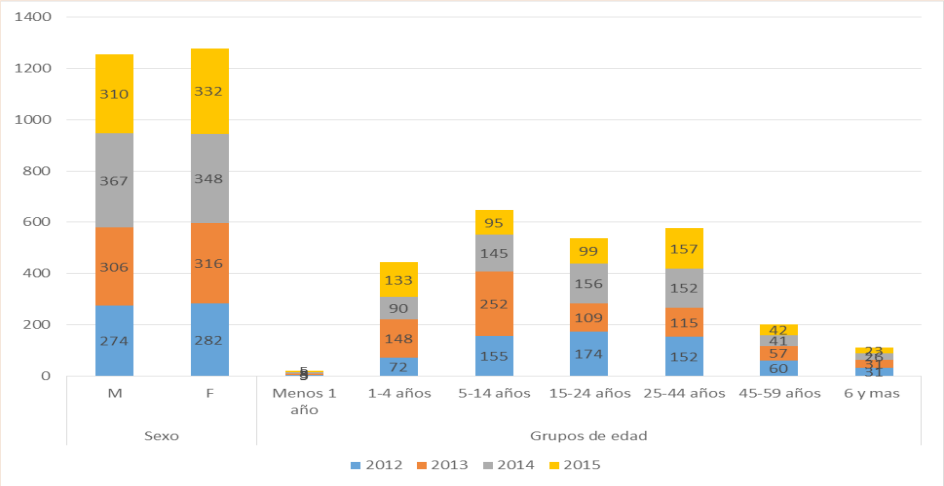


Figure 2. *Distribution of Cases of Diseases Transmitted by Food, by sex and groups of Ages.*

Source Own Design.

The food most implicated as the cause of outbreaks of foodborne diseases was the coastal cheese made by hand, presenting a greater number of cases during the period 2012 - 2015, with 124 outbreaks reported; followed by water for human consumption that caused the registration of 36 outbreaks, highlighting that in several municipalities of the Department there were cases of Hepatitis A, typhoid and paratyphoid fever, diseases caused by the consumption of contaminated water. In its order, they were also caused by cooked rice mixed with 34 cases and in smaller proportion foods such as drinks made out of corn and milk powder.

Their homes were the places most of the outbreaks occurred, evidencing an increase in the frequency of these since 2012 with 57%, in 2013 with 74%, while in 2014, they increased to 78%, presenting a slight decrease in 2015 compared to the previous year; followed by places of street sales and stores.

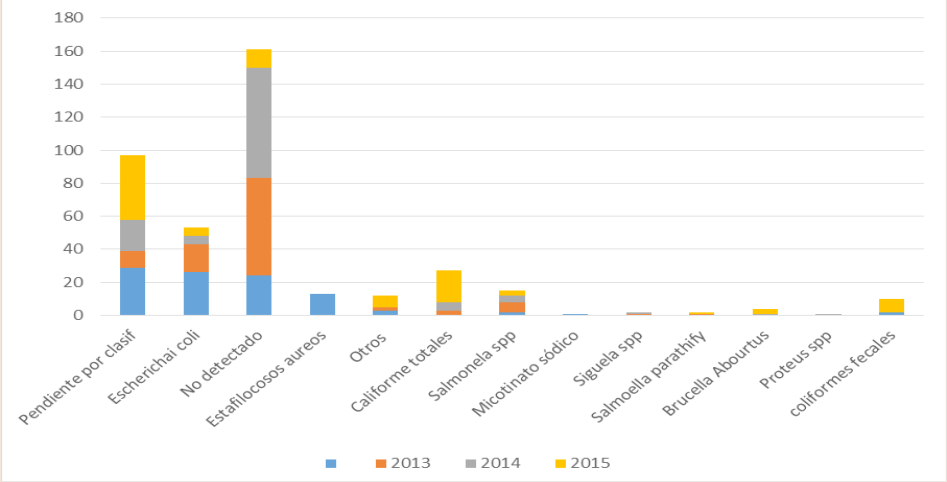


Figure 3. *Distribution according to the type of responsible microorganisms.*

Source: Own Design.

E. coli turned out to be the microorganism mostly involved in the causality of diseases, followed by *total Coliforms and Salmonella spp*; It is striking that the highest percentage are classified as undetected and pending classification.

Foodborne diseases in individual cases, during the years 2012 to 2015, presented a slightly downward behavior in some municipalities; while, in other municipalities, it was fluctuating, which may be due to favorable or circumstantial intrinsic conditions, rather than to preventive policies. This result leads to propose the expansion of the coverage of epidemiological surveillance of these diseases, promoting public policies of attention to communities and informal microenterprises; deploying the preventive activities at the level of the nascent population subsistence businesses of the economy on their own, those who work without proper compliance with sanitary hygienic norms, nor identification of health conditions, since the Health and Safety at Work System, just as food hygiene control in this type of business, does not have the proper supervision and advice to carry out proper handling; even more so when these small individual and family businesses represent a small-scale economy that minimally meet the basic needs of these population groups and most of them do not have affiliation to the Health and Safety System, as this is reserved only for workers in the formal sector or of the contributory and independent regime linked by means of contracts for fees in legally conformed companies, leaving vulnerable and socially active populations dedicated to self-employment unprotected.

On the other hand, the most affected age groups were the schoolchildren and the working population, data concordant with other researches, who found the same data[10] and discordant regarding the predominant gender[16]. The most implicated foods, such as artisanal fresh cheese, may be due to incipient sanitary measures during the manufacturing and / or handling thereof, a fact corroborated by other studies in Latin America found *Staphylococcus aureus* in 100% artisanal cheeses, 61% pasteurized and 11% mozzarella cheese[17], high loads of total and *FecalColiforms*, *Eschirichia coli*[18], *Stahpylococus aureus*[19], *fungi and yeasts, total Coliforms, Salmonell*[20]; in addition, *Mesophilic aerobes*, *total Coliforms*, *fecal Coliforms and S. aureus*[2].

While the factor related to contaminated water may be related to the lack of sanitary hygienic measures in supply networks to businesses and homes, this is a situation that would be improved by revisions and purification of water from the central pump; contamination that has been demonstrated in water quality studies[21,22],becoming a real risk factor that affects directly the inhabitants of the dwellings. The above data differ from the one that was found in other studies, where the products with the greatest commitment in the presentation of foodborne diseases were fish and its byproducts[10], medication and abuse[20], meat and sausages[23,24].

Regarding the presentation of outbreaks derived from rice and corn by-products, it can be related to the presence of microorganisms in the hands, throat and nostrils of the food handler, which, apart from having low preventive training, do not have the supply of elements for personal protection, and most of them are excluded from the programs for the revision of health conditions by the prevention and control agencies, due to the factors of non-affiliation to the Health and Safety System mentioned in the previous paragraph; in this sense, Bayona identified the presence of pathogenic microbial load (*Salmonella sp and Escherichia coli*) in foods sold on public roads in a sector of northern Bogota[26], which invites us to expand prevention coverage through programs based on training, monitoring, hand washing and periodic examinations defined by the Colombian Ministry of Health, a mechanism that would help reduce the problems presented in this study. On the other hand, food preservation and preservation actions in businesses and restaurants should be reviewed, which would not only impact the prevention of individual cases and outbreaks of foodborne diseases; but, that would diminish the intestinal parasitosis, included within this group.

Regarding the second place where the diseases originated, there is consonance with the study by Puig et al, [26] who found that the majority of cases occurred in population groups of workers and schoolchildren. When reviewing the types of microorganisms of greater presentation, the main cause was *Scherichia coli*; *total and fecal Coliforms*, followed by *Stahpylococusaureus*; data similar to other studies, [27,28] while *Salmonella* represented the main culprit in another study [29].

It is important to note that the results shown demonstrate that the highest frequency of microbial

typology corresponded to pending cases to be classified and not detected, which leads to the need to strengthen the system of testing referral laboratories, for this reason we are invited to review the techniques and / or identification resources of these microorganisms, since most of them are left without the knowledge of the specific causal factor, review the feasibility of applying effective techniques for the identification of microorganisms such as those proposed by Bonifaz et al[30], that confirmed that the use of pulsed field electrophoresis is a highly discriminatory, sensitive and universal method for the identification of outbreaks of foodborne diseases, as well as the use of biosensors that indicate the presence of pathogenic substances[29] and commercial bacteriophages for the control of bacteria in food[30]; other measures include the strengthening of the surveillance system through the implementation of adequate policies on individual hygiene, utensils, equipment and implements for the preparation and distribution of food [31], training and training in the topic[32] self-control practices based on the prevention and control of the dangers and the development of food traceability[33,34].

Conclusions

E. coli was the main causal factor of foodborne diseases. There was no greater variability in the number of cases reported between the observed years.

Acknowledgement

The authors thank: the Department of Health in the Department of Sucre, for allowing the information analysis in this place, Universidad Cooperativa de Colombia, Santa Marta, which sponsored the development of the research project and the language teacher Jorge Negrete, for his support in the translation of this article.

Declaration on Conflicts of Interest

The authors declare no conflict of interest, only those that motivate the investigation.

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Citation: **Gisela González Ruiz, Baldir Paba Osorio et al.** *Epidemiological Behavior of Diseases Transmitted by Food, in a Department of Colombia, 2012-2015. Open Access Journal of Nursing. 2018; 1(2): 82-88.*