Abanico Microbiano. January-December 2025; 1:1-17. https://doi.org/10.21929/abanicomicrobiano/2025.3
Original Article. Received: 17/05/2025. Accepted: 25/09/2025. Published: 06/10/2025. Code: e2025-3.
https://www.youtube.com/watch?v=qsAfrbiWJ58

Situational diagnosis of *Listeria monocytogenes* in frankfurters: Prevalence and consumption risk during pregnancy

Diagnóstico situacional de *Listeria monocytogenes* en salchichas Frankfurt: Prevalencia y riesgo para consumo durante el embarazo

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ABSTRACT

This research presents a situational assessment of the presence of *Listeria* spp. and *Listeria monocytogenes* along the frankfurter-type sausage processing line in a packing facility in Mexico City, complemented by a survey on sausage consumption among pregnant women to estimate the risk of listeriosis. A total of 51 samples were analyzed using the miniVIDAS® kit, of which 20 (39%) tested positive for *Listeria* spp.: 14 (27.3%) in raw materials, 3 (6%) in finished products, and 3 (6%) on surfaces. For *L. monocytogenes*, 8 samples (15.6%) were detected: 6 (12%) in raw materials and 2 (4%) in finished products, with no detection on inert surfaces. Documented irregularities and deviations from good manufacturing practices were observed in 16% of cases. In the survey, 44 out of 60 pregnant women (73%) reported consuming frankfurters, of whom 27 (45%) experienced gastrointestinal discomfort. The low presence of *L. monocytogenes* during production was classified as a moderate risk; however, considering the product at the point of sale, the risk was estimated as high. Implementing health education measures and strict adherence to good manufacturing practices could mitigate exposure and reduce the risk of listeriosis in this vulnerable population.

Keywords: *Listeria monocytogenes*, listeriosis, prevalence.

RESUMEN

La presente investigación aborda un diagnóstico situacional sobre la presencia de *Listeria* spp. y *Listeria monocytogenes* en la línea de proceso de salchicha tipo Frankfurt en una empacadora en la Ciudad de México, complementado con un sondeo sobre el consumo de salchicha en embarazadas para estimar el riesgo de listeriosis. Se muestrearon 51 unidades utilizando el estuche miniVIDAS®, de las cuales 20 (39%) fueron positivas a *Listeria* spp.: 14 (27.3%) en materia prima, 3 (6%) en producto terminado y 3 (6%) en superficies. En el caso de *L. monocytogenes*, se detectaron 8 muestras (15.6%): 6 (12%) en materia prima y 2 (4%) en producto terminado, sin detecciones en superficies inertes. Se observaron irregularidades documentales y en buenas prácticas en un 16% de los casos. En el sondeo, 44 de 60 embarazadas (73%) reportaron consumir salchicha, de las cuales 27 (45%) experimentaron malestares gastrointestinales. La baja presencia de *L. monocytogenes* durante la producción se clasificó como riesgo moderado; sin embargo, al considerar su salida al mercado, el riesgo se estimó como alto. La

implementación de medidas de educación sanitaria y el cumplimiento estricto de buenas prácticas de manufactura podrían mitigar la exposición y reducir el riesgo de listeriosis en esta población vulnerable.
Palabras clave: *Listeria monocytogenes*, listeriosis, prevalencia.

INTRODUCTION

Listeriosis (caused by *Listeria monocytogenes*) has a low incidence but a high associated mortality rate (20–30%) (OMS, 2018). The economic effect on the industry and countries derived from outbreaks, hospitalizations and trade makes it an important public health concern (INS, 2015). Pregnant women are considered a vulnerable population group, in which the immune system response is modulated and adapted to support pregnancy, and make it more tolerant, increasing tolerance but also making them more susceptible to infections with more severe outcomes (Ferrús *et al*., 2014), resulting in an 18-fold higher risk of illness compared to the general population (FAO/WHO, 2022).

The non-invasive form of listeriosis leads to subclinical infection, which often goes unnoticed and typically resolves within a few days without treatment, allowing spontaneous recovery of the pregnant woman (Montañez *et al*., 2011). The incubation period of listeriosis ranges from 5 to 70 days, or from one to two weeks depending on its presentation (invasive or non-invasive), complicating the identification of the food sources responsible for infection (AESAN, 2024). The infectious dose for the general population is 10^7 to 10^9 colony-forming units (CFU), causing febrile gastroenteritis. For vulnerable populations, the infectious dose is from 10^4 to 10^6 CFU, causing invasive listeriosis (Manyi-Loh & Lues, 2025). The disease occurs after the consumption of foods that favor the growth of *L. monocytogenes* such as ready-to-eat foods (RTE) products (SENASICA, 2015).

In Mexico, a product is considered as RTE if it is meat or poultry presented in edible form and is not labeled with safe handling instructions, nor another indicating that it must be cooked or otherwise treated (SAGARPA, 2017) for example: cooked sausages, pâtés, cooked and cured hams, sliced meat, turkey ham, smoked fish, dairy products, prepared salads, fresh vegetables and fruits (INS, 2015; AESAN, 2024). *L. monocytogenes* has been found more frequently in processed meat products than in raw foods.(Manyi-Loh & Lues, 2025) and due to its ubiquitous nature and its ability to form biofilms, it can persist in processing plants for extended periods of time (AESAN, 2024). Its presence in food is often overlooked due to the low count of the pathogen, the high population of competitive bacteria and the inhibitory effect of some food additives (Waffa *et al*., 2016). In the documentation component, food establishments must adhere to prerequisite programs for quality assurance (FAO/WHO, 2022; SADER, 2021; Guzmán *et al*., 2019). To reinforce food safety management systems, the FAO recommends conducting risk analysis, with situational assessment serving as a fundamental tool for identifying hazards and implementing preventive measures. (Rodrigues *et al*., 2017; Jamal *et al*., 2013). Some countries have adopted alternative control strategies. For instance, the

United States implemented a zero-tolerance policy for ready-to-eat foods, a measure that led to a reduction of up to 40% in listeriosis cases (AFDO, 2019; FSIS, 2023). With regard to regulation, European Commission Regulation 2073/2005 (EU, 2005) classifies ready-to-eat foods into two categories: (a) prior to leaving the control of the producing company. This refers to foods that may support the growth of *L. monocytogenes*, where the detection method requires absence in 25 g; and (b) products already placed on the market during their shelf life. This refers to foods that may or may not support the growth of *L. monocytogenes*, where the test method is enumeration and the specification is not more than 100 CFU/g (Viñuela *et al*., 2023).

Sanitary surveillance of *Listeria monocytogenes* in the category of cooked and raw ready-to-eat meat products has been part of Mexican regulation since 2018 (NOM-213-SSA1-2018; Castañeda *et al*., 2021). Nevertheless, contaminated ready-to-eat products continue to face rejection in trade (FDA, 2024). At the same time, deli meats are highly demanded products, which has driven industry growth (Martín *et al*., 2023). To date, however, no publications have reported on the sanitary status of these industries with respect to the presence of *L. monocytogenes*. For this reason, the main objective of this study was to generate a reference assessment using situational diagnosis as a tool in a federally inspected meat processing plant (TIF, by its Spanish acronym *tipo inspección federal*), and to estimate the scale of the problem and the level of risk in retail trade through a consumption of survey among pregnant women, with the aim of proposing alternative control measures to strengthen the food safety system.

MATERIALS AND METHODS

Situational diagnosis study design

A cross-sectional, descriptive observational study using convenience sampling was conducted to detect *Listeria* spp. and *L. monocytogenes* along the frankfurter-type sausage (hereafter referred to as frankfurters) processing line. Sampling took place over a three-month period. The deli-meat packing facility where the study was carried out was a federally inspected meat processing plant (TIF, by its Spanish acronym tipo inspección federal), located in the Mexico City metropolitan area (previously surveyed by Reyna, 2008). Finished products were vacuum-packed and labeled in 1.0 kg, 1.5 kg, and 2.0 kg package sizes, with the statement “keep refrigerated until consumption”.

The main processing stages for frankfurters were, in order: receiving; mincing and ingredient mixing; emulsification; stuffing and linking; smoking; heat treatment and cooling; peeling; packaging; metal detection; labeling; and storage.

Sample collection

Sample distribution was calculated under the assumption of three additional replicates. Collection was carried out through systematic random sampling (Daniel, 1991). The number of samples was determined based on an average daily production of 882 kg of frankfurters, considering an incidence rate of 6.3% for this type of food (Jiménez *et al*., 2020) and applying the formula for proportion estimation in a finite population (Daniel, 2008).

Study population

Process line samples: A total of 51 samples were analyzed under the framework of the Hazard Analysis and Critical Control Points (HACCP) scheme, which at that time did not yet consider the risk of contamination by Listeria monocytogenes. Three critical control points in the process were selected, and the sample size was adjusted to 51 units: 22 samples from the reception of raw meat, 7 from inert food-contact surfaces, and 22 from vacuum-packed finished products. A simple stratified sampling design was applied across the three sample types.

Raw material sampling: One sample was collected per 6.5 kg of pork shank meat, per 3 kg of fat trimmings, per 2.0 kg of skin emulsion, and per 2.0 kg of sausage rework.

Food-contact surface sampling: Locations and times were chosen based on direct contact with food, such as the transfer window for unpeeled frankfurters and the handling of peeled frankfurters prior to packaging. The applied sampling plan corresponded to type 2, based on the detection method of absence in 1000 cm², according to ISO 18593 (Midelet *et al*., 2023; Viñuela *et al*., 2023).

Finished product sampling: One package was selected for every 40 packages produced. Only frankfurter-type sausage (or Vienna sausages) made from pork with registered production orders were included.

Pregnant women sample: To collect information on sausage consumption and health effects, 60 pregnant women were randomly selected as a reference vulnerable population. They were recruited from the gynecology service of a social security clinic in the study area during the sampling period. Only women in their first pregnancy were included, as they represent the group most likely to modulate their immune response against Listeria monocytogenes for the first time (Ferrús *et al*., 2014).

Bacteriological analysis

Sample analysis was carried out at the Laboratory of the Department of Preventive Medicine, Faculty of Veterinary Medicine and Animal Science, UNAM, Mexico. The MiniVIDAS kit (LDUO bioMérieux®, bioMérieux SA, Marcy l'Etoile, France) was used, which simultaneously detects antigens of *Listeria* spp. and Listeria monocytogenes through a fluorescence-based technique. Positive samples were confirmed using the official testing method established in NOM-210-SSA1-2014 (SSA, 2014).

Sample preparation followed the manufacturer's protocol, with prior calibration of the equipment as indicated in the user manual and technical datasheet of the MiniVIDAS® kit for *Listeria*. The methodology was performed according to the manufacturer's recommendations. Biochemical identification of strains suspected to be *Listeria*, isolated through the official method (SSA, 2014), was carried out with the API Listeria® system (bioMérieux), following the manufacturer's instructions (Benetti *et al*., 2014). Strains isolated and confirmed as *L. monocytogenes* were not serotyped.

Application of the Hygiene Good Practices Evaluation Guide for food establishments and control of *Listeria monocytogenes*

Compliance with the Hygiene Good Practices Evaluation Guide for food establishments (COPRISEM, 2024) was assessed. The guide includes 62 questions covering the following areas: facilities; equipment and utensils; services; operations control; raw materials; packaging; contact water; maintenance and sanitation; waste management; personnel; transportation; and documentation and records.

Additionally, eight questions were incorporated from the guidelines on the application of general food hygiene principles for ready-to-eat (RTE) foods aimed at the control of Listeria monocytogenes (FAO/WHO, 2022; Martín *et al*., 2023; SADER, 2021). The total number of questions was 70. The scoring scale included four options: (2) Fully compliant, (1) Partially compliant, (0) Non-compliant, and (–) Not applicable.

Survey in pregnant women

In retail settings, tracing the origin of frankfurters and identifying contamination sources for corrective action is challenging. Instead, an alternative strategy was applied by estimating proper handling and storage practices through a survey on consumption and potential health impacts among pregnant women. To collect data for analysis, the following questionnaire was used.

Five-question survey administered to pregnant women

1. What pregnancy number is this, and have you experienced complications or miscarriages?
2. What is your current stage of pregnancy (in months)?
3. What is your age (in years)?
4. Do you frequently consume frankfurters or other RTE foods?
5. If yes, how do you consume them? Or what type of culinary preparation do you use?

The collected information was classified by age into three groups (23–27 years, 28–32 years, and 33–38 years) and by gestational stage into three trimesters. Consumption was categorized according to culinary preparation into those without heat treatment (fresh or directly from the refrigerator, with ketchup, dressings, or in cold salads) and those with heat treatment (fried, in corn dogs, hot dogs, pizzas, sandwiches, or with eggs).

Health complications were classified as minor (associated with non-invasive listeriosis), such as flu-like symptoms, low-grade fever, high fever, chills, back pain, gastroenteritis, diarrhea, muscle pain, and headaches—affecting otherwise healthy individuals; and major complications (associated with invasive listeriosis), such as miscarriage, preterm birth, encephalitis, sepsis, meningitis, septicemia, and neonatal death (Montañez *et al*., 2011; Lei Qu *et al*., 2022).

Responses were grouped to establish potential relationships between age, frankfurter consumption, gestational stage, and health outcomes. This approach aimed to address post-processing contamination and hygiene practices at the consumer level.

Estimation of the risk level of contamination in sausage production, commercialization, and consumption by pregnant women

Based on the results of the Hygiene Good Practices Evaluation Guide for food establishments and the control of *Listeria monocytogenes*, along with the previous survey, six qualitative risks were identified (see Table 3) that must be addressed to ensure that company processes and its Quality Management System (QMS) achieve the expected outcomes. A simplified risk analysis (ISO, 2018) was applied due to limited data availability. For this purpose, the Risk Priority Number (RPN) was determined for each of the six risks using the following formula:

RPN = P (probability) × C (consequence) × D (detectability).

Finally, the total RPN score provided an estimate of the classification or risk level of the processes.

Statistical analysis

Using Stata version 11.2, the sensitivity and specificity of the diagnostic tests were calculated. The differences were not significant, with an odds ratio (OR) of 0.52, indicating that the proportions for diagnosing *Listeria* spp. and *L. monocytogenes* were equivalent for both tests. Concordance between the two diagnostic tests was measured with the Kappa Index ($p < 0.05$), which was positive. The overall performance of the diagnostic tests employed was evaluated through the ROC (Receiver Operating Characteristic) curve.

RESULTS

Bacteriological analysis

Based on total production and the estimated incidence rate of the pathogen in this type of food, the minimum sample size was set at 49. Following this criterion, a total of 51 samples were analyzed to detect *Listeria* spp. and *Listeria monocytogenes* at three critical control points in the production of frankfurters. Results are shown in Table 1.

Table 1. Positive results with the miniVIDAS® LDUO system and percentage of positivity of the samples of raw material, finished product, and inert surface

Product	No. samples	No. Positives to *Listeria* spp	% positive	Positives to *L. monocytogenes*	% positive
Raw material	22	14	27	6	12
Shank meat	8	7	13.6	0	
Fatty trim	5	5	9.7	5	9.7
Skin emulsion	5	2	3.9	1	2
Reprocess	4	0		0	
Finished product	22	3	6	2	4
Inert sufarce	7	3	6	0	
Total	51	20	39	8	16

In summary, of the 51 samples analyzed, 20 were positive (39%) for *Listeria spp.* and 8 samples with 16% positivity for *Listeria monocytogenes*.

Raw material results: Of the 22 samples analyzed, 14 (27%) were positive for *Listeria* spp. and 6 (12%) were positive for *L. monocytogenes*. Among the eight shank meat samples, seven (13.6%) were positive for *Listeria* spp., but none for *L. monocytogenes*. In fat trimmings, all five samples (5.7%) were positive for *Listeria* spp., and all five (5.7%) were also positive for *L. monocytogenes*. In skin emulsion, two out of five samples (3.9%) were positive for *Listeria* spp., and one (2%) was positive for *L. monocytogenes*. No *Listeria* was detected in the four frankfurters rework samples.

Finished product results: Of the 22 finished product samples analyzed, three (6%) were positive for *Listeria* spp., and of these, only two were confirmed as *L. monocytogenes*, with a prevalence rate of 4%.

Inert surface results: Of the seven surface samples analyzed, three (6%) were positive for *Listeria* spp., while none were positive for *L. monocytogenes*.

Evaluation of hygiene and good manufacturing practices in establishments and guidelines for the control of Listeria monocytogenes

Out of the total 70 questions, 17 were rated as partially compliant and five as non-compliant. The overall compliance score for the company's frankfurter production line was 84%.

Responses of pregnant women to the five-question survey

The responses of the 60 participants are summarized as follows:

Age: Thirty-three women were between 23 and 27 years old, twenty were between 28 and 32 years old, and seven were between 33 and 38 years old.

Stage of pregnancy: The nine months of pregnancy were divided into three stages of three months each. Results are shown in Table 2.

Table 2. Consumption patterns and health complications during pregnancy stages by age group of the surveyed women

Age intervals (years)	Number of women	Frankfurters consumption			Stage of pregnancy (month)		
		No consume	Does not consume Consume	Culinary form	First to third	Fourth to sixth	Seventh to ninth
					Number of women with minor health complications[&]		
23 a 27	33	6	6	Fresh (4) and HT(2)	4		
		3	5	Fresh or with catsup (3) and HT (2)		5	
		2	11	Fresh (3)			3
28 a 32	20	3	5	Fresh or salad (2) and HT (3)	2		
		1	8	Fresh (1) or with catsup (5)		6	
		0	3	Fresh with catsup (1)			1
33 a 38	7	0	2	Fresh on salad (2)	2		
		1	2	Fresh or salad (2)		2**	
		0	2	Dressing fresh (2)			2
Total	60	16	44		8	13	6

& = Minor complications are signs or symptoms of non-invasive listeriosis. HT = With heat treatment, includes hot dog, tortas, pizza, fried with egg, and "corn dogs". Fresh = Consumption of sausage directly from the refrigerator. ** = Reported being under treatment for urinary infection.

None of the women reported major health complications, and all were under treatment for their minor complications, most commonly with antibiotics.

In summary, among the 60 pregnant women surveyed, 44 (73%) reported consuming frankfurters with varying frequency and preparation methods (in sandwiches, with eggs,

in salads, directly from the refrigerator, in hot dogs, or as corn dogs (fried frankfurters coated with pancake batter). Of these, 27 women (45%) who consumed frankfurters more frequently reported minor ailments such as headaches, joint pain resembling flu symptoms, and two reported urinary tract infections. The remaining 33 women (55%) consumed frankfurters after applying heat treatment and reported no complications beyond those inherent to pregnancy. Finally, 16 women (26.6%) out of 60 reported not consuming frankfurters. Women who consumed turkey frankfurters or other RTE foods were excluded from the analysis.

Qualitative estimation of the simplified risk analysis

Table 3 was completed with the results obtained from the estimation of the risk level in processes I and II.

Table 3. Risks, RPN, and risk level in processes from frankfurter production to consumption

Key	Process risks. I) Industrial frankfurter production stage	RPN*
R1	Failure to apply guidelines for the control of *Listeria monocytogenes* or to include them in control programs.	9
R2	Starting frankfurter production with raw material contaminated with *Listeria monocytogenes* and without proper control measures.	3
R3	Failure to correctly apply time and temperature conditions during frankfurter pasteurization.	4
	Clasification or level	Moderate
Key	Process risks. II) Commercialization and consumption stage during shelf life	
R4	Contamination with *L. monocytogenes* due to poor practices during commercialization or at home (e.g., failure to maintain storage temperature, unhygienic handling).	24
R5	Post-manufacture contamination with *L. monocytogenes* through cross-contamination when sold in bulk.	24
R6	Frankfurters leaving the plant contaminated with *L. monocytogenes* and being consumed fresh without any preservation or proper heat treatment.	9
	Clasification or level	Alto

*RPN = Risk Priority Number

DISCUSSION

In this study, the MiniVidas test and the NOM-210-SSA1-2014 method (SSA, 2014) showed concordance ($p < 0.05$) in the detection of of *Listeria spp.* and *L. monocytogenes.* However, seven samples tested negative with the normative method. This can be explained by the fact that the MiniVIDAS system is more sensitive than the normative method (Figueroa *et al*., 2022). In addition, using the official method, *L. monocytogenes* counts were below 100 CFU/g, which is lower than the infective dose for the vulnerable population (10^2 cells/g) (AESAN, 2024). Nonetheless, it must be considered that post-processing risk factors for frankfurters have been reported, such as exposure to temperatures above 4 °C, that may allow low bacterial concentrations to increase to levels constituting a high risk of listeriosis (INS, 2015; Meza *et al*., 2023).

In Mexico, listeriosis is not a notifiable disease (Castañeda *et al.*, 2018), and few reports link the presence of the pathogen in food to clinical cases (Jiménez *et al.*, 2020). This lack of surveillance contributes to inconsistencies when comparing prevalence or incidence across studies. In this regard, the prevalence of Listeria spp. has been reported as highly variable, depending on location, study design, hygiene practices, methodology, and regulations, among other factors (Manyi-Loh & Lues, 2025; Redondo *et al*., 2023).

In the present study, of the 51 samples analyzed, raw meat showed 27% positivity for *Listeria* spp. and 12% *for L. monocytogenes*. For *Listeria* spp., this positivity was higher than the prevalence in RTE foods reported in Spain (16.1%) (Viñuela *et al.*, 2023). This difference may be explained by reports that raw ground meat in Mexico carries a high *Listeria* spp. load (67%) (Heredia & García, 2018). In contrast, *L. monocytogenes* contamination (12%) decreased post-processing to a 4% positivity rate in finished products. This prevalence is lower than the 6.3% reported in Mexican deli meats (Jiménez *et al*., 2020), and very similar to the 4.5% prevalence reported in RTE foods in Spain (Viñuela *et al.*, 2023). Considering that raw material was the most contaminated of the three sample types, these findings suggest that process controls were effective in mitigating contamination, resulting in only two positive samples (4%) with low *L. monocytogenes* counts in finished frankfurters. This occurred despite the 16% non-compliance observed in the production line, which, if corrected, would likely lead to substantial improvements, as expected in a TIF-certified plant (SENASICA, 2015; SADER, 2021). A previous study (Reyna, 2008), reported 87% compliance, perhaps reflecting that current evaluation guidelines are more stringent.

Another factor increasing the probability of listeriosis is the rise in deli meat consumption, which reached approximately 8.6 kg per capita in Mexico in 2023 (Avicultura, 2023). This market trend drives greater production of RTE foods (Martín *et al*.,2023), thereby also increasing the risk of contaminated products entering the market. In the present study, frankfurter consumption was high (73%) among pregnant women, particularly in bulk purchases due to lower prices. Similarly, in Costa Rica, sausage consumption among women has been associated with socioeconomic status, as it is often perceived as a low-cost protein source (Santamaría *et al* 2021). Most women who consumed frankfurters in our study were between 23 and 27 years of age—a group that is often economically active, with high demand for inexpensive, fast, and convenient foods both in street settings and at home. This aligns with findings by Donoso *et al.* (2014), who identified women aged 20–29 years as a reference group in age-related studies due to their comparatively lower risks of maternal, fetal, neonatal, and infant mortality.

Regarding health outcomes, of the 44 women who consumed frankfurters without heat treatment, 27 (61%) reported minor complications, with symptoms consistent with non-invasive listeriosis as described in previous studies authors (Juárez *et al*., 2022; Manyi-Loh & Lues, 2025). Although uncertainty exists regarding self-reported responses, consumption of untreated frankfurters and its association with listeriosis has been documented (Lei Qu *et al*., 2022). Furthermore, these women, including two who reported urinary tract infections, stated they were under antibiotic treatment. Clinical studies have shown that timely administration of antibiotics in suspected listeriosis improves prognosis and can prevent neonatal infection (Montañez *et al*., 2011), which may explain why most participants were under treatment.

However, widespread use of antibiotics raises concerns about the pathogen's potential to develop resistance, both clinically and in food processing environments, particularly given that disinfectants are often applied at concentrations up to 100 times higher due to the biofilm-forming ability of *L. monocytogenes* (AESAN, 2024; INS 2015; SENASICA, 2024). This represents a major threat for both the food industry and public health (Manyi-Loh & Lues, 2025).

Most women reporting minor symptoms were in their second trimester across all age groups, which differs from other studies indicating that listeriosis in pregnancy can occur at any stage but is more frequent during the third trimester (Montañez *et al*., 2011; Gallardo *et al*., 2021). This discrepancy may be explained by early medical treatment preventing progression of the infection.

Finally, the overall risk level during frankfurter production was moderate to low, considering that the process was carried out in a certified plant. In contrast, risk during commercialization and consumption was high, especially under worst-case scenarios where frankfurters may originate from non-certified plants and be stored in favorable conditions for bacterial growth, including uncontrolled temperatures at retail or in households (FSIS, 2023; INS, 2015; AESAN, 2024; Jiménez *et al*., 2020). A similar situation has been reported in Colombia, where public health risks associated with *L. monocytogenes* were rated high in deli meats but moderate in hot-dog frankfurters (INS, 2015). In a Mexican study, Jiménez *et al,* (2020) also highlighted that poor hygienic handling of sausages at retail outlets is a common indicator of deficient sanitary practices in the food chain, representing a significant risk of foodborne illness. At the global level, in 2023 alone, approximately 60 food alerts were issued due to the presence of L. monocytogenes, all categorized as potentially high risk (RASSF, 2023). As reported, L. monocytogenes infection is a reality in Mexico, although its incidence and true public health impact remain underestimated (Rodríguez et al., 2018).

CONCLUSIONS

The results highlight the importance of systematic monitoring activities in RTE food industries for the identification of *Listeria monocytogenes* as a risk factor for potential contamination.

These findings also clearly demonstrate the significant advantage of certified companies in ensuring the safety of the foods they produce.

The information obtained through the situational diagnosis provides a basis for initial empirical treatments that may improve outcomes.

Due to data gaps and biases in commercialization and consumption processes, risk estimation required simplifications and was conducted under worst-case scenarios.

Finally, it remains necessary to further strengthen the One Health approach, working in coordination and joining efforts with interrelated sectors, particularly the clinical field.

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