

# Instruments to evaluate the profile of food and enteral formulation handlers

## Instrumentos para avaliação do perfil do manipulador de alimentos e de formulações enterais

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### ABSTRACT

To know the profile of food and enteral formulation handlers is important to promote more effective health education actions for these individuals. This study aimed to develop instruments to evaluate the profile of food handlers in households (PFH) and in food service establishments (PFSE), as well as the profile of handlers of enteral formulations in households (PEFHH). A scoping review was carried out to identify questions about the profile of food and enteral formulation handlers evaluated in studies in their main national and international databases. From 47 selected articles, 66 questions were identified. Of these, 17, 22, and 18 questions were established to assess the PFH, PFSE, and PEFHH, respectively. The instrument questions were subdivided by subject into personal data, sociodemographic and professional characteristics, and general information. Some questions differ between instruments due to segment specificities. The proposed instruments are novel tools. Through a scoping review and expert consultations, a comprehensive set of questions was identified and organized into instruments tailored to each specific segment. These tools will be valuable for nutritionists, researchers, and other professionals involved in assessing and addressing the needs of food handlers.

**Keywords.** Food Handling, Enteral Nutrition, Food Services, Home Care.

### RESUMO

Conhecer o perfil do manipulador de alimentos e de formulações enterais é importante para promover ações de educação sanitária mais efetiva para esses indivíduos. Este estudo teve como objetivo elaborar instrumentos para avaliação do perfil do manipulador de alimentos em domicílios (PFH), em serviço de alimentação (PFSE) e de formulações enterais em domicílios (PEFHH). Realizou-se uma revisão de literatura do tipo *Scoping review* para identificar as questões sobre o perfil do manipulador de alimentos e de formulações enterais avaliadas nos estudos nas principais bases de dados nacionais e internacionais. A partir de 47 artigos selecionados, foram identificadas 66 questões. Destas, foram estabelecidas 17, 22 e 18 questões para avaliar o PFH, PFSE e PEFHH, respectivamente. As questões dos instrumentos foram subdivididas por assunto nas seguintes categorias: dados pessoais; características sociodemográficas e profissionais; e informações gerais. Algumas questões se diferenciam entre os instrumentos devido à particularidade de cada segmento. Os instrumentos propostos são ferramentas inovadoras. Através de uma revisão abrangente e consultas com especialistas, um conjunto abrangente de perguntas foi identificado e organizado em instrumentos adaptados a cada segmento específico. Essas ferramentas serão valiosas para nutricionistas, pesquisadores e outros profissionais envolvidos na avaliação e atendimento das necessidades dos manipuladores de alimentos.

**Palavras-chave.** Manipulação de Alimentos, Nutrição Enteral, Serviços de Alimentação, Assistência Domiciliar.

## INTRODUCTION

A food handler is any person who manipulates food either in food services or at home. In food services, these individuals are involved directly or indirectly in the processes of food preparation, packaging, storage, transportation, distribution, and display or sale<sup>1</sup>. The handler of enteral formulations at home is the individual responsible for preparing and/or packaging homemade, industrialized, or mixed enteral formulations for patients on Home Enteral Nutrition (HEN)<sup>2</sup>.

These individuals play a key role in the care and safety of the handled food<sup>3</sup>, and enteral formulations<sup>4</sup>. In addition, studies show that the food handler can directly interfere in food contamination both at home and in food services when lacking hygiene care during preparation<sup>5-7</sup>.

It is worth noting that the risk of food contamination at home is even higher because the handler may not have enough knowledge about the hygienic-sanitary procedures that should be applied and/or they could have the misperception that, at home, the risk of food contamination is lower. In the case of HEN, the risk is also high because the enteral formulation handler is mainly a family member of the patient and usually has no experience or guidance on the care required to handle this type of food<sup>4</sup>.

Some studies have shown that variables such as age, sex, education, professional training, experience, and training courses or guidance in the field can also influence attitudes and practices in food handling<sup>8-12</sup>. Thus, knowing the profile of food and enteral formulation handlers is important to help develop more effective actions that meet the reality and specificities of these individuals and, thus, contribute to their qualification<sup>3,13-15</sup>.

The evaluation of the handler's profile can be performed using standardized instruments that measure and provide reliable data for future research. However, in the scientific literature, no standardized instruments have been found to evaluate the characteristics of such individuals. Thus, this study aims to develop instruments to assess the profile of food handlers in households (PFH), food handlers in food service establishments (PFSE), and enteral formulation handlers in households (PEFHH).

We expect that these instruments will help nutritionists, researchers, and other professionals to know the profile of food handlers, contributing to the decision-making regarding both routine activities and the orientation and training of handlers taking into account the particularities of each segment. Furthermore, we hope to encourage the development of more effective health education actions that meet the reality and specificities of these individuals and contribute to future scientific discussion, promoting the creation of new tools, policies, programs, and educational actions for these segments.

## METHODS

This is a qualitative and quantitative methodological study<sup>16,17</sup>, that resulted in the development of three instruments: PFH, PFSE, and PEFHH.

The study is part of a broader project entitled "Identification of Control Points in the Handling of Enteral Formulations and Proposal of Instruments for Assessment and Guidance of Good Practices in Household". It followed all ethical aspects and was approved by the Research Ethics Committee, under CAAE (Certificate of Presentation for Ethical Consideration) number 13012119.0.0000.0102.

## Bibliographic survey on the profile of handlers

A scoping review was conducted to identify the issues evaluated in studies on the profile of food and enteral formulation handlers. The guiding question was initially defined based on the acronym PCC, where P = population, C = concept, and C = context<sup>18</sup>, namely, “What is the profile of the food and enteral formulation handler?”

The inclusion criteria for the selection of articles were as follows: indexed articles from January 2014 to May 2021; published in English, Spanish, or Portuguese; descriptive-observational, cross-sectional, and experimental studies, prospective or retrospective; articles with information on the profile of the food and enteral formulation handler. The exclusion criteria for the selection of articles were: studies that did not assess the profile of food handlers and enteral formulations; literature review studies, integrative reviews, systematic reviews, or scoping reviews; studies in languages other than English, Spanish, and Portuguese.

The search for articles was carried out in May 2021 in the following national and international databases: Medical Literature Analysis and Retrieval System Online (MEDLINE), Scopus, Virtual Library Health (BVS), CAPES Journal Portal, Science Direct, and Scientific Electronic Library Online (SciELO). For the database search, the Health Sciences Descriptors (DeCS) and the articles’ free titles or keywords were used, resulting in the following combination of keywords: “Profile” AND “Food handlers” AND “Home” OR “Food service” OR “Enteral Nutrition” OR “Food hygiene” OR “Good Manipulation Practices”. For reference management, the initial results were stored in Microsoft Office Excel<sup>®</sup> 2010 software (Microsoft Corporation, Washington, USA) and the articles were independently screened by two reviewers. First, a separate reading of the title, abstract, and full article was performed, and then the study eligibility was checked. At each stage, the data found by the reviewers were compared and, when discordant, analyzed by a third reviewer based on the inclusion and exclusion criteria.

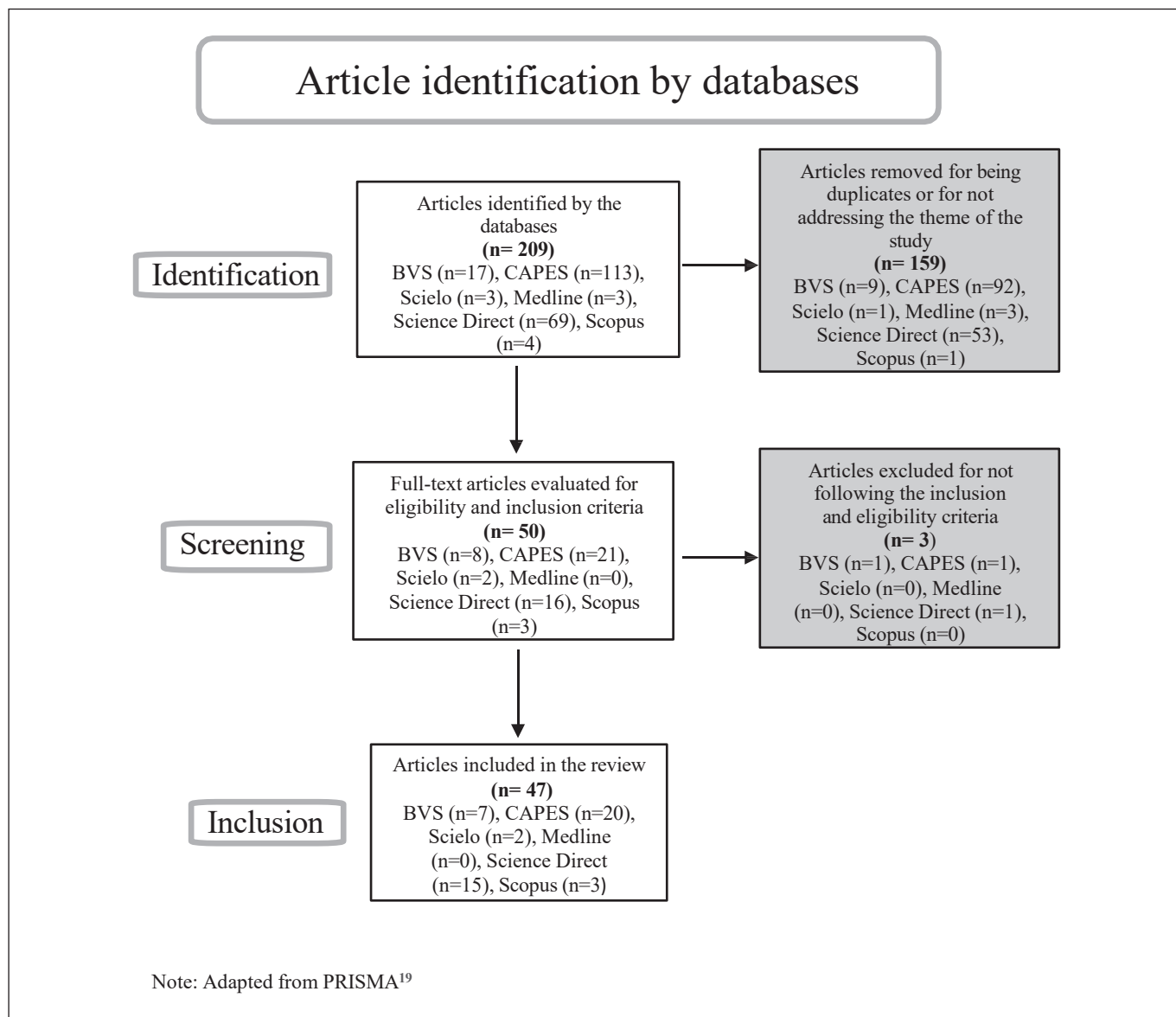
The data from the articles were entered into an extraction sheet in Microsoft Office Excel<sup>®</sup> 2010 software (Microsoft Corporation, Washington, USA). Questions about personal data, professional sociodemographic characteristics, and general information on each type of food handler were compiled from the studies. The systematic process of including the studies followed the guidelines of the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA)<sup>19</sup>.

## Instrument design

The questions and answer options for each instrument were defined based on meetings with three experts in the field of collective food. Those that appeared more often in the articles were selected in this step. Furthermore, other relevant questions to each segment (foods services, households, and household enteral nutrition) were added. The answer options for the questions were based on the articles and data from the Brazilian Institute of Geography and Statistics<sup>20,21</sup>. From this stage on, the questions and answer options were rewritten and/or reorganized taking the opinion of the same experts into account.

## RESULTS AND DISCUSSION

A total of 209 articles were found in the databases. With the exclusion of duplicates and articles that did not meet the inclusion criteria, a total of 47 articles remained. The workflow for this process is presented in **Figure**, following the model proposed by the Joanna Briggs Institute for scoping reviews<sup>19</sup>.



**Figure.** Flowchart of the study selection process

After data extraction, 66 questions regarding the profile of food and enteral formulation handlers were identified. The questions and answer options that remained in each of the instruments, as well as the categories they fall into, were defined based on the knowledge and experience of experts in the field of collective food, considering particular characteristics and relevance for each segment. The participation of experts contributed to more clear and cohesive instruments in relation to the population to be studied<sup>17</sup>.

The instruments to evaluate the PFH, PFSE and PEFHH (**Supplementary Material**) had 17, 22, and 18 questions, respectively. The questions of the instruments presented open and closed response options and were subdivided by theme into the following categories: personal data, sociodemographic characteristics, professional characteristics, and general information.

The instruments presented similar questions, such as: name, phone number, and e-mail address (personal data); gender, age, marital status, and education (sociodemographic characteristics); occupational

status (professional characteristics); means of communication, interest in learning about food handling, level of satisfaction in handling food and/or enteral formulations, and perception of risk of contracting some gastrointestinal problem by consuming the food and/or enteral formulations they handled (general information).

However, some questions differ due to the particularities of each segment (**Table**). In the sociodemographic characteristics category, the distinctions were found in the question referring to income, which in the PFSE instrument refers to the income from where the handler works. In the other instruments, because the food and/or enteral formulation handler at home is usually not paid for the service, the same question relates to the family's monthly income instead. It is worth noting that the preparation of the enteral formulations in the HEN can also be carried out by a hired professional or a paid family member. Therefore, a question on whether or not the person is paid for the service was also included in the PEFHH instrument.

**Table.** Questions with differences among instruments for the assessment of the handler's profile

Categories/Questions	Instruments		
	PFH	PFSE	PEFHH
<b>Sociodemographic characteristics</b>			
Income	X	X	X
Number of people living in the household and housing conditions	X		
Identification of the person responsible for preparing enteral formulations			X
<b>Professional characteristics</b>			
Handling operating time		X	X
Profession	X		X
Frequency of food and/or enteral formulation handling	X		X
How many people eat at home and which meals are prepared	X		
Name of food service; branch of activity; whether the handler is an owner or employee; which activity(ies) is(are) performed in food handling; how frequent is the work in the food service; work shift; hours worked per day; time of experience in food service; health examinations undertaken by the company; training participation on hygiene care in food handling (subject, certificate, and workload); whether the training brought any habit changes		X	
<b>General information</b>			
Gastrointestinal problem after consumption of food or enteral formulations at home	X		X
Type of enteral formulation handled at home			X
Guidance on handling enteral formulations			X

Subtitle: PFH – Instrument for assessing the profile of food handlers in households; PFSE – Instrument for assessing the profile of food handlers in food service establishments; PEFHH – Instrument for assessing the profile of enteral formulations handlers at households

Other distinct questions regarding the sociodemographic characteristics category were the number of people living in the household, and housing conditions, which were only included in the PFH instrument. These aspects were added because, in this case, the handler lives on site and prepares food for all members of the house. Thus, understanding these particularities is important to evaluate their housing conditions. In addition, it is also relevant to understand if the household has basic sanitation, minimum conditions of hygiene and organization, and an appropriate place for handling and preparing food since the absence of these elements interferes with its quality and safety. A study evaluated the housing conditions of food handlers and identified that individuals using pit latrine toilets were 3 times more likely to be contaminated with *Salmonella*, a notable bacterium when it comes to Foodborne Diseases<sup>22</sup>. Thus, the lack of toilets and sewage systems, for example, can predispose food handlers to direct contact with pathogenic microorganisms that might contaminate the food. Based on this, we included specific questions regarding that matter in the PFH instrument.

Some specificities were found in the questions of the instruments regarding the professional characteristics category (Table). The PFSE and PEFHH instruments presented a question about experience in food handling, which is relevant since professionals who have worked for longer may practice more appropriate handling procedures due to the continuous exposure and repetition of work-related exercises<sup>23</sup>. In the PFH instrument, this question is not relevant since food preparation is an everyday activity for many families.

Another distinction found in this category was that only the PFH and PEFHH instruments presented questions about the handler's job and how often he/she handles the food and/or enteral formulations. The occupation was included because the handler may have other tasks besides handling food and/or enteral formulations. The question about the frequency that food and/or enteral formulations are handled was added because this activity may not be daily, as required in food service.

Other specific questions for the PFSE instrument in the professional characteristics category were about the name of the food service, line of business, role of the food handler in the food service, activities performed in food handling, frequency in which he/she works in the food service, work shift, working hours, working time in the food service, whether the company has given him/her a health examination, participation in training on hygiene care in food handling, and presence of any habit change after the training (Table).

Among the items aforementioned, we highlight the health examinations (periodic and before admission) for food handlers in food services. The handler can be an asymptomatic carrier of pathogenic microorganisms and act as a contamination source for the preparations if proper hygiene procedures during manipulation are not followed<sup>24</sup>. It is also noteworthy that handlers who undergo health examinations by the company are more likely to follow proper hygiene practices than those who are not examined, as they usually receive recommendations during the examination and understand more clearly the hygiene procedures that must be applied<sup>23,25</sup>.

Also in the professional characteristics category, the questions about how many people eat at home and which meals are prepared were included in the PFH instrument to know the relationship between the amount of food prepared and the number of people who consume it.

In the general information category, only the PFH and PEFHH instruments presented a question about gastrointestinal problems after consuming food or enteral formulations at home since many home handlers believe that performing this task does not present a risk of Foodborne Diseases. Other distinctions in this category

were observed in the PEFHH instrument, which includes a question about the type of the enteral formulation handled which is relevant to know whether the preparation is industrialized, homemade, or mixed due to the risks during handling and a question about guidance in handling enteral formulations. The last question was included because many HEN handlers lack knowledge about procedures that should be applied during the manipulation of food and/or enteral formulations and are also unaware of their role in ensuring food safety<sup>4,26</sup>. On the other hand, institutions and/or healthcare professionals can guide and inform patients and families about the proper handling of enteral formulations in the home environment (**Table**).

It is important to note that, in food services or at home, qualification in food and enteral formulation handling promotes changes in habits and practices on the part of the handler. Many studies have addressed the topic, demonstrating that food safety orientation and qualification tend to change the attitudes, beliefs, and behaviors adopted by the handler, resulting in improved knowledge and hygiene in food handling practices<sup>27-30</sup>.

Finally, the general information category considers that satisfaction at work or with the task being performed is also an important factor for productivity. Therefore, it appears on all three instruments. A study found that individuals satisfied with their role/job are more productive<sup>31</sup>. In addition, handlers who are satisfied with their work tend to create a safer environment regarding food handling<sup>32</sup>.

The knowledge about the perception of the risk of developing some gastrointestinal problem after consuming food or enteral formulation is also important, as studies have shown that the greater the understanding that handling can compromise food safety, the greater the care taken in the process and, consequently, the lower the risk of contamination<sup>3,33</sup>.

Lastly, it is evident that, although the profile of food and enteral formulation handlers has already been evaluated in some studies<sup>3,4,14,22</sup>, and most of the characteristics regarding the profile of these individuals are similar, the evaluations were performed using questions that were often different among studies. This shows the absence of standardized instruments that evaluate the profile of food and enteral formulation handlers. Therefore, the PFH, PFSE, and PEFHH instruments are original and proved to be relevant in proposing a compilation of questions that allows us to know the sociodemographic and professional characteristics, as well as general information about the profile of handlers.

While the findings of this research are pertinent, the developed instruments lack validation, potentially limiting their effectiveness. Moreover, there is a concern that these instruments may not adequately capture the diverse and intricate contexts within which food handlers and handlers of enteral formulations operate. Nevertheless, this study contributes valuable insights to the literature by recognizing the significance of understanding the profiles of these individuals, thereby facilitating more targeted and effective health interventions. Furthermore, the integration of a literature review (Scoping review) with expert consultations underscores a growing inclination toward employing multidisciplinary and collaborative methodologies in crafting assessment tools.

The knowledge about the profile of food and enteral formulation handlers is relevant for obtaining a more accurate diagnosis of who handles food in both food services and homes. Once these characteristics are outlined, we can plan more specific health education strategies and actions for this public<sup>3,4,33</sup>. In food services, this information can also help in the development of intervention proposals and actions related to food safety and in the planning of training programs considering the reality and specificities of these individuals. They may also assist researchers in developing protocols and guidelines that can consistently provide evidence-based guidance to food handlers.

## CONCLUSION

The development of instruments to evaluate the PFH, PFSE, and PEFHH is a significant step toward promoting more effective health education actions for these individuals. Through a scoping review and expert consultations, a comprehensive set of questions was identified and organized into instruments tailored to each specific segment.

These instruments cover personal data, sociodemographic and professional characteristics, and general information, providing a holistic view of food and enteral formulation handlers. These tools will be valuable for nutritionists, researchers, and other professionals involved in assessing and addressing the needs of food handlers, ultimately contributing to improved food safety and public health outcomes.

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## CONFLICT OF INTEREST

The authors declare that there are no conflicting interests.

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The authors did not declare.

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## AUTHOR'S CONTRIBUTIONS

Julia Fernanda Costa Kozow: conception and design of the research. Rayane Luizi da Costa, Caroline Opolski Medeiros and Lize Stangarlin-Fiori: design and analysis of research data. All authors critically reviewed and approved the manuscript.

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