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PREVALENCE FOR PICKY EATERS AND ITS ASSOCIATED FACTORS AMONG TODDLERS IN PEDIATRICS CLINIC AT SELECTED GOVERNMENT HOSPITAL

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FPSK6 2014 4

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Abstract

PREVALENCE OF PICKY EATERS AND ITS ASSOCIATED FACTORS AMONG TODDLERS IN PEDIATRICS CLINIC AT SELECTED GOVERNMENT HOSPITAL

Nik Najwa Nik Abdul Kadir

This cross sectional study was conducted to determine the prevalence of picky eaters and its associated factors among toddlers in Paediatric Clinic at selected government hospital. A total of 54 toddlers were included in this study. Socioeconomic and medical status were obtained by interviewing the mothers or caregivers. Anthropometry measurements were collected from medical records. The 24 hour dietary recall was conducted to obtain their dietary intake. The mean age of toddlers was 20.3 ± 7.2 month, with majority of them were boys (64.8%) and Malay (87.0%). The prevalence of picky eaters among toddlers was 29.6%. In this study, 61.8% had history of medical problems and 47.3% had current known medical problems. Most of them (70.4%) had normal birth weight history, with the mean of birth weight was 2.8 ± 0.7 kg. The mean z-score (weight-for-age = -0.82 ± 1.25, height-for-age = -0.84 ± 1.40, and BMI-for-age = -0.39 ± 1.11), which fall under normal category. Slightly more boys were picky eaters than girls, but there was no significant difference between the two groups. There was no significant association between picky eating behaviour (PEB) and known medical problem. Body mass index (BMI) also shows no significant association with PEB, however, energy and carbohydrate intake were significantly associated with PEB (r=-0.28, p<0.043; r=-0.33, p<0.014). In conclusion, the prevalence of PEB among toddlers was 29.6%, and toddlers who presented with PEB had lower intake of energy and carbohydrate. Future research should be done to develop a standard validity and reliability of questionnaire to assess PEB among toddlers.

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Abstrak

PREVALENS KANAK-KANAK YANG CEREWET MAKAN DAN FAKTOR-FAKTOR YANG BERKAITAN DENGANNYA DALAM KALANGAN KANAK-KANAK BERTATIH DI KLINIK PEDIATRIK DI HOSPITAL KERAJAAN TERPILIH

Nik Najwa Nik Abdul Kadir

Kajian keratan rentas ini bertujuan untuk menentukan prevalens kanak-kanak yang cerewet makan dan faktor-faktor yang berkaitan dengannya dalam kalangan kanak-kanak berumur 1 hingga 3 tahun. Seramai 54 kanak-kanak terlibat dalam kajian ini. Status sosio-ekonomi dan perubatan diperoleh melalui temubual dengan ibu atau penjaga kanak-kanak tersebut. Ukuran anthropometri diperoleh daripada rekod perubatan. Pengambilan pemakanan diambil melalui temubual dengan ibu atau penjaga kanak-kanak tersebut. Purata umur kanak-kanak adalah 20.3 ± 7.2 bulan; kebanyakan mereka adalah kanak-kanak lelaki (64.8%) dan Melayu (87.0%). Prevalens kanak-kanak bertatih yang cerewet makan adalah 29.6%. Dalam kajian ini, 61.8% mempunyai sejarah rekod perubatan dan 47.3% menghadapi masalah perubatan. Majoriti kanak-kanak (70.4%) lahir dengan berat badan yang normal, dengan purata 2.8 ± 0.7 kg. Purata skor-z (berat-untuk-umur= -0.82 ± 1.25, panjang/tinggi-untuk-umur = -0.84 ± 1.40, dan BMI-untuk-umur = -0.39 ± 1.11), semuanya berada dalam kategori normal. Peratus kanak-kanak lelaki yang cerewet makan lebih sedikit daripada kanak-kanak perempuan, tetapi tidak berkaitan secara ketara. Tiada hubungan ketara dapat dilihat antara cerewet makan dengan isu perubatan sekarang. Jisim berat badan juga tidak dapat dikaitkan dengan cerewet makan. Walaubagaimanapun, pengambilan tenaga dan karbohidrat dilihat mempunyai perkaitan yang ketara dengan cerewet makan (r=-0.28, p<0.043; r=-0.33, p<0.014). Secara kesimpulannya, prevalens kanak-kanak bertatih yang cerewet makan adalah 29.6%, dan kanak-kanak yang mempunyai pengambilan tenaga dan karbohidrat yang kurang menghadapi risiko yang tinggi untuk cerewet makan. Kajian pada masa hadapan perlu dijalankan untuk membuat satu soal selidik yang sahih dan sesuai digunakan untuk menilai cerewet makan dalam kalangan kanak-kanak.

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CHAPTER 1

INTRODUCTION

1.1 Background

Toddlers are generally defined as children who are their range of age between 1 and 3 years (Brown, 2011). Toddler's stage of development is characterized by a rapid increase in gross and motor skills with subsequent increases in independence, exploration of the new environment, and language skills (Brown, 2011). Gross and fine motor development during the toddler years enhance children's ability to chew food at different texture and to self-feed (Brown, 2011). It allows the child to practice self-feeding skills, exploring new food, and to use cups and spoons more effectively. On average, toddlers gained 0.23 kg per month and 1 cm of height per month (Brown, 2011).

Although variety of food has been introduced at this stage, many toddlers demonstrate strong food preferences and dislikes. They can go through prolonged periods of refusing a particularly food or foods they previously liked (Brown, 2011). It needs to be reminding that toddlers naturally have decreased interest in food because of slowing growth, and a corresponding decrease in appetite (Brown, 2011).

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As a result, food intake will also decrease. This consequence is often making parents worried, which can contribute to labelling the child as a "picky" eater (Brown, 2011).

Picky eaters is defined as children who reject certain types of foods or groups of foods that parents think are appropriate or necessary for the child's development (Jacobi, Schmitz, & Agras, 2008). It is also defined as children who consumed of an inadequate variety of foods (Wright, Parkinson, Shipton, & Drewett, 2007). On the other hand, picky eating behaviours include rejection of certain types of food, acceptance of only certain foods, unwillingness to try new foods, limited intake of some food groups and strong food preferences (Jacobi, Agras, Bryson, & Hammer, 2003). Picky eaters had a lower sucking frequency in infancy, ate more slowly, and ate fewer calories at 4 to 5 years of age (Mascola, Bryson, & Agras, 2010). It was also reported that picky eaters who were not consuming enough fruits and vegetables, which if left unchecked will lead to a generation of unhealthy nutrient-deficient (Dovey, Staples, Gibson, & Halford, 2008).

The prevalence of picky eaters are varies across various countries and among various age group. In Canada, the prevalence of picky eaters ranging from 17% to 54%, where the age group of children was between 4 and 24 months (Carruth, Ziegler, Gordon, & Barr, 2004). In United States, the prevalence of picky eaters was 39% in which the children aged 3 until 11 years (Mascola et al., 2010). About 19% and 18% of girls and boys aged between 8 and 12 years in German experienced picky eating behaviour respectively (Jacobi et al., 2008). Meanwhile, in Singapore, they found that 29.9% of children aged 3 to 5 years, 25.0% of children aged 6 to 10

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years and only 20.3% were reported as picky eaters for 1 to 2 years (Goh & Jacob, 2012).

1.2 Problem Statement

There were several studies about picky eaters that have been conducted among various age groups and in various countries. One of the studies in Canada has studied the prevalence of picky eaters among infants and toddlers aged 4 to 24 month (Carruth et al., 2004). There was also a study conducted whether picky eating behaviour related to being underweight among children aged 2 to 7 years (Ekstein, Laniado, & Glick, 2010). They found that children with picky eating behaviour, especially those younger than 3 years of age, were at increased risk of being underweight. However, there was limited study on picky eating behaviour in Asia. One of the study that have been conducted in Singapore was about the key aspects of picky eating behaviour and feeding difficulties among children aged 1 to 10 years (Goh & Jacob, 2012). They found that the prevalence of picky eaters was significant at the age of 3 to 5 years and 6 to 10 years.

Most published studies about picky eating behaviour were conducted in children older than 2 years or between 2 and 7 years (Ekstein at al., 2010). There was very limited study among children aged 1 to 3 years. As the information is very limited, this study was performed to determine the prevalence of picky eating behaviour among children aged 1 to 3 years in selected government hospital and its associated factors. In doing so, the research questions were:

i. What was the prevalence of picky eaters among toddlers in paediatric clinic at selected government hospital?

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ii. What were the factors associated with picky eating behaviour among toddlers?

iii. Was there any relationship between body weight status and picky eating behaviour among toddlers?

1.3 Significance of Study

This study provides baseline data on point prevalence of picky eater among samples of Malaysian toddlers from selected government hospital. It also can be used by other health care professionals to propose appropriate intervention programme for these toddlers who is labelled as picky eaters.

1.4 Objectives

General objective:

To determine the prevalence of picky eaters among toddlers and its associated factors among toddlers at paediatric clinic in selected government hospital

Specific objective:

1) To determine the socioeconomic status, medical status, body weight status and dietary intake among toddlers at Paediatric Clinic in selected government hospital
2) To compare socioeconomic status and picky eating behaviour among toddlers
3) To determine the association between:
    i. medical status and picky eating behaviour among toddlers
    ii. body weight status and picky eating behaviour among toddlers
    iii. dietary intake and picky eating behaviour among toddlers

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1.5 Hypothesis

1. There was no significant difference between socioeconomic status and picky eating behaviour among toddlers
2. There was no significant association between medical status, body weight status and dietary intake with picky eating behaviour among toddlers

1.6 Conceptual Framework

Figure 1.1 below shows the conceptual framework for this study. The dependent variable was picky eating behaviour among toddlers at Paediatric Clinic. Meanwhile, the independent variables are socioeconomic status, medical status, body weight status, and dietary intake.

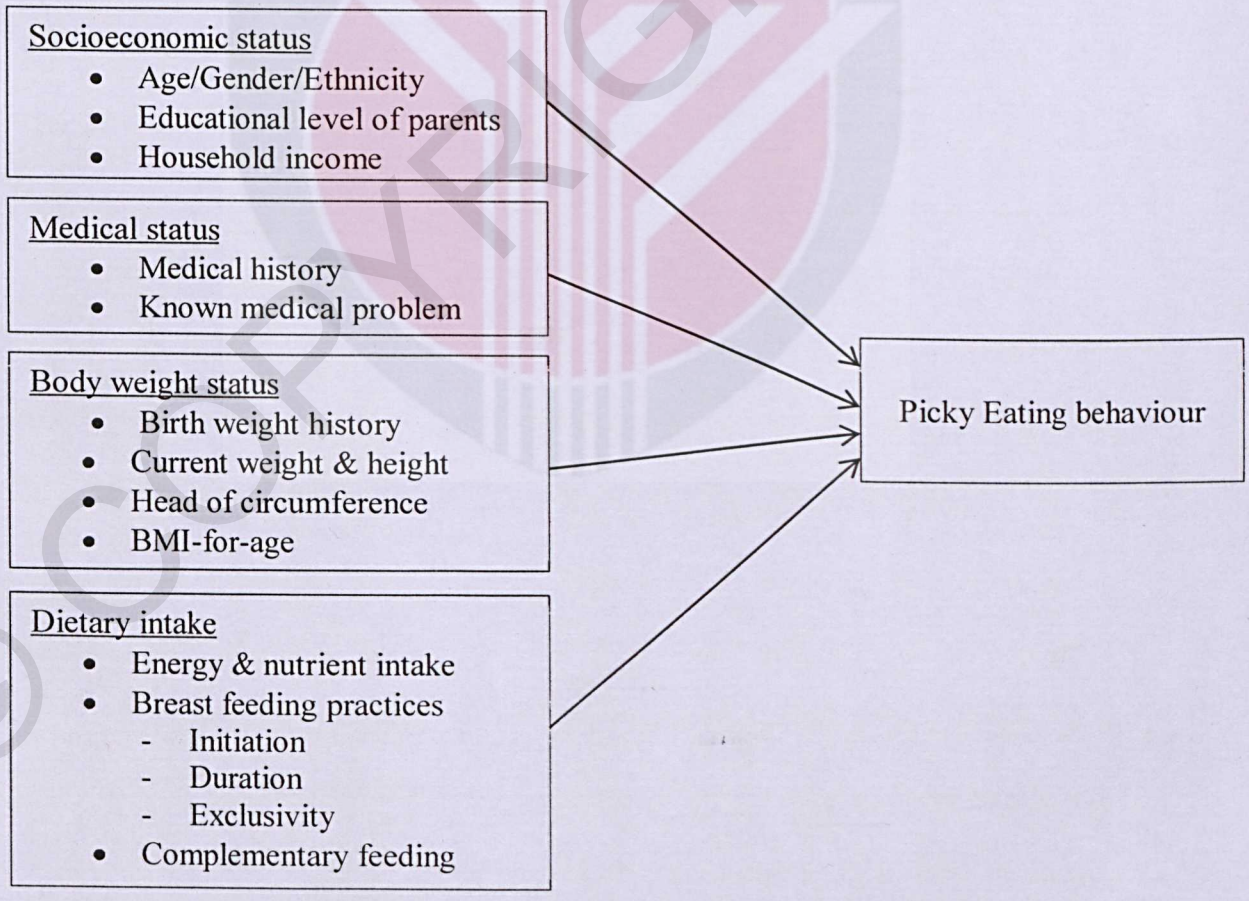


Figure 1.1: Conceptual Framework

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There was a study in United States found that picky eaters were breastfeed for fewer than 6 months (Galloway, Lee, & Birch, 2003). In addition, a study in Canada showed that a large proportion of children who were underweight were picky eaters (Dubois, Farmer, Girard, Peterson, & Tatone-Tokuda, 2007). Besides that, girls who were picky eaters were found to have lower energy intakes than girls who were not picky eaters (Galloway, Firoto, Lee, & Birch, 2005). Meanwhile, a study done in Canada found that those picky eaters had significantly lower in carbohydrates, vitamin C, thiamine, riboflavin, niacin, vitamin E, and iron (Carruth et al., 2004).

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CHAPTER 2

LITERATURE REVIEW

2.1 Definition of Toddlers

Toddlers are defined as children of age between 1 and 3 years (Brown, 2011). Growth during toddler is slower than in infancy but at steady rate (Brown, 2011). This slowing growth velocity is reflected in a decreased appetite which results in a less food intake (Brown, 2011). This situation often related with picky eating behaviour. In contrast, young children need adequate calories and nutrients intake to meet their nutritional needs. At this early stage of life, eating and health habits may impact food habits and subsequent health later in life. The important aspects of this stage of development are learning about and accepting new foods, developing feeding skills, and establishing healthy food preferences and eating habits (Brown, 2011).

Adequate energy and nutrients intake is necessary for toddlers to achieve their full growth and developmental potential (Brown, 2011). Undernutrition during these years may impair children's cognitive development as well as their ability to explore their environments (Brown, 2011). Long-term effects of undernutrition such as

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faltering growth and cognitive impairment could be prevented or reduced with adequate nutrition and environmental support (Brown, 2011). However, as mentioned earlier, children at these age tend to have a decreased interested in food as well as low in appetite. This behaviour is one of the characteristic of picky eating behaviour (Dovey et al., 2008). The development of food preferences and eating habits during this stage may be influenced by other factors such as socioeconomic status, medical status, body weight status and dietary intake.

2.2 Picky Eating Behaviour

There were many definitions that can describe picky eating behaviour. According to Goh and Jacob (2012), picky eating was characterised by fussiness about eating certain food, fussy meal time behaviours, sensory food aversion, and fear of eating and insufficient intake. Besides that, picky eating can be defined as unwillingness to try new food, rejection of specific food group such as fruits, vegetables, meat and fish, preferences for specific food preparation method and limited variety of food (Shim, Kim, & Mathai, 2011). Picky eaters were also comprised of children who ate a different meal from that eaten by other members of the family, those who refused to eat the right food, and those who refused to eat (Dubois et al., 2007). Meanwhile, Galloway, Fiorito, Lee, and Birch (2005), described that picky eating behaviour as limited food selection, unwillingness to eat many of the foods, and fussy or picky behaviour about eating. In general, picky eaters are usually defined as children who consume an inadequate variety of foods through rejection of a substantial amount of foods that are familiar as well as unfamiliar to them (Dovey et al., 2008).

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Difference studies measures picky eating behaviour differently, and this may occur because there was no standard validity and reliability of questionnaire to assess those children who were picky eaters at this point of time (Dovey et al., 2008). Therefore, the prevalence of picky eaters found in those studies varies, and the age group of subjects were also different. Table 2.1 showed the prevalence of picky eaters in different studies among different age group.

Table 2.1: The prevalence of picky eaters within age group, countries and gender

No	Age group	Country	Prevalence	
			Boys	Girls
1	0 to 2 years	Canada (Carruth et al., 2004)	17% to 47%	23% to 54%
2	9 years	Pennsylvania (Galloway et al., 2005)	-	52%
3	8 to 12 years	German (Jacobi et al., 2008)	18%	19%
4	1 to 2 years	Singapore (Goh & Jacob, 2012)	20.3%	
	3 to 5 years		29.9%	
	6 to 10 years		25.0%	

2.3 Eating behaviour that commonly presented among toddlers

A study conducted in United Kingdom among children 2 years stated where eating behaviour that rated as occurring often including eats a limited variety of food, prefer drinks to food, slow feeder, uninterested in food, will not take solid, and avoid feeding (Wright et al., 2007). Eating problems were a common cause of concern for the parents of toddlers (Wright et al., 2007). It was also reported that eating a limited variety and preferring drinks to food were the most prevalent problem behaviours among 2 years old children in United Kingdom (Wright et al., 2007).

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Several published studies about picky eating behaviour were conducted and different measures were used among different aged group. For example, a cross-sectional survey (Carruth et al., 2004) and questionnaire survey (Goh & Jacob, 2012) were using the same method which was telephone interviews. However, these two studies differed in term of variables they used. The first study only studied the demographic information and dietary intake among children aged 4 to 24 month (Carruth et al., 2004). Meanwhile, the later study focused on demographic information, body weight status, and key aspects of picky eating and feeding difficulties among children aged 1 to 10 years (Goh & Jacob, 2012).

On the other hand, a cross-sectional study was conducted in Canada and a retrospective study was done in Israel (Dubois et al., 2007; Ekstein et al., 2010). Both of these studies used body weight status as one of their variables (Dubois et al., 2007; Ekstein et al., 2010). Although both using the same variable, Ekstein, Laniado, and Glick (2010) were more focusing whether picky eating behaviour is related to being underweight among children aged 3 years old who were picky eaters, while Dubois, Farmer, Girard, Peterson, and Tatone-Tokuda (2007) aim to analyze the relationship of social factors, mother's perception of the child's picky eating behaviour and body weight among children aged 4 years.

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2.4 Factors Associated with Picky Eating Behaviour

2.4.1 Socioeconomic Status

A study in Singapore found that 3 to 5 years and 6 to 10 years age group were significantly more commonly reported as picky eater than were the 1 to 2 years age group (Goh & Jacob, 2012). It was also supported by a study in Canada that prevalence of picky eaters doubled from younger to older children aged between 0 and 2 years (Carruth et al., 2004) The results in Singapore showed that slightly more Chinese respondents felt that the child was picky eater that did Malay or Indian respondents (Goh & Jacob, 2012). In the same study, they found that children of respondents who were professionals were significantly more likely to be perceived as picky eaters than respondents from other occupations (Goh & Jacob, 2012).

In term of gender, a study showed that no statistically significant differences between picky eating behaviour and gender (Ekstein et al., 2010). Mascola, Bryson, and Agras (2010) also found the same result. Income sufficiency was also associated with this behaviour in which a greater proportion of children from insufficient income families had been picky eaters compared with children from sufficient-income families (Dubois et al., 2007).

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2.4.2 Medical Status

A study done in Germany does not support the concept that picky eating is associated with disordered eating but rather with a range of behavioural problems (Jacobi et al., 2008). In the meantime, a study done in Africa suggests that the health team should be aware that picky eaters may be tactile defensive (Smith, Roux, Naidoo, & Venter, 2005). Tactile defensiveness is characterized by behaviours such as rubbing, scratching, negative expressions, withdrawal or avoidance in response to tactile stimulation (Baranek & Berkson, 1994). A study in China also found that parents of children with autism often report gastrointestinal problems as well as picky eating and selective eating in their children (Xia et al., 2010). Autism is a neurodevelopmental disability that is usually diagnosed before 3 years of age and is characterized by deficits in social reciprocity and in language skills that are associated with repetitive behaviours and restricted interests (Eigsti & Shapiro, 2003).

2.4.3 Body Weight Status

The proportion of children who had picky eating behaviour was almost three times higher for children born with low birth weights (less than 2.5 kg) than children with higher birth weight, ranged between 2.5 and 4.0 or higher (Dubois et al., 2007). The underlying reason for that maybe because for some low birth weight children there was an underlying metabolic alteration that occurred in uterus that result in programming the infants to become picky eaters, and in turn, subsequently keeps some children in the lower weight trajectory (Dubois et al., 2007).

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A study done in Israel found that children with picky eating habit, especially those younger than 3 years of age, are at increased risk of being underweight (Ekstein et al., 2010). Another study stated that picky eaters had significantly lower body mass index (BMI) (Galloway et al., 2005). Similarly, Dubois, Farmer, Girard, Peterson, and Tatone-Tokuda (2007) also found that a greater proportion of picky eaters were underweight (BMI below the 10th percentile), and a lower proportion of picky eaters were at risk for overweight (BMI at 85 to 94.9th percentile) compared to children never reported as picky eaters. This might occur because pickiness may reflect the reverse of enjoyment, where eating was not as well liked, and then lead to inadequate energy intake (Webber, Hill, Saxton, Van Jaarsveld, & Wardle, 2009). This can result in those children to have low BMI and at risk of being underweight. On the other hand, Jacobi et al. (2008) found that BMI did not differ significantly between picky eaters and non-picky eaters.

2.4.4 Dietary Intake

Picky eaters had lower energy intakes than who were not picky eaters; however, this difference was not significant between the two groups (Galloway et al., 2005). In addition, specific food preferences and avoidances differ significantly between picky and non-picky eaters as indicated by a significant multivariate main effect (Jacobi et al., 2008). The food categories assessed by the Food Preference Questionnaire were avoided more often by picky eaters than by non-picky eaters are dairy products, fruits, vegetables, meat, fish, fast food, noodles or potatoes or rice and beverages (Jacobi et al., 2008). It was found that picky eaters consumed less fiber than non-picky eaters (Galloway et al., 2005).

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In addition, the same study revealed that picky eaters had significantly lower intakes of folate and vitamin E, and significantly at risk for inadequate intakes of vitamin C and E (Galloway et al., 2005). When comparing tactile defensive children with non-tactile defensive children, the tactile defensive children refused to a higher degree fresh and prepared vegetable such as fresh and crispy cooked vegetables, soft cooked vegetables, vegetable bredie, vegetable soup with vegetable pieces, and pureed vegetable soup (Smith et al., 2005).

In term of breastfeeding, children who had been exclusively breastfed for 3 months in infancy had reduced the preference for a specific food-preparation methods or presenting with that during their preschool years (Shim et al., 2011). In the same study, they found that exclusive breastfeeding during the first 6 months had lowered each indirect measure of limited variety such as preference for specific food preparation methods and food rejection (Shim et al., 2011). In addition, children introduced to complementary foods before 6 months of age were 2.5 times more likely to exhibit food rejection than their counterparts (Shim et al., 2011).

2.5 Instruments to Measure Picky Eating Behaviour

As stated before, difference studies measures picky eating behaviour differently because lack of standard criteria for defining pickiness (Dovey et al., 2008). Different studies used different questionnaires, and the differences in instruments used had been summarised in Table 2.2.

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Table 2.2: The instruments used to measure picky eating behaviour in various studies

No	Age group	Country	Instruments used
1	0 to 2 years	Canada (Carruth et al., 2004)	Simply asking the caregiver if they considered their child a picky eater, somewhat picky eater, or not a picky eater
2	9 years	Pennsylvania (Galloway et al., 2005)	Child Feeding Questionnaire
3	8 to 12 years	German (Jacobi et al., 2008)	Stanford Feeding Questionnaire
4	1 to 2 years 3 to 5 years 6 to 10 years	Singapore (Goh & Jacob, 2012)	Structured questionnaire consisted mostly with closed ended categorical questions with listed options to choose, for example "Do you think your child is a picky eater?" were answered by 'yes', 'no', 'sometimes', or 'in the past'
5	3 to 10 years	South Africa (Smith et al., 2005).	Compilation of eating habits questionnaire

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CHAPTER 3

METHODOLOGY

3.1 Study Design, Location & Subjects

This was a cross-sectional study in which the data were collected at one point of time. This study was conducted in paediatric clinic at Hospital Serdang. Subjects for this study were children aged 1 to 3 years.

3.2 Sample Size Determination

Sample size was determined using the formula below. Following formula (Cole, 1997):

$$n = \frac{(Z_{1-\alpha/2} + Z_{1-\beta})^2}{d^{*2}/(1-d^{*2})} + 5$$

Where,

n = Sample size,

$Z_{n-\alpha/2}$ = Z statistic for a level of confidence (1.96),

$Z_{1-\beta}$ = Z_{pwr} value at statistical power 0.90 (1.28),

d = Correlation of girl's BMI aged 3 years old with picky eating behaviour was 0. 47 (Striegel et al., 2005).

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Hence, sample size:

$$n = \frac{(1.96 + 1.28)^2}{0.47^2/(1 - 0.47^2)} + 5$$

20% was added to account for non-response and recording error.

42 + (20% x 42)

= 50 children

3.3 Sampling Design

A list name of toddlers was obtained from the system at Hospital Serdang prior to the days of data collection. Purposive sampling was used, where the children were purposively selected based on inclusion and exclusion criteria. Children who met the criteria were invited to participate. The inclusion and exclusion criteria were:

Inclusion criteria:

- Children aged 1 to 3 years.

Exclusion criteria:

4) Tube feeding children
5) Children with mental and physical disability

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3.4 Instruments

1) Questionnaires

Socioeconomic status and medical status was obtained from a set of questionnaire. The mother (father or care-giver are also included where necessary) were interviewed using a structured questionnaires. Socioeconomic status included were child's age, ethnicity, gender, siblings, and household income (Appendix A). Meanwhile, medical status included was medical history and known medical problem (Appendix A).

2) Picky eating behaviour

Picky eating behaviours (3 items) were assessed using the Child Feeding Questionnaire (Birch et al., 2001). It was a subscale from Child Feeding Questionnaire (Appendix A). This subscale measures mothers' reports of how they perceive their child's willingness to eat during mealtimes and included three items, including food selection, willingness to eat many of the foods, and fussy or picky behaviour about eating. All items were measured using a 5-point Likert-type scale; responses ranged from "never" to "always." A total score were calculated, and high scores on the pickiness subscale represent higher levels of pickiness (Galloway et al., 2005). The total score of 9 and above was considered as picky eater (Galloway et al., 2005).

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3) Anthropometry Measurement

The weight and height of children were taken from the nurses' record. The children were measured by the nurse at the hospital using TANITA Digital Weight Scale HD306 (TANITA Corporation, USA) and SECA Body Tape Measure SE206 (SECA, Germany). Head of circumference was also measured by the nurse using a measuring tape. In this study, weight-for-age, length/height-for-age, and BMI-for-age were used as the growth indicators to assess growth problem related to underweight, stunted, and overweight or obese respectively (WHO, 2006). All of these growth indicators was computed and expressed as z-scores by using WHO Anthro and AnthroPlus software and classified according to the WHO Child Growth Standards (2007). Z-score that falls between +1 and -2 were considered as normal range for weight-for-age and BMI-for-age, while the normal range for length/height-for-age was z-score between +3 and -2. Table 3.1 shows the definition for each of the growth indicator used.

Table 3.1: Definition of Each Growth Indicators Used

z-score	Growth indicators		
	Weight-for-age	Length/height-for-age	BMI-for-age
Above 3		See note (b)	Obese
Above 2			Overweight
Above 1	See note (a)		Possible risk of overweight
		Normal	See note (c)
0 (median)	Normal		Normal
Below -1			
Below -2	Underweight	Stunted	Wasted
Below -3	Severely underweight	Severely stunted	Severely wasted

(Adapted from WHO, 2006)

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Notes:

a) A child whose weight-for-age falls in this range may have a growth problem, but this is better assessed from weight-for-length/height or BMI-for-age.

b) A child in this range is very tall. Tallness is rarely a problem, unless it is so excessive that it may indicate an endocrine disorder such as a growth-hormone-producing tumour.

c) A plotted point above 1 shows possible risk. A trend towards the 2 z-score line shows definite risk.

4) Dietary intake

Dietary intake was assessed using 24-hour dietary recall (Appendix A). The collected data were divided into 2 sections, which was milk based and non-milk based. The total energy and macronutrients intake were analysed using NutritionistPro software, version 2.5 (First Databank, California USA). The total energy and some of the nutrients such as protein, calcium, vitamin C, iron and vitamin E, folate, and zinc were compared with Recommended Nutrients Intake (RNI) for Malaysia (MOH, 2005). Breastfeeding practices comprised of 3 main important questions including initiation, exclusivity, and duration. Initiation can be defines as early onset of breastfeeding, which is within 1 hour after birth, while exclusivity means giving breast milk only to infant without supplementation (Weiss, Boersma, & Myles, 2012). In addition, duration refers to the infant's age in months when the mother stopped breastfeeding (Radwan, 2013). Meanwhile, complementary feeding refere to infant receiving breast milk (including milk expressed or from a wet nurse) and solid or semi-solid foods and may include any food or liquid such as non-human milk and formula (WHO, 2008).

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3.5 Pre-Testing

The questionnaire was pre-tested on December 2013 among five children aged 1 to 3 years who fulfilled the criteria at PPR Seri Semarak in Setapak, Kuala Lumpur. Pre-testing of questionnaire was to:

i) Ensure that the questions and instructions are clear and without ambiguity.

ii) Check the sequential flow of the questions.

iii) Assess the time required to complete the questionnaire.

iv) Check for overall conduct of the survey.

After the pre-testing, changes and amendments were made for questions or items which were not clear or ambiguous.

3.6 Procedures

Data collection was conducted from March to May 2014. Ethical clearance was sought from the Ethical Committees of Ministry of Health (MOH), Malaysia through National Medical Research Registrar (NMRR) (Appendix C). Then, permission to conduct the study at Hospital Serdang was obtained from the Clinical Research Centre (CRC) (Appendix D). On the day of data collection, children were purposively chosen if they were between 1 and 3 years. Besides that, the mothers (father or caregiver) of the children were given an information sheet explaining the purpose of the study and consent form to participate prior to the administration of the questionnaire (Appendix B). A face-to-face interviewed was conducted between the researcher and the mother or father of the children that had been selected.

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3.7 Data Analysis

Statistical analysis was performed using IBM SPSS Statistics 21. Univariate analysis was used to analyze descriptive data. The results were presented as frequencies and percentages for categorical variables, and as means and standard deviations for continuous variables. Chi-square test of independence was used to test the associations between categorical variables while Pearson's correlation was used to test the correlation between continuous variables. Meanwhile, independent samples t-test was used to determine differences between genders in each scale, and one-way ANOVA was used to test the differences between household income and picky eating behaviour. A probability level (p) of <0.05 was set as statistically significant.

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CHAPTER 4

RESULT AND DISCUSSION

4.1 Socioeconomic Status

A total children included in this study were 54. Most of the children were 1 years (66.7%), followed with 2 years (27.8%), and 3 years (5.6%). The mean age of children was 20.3 ± 7.2 month. Besides that, most of them were Malay (87.0%), and boys (64.8%) (Table 4.1). 5.6% of the toddlers were Chinese and Indian, while 1.9% was others (Iban).

Majority of their fathers had attained secondary educational level (59.2%), while most of their mothers had attained tertiary educational level (57.5%). 40.8% of their fathers had attained tertiary educational level, and 40.7% of their mothers had at least attained secondary educational level. Besides that, majority of the toddlers were from medium household income families (68.5%) with the range of RM 1,501 to RM 5,000. The socioeconomic status of the toddlers is summarized in Table 4.1.

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Table 4.1: Socioeconomic status in children (n=54)

Characteristics	Frequency	%	Mean ± SD
Age (month)			1.39 ± 0.60
1 (12 until 23 month)	36	66.7	
2 (24 until 35 month)	15	27.8	
3 (36 until 47 month)	3	5.6	
Gender			
Boys	35	64.8	
Girls	19	35.2	
Ethnicity			
Malay	47	87.0	
Chinese	3	5.6	
Indian	3	5.6	
Others	1	1.9	
Number of siblings			2.19 ± 1.71
Educational level of fathers			
Primary	0	0	
Secondary	32	59.2	
Tertiary	22	40.8	
Educational level of mothers			
Primary	1	1.9	
Secondary	22	40.7	
Tertiary	31	57.5	
Household income			
Low (Less than RM1,5000)	4	7.4	
Medium (RM1,501 – RM5,000)	37	68.5	
High (RM5,001 and above)	13	24.1	

4.2 Prevalence of Picky Eating Behaviour

Table 4.2 show the picky eating score and its category of studied children. As shown in Table 4.2, the prevalence of picky eaters among toddlers in Paediatric Clinic at Hospital Serdang was 29.6%. On average, the mean picky eating score is 6.35 ± 3.01, in which it was considered as not having picky eating behaviour.

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Table 4.2: Picky eating scores in children (n = 54)

Characteristic	Frequency	%	Mean ± SD
Picky eating score			6.35 ± 3.01
Picky eaters (score ≥ 9)	16	29.6	
Non-picky eaters (score < 9)	38	70.4	

It was comparable with a study conducted in Singapore where the prevalence of picky eaters among children 3 to 5 years was 29.9% (Goh & Jacob, 2012). However, the prevalence of picky eaters among children aged 0 to 2 years was ranging between 17 to 54% in Canada (Carruth et al., 2004). Given the variation in assessing picky eating behaviour and different ages group between those studies, the varying prevalence examined was not surprising (Mascola et al., 2010). The mean picky eating score for the children is 6.35 ± 3.01, which indicate low level of picky eating behaviour. This was consistent with the study in Pennsylvania where they also found low level of pickiness among 7 years old children with the mean picky eating score was 6.33 ± 3.30 (Galloway et al., 2003).

4.3 Medical Status

Most of the children had a previous medical history of jaundice (55.9%), followed with pneumonia (8.8%), high fever (5.9%), and meningitis (2.9%). On the other hand, most of them had asthma (61.5%), followed with fever (11.5%), and faltering growth (11.5%) for current known medical problems. Table 4.3 show the frequency and percentage of medical status of children.

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Table 4.3: Medical status in children (n = 54)

Characteristic	Frequency	%
Present with medical history	34	61.8
Known medical problems	26	47.3

The common nutrition related problems among toddlers were faltering growth, diarrhoea, celiac disease, autism, cerebral palsy, and pulmonary problem (Brown, 2011).

4.4 Body Weight Status

As shown in Table 4.4.1, the mean birth weight history was 2.81 ± 0.71 kg, which indicate normal. Majority of the children had a normal birth weight history and 27.7% of them had a low birth weight history (Figure 4.1).

Table 4.4.1: Birth weight history of children (n = 54)

Characteristic (n = 54)	Mean ± SD
Birth weight history	2.81 ± 0.71

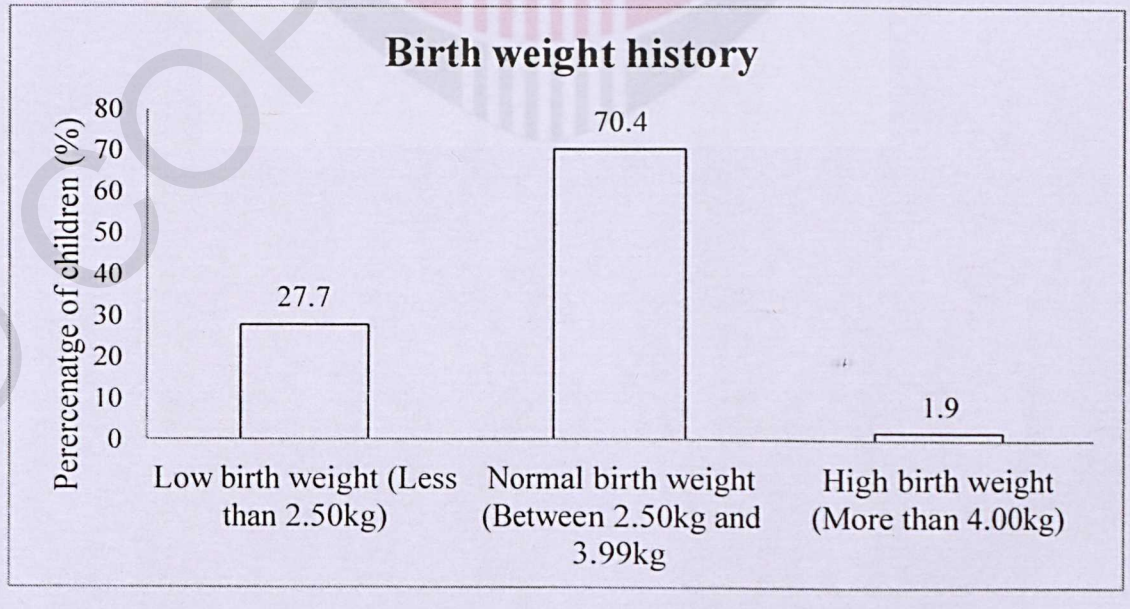


Figure 4.1: Percentage of the children based on birth weight history (n = 54)

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Table 4.42 show the mean z-score for weight-for-age, length/height-for-age, and BMI-for-age of children. The mean z-score for each growth indicators fall under normal category.

Table 4.4.2: Mean z-score for Weight-for-age, Length/Height-for-age, and BMI-for-age of children (n = 54)

Growth indicators	Mean ± SD
Weight-for-age	-0.82 ± 1.25
Height-for-age	-0.84 ± 1.40
BMI-for-age	-0.39 ± 1.11

Table 4.4.3 show the anthropometry measurement and growth indicators including weight, height, head of circumference, and mean z-score for weight-for-age, height-for-age, and BMI-for-age of children. For weight-for-age, it shows that the mean z-score for girls, aged 2 years indicate underweight (-2.19±2.25). Meanwhile, the mean z-score of length/height-for-age for children aged 2 years, girls and children aged 3 years, boys indicate stunted (-2.92±2.13, -2.54).

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Table 4.4.3: Weight, Height, Head of Circumference, and Mean z-score for Weight-for-age, Height-for-age, and BMI-for-age of children (n = 54)

	Mean ± SD (n = 54)					
	12 - 23 month		24 - 35 month		36 - 47 month	
	Boys(n=)	Girls(n=)	Boys(n=)	Girls(n=)	Boys	Girls
Weight (kg)	9.73±1.18	9.72±1.64	11.91±1.36	9.91±2.80	11.40	12.90±2.05
Height (cm)	78.46±3.89	78.13±3.66	90.20±86.37	80.15±7.39	86.70	90.65±4.74
Head of circumference (cm) [a]	46.42±1.49	45.72±1.00	-	-	-	-
Weight-for-age	-0.88±1.10	-0.40±1.23	-0.59±1.09	-2.19±2.25	-1.92	-0.89±1.22
Length/height-for-age	-0.68±1.16	-0.18±1.13	-0.94±1.26	-2.92±2.13	-2.54	-1.57±1.27
BMI-for-age	-0.68±1.07	-0.31±1.23	0.01±0.68	-0.39±1.20	-0.35	-0.08±3.04

[a] Head of circumference only applicable for children less than 2 years.

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Figure 4.2 shows the percentage of children based on weight-for-age. Most of the children were within the normal range, however, 11.1% was underweight and 1.9% was severely underweight.

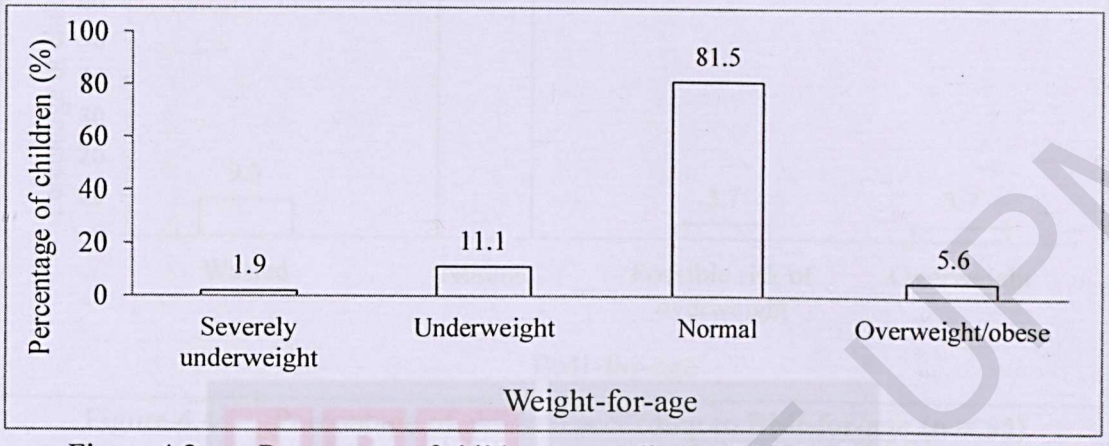


Figure 4.2: Percentage of children according to Weight-for-age (n = 54)

Figure 4.3 shows the percentage of children based on length/height-for-age. Majority of the children were within the normal range. However, there were children who were stunted (18.5%) and severely stunted (3.7%).

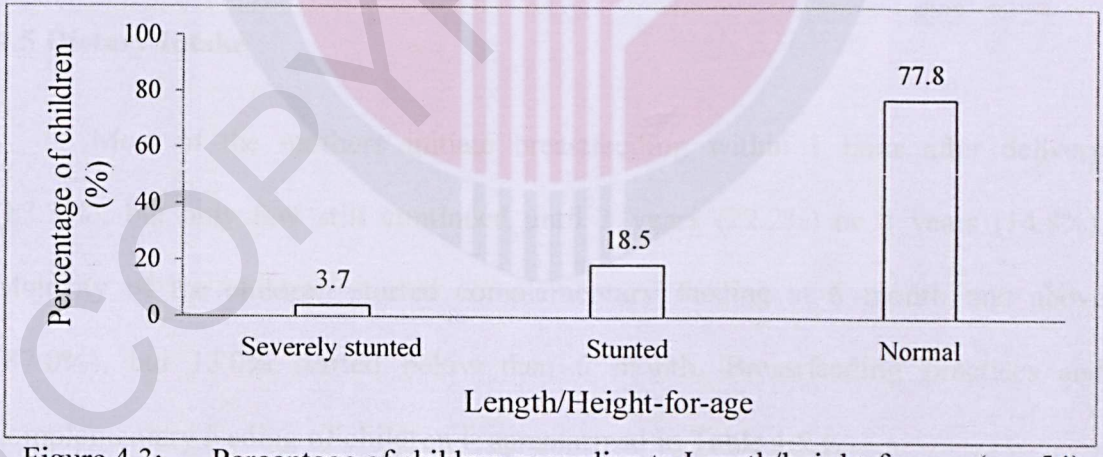


Figure 4.3: Percentage of children according to Length/height-for-age (n = 54)

Figure 4.4 shows the percentage of children based on BMI-for-age. Most of the children were within the normal range. However, 9.3% of them was wasted and 3.7% was overweight and at risk to become overweight.

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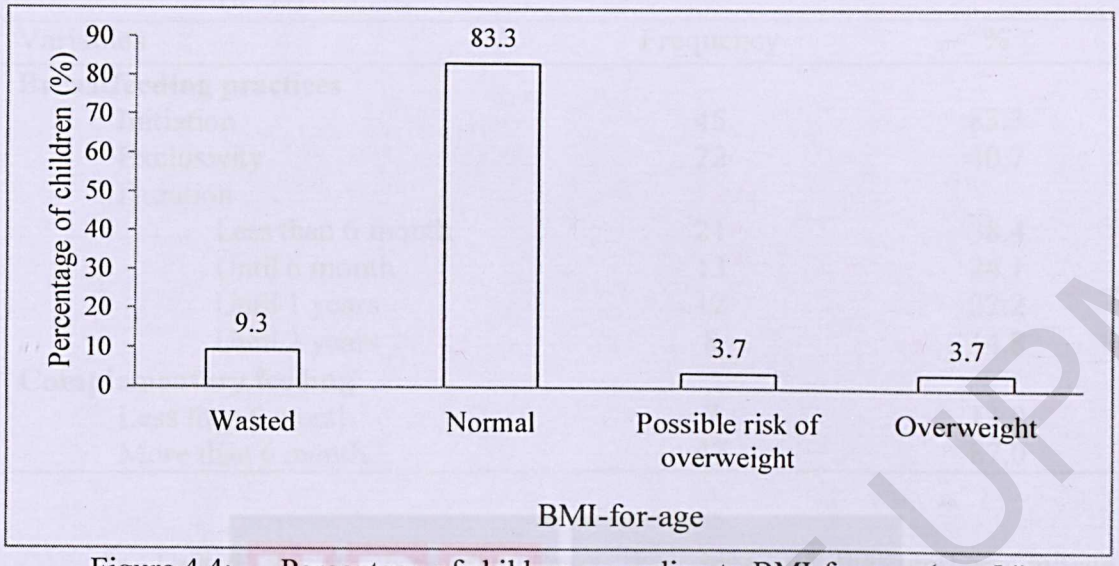


Figure 4.4: Percentage of children according to BMI-for-age (n = 54)

According to National Health & Morbidity Survey III (2006), the prevalence of overweight among toddlers was 3.2%, meanwhile in this study; the percentage of overweight was ranging from 3.7% until 5.6%.

4.5 Dietary Intake

Most of the mothers initiate breastfeeding within 1 hour after delivery (83.3%), but only few still continued until 1 years (22.2%) or 2 years (14.8%). Majority of the children started complementary feeding at 6 month and above (87.0%), but 13.0% started below than 6 month. Breastfeeding practices and complementary feeding of children is summarized in Table 4.5.1.

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Table 4.5.1: Breastfeeding practices and complementary feeding of children (n=54)

Variables	Frequency	%
Breastfeeding practices		
Initiation	45	83.3
Exclusivity	22	40.7
Duration		
Less than 6 month	21	38.4
Until 6 month	13	24.1
Until 1 years	12	22.2
Until 2 years	8	14.8
Complementary feeding		
Less than 6 month	7	13.0
More than 6 month	47	87.0

In United States, they also found that most of the mothers initiate breastfeeding practices (68.2%) among children 3 years (Shim et al., 2011). However, when comparing with exclusive breastfeeding for 6 month, only 12.4% of the mothers practice it in the same study (Shim et al., 2011). In this study, 13.0% of the children started complementary feeding at less than 6 month, and 87.0% of them started at more than 6 month. It was contrast with a study in United States where majority of the children started complementary feeding before 6 month of age among children 3 years (Shim et al., 2011). In term of duration of breastfeeding, it was recommended to continue breastfeed until 2 years, however there was still 38.4% that breastfeed until less than 6 month (MOH, 2013).

In total, the children consumed 1253 ± 356 kcal of energy intake as shown in Table 4.5.2. Most of the mean energy and nutrients intake had exceeded the recommended intake from RNI. This may be due to most of the working mothers were interviewed and self-reported, thus they might not really know about their children dietary intake as the children were taken cared by someone else (Vereecken, Keukelier, & Maes, 2004).

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Table 4.5.2: Mean macronutrient intake of children (n = 54)

Nutrients	Mean ± SD Total (n = 54)	Recommended Intakes from RNI (MOH, 2005)	Achievement
Energy (kcal)	1253 ± 356	910 - 980	Achieved
Protein (g)	45.01 ± 18.57	17	Achieved
% energy	14.15 ± 3.03	-	-
Carbohydrate (g)	160.79 ± 44.13	-	-
% energy	51.93 ± 6.74	-	-
Fat (g)	47.58 ± 17.13	-	-
% energy	33.81 ± 5.75	-	-
Fiber (g)	3.29 ± 2.77	-	-

Table 4.5.3 show the mean micronutrients intake of children. All of these micronutrients were believed to be inadequate in children with picky eating behaviour. Majority of them achieved the recommended nutrients intake (RNI) for Malaysia (MOH, 2005) except for certain nutrients such as folate and vitamin E.

Table 4.5.3: Mean micronutrients intake of children (n = 54)

Micronutrients	Mean ± SD	Recommended Intakes from RNI (2005)	Achievers (%)
Calcium (mg)	1016.51± 461.25	500	87.0
Vitamin C (mg)	118.21 ± 76.47	30	100
Iron (mg)	13.80 ± 6.83	6	88.9
Thiamin (mg)	0.91 ± 0.44	0.5	87.0
Niacin (mg)	10.49 ± 4.85	6	83.3
Riboflavin (mg)	1.52 ± 0.71	0.5	98.1
Folate (µg)	170.62 ± 86.64	160	46.3
Zinc (mg)	11.33 ± 25.37	4.1	79.6
Selenium (µg)	28.15 ± 19.38	17	64.8
Vitamin E (mg)	7.66 ± 7.94	5	46.3

Figure 4.5: Distribution of nutrients intake among children (n = 54)

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4.6 Comparison between Socioeconomic Status (Gender and Household Income) and Picky Eating Behaviour

There was no significant difference in picky eating scores for boys and girls as shown in Table 4.6.1.

Table 4.6.1: Comparison on picky eating scores between genders (n = 54)

Genders	Mean	SD	*t*-value	*p*-value
Boys	6.03	2.79	1.073	.228
Girls	6.95	3.37		

This is accordance with a study in Israel and in German among children aged 3 years and 8 to 12 years respectively (Ekstein et al., 2010; Jacobi et al., 2008). Nevertheless, there was a significant difference of picky eating behaviour between boys and girls in London among children aged 7 to 12 years (Webber et al., 2009).

When comparing between genders, majority of picky eaters was boys (56.3%) as shown in Figure 4.6. However, a study done in London among children aged 7 to 12 years found that more girls were picky eaters than boys (Webber et al., 2009).

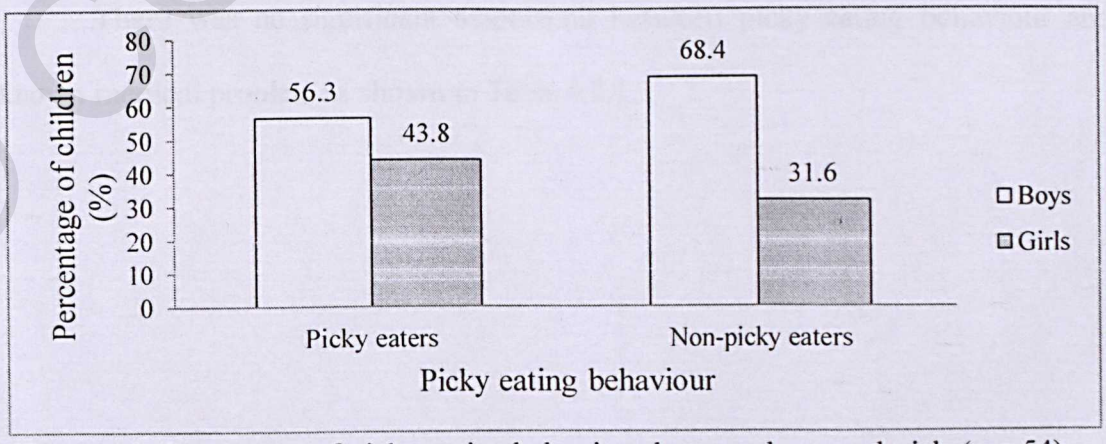


Figure 4.6: Percentage of picky eating behaviour between boys and girls (n = 54)

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A one-way between-groups analysis of variance was conducted to explore the impact of household income on levels of picky eating behaviour. It was found that no significant difference between household income and picky eating behaviour (Table 4.6.2).

Table 4.6.2: Comparison between picky eating behaviour and household income (n = 54)

Household income	*n*	*Mean*	*SD*	*F*	*p*
Low	4	7.50	4.44	0.42	.663
Medium	37	6.38	2.89		
High	13	5.92	3.07		

In contrast, a study in Canada among children aged 4 years old showed that a greater proportion of children from insufficient income families had been picky eaters compared with children from sufficient-income families (Dubois et al., 2007). Previous study done in the same place among children 0 to 2 years old also found that the prevalence of picky eaters doubled among those living with low household income (Carruth et al., 2004).

4.7 Association between Medical Status and Picky Eating Behaviour

There was no significant association between picky eating behaviour and known medical problem as shown in Table 4.7.1.

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Table 4.7.1: Association between picky eating behaviour and known medical problem (n = 54)

Variable	Picky eating behaviour n (%)		x^2	p
	Picky eaters	Non-picky eaters		
Known medical problem (n = 26)	7 (13.0)	19 (35.2)	.015	.903
Without known medical problem (n = 28)	9 (16.7)	19 (35.2)		
Total (n = 54)	16 (29.6)	38 (70.4)		

This result did not support the previous study that found picky eaters may be tactile defensive (Smith et al., 2005). In China, parents often report that autistic children aged 2 to 9 years tend to be picky eaters and restricted type of food (Xia et al., 2010).

4.8 Association between Body Weight Status and Picky Eating Behaviour

There was no significant association between birth weight history and picky eating scores (Table 4.8.1).

Table 4.8.1: Association between picky eating score and birth weight history (n = 54)

	Picky eating score	
	r value	*p* value
Birth weight history	- 0.22	0.114

This result did not agree with Dubois et al. (2007) who found that picky eaters were more likely to have been born with a low birth weight among children aged 4 years. It was also supported by a study in Canada among children aged 0 to 2 years (Carruth et al., 2004).

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The association between picky eating score and BMI was investigated using Pearson correlation coefficient. There was no significant association between BMI and picky eating scores (Table 4.8.2).

Table 4.8.2: Association between picky eating score and BMI (n = 54)

	Picky eating score	
	r value	*p* value
BMI	- 0.20	0.146

This findings support the study conducted in German among children aged 8 to 12 years and in United States among children aged 2 to 11 years (Jacobi et al., 2008, & Mascola et al., 2010). In contrast, there was a significant association between picky eating behaviour and being underweight in Israel among 3 years old children (Ekstein et al., 2010). Another study also found that majority of picky eaters were underweight (BMI below 10th percentile) compared to non-picky eaters in Canada among children aged 4 years (Dubois et al., 2007). Furthermore, the result did not consistent with Galloway et al. (2005) where they found that picky eaters had significantly lower BMI than non-picky eaters among 9 years old children in Pennsylvania.

4.9 Association between Dietary Intake and Picky Eating Behaviour

Association between picky eating score with energy, carbohydrate, fat, and fibre was investigated using Pearson correlation coefficient. There was a significant correlation between energy and carbohydrate intake with picky eating score (r=-0.28, p<0.043; r=-0.33, p<0.014) as shown in Table 4.9.1. On the other hand, there was no significant association between fat intake and fibre intake with picky eating scores.

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Table 4.9.1: Association between picky eating score and macronutrients intake (n = 54)

Macronutrients	Picky eating score	
	r value	*p* value
Energy intake	- 0.28	0.043*
Carbohydrate intake	- 0.33	0.014*
Fat intake	- 0.15	0.276
Fiber intake	- 0.17	0.220

*$p<0.05$

From table 4.9.1, it was found that there was a weak, negative association between energy intake and picky eating score with lower intake of energy associated with higher levels of picky eating score. Meanwhile, a medium negative association was found between carbohydrate intake and picky eating score. A study conducted in Canada among children aged 0 to 2 years also found that there was a statistically significant difference between energy and carbohydrate intake with picky eating behaviour (Carruth et al., 2004). However, it is not consistent with Galloway et al. (2005) in which they found no significant difference of energy intake between picky and non-picky eaters among children 9 years in Pennsylvania.

As mentioned before, there was no significant association between fat intake and fibre intake with picky eating scores. This was contrary with previous study among children aged 9 years in Pennsylvania that revealed fibre intake of picky eaters was significantly less than non-picky eaters. (Galloway et al., 2005). Nevertheless, in the same study, there was no significant difference between fat intake and picky eating behaviour (Galloway et al., 2005).

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In addition, Pearson correlation was used to determine the association between picky eating scores and micronutrient intake (Vitamin C, Vitamin E, Folate, Iron, Calcium, and Zinc). Table 4.9.2 show the result.

Table 4.9.2: Association between picky eating score and micronutrients intake (n = 54)

Nutrients	Picky eating score	
	r value	*p* value
Vitamin C intake	- 0.22	0.110
Vitamin E intake	- 0.08	0.586
Folate intake	- 0.05	0.699
Iron intake	- 0.19	0.174
Calcium intake	- 0.19	0.166
Zinc intake	- 0.09	0.517

The findings show that none one of the micronutrient intake were significantly associated with picky eating scores. Contrary with a study in Canada among children 0 to 2 years where they found that picky eating behaviour at risk of micronutrient deficient intake vitamin C, vitamin E, iron, calcium, folate, and zinc (Carruth et al., 2004). In the same study, they also found that picky eaters had lower intake of vitamin C, vitamin E, folate, iron, calcium, and zinc (Carruth et al., 2004). This finding did not agree with previous study done in Pennyslvania among 9 years old children who found that picky eaters had significantly lower intakes of vitamin E, vitamin C, and folate (Galloway et al., 2005).

Table 4.9.3 show that no significant association between picky eating behaviour and exclusive breastfeeding for 6 month.

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Table 4.9.3: Association between picky eating behaviour and exclusive breastfeeding practices (n = 54)

Variable	Picky eating behaviour n (%)		x^2	*P*
	Picky eater	Non-picky eater		
Exclusive breastfeeding (n = 22)	7 (13.0)	15 (27.8)	0.00	1.00
Not exclusive breastfeeding (n = 32)	9 (16.7)	23 (42.6)		
Total (n = 54)	16 (29.6)	38 (70.4)		

This finding was not consistent with a study in United State where they found that children who were breastfed exclusively for 6 months had lower risk of developing picky eating behaviour such as limited variety of food, preferences for specific food preparation and food rejection (Shim et al., 2011). The result also contrasts with Galloway, Lee, and Birch (2003) in which they found that picky eaters were breastfed for fewer than 6 months. This may occur as breastfeeding increases a chance to learn flavours in all foods consumed by mothers and likely provides a protective effect against the development of picky eating in infancy (Beauchamp & Mennella, 2009). This study found no significant association between picky eating behaviour and exclusive breastfeeding for 6 month, and this may be due to the smaller sample size compared to those studies.

Chi-square was used to determine the association between duration of breastfeeding and picky eating behaviour (Table 4.9.4). The result shows that no significant association between duration of breastfeeding and picky eating behaviour.

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Table 4.9.4: Association between picky eating behaviour and duration of breastfeeding (n = 54)

Variable	Picky eating behaviour n (%)		x^2	p
	Picky eaters	Non-picky eaters		
Breastfeeding duration less than 1 years (n = 34)	9 (16.7)	25 (46.3)	0.13	0.73
Breastfeeding duration more than 1 years (n = 20)	7 (13.0)	13 (24.1)		
Total (n = 54)	16 (29.6)	38 (70.4)		

Further analysis was done to determine if there was any difference in energy intake between picky and non-picky eaters. Picky eaters had lower energy intake than non-picky eaters, and there was a significant difference ($p<0.05$) between the two groups, as shown in Table 4.9.5.

Table 4.9.5: Comparison on energy between picky eating categories (n =54)

	Mean	SD	t-value	p-value
Picky eater	1081.23	266.96	-2.411	0.019
Non-picky eater	1326.19	366.71		

It was reported that picky eaters had lower energy intake than non-picky eaters, however, this difference was not significant between the two groups (Galloway et al., 2005). The result from that study was differing with this finding, and this difference might be due from different sample subjects. The subjects from this study involved boys and girls between 1 and 3 years, while Galloway et al. (2005) only included girls aged 9 years. As the energy intake was low for those children who perceived as picky eaters, it was predicted that they also have lower intake of other essential nutrients such as folate, calcium, iron, zinc, vitamin C, and vitamin E (Carruth et al., 2004). If this situation prolonged, children may develop an unhealthy nutrient-deficient in the future (Dovey et al., 2008).

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CHAPTER 5

CONCLUSION AND RECOMMENDATION

5.1 Conclusion

This cross sectional study was conducted to determine the prevalence of picky eaters and its associated factors among toddlers in Paediatric Clinic at selected government hospital. A total of 54 children were included in this study. The mean age of children was 20.3 ± 7.2 month, with majority of them were boys (64.8%) and Malay (87.0%). The point prevalence of picky eaters among toddlers was 29.6%. In this study, 61.8% presented with medical history and 47.3% have known medical problems. Most of them (70.4%) had a normal birth weight history, with mean of 2.8 ± 0.7. The mean z-score (weight-for-age = -0.82 ± 1.25, height-for-age = -0.84 ± 1.40, and BMI-for-age = -0.39 ± 1.11), which fall under normal category.

Slightly more boys were picky eaters than girls, but there was no significant difference between the two groups. It was also found no significant difference between household income and picky eating behaviour. Besides that, there was no significant association between picky eating behaviour and known medical problem.

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Body mass index (BMI) also shows no significant association with picky eating behaviour.

For dietary intake, energy and carbohydrate were significantly associated with picky eating behaviour (r=-0.28, p<0.043; r=-0.33, p<0.014). However, no significant association was found between micronutrients intake (vitamin C, vitamin E, folate, iron, calcium, and zinc) and picky eating behaviour. In conclusion, the prevalence of picky eating behaviour among toddlers was 29.6%, and toddlers with lower intake of energy and carbohydrate were at higher risk to develop picky eating behaviour.

5.2 Strength and Limitation

This study was among the first attempt to study about picky eating behaviour among toddlers using the Child Feeding Questionnaire in Malaysia. This was a cross-sectional study; therefore it could not determine the cause-effect relationship between independent variable and dependent variable. Besides that, this study cannot be generalised to the whole population as it only involved a small number of children. The main concern found in this study was no standard measurement or questionnaire to assess picky eating behaviour among children.

5.3 Recommendations

Intervention related to picky eating behaviour among children are necessary and must be strengthen as they may develop some nutrient deficient in the future. Future studies should be conducted to develop a standard validity and reliability of questionnaire to assess picky eating behaviour among children.

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Appendices

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UNIVERSITI PUTRA MALAYSIA
BERILMU BERBAKTI

Final Year Project (DTK 4999)
Projek Ilmiah Tahun Akhir (DTK4999)

Questionnaire:
Prevalence of Picky Eaters and Its Associated Factors among Toddlers in Paediatric Clinic at Selected Government Hospital
Borang Kaji Selidik:
Prevalens kanak-kanak yang cerewet makan dan factor-faktor yang berkaitan dengannya dalam kalangan kanak-kanak berumur 1 hingga 3 tahun di Klinik Pediatrik di hospital kerajaan yang terpilih

Your personal information given in this questionnaire is for research purpose only. It will be kept strictly confidential. I would be very grateful if you could help me by completing this questionnaire.

Maklumat peribadi yang terdapat di dalam borang kaji selidik ini adalah untuk tujuan kajian sahaja. Semua maklumat dijamin sulit. Segala kerjasama amat dihargai.

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Section A: Socioeconomic Status / Status sosioekonomi

1) Date of birth / Tarikh lahir anak ini: ☐☐ ☐☐ ☐☐
   Hari bulan tahun

2) Gender / Jantina: M (L) / F (P)

3) Ethnicity / Kaum : Malay (Melayu) / Chinese (Cina) / Indian (India)

4) Siblings / Adik-beradik: _____ orang

5) Household income / Purata pendapatan keluarga dalam sebulan:

	Less than / Kurang daripada RM 1,500
	RM 1,501 – 3,000
	RM 3,001 – 5,000
	RM 5,001 and higher / dan ke atas

6) Educational level of parents / Tahap pendidikan ibu bapa:

	Primary School / Sekolah Rendah
	SRP / LCE / PMR
	SPM / HCE
	Matriculation / A-level / STPM
	Diploma / Sarjana Muda
	Sarjana / PhD
	Others / Lain-lain: _____

Section B: Medical Status / Status Perubatan

1) Medical history / Rekod perubatan:

2) Known medical issue/ Isu perubatan sekarang:

Section C: Body weight Status / Status berat badan

1) Anthropometry Data:

Current weight / Berat badan	Height / Tinggi	BMI

Head circumference / Lilitan kepala		
1st reading / Bacaan pertama	2nd reading / Bacaan ke-2	Average / Purata

2) Obsteric history / sejarah kelahiran:

- Birth weight / Berat badan semasa dilahirkan: _____ g

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Section D: 24-Hour Dietary Recall

Milk-based / Susu			
Frequency /kekerapan	Type of milk/jenis susu (breast milk/formula)	Amount (if drink formula milk)	Duration/tempoh meyusu (if breastfeeding)

Non-milk based / Makanan selain susu		
Time/ Masa	Food & Drink / Makanan atau minuman	Amount / Jumlah

1) Breastfeeding:

- Do you breastfeed your child within one hour after delivery? / Dalam masa sejam selepas bersalin, adakah anda menyusukan anak anda?
  ☐ Yes ☐ No
- Do you exclusively breastfeed your child until 6 months? / Adakah anda menyusukan anak anda sehingga berusia 6 bulan?
  ☐ Yes ☐ No
- For how long do you breastfeed your child? / Berapa lama anda menyusukan anak anda?

	From birth until less than 6 month (< 6 month)
	From birth until above 6 month (< 1 year)
	From birth until 1 year (< 2 year)
	From birth until 2 year

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2) At what month/age does your child start to eat complementary food? / Pada umur berapa anak anda mula makan makanan pelengkap?

	4 – 6 month / bulan
	6 – 12 month / bulan
	1 – 2 years / bulan

Section E: Picky eating / Cerewet Makan

Items/ score	Never Tidak pernah	Seldom Jarang-jarang	Half of the time Kadang-kadang	Most of the time Kebanyakan masa	All the time Setiap masa
My child's diet consists of only a few foods / Pemakanan anak saya mengandungi sedikit makanan sahaja					
My child is unwilling to eat many of the foods that our family eats at mealtimes / Anak saya tidak mudah makan kebanyakan makanan yang dimakan oleh ahli keluarga pada waktu makan					
My child is fussy or picky about what she eats / Anak saya terlalu memilih atau cerewet tentang makanan					

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JAWATANKUASA ETIKA UNIVERSITI UNTUK
PENYELIDIKAN MELIBATKAN MANUSIA (JKEUPM)
UNIVERSITI PUTRA MALAYSIA, 43400 UPM SERDANG,
SELANGOR, MALAYSIA

FORM B2: RESPONDENT'S INFORMATION SHEET AND GUARDIAN'S/PARENT'S CONSENT

Please read the following information carefully and do not hesitate to discuss any questions you may have with the researcher.

1. **STUDY TITLE:**
   Prevalence of picky eaters and its association factors among toddlers in pediatric clinic at selected government hospital.

2. **INTRODUCTION:**
   This study will determine the prevalence of picky eater among toddlers in paediatric clinic at selected government hospital. It will also study about the factors that associated with picky eating which are body weight status and dietary intake. Furthermore, this study is conducted as there is very limited study about picky eater in Malaysia. Therefore, this study will determine the prevalence of picky eater and its association factors among toddlers.

3. **WHAT WILL YOU HAVE TO DO?**
   You will be interviewed by a researcher a set of questionnaire which includes information regarding socioeconomic status and dietary intake. In addition, your child's body weight and height will be measured and recorded to calculate the BMI.

4. **WHO SHOULD NOT PARTICIPATE IN THE STUDY?**
   Children aged below 1 or above 3.

5. **WHAT WILL BE THE BENEFITS OF THE STUDY:**
   (a) TO YOU AS THE SUBJECT?
   You will know your child's body weight status and if there is any picky eating behavior after participation. Therefore, you can modify your child's dietary and lifestyle practices to improve your body weight status or maintain your healthy lifestyles.

   (b) TO THE INVESTIGATOR?
   Information obtained can be used by researchers and healthcare professional to propose appropriate intervention programs for these children labeled as picky eaters.

6. **WHAT ARE THE POSSIBLE RISKS?**
   This study will not impose any risks as what you have to do are answers the questions that will be interviewed by researcher and measure your body weight and height.

7. **WILL THE INFORMATION THAT YOU PROVIDE AND YOUR IDENTITY REMAIN CONFIDENTIAL?**
   All the information gathered will be kept confidentially. No individual description will be made at any part of research or publication.

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9. GUARDIAN'S/PARENT'S CONSENT

I ..... Identity Card No. .....

address.....

.....hereby voluntarily agree to allow my *son / daughter / ward to take part in the research stated above *(clinical /drug trial/video recording/ focus group/interview-based/ questionnaire-based).

I have been informed about the nature of the research in terms of methodology, possible adverse effects and complications (as written in the Respondent's Information Sheet). I understand that my *son / daughter / ward has the right to withdraw from this research at any time without giving any reason whatsoever. I also understand that this study is confidential and all information provided with regard to the identity of my *son / daughter / ward will remain private and confidential.

I* wish / do not wish to know the results related to my son's / daughter /ward participation in the research

I agree/do not agree that the images/photos/video recordings/voice recordings related to me be used in any form of publication or presentation (if applicable)

* delete where necessary

Signature ..... Signature .....
(Parent/Guardian) (Witness)

Date :..... Name :.....

I/C No. :.....

I confirm that I have explained to the respondent's parent/guardian the nature and purpose of the above-mentioned research.

Date ..... Signature .....
(Researcher)

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UNIVERSITI PUTRA MALAYSIA, 43400 UPM SERDANG,
SELANGOR, MALAYSIA

BORANG B2: PENERANGAN DAN PERSETUJUAN IBUBAPA / PENJAGA

Sila baca maklumat berikut dengan teliti. Sekiranya anda mempunyai sebarang pertanyaan, sila kemukakan kepada penyelidik.

1. **TAJUK KAJIAN**
   Prevalens kanak-kanak yang cerewet makan dan faktor-faktor yang berkaitan dengannya dalam kalangan kanak-kanak berumur 1 hingga 3 tahun di Klinik Pediatrik di hospital kerajaan yang terpilih.

2. **PENGENALAN**
   Tujuan kajian ini adalah untuk menentukan prevalens kanak-kanak yang cerewet makan dalam kalangan kanak-kanak berumur 1 hingga 3 tahun. Kajian ini juga dijalankan untuk mengkaji hubungan antara cerewet makan dengan status berat badan dan pengambilan pemakanan.

3. **APAKAH YANG PERLU ANDA LAKUKAN?**
   Anda akan ditemubual dengan menggunakan borang soal selidik untuk mendapatkan maklumat mengenai status sosioekonomi dan pengambilan pemakanan. Anak anda juga akan diminta untuk membuat pengukuran berat dan ketinggian untuk pengiraan BMI.

4. **SIAPA YANG TIDAK BOLEH MENYERTAI KAJIAN INI?**
   Kanak-kanak berumur 1 tahun ke bawah atau 3 tahun ke atas.

5. **APAKAH FAEDAH MENYERTAI KAJIAN INI?**

   a) KEPADA ANDA SEBAGAI PESERTA?
   Anda akan mengetahui status berat badan anak anda dan sebarang ciri-ciri cerewet makan yang dialami anak anda selepas menyertai kajian ini. Oleh itu, anda boleh mengubah cara pemakanan dan cara hidup anak anda bagi meningkatkan status berat badan atau mengekalkan kualiti kehidupan anak anda.

   b) KEPADA PENYELIDIK?
   Maklumat-maklumat yang diperoleh akan digunakan oleh penyelidik dan pakar kesihatan untuk mencadangkan program yang lebih efektif dan sesuai untuk kanak-kanak yang dilabel sebagai cerewet makan.

6. **ADAKAH IA BERISIKO?**
   Kajian ini tidak akan membawa sebarang risiko memandangkan anda hanya perlu menjawab soalan-soalan yang dikemukan daripada penyelidik dan pengukuran berat dan ketinggian anak anda.

7. **ADAKAH MAKLUMAT DAN IDENTITI SAYA KEKAL RAHSIA?**
   Semua maklumat yang diperolehi adalah dijamin sulit. Tiada huraian individu akan dibuat pada mana-mana bahagian di dalam kajian atau penerbitan.

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9. PERSETUJUAN

Saya..... No Kad Pengenalan. .....
beralamat.....
.....dengan ini secara sukarela bersetuju membenarkan *anak / jagaan saya .....menyertai penyelidikan yang tersebut di atas *(kajian klinikal/percubaan ubat-ubatan/rakaman video/kumpulan sasaran/temuduga/ soal selidik).

Saya telah diberi penjelasan secara menyeluruh mengenai penyelidikan ini dari segi metodologi, risiko dan komplikasi (seperti yang tercatat pada Helaian Penerangan). Saya memahami bahawa *anak / jagaan saya berhak menarik diri dari penyelidikan ini pada bila-bila masa tanpa memberi sebarang alasan. Saya juga memahami bahawa sebarang maklumat yang berkaitan identiti *anak / jagaan saya akan dirahsiakan.

Saya* berminat / tidak berminat untuk mengetahui keputusan kajian yang melibatkan *anak / jagaan saya.

Saya setuju / tidak bersetuju untuk imei/gambar/rakaman video/ rakaman suara berkaitan dengan anak / jagaan saya digunakan dalam apa jua bentuk penerbitan atau pembentangan. (sekiranya berkaitan).

*potong yang tidak berkenaan

Tandatangan .....
(*Ibubapa / Penjaga*)

Tarikh :.....

Tandatangan .....
(*Saksi*)

Nama :.....

No. K/P: .....

Saya mengesahkan bahawa saya telah menerangkan kepada ibubapa / penjaga responden mengenai sifat dan tujuan penyelidikan yang tersebut di atas.

Tarikh .....

Tandatangan .....
(*Penyelidik*)

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NATIONAL INSTITUTES OF HEALTH (NIH) RECOMMENDATION FOR THE CONDUCT OF RESEARCH IN THE MINISTRY OF HEALTH MALAYSIA
PENGESAHAN INSTITUSI KEBANGSAAN NEGARA UNTUK MENJALANKAN PENYELIDIKAN DI KEMENTERIAN KESIHATAN

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Dokumen ini adalah cetakan berkomputer. Borang ini dikeluarkan oleh salah satu institusi dibawah National Institutes of Health (NIH) iaitu Institut Penyelidikan Perubatan (IMR), Institut Kesihatan Umum (IKU), Pusat Penyelidikan Klinikal (CRC), Institut Pengurusan Kesihatan (IPK), Institut Pengurusan Sistem Kesihatan (IPSK) dan Institut Penyelidikan Tingkahlaku Kesihatan (IPTK).

Unique NMRR *[Nombor Pendaftaran]*	NMRR-13-1428-18566
Research Title *[Tajuk]*	Prevalence of Picky Eater and Its Associated Factors Among Toddlers in Pediatric Clinic at Selected Government Hospital
Protocol Number if *[Nombor Protokol jika ada]*	

#	**Investigator Name** ***[Nama Penyelidikan]***	**Institution Name** ***[Nama Institusi]***
1	BARAKATUN NISAK MOHD YUSOF	Serdang Hospital
2	Nik Najwa binti Nik Abdul Kadir	Serdang Hospital

I have reviewed the above titled research, and has recommended to MREC* for its decision.

Saya telah menyemak penyelidikan yang bertajuk diatas, dan telah disyorkan untuk MREC bagi keputusannya.

Name of Director *[Nama pengarah]*	Dr Roslinah Ali
NIH Institute (IMR, IPH, CRC, IHM, IHSR, IHBR) *[Nama institusi di bawah NIH]*	Institute for Health Management (IHM)
Signature & Official Stamp *[Tandatangan dan Cop Rasmi]*	
Date *[Tarikh]*	10-03-2014

*Final approval is pending MREC decision.

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EXTENDED ABSTRACT

PREVALENCE OF PICKY EATERS AND ITS ASSOCIATED FACTORS AMONG TODDLERS IN PEDIATRICS CLINIC AT SELECTED GOVERNMENT HOSPITAL

NIK NAJWA NIK ABDUL KADIR

Toddlers are generally defined as children who their age between 1 and 3 years old. They naturally have a decreased interest in food because of slowing growth and decrease in appetite. This often making parents worried, which can contribute to labelling the child as a 'picky' eater. Picky eater is defined as children who reject certain types of food, accepted only a limited number of foods, and consumed insufficient intake.

The prevalence of picky eater ranging from 17% to 54% in Canada among children aged 4 to 24 months. Meanwhile, in Singapore, the prevalence was ranging from 20.3% to 29.9% where the children aged 1 to 10 years. Most published studies about picky eating behaviour were conducted in children older than 2 years or between 2 and 7 years. There were very limited studies on picky eating behaviour among children aged 1 to 3 years. Therefore, this study was conducted to determine the point prevalence of picky eaters and its associated factors among toddlers in paediatric clinic at selected government hospital. This study aimed to determine the association between medical status, body weight status, and dietary intake with picky eating behaviour among toddlers.

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This cross sectional study was conducted in Paediatric Clinic at Hospital Serdang. Purposive sampling was used to select the children based on the inclusion criteria. Socioeconomic status and medical status were obtained by interviewing the mothers or caregivers. Meanwhile, anthropometry measurements were collected from medical record. The 24 hour dietary recall was conducted to obtain children's dietary intake. A subscale from Child Feeding Questionnaire was used to assess picky eating behaviour. Statistical analysis was performed using IBM SPSS Statistics 21. Chi-square test of independence or Pearson's correlation was used to test the associations between variables where appropriate. Meanwhile, independent samples t-test and one-way ANOVA was used to determine the differences between variables in each scale. A probability level (p) of <0.05 was set as statistically significant.

A total of 54 toddlers were included in this study. The mean age (month) of toddlers was 20.3 ± 7.2 month, with majority of them were boys (64.8%) and Malay (87.0%). The prevalence of picky eaters among toddlers was 29.6%. In this study, 61.8% presented with medical history and 47.3% have known medical problems. Most of them (70.4%) had a normal birth weight history, with mean of 2.8 ± 0.7 kg. The mean z-score (weight-for-age = -0.82 ± 1.25, length/height-for-age = -0.84 ± 1.40, and BMI-for-age = -0.39 ± 1.11), which fall under normal category. However, when divided into age group and gender, the mean z-score of weight-for-age for girls, aged 2 years indicate underweight (-2.19±2.25). Besides that, the mean z-score of length/height-for-age for children aged 2 years, girls and children aged 3 years, boys indicate stunted (-2.92±2.13, -2.54). In total, the children consumed 1253 ± 356

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Slightly more boys were picky eaters than girls, but there was no significant difference between the two groups. It was also found no significant difference when comparing the household income (low, medium, high) with picky eating behaviour. There was no significant association between picky eating behaviour and current known medical problems. Body mass index (BMI) also shows no significant association with picky eating behaviour. No significant association between picky eating behaviour and exclusive breastfeeding for 6 month. Energy and carbohydrate intake were negatively associated with picky eating behaviour (r=-0.28, p<0.043; r=-0.33, p<0.014).

Further analysis was done to determine if there was any difference in energy intake between picky and non-picky eaters. Picky eaters had lower energy intake than non-picky eaters, and there was a significant difference between the two groups (t =-2.411, p =0.019). As the energy intake was low for those children who perceived as picky eaters, it was predicted that they also had lower intake of other essential nutrients such as folate, calcium, iron, zinc, vitamin C, and vitamin E. If this situation prolonged, children may develop an unhealthy nutrient-deficient in the future.

In conclusion, the prevalence of picky eating behaviour among toddlers was 29.6%, and toddlers with lower intake of energy and carbohydrate were at higher risk to develop picky eating behaviour.

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