

Elaboration and validity of an instrument for assessing good handling practices for fishmongers to guide the sanitary surveillance in Rio Grande do Sul/Brazil

Elaboração e validação de instrumento de avaliação de boas práticas de manipulação para uso da vigilância sanitária em peixarias do Rio Grande do Sul/Brasil

Elaboración y validación de un instrumento para evaluar buenas prácticas de manejo para el uso de vigilancia sanitaria en pescaderías en Rio Grande do Sul/Brasil

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Abstract

Fish consumption has increased in recent years due to the increased supply and awareness of the health benefits of fish proteins. Fresh fish and its products can be purchased in fish retail trades known as fishmongers. However, there is no specific regulation in the state of Rio Grande do Sul (RS)/Brazil to provide a checklist for the inspection of fishmongers. Thus, this study aimed to elaborate and validate a complete easy-to-use checklist of good handling practices for fishmongers (LVBPM) to assist municipal sanitary inspectors of these establishments. For that, 11 health inspection scripts focused on fishmongers were consulted, concerning municipal, state, federal, and international regulations, resulting in 1,188 items analyzed. Of these, 74 items were selected and divided into six categories according to current Brazilian legislation. A pre-test was carried out on two fishmongers in Porto Alegre/RS, and then the LVBPM was analyzed by a committee of six experts for the face validity of the instrument. The validated LVBPM comprised 84 items. LVBPM proved to be a complete and objective instrument to guide the sanitary surveillance staff in the inspection of fishmongers, allowing its use by regulatory agencies to assist the municipal sanitary inspectors of fishmongers in the RS state.

Keywords: Health surveillance; Fishmonger; Checklist.

Resumo

O consumo de pescado vem aumentando nos últimos anos devido ao acréscimo da oferta desta proteína animal e aos benefícios à saúde que este alimento pode promover. O acesso ao pescado in natura e seus produtos se dá através do comércio varejista de pescados denominado como peixarias. Tendo em vista que não há normativa específica no estado do Rio Grande do Sul (RS)/Brasil, que contemple a fiscalização de peixarias e que contenha um checklist para este ramo de atividade, o objetivo do estudo foi elaborar e validar uma lista de verificação de boas práticas de manipulação para peixarias (LVBPM) que fosse completa, objetiva e de fácil aplicabilidade para auxiliar os fiscais sanitários municipais nas inspeções destes estabelecimentos. Para tanto, foram consultados 11 roteiros de inspeção sanitária com foco em peixarias que contemplaram as esferas municipais, estaduais, federal e uma normativa internacional, resultando em 1.188 itens analisados. Destes, foram selecionados 74 itens e divididos em seis blocos conforme legislação brasileira vigente. Foi realizado um pré-teste em duas peixarias de Porto Alegre/RS e após, a LVBPM foi encaminhada para um comitê de seis especialistas para validação de face do instrumento. A LVBPM validada finalizou com 84 itens. Conforme os resultados apresentados, a LVBPM mostrou-se um instrumento completo e objetivo para aplicação pela fiscalização sanitária durante as inspeções nas peixarias, vislumbrando-se a possibilidade de sua adoção e utilização pelos órgãos reguladores para auxiliar os fiscais sanitários municipais na fiscalização de peixarias no estado do RS.

Palavras-chave: Vigilância sanitária; Peixaria; Lista de verificação.

Resumen

El consumo de pescado ha ido en aumento en los últimos años debido al incremento en el aporte de esta proteína animal y los beneficios para la salud que este alimento puede promover. El acceso al pescado fresco y sus productos se realiza a través del comercio minorista de pescado conocido como pescaderías. Considerando que no existe una

regulación específica en el estado de Rio Grande do Sul (RS)/Brasil, que contemple la inspección de las pescaderías y contenga una lista de control para esta rama de actividad, el objetivo del estudio fue elaborar y validar una lista de control de buenas prácticas de manejo para pescaderos (LVBPM) que fue completa, objetiva y de fácil aplicación para ayudar a los inspectores sanitarios municipales en las inspecciones de estos establecimientos. Para ello, se consultaron 11 libretas de inspección sanitaria, con foco en pescaderías, que abarcan normativas municipales, estatales, federales e internacionales, resultando en 1.188 ítems analizados. De estos, 74 artículos fueron seleccionados y divididos en seis bloques de acuerdo con la legislación brasileña vigente. Fue realizado un pre-test en dos pescaderías de Porto Alegre/RS y después de eso, el LVBPM fue enviado a un comité de seis expertos para validación facial del instrumento. El LVBPM validado finalizó con 84 ítems. De acuerdo con los resultados presentados, la LVBPM demostró ser un instrumento completo y objetivo de aplicación por parte de la inspección sanitaria durante las inspecciones en las pescaderías, vislumbrándose la posibilidad de su adopción y uso por parte de los Órganos reguladores para auxiliar a los inspectores sanitarios municipales en la inspección de pescaderías en el estado de RS.

Palabras clave: Vigilancia en salud; Pescadero; Lista de verificación.

1. Introduction

According to The State of World Fisheries and Aquaculture (SOFIA) of 2020, published by the Food and Agriculture Organization of the United Nations (FAO), global fish consumption increased at an average annual rate of 3.1% from 1961 to 2017, which is almost double the population growth (1.6%) in the same period, and higher than the consumption of other foods of animal origin (meat, milk, and derivatives), with a 2.1% annual increase (FAO, 2020).

The per capita consumption of fish in Brazil was 10.5 kg per inhabitant per year in 2021, which is below the FAO recommendation of 12 kg (PeixeBR, 2020). As reported by Santos (2022), this scenario has increased after three consecutive years of declined consumption of this protein.

Sartori and Amancio (2012) reported that fish is seen as a food of great importance for human nutrition, mainly due to its nutritional value. It is considered a source of high biological value proteins and presents a balance of essential amino acids and fat-soluble vitamins, besides containing minerals such as calcium, phosphorus, and iron (Sartori & Amancio, 2012). In addition, it contains all essential amino acids, with high lysine content and the minimum amount of connective tissue, which favors digestibility above 95%, depending on the fish species, which is higher than that of meat and milk (Oetterer et al., 2006).

The World Health Organization (WHO) recommends the consumption of at least two portions of some variety of fish products a week to supplement eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA), which are essential to the human body due to their cardioprotective effects (Hellberg et al., 2012).

The commercialization of fish is carried out in fish retail stores called fishmongers. In Brazil, this economic activity is included in the National Code of Business Activity (CNAE) under registration number 4722-9/02, which includes the retail trade of fresh, frozen, preserved, or refrigerated fish, crustaceans, and mollusks (Concla, 2021).

The municipal health surveillance authorities are responsible for the inspection of fishmongers in the municipalities, aiming to verify the hygiene and sanitary conditions of the facilities and equipment, the health of the handlers, as well as the quality and safety of the stored, processed, and marketed fish.

Although sanitary regulations have been used to guarantee the adequate inspection of the fish market, there are no specific rules in the state of Rio Grande do Sul for this branch of activity, which impairs an effective sanitary inspection. In addition, fish is a highly perishable and easily degradable food, with high risk to the consumer when handled and marketed without the minimum requirements for hygiene and food control.

The FAO and WHO Joint Sanitary Code Commission has outlined preventive measures for the preparation, handling, storage, transport, and market for producing safe and suitable food for human consumption (WHO, 1968 apud Marins & Tancredi, 2014). The Integrated Manual of Surveillance, Prevention, and Control of Food borne Diseases (Brasil, 2010)

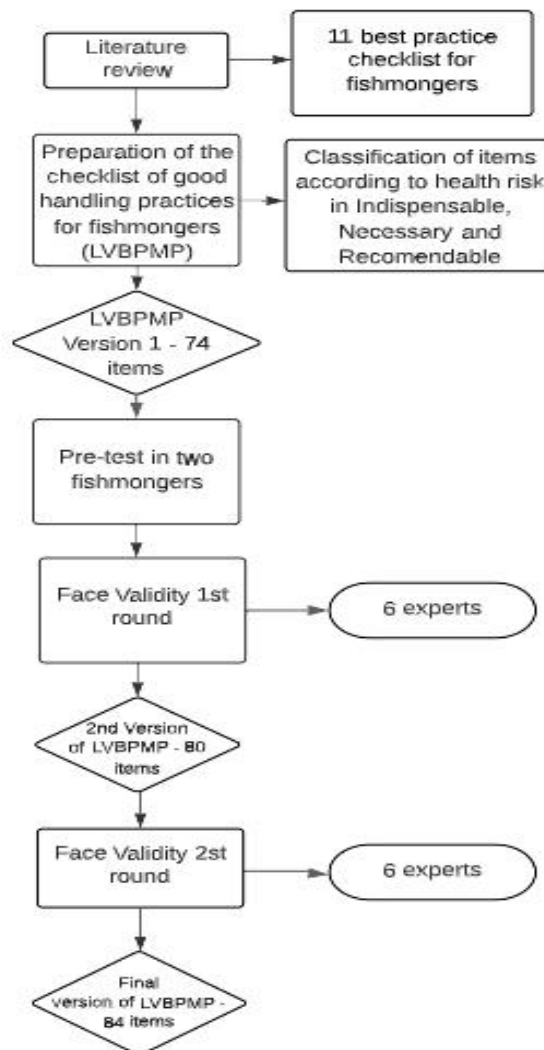
defines safe food as those products manufactured, preserved, transported, sold, or exposed for sale, under conditions that ensure the control of hazards, without risk to the consumer.

According to the World Health Organization (WHO), food borne diseases encompass diseases of the broadest spectrum and result from the ingestion of food contaminated with microorganisms or chemicals, being considered a growing public health problem (Brasil, 2010). Huss et al (1997) states that diseases transmitted by fish consumption may be associated with contamination by microorganisms such as *Clostridium perfringens*, *Escherichia coli*, *Vibrium cholerae*, among others. In addition, the presence of chemicals, such as marine biotoxins, are also associated with the consumption of contaminated fish.

Considering the importance of fish consumption, the lack of specific sanitary legislation for fishmongers in the state of Rio Grande do Sul/Brazil, and the food safety threat of this product, this study aimed to develop and validate a checklist of good handling practices for fishmongers that is easy to apply, up-to-date, and objective, thus contributing with the municipal sanitary surveillance team of Rio Grande do Sul during inspection of these establishments.

2. Methodology

Figure 1: Flow chart of the experimental design of the development and validity of a handling checklist for fishmongers (LVBPM).



Source: Authors.

The flow chart in Figure 1 demonstrates the experimental design of the process of elaboration and validation of a handling checklist for fishmongers (LVBMP), which was composed of the following steps: literature review, in which eleven best practice checklist for fishmongers from different administrative spheres were evaluated (municipal, state, federal and international); preparation of the checklist handling practices for fishmongers (LVBMP); classification of the items according to health risk in Indispensable, Necessary and Recomendable. From these initial stages, the Version 1 of the LVBMP was elaborated, with 74 items, which was applied, as a pre-test, in two fishmongers. For validation of the experiment, face validity was applied by 6 experts, in two rounds, after the elaboration of the first and second versions of the LVBMP. The Final Version of the instrument was written with 84 items.

2.1 Elaboration of a checklist of good handling practices for fishmongers

A checklist of good handling practices for fishmongers was developed from a literature review and analysis of existing instruments for the evaluation of hygienic-sanitary conditions of commercial establishments, with a focus on fish that included storage, processing (peeling, skinning, gutting, and filleting) and commercialization of fish as described in the State Decree 23.430 of October 24, 1974.

Eleven inspection schedules from the different spheres of sanitary inspection in Brazil were analyzed, at the federal, state, and municipal levels, as well as an international schedule. At the federal level, the Good Manufacturing Practices of the Food Establishment Checklist of ANVISA (Resolution RDC 275 of October 21, 2002, ANVISA) was used for the overall structuring of the instrument. At the state level, the schedules used in the states of Rio Grande do Sul (Ordinance/RS 78, of January 30, 2009), Parana (SESA/PR 469, November 23, 2016), Santa Catarina (Decree/SC 31,455, of February 20, 1987), and São Paulo (CVS/SP Ordinance 5, of April 9, 2013) were selected. Concerning the municipal level, the schedules used by the municipal health surveillance agencies of Recife (Special Technical Standard SESAU 1, June 1, 2017), Rio de Janeiro (Decree/RJ 45. 585, December 27, 2018), São Paulo (Ordinance/SP 2619, of December 6, 2011), Belo Horizonte (Ordinance Smsa-Sus/BH 035/98, of November 11, 1998; Ordinance Smsa-Sus/BH 018/00, of April 14, 2000), and Manaus (Law 392/Manaus, of June 27, 1997) were studied. Finally, an international schedule used in the city of Seixal (Portugal, 2008 apud Dias, R. C. J., 2010) was assessed. This theoretical basis was important for the decision and development of a new instrument, leading to the analysis of 1,188 verification items reported in the 11 inspection schedules.

To structure and organize the LVBMP, the categories of the good manufacturing practices checklist of ANVISA (Resolution RDC 275, of October 21, 2002) were used, with adaptations. Although it was not a specific list for fishmongers, it was considered the most appropriate basis due to its scope, wide dissemination, excellence, and wide use by sanitary inspection.

The categories of the ANVISA checklist (Resolution RDC 275, October 21, 2002) are classified according to the standard operating procedures (SOPs), which are determinants for implementing good practices in food service establishments. Therefore, the checklist proposed and adapted for the present study was organized into six categories, as follows: i) identification of the fish monger; ii) documentation; iii) buildings and facilities; iv) equipment, furniture, and utensils; v) handlers; and vi) raw material.

The first checklist contained 74 items (Version 1 of the LVBMP) that covered most of the evaluation steps for the good handling practices and hygienic-sanitary conditions in a fish monger. Of the total of 74 items, 65 were objective, consisting of the responses Yes - Y (meets the requirements of the evaluation item), No - N (does not meet the requirements of the evaluation item), and Not Applied - NA (the evaluation item does not apply to the inspected establishment or was not observed during the application of the instrument).

All 74 items on the checklist were also classified according to the guidelines of the Ministry of Health (Brasil, 2010) into Indispensable (I), Necessary (N), and Recommendable (R). The classification criteria were based on the potential risk inherent in each item, concerning product quality and safety, and worker safety in their interaction with products and processes (Brasil, 2010). The indispensable items (I) are those that meet the good manufacturing practices and can greatly affect the quality or safety of products and workers in their interaction with products and processes. The necessary items (N) are those that meet the good manufacturing practices and can influence to a less extent the quality or safety of products and workers in their interaction with the products and processes. Finally, the recommendable items (R) are those that meet the good manufacturing practices and may have little effect on the quality or safety of products and the safety of workers in their interaction with products and processes (Brasil, 2010).

2.2 Pre-test in the fishmongers

A pre-test using Version 1 of the LVBMP was performed on two fishmongers in the city of Porto Alegre/RS. The application of the checklist was performed by the researcher of this study, accompanied by an inspector from the food surveillance team of the General Directorate of Health Surveillance (DGVS) of the city of Porto Alegre.

2.3 Validity of LVBMP

The apparent or face validity method was used to validate the LVBMP, as proposed by Pasquali (2010). In this method, the evaluation instrument is analyzed by a committee of experts regarding the measurement capacity, measurement of effectiveness, and the relevant evidence, in addition to evaluating the structure and appearance of the instrument. The expert team was made up of health or agricultural inspectors. The validity process of the LVBMP was carried out in stages, using Version 1 and Version 2 of the document, until a validated Final Version for use in a larger number of fish mongers.

For the analysis, six previously selected experts who agreed to participate in the study received Version 1 of the LVBMP via e-mail, followed by Version 2 after four months. The experts were asked to evaluate and suggest changes in the instrument that they considered pertinent and necessary for its improvement.

The experts were selected as suggested by Oliveira et al (2014), as follows: i) academic background (multidisciplinary, with knowledge in the food area and good practices) in veterinary medicine, food engineering, nutrition, biology, or related fields; ii) position of health or agricultural inspector; iii) appointment by public competition (municipal, state, or federal spheres), and iv) experience in inspection of fish and fish mongers. The experts also received a link to Google Forms to evaluate the checklist. The methodology Seven Dimensions of Evaluation Quality proposed by Equal (2007 apud Stedefeldt et al. 2013) was used in the questionnaire, with the following evaluation criteria: i) contemplation and innovation, ii) benefit, iii) adequacy, iv) utility, v) accessibility, vi) equality, and vii) transference. The experts assigned a score for each question according to the five-point Likert Attitude Scale (Likert, 1932 apud Stedefeldt et al. 2013), corresponding to 1 - strongly disagree, 2 - partially disagree, 3 - neither agree nor disagree, 4 - partially agree, and 5 - strongly agree.

2.4 Statistical analysis

All guidelines of the experimental design, the methodologies for validation, and the statistical analyses were performed by the Statistical Advisory Center (NAE) of the Department of Statistics, Institute of Mathematics and Statistics, Federal University of Rio Grande do Sul (NAE, 2021).

3. Results and Discussion

3.1 Pre-test

A pre-test was performed on two fishmongers in Porto Alegre, named "A" and "B", to determine the applicability and objectivity of the LVBMP. Both fishmongers were intentionally selected to apply the instrument to fishmongers with different characteristics.

The fishmonger "A" was located in the northern of Porto Alegre/RS, with an average area of 60 m², and had only one employee and no technical manager. Mullet fish was the main fish commercialized in the establishment, and the average monthly sales in volume were approximately 200 kg. The establishment commercialized frozen fish coming directly from fish distributors, with sanitary certification of origin and purchase invoices. It also bought fresh fish from fishermen from the northern coast of Rio Grande do Sul, and the freezing steps were performed at the fishmonger, with no invoice, inspection record, or any other form of sanitary certification of origin.

In turn, fishmonger "B" was also located in the northern of Porto Alegre/RS, inside a supermarket. It had an area of 30 m², 4 employees, a technical manager, and Saint Peter (a variety of tilapia) was the main fish marketed in the establishment, with average monthly sales in volume of 4 tons. Fish were marketed as fresh, chilled, and frozen, and the latter was placed directly on the shelves, without handling. The results of the pre-test are shown in Table 1.

Table 1: Results of the pre-test carried out on two fishmongers in Porto Alegre/RS in January 2020 to determine applicability and objectivity.

Fishmonger	COMPLIANCE OF ITEMS			Total of items
	YES	NO	NA	
Fishmonger "A"	13 (20%)	42 (64.61%)	10 (15.38%)	65
Indispensable items	5	10	8	23
Necessary items	8	23	2	33
Recommendable items	-	9	-	9
Fishmonger "B"	59 (90.77%)	6 (9.23%)	-	65
Indispensable items	22	1	-	23
Necessary items	26	5	-	31
Recommendable items	11	-	-	11

Source: Authors.

Due to the unsatisfactory hygienic-sanitary conditions, represented by only 20% of compliant items in fishmonger "A", the establishment was notified by the municipal health surveillance of Porto Alegre to correct the irregularities within the period established by the health inspector. The action was considered appropriate, once most of the nonconforming items were classified as indispensable and necessary, as can be seen in Table 1, thus posing a high risk of an outbreak of food borne illness.

The fishmonger "B" had 90.77% of items in compliance with the checklist, thus meeting the sanitary and hygienic criteria. In addition, the number of indispensable items in compliance (22) also characterized fishmonger "B" as having good

sanitary conditions (Table 1).

The results of the pre-test showed that the proposed LVBPM instrument was easily understood and applicable by the sanitary inspectors, once it adapted well to the very different fishmongers and was considered complete and objective for all situations, allowing a better technical basis for decision-making in notifications by the sanitary inspectors.

3.2 Validity of LVBPM

In the first round of evaluation of the good handling practices checklist by the experts (Version 1 of the LVBPM), the following results were verified regarding the seven dimensions of evaluation (Table 2).

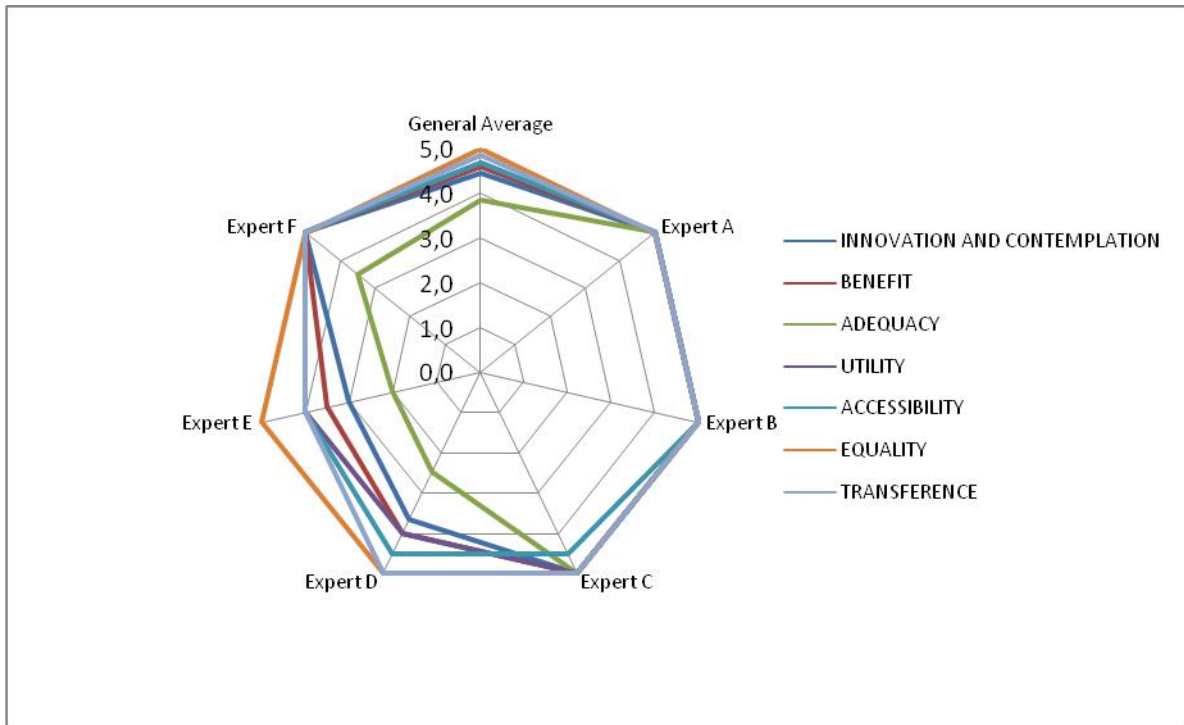
Table 2: Average score assigned by the experts for each dimension of evaluation, and number of questions on the form for each dimension of Version 1 of the LVBPM.

Dimension	Number of questions in the form	Average score assigned by the experts
Innovation and Contemplation	3	4.44
Benefit	2	4.58
Adequacy	2	3.83
Utility	1	4.67
Accessibility	2	4.67
Equality	1	5.00
Transference	2	4.83

Source: Authors.

The graphical representation of the average scores assigned by each expert for each dimension in Table 2 is shown in Figure 2.

Figure 2: Graphical representation of the average scores, and individual scores assigned by the six experts for each dimension of Version 1 of the LVBMPM.



Source: Authors.

The scores in Figure 2 showed that the dimension equality received the higher scores, with a final average of 5.00, demonstrating that the LVBMPM can be used in all types of fish mongers, as long as the 4722-9/02 code is provided by the CNAE. However, adequacy had the lowest score (3.83), mainly due to the scores assigned by the agricultural inspectors (experts D, E, and F), probably because these professionals are veterinarians working in inspection rather than fish retailing. They reported that the checklist of the new version of the LVBMPM should contemplate items concerning the organoleptic characteristics and the sanitary inspection of fish.

On the other hand, the health inspectors (experts A, B, and C), consisting of two veterinarians and a nutritionist, all with experience in the fish market, gave higher scores for all dimensions, except for accessibility, in which the nutritionist (expert C) recommended a clearer and more direct description of the items in the new version of the LVBMPM.

In addition to answering the questionnaire, the experts also suggested changing 28 items in the checklist, including the classification and/or writing of the items, inclusion and/or exclusion of items, improvement of items described with negative sentences, and instructions for completion at the end of the checklist.

All suggestions of the six experts were taken into account, thus Version 2 of the LVBMPM was expanded to 80 items. The results of the second round of evaluation (Version 2 of the LVBMPM) for the seven dimensions of evaluation are shown in Table 3.

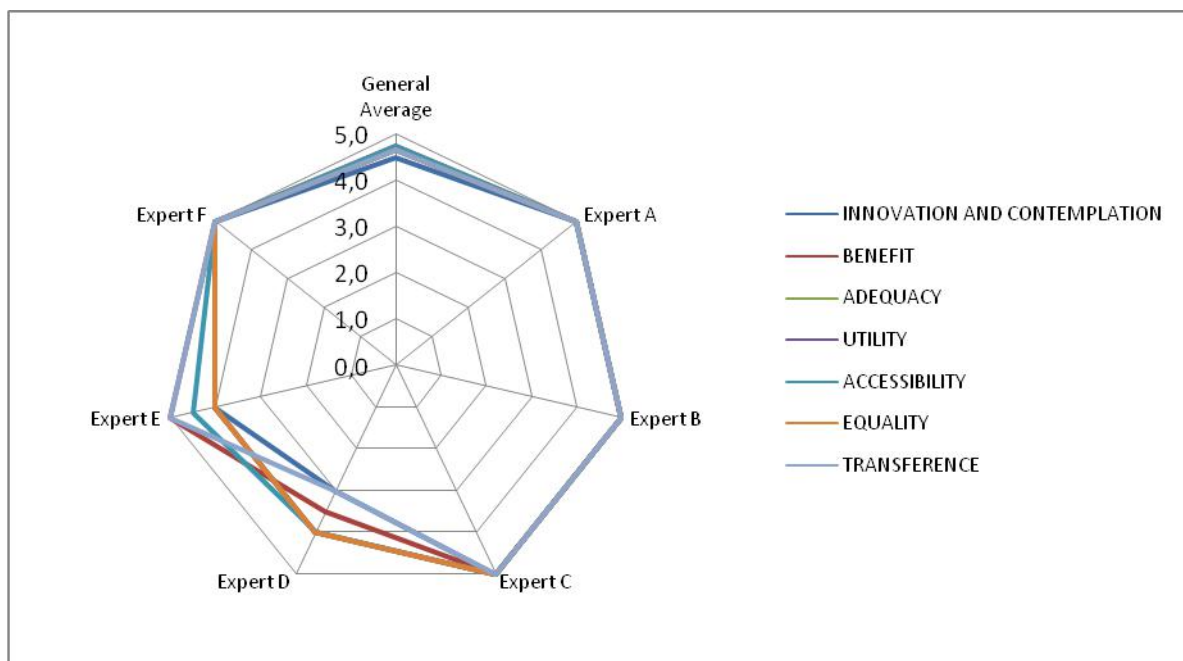
Table 3: Average scores assigned by the experts for each dimension of evaluation in Version 2 of the LVBPMF.

Dimension	Average score assigned by the experts
Innovation and Contemplation	4.50
Benefit	4.75
Adequacy	4.67
Utility	4.67
Accessibility	4.75
Equality	4.67
Transference	4.67

Source: Authors.

The graphical representation of the average scores assigned by each expert for each dimension in Table 3 is shown in Figure 3.

Figure 3: Graphical representation of the average scores, and individual scores assigned by the six experts for each dimension of Version 2 of the LVBPMF.



Source: Authors.

The dimensions benefit and accessibility showed the highest scores (4.75), followed by adequacy, utility, equality, and transference (4.67), and innovation and contemplation with an average score of 4.50, as can be seen in Figure 3.

Considering the two rounds of evaluation, all dimensions had final scores above four, representing a good evaluation of the instrument by the experts. Table 4 shows the average scores of the first and second rounds and the final scores of each dimension.

Table 4: Average scores assigned by the experts for each dimension per round of evaluation, and final scores.

Dimension	Average score Round 1	Average score Round 2	Final score
Innovation and Contemplation	4.44	4.50	4.47
Benefit	4.58	4.75	4.66
Adequacy	3.83	4.67	4.25
Utility	4.67	4.67	4.67
Accessibility	4.67	4.75	4.71
Equality	5.00	4.67	4.83
Transference	4.83	4.67	4.75

Source: Authors.

As can be seen in Table 4, the dimensions equality, transference, and accessibility presented the best scores in both rounds of evaluation, thus the LVBPM has proven to be adequate, with the potential to improve the inspection processes of the local sanitary surveillance, making them more agile and focused on the final decisions. It also indicated that the instrument had clear and objective questions, was easy to understand and interpret, and can be easily integrated into professional inspection practice.

The experts suggested changes in the structure of Version 2, with the inclusion of six new items and the exclusion of two items, due to ambiguity of information. After the changes, the Final Validated Version of the LVBPM contained a total of 84 items (Figure 4). A summary of the changes proposed by the experts in the first and second rounds of evaluation is shown in Table 5.

Table 5: Changes proposed by the experts, per category, in the two rounds of evaluation of the LVBPM.

Category	Round 1				Round 2				Final instrument
	Item	I ¹ (n)	A ² (n)	E ³ (n)	Item	I ¹ (n)	A ² (n)	E ³ (n)	Item
1 – Identification of the fishmonger	9	1	0	0	10	0	0	0	10
2 – Documentation	8	0	3	0	8	0	0	0	8
3 – Buildings and Facilities	29	3	9	4	28	0	0	2	26
4 – Equipment, furniture, and utensils	6	1	1	0	7	0	0	0	7
5 - Handlers	6	0	0	0	6	1	2	0	7
6 – Raw material	16	6	6	1	21	5	2	0	26
Total	74	10	18	5	80	6	4	2	84

¹I – inserted items; ²A - modified items; ³E - excluded items. Fonte: adapted from Oliveira *et al.* (2014).

The importance of Category 6 in the experts' opinion, corresponding to the raw material, can be seen in Table 5. In the second round of evaluation, five items were included, two were altered, and no item was excluded, totaling 26 items in the second round of evaluation. The number of items was the same as Category 3 - buildings, furniture, and utensils, which had only two items excluded by the experts with almost no changes in the structure of the categories.

Regarding the individual evaluation per expert, the lower scores were assigned by the agricultural inspectors (experts

D, E, and F), while the nutritionist (expert C) assigned the lowest scores on the dimensions of evaluation among all health inspectors.

When assessing the items by health risk, the experts had the opportunity to modify the initial rating. The checklist of good handling practices for fish mongers was composed of 74 items, of which the first nine were not tabulated once they corresponded to the identification of the establishment, while the remaining 64 items were initially considered indispensable by 35.9% (23), necessary by 46.7% (30), and recommendable by 17.1% (11) of the experts.

Table 6 shows the changes in the classification of items by health risk suggested by the experts, resulting in the finalized instrument, with 74 classifiable items.

Table 6: Modifications proposed by the experts in the classification of items by health risk, resulting in the finalized instrument with 74 classifiable items.

Category	Item	Round 1						Round 2						
		I ¹		N ²		R ³		Item	I ¹		N ²		R ³	
		n	%	n	%	n	%		n	%	n	%	n	%
2	8	1	12.5	3	37.5	4	50	8	1	12.5	3	37.5	4	50
3	28	7	25	19	67.8	2	7.1	26	7	26.7	18	69.2	1	3.8
4	7	5	71.4	2	28.6	-	-	7	5	71.4	2	28.6	-	-
5	6	2	33.3	2	33.3	2	33.3	7	3	42.8	3	42.8	1	14.3
6	21	20	95.2	1	4.8	-	-	26	25	96.2	1	3.8	-	-
Total	70	35	50	27	38.5	8	11.5	74	41	55.4	27	36.5	6	8.1

¹I – Indispensable items; ²N - Necessary items; ³R - Recommendable items. Source: adapted from Oliveira *et al.*, (2014).

In the first round of evaluation, there was an increase in the number of items classified as indispensable, mainly in Category 6, which refers to the raw material (Table 6). The relevance of this category when compared to the other categories was confirmed in the second round of evaluation, which culminated in the final version of the LVBPM. Thus, given the number of indispensable items in Category 6, during a sanitary inspection, the greatest attention of the inspector should turn to the items in this category.

As shown in Table 6, Category 3, which referred to building and facilities, had the highest percentage of items considered necessary. Thus, the noncompliance of these items can interfere to a less extent with the quality and sanitary safety of the marketed products, although they should meet the good manufacturing practices. Category 2 presented the highest number of recommendable items, probably for containing items that cover the documental part of the establishment, which are answered according to the information provided by the person in charge during the evaluation. Thus, an inspection action cannot be performed immediately in the case of negative responses once the failure does not lead to imminent health risk to the consumer.

Figure 4: Validated Final Version of the LVBPM with a total of 84 items, divided into six categories.

Checklist of good handling practices for fishmongers

Inspection date: _____ Health inspector responsible for filling in: _____

Reason for inspection: () request for health permit () renewal of health permit () verification of consumer complaint () food collection () investigation of DTA outbreaks () others

1. Identification of the Fishmonger					
1	Social Reason:	_____			
2	Fantasy name:	_____			
3	CNPJ:	_____			
4	Address and Municipality:	_____			
5	Telephones (DDD):	_____			
6	Technical manager:	_____			
7	Estimated area of fish market (m2):	_____			
8	Average number of employees:	_____			
9	Fish market water supply source (public/alternative/both)	_____			
10	Average monthly volume of processed/processed fish (in kg):	_____			
2. Documentation		CLASSIFICATION OF THE ITEM (I, N, R)	YES	NO	NA
11	Do you have a sanitary permit?	R			
12	Do you have a manual on good food handling practices?	R			
13	Do you have fish temperature control sheets?	N			
14	Do you have an updated proof of water tank cleaning, with an execution date of less than six months?	N			
15	In the case of water from an alternative source, is potability certified every six months through laboratory reports?	N			
16	Do you have a certificate of employee participation in training in good food handling practices?	R			
17	Do you have a temperature record of the handling room?	R			
18	Do you have an up-to-date integrated pest control certificate, dated less than six months ago?	I			
3. Buildings and Facilities		CLASSIFICATION OF THE ITEM (I, N, R)	YES	NO	NA
19	External area free of unhealthy sources, such as objects in disuse, stagnant water, accumulation of garbage, vectors and domestic animals.	N			
20	The fishmonger's main access is exclusive and independent, not common to other uses.	N			
21	The external doors of the fishmonger have barriers that prevent the entry of vectors.	N			
22	The windows have barriers that prevent the entry of vectors.	N			
23	The doors of the fish handling room are self-closing and have barriers that prevent the entry of vectors.	N			
24	The floor of the fish handling area has a smooth waterproof surface, resistant, light in color, easy to clean and allows the collection of waste water.	N			
25	The floor of the fish handling area is in good condition.	N			
26	The roof of the fish handling area is light in color, with a smooth, waterproof surface, resistant, easy to clean, with no condensation, mold or fungi.	N			
27	The roof of the fish handling area is in good condition.	N			
28	The walls of the fish handling area have a smooth, waterproof, resistant, light-colored surface and are easy to clean.	N			
29	The walls of the fish handling area are in good condition.	N			
30	The lighting is suitable for the activity performed.	N			
31	Use of lamps properly protected against shattering in the fish handling area.	N			
32	Ventilation and air circulation capable of preventing condensation and unpleasant odors.	N			
33	Presence of bins with lids, with non-manual activation, in sufficient quantity for the activity carried out in the handling area.	N			
34	Presence of a sink for equipment and utensils with running water and hygiene products registered with the Ministry of Health.	I			
35	Presence of a washbasin preferably equipped with a faucet with automatic and/or non-manual activation, exclusively for washing hands by the handlers with running water, liquid and antiseptic soap, disposable towels made of non-recycled paper and a garbage can with non-manual activation.	I			
36	Toilet for handlers for exclusive use, equipped with a toilet with a lid, washbasin with running water, liquid soap, antiseptic, non-recycled paper towels and a non-manual trash can.	I			
37	Handlers' toilets without direct communication with the handling area.	I			
38	Production flow without crossings between stages: raw material reception and storage area, handling and marketing separated by physical barriers.	I			
39	Structural planning of the fish shop suitable for the handling volume.	N			
40	The fishmonger has a water tank properly sealed, without cracks and properly capped.	R			
41	The fishmonger is in an adequate state of hygiene.	I			
42	Cleaning products and materials stored in a specific place, without contact with food.	N			
43	Absence of vectors, urban pests and/or domestic animals.	I			
44	Existence of a separate refrigerated place for storing waste, with frequent removal, avoiding outbreaks of unhealthy conditions.	N			

4. Equipment, furniture and utensils		CLASSIFICATION OF THE ITEM (I, N, R)	YES	NO	NA
45	Equipment in the handling area in adequate numbers for the volume of fish handled.	N			
46	Equipment surfaces that come into contact with food are smooth, resistant, easy to clean, made of non-contaminating material and intact.	I			
47	Fish storage equipment in an adequate state of hygiene and functioning.	I			
48	Equipment for displaying fish in the commercialization area in an adequate state of hygiene and functioning.	I			
49	Presence of temperature indicators in equipment for the storage and marketing of chilled or frozen fish, in order	N			
50	Ice manufacturing and/or storage equipment in proper working order and cleaning.	I			
51	Utensils made of non-contaminating, resistant material that allow easy cleaning, in an adequate state of conservation.	I			
5. Handlers		CLASSIFICATION OF THE ITEM (I, N, R)	YES	NO	NA
52	The handlers wear a uniform suitable for the activity and exclusive to the production area.	N			
53	Handlers have good personal cleanliness, clean hands, short, unadorned nails, nail polish, shaved, protected hair.	N			
54	Handlers carefully wash their hands before handling the fish, after going to the bathroom and after any interruption in handling activities.	I			
55	Handlers have an updated health card or similar document, attesting that their health status is fit to handle food.	N			
56	Handlers are removed if they have skin conditions, wounds, suppurations, respiratory, gastrointestinal and eye infections.	I			
57	Handlers use personal protective equipment: steel glove, apron, rubber boot.	R			
58	Handlers adopt good hygiene practices during food handling activities.	I			
6. Raw material		CLASSIFICATION OF THE ITEM (I, N, R)	YES	NO	NA
59	The reception of the raw material takes place in a place protected against the weather (sun, dust, wind, vectors and rodents) and isolated by a physical barrier from the handling area.	N			
60	All packaged raw material is labeled in accordance with current health regulations.	I			
61	All raw material comes from establishments registered and inspected by the competent sanitary agency.	I			
62	Fresh fish is received and marketed at a temperature close to melting ice (0°C), packed with crushed ice or under refrigeration, as established by the labeling.	I			
63	Upon receipt, the fresh fish is free from any and all evidence of decomposition, blemishes and bruises, incisions or breaks in the external surfaces.	I			
64	When storing whole or gutted fresh fish at the sales counter, the amount of finely crushed ice is sufficient to ensure a temperature close to the melting point of ice in the innermost part of the muscle.	I			
65	All cooled fish is received packaged, stored and marketed at a temperature between 0 and 4° C.	I			
66	All frozen fish is received packaged, stored and marketed at a temperature of -18°C.	I			
67	All salted fish is received and kept refrigerated at a maximum temperature of 4°C.	I			
68	All dried salted fish is received and stored at a maximum temperature of 7°C.	I			
69	The fish received and marketed maintains its sensory characteristics preserved.	I			
70	The fish received and marketed maintains the nomenclature of a compatible species.	I			
71	The fish received, stored and marketed packaged is presented with its packaging and labeling intact.	I			
72	The fish is processed in a separate room with a temperature of up to 16°C.	I			
73	The products of the fish processing (slices, fillets) are exposed on refrigerated counters, without the direct action of the ice, guaranteeing the maintenance of the temperature of the products up to 4° C.	I			
74	Fish processing products (slices, fillets) are displayed on refrigerated counters, without the direct action of ice, protected from the possibility of cross-contamination with other foods.	I			
75	The fishmonger does not carry out industrial fish activities, such as salting, cooking, smoking, freezing, fabrication of preserves.	I			
76	The fishmonger does not perform frozen fish fractionation.	I			
77	The fishmonger does not carry out water immersion bathing activities in the fish.	I			
78	The fishmonger does not use newspapers, magazines and used papers to wrap the fish and deliver it to the consumer at the time of sale.	I			
79	The fishmonger does not offer ready-to-eat foods, such as boiled, fried and stewed fish.	I			
80	The water used in the fishmonger meets the water potability standards established by the current sanitary legislation.	I			
81	The ice used in the fishmonger's is in an adequate state of hygiene, free of dirt, tasteless, odorless and colorless.	I			
82	The ice used in the fishmonger is stored and handled in such a way as to be protected from any contamination.	I			
83	The ice used in the ice fish shop is made from water whose microbiological, chemical and radioactive parameters meet the quality standards of water for human consumption.	I			
84	The ice used in the fishmonger comes from a place licensed by the health surveillance.	I			

Fish processing: comprises the actions of gutting, scaling, skinning, heading and filleting
Indispensable (I) (to those who comply with GMP, which can critically influence the quality or safety of products and the safety of workers in their interaction with products and processes)
Necessary (N) (to those who comply with GMP, which can influence to a lesser degree the quality or safety of products and the safety of workers in their interaction with products and processes)
Recommendable (R) (to those who comply with GMP, which may influence in a non-critical degree the quality or safety of products and the safety of workers in their interaction with products and processes)

Source: Authors.

4. Conclusion

The main topics required by the existing sanitary legislations applicable to fish mongers were contemplated in the final version of the LVBMP. The indication of indispensable items in these establishments can contribute effectively to the results of sanitary inspections, aiming to enhance food safety.

The heterogeneity of the expert committee that validated the instrument contributed to a more differentiated view of

fish mongers, from the quality and safety of the raw material to the supply to the consumer, allowing a complete evaluation of the instrument.

According to the validity rounds of the LVBMP regarding the classification according to sanitary risk, Category 6 corresponding to the raw material should be considered the focus of sanitary inspections in fishmongers due to the largest number of indispensable items. However, further studies on the validity of checklists of GMP are required, which can contribute to the discussion topics.

Thus, the validated LVBMP of the present study can effectively contribute to food sanitary surveillance actions in the Rio Grande do Sul by proposing a complete easy-to-use instrument to assist the sanitary inspectors during inspections in fish mongers, with the possibility of its adoption by regulatory agencies.

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