Assessment of the Microbiological Quality and Safety in Takeaway Sushi Meals in Portugal

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Introduction:

Being a food product that contains perishable ingredients and involves a significant degree of manual handling during preparation, sushi is regarded as a potentially hazardous food, which may lead to foodborne disease outbreaks. In Portugal, consumption of takeaway sushi meals has strongly increased throughout the past few years; however, there is limited information regarding its compliance with food quality standards. Under this context, the present study aimed to evaluate the microbiological quality and safety of take-away ready-to-eat sushi meals in Lisbon, Portugal.[1]

Materials and Methods:

A total of 62 sushi samples, with different fish varieties, were purchased in takeaway services (31 from hypermarkets and 31 from a traditional restaurant). An automated test (TEMPO®, Fig. 1) for the enumeration of food hygiene and quality indicators was used;[2] and aerobic mesophilic microorganisms (AC), *Enterobacteriaceae* (EB), *Escherichia coli* (EC), coagulase-positive *Staphylococci* (STA) and *Bacillus cereus* (BC) were counted.

Fig. 1. Schematic illustration of the procedure for searching for AC, EB, EC, STA and BC using the automated method (From Alegria *et al*, 2020).

For *Salmonella* spp. and *Listeria monocytogenes*, the VIDAS® immunoenzymatic system was used. The samples were classified as either satisfactory, borderline or unsatisfactory according to the Portuguese guidelines.[3]
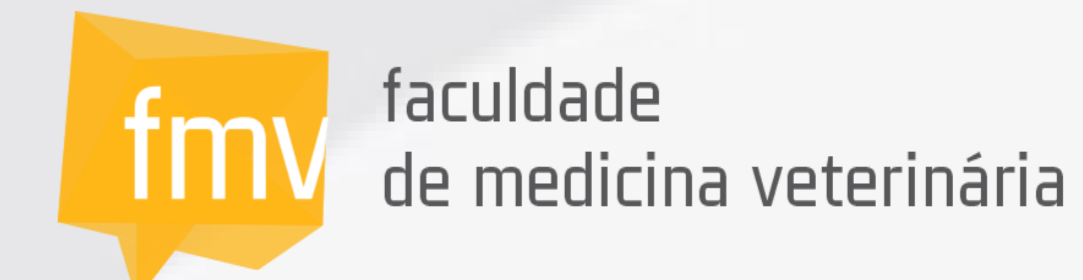
Results :

Of the total samples analysed, 48.4% (30/62) were classified as having an unsatisfactory microbiological level, corresponding to 54.8% (17/31) of the samples from hypermarkets and 41.9% (13/31) of restaurant samples (Fig. 2). As for the remaining samples, 35.5% (22/62) were classified with borderline level and only 16.1% (10/62) were classified as having a satisfactory microbiological level (Fig.2). Concerning fish variety, of the 62 sushi samples analysed, 64% (16/25), 29% (9/31) and 83.4% (5/6) were classified as unsatisfactory, respectively from tuna, salmon and shrimp (Fig. 3).
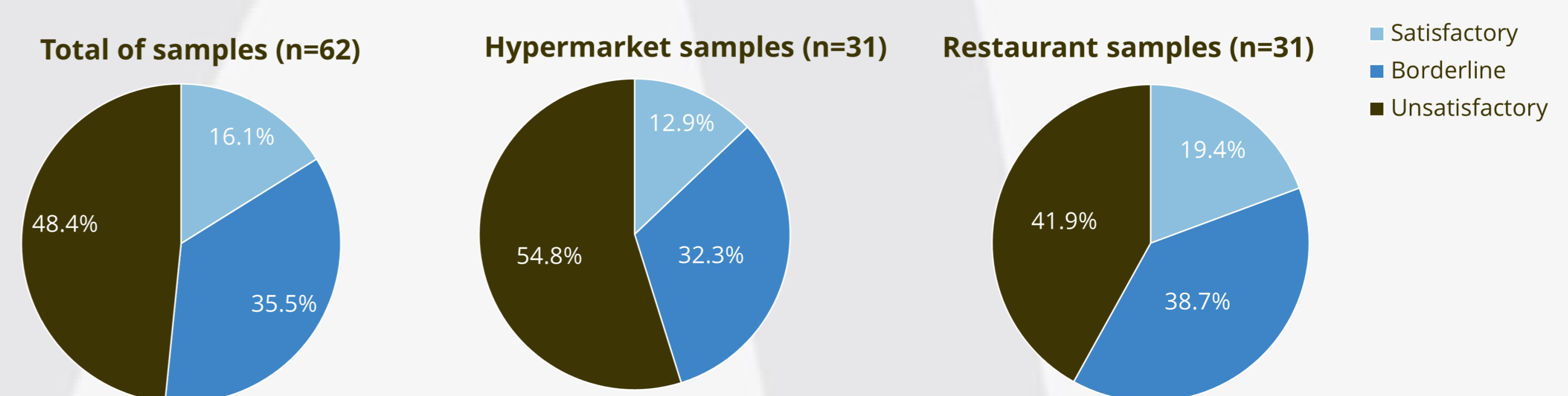

Fig. 2. Comparing the microbiological quality of total sushi samples (n = 62) analysed in different commercial areas, hypermarkets and restaurants; From Alegria *et al*, 2022.
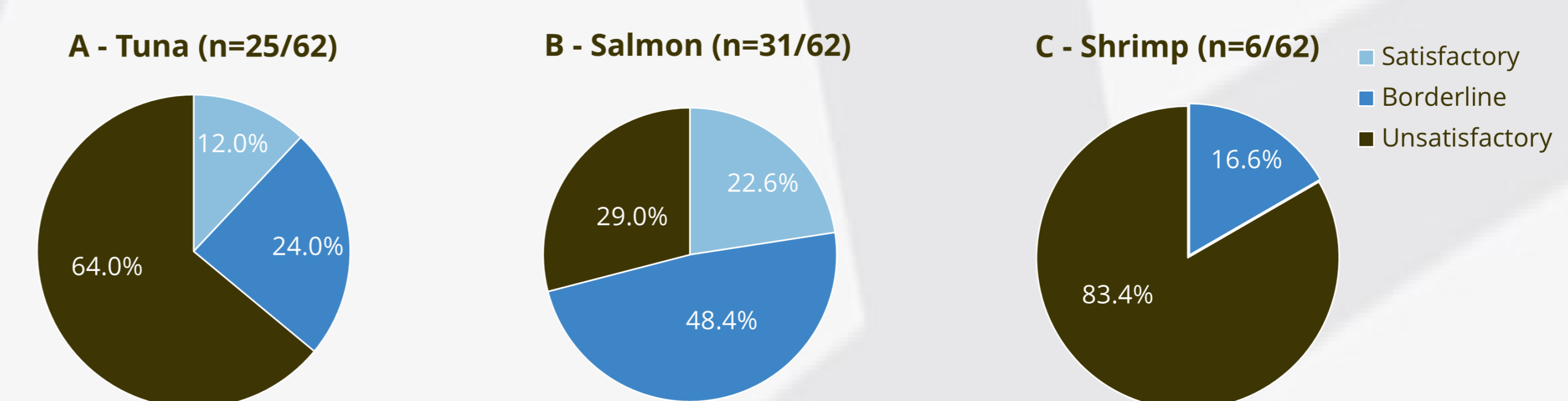

Fig. 3. Comparing the microbiological quality of sushi samples by a variety of fish (tuna, salmon and shrimp); From Alegria *et al*, 2022.

Discussion:

In our study, The mean count of *Enterobacteriaceae* was higher than the average obtained by other authors.[4, 5] *Enterobacteriaceae* count is used to assess the general hygiene status of a food product and its presence in food can be suggestive of environmental contamination and poor hygiene practices, such as, for example, incorrect hygiene of horticultural products.[4] Also, sushi containing shrimp presented a significantly higher percentage of samples classified with an unsatisfactory microbiological level, followed by tuna and salmon. This may be because shrimp needs to be peeled and deveined, increasing the likelihood of contamination by the human manipulator or by internal contamination from the gut. Finally, for *Salmonella* spp., *L. monocytogenes* and *Vibrio* spp., all samples were considered to have a satisfactory microbiological level. Given these results, we can consider that the samples analysed do not compromise the product's food safety.
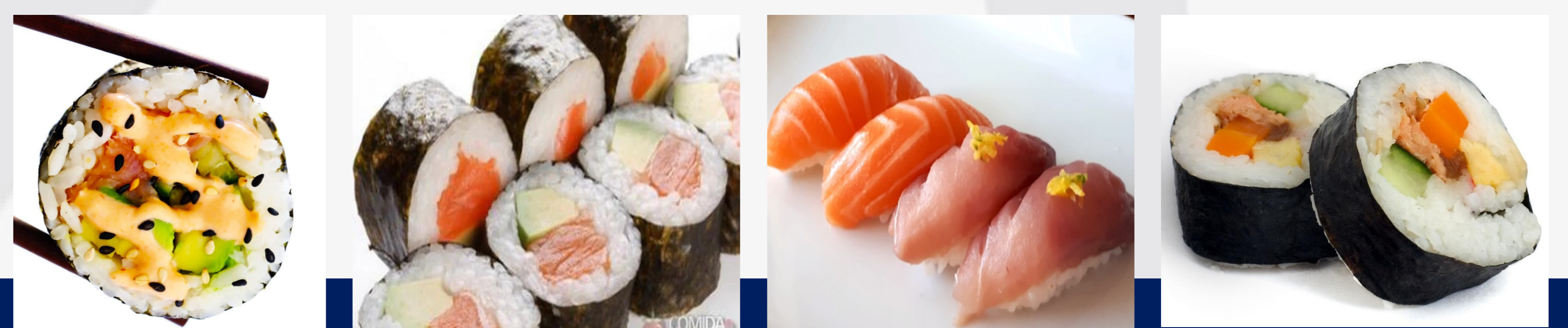
Conclusions:

Our results indicate the need to improve good practices in takeaway sushi preparation, and since the worst microbiological results were obtained in hypermarkets, this work further suggests that there is an essential need to improve food safety plans in these establishments, to obtain a final product with the desired quality level.

References: 1. Alegria, S. *et al* (2022), Port J Public Health, DOI: 10.1159/000525005; 2. Alegria, S. *et al* (2020),Dissertação obtenção grau de Mestre, FMV-ULHT; 3. INSA; 2019 Available from: http://repositorio.insa.pt//handle/10400.18/5610; 4. Hoel, S. *et al* (2015), J Food Prot. 78(5):977–82; 5. Tirloni, E. *et al* (2017), J Food Nutr Res. 5(2): 95–100.