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## Deliverable D5.4:

Report: effect of public health guidelines on parental feeding practices and children's eating behaviour.

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## Executive summary

Overall, Work package 5 (WP5) aims at studying sensory influences on food liking and satiation in infants, toddlers and preschoolers. In this context, the work conducted in the thesis of ESR6 focused on how to deliver public health information related to the development of food liking and satiation in children below the age of 3 years. ESR6, Sofia De Rosso (supervised by Sophie Nicklaus and Camille Schwartz from INRAE, France) conducted her PhD thesis between January 2019 and January 2022. The following is the summary of her thesis.

The first thousand days of life from conception onwards are crucial, among other aspects, for the development of healthy eating habits and food preferences in children. Parental feeding practices significantly influence infants' food consumption and choices during this period, therefore parents must be properly informed and guided through the early feeding process. Renewed guidelines, covering this theme, have been released in France in June 2019. Considering the frequent interactions that healthcare professionals, such as pediatricians, have with parents during the early feeding, their role can be considered fundamental for the transmission of updated information. This thesis aims at contributing to the development of a paper brochure to disseminate these public health recommendations to the lay public. It consists of four studies aiming at: informing a new public health communication strategy considering the needs of parents and healthcare professionals on child feeding communication; assessing whether the material developed (paper brochure) has a short-term effect on parental knowledge; and finally, if it is positively evaluated by healthcare professionals. The results, reported in four articles in this doctoral thesis, highlighted that healthcare professionals are the most used and influent source of information for parents. Some differences existed regarding the communication needs of parents and the perceptions of pediatricians regarding those needs. In particular, diverging from pediatricians' opinion, parents often ask for meaningful advice to their personal network and are in demand for practical tips. The paper brochure contributed to increase parental knowledge on child feeding independently from parental socio-demographical characteristics. Professionals evaluated the brochure as a good tool to support their discourse during consultations. These results contribute to the evidence for public health stakeholders when updating and providing resources for the dissemination of child feeding guidelines, with the ultimate aim of building a strategy accounting for the needs of all the users, to facilitate the circulation of official and updated information.





# Deliverable D6.1: effect of public health guidelines on parental feeding practices and children's eating behaviour

## Introduction

This deliverable relates the work conducted as part of the doctoral thesis of Sofia De Rosso, ESR #6 of the Edulia project (Innovative Training Networks Marie Skłodowska-Curie, grant agreement n° 764985). During her PhD thesis, Sofia De Rosso participated in two secondments, the first one took place in May 2019 at Wageningen University; the second one from June 2019 to March 2020 at Santé publique France (Nutrition and Physical activity unit), a non-academic partner. Santé publique France is the governmental communication agency of the French Ministry of Health, in charge of preparing public health communication campaigns for the French population. There, Sofia De Rosso was part of a working group of experts in charge of formulating educational advice on infant and young child feeding practices. Her thesis project aimed to shed light on the communication strategy (support for the development of dissemination materials during the design phase) of the new recommendations on the nutrition of children (0-3 years), disseminated in France by public health authorities in 2019 (1-2). This project had two main objectives, (1) to support the development of communication material by exploring the perceptions and needs of parents and pediatricians, and (2) to assess the material developed quantitatively with parents (short-term impact on knowledge concerning the feeding of children) and qualitatively with health professionals (for example testing the acceptability of new recommendations).

## Context

Obesity is an alarming problem worldwide, threatening the health of children especially in Western societies, but also in developing countries, where the double burden of malnutrition is a major public health issue (3-5). Understanding the determinants of unhealthy weight gain in early childhood is essential to prevent diet-related diseases later in life (6-7). The first 1000 days from conception to a child's second birthday are an important period in an individual's life. This period is a unique opportunity for the establishment of optimum health, growth, and neurodevelopment across the lifespan (8-9).

As part of the first 1000 days, the shift from milk feeding to a variety of foods is of critical importance for the development of healthy eating behaviors in infants. During complementary feeding (CoF) an infant discovers, for the first time, different tastes, textures and food preferences develop, as well as his/her habits in terms of consumed quantities. In fact, it is at





this moment of life that the child learns what, when and how much to eat; this learning occurs through direct experience, or by observing the eating behaviors of others (most often parents) (10-11). According to Bronfenbrenner's theory (developed in the socio-ecological model), the development process of a child is defined by his/her individual characteristics, accompanied by the relationships that are established with those who are part of his/her own environment (family and friends, teachers at school, etc.) (12).

Parents' dietary practices are considered to have a significant impact on infant food choices and consumption. Parents, with their parenting style and feeding practices, exert the strongest influence on children's eating behaviors. They define, among other things, the food environment at home, which helps shape the food preferences as well as the eating patterns of their offspring (13-14). It is therefore important that parents are properly informed and guided throughout the CoF process.

However, the recommendations available in France since 2005 did not integrate the latest scientific knowledge related to the development of eating behavior. Notably, explanations about the importance of repeated exposure, dietary variety and the introduction of different textures, or the way to encourage the child's appetite "self-regulation" were missing. The need for an update of the French guidelines and recommendations on infant feeding was obvious (15). In 2019, new guidelines covering these topics were published by ANSES and the HCSP (1-2). However, the level of parental understanding of such technical guidelines is often uncertain, which could be due to an inappropriate method of communication.

New parents interact with many healthcare (HCPs) and childcare (CCPs) professionals in the prenatal and postnatal periods. There are many occasions when discussion of prevention issues (such as healthy eating practices) could be brought up. Previous research has shown how educational interventions targeting parents could enhance children's health and improve CoF practices. Many of these educational interventions include training provided by HCPs or CCPs (16-17). Considering the opportunity that they have to influence parents the earliest years of the child, HCPs should have a key role in disseminating new child feeding recommendations and associated communication supports. Therefore, considering their needs in terms of the most adapted communication supports and required content is paramount.

### Research objectives of the thesis

In this context, the general objective of this thesis was to contribute to the development and evaluation of the communication material, dedicated to parents, aimed at disseminating





public health guidelines concerning the adoption of healthy eating behaviors in children aged 0 to 3 years.

The main research question that this project attempted to answer was: "How can we transfer evidence-based knowledge, at a large scale, to parents and HCPs to leverage healthier feeding practices, and in turn healthier children's eating behaviors?".

Following what emerged from the literature, certain points were considered as potential gaps, in line with the general objective of the thesis, and worthy of investigation. In particular:

- Parents are the primary influencers of their children's eating behaviors, especially in the 0 to 3 years period; properly informing them through communication materials containing updated recommendations is necessary in order to facilitate the application of feeding practices that can turn into healthier dietary habits for children. However, we do not know how French parents seek information regarding child feeding, which information they look for and to which extent they trust the advice they find or receive.

- HCPs interact with parents at the onset of CoF transition (one of the key periods in early feeding for the development of eating behaviors), but we do not know how they advise parents and if they are confident about giving information on child feeding. In fact, the latest recommendations are outdated and professionals might not be willing to point out communication material dated over 15 years ago. It is important to understand whether HCPs have the proper means to communicate with parents regarding those topics and to evaluate any further need in order to facilitate their counselling role. This thesis was organized in two parts. The first part (studies 1 and 2) included the evaluation of the needs and practices of parents and HCPs (in this case, pediatricians) regarding information seeking on child feeding. This part informed and preceded the development of the communication material (paper brochure produced by SpF with the help of a working group of experts) whereby the recommendations will be spread to the lay public. The second part of the thesis (studies 3 and 4) included an evaluation of the developed material with parents and HCPs and CCPs.

The following specific objectives were defined:

- 1) To explore the perceptions and practices of pediatricians and parents of children aged 0 to 3 years regarding child feeding information and subsequently inform the communication strategy accounting for their needs: Studies 1 & 2.

- 2) To contribute to the development of communication material, dedicated to parents, aimed at disseminating public health guidelines (aligned with ANSES and HCSP) concerning





the adoption of healthy eating behaviors in children aged 0 to 3 year: Secondment at SpF and work with the group of experts.

3) To evaluate the short-term impact of the communication material on parental knowledge regarding child feeding: Study 3.

4) To evaluate the level of understanding of HCPs and CCPs regarding the information (new recommendations) contained in the brochure for parents, and to explore their barriers and needs in communicating with parents about child feeding: Study 4.

The four studies led to the writing of four scientific articles, the main methods and results of which will be summarized in the following sections of this summary.

## Results

### Article 1: The Perceptions and Needs of French Parents and Pediatricians Concerning Information on Complementary Feeding

**Authors:** Sofia De Rosso, Camille Schwartz, Pauline Ducrot and Sophie Nicklaus

Published in *Nutrients*: <https://doi.org/10.3390/nu13072142>

#### **Summary:**

Proper complementary feeding is key to preventing childhood obesity and promoting long-term health. Parents must be properly informed throughout the CoF process. Pediatricians have the opportunity to interact with parents during the CoF transition and to influence parental decisions about feeding. They can convey public health messages about child feeding to parents. With the release in France in 2019 of new child feeding recommendations, and with the perspective to convert them into official public health communication material, the objective of this study was to explore parents' and pediatricians' perceptions and needs regarding information on CoF.

Two online surveys have been prepared; answers were anonymous and on a voluntary basis. The pediatricians members of AFPA, the French Association for Ambulatory Pediatrics (n = 1402), were surveyed in October 2019 on their attitudes and practices in terms of counseling parents on CoF. Responses were obtained from 301 pediatricians. In addition, a representative national sample of 1001 parents, with at least one child under the age of 4, was surveyed in January 2020 to find out their expectations and their CoF information sources.





The analysis of the results showed that the importance of CoF for the health and growth of the child was well recognized by all (99% of parents and pediatricians). Pediatricians considered that advising parents on CoF was one of their responsibilities, 93% of them always give advice on this subject during medical consultations. Parents recognized pediatricians as their most influential and most trusted source of advice (81% of parents turn to health professionals for advice, 46% specifically to pediatricians). However, only a small proportion of pediatricians (13%) realized that parents rely on their personal network (family, friends) when seeking information about CoF. The personal network was identified as a source of information by 62% of parents. Parents began to learn about CoF when children were 5 months of age. Most research is done when the child is 6 months to 1 year old. Pediatricians reported giving information about CoF to parents systematically when children are 4 to 5 months old.

Parents gave credit to information given by CCPs, but ultimately, they did not turn often to this professional figure. The Internet was a source of information widely used and acclaimed by pediatricians as an adequate medium for communicating with parents. However, parents' trust in information on the Internet (including websites, blogs, social networks, applications) was low. Applications for smartphones or tablets were also evaluated as an appropriate communication tool by pediatricians, but no official application existed up to date in France. Media or paper documents were a source of information for almost half of the parents who responded to the survey. A third of parents believed that the available advice could contradict itself, was not always consistent and could even make parents develop a feeling of guilt of not behaving correctly. Contrary to what pediatricians thought, parents were looking for very practical tips for implementing CoF, such as sample of recipes or menus.

This study provides directions for public health stakeholders in order to build a strategy for disseminating the new recommendations on infant and child feeding via information material adapted to the needs of parents and pediatricians. In particular, the needs and perceptions of pediatricians must be considered, given the importance that parents place on their advice.







## Article 2: Information seeking of French parents regarding infant and young child feeding: practices, needs and determinants

**Authors:** Sofia De Rosso, Sophie Nicklaus, Pauline Ducrot and Camille Schwartz

Published in *Public Health Nutrition*: <https://doi.org/10.1017/S1368980021003086>

### **Summary:**

As part of an update of the feeding guidelines targeting children aged 0 to 3, this study aimed to explore the perceptions of French parents of children under 4 years of age on the infant and young child feeding (IYCF) and their feeling of information. It also aimed at evaluating whether these perceptions differed according to selected socio-demographic characteristics (parental education, perceived financial situation, parity, child's age and prematurity). The second objective was to explore which were the parental practices linked to searches for guidance about IYCF, and whether these practices differed according to the socio-demographic characteristics mentioned above. The final objective was to explore the same topics in parents of children with a medical condition that may influence their diet compared to parents of healthy children.

This descriptive study was conducted in France in the form of an online survey. We targeted a representative national sample of 1001 French parents of children under 4 years old. Participants were recruited using the quota sampling method. The effects of parity, child age, prematurity, parental education, and financial status on parental responses were assessed separately.

Parents whose child had a medical problem affecting the diet (17%) were considered separately from parents of healthy children. All the healthy children's parents recognized the importance of IYCF for children's health and growth. Eighty-eight percent of parents considered themselves knowledgeable about IYCF and 86% of parents were satisfied with the available information. Eighty-eight percent of parents also found information about IYCF easy to find and they said the available information answered to their questions. However, a third of parents considered the available IYCF information contradictory and guilty-laden. For first-time parents, it was more difficult to find and understand information without feeling uneasy.

The most used sources of information were HCPs (81%), the Internet (72%) and parental networks (63%). The most influential sources (mean influence  $\pm$  standard deviation) included HCPs ( $7.7 \pm 1.7 / 10$ ), CCPs ( $7.3 \pm 1.8 / 10$ ) and parental networks ( $6.9 \pm 1.8 / 10$ ). Our results suggest that parents recognize HCPs as their most influential source of advice and





those they most often refer to for information on IYCF. This perspective was especially true for parents of younger children ( $7.9 \pm 1.5$  vs.  $7.5 \pm 1.6$ ), those with better financial situation ( $7.9 \pm 1.5$  vs.  $7.7 \pm 1.7$ ) or having a higher level of education ( $7.1 \pm 2.0$  vs.  $7.8 \pm 1.5$ ). The Internet was used more and had more influence on parents of younger children, and it was used more by first-time parents than by multiparous parents. Our study confirms that first-time parents and parents with fewer years of formal education more often used their networks as a source of information.

Parents sought practical advice on starting CoF from the age of 5 months. According to our results, the financial situation of parents was not a determinant of the source used to collect information on IYCF. Nevertheless, there were some differences in the topics searched depending on financial status and level of education. Parents in more vulnerable financial circumstances sought information on menus / recipes more frequently and they searched less often for information on promoting the development of healthy eating habits or the appropriate age for food introduction. They were less influenced by HCPs. Parents with more years of formal education were more aware of the importance of CoF for their child's health; they more often sought information about feeding strategies and portion sizes. Search strategies differed according to parity or age of the child but not according to prematurity. Parents whose children had a medical problem affecting the diet reported slightly different needs and practices. For example, parents of children with medical conditions were more concerned with the course of CoF and used the Internet (80% vs. 72%) and the media (37% vs. 24%) more frequently.

Parents receive information about IYCF from several sources, which can be confusing when deciding which advice to follow. We found differences in search strategies based on parity or age of the child, but surprisingly few differences between parents of preterm and term babies were found. This study contributes to the evidence available to public health actors when updating resources on IYCF.





## Article 3: Increasing parental knowledge about child feeding: evaluation of the effect of public health policy communication media in France

**Authors:** Sofia De Rosso, Pauline Ducrot, Claire Chabanet, Sophie Nicklaus and Camille Schwartz

Article submitted to *Frontiers in Public Health* (accepted for publication the 2<sup>nd</sup> of February 2022)

### Summary:

Inappropriate eating behaviors are risk factors for non-communicable diseases. Eating behaviors develop during childhood, and parents largely influence this process through their feeding practices. Parental feeding practices that meet the recommendations are more likely to translate into a better health outcome for the child. From a public health perspective, it is first necessary to determine whether providing parents with recommendations on child feeding is a useful approach to increase parental knowledge. Recently, the French health authorities produced a brochure containing updated recommendations on child feeding. The present study aimed to assess the short-term effects of reading this brochure on parental knowledge regarding child feeding, distinguishing between the accuracy and certainty of knowledge.

A brochure with updated recommendations on the nutrition of children aged 0 to 3 has been developed by SpF. A sample of parents representative of the French population in terms of parity, age, socio-professional background and residential area ( $n = 400$ ) was targeted to complete an online questionnaire (T0) comprising 30 statements concerning child feeding. For each statement, the parents indicated whether it was true or false and how certain they were of their answer (on a 4-point scale). After receiving and reading the brochure, the same parents completed the same questionnaire three weeks later (T1). Accuracy (number of correct answers) and certainty of knowledge (number of mastered answers: correct answers given with the maximum degree of certainty) were compared (T1 vs. T0) using paired t-tests. The evolution of knowledge according to the age, parity and educational level of parents was tested with linear models.

A total of 452 parents responded to T0 and T1 and were included for the analysis. Between T0 and T1, the number of correct answers (median 22 to 25,  $t(451) = 17.2$ ,  $p = <0.001$ ) and mastered answers (median 11 to 17,  $t(451) = 18.8$ ,  $p = <0.001$ ) significantly increased. The median of the difference between T1 and T0 was greater for the mastered answers than for the correct answers. No significant effect of the socio-demographic characteristics of the parents (age, level of education and parity status) was found on the evolution of knowledge





between T0 and T1. At T0, an effect of education on the proportion of mastered answers was observed. Parents with a higher level of education had a significantly higher mean of mastered answers at T0 than parents with fewer years of formal education (mean difference = 1.4; t-value = 2.14; p = 0.03). The effects of other socio-demographic characteristics on the accuracy of knowledge or the degree of certainty at T0 were not significant (all p-values > 0.05). The accuracy of knowledge increased significantly between T0 and T1 for all questions, except for questions q6 (new textures 6-8 months), q8 (refusal of food), q17 (transition to the family food) and q23 (consumption of salt). For q26 (age of introduction of allergens), there was a significant increase, but the proportion of correct answers was still low after reading the brochure.

Parents were on average very satisfied with the content of the brochure. Thirty-two percent of parents revealed that in the weeks before completing the questionnaire at T1, they had sought information about children's nutrition through other means than the brochure. Among parents using other sources, the most popular ways to search for information were through the Internet (especially childcare websites, 37%), HCPs (especially pediatricians, 28 %) and personal network (grandparents, 19%, and friends, 16%). Regarding self-efficacy, the majority of parents (98%) said they would try to follow the advice and recommendations in the brochure, but for 29% of them it would be difficult without the support of their partner and their family. For 10% of parents, it would be difficult to follow the recommendations if their friends would not follow the same recommendations. The fact that parents would follow the recommendations did not differ according to the socio-demographic characteristics of the parents (age, parity, level of education).

The brochure with child feeding recommendations appears to have the potential to increase the accuracy and, to an even greater degree, the certainty of parental knowledge, even for younger, first-time or less educated parents. For questions with lower proportions of correct answers in T1, a reformulation of the messages carrying these recommendations in the brochure may be advised to improve their understanding by parents.





## Article 4: Counseling parents about child feeding: a qualitative evaluation of French healthcare and childcare professionals' experiences and their perception of a brochure containing new recommendations

**Authors:** Sofia De Rosso, Camille-Riera Navarro, Pauline Ducrot, Camille Schwartz and Sophie Nicklaus

Article submitted to *BMC Public Health* (Dec 2021)

### **Summary:**

Parents play a crucial role in establishing their children's eating habits, and healthcare (HCPs) and childcare professionals can provide helpful and reliable feeding advice, especially during the 0-3-year period. With the upcoming release of the official brochure containing the new feeding recommendations for children in France, this qualitative study aimed to: 1) assess the practices and perceptions of professionals regarding their communication with parents on child feeding and 2) evaluate their impressions of the new brochure and their understanding of the new recommendations.

A 15-page brochure containing the updated child feeding recommendations has been developed by Santé publique France. Semi-structured online interviews were conducted with professionals (n = 21), including 13 pediatricians, general practitioners or PMI physicians; and nine CCPs, two weeks after receiving this brochure to read. The interview guide was developed and tested with other professionals (n = 3) during pilot interviews. Interview data was transcribed verbatim and analyzed thematically using an inductive approach.

Two main themes and nine sub-themes were developed through the thematic analysis. The main themes were: 1) the practices and needs of professionals in terms of communicating with parents about child feeding, and 2) the perceptions of the brochure. Professionals mentioned that they mainly provided information orally to parents, but they recognized that the brochure could be a useful support, especially for CCPs, to legitimize their advice to parents.

On average, pediatricians and general practitioners perceived the brochure as more useful in their practice than CCPs. These differences in practices between HCPs and CCPs and their perceptions of the usefulness of the brochure may reflect the different use that these two professional categories may make of it. Concretely, while HCPs indicated that they could use the brochure systematically with parents during consultations, CCPs would rather use it as an instrument to obtain information, to legitimize their knowledge on the subject or to address the doubts of curious parents. Nevertheless, the two types of professionals agreed that this





brochure would allow them to update their knowledge on the nutrition of children from 0 to 3 years old. For HCPs, handing out the brochure to parents can provide systematic advice and save time during consultations. Professionals dealing with parents of lower socioeconomic status would prefer a support with less text and more illustrations. In general, the messages contained in the brochure were seen as easily understandable, but providing tear-off cards to distribute according to the child's age would facilitate the dissemination of information and might be more useful to parents. Professionals (especially in PMI) reported that lack of training, the circulation of contradictory information and language barriers were common challenges. Professionals suggested that short texts with more references and visual aids could improve the brochure.

This study did not reveal important differences between the new recommendations and the advising practices of professionals, but still pointed out particular advice given by professionals that could be updated and improved in light of the new recommendations. In particular, advice with regard to the introduction of allergens and of all types of food between four to six months of age. However, the brochure itself did not fulfil the HCPs' need for explaining some recommendations, since they expressed the need to verify some of the information themselves. GPs and pediatricians have also signaled their need to obtain more information regarding the quantities of milk according to the child's age to answer parents' questions, and why certain foods are not recommended for young children (e.g. certain types of fish, chocolate).

French professionals welcome the new official brochure as a means to disseminate updated child feeding recommendations, but it could be modified to be better suited to their communication needs with parents and to facilitate the relay of information.

## Discussion of the results

### How to inform the communication strategy accounting for the needs of parents and HCPs in relation to child feeding information?

From Article 1, it emerged that parents look for practical tips when searching for child feeding information. From Article 2 it was also shown that a higher proportion of parents in financial difficulty were those who looked more frequently for examples of menus / recipes. Pediatricians, on their side, think that parents must primarily be informed about the age of start of CoF, and the age of introduction of the different food groups. This incongruence might highlight the fact that pediatricians, and more generally HCPs, do not feel at the right place to give such kind of (practical) advice and specific material is needed to satisfy the parents'





request for practical tips. Complementarily, from the analysis of interviews with 21 professionals (article 4) it emerged as a matter of fact that CCP's, especially those working in collective facilities, are mostly giving to parents very practical information on child feeding (what the child eats at home/at the childcare center). They provide such information especially orally, but also with the support of paper documents, therefore they would feel in a more appropriate position to spread those kinds of information.

Regarding the sources for disseminating information to parents, from Chapter 3, we highlighted that HCPs should be privileged; they are the most used and trusted source according to the parents surveyed for our study. Pediatricians confirmed that they feel at their place advising parents on child feeding and CoF (article 1). The influence of HCPs was stronger for parents of children under one year of age, those with better financial situation and higher level of education. However, HCPs revealed that often during consultations they do not have time to discuss prevention-related topics. This is confirmed by other studies examining doctor-patient communication, revealing lack of time as a communication barrier. In Chapter 3, it was also pointed out that the Internet, the parents' personal network and paper documents are also widely used sources of information.

Parents in our studies also sought social support (Articles 2 and 3) by seeking advice from their closest network (family, friends, etc.), especially primiparous parents with lower education. This evidence is supported by other studies examining how parents get information during a child's early years and how family, friends and peers can positively or negatively influence their decisions. According to the results of article 1, pediatricians were not aware of the great use that parents made of their personal network, but the professionals interviewed for our qualitative study were more aware of it.

When planning public health communication interventions aimed at influencing children's eating behaviors, it is essential to consider not only the influence that parents can have on children's behaviors, but also what can influence parents. When looking for advice on child feeding parents turn to different kinds of professionals and also to their closest network including family and friends. From a public health perspective, the work of HCPs should be facilitated besides the systematic provision of the brochure. For instance, providing solutions that may include more time to devote to primary prevention (including more advice on nutrition) could be beneficial.

Prevention-dedicated consultations (single or group e.g. mandatory and free trainings for parents with HCPs specialized in child feeding) could be scheduled at key ages for the child





feeding process (e.g. transition to CoF, change of textures or even prenatally for the initiation of breastfeeding).

Further research is needed in order to explore quantitatively and qualitatively which are the role that parents' personal network foresee for their advising role and to which extent the support of the family would make it easier to follow the recommendations.

**How to design and deliver a public health communication strategy able to leverage parents feeding practices in a way that the majority of parents will understand correctly the messages?**

From the results discussed in article 1, it emerged that for 35% of pediatricians, the different economic and cultural situations of families were not sufficiently taken into account in the information and existing communication material on child feeding available to parents. This observation was reinforced by what was underlined in article 4, this time specifically in relation to the tested brochure. In fact, the analysis of the semi-structured interviews revealed that professionals perceived the SpF brochure as not adapted to all the families whom they were meeting. Particularly, according to the HCPs and CCPs participating in study 4, low SES families, or families of migrants or refugees could have experienced problems in understanding the recommendations of the brochure. The main obstacles that were highlighted were the difference in culture and language, suggesting that a tool composed only of images with simpler text would be of greater utility for these specific targets. The fact that communication problems between parents / patients and their children's healthcare providers can influence health outcomes and increase disparities has already been discussed in the literature. This is especially true for low-income parents and foreign-born parents, for linguistic minorities or for those with limited fluency in the language of the country in which they sought for care.

In article 1 we observed that the 34% of parents who were surveyed considered that the available information on child feeding was not always consistent and could contradict itself (especially for primiparous parents, as shown by article 2). For 32% of parents, the received advice could make them experiencing a feeling of guilt of not behaving as recommended. These findings should raise the issue of stigma and social inequalities when implementing nutritional recommendations, as people may perceive health messages differently.

The coexistence of different cultures in the same country should draw attention to the development of public health prevention strategies capable of including minorities and communities of different ethnicities. More research is needed to understand what type of communication can best meet the needs of a globalized society, avoiding any form of







stigmatization. This research may include a qualitative approach designed to explore the needs of different minorities. Focusing attention on translating communication material into other languages or helping professionals with translation services in hospitals or private practices can be a strategy to reduce communication problems in healthcare settings (including communication with parents regarding child feeding).

### Which are the effects of the child feeding messages on parental knowledge?

Parental knowledge (in domains related to child development, caregiving and childrearing skills) was found to be a moderator in the relation between parental self-efficacy and parenting competence (how the parent act / parental practices); in fact, parental self-efficacy and parenting competence were positively associated when parental knowledge was high (18, 19).

According to the results of Article 1, 87% of parents felt that they were well informed about CoF and were satisfied with the available information. The information they could find about CoF was clear to 90% of parents; relevant to answering their questions for 87%; and easy to put into practice for 86% of them. These results could raise the idea that French parents already have a high level of knowledge and self-efficacy regarding child feeding.

The literature suggests that parental knowledge is linked to increased self-efficacy. The increase in self-efficacy is linked to parenting practices promoting more positive outcomes for children. Being certain of one's own knowledge could also be linked to self-efficacy, but to the best of our knowledge no studies have explored this. There is no comprehensive evidence on child feeding knowledge about children's eating behavior, and no studies were found taking into consideration both accuracy and certainty of knowledge. In Article 3, we analyzed the short-term change in the accuracy of parents' knowledge of infant feeding (how much parents know) and knowledge certainty (how certain parents are about what they know) after reading the SpF brochure. An increase in both the accuracy and certainty of knowledge was highlighted for almost all the 30 questions covering the new child feeding recommendations. For the questions obtaining the lowest proportions of increase, SpF carried out adaptation of the child feeding messages to be included in the final version of the brochure.

This study did not examine whether an increase in knowledge resulting from reading the brochure was related to an increase in self-efficacy and a change in parental feeding practices and in children's eating behavior. However, further research on this aspect could be of interest in order to consolidate evidence for the construction of specific educational





interventions aimed at increasing parents' knowledge of child feeding, improving parental feeding practices and, ultimately, children's eating behaviors.

### Are professionals ready to deliver the child feeding messages to parents?

From Article 1, it was pointed out that 93% of pediatricians always advise parents on child feeding during consultations. Ninety nine percent of them were confident in their role of advising parents on these issues, and 82% of them thought they had enough knowledge about CoF and infant feeding. From the analysis of the interviews (article 4), it emerged that HCPs perceived that they had not received enough training in nutrition during their medical studies. The training they received was considered outdated and it happened mostly on a voluntary basis. This is confirmed in the literature; in fact, doctors often do not feel competent to give advice, for example, on the management of obesity and there is a risk that obesity will go undiagnosed and therefore untreated in clinical practice (20-21).

Recent studies have explored the effect of an alternative way of learning nutrition for preventive medicine residents or medical students. They have attended cookery and nutrition education courses or workshops aimed at teaching practical skills and knowledge. The results were positive, showing improvements in nutritional knowledge, confidence in counseling, and personal cooking skills that could be lately transferred onto patients (22-24). This method could be a promising approach for specific training on child feeding. It could enable pediatricians and other professionals responsible for counseling parents on child feeding to increase, for example, their willingness and ability to promote adherence to guidelines.

## Conclusions and perspectives

This doctoral thesis aimed initially to give an insight into which were the needs and practices of parents of young children, and pediatricians, with respect to child feeding communication, and then, to evaluate the brochure that was developed by SpF in line with the updated child feeding guidelines. The results of four studies, presented in four articles, provided interesting evidence of similarities and divergences between parental and professionals' visions, including the best ways to communicate around child feeding and CoF recommendations. The messages on child feeding have been modified and adapted based on the understanding that parents and professionals had of the new recommendations. The brochure produced by SpF took into consideration the results of our studies and is now accessible to the French population since September 2021. The communication strategy of SpF also includes other means of disseminating the new child feeding recommendations





(videos, tutorials and specific websites). This strategy takes into account the needs of vulnerable populations through the formulation of messages considered the easiest to understand.

Looking at the results systemically, we can conclude that the development of healthy eating behaviors in young children is influenced by different actors at different levels. The main level explored in this thesis is the interpersonal one, referring in particular to the influence of parents and HCPs on the development of children's eating habits. Children's behaviors are primarily defined by the practices of parents, which are influenced by the advice of HCPs, who operate within the health system of a specific country. The health system is defined by policies and decisions that are taken at the political level; those decisions define, for example, the directions that prevention and health promotion could take in the planning of public health actions and strategies. Communication between different actors at different levels is essential for the transfer of evidence-based knowledge to guide best practice. Public health interventions should be planned to guarantee an efficient flow of information adapted to each level, toward an increase in knowledge as a first step for the adoption of behaviors in accordance with public health recommendations, in our case specifically on child feeding.

## Ethics and DPO

Ethical approval of an independent ethical committee (CEEI/IRB, IRB00003888, IORG0003254, FWA00005831) of the French Institute of Medical Research and Health, has been obtained (approval n°21-788). The data collection has been registered by the relevant data protection service.

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