

PARENTAL ATTITUDES TOWARD FEEDING PRACTICES OF INFANTS AND YOUNG
CHILDREN AND THEIR PERCEPTION OF BABY MILK PRODUCTS

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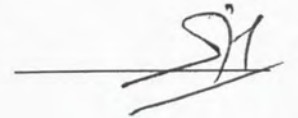
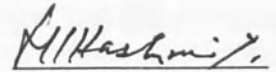
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ABSTRAK

SIKAP IBU BAPA TERHADAP AMALAN PEMAKANAN BAYI DAN KANAK-KANAK SERTA PERSEPSI MEREKA TENTANG PRODUK SUSU FORMULA BAYI

Kajian terhadap amalan pemakanan bayi serta faktor-faktor yang mempengaruhi keputusan pembelian susu formula bayi telah dijalankan di Kota Kinabalu dengan 505 responden yang mempunyai anak berusia antara 0-6 tahun. Sebanyak 86.3% daripada responden menyatakan bahawa mereka memberikan susu ibu kepada bayi sewaktu kelahiran. Hanya 8.3% daripada 436 responden memberikan susu ibu sepenuhnya kepada anak mereka untuk 6 bulan ke atas. Tahap pendidikan dan pendapatan bulanan ibu bapa merupakan faktor utama yang mempengaruhi tempoh penyusuan bayi ($R^2=0.717$) dan juga tempoh penceraian susu ($R^2=0.636$). Ibu bapa yang mempunyai tahap pendidikan ($\chi^2=70.191$, $df=28$, $p<0.001$) serta pendapatan bulanan ($\chi^2=74.863$, $df=28$, $p<0.001$) yang lebih tinggi lebih cenderung memberikan rumusan bayi pada tahap yang lebih awal. Responden yang mempunyai anak tunggal ($OR=0.55$) dan yang telah menyusukan anak lebih dari 6 bulan ($OR=2.46$) kurang cenderung memberikan rumusan bayi sewaktu usia bayi belum mencecah 6 bulan. Rumusan bayi diperkenalkan kerana kemudahannya (53.5%)serta ibu yang mengalami kekurangan susu (43.5%). Ibu bapa yang mempunyai tahap pendidikan ($\chi^2=99.107$, $df=9$, $p<0.001$) dan pendapatan yang tinggi ($\chi^2=96.501$, $df=12$, $p<0.001$) juga didapati lebih cenderung menceraikan susu sewaktu bayi masih amat muda. Makanan yang paling kerap diberikan kepada bayi sewaktu penceraian susu ialah bijirin dan bubur. Enfalac, Dumex, Dutch Lady, Nestle dan Fernleaf ialah 5 jenama paling dikenali antara responden. Kebanyakan ibu bapa mengenali sesuatu jenama melalui iklan dan promosi (32.9%). Kualiti dan jenama produk merupakan faktor yang paling mempengaruhi keputusan pembelian rumusan bayi. Rumusan bayi dan rumusan susulan yang dibeli oleh responden didapati mempunyai korelasi ($r=0.523$, $p<0.05$). Kesimpulannya, penyusuan bayi untuk tempoh yang melebihi 6 bulan masih kurang dipraktikkan kerana kekurangan kemudahan di tempat kerja dan juga sokongan awam kepada ibu-ibu yang sedang menyusukan. Kesedaran ibu bapa terhadap jenama susu formula mempengaruhi keputusan pembelian mereka. Enfalac, Dumex dan Dutch Lady ialah 3 jenama susu formula bayi yang paling banyak dibeli oleh responden.



ABSTRACT**PARENTAL ATTITUDES TOWARD FEEDING PRACTICES OF
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A survey on infant-feeding and weaning practices of 505 respondents who had children currently aged between 0-6 years old and the decisive factors which influence parents' purchase decision of infant and follow-up formula was studied in Kota Kinabalu. Initiation of breast-feeding was practiced by 86.3% of respondents. Only 8.3% of 436 respondents exclusively breast-fed for 6 months and beyond. Parental education and income were the major predictors for the duration of breast-feeding ($R^2=0.717$) as well as the initiation of weaning ($R^2=0.636$). An association was established where parents with a higher educational background ($\chi^2=70.191$, $df=28$, $p<0.001$) and household income ($\chi^2=74.863$, $df=28$, $p<0.001$) were found to have a higher tendency in initiating formula feeding earlier. Respondents with only 1 child ($OR=0.55$) and who breast-fed for more than 6 months ($OR=2.46$) were less likely to initiate early formula feeding. Infant formula was incorporated into the baby's diet due to its convenience (53.5%) as well as mothers suffering from insufficient breast-milk (43.4%). Parents who were highly educated ($\chi^2=99.107$, $df=9$, $p<0.001$) and had a higher income ($\chi^2=96.501$, $df=12$, $p<0.001$) also tended to wean their babies earlier. The most common weaning food given was baby cereal and porridge. Enfalac, Dumex, Dutch Lady, Nestle and Fernleaf were among the top 5 brands which respondents were most familiar with. Parents became acquainted to infant and follow-up formulas mainly through advertisement and promotion (32.9%). Quality and brand were the 2 most influential factors in determining consumer purchase decision on infant and follow-up formulas. The infant and follow-up formulas which respondents purchased were correlated with each other ($r=0.523$, $p<0.05$). Although breast-feeding is widely practiced, its continuation is still hampered by many social constraints such as lack of facilities and support in the workplace to encourage mothers to breast-feed and therefore most parents resolved to early formula feeding for their convenience. Parents' familiarity towards the brands of infant and follow-up formula products affected their purchase decisions. Enfalac, Dumex and Dutch Lady were the top 3 brands of formula, which parents purchased.



LIST OF ABBREVIATIONS

AIDS	Acquired Immuno Deficiency Syndrome
ANOVA	Analysis of Variance
ARA	Arachidonic acid
BPNI	Breast-feeding Promotion Network of India
DHA	Docosahexanoic acid
EER	Estimated energy requirements
FDA	Food and Drug Administration
GBS	Group B Streptococcal Disease
GER	Gastroesophageal reflux
GMP	Good Manufacturing Practice
LCPUFA	Long chain polyunsaturated fatty acid
LDL	Low Density Lipoprotein
LOS	Lower-oesophageal sphincter
HDL	High Density Lipoprotein
rHLF	Recombinant human lactoferrin
SOD	Superoxide dismutase
WHO	World Health Organization



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LIST OF SYMBOLS

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kg	kilogram	1
g	gram	1
%	percent	1
χ^2	Chi Square	1
>	greater than	1
<	less than	1
r	Phi coefficient	1
kJ	kilo Joule	1
OR	Odds ratio	1

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CHAPTER 1

INTRODUCTION

Infant feeding consists of breast feeding and artificial feeding. The benefits of breast-feeding are well established and include a lower LDL/HDL cholesterol ratio, effects on cardiovascular risk factors such as blood pressure and plasma lipid profile, protection against gastroenteritis, ear infection and atopy during infancy (Fewtrell, 2004). In pre-term infants, breast milk significantly reduces the risk of developing systemic infection (Howie *et al.*, 1990). Artificial infant feeding also plays an indispensable role in supplementing breastfeeding. In the United States, 54% of infants received artificial feeding during hospitalization. In the first month, 40% of mothers planning exclusive breast-feeding gave their infants human milk substitute with the main reason being insufficient breast milk (Chezem, 2004). Identification of the factors influencing infant feeding decisions showed that the strongest influencing factor is the infant's health. Other factors include the mother's own health, physician's advice and childbirth education classes (American Dietetic Association, 2001).

In artificial infant feeding, specific international and national guidelines have been defined to ensure the adequacy of nutritional intake and optimal growth in infants. Codex standards define an infant as a person not more than 12 months of age and infant formula as a product that shall be nutritionally adequate to promote normal growth and development, it is based on cow's milk or other animals or edible constituents of animal



including fish or plant origin which have been proved suitable for infant feeding (Codex, 1997).

In Malaysia, the Food Regulations 1985 define infant formulas to be any food described or sold as an alternative for human milk for the feeding of infants. It is a product prepared from cow's milk or other animals or other edible constituent of animals or both and may be modified to suit particular dietary requirements known to exist as a result of physiological conditions or specific disease or disorder or both (Food Regulations 1985). Follow-up formula is defined as food intended for use as a liquid part of weaning diet for the infant from 6 months onwards and for young children (Codex, 1989).

Globally, baby milk was the largest sector representing 53.4% of volume sales in 1997. Volume sales of baby milk reached 29 200 tonnes representing a rise of 17.3 % from 1993 (Euromonitor, 2005). In the year 2003, the infant formula production has risen to an astounding US\$ 3 billion per year industry (Morrow, 2003). In terms of consumption per capita, the value decreased from the year 2000 (36.23 kg per capita) to the year 2001 (17.36 kg per capita) (Department of Statistics Malaysia, 2004). The top five manufacturers of infant formula worldwide are Nestle SA in Switzerland, Bristol-Myers Squibb Corporation in New York, Abbott Laboratories in Illinois, Wyeth in United States of America and Mead Johnson Nutritionals in Indiana (Euromonitor, 2005). These and other manufacturers have invented current infant formulas that are of great demand in global markets.

Current infant formulas have been modified to resemble human milk with its most recent advancement being supplementation of two long chain polyunsaturated fatty acids



(LCPUFA), which are docosahexaenoic acid (DHA) and arachidonic acid (ARA). This supplementation is still currently under debate with the supporters claiming that supplementation prevents mental deficiencies and improve visual acuity. However, potential liabilities include retardation of physical growth and increased susceptibility to infectious disease (Wroble *et al.*, 2002). Thus, these studies still prove to be controversial and further investigation is needed.

Researches are also being carried out on the beneficial effects of pre- and probiotic supplemented infant formula. Prebiotics are important bifidogenic factors that selectively stimulate the growth of microflora in the colon of the infant and have an inhibitory effect on certain pathogenic microorganisms, whereas probiotics are live cultures that beneficially affect the host by improving its intestinal microbial balance (Alles, Scholtens & Bindels, 2004). In a recent study, gut microbiota of infants were found able to be modified by supplemented formula until the age of six months to improve their immunity toward illnesses (Rinne *et al.*, 2004). Probiotic supplemented formula is a new approach to alleviating allergic symptoms in infants. It has been found to be beneficial in host protection against allergic sensitization (Kankaanpaa *et al.*, 2002). Supplementation of infant formulas with nucleotides also increases the gastrointestinal and immunology effects in infants especially during the period of rapid growth when nucleotide availability may be low. Nucleotides play a significant role in many physiologic functions ranging from encoding of genetic information to signal transduction (Aggett *et al.*, 2003).



Besides supplementation, partially or extensively hydrolyzed formula has been recommended as substitutes of human milk for the first 4-6 months in infants at risk to reduce early allergen exposure (Tuohy, 2003). Prevention of allergic diseases in the first year of life is feasible by means of dietary intervention but also influenced by family history of atopic dermatitis. The preventive effect of each hydrolyzed formula still needs to be clinically evaluated (von Berg *et al.*, 2003). For infants who are allergic to cows milk protein, extensively hydrolyzed formulas and amino acid based formulas prove to be safe and exhibit overall gain in length and weight of infants 1 to 9 months of age (Boissieu & Dupont, 2002). Infants who suffer from mild or moderate gastroesophageal reflux (GER) can be managed effectively with antiregurgitation formula. Improved clinical and laboratory findings were seen in the majority of infants and the formula was found well tolerated with no adverse effects (Xinias *et al.*, 2003).

Currently, there are still ongoing debates on when should infant formula be introduced to infants especially when breast-milk is found to be insufficient in optimizing the growth and development of infants after six months of age (Briefel *et al.*, 2004). This is due to the declining level of some nutrients such as iron in breast- milk after a period of time (Wu, Hertzler, & Miller, 2001). Parental attitudes toward genetically engineered proteins used in infant formulas may also impede the implementation of new developments in infant formulas (Wells, 1998). Besides this, there has been an increasing number of new infant and follow-up formula products in the market. These products have a lot of claims but very few studies have been carried out on the formulas especially in Malaysia. Therefore, the main aim of this research is to determine the relationship between consumer behavior and the market of infant and follow-up formula.



The specific objectives of this study are:

1. To determine consumers' practices as one of the factors influencing the market of infant formula.
2. To determine the effect of consumer perception on infant and follow-up formula products.
3. To assess the marketing mix of infant and follow-up formula.



CHAPTER 2

LITERATURE REVIEW

2.1. Infant nutrition

2.1.1. Infant nutrition in developed countries

The nutrient intakes of infants and toddlers are very important as it determines their growth and development. The nutrients required by infants and toddlers vary with their age. Nutrient intakes include intakes from foods, beverages and supplements. Some of the nutrients required are such as protein, carbohydrate, fats, vitamin A, B group vitamins, vitamin D, vitamin K, antioxidants, iron, zinc, calcium, magnesium and phosphorus (Skinner *et al.*, 1997). In developed countries, infants under 12 months of age were found to have adequate intake (AI) for all nutrients. For toddlers (12 to 24 months of age), vitamin E and fiber intakes are still below the average requirement (Devaney *et al.*, 2004a).

Energy intakes in young infants who were not fed solid food were less than the estimated requirement especially for exclusively breast-fed infants. Infants that were fed solid foods were found to have greater energy intakes compared to those consuming milk products and no solid food (Carriquiry, 1999). Energy intakes among toddlers in developed nations exceed the estimated energy requirements (EER) by approximately 300kcal per day. This may lead to an excess weight gain and thus, cause the prevalence of obesity among toddlers (Heinig *et al.*, 1993). Calcium intake among infants and toddlers in developing countries are more than adequate especially among formula fed infants as it contains supplementation of calcium. Intakes of iron exceeded the adequate



intake requirement except for exclusively breast-fed infants where iron levels were found to be insufficient after 6 months of age (Devaney *et al.* 2004a).

Studies suggest that the diets of infants and toddlers in developed nations are nutritionally adequate. It also implies that current feeding practices in the developed nations provide a strong nutritional foundation with minimal risk of nutrient deficiency (Devaney *et al.*, 2004b) However, the prevalence of vitamin E deficiency and low fiber intakes that is below the estimated adequate requirement need to be revised. This phenomenon shows the need for parent education about appropriate infant and toddler feeding practices. Reinforcement of the importance to monitor weight gain by health professionals is also recommended in recent studies (American Dietetic Association, 2004; American Academy of Pediatrics, 1998a).

2.1.2. Infant nutrition in developing countries

People living in third world countries are lacking in nutritional knowledge. Research units in third world countries are still pursuing biochemical and physiological studies of severe protein malnutrition. Most third world countries have inadequate and poor quality food. Infants are found to be at a high risk of low birth weight (Williams, 1998).

In Africa, during the harvest season, birth weights are an average 200g greater than the famine season where food is scarce. In a study that was conducted, the proportion of low birth weight infants during the harvest season in Gambia was 10.7% and during famine was 11.6% (Poskitt, 1998). The accelerated growth shown by breast-fed infants does not last. By six months, weight curves are seen deviating from the



expected weight gain. This problem is entirely a consequence of maternal malnutrition, increased physical activity during famine and unhygienic conditions due to lack of sanitary facilities. Breast milk gives a protective effect only for at least the first 4 months of life. Nutritional supplementation in pregnant mothers has been carried out to aid in the reduction of low birth weight infants (Caulfield, Bently & Ahmed, 1996).

As the infants grow, they need more total energy and mothers may have difficulty maintaining high volume of milk secretion to meet the infants' needs. The micronutrients found in breast milk such as iron, zinc and vitamin A become insufficient to meet the requirements of the infants. Thus, weaning foods are needed to supplement the deficiencies of breast milk. Unfortunately, the weaning foods contain energy density, which is less than breast milk, and low in micronutrients thus causing micronutrient deficiency in the weaning age group between 6 to 18 months (Zetterstrom 1994). Studies were conducted on the survival of infants supplemented orally with vitamin A from 6 to 90 months old in African countries. Supplementation gave a 19% reduction in all causes of mortality and 30% reduction in mortality from diarrhea. Oral re-hydration has also proved to save lives and reduce morbidity due to infantile diarrhea relating to malnutrition (Cohen *et al.*, 1994).

Generally, infants in third world countries are stunted due to malnutrition. Third world populations are mostly illiterates and have little or no access to health professionals or to the media to get advice and gain nutritional knowledge. Their lifestyle, which is harsh causes them to be malnourished. Besides that, the unwillingness to change some



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