KNOWLEDGE, ATTITUDE AND PRACTICES (ON NUTRITION AND ORAL HEALTH) OF MOTHERS AND NUTRITIONAL STATUS OF CHILDREN: AN ASSOCIATION WITH EARLY CHILDHOOD CARIES (ECC) OF CHILDREN ATTENDING PRIVATE TASKA IN KOTA BHARU, KELANTAN.

By

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LIST OF ABBREVIATIONS

ARI	Acute respiratory infections
BMI	Body mass index
CDC	Centers for Disease Control and Prevention
CDHS	Child Dental Health Survey
dmft	Decayed, filling, missing teeth
ECC	Early childhood caries
FTT	Failure to thrive
HAZ	Height-for-age
KAP	Knowledge, attitude and practices
MCHN	Maternal and Child Health Nurses
MOH	Ministry of Health
NHMS	National Health and Morbidity Survey
SECC	Severe early childhood caries
SNNPR	Southern Nations, Nationalities, and Peoples' Region
UNICEF	United Nations Children's Fund
WAZ	Weight-for-age
WHO	World Health Organization

ABSTRAK

Objektif kajian ini adalah untuk menentukan hubungan antara pengetahuan, sikap dan amalan (KAP) mengenai pemakanan, KAP kesihatan oral ibu serta status pemakanan (berat terhadap umur (WAZ), tinggi terhadap umur (HAZ) dan indek jisim tubuh terhadap umur) kanak-kanak dengan status karies anak-anak mereka yang berumur 2 hingga 5 tahun. Ini adalah satu kajian keratan rentas melibatkan 126 peserta dari 8 TASKA swasta di Kota Bharu, Kelantan. Peralatan yang digunakan dalam kajian ini ialah borang soal selidik mengenai KAP pemakanan dan KAP kesihatan oral, pengukuran antropometri dan penilaian kesihatan oral. Majoriti ibu bapa daripada status sosioekonomi yang tinggi dengan median pendapatan bulanan RM4000.00. Hasil kajian menunjukkan bahawa 1.6% daripada kanak-kanak prasekolah mengalami kekurangan berat badan yang teruk dan 13.5% mengalami kekurangan berat badan. Kira-kira 4.0% dan 10.3% daripada mereka adalah teruk terbantut dan terbantut masing-masing. Status pemakanan untuk indek jisim tubuh terhadap umur menunjukkan bahawa 1.6% daripada mereka adalah sangat kurus dan 15.2% adalah kurus. Hanya 2.4% dan 4.8% daripada mereka adalah gemuk dan obes masing-masing. Selain itu, hasil kajian juga menunjukkan bahawa kanak-kanak prasekolah yang tidak mempunyai atau rendah karies (dmft≤3) ialah 31.0%. Untuk penilaian KAP kesihatan oral, kebanyakan ibu mempunyai pengetahuan (61.1%) dan sikap (66.7%) yang sederhana manakala kebanyakan mereka mempunyai amalan (64.3%) yang tinggi. Untuk penilaian KAP pemakanan, kebanyakan ibu mempunyai pengetahuan (75.4%) dan sikap (84.1%) yang tinggi manakala kebanyakan mereka mempunyai amalan (56.3%) yang sederhana. Sikap ibu mengenai kesihatan oral dihubungkaitkan dengan status karies ($r = -0,183$, $p < 0.05$). Untuk status pemakanan, HAZ mempunyai korelasi dengan status karies

(r = 0,185, p <0.05). Kesimpulannya, sikap ibu mengenai kesihatan oral dan HAZ mempunyai perkaitan dengan status karies.

ABSTRACT

The objective of the study is to investigate the association between knowledge, attitude and practices (KAP) on nutrition, KAP on oral health of mothers and nutritional status (weight-for-age (WAZ), height-for-age (HAZ), BMI-for-age) of children with caries status (dmft) of their children aged 2-5 years old. This was a cross sectional study of 126 subjects from 8 private TASKA in Kota Bharu, Kelantan. Tools using for this study were questionnaires of KAP on nutrition and KAP on oral health, anthropometric measurements and oral health measurement. Majority of the parents were from high socioeconomic status with the median monthly household income of RM4000.00. The results indicated that 1.6% of preschool children were severely underweight and 13.5 % were underweight. About 4.0% and 10.3% of them were severe stunted and stunted respectively. The nutritional status of BMI-for-age indicated that 1.6% of them were severely thinness and 15.2% were thinness. Besides, only 2.4% and 4.8% of them were overweight and obese respectively. Furthermore, the results also indicated that the preschool children who have no or low caries (dmft≤3) were 31.0%. For the assessment of KAP on oral health, most of the mothers have moderate knowledge (61.1%) and attitude (66.7%) while most of them have high practices (64.3%). For the assessment of KAP on nutrition, most of the mothers have high knowledge (75.4%) and attitude (84.1%) while most of them have moderate practices (56.3%). Maternal attitude on oral health was associated with caries status ($r=-0.183$, $p<0.05$). For nutritional status, indicator of HAZ was significantly correlated with caries status ($r=0.185$, $p<0.05$). As conclusion, both maternal attitude on oral health and indicator of HAZ were associated with early childhood caries.

CHAPTER 1

INTRODUCTION

1.1 BACKGROUND

The nutritional status of children influences their health status. However, malnutrition is a common problem among them and a good nutrition is an essential determinant for well-being and its associated consequences (Jyothi *et al.*, 2003). It indicates imbalance, inadequate or excessive supply of protein, energy or micronutrients. Inadequate energy intake leads to undernutrition in the form of wasting, stunting and underweight while excessive energy intake causes overnutrition resulting in overweight and obesity (WHO, 2012). According to UNICEF (2009), once children are stunted, it is hard for them to catch up in height later on, especially for those who are living in conditions that prevail in many developing countries. However, a deficit in weight (underweight) can be compensated if nutrition and health improve later in childhood. Whether a child has experienced chronic nutritional deficiencies in early life is best indicated by the infant's growth in length and the child's growth in height (UNICEF, 2009).

Malnutrition is rarely the direct cause of death except in chronic situations, for example in famine, however malnutrition children were associated with about 60% of under five mortality in sub-Saharan Africa (UNICEF, 1998) and 54% of child deaths or 10.8 million children in developing countries in 2001 (Monika & Mercedes, 2005). Report by WHO attributed more than one third of child mortality is linked to malnutrition

(WHO, 2014). Therefore, improvement of children nutritional status increases the chances of child survival and is considered as a precondition for their contribution to community as well as human development (UNICEF, 1998).

At an advanced stage, dental caries especially Early Childhood Caries (ECC) influence the quality of life of children significantly due to dental pain, and subsequently tooth loss resulting in difficulty in consumption of hard food, speaking, socializing and sleep disturbances (Lewis *et al.*, 2000; Acharya & Tandon, 2011; Gaur & Nayak, 2011; Baginska & Rodakowska, 2012; Mani *et al.*, 2012). The pain caused by ECC may result in a decrease in appetite and diminished ability to eat, finally leading to malnutrition (Sobia, Soraya, & Allauddin, 2009) and resulting in unintentional weight loss. In addition, according to study done by Elice and Fields (1990) showed that severe dental decay could contribute to failure to thrive (FTT).

Parents especially mothers are directly responsible for the oral health of their offspring and can play a crucial role in preventing oral diseases in children (Primosch, Balsewich, & Thomas, 2001; McKinney, 2006; Baginska & Rodakowska, 2012) as they are the primary decision makers on matters influencing their children's health and health care (Kamolmatyakul, 2012). This statement was supported by Wendt *et al.* (1996), Suresh *et al.* (2010) and Mani *et al.* (2012) with the findings showed an association between maternal oral health knowledge, attitude and practices and oral health of their children. However, Kamolmatyakul and Saiong (2007) demonstrated that caregivers seem to be unable to apply them to everyday oral health practice despite good levels of

knowledge and attitude in oral health. Hence, Kamolmatyakul (2012) concluded that more practical programs on "do it" such as avoiding saliva-sharing behaviors, repeated use of a sippy or no-spill cup and frequent consumption between meals of sugar-containing snacks or drinks in the course will probably result in less carious teeth in young children's mouths instead of focusing on providing knowledge to mothers or caregivers (Kamolmatyakul, 2012).

Besides, studies also revealed that maternal knowledge, attitude and practices on nutrition are associated with nutritional status of their children (Marie & Purnima, 2002; Michelle, Renata, & David, 2005; Makoka, 2013). Nutrition knowledge acts as a pathway through which maternal education affects dietary intakes of children. Ayachandran *et al.* (1999) suggested that nutrition education may be more effective if targeted both toward mothers with young children and directly toward school-age children. Parents especially mothers play an important role to create a good environments for children to promote the development of healthy eating behaviors and weight, or that may foster overweight and disordered eating aspects. (Ayachandran *et al.*, 1999).

1.2 PROBLEM STATEMENT

Report from the Malaysian Oral Health Survey on 5-years old children conducted in 2005 showed caries prevalence was 75.5% with mean dmft 5.57 (Muttalib, 2009). In Malaysia, dental epidemiological surveys of 5 to 6-year-old showed high prevalence of caries, despite a declining trend for the last three decades. In 1970, the proportion of 6-year-old with one or more carious teeth in the deciduous dentition was 95.4% in

Peninsular Malaysia (Dental Services Division, 1972). This reduced to 88.6% in 1988 and a further decline to 80.6% was noted in 1997 (Dental Services Division, 1990; Oral Health Division, 1997).

In a similar study in Sarawak in 1982, caries prevalence was 91.7% in the same age group (Dental Services Division, 1982). By 1994, caries prevalence had dropped to 88.2% and this further declined to 79.6% three years later (Dental Services Division, 1994; Oral Health Division, 1997). Among the regions, Sabah recorded the highest caries prevalence among 6-year-old at 96.9% and 94.7% in 1985 and 1997 respectively. This showed a very small decrease of 2.2% over the 12-year period (Dental Services Division, 1986; Oral Health Division, 1997).

In the 1995 pre-school survey, caries prevalence among 5-year-old was 87.1%. The restorative index was 2.6%, which indicates a high level of unmet treatment need. In addition, about 55% of these children were considered to be at high risk. In a regional pre-school survey in 1995, the caries prevalence of 5-year-old children in Sarawak was discovered to be 85.8%, with 49.6% considered at high risk with 5 or more carious teeth. Only 10.7% of affected teeth were restored, reflecting the high-unmet treatment needs seen elsewhere in Malaysia (Dental Services Division, 1995).

In Pasir Mas, Kelantan, one study on preschool children aged 4-6 years old found that 99.6% had caries, only a few (1.8%) children had dmft index less than or equal to 3 (dmft≤3) and only one child was caries-free (dmft=0; 0.4%) while 4.3% had the

maximum dmft of 20. Each child had on average 12 teeth influenced by ECC (dmft=12.2) (Badariah, 2005). Current study in Pasir Mas found that the mean carious teeth among preschoolers were very high (dmft 11.1±4.8) and almost every preschooler was affected with ECC (98.1%) (Ruhaya *et al.*, 2012).

The survey of school children reported caries prevalence of 80.6% among 6-year-old subjects (Oral Health Division, 1997). This age group also received the least amount of dental care with a restorative index of only 11.1%. Sarawak ranks highest (30.8%), followed by Peninsular Malaysia (10.5%) and Sabah (4.8%) when restorative index amongst 6-year-old is considered by region. These findings are consistent with the fact that the oral health programme for pre-school children in most parts of Malaysia was mainly preventive in nature.

Findings of high caries prevalence and a high level of unmet treatment needs were similarly reflected in several local studies on smaller samples. A study carried out in Kuala Lumpur discovered the mean dft among the 6-year-old to be 6.0. The ratio of decayed (d) to filled teeth (f) was 5.2:1. Caries prevalence increased from 59% among the 3-year-old to 83% among the 6-year-old (Nik Hussein & Meon, 1985). Another study done in Petaling Jaya reported that only 15.4% of 5-year-old and 14.8% of 6-year-old were caries-free (Meon & Nik Hussein, 1985). The mean number of decayed and filled primary teeth (dft) was 5.5 for the 5-year-old and 5.9 for the 6-year-old.

According to UNICEF (2012), childhood undernutrition and overweight co-exist in many countries, leading to a double burden of malnutrition. Child malnutrition in term of undernutrition or overnutrition is an important indicator for monitoring population nutritional status and health. It is always related to prevalence of underweight, stunting, wasting, overweight and obesity. Underweight prevalence is a useful indicator to assess overall nutritional status of the population whereas stunting and wasting prevalence are useful indicators for tracking trends in child malnutrition. For chronic malnutrition, the survivors will never learn, nor earn, as much as they could have if properly nourished in early life as it leaves the body lacking the nutrients for proper health and development and vulnerable to infection and disease (UNICEF, 2012).

The Third National Health and Morbidity Survey (NHMS III) was conducted in 2006 on a nationally representative sample of population in Malaysia. The finding showed that the weight-for-age (WAZ) and height-for-age (HAZ) of children aged 0-59.9 months was 12.9% and 17.2% respectively. These levels included 2.4% severe underweight and 6.0% severe stunting. Prevalence of overweight based on BMI-for-age for the sexes combined was 6.4%, while that based on WAZ was 3.4%. The NHMS III results indicate that Malaysian children have better nutritional status as to children under 5 years in neighboring countries (Khor *et al.*, 2009).

Underweight was found at 12.9% of the children who was undernutrition consisting of about 14.9% of BMI-for-age. At the same time, stunting prevalence was at 17.2% of the children. The MOH/UNICEF (2000) study had reported 19.2% underweight and 16.7%

for stunting prevalence. This indicates that underweight prevalence in both sexes was low, while stunting prevalence remains close to the magnitude of a decade ago when compared with the MOH/UNICEF (2000) study.

It is seen that generally undernutrition levels are comparatively lower amongst Malaysian children when compared with the NHMS III results with other studies from neighboring countries, which have assessed nationally representative samples of children below five years in recent years. In the Philippines, underweight and stunting prevalence was 26.2% and 27.9% in children below 5 years respectively (Food and Nutrition Research Institute, 2008). In Vietnam, the nationwide prevalence of underweight was 25.2% and prevalence of stunting was 29.6% for children below 5 years (Vietnam MOH, 2001). As for Indonesia, 27.5% of pre-school children were underweight while 45.6% were stunted (Atmarita, 2005). In comparison, the prevalence of underweight and stunting in Malaysian children below 5 years appeared considerably lower at respectively 12.9% and 17.2%.

From the above explanation, it is showed that children age less than six years old faced with a serious of ECC problem as well as nutritional status. Therefore, it is very important to explore the level of knowledge, attitude and practices of mothers on nutrition and oral health and its association with ECC.

1.3 SIGNIFICANCE OF THE STUDY

The outcomes of this study may provide information to improve the knowledge, attitude and practices on nutrition and oral health of mothers which may be useful in alleviating the problems of oral health among children. In addition, the assessment of knowledge, attitude and practice among primary caretakers of young children could indicate knowledge areas that are deficient and attitudes and practices that are erroneous. As a result, healthcare professionals, medical personnel or researchers in clinical settings could have better understanding on how knowledge, attitude and practices on nutrition and oral health of mothers influence the oral health of their children. Subsequently, they could create or establish some interventions that are useful in improving or solving the issues regarding oral health.

1.4 OBJECTIVE OF THE STUDY

1.4.1 GENERAL OBJECTIVE

1. To investigate KAP on nutrition, KAP on oral health among mothers and nutritional status (children aged 2 to 5 years old) and the association with caries status among children aged 2 to 5 years old who attending the private TASKA in Kota Bharu, Kelantan.

1.4.2 SPECIFIC OBJECTIVES

1. To identify KAP on nutrition and KAP on oral health among mothers who have children aged 2-5 years old attending the private TASKA in Kota Bharu, Kelantan.

2. To determine the nutritional status (weight-for-age, height-for-age, BMI-for-age) of children aged 2-5 years old who attending the private TASKA in Kota Bharu, Kelantan.
3. To identify the caries status (dmft) of children aged 2-5 years old who attending the private TASKA in Kota Bharu, Kelantan.
4. To access the association between KAP on nutrition, KAP on oral health among mothers and nutritional status (weight-for-age, height-for-age, BMI-for-age) of children with caries status (dmft) of their children aged 2-5 years old.

1.5 RESEARCH HYPOTHESIS

a) NULL HYPOTHESIS

There is no association between KAP on nutrition, KAP on oral health among mothers and nutritional status of children with caries status (dmft) of their children aged 2-5 years old who attending the private TASKA in Kota Bharu, Kelantan.

b) ALTERNATIVE HYPOTHESIS

There is association between KAP on nutrition, KAP on oral health among mothers and nutritional status of children with caries status (dmft) of their children aged 2-5 years old who attending the private TASKA in Kota Bharu, Kelantan.

1.6 CONCEPTUAL FRAMEWORK

The conceptual framework guiding this research is based on the association between maternal KAP on nutrition, KAP on oral health and nutritional status of children with caries status (dmft) of their children aged 2 to 5 years old. Figure 1.1 shows the factors that may influence caries status of children. The pathway of KAP on nutrition, KAP on oral health among mothers and nutritional status of children can influence caries status among children is through exposure to health information and transition of health behavior or habits that leads to improved health status and oral health status of their children as well as themselves. It is therefore expected that women with better KAP are more likely to emphasize on the nutrition and oral health of children which subsequently improve the life quality of their children.

According to Pirate (2006), Health Belief Model in Figure 1.2 can be used to describe how maternal knowledge, attitude and practices affect the oral health and care seeking behaviors for their children. A schematic model is created based on maternal respond and the correct responses.

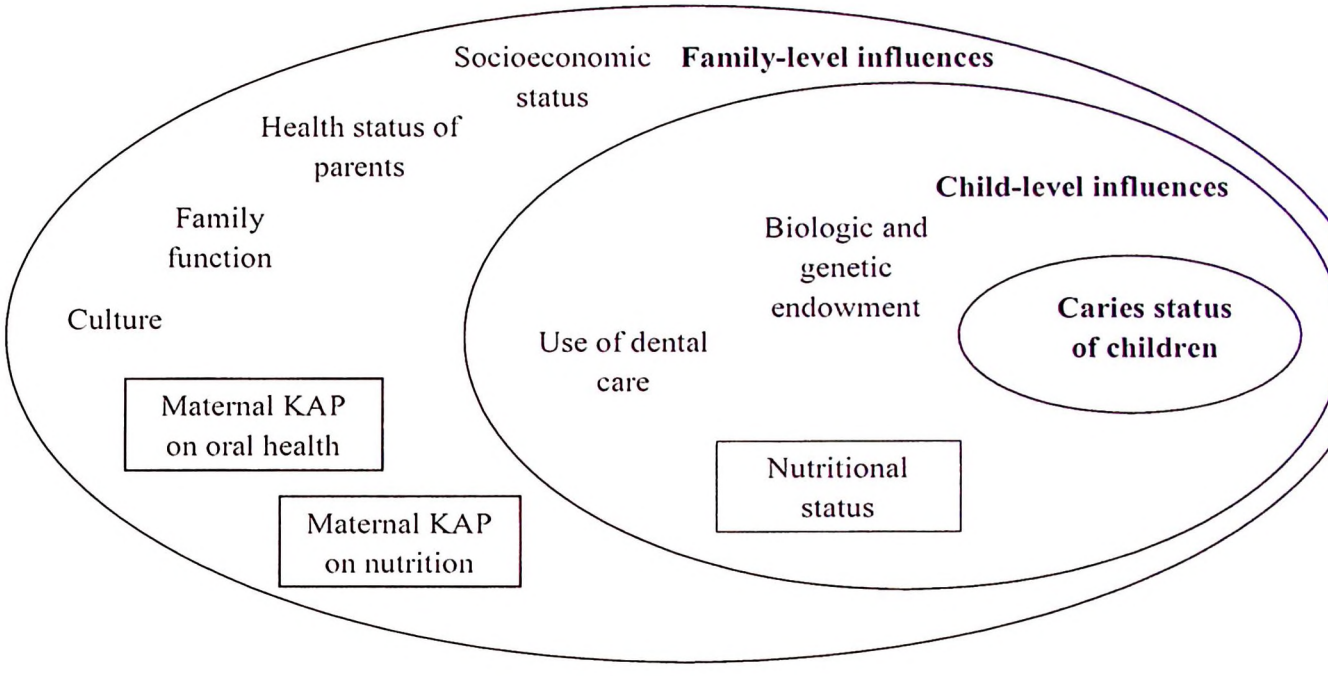

Figure 1.1: Factors that may influence the caries status of children

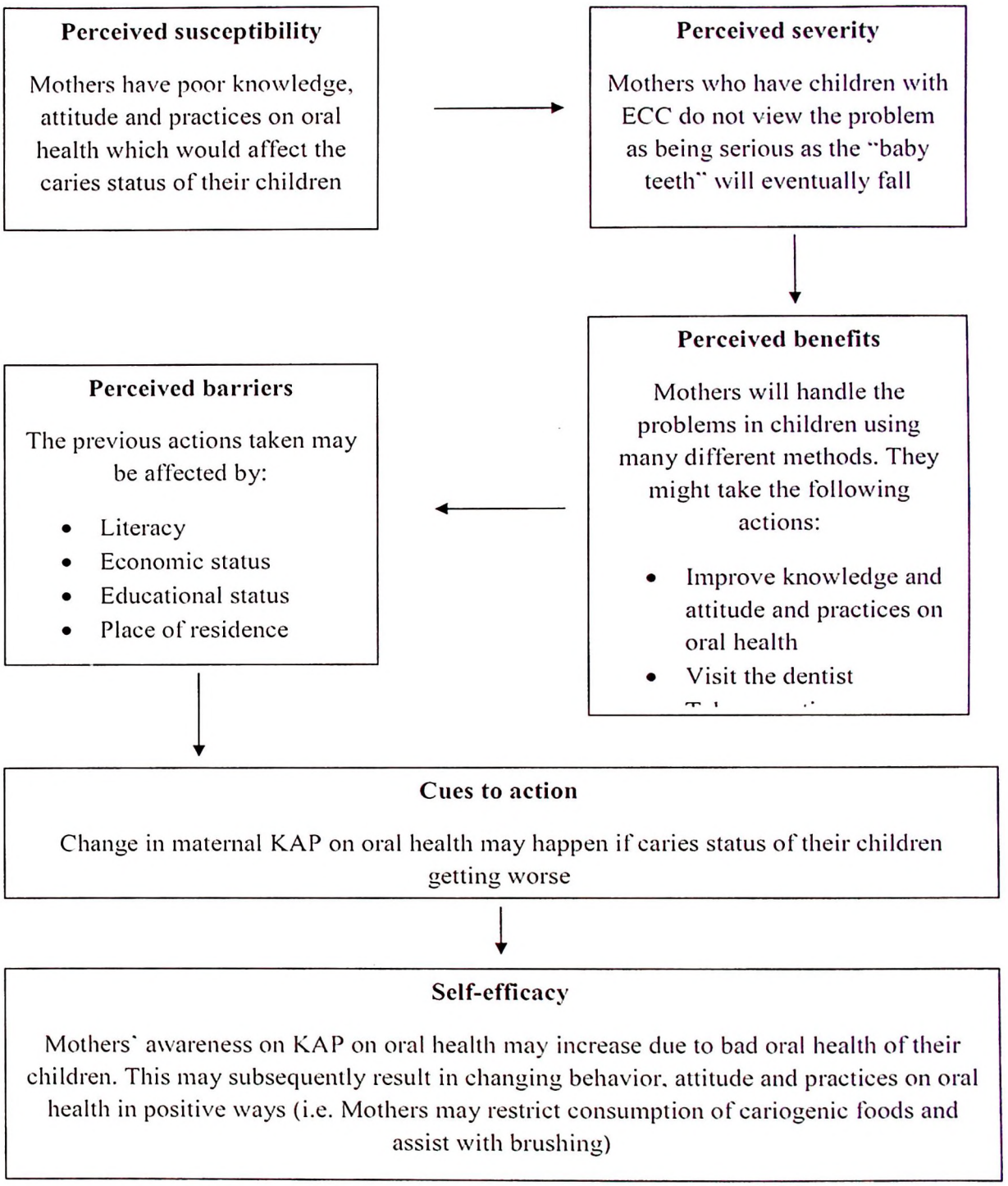

Figure 1.2 Health Belief Model (Pirate, 2006) explaining the mothers changing perception on children's oral health

CHAPTER 2

LITERATURE REVIEW

2.1 Maternal knowledge, attitude and practices (KAP) on oral health

A study done by Smyth *et al.* (2007) to assess the association between knowledge, attitude and practice on oral health revealed that strong knowledge of oral health showed better oral care practice. Al-Omiri *et al.* (2006) also revealed that people with a more positive attitude towards oral health are predisposed by better knowledge in how to take care of their teeth. This can be done through appropriate oral health education that can help to cultivate healthy oral health practice (Ab-Murat & Watt, 2006). Furthermore, the change to healthy attitude and practice can be created by providing adequate information, motivation and practice of the procedure with the respondents (Smyth, Caamano, & Fernández-Riveiro, 2007).

However, knowledge of mothers who know about the concept of the first dental visit before the child's first birthday does not necessarily translate into practices that are likely to prevent ECC (Schroth *et al.*, 2005; Schroth, Brothwell, & Moffatt, 2007). This was proven by most parents who attending the Prince of Songkla University dental hospital in Thailand showed that those who have a good level of knowledge and a positive attitude about their children's oral health but some of them still could not follow some of the recommendations for preventive pediatric dental care. Hence, knowledge may not lead to appropriate behavior where dental knowledge and parents oral health care

practices indicate a need for oral health education. This study suggested that it may be more practical to offer comprehensive oral health educational programs for children at school as to influence the oral health behavior of parents is challenging (Kamolmatyakul & Saiong, 2007).

Gussy *et al.* (2008) indicated that parents had good knowledge of diet related risk factors, however, half of their children were given bottle feeding at bedtime. In addition, poor knowledge was noted in Wu-Han, China and Romania where only 42% (Petersen & Esheng, 1998) and 39% (Petersen *et al.*, 1995) of mothers knew that dental caries is caused by sugar respectively. In most studies, however, few could identify the diet with hidden sugars (some sweet-tasting foods don't have the word 'sugar' in the ingredients list on their packaging, but still have sugar in them) related to dental caries (Horton & Barker, 2008; Hoeft, Barker, & Masterson, 2010).

A study done by Mani *et al.* (2012) revealed that 99% of parents aware of the types of food that can lead to tooth decay, however, 45% of parents gave sweetened liquid in the bottle. In addition, about 49% parents did not agree that nighttime bottle or breastfeeding can lead to dental caries and 64 % did not think that frequent daytime bottle or breast feeding can lead to tooth decay. It is apparent that parents aware that sugars in the diet can lead to dental caries. However, they were not aware of hidden sugars and their effects (Mani *et al.*, 2012).

Another studies showed that urban Mexican American and immigrant Latino mothers rarely recognized cariogenic food and demonstrated inquiry as to how exactly bottle feeding is detrimental to oral health (Horton & Barker, 2008; Hoeft, Barker, & Masterson, 2010). Parents of children with ECC were significantly disagree that nighttime nursing was safe, indicating that knowledge among parents is high, but not reflected in the dental health of their children (Schroth, Brothwell, & Moffatt, 2007).

Studies indicated that majority of the mothers had good knowledge regarding the role of diet in oral health. They believed that sweet snacks and sweet drinks contribute to caries. Despite having good knowledge, many mothers reported of using nursing bottle at bed time (Lin *et al.*, 2001; Kumar *et al.*, 2009). Similar results were reported in another study, in rural Australian mothers, which is contrary to the Maternal and Child Health Nurses (MCHNs) recommendation (Gussy *et al.*, 2008), although it is apparent that the content of the bottle is more important than the use of the bottle (Reisine & Douglass, 1998).

Mani *et al.* (2012) reported that all parents knew brushing is important for baby's teeth where 81.4% parents knew that a baby's mouth should be cleaned even before the teeth erupt, 88% agreed that they should brush their baby's teeth as soon as it erupted. About 27% and 60% of the parents reported brushing their child's teeth once and twice daily respectively (Mani *et al.*, 2012). Mothers with higher frequency of brushing their teeth and with higher confidence in brushing their children's teeth had children with

cleaner teeth (Gussy *et al.*, 2008; Mohebbi *et al.*, 2008). Those children who started tooth brushing earlier also have less dental caries (Chan, Tsai, & King, 2002).

However, 52% thought that effective cleaning can be achieved by the children themselves (Mani *et al.*, 2012). Similar results were seen in other studies (Gussy *et al.*, 2008) and most children aged 3 years and below were allowed to brush their own teeth (Chan, Tsai, & King, 2002). Many studies have showed that most mothers are aware that poor oral hygiene is a cause for caries (Blinkhorn, Wainwright-Stringer, & Holloway, 2001; Szatko *et al.*, 2004; Gussy *et al.*, 2008; Hoeft, Barker, & Masterson, 2010). However, other studies revealed that mothers did not place enough emphasis on tooth cleaning (Hood, Hunter, & Kingdon, 1998). Tooth brushing was reportedly delayed in some instances for example where children temperament did not allow the parent clean teeth (Blinkhorn, Wainwright-Stringer, & Holloway, 2001; Riedy *et al.*, 2001; Hoeft, Barker, & Masterson, 2010).

A study reported that 85.3% of parents knew that fluoride in toothpaste is important for preventing caries in teeth but 46% disagreed that swallowing of fluoride toothpaste is harmful to the health and 31% were not sure of its harmful effects. Eleven per cent used full length toothpaste while 41% and 45% used smear and pea-size amount of toothpaste respectively indicated that majority of the parents were familiar with the correct amount of toothpaste to be used. This could be due to the fact that most fluoridated toothpaste tubes have printed instructions on the cover which are easy to

et al. (2012) also revealed that knowledge of transmissibility of oral bacteria is minimal in his study population since 72.6% disagreed that bacteria can be transmitted by sharing feeding utensils. Besides, 67.6% of parents practiced biting hard food into small pieces before giving it to the child (Mani *et al.*, 2012).

Attitudes towards importance of primary teeth vary among parents. In rural Australia, all parents agreed that their child's teeth were important (Gussy *et al.*, 2008) whereas 4.2% disagreed that primary teeth are important in Manitoba (Schroth, Brothwell, & Moffatt, 2007). A study reported that 63.7% of parents knew that it is necessary to do fillings in baby's teeth (Gussy *et al.*, 2008), similarly, 47% of the mothers wanted their child's decayed teeth to be filled in the UK (Blinkhorn, Wainwright-Stringer, & Holloway, 2001). On the other hand, another study in the UK indicated that only 6% of mothers wanted their child's asymptomatic primary tooth to be filled (Tickle *et al.*, 2003), and two-thirds of mothers in Poland opined that care of deciduous teeth was unnecessary (Szatko *et al.*, 2004).

In a study, 32% of mothers initiated semisolid food after one and half years of age and 15.7% thought that bottle should be stopped after two and half years, showing prolonged bottle or breast feeding beyond the recommended 1 year of age (Mani *et al.*, 2012). Similar findings of prolonged bottle feeding up to 2 years in 73% of the children were also reported from Hong Kong (Chan, Tsai, & King, 2002). However, the children were weaned from the bottle during the day, but continued nighttime bottle feeding in another study (Riedy *et al.*, 2001). In some studies, mothers indicated that other

caregivers encourage use of the bottle or sugar in diet when the mothers were away at work, even though mothers were not in favor of such practices (Riedy *et al.*, 2001; Amin & Harrison, 2009).

Togoo *et al.* (2012) reported that 37% of parents favored taking a child for dental checkup even in absence of any complaint whereas 33% did not find it important and 21 % did not respond to the question. This again indicates lack of awareness among parents about regular dental checkups. Seventy per cent agreed that pacifiers influenced oral health and 68% favored using a cup when the child is able to hold it. The fact that 68% encouraged their children to use cups early in life is significant as it discourages the use of bottles and pacifiers. Meanwhile, 71% of them favored providing sweetened juices to their children frequently which again represent some confusion among parents about the causative factors of ECC (Togoo *et al.*, 2012).

2.2 Maternal knowledge, attitude and practices (KAP) on nutrition

Level of knowledge of primary caretakers especially mothers regarding infections, nutrition, and hygiene is crucial to their corresponding practices which influence their children's health directly and indirectly (Saini *et al.*, 1992; Bhatia *et al.*, 1999; Mangla *et al.*, 2000; Datta *et al.*, 2001). Although knowledge is necessary for the appropriate practice to follow, it is not adequate enough to guarantee corresponding action will ensue. However, lower levels of knowledge result in decreased levels of the desired practice in which without enough knowledge, the practice will most likely not occur, while having

the knowledge does not guarantee that it will be applied correctly or at all (Sood & Kapil, 1990; Saini *et al.*, 1992).

Maternal level of education or literacy is also significantly related to child health as measured by episodes or diarrhea, acute respiratory infections (ARI), and nutritional status. Better practices are observed among mothers with higher literacy levels, translating into lower rates of infection for their respective children (Bhatia *et al.*, 1999; Mangla *et al.*, 2000; Datta *et al.*, 2001; Borooah, 2004). However, this does not showed that mothers with lower levels of education cannot improve their knowledge level, and in turn, improve their practices. Mothers sometimes require multiple exposures to the information or reinforcement after a period of time to re-emphasize the importance of certain practices (Mangla *et al.*, 2000).

Lloyd (2009) indicated that the data analysis of his research supports the literature of maternal KAP impacts child health in terms of disease and nutrition. His research also supports the fact that maternal education is an important factor in child health. In another study, primary caregivers indicated that they were aware of their potentially education impact upon their children's developing food behaviors and attitudes and health practices. They understood that their children's health was impacted by their behaviors and the models they gave to their children. They also reported that willingness to adopt health recommendations for themselves and their children would affect their health (Reed & Jernstedt, 2000).

A study done by Jayachandran *et al.* (1999) to examine the effect of maternal nutrition knowledge on the dietary intakes of children between two and seventeen years of age showed that maternal knowledge influences children's diets and that such influence decreases as children grow older. Nutrition knowledge acts as a pathway through which maternal education influences children's diets. This outcome supports the hypothesis that education affects health-related choices by raising the allocative efficiency of health input use. The findings suggest that nutrition education may be more effective if targeted both toward mothers with young children and directly toward school-age children (Jayachandran *et al.*, 1999).

It is likely that greater education was functionally connected to higher fruit consumption via better nutritional knowledge, as well as positive attitudes towards fruit and disease prevention. Therefore, mothers' nutritional knowledge was quite strongly correlated to their children's fruit intake, but not to intake of vegetables or confectionery (Gibson, Wardle, & Watts, 1998). It is encouraging that mothers' nutritional knowledge is strongly and independently associated with children's fruit intake as it suggests that nutritional education might have a positive impact, irrespective of underlying educational level or even diet–disease attitudes.

A meta-analysis of earlier studies of the impact of nutritional knowledge on dietary quality did support a positive correlation (Axelson, Federline, & Brinberg, 1985). However, it is likely that the measure of knowledge, the particular population and the type of food being studied will influence this relationship. For instance, knowledge of fat

content was negatively related to consumption of fatty meat products (Shepherd & Towler, 1992).

Nurcan *et al.* (2014) revealed that many of the mothers who have higher level of nutritional knowledge produced children with normal body weight. The mothers who have higher level of nutritional knowledge feed their children less sugared drinks such as pops, juice and fast foods, and more with vegetable, fruit, legumes as compared to the mothers who have lower level of nutritional knowledge. In addition, higher nutritional knowledge level mothers believe more the knowledge about nutrition-health, and avoid giving the foods which contains artificial to their children (Nurcan, İbrahim, & Suzan, 2014).

Jayachandran *et al.* (1999) and SunWoong *et al.* (2000) reported that the more nutritional knowledge level of the mothers is increased, the more their children's dietary intake levels on total fat and cholesterol are decreased, and consumption of dietary fiber is increased. This is supported by study done by Nurcan *et al.* (2014) which found that high nutritional knowledge level mothers give less butter spread breads, and high fat included foods such as sausage, hot dog and salami ($p<0.05$). On the other hand, it is determined that having high nutritional knowledge of the mothers are positively effective on their children's eating behaviors and habits. For instance, the mothers who have higher nutritional knowledge provide their children with more cheese and egg as compared to the mothers who have low nutritional knowledge ($p<0.05$). (Nurcan, İbrahim, & Suzan, 2014).

Mother's nutritional knowledge has positively effect on their children's eating habits (Poh *et al.*, 2012). A study stated that there is a correlation between nutritional knowledge of the mothers and their nutrition status, nutritional habits and nutritional knowledge of their children (SunWoong *et al.*, 2000). In addition, there is a positive relationship between educational status of the mothers and consumption fruits of their children. It is found that mother's nutritional knowledge is negatively related with snack taking behaviors of their children (Nurcan, İbrahim, & Suzan, 2014). Similarly, another study discovered that nutritional attitude and knowledge scores in mothers are positively related with diet scores of their children (Vereecken & Maes, 2010). Mother's attitudes about fruit, vegetable and protect from cancer risk her child are related positively with fruit consumption of the child (Gibson, Wardle, & Watts, 1998).

In studies where attitudes have been discovered to be better predictors of food choice than was nutritional knowledge (Shepherd & Towler, 1992), the items assessing attitudes were explicitly related to the food choice behavior, while those measuring knowledge were not. The only attitude predicting children's fruit consumption here was particularly explicitly related to the benefits of eating more fruit and vegetables for cancer prevention, but its independent contribution at least suggests that highlighting diet–disease issues may be beneficial. When measures of both knowledge and attitudes were similarly unfocused, knowledge correlated more strongly with consumption of the target foods than did attitudes (Frederick & Hawkins, 1992).

A study done by Liu (2013) to investigate the feeding attitudes, practices and traditional dietary beliefs of Chinese mothers with young children in Australia revealed that mothers' feeding attitudes and practices were associated with children's weight status and mothers' perceptions of picky eating behavior in children after adjusting for a range of sociodemographic maternal and child characteristics. Pressuring to eat and using food rewards method appeared to be negative feeding practices whereas monitoring and restriction of children's food consumption according to food selection may be positive feeding practices in this study (Liu, 2013).

Carine *et al.* (2004) reported that maternal consumption was the only significant predictor for children's fruit, vegetable, soft drink and sweet consumption, herewith supporting the literature on the important role of parents (Carine, Els, & Lea, 2004). Significant parent–child correlations of dietary intake have been found in several other studies (Garn, Cole, & Bailey, 1979; Perusse *et al.*, 1988; Oliveria *et al.*, 1992; De Bourdeaudhuij, 1996; Woodward *et al.*, 1996; Gibson, Wardle, & Watts, 1998; Hannon *et al.*, 2003) and may represent many influencing factors like the role of parents as models for their children's food preferences and eating behavior, but also simply increased availability and accessibility to those items that parents prefer and bring into the home (Fisher *et al.*, 2002).

Permissiveness was related to a higher likelihood of a frequent consumption of soft drinks and sweets. This result suggests a positive effect of restricting children's access to these 'empty calorie' items. Other studies suggest that restricting children's