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Asociación de prácticas sustentables según los tipos de servicios de alimentación colectiva

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ABSTRACT

Introduction: collective food services (CFSs) play a key role in sustainability, but face challenges in measuring and managing waste, as well as some studies demonstrate unsatisfactory results considering sustainability indicators used in food services.

Objective: to associate sustainable practices according to types of collective food services.

Methodology: a cross-sectional analytical study conducted using an online survey of nutritionists in collective food services (CFS) with at least six months of experience. The survey, validated by experts, consists of 43 questions on general characteristics and sustainable practices. Associations were analyzed using Chi-square test and logistic regression.

Results: factors associated with sustainable practices were the type of facility with energy optimization (p = 0.038) and use of disposable packaging (p = 0.002). CFSs complexity was associated with liquid waste management (p = 0.001) and use of disposable packaging (p = 0.008). CFSs administration type was associated with liquid waste management (p = 0.009). A multivariate analysis found that non-hospital services were more likely to implement sustainable practices (OR = 0.372; 95 % CI, 0.171-0.813).

Finally, among the main barriers identified for the implementation of sustainable practices are the limited time to monitor compliance and the safety risk when making food donations.

Conclusion: it highlights the importance of the type of service and how it can influence sustainable practices, defining consequently, sustainability promotion strategies that must be different and specific, according to the nature of the CFSs, and the importance of generating awareness, training and effective action plans to mitigate environmental impact and ensure the long-term sustainability of these facilities.

Keywords: Sustainability. Food service. Sustainable practices. Nutritionist.

RESUMEN

Introducción: los servicios de alimentación colectiva (SAC) juegan un papel clave en la sostenibilidad, pero enfrentan desafíos en la medición y gestión de residuos, así como también algunos estudios demuestran resultados insatisfactorios considerando indicadores de sostenibilidad utilizados en los servicios de alimentación.

Objetivo: asociar prácticas sustentables en diferentes tipos de servicios de alimentación colectiva.

Metodología: estudio analítico transversal con encuesta online a nutricionistas en servicios de alimentación colectiva (SAC) con al menos 6 meses de experiencia. La encuesta, validada por expertos, consta de 43 preguntas sobre características generales y prácticas sustentables. Se analizaron asociaciones con chi cuadrado y regresión logística.

Resultados: los factores asociados con las prácticas sostenibles fueron el tipo de instalación con optimización energética (p = 0,038) y el uso de envases desechables (p = 0,002). La complejidad de los SFC se asoció con la gestión de residuos líquidos (p = 0,001) y el uso de envases desechables (p = 0,008). El tipo de administración de los SFC se asoció con la gestión de residuos líquidos (p = 0,009). Un análisis multivariante reveló que los servicios no hospitalarios tenían mayor probabilidad de implementar prácticas sostenibles (OR = 0,372; IC 95 %: 0,171-0,813).

Finalmente, entre las principales barreras identificadas para la implementación de prácticas sostenibles se encuentran el tiempo limitado para supervisar el cumplimiento y el riesgo de inocuidad al realizar donaciones de alimentos.

Conclusión: destaca la importancia de generar conciencia, capacitación y planes de acción efectivos para mitigar el impacto ambiental y asegurar la sostenibilidad a largo plazo de los SAC, optimizando el uso de recursos y reduciendo los desperdicios, para

mitigar el impacto ambiental y el compromiso de recursos para las generaciones futuras.

Palabras clave: Sostenibilidad. Servicio de alimentación. Prácticas sustentables. Nutricionista.

INTRODUCTION

According to the Food and Agriculture Organization of the United Nations (FAO), the abusive use of natural resources and food loss and waste (1) are considered important indicators of sustainability and within the Sustainable Development Goals (SDGs) established by the United Nations (UN), which are based on actions to promote sustainable production, are clean water and sanitation, affordable and clean energy, responsible production and consumption, and climate action, although there are also others that to a lesser extent, would also have an impact on mitigating pollution.

This action contributes to a more efficient use of natural resources, such as water and agricultural land, as well as to an improved management of human resources involved in food production processes (2,3).

When it comes to the industry that provides institutional food services, it is important to note the role of Collective Food Services (CFSs) as significant contributors to the phenomenon of food unsustainability**.** In addition, based on the evidence gathered from a systematic review, it was determined that the assessment of CFSs practices is mainly conducted through the quantification and classification of solid waste. However, unsatisfactory results have been obtained in relation to the sustainability indicators used, particularly those related to waste measurement, along with the absence or lack of sustainable development initiatives (4).

The high levels of waste, combined with the lack of practices designed to control the use of natural resources and waste generation, point to

the importance of raising awareness among professionals about the combination of the different measures implemented, and their strengthening, to mitigate the environmental impact and the commitment of resources for future generations (5).

Additionally, emphasis is placed on the important role of the nutritionist, since the Technical Standard for Food and Nutrition Services in Chile (6) establishes that the organization, operation, administration and control of collective food services represent managerial responsibilities, whether the service is self-managed or outsourced (7). Moreover, the nutritionist has been trained to select and direct the application of efficient and appropriate methods for the purchase, production and distribution of food products, as well as to supervise and analyze each of the indicators involved in the production chain (8). However, sustainable practices that are being applied in Chilean food services remain unknown.

The objective of this study is to associate sustainable practices according to types of collective food services.

MATERIALS AND METHODS

Cross-sectional analytical study that involved the application of an online survey was developed by academics based on available literature in the field of institutional food services and was conducted in two phases:

- Phase 1: four external experts from the research group with extensive experience in food and nutrition services were brought in to review the survey, and adjustments were suggested to reflect the national situation.
- Phase 2: the questionnaire was validated through an analysis of the Content Validity Index (CVI) and the calculation of Lawshe's Content Validity Ratio (CVR) (9)

A total of 48 questions were formulated. At this point, each expert must assign a score to each item, within three possibilities: the element is “essential” (1) to evaluate the construct; it is useful, but not essential (0); or it is deemed not necessary (0). On this assessment, the following expression is applied:

$$CVI = \frac{\sum_{i=1}^{M} CVRi}{M}$$

Where *n* is the number of experts who agree in the “essential” category (addition of ones) and N is the total number of experts who evaluate the content (In this case 12 experts external). The original Lawshe acceptance criterion for 12 experts was an CVR equal to or greater than 0.56. The experts consisted of nutritionists who worked in CFSs or university academics who worked in the field of collective food services. Finally, 43 questions were selected to be included in the final document.

The first item of the survey consisted of 4 questions to characterize the nutritionist, including whether he/she was a nutritionist, whether the nutritionist lived in Chile, type of position in the CFSs and whether he/she worked for at least 6 months in the corresponding CFSs.

The second item of the survey characterized the CFSs and consisted of 5 questions, among which were the level of complexity, the type of establishment in which it was located, the region of Chile in which it was located, type of administration, etc. The third item consisted of 34 questions, and focused on sustainable practices in different areas, for example, on waste management, energy optimization, rational use of water, among others. All the answers were alternative; it did not consider open questions.

This survey was subsequently sent to nutritionists working in the area of collective food services (CFSs). Respondents must have at least 6 months of experience in this field of work and residing in the national territory. A poster including a QR code that directed to the

survey was used to distribute the questionnaire. In addition, the link was distributed in case of not being able to access directly via the QR. The link was disseminated through groups of nutritionists via social networks (Instagram, Facebook, LinkedIn, Twitter).

The anonymous self-administered survey had an online version at the QuestionPro platform available from the Universidad San Sebastián (USS). The survey consisted of 43 questions and was divided into two items: the first item corresponded to general characteristics and the second item corresponded to questions related to sustainable practices.

Ethics

All procedures were performed in accordance with the Declaration of Helsinki. At the beginning of the survey, the informed consent form which details the objective of the study was displayed. When the participant agreed to participate, the survey opened and the participant could answer the questions. In case of refraining from participating, the survey immediately closed. This study was approved under the code 109-24 by the Ethics Committee of USS.

Statistics

Qualitative values were expressed as absolute frequency (n) and percentage (%). To evaluate the associations between the variables of interest, the Chi-square test (χ^2) was used. The implementation of sustainable practices was defined as having answered in the affirmative to 8 of 11 questions related to sustainability measures, corresponding to the 75th percentile of the distribution. This variable was dichotomized for subsequent analyses. To analyze factors associated with the implementation of sustainable practices, a logistic regression was performed; a value of $p < 0.05$ was considered significant. For the interpretation of the results, the values of the odds ratio (OR) and its 95 % confidence interval (95 % CI) were calculated. All analyses were performed using the Stata software.

RESULTS

Table I shows the general characteristics of the study sample. In terms of the Chilean regions, 52.5 % reside in the Metropolitan region, while 47.5 % are located in other regions of the country. With respect to the type of facilities, 51.9 % correspond to hospitals or clinics; 17.5 % to industrial facilities and factories; 11.2 % to nursery schools, schools or universities; 8.8 % to mining companies; and 10.6 % to others. Regarding the level of complexity of CFSs, 74.3 % correspond to maximum complexity, 13.7 % to medium complexity, and 11.8 % to minimum complexity. Finally, in terms of the type of administration, 68.7 % correspond to outsourced CFSs, versus 31.2 % which are self-managed.

Table II represents the association between the type of facility and the adoption of sustainable practices. It can be observed that there is a significant association between the type of facility and the optimization of energy consumption (p = 0.038), where 63.6 % of hospitals and clinics reported that no measures are taken to optimize energy consumption, compared to 36.4 % of industries/factories, 40 % of nursery schools/schools/universities, and 50 % of mining companies. Additionally, there is a significant association between the type of facility and the use of disposable containers (p = 0.002), where it is observed that 95.5 % of hospitals and clinics mentioned the use of disposable containers, as well as 63.6 % of industries/factories, 80.0 % of nursery schools/schools/universities and 100 % of food services operating in mining companies.

Table III shows the association between the level of complexity of CFSs and sustainable practices, where there is a significant association between the level of complexity of the facility and liquid waste management (p = 0.001); 93.2 % of maximum complexity collective food services reported that they have a liquid waste management procedure and that this is fulfilled, so is the case in 94.1 % of medium complexity CFSs, and in 62.5 % of minimum

complexity CFSs. On the other hand, there is a significant association between the level of complexity and the use of disposable packaging (p = 0.008) where 93.2 % of maximum complexity CFSs indicated that they use disposable containers, as well as 76.5 % of medium complexity CFSs, and 68.8 % of minimum complexity CFSs.

Table IV shows the association between the type of CFS administration and sustainable practices. There is a significant association between the type of administration and liquid waste management (p = 0.009). It is noted that 94.8 % of outsourced CFSs reported that their food service had a liquid waste management procedure and this was fulfilled, versus 79.5 % of self-managed CFSs.

Table V presents the associations between sustainable practices and the variables studied. A significant association was only found in collective food services that are not in the hospitals or clinics sector, with a 63 % higher probability of implementing sustainable practices (OR, 0.372; 95 % CI: 0.171-0.813).

Figure 1 presents the main obstacles identified to sustainable practices in the CFS, being lack of time to monitor compliance with procedures and food safety risks in relation to donations 15.6 % for both, followed by lack of awareness among food handlers, with 14.7 %, and continuing in decreasing order, according to the answers given in the list of obstacles in the survey (more than one could be checked).

DISCUSSION

The main results of this research indicate that outsourced maximum complexity collective food services presented an improved management of liquid waste; however, they used a higher number of dishes, cutlery or disposable cups compared to medium and minimum complexity collective food services. On the other hand, when analyzing by type of facility, collective food services of the hospital or clinic type implemented fewer sustainable practices than other types of facilities. Finally, among the main barriers identified to the

implementation of sustainable practices are: limited time to monitor compliance and safety risks associated to food donations.

In relation to liquid waste management, the results of this study suggest that the maximum complexity outsourced CFSs report high compliance with the legal requirements in force in Chile. However, it is necessary for all facilities, including those of medium and minimum complexity, to develop and execute procedures to reduce pollution of wastewaters, such as: eliminating immersion frying in food planning or decreasing the amount of oil in fried preparations, even choosing canned foods in water. Moreover, it is relevant that once a program for the storage and removal of these hazardous waste has been established, the individuals who perform this handling receive training, since this strategy has been shown to improve the final disposal of such contaminants, with awareness raising becoming a tool for change (10). Finally, waste collection should be managed by companies that have sanitary approval, and the relevant documents that enable the verification of this process should be requested and stored.

On the other hand, when it comes to the type of facilities that encompass hospitals and/or clinics, these are considered as an environment in which food waste is apparently inherent to the setting, which is related to the result of this study, where hospitals and/or clinics adopt fewer sustainable practices than other types of facilities. This fact demonstrates that it is essential to address waste management strategies (11), as well as emphasizing other sustainable measures. In some healthcare establishments, up to 50 % of total waste consists of food waste (12). This includes inedible organic material (e.g., vegetable peels) and edible food products fit for human consumption, for instance, surplus food (13). Several reasons lead to food waste in hospitals. Patient-related factors include health status and length of stay; patient's appetite; expectations and satisfaction regarding quality and quantity of food; food appearance; portion size and taste of meals; and the variety of menu choices (14).

These aspects should be examined to establish strategic plans aimed at minimizing losses.

Regarding the increase in the use of disposable packaging in maximum complexity CFS, Law 21.368 is in the process of being enacted in Chile. This regulation limits the use of single-use plastics in the food vending sector and as of 2026, the delivery of single-use products will be completely prohibited in food vending establishments, whatever material they are made of. Therefore, mass catering services, regardless of their size or type of service, will have to strive to comply with this law, as inspections include the imposition of fines in case of non-compliance. This law will also be directly related to the United Nations Development Program (UNDP), which, within the framework of regulation (EU) 2025/40 (15), must coordinate all UN member states with regard to recycling and single-use plastics (16).

Furthermore, in the case of healthcare establishments, there is a significant amount of disposable tableware that is used for patients in various forms of isolation, although current protocols recommend that in all cases of isolation, whether transmission may occur by airborne, droplet or even contact, the use of disposable tableware is not necessary, since only dishwashing liquid and hot water are sufficient (17). This process is automatically performed in an automatic dishwasher machine, however, the procedure can be modified by soaking the dishes in disinfecting solution if no dishwasher is available.

Another relevant aspect of this study deals with the main barriers identified to implement sustainable practices in CFSs, where food safety risks related to donations are identified as the main barrier, and although it seems to be an alternative to minimize food waste, some studies have reported that a reason for not implementing this measure is the concern about responsibility for any problem that could arise from donated food (18), in addition to the lack of a legal framework that enables a smooth donation process.

In Chile, food services do not make food donations, except for what concerns the incipient legal regulations regarding food banks (19,20). In fact, most food safety standards are stipulated in the Reglamento Sanitario de los Alimentos (RSA) (21), promulgated under the Código Sanitario (22). However, the RSA does not include a specific section on donations, nor does it make explicit reference to food donation among its many provisions.

Nevertheless, the act of donating food has been legally regulated in other countries, for example, the U.S. Congress in the Bill Emerson Good Samaritan Food Donation Act of 1996 protects restaurants from liability after food has been donated. In California, the California Civil Code Section 1714.25(a) states that no food facility that donates food for human consumption to a non-profit charitable organization or food bank is liable for any damage or injury resulting from the consumption of the donated food (23).

Additionally, the limited time that Nutritionists have to monitor compliance with the procedures is highlighted as a barrier to implementing sustainable measures in CFSs. This is explained by the multiple functions that must be performed and by the daily contingencies that occur, resulting in nutritionists not being able to engage in sustainable practice management. Despite this, nutritionists are expected to become advocates for a sustainable food system (24), managing the implementation and follow-up of sustainable practices in collective food services and moreover, to play a crucial role in designing menus that are both efficient in terms of nutrient content, appropriate for hospital use, safe, culturally acceptable, and environmentally sustainable (25), in a positioning, constituted by CFSs in which the sustainability of food systems can be significantly promoted (26)

Finally, among the weaknesses we can mention that this study is of a cross-sectional nature, therefore, we can only establish associations and not causality. Moreover, this study is not representative of food services in Chile, and consequently, we cannot generalize the results.

CONCLUSION

The adoption of sustainable measures in collective food services such as waste reduction, optimization of resources such as water and energy, decreasing the use of disposable products, among others, is critical for the sustainable development of countries, therefore, raising awareness, conducting training and implementing effective action plans is essential to mitigate environmental impacts and to ensure resources for future generations.

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Table I. Characteristics of collective food services (n = 160)

Region where the mass catering service is located	
Region	**Frequency and percentage (%)**
Metropolitana	84 (52.5 %)
Other	76 (47.5 %)
Type of mass catering establishment	
Institution	**Frequency and percentage (%)**
Mining companies	14 (8.8 %)
Hospital/Clinic	83 (51.9 %)
Industries and factories	28 (17.5 %)
Kindergarten. School. University	18 (11.2 %)
Other Mass Catering Services	17 (10.6 %)
Level of complexity of the service	
Level	**Frequency and percentage (%)**
Maximum complexity	119 (74.3 %)
Medium complexity	22 (13.7 %)
Minimum complexity	19 (11.8 %)
Type of service administration	
Administration	**Frequency and percentage (%)**
Self-managed	50 (31.2 %)
Outsourced	110 (68.7 %)

Level of complexity in accordance with the provisions of the Technical Standard for Food and Nutrition Services. Minimum complexity corresponds to facilities that produce a number equal to or less than 149 lunches per day; medium complexity refers to facilities that produce between 150 and 299 lunches per day; and maximum complexity means facilities that produce a number greater than or

equal to 300 lunches per day.

Table II. Association between the type of establishment and sustainable practices

Type of establishment											
Sustainable practices	**Hospitals and Clinics**		**Industries/ factories**		**Nursery schools/Schools/Universities**		**Mining companies**		**Other**		**Chi²**
	Yes	**No**	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**	
Rational use of water	32 (48.5 %)	34 (51.5 %)	14 (63.6 %)	8 (36.4 %)	4 (40 %)	6 (60 %)	4 (50 %)	4 (50 %)	12 (80 %)	3 (20 %)	0.162
Energy optimisation	*24 (36.4 %)*	*42 (63.6 %)*	*11 (63.6 %)*	*8 (36.4 %)*	*6 (60 %)*	*4 (40 %)*	*4 (50 %)*	*4 (50 %)*	*11 (73.3 %)*	*4 (26.7 %)*	*0.038*
Liquid waste management	57 (86.4 %)	9 (13.6 %)	20 (90.9 %)	2 (9.1 %)	8 (80 %)	2 (20 %)	8 (100 %)	0 (0 %)	15 (100 %)	0 (0 %)	0.367
Solid waste management	51 (77.3 %)	15 (22.7 %)	16 (72.7 %)	6 (27.3 %)	7 (70 %)	3 (30 %)	7 (87.5 %)	2 (12.5 %)	13 (86.7 %)	1 (13.3 %)	0.772
Waste separation	42 (63.6 %)	24 (36.4 %)	14 (63.6 %)	8 (36.4 %)	7 (70 %)	3 (30 %)	5 62.5 %	3 (37.5 %)	11 (73.3 %)	4 (26.7 %)	0.956
Purchase from local	54 (81.8 %	12 (18.2 %	17 (77.3 %	5 (22.7	7 (70 %)	3 (30 %)	6 (75 %)	2 (25 %)	13 (86.7 %)	2 (13.3	0.842

suppliers	)	)	)	%)						%)	
FIFO and FEFO use	63 (95.5 %)	3 (4.5 %)	21 (95.5 %)	1 (4.5 %)	10 (100 %)	0 (0 %)	8 (100 %)	0 (0 %)	15 (100 %)	0 (0 %)	0.818
Separation of organic waste	15 (22.7 %)	51 (77.3 %)	7 (31.8 %)	15 (68.2 %)	2 (20 %)	8 (80 %)	1 (12.5 %)	7 (87.5 %)	7 (46.7 %)	8 (53.3 %)	0.291
Pest control with external company	65 (98.5 %)	1 (1.5 %)	21 (95.5 %)	1 (4.5 %)	10 (100 %)	0 (0 %)	8 (100 %)	0 (0 %)	15 (100 %)	0 (0 %)	0.792
Use of disposable packaging	*63 (95.5 %)*	*3 (4.5 %)*	*14 (63,6 %)*	*8 (36.4 %)*	*8 (80 %)*	*2 (20 %)*	*8 (100 %)*	*0 (0 %)*	*13 (86.7 %)*	*2 (13.3 %)*	*0.002*
Other sustainable practices	4 (6.1 %)	62 (93.9 %)	0 (0 %)	22 (100 %)	1 (10 %)	9 (90 %)	0 (0 %)	8 (100 %)	2 (13.3 %)	13 (86.7 %)	0.442

FIFO: first in, first out; FEFO: first expired, first out.

Table III. Association between the level of complexity of collective food services and sustainable practices

Level of complexity (number/ %)							
Sustainable practices	**Maximum Complexity**		**Medium Complexity**		**Minimal Complexity**		**Chi²**
	Yes	**No**	**Yes**	**No**	**Yes**	**No**	
Rational use of water	44 (50 %)	44 (50 %)	13 (76.5 %)	4 (23.5 %)	9 (56.3 %)	7 (43.7 %)	0.132
Energy optimisation	39 (44.3 %)	49 (55.7 %)	12 (70.6 %)	5 (29.4 %)	8 (50 %)	8 (50 %)	0.139
Liquid waste management	*82 (93.2 %)*	*6 (6.8 %)*	*16 (94.1 %)*	*1 (5.9 %)*	*10 (62.5 %)*	*6 (37.5 %)*	*0.001*
Solid waste management	71 (80.7 %)	17 (19.3 %)	13 (76.5 %)	4 (23.5 %)	10 (62.5 %)	6 (37.5 %)	0.273
Waste separation	56 (63.6 %)	32 (36.4 %)	11 (64.7 %)	6 (35.3 %)	12 (75 %)	4 (25 %)	0.679
Purchase from local suppliers	70 (79.5 %)	18 (20.5 %)	15 (88.2 %)	2 (11.8 %)	12 (75 %)	4 (25 %)	0.611
FIFO and FEFO use	84 (95.5 %)	4 (4.5 %)	17 (100 %)	0 (0 %)	16 (100 %)	0 (0 %)	0.460
Separation of organic waste	22 (25 %)	66 (75 %)	6 (35.3 %)	11 (64.7 %)	4 (25 %)	12 (75 %)	0.672
Pest control with external company	88	0	16	1	15	1	0.066

	(100 %)	(0 %)	(94.1 %)	(5.9 %)	(93.7 %)	(6.3 %)	
Use of disposable packaging	*82 (93.2 %)*	*6 (6.8 %)*	*13 (76.5 %)*	*4 (23.5 %)*	*11 (68.8 %)*	*5 (31.2 %)*	*0.008*
Other sustainable practices	7 (7.9 %)	81 (92.1 %)	0 (0 %)	17 (100 %)	0 (0 %)	16 (100 %)	0.248

Table IV. Association between the type of administration of collective food services and sustainable practices

Type of administration					
Sustainable practices	Outsourced		Self-managed		Chi^2
	Yes	No	Yes	No	
Rational use of water	39 (50.7 %)	38 (49.3 %)	27 (61.4 %)	17 (38.6 %)	0.255
Energy optimisation	36 (46.8 %)	41 (53.2 %)	23 (52.3 %)	21 (47.7 %)	0.559
Liquid waste management	*73 (94.8 %)*	*4 (5.2 %)*	*35 (79.5 %)*	*9 (20.5 %)*	*0.009*
Solid waste management	59 (76.6 %)	18 (23.4 %)	35 (79.5 %)	9 (20.5 %)	0.710
Waste separation	55 (71.4 %)	22 (28.6 %)	24 (54.5 %)	20 (45.5 %)	0.061
Purchase from local suppliers	58 (75.3 %)	19 (24.7 %)	39 (88.6 %)	5 (11.4 %)	0.077
FIFO and FEFO use	74 (96.1 %)	3 (3.9 %)	43 (97.7 %)	1 (2.3 %)	0.631
Separation of organic waste	21 (27.3 %)	56 (72.7 %)	11 (25 %)	33 (75 %)	0.785
Pest control with external company	*77 (100 %)*	*0 (0 %)*	*42 (95.5 %)*	*2 (4.5 %)*	*0.059*
Use of disposable packaging	66	11	40	4	0.404

	(85.7 %)	(14.3 %)	(90.9 %)	(9.1 %)	
Other sustainable practices	4 (5.2 %)	73 (94.8 %)	3 (6.8 %)	41 (93.2 %)	0.713

Table V. Association between sustainable practices and the variables studied

Sustainable practices	**OR**	**[95 % CI]**	***p*-value**
Hospital establishments vs non-hospital establishments	0.372	(0.171-0.813)	0.013
Metropolitan Region vs other regions	1.661	(0.749-3.682)	0.211
Maximum complexity vs medium and low complexity	0.876	(0.367-2.087)	0.765
Outsourced vs self-managed	0.766	(0.342-1.714)	0.517

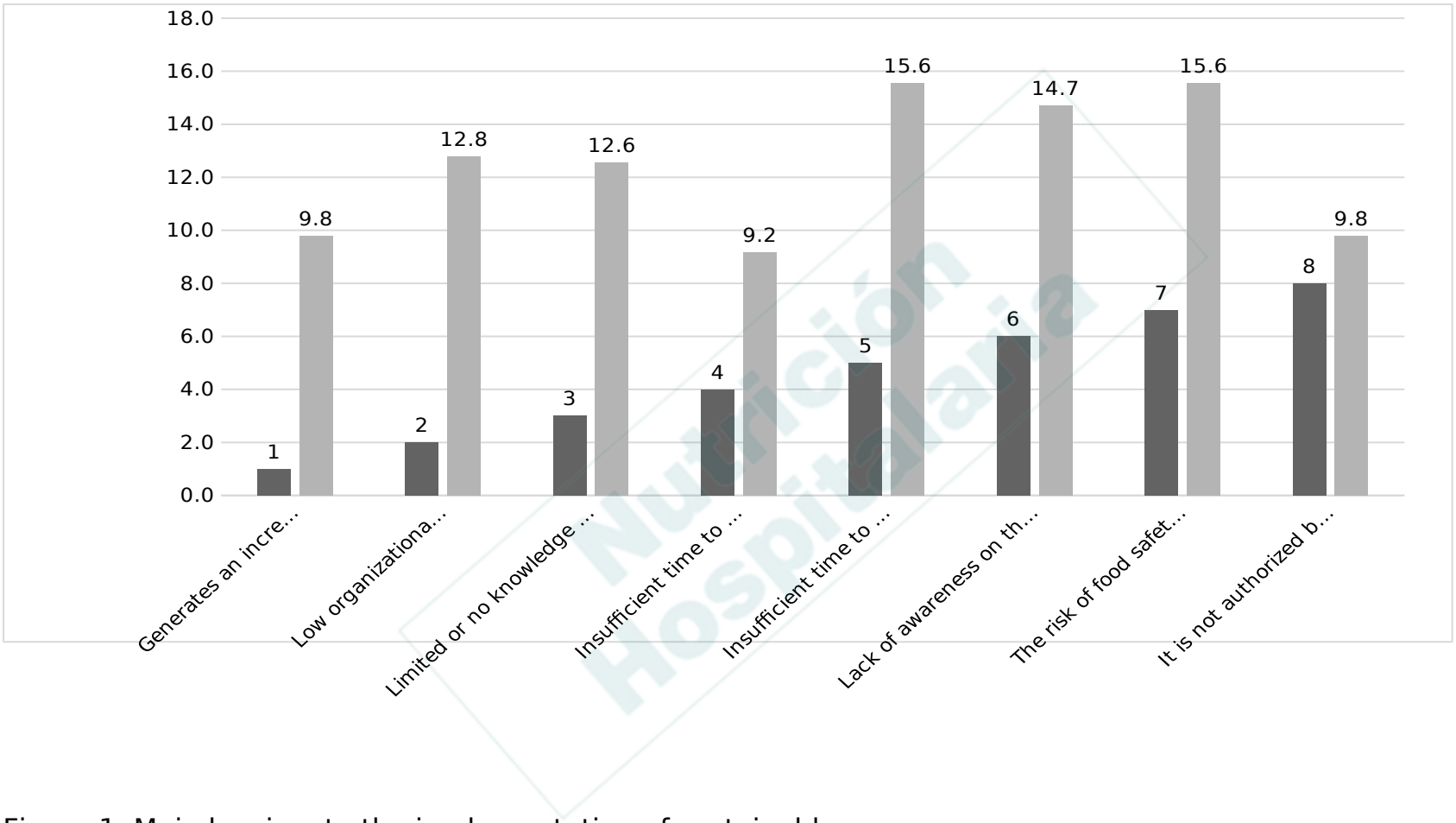

Figure 1. Main barriers to the implementation of sustainable measures.