Review

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# Feeding difficulties in childhood: A narrative review

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## ABSTRACT

It has been estimated that between 25% and 40% of healthy children show symptoms of feeding difficulties (FDs) during their growth and development; many times, these are not adequately diagnosed.

The objective of this study was to conduct a narrative review that collected the available information on feeding difficulties. Assessment and management algorithms were developed based on the bibliographic evidence.

Most feeding problems in young children (feeding selectivity, loss of appetite, fear of feeding) are often concurrent, and a clinical risk assessment is necessary to plan an individualized intervention.

Having standardized definitions and common terms to address these difficulties in an appropriate and multidisciplinary manner is one of the ways to optimize their treatment. The involvement of different health care providers and parents is critical to address feeding difficulties.

***Keywords:*** *picky eating; loss of appetite; child.*

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## INTRODUCTION

Establishing the prevalence of feeding difficulties (FDs) is complex, as there is no single definition in the bibliography. It is defined as "a broad term that encompasses any problem related to feeding behaviors, ranging from parental misperceptions to actual eating disorders."[1] It has been estimated that between 25% and 40% of healthy children show symptoms of FDs during their growth and development.[2,3] However, in order to establish an epidemiological estimation of FDs, first of all, it is necessary to agree on which condition we are referring to. Kovacic et al., considering the broad definition of FD, reported an estimated annual prevalence in 2014 of 1 in 23/24 children seen in the public sector and of 1 in 37 children seen in the private sector in the under-5-year-old group.[4] Prevalence values depend on the classification employed: 1) picky eating (PE), 2) poor appetite or loss of appetite (LA), and 3) fear of feeding (FF); PE is the most frequent condition and accounts for approximately two thirds of the total number of children in whom FDs are identified.[5]

It is worth noting that, of the total number of patients with symptoms compatible with FDs, 20% are not adequately diagnosed. The risk factors associated with an increased prevalence of FDs include prematurity, autism spectrum disorders, and developmental delay, as 80% of these children are reported to experience some type of feeding problem. However, of the total number of children who experience some form of FD during their growth, only in 10% of cases their severity warrants an intensive intervention.[6]

Unfortunately, data on the prevalence of FDs in the Latin American population are very scarce. A study by Fisberg et al. carried out in São Paulo, which included 166 patients with FDs, described the following distribution: picky eating (37.8%), loss of appetite (17.6%), misperception by parents and caregivers (17.6%), organic causes (10.1%), fear of feeding (6.7%), other causes (6.7%), and restlessness (3.4%). In Brazil, the average age at the onset of FDs is 52 months, unlike fear of feeding or loss of appetite, which usually present between 31 and 34 months.[7,8]

There may be clinical involvement without an underlying organic cause and the FD may act as a triggering factor, or FD itself may result in different degrees of malnutrition. Decreased appetite is frequent in any clinical condition and is usually a symptom that may persist, even after resolution.[9]

Given the importance of agreeing on criteria and definitions relating to FDs and for the purpose of addressing behavioral, functional, and nutritional aspects, our primary objective was to carry out an update on FDs; our secondary objectives were:

- To describe the definitions used to refer to FDs.
- To describe the diagnostic classifications and sub-classifications reported in the bibliography.
- To develop a model assessment of and a clinical and functional approach to FDs based on available scientific evidence.
- To propose an intervention algorithm.

## METHODS

This is a narrative review that includes the evidence on FDs in the pediatric age group available in the bibliography. Based on such evidence, the authors proposed an intervention algorithm agreed upon by consensus among the authors.

The search included articles published in the past 10 years (2013–2023) and in the following electronic databases: the United States National Library of Medicine (NIH-Pubmed), SciELO, Lylacs, and the Virtual Health Library (BVS Brazil). The following terms were used in the bibliographic search: prevalence of picky eaters, feeding disorders, food neophobia, limited appetite children, feeding difficulties in children, food selectivity, eating difficulties. Some reference reviews predate the search period. Articles in English, Portuguese, and Spanish were included.

## NOMENCLATURE AND DEFINITIONS

The bibliography includes a variety of terms that refer to FDs. It should be noted that none of these terms refers to classical eating disorders. Sometimes, a single term has different meanings. In order to facilitate understanding, terms were grouped together if they are synonymous and/or describe the same clinical or behavioral condition.

**Neophobia**: it is defined as "the rejection of novel or unfamiliar foods by the child" that resolves with repeated exposure.[5] It usually occurs between 2 and 6 years of age.[10] It is considered part of avoidant/restrictive food intake disorders (ARFIDs).[11] The prevalence of neophobia ranges from 40% to 60% among FDs.[12]

**Picky eaters, fussy eating, picky/fussy about food, limited appetite, food selectivity**: it is defined as a mild form of sensory disturbance, generally a transient problem.[5] Children with this

condition tend to reject foods not only when they try them for the first time, but also when these foods have already been tried and accepted. The variety and quantity of foods consumed is limited. This typically occurs between 2 and 3 years of age.[11]

**Children with fear of feeding or food phobia**: these children refuse to eat because of discomfort, not loss of appetite. This condition usually follows a traumatic experience, such as choking, vomiting, nausea, gagging, or stomach aches. Food refusal is accompanied by screaming and fits of rage. Prolonged chewing, hiding food in the cheeks, or discarding food is common.[13] Fear of feeding corresponds to 1% of FD cases.[5]

**Loss of appetite**: this is characterized by a lack of desire to eat, early satiety, inadequate food intake to maintain a normal growth, and constant conflicts at mealtime. Decreased appetite results in a child who is often lethargic, inactive, and unmotivated, which may be due to medical conditions that adversely affect appetite. Unlike the previous conditions, loss of appetite may be associated with food deprivation, especially in certain populations or geographic regions. It accounts for approximately 25% of FDs.[13]

## DIAGNOSTIC CLASSIFICATIONS

Feeding has multiple underlying mechanisms that impact it; therefore, diagnostic criteria are essential.

A common, standardized terminology helps to better characterize the heterogeneous needs of this patient population and facilitates clinical practice and the inclusion of the various disciplines necessary for their treatment.[14] *Table 1* describes the 3 diagnostic classifications of children with FDs:

- The *Diagnostic and Statistical Manual of Mental Disorders* (DSM-5, 2013) proposes diagnostic criteria for eating disorders in young children and also minimizes the role played by medical or psychological comorbidities in feeding problems.[15]
- Kerzner et al. classify children base on the concerns described by their parents regarding the children's *feeding behavior*.[5] Each category includes subcategories to recognize that such concerns may correspond to a misperception on their part, whether behavioral or organic. The authors consider that feeding results from the interaction between the children's behavior and the parent's feeding technique and describe red flags that alert about biological conditions that could lead to FDs.
- Goday et al., in an interdisciplinary consensus, use the framework proposed by the World Health Organization (WHO) in its International Classification of Functioning, Disability and Health.[14] Contrary to the DSM-5, these criteria downplay specific types of feeding behaviors, but specifically include FDs associated with medical comorbidities or developmental delay.

## DIAGNOSTIC ASSESSMENT

When parents or caregivers are concerned about their child's feeding, it is important to conduct an initial assessment that includes: 1) a physical examination, 2) an anthropometric assessment, and 3) a dietary history.[5]

Kerzner et al. propose a progressive approach to the management of feeding problems in all clinical settings.[13] It is worth noting that this approach begins with the identification of warning signs that would indicate serious threats to children (*Figure 1*). These signs may relate to both organic and behavioral risks.[13]

The first assessment should address all of these issues:

1. **Development and motor and psychosocial skills**: this refers to any swallowing disorder or presence of restrictive eating behaviors.
2. **Personal medical history**: perinatal history, growth, family history, eating habits and preferences, psychosocial bonds. Medical history (e.g., gastroesophageal reflux, respiratory health, history of failure to gain weight or food allergies). The dietary history should include breastfeeding, introduction of solid foods and later stages, depending on the child's age.[16]
3. **Intake assessment**: this refers to having information about the consumption of the different food groups and their frequency in order to quantify consumed nutrients. Intake quantity and quality may be established by means of a 24-hour food recall or an intake frequency registry.[17] In addition, the dietary history-taking is intended to determine the regular intake of energy and critical nutrients, such as protein, calcium, iron, essential fatty acids, vitamin B12, zinc, and selenium.[18]
4. **Anthropometry**: registry of weight, height, and growth velocity, body mass index, and weight/height ratio. The growth curve provides information on the course of weight, height, and head circumference, which may alert on the relationship between the onset of behavioral or organic conditions and changes

**Table 1. Classifications based on diagnostic criteria for children with feeding difficulties (FDs)**

**Diagnostic and Statistical Manual of Mental Disorders, 5th edition (DSM-5)**
**DSM-5 diagnostic criteria.**
**Avoidant/restrictive food intake disorder (ARFID):**

A. An eating or feeding disturbance (e.g., apparent lack of interest in eating or food; avoidance based on the sensory characteristics of food; concern about aversive consequences of eating) as manifested by persistent failure to meet appropriate nutritional and/or energy needs associated with one (or more) of the following:
   1. Significant weight loss (or failure to achieve expected weight gain or faltering growth in children).
   2. Significant nutritional deficiency.
   3. Dependence on enteral feeding or oral nutritional supplements.
   4. Marked interference with psychosocial functioning.
B. The disturbance is not better explained by lack of available food or by an associated culturally sanctioned practice.
C. The eating disturbance does not occur exclusively during the course of anorexia nervosa or bulimia nervosa, and there is no evidence of a disturbance in the way in which one's body weight or shape is experienced.
D. The eating disturbance is not attributable to a concurrent medical condition or not better explained by another mental disorder. When the eating disturbance occurs in the context of another mental disorder, the severity of the eating disturbance exceeds that routinely associated with the condition or disorder and warrants additional clinical care.

Specify if in remission: after full criteria for eating disorder and food intake disorder were previously met, the criteria have not been met for a sustained period of time.

**Kerzner, Milano, and Chatoor**

Their classification is based on the parents' expressed concerns about their child's feeding/eating behavior. Three principal categories are described:

1. Limited appetite: those not eating enough.
2. Selective intake: those eating an inadequate variety of foods.
3. Fear of feeding: those afraid to eat.

Each category has subcategories to acknowledge that such concerns may be:

   a. A misperception on the part of the parents.
   b. Organic.
   c. Behavioral.

Both b) and c) with a spectrum ranging from mild to severe.

**Goday PS, Huh SY, Silverman A, et al.**

Proposed diagnostic criteria for pediatric feeding disorder

A. A disturbance in oral intake of nutrients, inappropriate for age, lasting at least 2 weeks and associated with 1 or more of the following:
   1) Medical condition, as evidenced by any of the following:
      a. Cardiorespiratory compromise during oral feeding.
      b. Aspiration or recurrent aspiration pneumonitis.
   2) Nutritional compromise, as evidenced by any of the following:
      a. Malnutrition.
      b. Specific nutrient deficiency or significantly restricted intake of 1 or more nutrients resulting from decreased dietary diversity.
      c. Reliance on enteral feeds or oral supplements to sustain nutrition and/or hydration.
   3) Feeding skill dysfunction, as evidenced by any of the following:
      a. Need for texture/consistency modification of liquid and/or food.
      b. Use of modified feeding position or equipment.
      c. Use of modified feeding strategies.
   4) Psychosocial dysfunction, as evidenced by any of the following:
      a. Active or passive avoidance behaviors by child when feeding or being fed.
      b. Inappropriate caregiver management of child's feeding or nutrition needs.
      c. Disruption of social functioning within a feeding context.
      d. Disruption of caregiver-child relationship associated with feeding.
B. Absence of the cognitive processes consistent with eating disorders and pattern of oral intake is not due to a lack of food or congruent with cultural norms.

**Figure 1. Assessment algorithm and approach to feeding difficulties**

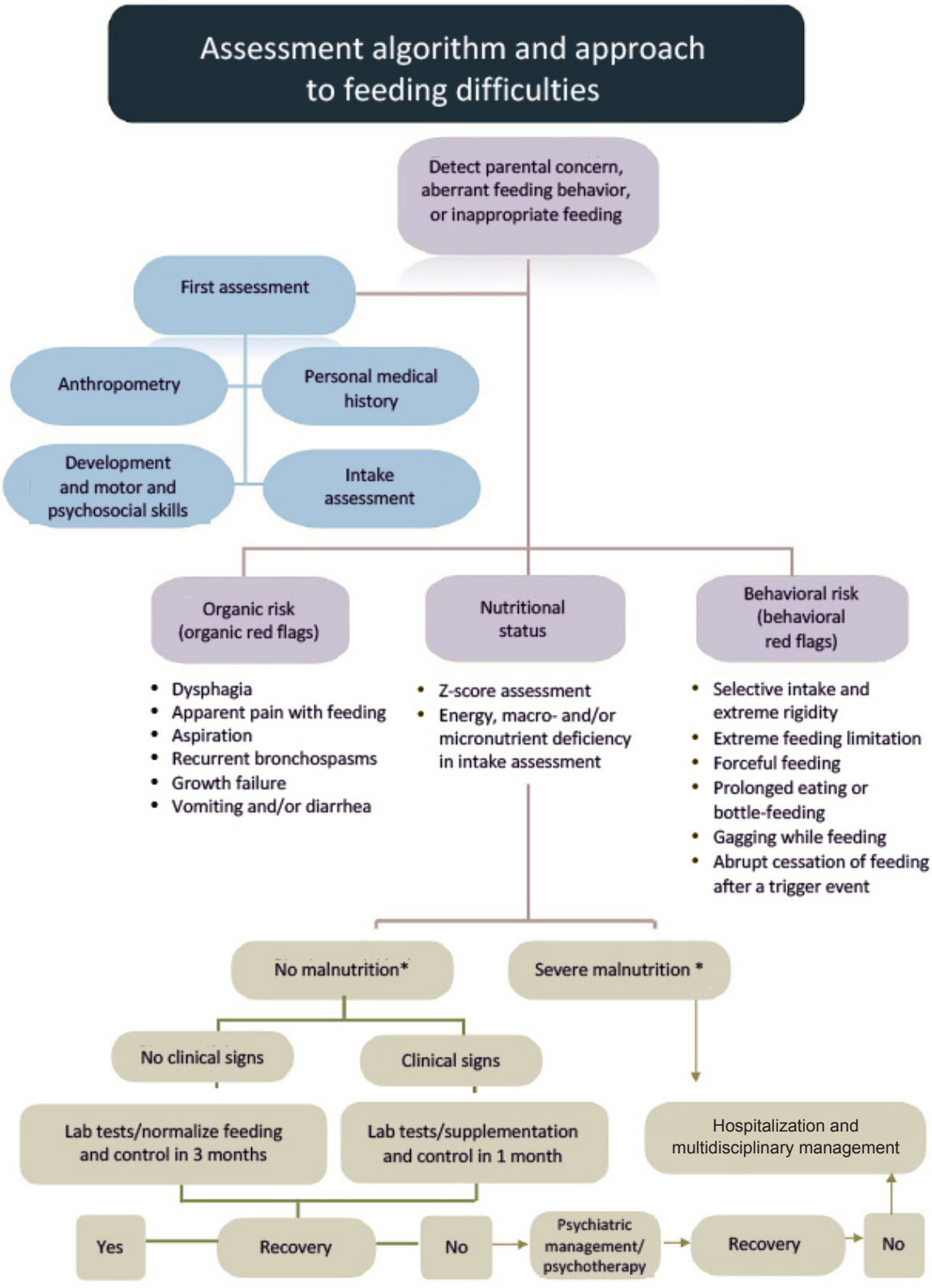


*Figure adapted from Kerzner 2015 (5) and Feillet 2019 (35).*
** Malnutrition is defined based on the WHO guidelines (33, 34).*

in weight and/or height percentiles or Z-scores and on the impact of eating behaviors on growth and nutritional status.[19–21] Severe growth retardation or clear nutrient deficiencies require immediate specialized care.[14,22]

5. **Clinical observation of feeding**: this allows to discriminate behaviors and manifestations secondary to organic disorders. It is also relevant to know the child's response to food or whether they experience anticipatory gagging or vomiting.[23] The presence of sensory disturbances related to food taste, texture, or smell may indicate the presence of a more serious condition associated with sensory processing problems.[24,25] Specifically, when these alterations are associated with responses to stimuli, such as sound, light, and touch, it is necessary to consider the possibility of neurodevelopmental disorders, e.g., autism spectrum disorder (ASD) or other disorders affecting sensory processing.[26] Other factors should also be considered, such as the environment where the child is fed, the time they take to eat, the person in charge of feeding, the use or not of distracting factors (e.g., screens), who makes decisions regarding food, and the existence of pre-established routines.[16]
6. **Lab tests:** these provide complementary information for the detection of possible organic causes and nutritional deficiencies.[27,28] *Table 2* indicates the lab tests necessary for a general nutritional assessment. Micronutrient deficiencies should be found based on history-taking and clinical examination.[29]

Malnutrition affects 25% to 50% of children with FDs[30,31] and is significantly increased in children with associated comorbidities.[4] Malnutrition is also more prevalent among children with chronic diseases or neurodevelopmental disorders.[32] Here we propose an approach using an intervention algorithm for children with restrictive/selective feeding behaviors based on their nutritional status (*Figure 1*).[5,33–35]

## SPECIFIC INTERVENTIONS

An intervention aimed at eating disorders should be comprehensive and address both the underlying medical condition and inappropriate feeding patterns. In most cases, medical, oral, motor, and behavioral therapy may resolve or significantly improve feeding problems.[36] The following is suggested:

### 1. To establish the hierarchy of problems

Most of the feeding problems described here (picky eating, loss of appetite, fear of feeding) often coexist and it is necessary to carefully assess the contribution of each condition to feeding dysfunction and to the clinical risk so as to plan an individualized intervention.[15] Setting short-, medium-, and long-term goals for the problem identified is a priority, taking into account the course (< or > 3 months).[36]

### 2. To establish a nutritional management intervention

Appropriate nutritional interventions are relevant. This implies providing precise recommendations in terms of calories and nutrient supplementation, when necessary.[37]

**Table 2. Biochemical information for the assessment of nutritional status**

| | |
|---|---|
| **Blood count** | |
| | Hemoglobin (g/dL) |
| | Hematocrit (%) |
| | Mean corpuscular volume (fL) |
| | White blood cell count (x$10^3$/µL) |
| | Platelet count (/µL) |
| **Other blood chemistry values** | |
| | Albumin (g/L) |
| | Creatinine (mg/dL) |
| | Urea nitrogen (mg/dL) |
| | Glucose (mg/dL) |
| **Lipid profile** | |
| | Total cholesterol (mg/dL) |
| | HDL, LDL, triglycerides (mg/dL) |

*HDL: high-density lipoproteins; LDL: low-density lipoproteins.*
*Adapted from JA Chávez et al. Nutritional assessment chapter. Pediatric Nutrition Manual (LASPGHAN).*

*Figure 1* provides a general intervention algorithm based on the presence or absence of malnutrition according to the WHO classification. In the case of picky eaters, although they may have a normal growth, it is critical to ensure adequate nutritional support and supplementation for any nutrient that may be deficient (preventive supplementation).[37] Liquid oral supplements are often necessary to provide nutritional support while the child gradually tries new textures.[5]

Ideally, nutritional goals should be achieved orally, minimizing the need for nasogastric tube (NGT) feeding, in order to prevent potential complications that may lead to iatrogenic interventions.[38,39] Even so, it is sometimes necessary to consider the insertion of a NGT to provide nutritional support.

NGT indications are summarized below:[40]

**a. Acute:**

- When oral feeding covers less than 60% to 80% of the nutritional requirement for more than 10 days.
- When the total time dedicated to feeding takes more than 4 to 6 hours a day.
- When the intake is less than 70% of the total calorie requirement for more than 5 days.

**b. Chronic**:

- Wasting and stunting status.
- Inadequate growth for more than 1 month and constant weight loss in children younger than 2 years.
- Weight loss for more than 3 months or no weight gain in children younger than 2 years.
- Two changes in weight percentiles in the growth charts.
- Triceps skinfolds below the 5$^{th}$ percentile for age.
- Decreased growth velocity by more than 0.3 standard deviations per year.
- Decreased height velocity by more than 2 cm per year during puberty.

Vitamin and micronutrient supplementation requires a thorough assessment of the clinical condition and dietary history-taking.

### 3. To conduct eating behavior interventions

As a general rule, it is suggested to implement feeding patterns that discourage aversive feeding practices[5] and promote a gradual transition from more accepted foods to those less preferred by resembling their color, volume, or texture.[18,41,42] When food selectivity is severe, behavioral therapy and sensory desensitization may be key tools in feeding and the overall well-being of children.[41,43,44] Behavioral feeding strategies may be effective even in eating disorders of organic origin.[38,45] Reducing food-related anxiety, in some cases considering the use of drug therapy, may be some of the strategies that can be implemented.[46]

#### Examples of interventions:

- Having family meals in a nice environment.
- Involving children in meal preparation.
- Adapting food sensory properties to achieve acceptance.
- Adapting responsibilities (caregivers say what, where, and when to eat, and children determine the quantity).
- Introducing new foods systematically, offering them repeatedly (8 to 15 times).

In relation to parenting practices, it is suggested to strengthen positive behaviors, such as:

- Selecting meals appropriate to the child's age.
- Encouraging autonomous feeding.
- Tolerating age-appropriate behaviors (e.g., getting dirty).
- Avoiding distractions (e.g., screens) during mealtime.
- Maintaining a calm and neutral attitude during mealtime.
- Establishing feeding routines (e.g., set times and places).
- Limiting the time of each meal to a maximum of 20–30 minutes.

## CONCLUSION

FDs in children are a common problem that may affect their growth and development. The identification of warning signs that indicate serious threats to a child's health, the consideration of feeding behaviors, and accurate nutritional recommendations are necessary measures for an adequate strategy.

A comprehensive and multidisciplinary approach is critical. ■

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