

CHAPTER 1: INTRODUCTION

1.1 Introduction to Study Area

Kelantan, located in northeastern Peninsular Malaysia is one of 14 states in Malaysia, bordered by Perak (in the west), Pahang (south), Terengganu (southeast) and Pattani province of Thailand (northeast). Kelantan is one of the poorest state in terms of socioeconomic development in Malaysia.

The study areas consist of two predominantly rural districts in Kelantan viz. Pasir Mas and Tumpat Districts. Both districts were chosen because of its poor socioeconomic status and its proximity to Thailand which contributes to difficulty in mainstream development. Both districts share the same border with each other as well as with Thailand in the north. Thus they are identical in almost all aspects of socioculture, health status and development status.

Pasir Mas borders Tumpat district in the north, Tanah Merah (south), and Kota Bharu district (east) and Sungai Golok district, Thailand (West) (<http://www.mdpmas.gov.my>). It has a population of about 206,400 comprising of 96% Malays in an area of 577.52 sq km (<http://ptgpm.kelantan.gov.my>). The district was divided into 10 administrative regions (Alor Pasir, Kubang Gadong, Rantau Panjang, Gual Periok, Kangkong, Chetok, Bunut Susu, Kubang Sepat, Pasir Mas and Kuala Lemal). Most people here are farmers engaged in rice farming, rubber tapping and fruit cultivation and are generally poor, with most living below the national poverty line.

Tumpat District is also among the poorest district in Malaysia, covering an area of 16,800 km² and divided into 7 administrative regions (Wakaf Bharu, Pengkalan Kubur, Tumpat, Sungai Pinang, Terbak, Kebakat and Jalan Besar) (<http://www.kelantan.gov.my>). Most people here work as a fishermen and also farmers

involved in the cultivation of fruits. The total population was estimated at 140,989 (Department of Statistic, 2005). Similar to Pasir Mas, the majority of the population were Malays (91.5%) with a small population of Siamese, Chinese and Indians.

Thus it can be summarised that both these districts share similar sociocultural roots, socioeconomic status and physical infrastructure problems and are among the poorest in Malaysia. This is one of the main reasons why the districts were chosen for the present intervention study, so that any intervention in health promotion would be more beneficial and makes an impact in reducing health and oral health inequities.

1.2 Background of the study.

There are two kinds of malnutrition; one associated with hunger or nutritional deficiency and the other with dietary excess. Urbanization and economic development result in rapid changes in diets and lifestyle. Globalization has a worldwide impact on dietary excess leading to chronic diseases such as obesity, diabetes, cardiovascular diseases, cancer, osteoporosis and oral diseases. Diet and nutrition affects oral health in many ways. Nutrition influences craniofacial development, oral cancer and oral infectious diseases. Faulty diet influences dental caries, developmental defects of enamel, dental erosion and periodontal disease (WHO, 2003).

The health of the oral cavity is critical to nutritional status and thus, general health. Mouth contains different tissues such as membranes, connective tissues, blood vessels, nerves, muscles and bones which can suffer from infection, trauma, degeneration or neoplastic changes (Murray, 2003). Being well-nourished throughout life is essential for the development and maintenance of sound teeth and tissues. On the other hand, if the individual does not have sound teeth and a healthy mouth, they cannot eat properly and may suffer from nutritional disorders (Ehrlich, 1994; Sheiham, 2006). Although the oral cavity is a small part of the body, it has many implications to the rest

of the body (World Health Organization, 1998). Oral diseases have been referred to as the “neglected epidemic” because they affect almost the total population, with many people having new diseases each year (Allukian and Horowitz, 1998).

The human teeth are very important in preparing food for digestion, enhance facial appearance and speech especially in modern society. Meal planning, preparation and eating habits are very different in the 21st century than in the past, which has made our lives unique from previous generations. The concept of family mealtime has changed with the help of food processing technology (eg. frozen dinners), the fast food industry and mass marketing, (Schlosser,2000; Popkin, 2001). Diets rich in sugar and fat has an impact on dental diseases.

Early childhood caries (ECC) is the most common type of oral health problems in young children in many many countries (Dental Services Division, 1995; Oral Health Division, 1998; Pine, 1997; Sheiham 2006). Although the prevalence in westernized countries have decreased in the last few decades (Murray, 1996), more recent findings indicate that dental caries is still high in certain groups of children (California Dental Health Foundation, 2004; Washington State Department of Health, 2004) due to poor diet (Davies, 1998) and bad oral health habits (Berkowitz, 2003). The child is also dependent on their parents for treatment or prevention choices (Jokovic *et al.*, 2003). Family structure also played an important role in the development of dental caries because parental influence can affect the child’s oral hygiene practices and dietary habits (Primosch, 1982).

Despite low mortality rates associated with dental caries, it has considerable impact on self-esteem, eating ability, nutritional status and health (Moynihan, 2003). Ultimately, dental caries and its consequences cause a lot of pain and suffering which affects the quality of life (Sheiham, 2006). The treatment of problematic teeth is

expensive and palliative. On a population basis, cost of dental caries treatment is the most expensive part of the human body (Sheiham, 2001).

1.3 Problem Statement

Caries among young children or ECC is a major public health problem. Glick (2005) reported that 41% of children aged 2-11 years in the National Health and Nutrition Examination Survey (NHANES) of USA in 1999-2002 had primary caries. This prevalence was still unchanged from the previous survey (NHANES) in 1988-1994 where the prevalence and the severity of caries was high. Tinanoff (1998) and Wendth (1995) estimated that the prevalence ECC was estimated at 1% to 12% in the infant population. But for certain communities such as immigrants in Sweden, the percentage of ECC was higher (70%) and most of them came from the lower socioeconomic group. Milgrom *et al.*, (2000) found that the prevalence of dental caries among 6-36 month old children in Northern Mariana Islands, USA was high. About 46.8% of the children had white spot lesions and 39.1% had enamel cavitations.

In less developed countries, the caries experience of young children is generally very high too. In Eastern European countries the mean dmfts of 5-6 year olds ranged from 2.5 in East Germany to 8.5 in Albania. Within the Commonwealth of Independent States, the mean dmft of 5 year olds ranged from 4.4 in Lithuania to 7.4 in Belarus. The caries experience of 4-6 years old children in five urban areas in China ranged from 3.7 to 7.6 (Blinkhorn and Davis, 1996).

Carino *et al.*, (2003), reported the prevalence of ECC in northern Philippines at age 2 years was 59% (dmft 4.2 ± 5.3); 3 years old, 85% (7.4 ± 5.5), 4 years old, 90% (8.8 ± 5.6) and 6 years old, 92% (10.1 ± 5.5). They postulated that the prevalence was high because the children started brushing at a late age, had frequent snacks and had a dental visit for emergency reasons. They suggested that to prevent ECC, there is a need

to increase awareness that ECC is a public problem in developing countries, advocate the use of fluoride as a public health measure and increase access to preventive dental services.

Peretz *et al.* (2003) stated that the effect of ECC can be long term. It will increase the risk for dental problems later in life and interfere with basic social functioning. Acs *et al.*,(1992) and Ayhan *et al.* (1996) added that early childhood caries may also influence optimal growth and development. Data from the Third National Health and Nutrition Examination Survey from 1988 to 1994 (NHANES III), suggested that ECC occurred about twice more frequently in minority children and affect two and half times as many children of less educated parents (ie. those who did not finish high school).

It is important to note that more than a third (36.8%) of poor children aged 2-9 years had one or more teeth with untreated caries (NIDCR, 2000). This high figure was also supported by other epidemiological studies in various Head Start programs throughout the USA and data from other countries such as Netherlands (Truin *et al.*, 1991) and UK (Pitts and Palmer, 1994). Other risk factors of caries include maternal caries experience, low exposure to fluorides, certain dietary and feeding practices, poor oral hygiene and poor oral health knowledge (Krol, 2003).

In Malaysia, about one-quarter (25.2%) of the total population received primary oral health care services. The highest attendances was primary school (3,009,876) compared to preschool children (454,367), secondary school (1,403,451), ante-natal (74,218) and adults (890,837) (Oral Health Division, 2004). The National Oral Health Survey of School Children (Oral Health Division, 1998), consistently found that the Malay ethnic group had the highest caries experience compared to other races (Oral Health Division, 1998). Recent studies in preschool children aged 4-6 year olds by Badariah (2005) in Pasir Mas, Kelantan found that only a few (1.8%) children had dmft

index less than or equal to 3 ($dmft \leq 3$) and only one child was caries-free ($dmft = 0$; 0.4%) whereas 4.3% had the maximum $dmft$ of 20. Each child had on average 12 teeth affected by ECC ($dmft$ 12.2).

Elsewhere in Malaysia, the Oral Health Division, (2007), reported the prevalence of caries-free preschool children (aged 6 years) increased from 16.9% in 1996 to 37.7% in 2005. This means that the target to achieve the National Oral Health goal of 50% caries-free ($dmft=0$) preschool children is still far beyond our reach. If the goals are to be achieved the pockets of population which are most at-risk such as those in Pasir Mas, Kelantan must be effectively prevented and treated.

Jaafar *et al.* (1992) categorized dental care needs into diagnostic, preventive and disease-disability dysfunction oriented needs. He also pointed out that delay in getting dental care is very common and serious in Malaysia. Intervention with more frequent reinforcement visits may be needed to prevent the ECC (Feldens *et al.*, 2007) . However for the ECC problem in Kelantan which affects almost 99% of the preschoolers, an innovative package of intense health promotion and prevention must be designed to make any impact. This is because the current toddlers program does not seem to make much impact and it is almost impossible to treat all the ECC with the existing lack of manpower and inadequate technology. Fillings for deciduous teeth do not last long due to difficulty in getting cooperation from toddlers and preschoolers. In addition, it is also an expensive strategy because the filled deciduous teeth are going to be lost through natural exfoliation anyway. On the other hand, extraction of painful carious deciduous teeth creates a traumatic experience to the child and mother which lasts a lifetime. Thus there is actually very little choice but to design an effective health promotion intervention strategy that is proven effective to prevent ECC.

Tinanoff and Palmer (2003) suggested that to prevent ECC in toddlers, nutrition education and diet counseling should be introduced aimed at teaching parents the

importance of reducing high frequency exposure to obvious and hidden sugars. Feldens *et al* (2007), assessed the effectiveness of home visits on breast feeding, weaning practices, children's nutritional status (anemia, overweight, wasting and stunting) and psychomotor development with oral health. They reported that significantly lower caries prevalence were found in the intervention group which received home visits and dietary intervention (10.2%) as compared to the control group which did not receive any home visits (18.3%). The odds of dental caries was 48% lower for the intervention group as compared to the control group (OR= 0.52, 95% CI=0.27-0.97). Based on these above experiences, it is argued that a health promotion package suitable for the high risk preschool population in Kelantan is urgently needed.

1.4 Rational of the study

In order to gauge the success of a health promotion intervention strategy or package, an incidence or cohort study would be needed. However this will need a long time (at least 3 years or more) to be evaluated because the development of caries can be a relatively slow process. To overcome this drawback, a cross-sectional study on preschool children who are 5-6 years old in the same study district may be used to establish a "proxy" reference data on caries, dietary habits and nutritional status to be conducted in Pasir Mas and Tumpat districts, Kelantan.

It is argued that the oral health and nutritional status measures of the "proxy" population will represent what happens IF the current situation (ie the current toddlers health program conducted by the Ministry of Health) is not applied when they were younger (at age 2 years for example). Thus the "proxy" population oral health and nutritional status will be collected and reported as an outcome measure of the current toddlers health program.

On the other hand, a new oral health promotion intervention package will be designed (packaged as the TIPTOP program) and applied to a population of two year olds who are initially caries free (the intervention group). For control, another group of two year olds who were also initially caries-free, living in another district with similar social characteristics will be exposed to the standard toddlers program conducted by the Ministry of Health. The oral health and nutritional status outcomes of both groups will be assessed at the beginning and at the end of the 18 months intervention study period.

To ensure that both control and intervention groups are comparable at the beginning of the study, the data for proxy population of 5-6 year old were collected and presented as follows:

a). Both districts had comparable levels of dental caries ie. high prevalence and severity.

Tumpang: mean dmft 10.15 (sd 5.047); 3% caries free; 97% prevalence.

Pasir Mas: mean dmft 11.06 (sd 4.78); 1% caries free.; 99% prevalence.

b). Both districts had high prevalence of malnutrition:

Weight-for-age (WAZ)

Tumpang: Underweight/moderate underweight/severe underweight = 49.4%

Pasir Mas: Underweight/moderate underweight/severe underweight = 51.4%

Height-for-age (HAZ)

Tumpang: Stunting = 44.2%

Pasir Mas = 36.7%

BMI-for-age

Tumpang: Underweight = 24.9%

Pasir Mas = 36.1%

The above findings showed that in both locations, the caries experience were much higher as compared to the national average as reported in the National Oral Health Survey of Preschool Children (Oral Health Division, 2007). For instance the mean caries experience in Kelantan (dmft 10.0; sd 4.79) was obviously higher as compared to other states in Peninsular Malaysia and even to Sarawak (dmft 6.4, sd 5.38) and Sabah (dmft 8.3.;sd 5.49).

As noted earlier, oral health is a major contributor to good nutrition. The oral cavity is the pathway to the body, and disturbances in the mouth can profoundly affect diet and nutritional status. Furthermore, the seriousness of the ECC problem and undernutrition / overnutrition could have negative consequences for their health. If no appropriate package of intervention were taken to rectify the factors, there would be an increased incidence and prevalence in this cohort, as evidenced by the “proxy” population of 5-6 year olds.

Therefore, a oral health promotion package of ECC prevention called the “TIPTOP” programme, which was targeted to promote skills of oral care and teaching mothers the importance of reducing dietary exposures to sweet foods and hidden sugars with the ultimate goal of modifying the mothers behaviours and reducing their toddlers risks for early childhood caries and nutrition problem was initiated. In order to identify the effect of the intervention group, a control group which was similar to the target group was enrolled.

1.5 Aim of the Study

To assess the effectiveness of a health promotion intervention program (TIPTOP program) in preventing early childhood caries (ECC), and improving Nutritional Status and Dietary Habits among toddlers in Kelantan.

1.5.1 Specific Objective

1. To establish a proxy baseline data on early childhood caries in preschool children (5-6 years old) by assessing the prevalence of ECC, nutritional status, dietary habits and knowledge, attitude and practices of mothers in Pasir Mas and Tumpat districts.
2. To assess the effectiveness of a health promotion intervention program in controlling ECC and its indirect impact on nutritional status and dietary habits among toddlers (2-3 years old) over a period of 18 months.
3. To assess the effectiveness of a health promotion intervention program in improving the mother's knowledge, attitude and practices (K/A/P) related to ECC among toddlers (2-3 years old).

1.5.2 Hypothesis

The study will develop and test a health promotion intervention package called the **Toddler Intervention Package for Total Oral Health Program** (subsequently referred to its acronym as "TIPTOP" programme).

1. The TIPTOP intervention programme is more effective in preventing ECC as compared to the existing oral health program for toddlers and will also have a positive indirect impact on general health status by improving the nutritional status and dietary habits of the toddlers involved in the program.

2. The TIPTOP intervention program meant to prevent ECC will also improve mother's knowledge, attitude and practices related to ECC among toddlers (2-3 years old).

1.5.3 Research Question

The present study attempts to pose an important research question. Can a health promotion intervention packaged program designed to control and arrest early childhood caries (ECC) have an indirect impact in improving general health status as well?

This may be evidenced by improvements in outcomes in nutritional indices, BMI and dietary habits and practices? This can potentially provide scientific evidence that oral and general health promotion can be successfully integrated.