

2.1 Why Address Problem Eating and Mealtime Behaviours?

Problem eating and mealtime behaviours are common in children. If these behaviours are not addressed children are at risk of developing both short and long term health problems such as mild nutritional imbalances, constipation, iron deficiency anaemia, failure to thrive, and obesity.

What is problem eating and mealtime behaviours?

Children's problem eating behaviours are described as aversive behaviours related to eating (Chartoor 1997; Douglas 1995). Aversive eating behaviours may include gagging, vomiting, inability to progress through developmentally appropriate food textures, spitting out of food, refusal or inability to chew foods, and refusal or reluctance to try new foods. In addition, children's problem mealtime behaviours are described as aversive behaviours that surround mealtimes (Turner, Sanders & Wall 1994). Aversive mealtime behaviours include refusal to come to the table, refusal to stay seated at the table, whining or crying, fighting with siblings during mealtime, and throwing food. Children with problem eating and mealtime behaviours will often exhibit more than one of the above behaviours.

In defining problem eating and mealtime behaviours, the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-IV) (American Psychiatric Association 1994) describes feeding difficulties as feeding disorders of infancy and early childhood, where there is a failure to eat adequately. *The International Classification of Disease* (ICD-10) Classification of Mental and Behavioural Disorders (WHO 1992) further broadens the definition to include food refusal and extreme faddiness in the presence of a competent caregiver, an adequate food supply, and absence of organic disease.

The extent of the problem

Problem eating and mealtime behaviours are common in children, with an estimated incidence ranging from 41% (Carruth et al. 1998), through to 35% (Linscheid 1983), to 20% (Ferguson, Horwood & Shannon 1985). However, these figures are conservative estimates, and only include problem behaviours brought to professional attention (Satter 1990). Problem eating and mealtime behaviours are estimated to account for 25–35% of referrals to outpatient paediatric and mental health clinics (Archer & Szatmari 1990).

In a survey conducted by the Australian Institute of Health and Welfare (1994), of staff and parents in family day care, and staff and parents in long day care centres, one of the most important issues raised by parents and carers was 'addressing eating problems'. In both groups this concern ranked approximately 30% higher than for other concerns. Children's problem eating and mealtime behaviours are not restricted to Western societies. In a study that explored the

prevalence of child behaviour problems in rural China, Li et al. (2001) found the prevalence of 'picky eating' was 17%, with the prevalence increasing with age.

Possible causes of problem eating and mealtime behaviours

Problem eating and mealtime behaviours in children can arise for a number of reasons. Gastro-oesophageal reflux, respiratory, cardiac and, ear, nose and throat disorders are common medical problems associated with feeding problems (Chartoor 1997; Douglas 1995; Stein 2000). Force-feeding, tube feeding, vomiting and choking may provide the child with an aversive feeding experience, thus resulting in negative associations to food, chewing or swallowing (Douglas & Byron 1996; Stein 2000). Developmental delay, speech delay and behavioural problems are also associated with feeding difficulties (Douglas 1995; Hutchinson 1999).

However, feeding difficulties may arise simply because of the child's developmental stage (Turner, Sanders & Wall 1994). Developmentally related problem eating and mealtime behaviours commonly commence at around 12 to 24 months of age. This age range encompasses a period when a child demonstrates a need for autonomy and control (Chartoor 1997; Linscheid 1983) which can lead to problems. For example, if a parent does not recognise the child's desire for self-feeding, the child may then exhibit signs of food refusal.

Factors in the family environment that appear to be important include: parental food preferences, knowledge and beliefs, children's food exposure, role modelling, media exposure, and child-parent interactions around food (Campbell & Crawford 2001). Parents provide food environments for their children's early experiences with food and eating. Parents' own eating behaviours and their parenting practices influence the development of their children's eating behaviour (Benton 2004). Parenting practices have been influenced by socio-cultural shifts in recent decades, including a rise in single parenthood, greater family instability, loss of extended family support, and increased reliance on childcare arrangements (Birch & Davison 2001).

Consequences of problem eating

There are numerous short- and long-term health related concerns when children have problem eating and mealtime behaviours. Lifelong eating habits and attitudes are developed during early childhood (Splett & Story 1991), with poor eating habits and attitudes in childhood often resulting from behavioural problems. For example, parents may wrongly assume that after three or four attempts of encouraging their child to eat vegetables, that their child dislikes vegetables. As a consequence of the child's refusal to taste or eat the vegetables, parents may not offer vegetables again. The behaviour of resisting new food tastes and textures is very common in children. Children often require frequent and repeated exposures to new food (up to 30 times) before accepting the food (Chartoor 1997). If parents do not recognise why their child refuses new tastes or textures, they may cease offering the new food, thus creating a potential lifelong aversion to the food, as well as a lost opportunity to obtain essential vitamins and minerals from the particular food.

Health impact of problem eating and mealtime behaviours

Problem eating and mealtime behaviours may impact negatively on child's nutritional status and their ability to develop and grow to their full physical and cognitive potential, and to be protected against chronic disease in later life. Problems may range from mild, short-term problems such as food fads or picky eating (Turner, Sanders & Wall 1994) to more serious long-term difficulties such as food refusal (Chamberlin et al. 1991), which may lead to failure to thrive (Reifsnider 1998) and suboptimal growth.

Also of concern is the child that has a limited nutritious but high energy diet contributing to overweight and obesity and early development of associated problems (including type 2 diabetes). As well, excess weight gain in childhood is an important predictor of adult overweight and obesity, chronic disease (such as cardiovascular disease, type 2 diabetes and some forms of cancers) and early mortality (Queensland Health 2001).

Other health concerns resulting from poor childhood nutrition include iron deficiency anaemia (Boddy, Andrews & Skuse 2000; Spencer 1995; Wright et al. 1998), malabsorption, heart disease (Smith 1999) and intellectual impairment and aversive behaviours persisting into adolescence (Galler 1987).

Relevant national and state documents

Addressing childhood nutrition issues including problem eating and mealtime behaviours, have been identified as a priority in a number of state and national policy documents that seek to promote the health and wellbeing of Australian children.

The national policy — The Health of Young Australians (Commonwealth Department of Human Services and Health 1995) is a formal commitment by Commonwealth, State and Territory Governments to work cooperatively to promote, maintain and improve the health status of Australian children and young people. Nutritional issues and childhood problem eating and mealtime behaviours were key areas of health concern identified in the policy document in relation to infants and young children.

The national policy reinforced the priorities outlined in the Health Goals and Targets for Australian Children and Youth (Child, Adolescent and Family Health Service, 1992). This policy document outlined five key goals for improving health outcomes. Fun not Fuss with Food focuses on two of the five goals: to reduce the impact of conditions occurring in adulthood, which have their early manifestations in childhood or the teen years; and to enhance family social functioning.

The Queensland Strategic Policy Framework for Children's and Young People's Health 2002–2007 (Queensland Health 2002) aims to progress the five National Health Goals and Targets for Australian Children and Youth. The Queensland policy document recognised a number of key principles in improving the health and wellbeing of Queensland's children and young people. These principles include: the importance of families in supporting and nurturing children, the promotion of healthy growth and development in safe, supportive environments, and ensuring quality treatment, management and monitoring (Queensland Health 2002).

The Strategic Policy Framework also identified priority health outcomes, one of which aims to reduce the prevalence and impact of risk behaviours among children and young people which contribute to poor health outcomes later in life. Reducing the prevalence and impact of risk behaviours such as poor nutrition which may lead to such diseases as adult onset of cardiovascular disease, diabetes, overweight and obesity (Commonwealth Department of Health and Aged Care 2000), can be achieved by promoting healthy eating in young children (Queensland Health 2002).

To address these health outcomes, a balance of primary (community-based early intervention, prevention and education programs), secondary (individual clinical care) and tertiary intervention (hospital and treatment services) strategies is required (Queensland Health 2002). A health system that balances primary prevention and secondary and tertiary treatment strategies acknowledges that good health results from positive investments across the continuum of care. Therefore, investing in community-based primary prevention strategies that target the critical years of childhood has the potential to have an impact on reducing the burden of disease (Queensland Health 2002).

Eat Well Queensland 2002 - 2012: Smart Eating for a Healthier State is a public health food and nutrition strategy developed to improve the health and wellbeing of all Queenslanders through better food and nutrition. Eat Well Queensland supports the implementation of primary prevention nutrition programs that aim to improve health gains in community mortality and morbidity for chronic diseases. Eat Well Queensland has identified priority action areas which include the promotion of healthy eating and enhancing the health of mothers, infants and children.

This strategic document highlights that early nutrition is an important determinant of health over the whole lifespan. With the link between childhood eating patterns, nutrition and growth; and the development of risk factors such as hypertension and coronary artery disease in adulthood (Smith 1999), diabetes, overweight and obesity (Commonwealth Department of Health and Aged Care 2000), it is important that intervention occurs as early as possible in a child's life. The important role of parents in fostering children's nutritional preferences is recognised.

What makes Fun not Fuss with Food unique?

When reviewing the published literature, no descriptions or evaluations of primary level, community-based, early intervention and prevention strategies for children's problem eating and mealtime behaviours were found. *Fun not Fuss with Food* incorporates input from a range of health professionals including child health nurses, dietitians/nutritionists, child psychologists, and speech pathologists, and can be delivered using a multidisciplinary approach, or by any health professional with some knowledge of childhood nutrition and behavioural management strategies.

A research study was conducted in 2002 that aimed to evaluate the effectiveness of the *Fun not Fuss with Food* workshop. This quasi-experimental research study utilised a time series design incorporating data collection twice before and twice following the workshop. Results showed that parents who attended the workshop reported significant improvements in their child's problem eating and mealtime behaviours and reported reductions in parental concerns regarding their child's problem eating and mealtime behaviours. The findings support the use of this early intervention group education workshop as a strategy for parents with children who have problem eating and mealtime behaviours.

2.2 Conceptual Framework

The *Fun not Fuss with Food* workshop has been developed using the principles of two conceptual frameworks. These are:

1. Behavioural family intervention
2. Division of responsibility in feeding

Behavioural family intervention

Behavioural family intervention (BFI) based on social learning principles aims to teach parents strategies that increase positive interaction with children and reduce coercive and inconsistent parenting practices (Sanders, Markie-Dadds & Tully 2000). BFI programs use verbal instructions, role modelling, positive reinforcement and stimulus control techniques. These procedures are covered within the *Fun not Fuss with Food*. Case report studies have documented the effectiveness of BFI strategies when working with children with feeding difficulties (Dadds, Sanders & Bor 1984; Greer, et al. 1991; Larson, Ayllon & Barrett 1987).

Division of responsibility in feeding

To enhance positive feeding interactions, Satter (1987) describes a framework for the division of responsibility in feeding. That is, parents are responsible for providing the child with nutritious, safe and engaging foods, while it is the child's responsibility to decide how much they will eat. When parents become aware of, and adopt the division of responsibility in feeding, there may be a reduction in parental stress, and a concurrent decrease in behavioural non-compliance as a result of improved feeding interactions between the parent and child. The *Fun not Fuss with Food* utilises Satter's (1987) division of responsibility in feeding as a framework for behaviour change in the parent. Health professionals such as child health nurses and dietitians/nutritionists can implement prevention strategies that encourage positive feeding interactions between parent and child (Satter 1987).

The role of parents

For parents to become the vehicle for teaching and modelling appropriate behaviours to their children, then parents may require specific knowledge and behavioural management skills to attain this goal. Parent education aims to teach parents strategies to assist their child in attaining developmental skills (Mahoney et al. 1999), manage their child's behaviour positively and promote caring relationships between parents and their children (Turner, Markie-Dadds & Sanders 1998).

2.3 Review of the Literature

The following literature review aims to assist facilitators in enhancing knowledge and understanding of a number of constructs related to problem eating and mealtime. These constructs include: the parent–child feeding relationship, child behavioural compliance, parental attitudes and feelings towards mealtimes and the child’s manual/oral motor development.

Parent–child feeding relationship

The feeding relationship between parent and child may reflect a relatively smooth transition, whereby the child and parent progress cooperatively through the many developmental stages of infant - child feeding. However, this may not always be the case, with an estimated 20% to 41% (Carruth et al.1998; Ferguson, Horwood & Shannon 1985; Linscheid 1983) of parents reporting concerns regarding their child’s problem eating and mealtime behaviours.

The parent–child feeding relationship consists of a complex set of interactions (Satter 1990) in which the child’s cooperation is required in feeding. An effective feeding relationship supports the child’s development (Satter 1990), encourages learning of new skills (Sanders 1992), promotes adaptive interactional patterns between parent and child (Linscheid 1983) and provides the child with nourishment to sustain growth. When there is a disruption in the parent–child feeding relationship, there is the potential for maladaptive interactional patterns to develop (Linscheid 1983). These maladaptive patterns may include delays in the development of manual and/or oral motor skills and child behavioural compliance, and parental distress regarding the child’s problem eating and mealtime behaviours.

The family plays a significant role in childhood nutrition (Kennedy 1998). Parents of children who are experiencing feeding difficulties have been reported to have inaccurate beliefs about nutrition, or poor knowledge of nutritional requirements (Chartoor 1997). Parents also report stressors related to the day-to-day management of children with problem eating and mealtime behaviours (Archer, Cunningham & Whelan 1988). These stressors often relate to lack of knowledge and understanding of the child’s normal developmental progress and the management of the myriad aversive behaviours associated with problem eating and mealtimes.

Child behavioural compliance

An effective feeding relationship between the parent and the child is dependent on various interactive processes, abilities and characteristics of both the parent and the child. The feeding relationship is a reciprocal relationship that commences with the child indicating an interest in being fed. The parent may respond to the child’s interest readily, reluctantly or not at all (Satter 1990). Parental responses that assist with appropriate eating and mealtime behaviours include attentiveness to the child during feeding (for example, talking calmly and praising the child), encouraging the child to feed his/her self, allowing the child to

determine when they have had enough food, allowing the child to explore and play with the textures, shapes and smells of the different foods.

An effective feeding relationship whereby the parent is cognisant of the child's developmental needs, food likes and dislikes and feeling of satiety, encourages an intimate relationship between the parent and the child (Satter 1990). Conversely, parents who implement punitive responses to their child's feeding behaviours (for example, smacking and shouting) will increase the child's ambivalence about food (Douglas 1995) and create opportunities for the child not to comply with parental instructions (Sanders 1992) and for the child's behaviour to deteriorate (Satter 1995).

Problem eating and mealtime behaviour is influenced and reinforced by the family's social interaction patterns and parental responses (Turner, Sanders & Wall 1994). Failure to model appropriate mealtime behaviours also contributes to the development and maintenance of children's feeding problems (Turner, Sanders & Wall 1994). In an examination of mealtime interactions of children with feeding disorders and children who did not have problems with eating, Sanders, et al. (1993) found parents of problem feeders used more coercive behaviours, and this was significantly associated with food refusal and non-compliance in children.

Parents may have unrealistic expectations of their child's age-appropriate dietary intake and mealtime behaviour (Satter 1995). These unrealistic expectations, coupled with instituting inappropriate consequences related to non-completion of food (for example, a child who does not eat all the food on his/her plate is sent to bed as punishment) serve to reinforce and maintain non-compliance. As a result of parental concern regarding their child's dietary intake, inappropriate responses may occur when a child refuses offered food. For example, a parent may offer vegetables at mealtime, which the child refuses to eat; the parent may then be concerned that the child will be hungry and, as a result will offer the child's favourite food (such as custard or yoghurt). Thus the child learns that refusal of offered food leads to the offering of favourite foods. This sets the scene for an ongoing pattern of child non-compliance.

Satter (1995) describes how health professionals such as child health nurses can implement prevention strategies that may encourage positive feeding interactions between parent and child. To enhance these positive feeding interactions Satter (1987) describes a framework for the division of responsibility in feeding. That is, parents are responsible for providing the child with nutritious, safe and engaging foods, while it is the child's responsibility to decide how much they will eat. When parents become aware of, and adopt the division of responsibility in feeding, there may be a reduction in parental stress, and a concurrent decrease in behavioural non-compliance as a result of improved feeding interactions between the parent and child.

Parental attitudes and feelings towards mealtimes

Parental and family interaction patterns, attitudes and feelings towards eating and mealtimes may serve to develop and maintain children's problem eating and mealtime behaviours (Sanders 1996). When describing attitudes and feelings towards mealtimes, the literature recognises the role of the parent in the complex relationship between attitudes and feelings and the maintenance of children's problem eating and mealtime behaviours (Archer & Streiner 1992; Hagekull & Dahl 1987; Ruchala & James 1997; St John Alderson & Ogden 1999).

For some parents, providing their child with nourishment equates to a strong sense of nurturing and competence as a parent (Keren, Feldman & Tayo 2001). When problem eating and mealtime behaviours occur, such as food refusal, refusal to come to the table to sit or to try new foods, parents may believe that they are not nurturing their child adequately. Feeney (1986) suggests that nourishment is but one component of nurturing. Other ways parents may nurture their child to promote growth and development include age-appropriate play and stimulation, human contact, sleep, social interaction and touch.

Parents who place too great an emphasis on feeding may become overly concerned with the child's behaviour during meals (for example, taking excessive time to eat meals, refusing to swallow food, whining and tantruming) the quality, quantity and variety of foods consumed by the child. For the parent who equates nourishment with nurturing, these problem eating and mealtime behaviours may evoke feelings of inadequate parenting skills. These cognitions and feelings about their relationship with their child may lead to poor parent-child interactions (Keren, Feldman & Tayo 2001) and may exacerbate temporary feeding difficulties and problem behaviours (Feeney 1986).

Promoting caring relationships between parents and their children requires acknowledgment of parental thoughts and feelings about feeding their child, parents' attitude to food and mealtimes (Daniels 1999; Kleges, Stein, Eck, Isbell & Kleges 1991) and their parents' anxieties regarding their child's feeding difficulties may also have an impact on their child's dietary intake and eating behaviour (Turner, Sanders & Wall, 1994). In a descriptive comparative study conducted in Sweden, Hagekull and Dahl (1987) examined maternal experiences and emotions related to the feeding situation in infancy through a structured interview method. Eighty-four families with infants aged between 3 and 12 months were allocated to either a problem group or a control group. The problem group consisted of families with an infant who had a long-lasting feeding problem. The control group consisted of matched infants without feeding problems. Large group differences were found, with parents who were experiencing feeding difficulties with their infants having more negative experiences and emotions, more social isolation and more irritable child behaviour.

Hagekull, and Dahl (1987) found that younger mothers tended to experience greater problems and more social isolation than older mothers. However, reported emotions and problematic behaviours were relatively independent of maternal educational background. In the control group the authors found infants

characterised by a generally happy mood during mealtimes, mothers who had no concerns regarding feeding their infant and who had generally positive feelings when preparing and serving their child food. The researchers concluded that infant feeding problems were clearly related to elevated parental stress experiences. Their results are consistent with a study that explored maternal sensitivity, responsiveness, and limit-setting styles of 61 mothers of 12-month-old infants. LeCuyer-Maus (2000) found that mothers vary in their ability to integrate sensitivity and responsiveness into control-salient interactions. The study found mothers who were less sensitive and responsive during play and feeding interactions and who had less optimal relationship histories with their parents may be more at risk of developing compromised interactive patterns with their infant. The findings, however, may be difficult to generalise due to the over-representation of boys ($n = 41$) to girls ($n = 20$) and the relatively small numbers enrolled in this study. Another limitation to the study relates to the lack of recognition of family relationships and attitudes (Ford-Gilboe 1997), influence of partners or significant others and the age of the mother (Ruchala & James 1997). These factors may also influence sensitivity and responsiveness in the mother.

The above studies by Hagekull, and Dahl (1987) and Le-Cuyer Maus (2000) examined families with infants under the age of 12 months. It could be assumed that unless the feeding problem resolves, or there is a subsequent reduction in parental stress, these negative feelings and emotions would continue to negatively impact on the family.

Infants and children have the ability to self-regulate their energy intake by adjusting their food intake in response to the energy content of foods they consume (Birch & Deysher 1986). Parents who allow their child to determine the quantity of food offered may encourage self-control in eating in their child (Johnson & Birch 1994). Conversely, parents who have more controlling approaches to child feeding may over ride the development of the child's self-control of eating (Johnson & Birch 1994). For example, parental pressure to eat may over ride the child's feeling of satiety which encourages overeating in the absence of hunger. Children who overeat in the absence of hunger, or eat in response to external cues (for example, in response to emotional stressors or parental pressure to eat more food) are said to have disinhibited eating patterns.

Manual/oral motor development

Early intervention programs that target specific childhood issues such as eating and mealtime behaviours must also recognise the importance of children's normal developmental progress, mastery of new skills (for example, self-feeding and chewing) and the relationship between developmental stages and associated behaviours. Initially children's eating and swallowing are reflexive in nature (Linscheid 1983). Infants in the first year triple their birth weight (Whaley & Wong 1999). After the first year, the infant's appetite and interest in food decreases dramatically (Linscheid 1983; de la Hunty, Lader & Clarke 2000). Weight gain after the first year will be approximately 2–3 kilograms per year over the next three to four years (Whaley & Wong 1999). It is at this time when children's energy needs decrease, that, coupled with diminishing interest in food, the development of problem eating and mealtime behaviours often commences.

As children develop, the unique nature of the parent and child feeding relationship can set the stage for adaptive or maladaptive interactional patterns (Linscheid 1983).

As children seek the need for autonomy, behavioural problems such as food refusal are common (Chartoor 1997; Linscheid 1985). Many annoying and difficult behaviours (as defined by caregivers) are age appropriate, reflecting developmental changes in the child or age-related frustration or conflict (Campbell 1990). Disruptions to children's eating may be as a result of not having or learning the necessary physical skills and competencies required for eating (Douglas & Harris 2001). Non-compliance in children may also reflect children's lack of understanding of adult expectations (Kaler & Kopp 1990), or the adult's lack of understanding of age-appropriate behaviours (Campbell 1990). As children advance developmentally towards independence, non-compliance may reflect the child's self-awareness and self regulation, but may also reflect angry defiance, which may signal problems in the parent-child relationship, or parental difficulties coping with the child's developmental transition (Campbell 1990; Chartoor 1997).

Parents may not recognise normal developmental cues displayed by their child. For example, parents who dislike the mess associated with a toddler learning to self-feed or who are acutely focused on the quantity of food their child should eat, will restrict the child's self-feeding abilities by offering food that is handled only by the parent. This denial of the child's need to self-feed often leads to conflict at mealtimes and food refusal (Daniels 1999; Douglas 1995; Wolff & Lierman 1994). This in turn may create anxiety and conflict between the parent and child whenever food is offered. Another example of parents not recognising normal developmental cues relates to the progression of developmentally appropriate foods. Children progress through transitional foods starting with pureed food to more complex textured solids within their first 12 months of life. Children who have difficulty in progressing through developmentally appropriate foods may gag and appear to reject the food. Parents may incorrectly interpret this behaviour as indicating that their child is not developmentally ready to progress with their solids (Douglas 1995). The gag reflex is a protective mechanism in infants and is easily elicited (Douglas 1995). The gag reflex usually diminishes as the child gets older. However, parents may revert back to offering their child pureed foods in the hope of avoiding gagging episodes. As a consequence of avoiding gagging episodes by maintaining the child on pureed foods, future progression of more textured solids will probably see the child continue to gag when offered the textured solids. Therefore, parents will often maintain pureed foods well past the developmentally appropriate age. This delay in progressing solids means that the child does not practise chewing and swallowing movements, which may lead to oral motor impairment, which in turn may lead to delayed speech development (Chartoor 1997; Douglas 1995).

In a case control study of nine, 1-year-old infants who were diagnosed with non-organic failure to thrive, and nine comparison infants (who were matched pair-wise according to age, race, gender, ordinal position, birthweight and gestation, maternal ages, years of education and type of dwelling and crowding index), Matheisen, Skuse, Wolke, and Reilly (1989) quantified oral-motor functioning

and behaviour during feeding through the use of a feeding assessment schedule (developed by the authors). The authors also investigated the prevalence of dysfunctional oral–motor development and observed contextual factors during feeding to see if the infants’ needs were being met. The findings suggested that non-organic failure to thrive may be associated with abnormal oral–motor functioning and aspects of social adversity, such as disorganised mealtimes. Many of the children who had non-organic failure to thrive were still receiving a high proportion of their nutrition in the form of purees or semi-solids. Generalisability of the results was limited due to the relatively small number of participants enrolled in the study. However, the results reinforce the need for improving parents’ knowledge of the importance of understanding key developmental milestones and behaviours that may affect the successful transitioning of food textures. For example, parents who are made aware of the importance of transitioning food textures (from pureed through to solid foods and how and in what order the transition of textures should occur), the role of the gag reflex as a protective mechanism and the importance of mealtime routines, will be able to assist their child in developing their manual/oral motor skills in a supportive and safe way.

The ability of parents to guide and support young children through potentially difficult developmental transitions such as the independence stage of development, where eating and food-related behaviours often commence (Chartoor 1997), may in part determine whether a difficult transition is a transient phenomenon or sets the precedence for parent–child conflict and ongoing problems (Campbell 1990; Feenney 1986; Satter 1990). Lifelong eating habits and attitudes are developed during early childhood (Splett & Story 1991). Intervention with families who have concerns with their child’s eating and mealtime behaviours should occur prior to the establishment and/or entrenchment of these lifelong eating habits and attitudes. Ideally, intervention should occur when the child is aged between 3 and 8 years (Farrand & Cox 1993; Green & Bird 1986), thus allowing for changes in behaviour prior to the establishment of lifelong eating habits and attitudes.

2.4 Rationale for Inclusion of Serving Sizes in the Parent Resource

For 1-3 years

Feedback from parents from post-workshop questionnaires for the Fun not Fuss with Food (FnFwF) sessions showed a demand for information on the types and amounts of foods needed to meet dietary guidelines. It is understood that guidelines for 1-3 year olds were not developed initially as there is great variation in growth and appetite and the focus should be on the introduction of a healthy eating pattern and family meal acceptance rather than on serves. However, the project Reference group agreed that suggested sample servings should be developed for use in this project. This paper documents the findings of the background work collected to draft the suggested sample servings.

Background

A review of the Australian literature available on under 4's serving sizes and amounts was undertaken; the following key documents were referred to in developing suggested serving sizes for the 1-3 years:

- The Core Food Groups (National Health and Medical Research Council 1995)
- The Australian Guide to Healthy Eating (Commonwealth Department of Health and Family Services 1998)
- Dietary Guidelines for Children and Adolescents (National Health and Medical Research Council 2003)
- Recommended Dietary Intakes for use in Australia (National Health and Medical Research Council (NHMRC) 1991)

A recent study by Webb et al. (Webb et al. 2005) highlights the lack of official national dietary guidance for children in the transition from infancy to varied diet, specifically from one to two years, as a significant problem facing the nutrition community. Webb et al. (2005) emphasises the current official national food selection guide The Australian Guide to Healthy Eating (AGTHE), which includes quantitative recommendations for core food groups, does not include recommendations for children under the age of four years.

Method

The proposed serve sizes and number of serves to be included in the FnFwF parent resource were developed in the absence of any official guidelines. The sample serves were modelled against the Core Food Groups, which is the basis for the official national food selection guide, the Australian Guide to Healthy Eating (Commonwealth Department of Health and Family Services 1998). The serves were checked against current Recommended Dietary Intakes (RDI) for selected nutrients and energy for children aged 1-3 (NHMRC 1991) and approved by the Reference group as consistent with children's current eating patterns.

The Core Food Groups calculated the minimum number of daily sample serves needed to achieve at least 70 per cent of the Recommended Dietary Intake (RDI) for all nutrients and less than 50 per cent of the recommended intake for energy for most age groups - Model B (NHMRC 1995). The Core Food groups minimum number of daily sample serves essentially provide all nutrients for health, but not sufficient energy intake. For children aged 4-7 years the minimum number of sample serves from the Core Food Groups supply 3614kJ, the AGTHE to meet energy requirements of the 4-7 year old (7200kJ) incorporated additional serves (including extras group) to make the sample serves meet energy requirements for this age. The proposed FnFwF sample serves for 1-3 year olds follows a similar pattern to meet energy requirements which is consistent with Dietary Guidelines for Children and Adolescents.

The RDI's for protein, vitamin and minerals for children aged 1-3 are the same or less than those for 4-7 year olds. Therefore using the Core Food Groups minimum number of serves for 4-7 year olds would mean that the protein, vitamin and mineral needs of 1-3 year olds are adequately met. Specific details on the nutrients supplied can be found in the Core Food Groups document (NHMRC 1995). As these minimum serves do not meet energy requirements additional serves (including extras group) needed to be added to meet energy requirements of children aged 1-3 of 5400kJ (NHMRC 1991).

Recommendation

The suggested serve sizes for the FnFwF resource reflect the food groups in the Australian Guide to Healthy Eating (Commonwealth Department of Health and Family Services 1998) and are supportive of the current Dietary Guidelines for Children and Adolescents in Australia, as produced by the National Health and Medical Research Council (2003). The proposed FnFwF number of food serves for children aged 1-3 (defined as sample serves in the AGTHE) are **three** bread and cereal serves (1 serve = 2 slice of bread), **three** vegetable serves (1 serve = ½ cup of cooked vegetables), **two** fruit serves (1 serve = 1 medium piece of fruit), **two - three** dairy serves (1 serve = 250ml milk), and **half** serve of meat or meat alternative (1 serve = 65-100g meat). The extra foods group significantly contributes to energy allowance for children aged 1-3 and to allow the additional needs of this age group to be met the extra food serve is **one** (Table 1).

Table 1- Proposed serve sizes for 1 – 3 year olds

	Bread, Cereals, Rice, Pasta, Noodles	Vegetables, Legumes	Fruit	Milk, Yoghurt, Cheese	Meat, Fish, Poultry, Eggs, Nuts, Legumes	Extras
Core Food groups - minimum number of daily serves needed to achieve at least 70% of requirements for protein, vitamins, minerals*						
Children 4-7 Years	2	2	1	2	0.5	0
AGTHE (blue line) ** - meets at least 70% of requirements for nutrients and energy						
Children 4-7 years	3-4	4	2	3	0.5-1	1-2
Proposed FnFwF 1-3 year (defined as AGTHE serves)						
Children 1-3 years	3	3	2	2-3	0.5	1
Proposed FnFwF 1-3 year (defined as child size serves)						
Children 1-3 years	6 child size serves	6 child size serves	4 child size serves	4-6 child size serves	1 child size serve	1

* Source: National Health and Medical Research Council. *The Core Food Groups* (1995)

** Source: Commonwealth Department of Health and Family Services. *The Australian Guide to Healthy Eating - Background Information for nutrition educators*. Healthy Diet Example B – Blue Line (1998).

Due to the eating habits of this age group ‘child size serves’ (Table 1) were developed, using the AGTHE standard serve sizes as the basis (Commonwealth Department of Health and Family Services 1998). The reference group felt ‘child size serves’ were more indicative of the amounts actually consumed by this age group. This was supported in a recent article by Webb et al. (2005) reviewing meat consumption among 18 month year old children, concluding the use of the lower limit recommended in the AGTHE of 32.5g-50g meat per day as an appropriate portion size range for children aged 1-3 (a sample serve defined in AGTHE is 65-100g meat per day). Webb et al.’s (2005) data highlights the large differences between what is actually consumed by this age group and the current ‘standard’ portions to assess diets.

What is a 'child size' sample serve?

A sample serve of bread, cereal, rice, pasta, noodles:

1 slice bread (wholemeal, wholegrain, white)
½ cup breakfast cereal
½ cup cooked rice, pasta, noodles
½ cup cooked porridge
¼ cup untoasted muesli

A sample serve of vegetables, legumes:

¼ cup cooked vegetables
½ cup salad vegetables
½ small potato
¼ cup cooked baked beans, legumes, lentils

A sample serve of fruit:

1 small piece of fruit eg small apple, banana, orange
¼ cup fruit juice – if offering fruit juice, offer unsweetened diluted (three quarters water, one quarter juice) not more than once per day

A sample serve of milk, yoghurt, cheese:

125 ml (small glass) milk
125 ml soy milk (fortified with at least 100mg calcium/100ml)
20g (small slice) cheese
100 g (½ small container) yoghurt
125 ml custard

A sample serve of meat, fish, poultry, eggs, nuts, legumes:

¼ cup cooked baked beans, legumes, lentils
40-60g cooked fish
1 medium egg
1-tablespoon peanut paste
30-50g meat (1 small chop, ¼ cup mince, 1 slice of roast meat)

In producing the FnFwF sample serves the at-risk nutrients for this age group were carefully reviewed (Table 2) to ensure that RDI's were being met particularly for iron, zinc, calcium and energy. This is reflected in those nutrient groups highlighted in the Dietary Guidelines for Children and Adolescents. In Australia several nutrition studies of children in care centres reveal energy, iron, calcium and zinc are the most common nutrients to be consumed at levels of less than 50 per cent RDI during long day care (Radcliffe, Cameron & Baade 2002). Landers et al. (1994) in a study of nutrient intake supports this and found recommended intake of iron, calcium and energy were not met when nutrient intake over the entire day was considered of children both inside and outside of formal childcare hours. A recent study by Webb et al. (2005) found marginally lower intakes of iron and zinc in 18-month-old children and substantial numbers of children did not reach the RDI for iron and zinc. Several recommendations came from this study firstly to encourage parents in the use of cuts of red meat in place of some of the white and processed meats, in view of their higher contribution of bioavailable iron and zinc per portion (Webb et al. 2005) and secondly where plant-based foods were

preferred, advise the use of iron-fortified food products. The FnFwF reference group felt that it was important to support these recommendations.

Table 2 – At risk nutrients in children aged 1-3

Nutrients	Children aged 1-3 years		
	RDI*	70% of RDI	FnFwF Serve Sizes**
Energy (kJ)	5400	3780	4275-6365
Iron (mg)	6-8	5	6.7-7.1
Calcium (mg)	700	490	900-1280
Zinc (mg)	4.5	3.2	6.8-8.8

* Source: National Health and Medical Research Council. *Recommended Dietary Intakes for Use in Australia* (1991)

** Source: Iron, calcium and zinc calculated from *Core Food Groups* Table 3B (Model B) - *Nutrients per weighted portion* and energy calculated from energy values provided in the *Australian Guide to Healthy Eating* (1998)

Conclusion

The FnFwF Reference group are aware that the NHMRC is in current consultation regarding draft Nutrient Reference Values for Australia and New Zealand including Recommended Dietary Intakes. However, these will be unavailable for use for sometime. It is acknowledged that there is an important need for national standards for the quantification of foods to meet children’s nutritional requirements for 1-3 years so that messages to parents are consistent across states.

For 4-7 years

The serve sizes and number of serves used in the FnFwF parent resource are consistent with the official national food selection guide, the Australian Guide to Healthy Eating (Commonwealth Department of Health and Family Services 1998). The FnFwF project used the eating pattern (Healthy Diet Example B – Blue Line). The rationale for using the blue line is it includes more from all the foods groups, in amounts proportional to the minimum number of daily serves needed. The Reference group felt this was more consistent with children’s current eating patterns and would mean an increase in their fruit and vegetable intake. Furthermore, the current FnFwF facilitator’s manual which was updated in 2004 uses the Healthy Diet Example B – Blue Line (Commonwealth Department of Health and Family Services 1998). In the interest of consistency with the Australian Guide to Healthy Eating, child size serves were not used for this age group.

For 8-11 years

The serve sizes and number of serves in the FnFwF parent resource are consistent with the official national food selection guide, the Australian Guide to Healthy Eating (Commonwealth Department of Health and Family Services 1998). The FnFwF project used the eating pattern (Healthy Diet Example B – Blue Line). The rationale for using the blue line is it includes more from all the foods groups, in amounts proportional to the minimum number of daily serves needed. The reference group felt this was more consistent with children's current eating patterns and would mean an increase in their fruit and vegetable intake. Furthermore, the current FnFwF facilitator's manual which was updated in 2004 uses the Healthy Diet Example B – Blue Line (Commonwealth Department of Health and Family Services 1998). In the interest of consistency with the Australian Guide to Healthy Eating, child size serves were not used for this age group.