THE PREVALENCE OF EARLY CHILDHOOD CARIES IN THE SOUTHERN CAPE KAROO REGION

By

T. K. Jacobs

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Supervisor: **Prof. Sudeshni Naidoo**

DECLARATION

I, Theodore Konrad Jacobs, hereby declare that the work contained in this thesis is my own original work and that I have not previously in its entirety or in part been submitted it at any university for a degree.

Signature: .....

Date: .....

ABSTRACT

Heidelberg, Ladismith and Riversdale are towns in the Southern Cape Karoo region.

They are basically agricultural centres, with a few light industries supplying local needs. Of the three towns, Ladismith has the largest population totaling 23,971 people, followed by Riversdale with a population of 13,667 and Heidelberg with the smallest population of 7,322.

Dental caries is a huge problem among the previously disadvantaged population. Early childhood caries is a problem with infants.

In this survey crèches in all three above mentioned towns were surveyed. These crèches were located in the previously disadvantaged populations. A total of 221 questionnaires were handed out to parents to complete. This contained information concerning their knowledge about their children's' oral health and their own personal details. These children were all in the age group 2-5 years. The dmft figures of children whose parents had completed and returned questionnaires were examined on the school premises.

The study findings suggest that parents and parents-to-be, need to be informed on oral health issues concerning their children. This should not solely be the task of dentists but other health care workers as well.

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DEDICATION

This thesis is dedicated to my parents.

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CHAPTER 1: INTRODUCTION

1.1 EARLY CHILDHOOD CARIES

Early childhood caries (ECC) is a destructive form of tooth decay affecting young children. A distinctive pattern of caries in infants and young children, starting in the primary maxillary incisors and often progressing to the deciduous molars, is a clear indication of ECC (Schroth et al, 2005).

As early childhood caries (ECC) is clinically a complex situation to address in a state clinic, it was decided to conduct a survey of the situation in the three towns of Heidelberg, Ladismith and Riversdale. These towns form part of the Southern Cape Karoo region and fall under the researcher's jurisdiction. Oral health services such as extractions and fillings are made available to the public in these 3 towns.

Of the above-mentioned towns only Riversdale has dentists in private practice of which 3 practice full time. Heidelberg and Ladismith are attended to solely by the researcher, a state employed dentist. Riversdale state patients are also cared for at the clinic situated in Riversdale.

This survey included examining pre-school children at the local crèches and presenting the parents with questionnaires to obtain knowledge of their insight regarding problems of ECC and the parents' social background.

1.2 ORAL HEALTH IN HEIDELBERG, LADISMITH AND RIVERSDALE

Heidelberg and Riversdale form part of the Langeberg Municipality and Ladismith falls under the Kannaland Municipality. The population of Heidelberg is 7,322, Ladismith 23,971 and Riversdale 13,667. This area is part of the Southern Cape Karoo Region.

Caries is a huge problem in this area among the whole spectrum of adult, children and infants. Therefore it would seem sensible to try and address this problem at as early an age as possible and to educate parents about the causes and risk factors.

To evaluate their knowledge concerning tooth decay a questionnaire was proposed to get an insight as to their understanding of this topic.

1.3 AIMS AND OBJECTIVES

The aim of the study was to determine the prevalence of ECC among 2-5 year old children in the Southern Cape Karoo areas of Heidelberg, Ladismith and Riversdale.

The study objectives were:

i) to evaluate the caries experience of the children

ii) determine feeding patterns and

iii) determine knowledge of parents with regards to caries oral hygiene and feeding habits.

CHAPTER 2: LITERATURE REVIEW

2.1 INTRODUCTION AND DEFINITION

The first description of caries in infants was done in 1962 by Fass who used the term “nursing bottle mouth”. Other terms since then have been used such as “night bottle mouth”, “nursing caries” and “baby bottle tooth decay” (Tinanoff, 1998; Reisine and Douglass, 1998). This term is used when caries is first noticed, until the age of 5 years. When ECC is associated with the bottle habit, it has been characterised as first affecting the primary maxillary anterior teeth, followed by involvement of the primary molars. Mandibular incisors are generally not affected, reportedly due to the child’s tongue in the sucking position protecting these teeth from the cariogenic effect (Ripa, 1988; Seow, 1998).

At a workshop, convened by the National Institutes of Health (NIH) in 1999, it was proposed that the term (ECC) be used to describe the presence of one or more decayed, missing (because of caries) or filled tooth surfaces on any primary tooth in children up to 71 months of age (Drury et al, 1999)

The American Academy of Pediatric Dentistry (AAPD) now defines ECC as the occurrence of at least one primary tooth affected by decay in a child under 6 years of age (AAPD, 2004), whereas the presence of at least one carious lesion affecting a maxillary anterior tooth in pre-school children may be classified as ECC (Gussy, 2006).

The term “baby bottle tooth decay” is easily understood by non-professionals and, therefore, is useful in a program that educates parents about this condition.

2.2 PREVALENCE

Dental decay has become a significant health problem in some underdeveloped countries, in contrast to developed nations where the problem has decreased (Du et al, 2000). Increased urbanisation and rapid changes in food customs are probably contributing factors to this deterioration in dental health in the developing countries (Maupomé, 1998). While the prevalence rate is from 1-2% in developed countries, in developing countries and within disadvantaged populations of developed countries (immigrants, ethnic minorities), the prevalence rate is as high as 70%. Of all the provinces in South Africa, the Western Cape Province had the highest prevalence of dental caries for age groups 4-5, 6, 12 and 15 years and the Limpopo Province the lowest (Van Wyk, Louw and Du Plessis, 2004).

Table1: Percentage distribution of care needed and the mean number of teeth needing care for dental caries per age group and province in South Africa (Van Wyk et al, 2004).

Age group	4-5*		6*		12		15	
	% children needing care	Mean number of teeth	% children needing care	Mean number of teeth	% children needing care	Mean number of teeth	% children needing care	Mean number of teeth
Weighted national mean	**45.6**	**2.1**	**59.1**	**3.00**	**45.3**	**2.6**	**49.9**	**2.9**
Western Cape	73.2	3.9	86.3	5.24	80.5	5.3	85.2	6.2
Northern Cape	54.4	2.5	72.9	4.05	57.4	1.84	62.2	2.79
Eastern Cape	59.7	2.7	66.6	3.17	38.5	0.94	49.7	2.33
Free State	43.7	2.07	65.9	3.11	58.2	5.87	66.6	4.63
KwaZuluNatal	43.0	1.4	62.3	3.15	52.3	3.23	59.0	3.74
Gauteng	33.6	2.0	62.5	2.8	61.6	4.0	47.1	2.7
North West	36.9	2.2	39.6	2.4	29.8	2.1	31.3	2.6
Mpumalanga	30.1	0.8	51.3	3.0	39.2	1.8	44.9	1.9
Limpopo			35.5	1.5	14.1	0.4	24.1	0.8
*Primary Dentition								

Related factors

It has been noted that the financial status of parents, is related to levels of diseases in populations. It was found that children with parents in the lowest income category had mean DMFT scores four times higher than those with parents in the highest category (Weinstein, 1998). The level of caries experienced in developing countries is dependant on the availability of sugar in the country concerned (Peters, 1994). A child's difficulty with chewing because of poor teeth, may lead parents to rely on sugary soft drinks and juices as the primary source of calories for the child, a practice that exacerbates the child's dental decay (Maupomé, 1998). Lopez-Del-Valle et al (1998) noted that what mothers reported to stop their babies crying at night was related to the caries problem. Mothers who reported that they gave their babies a bottle or nursed them had children with significantly more disease than those who reported they held, rocked, talked or distracted their children. Breastfed babies were also at greater risk for caries.

2.3 CLINICAL APPEARANCE

The teeth are affected in the way they erupt (Peters, 1994). Babies as young as eleven months are at risk of a distinctive pattern of severe tooth decay (Lee et al, 1994). The maxillary incisors are usually the most severely affected, while the mandibular incisors are usually unaffected (Koroluk and Riekman, 1991). The maxillary and mandibular first molars can also be involved to a lesser extent, while the maxillary and mandibular second primary molars are involved to a lesser degree (Schroth et al, 2005). Explanation for this pattern of caries distribution is based on the pooling of milk or sweetened liquid from the nursing bottle around the maxillary incisors and other teeth, while the mandibular incisors are physically protected by the tongue (Hattab et al, 1999). This liquid is normally high in

fermentable carbohydrates and the lack of salivary flow during sleep favours the situation for caries to progress (Cook et al, 1994).

ECC is a particularly severe rampant form of caries – it begins on tooth surfaces which are usually only affected to a minor extent, such as the labial, lingual and proximal surfaces of primary maxillary incisors, soon after the teeth erupt (Davies, 1998). The disease has a predictable progression; at first white spots appear on the teeth – these are usually decalcified lesions and may progress to frank lesions or caries, usually within six months to a year (Lee et al, 1994). The maxillary incisors may also initially develop a band of dull white decalcification along the gum line that goes undetected by the parent.

However, as the process progresses, the white lesions develops into dark brown or black collars of decay, which girdle the necks of the teeth (Ismail, 1998). In advanced cases the crowns of the 4 maxillary incisors may be destroyed completely, leaving decayed black root stumps (Ripa, 1988). Sometimes decalcification occurs interproximally, but occur mostly cervically in a circular pattern and creates and area for the retention of dental plaque (Veerkamp and Weerheijm, 1995).

Decalcification lesions will not necessarily progress to cavities. The process may be reversed and the teeth may remineralise (Lee et al, 1994). If allowed to progress to an advanced state, ECC can lead to pain, infection, tongue thrusting, abnormal swallowing habits and speech difficulties (Koroluk and Riekman, 1991). Failure to seek early treatment can result in rampant caries with subsequent pulpal

infection, abscess formation and eventual complete destruction of the deciduous dentition by the age of 30 months (Peters, 1994).

There are generally four stages of nursing bottle caries, which are described as follows:

1. Initial stage
2. Carious stage
3. Deep lesions
4. Traumatic stage

1. Initial stage

Cervically and sometimes interproximally, the maxillary anterior teeth display chalky white decalcifications. This is a difficult stage to identify, as lesions are difficult to detect. In this stage pain and toothache does not occur.

2. Carious stage

Due to the lesions extending into the dentin of the maxillary anterior teeth, discolorations are seen. This is a rapid process. Parents normally are aware of the discoloration on the labial or lingual surfaces and sometimes interproximally. Children normally start complaining about toothache when cold foods like ice cream are ingested.

3. Deep lesions

Lesions in the maxillary anterior teeth are larger (Veerkamp and Weerheijm, 1995). Depending on how often the sweetened comforter is used and on its

concentration, this stage could be reached in fourteen months. The first primary molars are affected; the 54 and 64 are in the second stage, and the 74 and 84 have initial lesions. Depending on the factors above, lesions can be seen in 53 and 63. Complaints of pain during toothbrushing or eating, especially when biting, are frequent. Pain with hot or cold drinks is common and lasts for several minutes.

4. Traumatic stage

Starting with the maxillary incisors, the teeth become so weak that small forces can cause them to fracture. Often only roots remain. A diagnosis of nursing-bottle caries is almost certain at this stage. The maxillary molars show pulpal problems and the maxillary incisors have become non-vital in most cases.

5. Arrested caries

By eliminating caries in the above stages, arrested caries may occur. During the full or partial remineralisation, the lesion might get a typical dark-brown-to-black appearance (Veerkamp and Weerheijm, 1995).

2.4 AETIOLOGY

An ecological environment conducive to caries is necessary for caries to develop (Reisine and Douglass, 1998). Caries in young children affecting the maxillary anterior teeth, is often attributed to the use of a sweetened comforter (Veerkamp and Weerheijm, 1995) or an at will breastfeeding regimen (Ripa, 1978). When using a bottle filled with sugared juices, a baby's teeth are constantly exposed to fermentable carbohydrates (Van Everdingen et al, 1996). Thus, caries is a result

of improper nursing-bottle habits and nighttime feeding or prolonged unrestricted bottle and breastfeeding (Lamis and Hamdan, 2002). Nursing caries has also been associated with inappropriate breastfeeding patterns, such as frequent and prolonged feedings once teeth have erupted (Goepferd, 1986).

Oral clearance of carbohydrates is lowest during sleep, as salivary flow decreases and increases the contact between plaque and substrates, thus increasing the cariogenicity of the substrate significantly. Intra-oral site differences in rates of oral clearance are probably related to saliva velocity at different sites in the mouth. It seems that clearance of glucose is slowest on the labial surfaces of the maxillary incisors and the buccal surfaces of the mandibular molars. These site differences in oral clearance may explain, in part, the distribution of the carious lesions in ECC (Seow, 1998).

Schwartz et al (1993) conducted a survey to determine the relationship between infant bottle drinking patterns and ECC. The sleeping habits of the child and the contents of the bottle were evaluated. The results indicate that children who fell asleep while feeding from the bottle had significantly more cases of ECC than did children who discarded the bottle before falling asleep. Children who discarded the bottle before falling asleep, however, had more cases of ECC than did children who were not given the bottle at all at bedtime.

There appears to be little doubt that the prolonged and inappropriate use of the nursing bottle in the susceptible infant will result in rampant caries in the primary dentition (Ayhan, 1996).

2.5 CARIES MECHANISM

The bacterial flora and host defense systems in the young infants are in the process of being established. Tooth surfaces are newly erupted and immature and may show hypoplastic defects. Thus in ECC there may be unique risk factors in young children and infants (Seow, 1998).

Caries development is dependant on the following factors:

1. Susceptible tooth and host
2. Fermentable carbohydrate diet
3. Microflora
4. Time (Reisine and Douglass, 1998)

For dental caries to develop, teeth must be present. Implantation of *S. mutans* can occur only when teeth are present, because the teeth provide anon-shedding surface for colonisation of the micro-organisms. The amount of *S. mutans* depends on the number of erupted teeth present in the infant's mouth (Ripa, 1988). Oral levels of these bacteria, which are generally acquired from the mother, were found to be elevated in children with ECC (Tinanoff and O'Sullivan, 1997).

The progression of lesions is rapid and this is a result of the enamel in primary incisors being very thin. However, the main reason for lesion development is the presence of *S. mutans* and fermentable carbohydrates (Du et al, 2000).

Some time after eruption, newly exposed enamel surfaces undergo the final stages of post-eruptive maturation and hardening. This period immediately after

eruption and prior to final maturation, is when the tooth is most susceptible to caries. The presence of structural developmental defects in enamel may increase the caries risk. These defects may manifest as partial or total loss of enamel (hypoplasia). Enamel defects in the primary dentition have been associated with a variety of causes, such as hereditary diseases to acquired pre-natal, peri-natal and post-natal conditions such as birth prematurity and low birth weight, infections, malnutrition metabolic disorders and chemical toxicity. Trauma and infections are also responsible for many localised defects (Nunn et al, 1992).

Irregular surfaces such as pits and grooves lead to plaque retention, increased *S. mutans* and decreased elimination of carbohydrates. Dentin, when exposed, provides little resistance to acid attack (Seow, 1988).

2.6 FERMENTABLE CARBOHYDRATE DIET

The formation of dental caries is associated with the carbohydrate component of the diet. Oral micro-organisms, especially *S. mutans*, utilise certain carbohydrates to form a sticky matrix that enables them to adhere to the teeth. Organic acids are formed from the carbohydrates, which demineralise the teeth (Lamis and Hamdan, 2002). The frequent consumption of soluble carbohydrates therefore as well as their prolonged contact with tooth surfaces are highly significant risk factors (Dimitrova et al, 2002).

The major cariogenic food in the human diet is sugar (sucrose) (Ripa, 1988). Children who receive bottles containing sweetened milk or other sweet drinks have a higher prevalence of maxillary anterior caries than those whose bottles contain only milk or water (Reisine and Douglass, 1998). It appears that the frequency of

intake of sucrose is more important than the total amount consumed (Gussy et al, 2006). Children in Jordan had a high caries prevalence associated with high sugar consumption, due to cake and confectionery (Sayegh et al, 2005). The use of comforters dipped in sweet substances such as honey is a risk factor (Dimitrova, Kuleva and Kondeva, 2002). Reductions in sugar availability due to sanctions were related to marked caries reductions in Iraqi children over a 5 year period (UN Sanctions) (Jamel et al, 2004).

Bovine and human milk contain the carbohydrate lactose, which enhances the oral implantation of cariogenic bacterial and demineralise tooth enamel when acted upon by bacteria. After frequent use of either lactose or milk, acid production in dental plaque increases (Du et al, 2000). Although breast-feeding is essential in providing the best possible nutrition to infants, frequent breast-feeding at night and on demand after eruption of teeth may be implicated in contributing to the development of early childhood caries (ECC). This is a highly controversial topic and one in which there is considerable conflict and confusion (Gussy et al, 2006).

However, milk is a complex fluid, and, in addition to its potentially cariogenic lactose content, it contains ingredients that may protect against caries. One of these contents is casein, which could provide a protective organic coating on the enamel surface. The mechanisms of protection by milk appear to work through first, decreasing demineralisation and increasing remineralisation of enamel, probably through easing the calcium and phosphate concentrations in play, as well as increasing the acid buffering capacity of plaque through catabolism of the peptides by plaque bacteria (Seow, 1988).

Studies by Erickson and Mayhari (1999) have shown that milk is slightly acidogenic in plaque, but less acidogenic that the same amount of lactose or sucrose alone. Human milk contains nearly twice as much lactose as bovine milk and producing a greater drop in plaque pH and therefore greater enamel demineralisation or decalcification.

However, studies *in vivo* demonstrated that the plaque pH was still above 6.0, therefore, the cariogenicity of milk could not be that destructive. Although soy-protein is lactose free, it contains carbohydrates, which is mostly sucrose (Seow, 1998).

Fruit juices and carbonated beverages have also been implicated in children diagnosed with nursing caries. Fruit juices naturally contain a sugar (fructose) and are intrinsically acidic. Carbonated beverages may have a sugar sweetening agent (frequently fructose) and an acid pH. When fruit juices are involved in nursing caries, erosion may be the primary enamel change preceding rampant caries. Both fruit juices and carbonated beverages lead to a significant decrease in plaque pH (Du et al, 2000).

2.7 MICROFLORA

The micro-organisms responsible for dental caries can be transmitted from one individual to another. Studies by Ripa (1988) have shown that the transmission is usually from the mother. Saliva is the vehicle by which the transfer occurs. If the mother uses her own spoon to feed the child, she may introduce several hundreds of micro-organisms into the child's mouth. Objects such as glasses and forks, which the mother had in her mouth, may harbour these micro-organisms for

several hours. Infants also often put their fingers in their mothers' mouth and then their own (Goepferd, 1986).

The early colonisers of these micro-organisms are mainly *streptococci*, namely, *S. sarguis, S. oralis* and *S. mitis*. The main bacteria implicated in ECC are of the group now termed "mutans streptococci" of which the species *S. mutans* and *S. sobrinus* are the most commonly observed. The majority of studies have shown that infants harboured *S. mutans*. Mutans streptococci produce large amounts of acid, especially lactic acid, which are potent in causing tooth demineralisation (Ayhan et al, 1996).

Attachment of the *S. mutans* is now thought to be independent of sucrose and mediated by adhesions on the bacterial surfaces interacting directly with the salivary proteins, which form the pellicle on the tooth surface. *S. mutans* are usually not cultured from the oral cavity prior to the eruption of teeth. The organisms are first detected when the first primary teeth emerge into the oral cavity or when obturators for palatal clefts are inserted. *S. mutans* increases with age as well as the number of teeth in the infant's mouth. It is felt that the earlier the colonisation of organisms, the higher the caries risk. Caries as an infectious and transmissible disease is amenable to prevention by interfering with the chain of transmission or by suppressing the mutans streptococci (Newburn, 1992).

2.8 TIME

Time is an important factor in the development of ECC in relation to the frequency and amount of exposure of the liquid. It is reported that children with ECC use a bottle, breast or pacifier 8.3 hr/day compared to only 2.2 hr/day for children without

caries. The frequency of contact of the substrate has a major role in cariogenicity during a 24-hr period. When milk is taken frequently over a period of 4 to 6 weeks, there is a greater decrease in plaque pH from subsequent milk ingestion (Ripa, 1988).

Time is also an important factor to the duration of the habit of using a bottle, breast, or pacifier and this will affect both the severity of the lesions and the number of teeth involved. Reports of caries in breast-fed infants state not only that the breast was available on demand, but in most instances that the child slept with the mother so that nursing could continue at will during the night (Hattab et al, 1999). In Jordan it was found that mothers from less advantaged backgrounds were more likely to breast-feed their children than mothers from advantaged backgrounds (Savegh et al, 2005).

2.9 OTHER POSSIBLE RISKS

2.9.1 Socio-economic factors

Tinanoff (1997) suggested that socio-demographic factors might have an effect on caries risk with children of higher social classes having lower caries levels. Children from disadvantaged groups have the lowest levels of dental health. Income and education were inversely associated with early childhood caries (Psoter et al, 2006). A relationship between a population's level of socio-economic development and dental caries has often been assumed. Countries with socio-economic transition were found to have the highest DMFT scores (Lalloo, Myburgh and Hobdell, 1999). Research on Flemish preschool children found that caries was 2.5 times greater among socio disadvantaged children than socio advantaged

children (Vanobberge, 2001). Disadvantaged children in the USA from Hispanic and African-American parents had high caries prevalence (Albert et al, 2002).

The following families are typical of having children who may develop caries:

- Families where relationships are complicated.
- Parents who fail to pay adequate attention to their children.
- Young parents who are ill-equipped to bring up their children.
- Families where children watch television daily for hours.
- Frequently feeding children with sweets.
- Using sweets to comfort the child during tantrums.

(Weinstein et al, 1996; Lopez-Del-Valle et al, 1998).

Parents' previous poor dental health history and dental hygiene habits also had associations with the child's poor oral health (Matilla, 2000). Mothers' attitudes made a great difference towards oral health in the mean dmft levels (Maheejabeen et al, 2006).

Blinkhorn (1994) mentioned that mothers form deprived areas gave their children sweets after nursery school, while mothers from non-deprived areas preferred savoury foods or fresh fruit. Both caries experience and frequency of sugar consumption was highest among children of less well-educated parents (Kiwanuka et al, 2004). Socio-demographic conditions played a role in tooth decay. It was found that where parents were less educated and older, caries was more prominent (Namal et al, 2005). Income of a lower degree and lack of education were inversely associated with ECC (Psoter et al, 2006).

Studies have demonstrated that lower-income families have more fatalistic beliefs about health, leading to less self-care and lower utilisation of preventive health services. The availability of dental care in low-income areas is often limited (Reisine and Douglass, 1998). Petersen and Lennon (2004) predicted that the prevalence of caries will increase in Africa due to changing living conditions and dietary habits.

2.9.2 Malnutrition

Horowitz (1998) stated that children who are malnourished pre-, peri- or post-natally and/or who are of low birth weight are likely to have hypomineralised or hypoplastic primary teeth. These teeth have a higher risk than normal of becoming carious and are more susceptible to mutans streptococci colonisation.

Tinanoff (1997) stated that children with ECC were shown to weigh less than 80% of their ideal weight. The pain or infections associated with ECC make it difficult for affected children to eat. Alternatively, poor nutritional practices may be responsible for both the reduced body weight and caries.

A child who has poor oral health is not a healthy child, and efforts to improve child health without addressing oral health needs, are certain to fail (Johnsen, 1998). The risk of developing diseases of the mouth increases when nutritional health is compromised, masticatory efficiency is depressed, oral cleansing is neglected and sugar and starches are consumed in excess (Falco, 2001).

2.9.3 Genetic Factors

The presence of bacteria and carbohydrates are necessary for caries to develop. Whether this actually happens depends upon the inherited or acquired resistance of the teeth (Davies, 1998).

2.10 PREVENTION

ECC prevention has focused on educational programs to alter children's feeding practices, and to reduce levels of mutans streptococci infection (Tinanoff, 1997).

The mineral of dental hard tissue is an impure form of hydroxyapatite (HA), $Ca_3(PO_4)_3OH$. Fluoride has a strong affinity for apatite, because of its small ionic and strongly electronegative character. Two kinds of fluoride/apatite interaction occure; incorporation into the crystal lattice and binding to crystal surfaces. When incorporated into the apatite crystal lattice, F^- ions replace OH^- ions. Fluorapatite (FA), $Ca_3(PO_4)_3F$ is more stable than HA. The rate at which caries lesions progress is clearly heavily dependent on the rate at which the apatite crystals dissolve. It has been shown that the dissolution rate can be reduced by fluoride. This effect is the basis for topical fluoride treatments (Shellis and Duckworth, 1994).

Primary prevention must begin in the pre- and perinatal period and should consist of advice on maximising the nutrition of pregnant women during the last trimester of pregnancy and of infants during the first year of life when the enamel is undergoing maturation. There are other preventive measures that can be applied during this period. They include water fluoridation, or in its absence, the administration of fluoride supplements (Davies, 1998). Many developing countries

in the Americas do not have the resources to fluoridate water. Salt fluoridation was introduced and found to be comparable to water fluoridation (Gillespie and Baerg, 2005). Supervised regular use of fluoride mouthrinse and rinsing at certain intervals resulted in the reduction in caries increment in children (Marinho et al, 2003). Another cheap fluoridation alternative could be salt. This has shown to be just as effective as water fluoridation (Marthaler, 2005).

The knowledge and skills of the mother about her own dental status, about self-care and about proper care of the child, are all areas of behavioural concern. Culture and family structure determine feeding behaviours after the baby is born. These are the behaviours that most clinicians have tried to change with little success (Milgrom, 1998).

Evidence was presented that educating parents in preventive methods alone has little long-term effect in reducing the prevalence of the disease. Even when informed about the cause of the condition, many parents are resistant to the message (Ripa, 1998; Tinanoff, 1997). Counseling is needed to help change parenting practices. This should include listening to the parents and understanding their life circumstances, discussing options to reduce risk and suggesting behaviour change strategies (Weinstein, 1998).

Nursing caries is the result of improper parenting. Feeding habits that produce carious destruction of the teeth are used to keep children pacified. Other methods with detrimental consequences would also be applied, e.g. using sweetened beverages in cups, or feeding infants with biscuits or sweets (Febres et al, 1997).

An analysis of the child's diet should be performed to identify other cariogenic food habits and steps should be taken to correct them (Ripa, 1988).

Weinstein (1998) identified patterns of parenting practices for different cultural groups and for single- and two-parent families. This study found that feeding practices evolve over time and that previous feeding practices are related to future feeding behaviours. Single parent status and childcare provided by others were found to affect parenting practices (Antunes et al, 2002). Factors most associated with increased caries activity included low maternal education and increased family size (Schroth and Moffat, 2005).

Attitudes and knowledge of pregnant women may be deficient and unfavourable toward preventive dental practices (Low et al, 1999).

The State of Texas, USA, implemented a campaign to educate expectant and new mothers, especially teenagers, to recognise white spot lesions and to teach them what to do about the lesions and to work with dental schools to initiate training programs for students and graduates in techniques for early intervention of ECC. The state of Vermont has broadened the target group of health care providers to include paediatricians, since infants are more likely to be seen by them (Horowitz, 1998).

Edelstein (1998) suggested that policy should classify ECC as a paediatric, rather than a dental problem. Due to their size, stature and history, the child welfare and child health communities may be far more influential in promoting an ECC agenda than the dental communities, which can better offer technical expertise.

Policy must recognise that traditional surgical interventions hold little promise compared with behavioural and medical interventions. Behavioural interventions tend to have cultural overtones. ECC policy must therefore address cultural constraints and make a relative valuation of competing demands on individuals and their families (Weintraub, 1998).

Programs must be community based and performance must be measured at the community level. Policy for ECC must similarly require that programs be community based and able to demonstrate their impact at the community level. The need for properly trained personnel is essential. Social as well as technical approaches to health promotion and disease prevention, are all domains which need to become familiar to existing and new dental health professionals for ECC to be successfully addressed (Edelstein, 1998).

It is important for pediatricians, family physicians and other health service providers encountering very young children and expectant mothers to be aware of ECC and its causes, as their education efforts represent the first line of defense (Schroth et al, 2005).

2.11 TREATMENT

A survey conducted in South Africa found that in 80% of children 4-5 year olds caries went untreated. This was represented of both the private and public sectors (Van Wyk et al, 2004).

Table 2: The prevalence of dental caries and untreated caries by age group and province in South Africa (Van Wyk et at, 2004).

Age group	**4-5***	
	% Caries	% Untreated caries
Weighted national mean	**50.6**	**46.6**
Western Cape	77.1	72.0
Eastern Cape	58.9	53.7
Free State	60.1	57.8
KwaZuluNatal	52.4	50.8
Gauteng	49.1	37.6
North West	41.0	39.5
Mpumalanga	40.2	35.1
Limpopo	31.3	30.8
*Primary dentition		

The treatment of children with nursing caries depends upon the extent of the lesions, the age and behaviour level of the child and the degree of co-operation of the parents. The first step in treating children with nursing caries is to identify the habit and eliminate it (Ripa, 1988).

The treatment of ECC is multi-factorial, involving the child's parents, dental team and other health care providers to ensure the restorative dental treatment is supported by parental education in caries prevention, oral hygiene and infant nutrition (Ayhan, 1996).

Rugg-Gunn (1994) stated that many dental education programmes have included advice to reduce the frequency of intake of foods and drinks sweetened with sugar. Two other factors needed for good oral health is to brush teeth regularly with fluoride toothpaste and to visit a dental professional regularly.

In the coastal areas of South Africa the drinking water is mostly of surface origin and the fluoride content very low (Van Wyk et al, 2004). A study done in New Zealand among 5 and 12 year old children living in fluoridated and non fluoridated areas, showed that those in fluoridated areas had less caries prevalence and severity (Lee and Dennison, 2004). It is not claimed that the use of fluoridated toothpastes has been wholly responsible for the improvements in prevalence and severity, but it seems likely that the surge in improvement in the decline in caries in South Africa over the past 20 years can be due to the marked increase in their use (Van Wyk et al, 2004).

Very low fluoride levels (<0.1 ppm) were found in all nine provinces of South Africa, while the Western Cape Province had the largest number of municipalities with these low fluoride levels (Grobler et al, 2006).

According to the Cochrane Database system Review, fluoride toothpastes in comparison to mouthrinses or gel appear to have a similar degree of effectiveness for the prevention of dental caries in children (Marinho et al, 2004).

If lesions are identified while still in the early or “white spot” stage, within minimal or no loss of enamel surface integrity, it is theoretically possible that they can be arrested. Parents must be taught how to clean their child’s teeth with fluoride toothpaste. The surfaces of the teeth should be carefully scrubbed after each feeding. It is desirable to brush the fluoride toothpaste over the surface of the white spot lesions, thus incorporating fluoride into the white spot areas, promoting remineralisation and rehardening of the enamel surfaces (Ripa, 1988).

Topical fluoride application may be a viable option, especially when targeted at children with carious maxillary incisors. Children should also participate in a school-based fluoride mouthrinsing program (Lopez-Del-Valle et al, 1998). Minimal intervention restorative techniques such as atraumatic, restorative treatment (ART) is useful to decrease the trauma to both child and parent (Horowitz, 1998). ART techniques for caries are available, such as placement of glass ionomer cements that my not require the use of local anaesthesia or a dental handpiece (Weinstein, 1998).

When cavitation has occurred, more definitive treatment is required. Early stages of cavitation can be treated with restorations. Advanced stages will require more complicated measures such as polycarbonate crowns for the anterior teeth and stainless steel crowns for the posterior teeth. Depending on the extent of the lesions, pulpotomies or extractions may be indicated. Some of the above mentioned treatment would not be achievable in underdevelopment countries with financial constraints and lack of manpower (Whelton and O'Mullane, 1997).

Robert and Sheiham (2002) analyzed whether a developing country such as Nepal would have sufficient funds to treat dental caries in children. They found that even though the caries levels are low and most of the caries occurred on the occlusal and buccal/lingual surfaces, more than 90% of the caries remained untreated. It was then calculated that to restore the permanent dentition of the child population using traditional amalgam restorations would cost between U$ 1,618 per 1,000 children. This amount exceeded the available resources for the provision of an essential public health care package for the children of Nepal.

Orienting the parent to dental care includes teaching that disease and painful treatment are not inevitable, that primary teeth are important, that regular visits are needed and that dental providers really care about the children and the family. Preparing for dental care consists of reminding parents not tell the child scary dental stories or threaten punishment for non-co-operation and recommending a good night's sleep, and clean teeth before coming to the dentist (Weinstein, 1998).

Along with nutritional factors, a comprehensive approach to preventing dental caries in preschool children must include good oral hygiene, appropriate use of fluoride and access to preventative and restorative dental care (Tinanoff, 2005).

2.12 DENTISTS' ATTITUDES

Highly motivated and trained dentists working in the public sector can successfully increase rates of preventive care for infants (Milgrom, 1998).

Milgrom (1998) mentioned that in Washington State, USA, 300 interviewed dentists said that about one-third of their patients were children. Yet, less than one in three dentists felt that it was appropriate to provide care for babies and small children.

Dentists and other dental personnel must master the behavioural skills needed to manage young children. They must also become familiar with and trained in the use of pharmacological and restorative procedures, such as fluoride varnishes, fluoride rinses, sealants and glass ionomer restorations. In addition, skills in establishing rapport and trust with adults with previous aversive dental experiences are necessary (Weinstein, 1998).

Oral hygienists are used as first-line personnel in child dental care in Norway, and have increasing influence on the delivery of dental services (Wang, 2005). At the same time we need to take a broader view on the employment of dental and medical auxiliaries to screen infants and young children, as well as to apply control measures such as fluoride gels or varnishes (Davies, 1998).

Many dentists currently are not comfortable with examining young children and would benefit from didactic and practical training (Lopez, 1998).

According to Weinstein (1998), dental schools and other dental training programs give very little or no exposure to pre-school children. Public health clinics, where the disadvantaged are most often treated, focus most of their resources on providing impersonal, emergency services. Patients experience little trust and comfort, but much fear and pain. Additionally, personnel in such clinics may be inexperienced and may not follow clinical protocols. They choose whom they work on and what procedures to use, often being accountable only for the number of completed procedures.

CHAPTER 3: RESEARCH DESIGN AND METHODOLOGY

3.1 INTRODUCTION

The study design, inclusion, exclusion and sample criteria will be discussed in this chapter. The development, data analysis and oral examination procedure are also described.

3.1.1 Study Sites

The study used 5 crèches situated in Heidelberg, Ladismith and Riversdale: two in Heidelberg, two in Ladismith and one in Riversdale. These 3 towns, and thus the 5 crèches, fall under the jurisdiction of the researcher. They form part of the patient spectrum. Therefore it was needed to target them. However the caries prevalence reflected here in the research represents a small portion of the paediatric population and not necessary the caries condition of the rest of the Southern Cape Karoo Region. All 5 crèches are partly privately owned and located in previously disadvantaged areas. These crèches receive a daily allowance of R4-50 per day per child from the Provincial Administration Western Cape. Parents contribute R50 per month fees. Teachers receive training in Oudtshoorn, Western Cape at the Western Cape Education Department. Meals are provided daily. Breakfast consists of porridge, and lunch a cooked balanced meal. Children do also bring their own snacks with to school. This normally includes sweets and cooldrink. The parents or guardians were from a low socio-economic background, and children with dental problems attend public clinics. Attendance at these clinics is high and treatment needs are not always met.

3.1.2 The Sample

A total number of 221 children attended these 5 crèches. Children aged 2-5 years old were included in the study. All children in this age group (2-5 years) present at school on the specific day, where given a questionnaire to take home to their parents to complete. The schools are pre-primary schools and only generally accept children in the age 2-5 years of age. Therefore it was decided to target this group.

3.1.3 Questionnaire

A structured questionnaire was designed to collect data. The data capture sheet was to be clear and simple to allow for minimal potential errors from the researcher and the parents. In general information obtained from the questionnaire related to parents/guardians knowledge concerning their children's oral health, eating habits and information relating to parents/guardians

The questionnaires were designed to:

- Suit the study aims
- Be clearly understood and interpreted
- Keep errors from respondents to a minimum
- Allow an honest reply from respondents
- Interpret data efficiently
- Evaluate oral health knowledge
- Enquire about teeth and brushing habits
- Enquire about eating and drinking habits
- Evaluate information concerning parents/guardians

The questionnaire was in Afrikaans due to the language spoken by the population questioned.

3.1.4 Oral Health Status Assessment

For the purpose of the study, the data gathered was divided into 2 sections:

i) clinical examination – extra oral assessment, intra oral assessment, enamel opacities/hypoplasia, dental status and treatment needed.

ii) General information: name, gender, date of birth

Oral examinations were carried out by the researcher and the oral hygienist. A normal standard chair was used at each school. Where possible natural light was used by placing children close to the entrance door or window of the classroom. Plane mouth mirrors were used.

The oral hygienist completed the forms by filling in the details. Mirrors were sterilized in a portable autoclave during use on the children to prevent any possible cross-infection.

The dmft, decayed, missing and filled teeth indices were used to determine dental caries. The dmft is referring to the primary and DMFT to the secondary dentition. As the age group ranged from 2-5 years old, the DMFT index was excluded. The examination proceeded in a systematic manner. The first, second, third and forth quadrants were examined in that order. A tooth was considered present in the mouth when any part was visible (WHO, 1997).

Only children present on the day of examination who returned their questionnaires, were examined. This figure related to 142 subjects.

3.1.5 Piloting the Data Capture Sheet

Prior to the study, the author and the oral hygienist, a state employee, examined 10 children at the Heidelberg crèche.

The aim of the study was:

- To test how long each examination took
- To become acquainted with the WHO questionnaire
- To get the author and oral hygienist acquainted in working together
- To see that all relevant examinations were practical to carry out under prevailing conditions.

Ten questionnaires were handed out to parents at Heidelberg and Riversdale clinic. This was done to test the clarity of the questionnaire.

After the trial examinations and ten sampling questionnaires, problematic areas in the questionnaire were identified and revised. A final draft of the questionnaire was then completed.

3.1.6 Codes

0 Sound crown

If no evidence of treated or untreated clinical caries was present, a crown was recorded as sound. Hard white spots and stained areas that were not soft to touch with a CPI probe, were considered sound.

1 Decayed crown

A pit, fissure, lesion or smooth surface with a cavity was recorded as caries. This again was also confirmed with a CPI probe.

2 Unerrupted tooth

A tooth was considered unerrupted if it was not visible in the mouth.

3 Trauma fracture

A crown was scored as fractured when some of its surface was missing as a result of trauma and there was no evidence of any caries.

4 Missing as a result of caries

Teeth that had been extracted because of caries were recorded under this heading.

3.1.7 Data Collection

A total of 142 questionnaires were returned. Only children whose parents completed the questionnaires were examined. All data was entered into a computer using Microsoft Excel Software with statistical subroutines added in. The author was assisted with data analysis.

3.1.8 Ethical Considerations

The protocol for research was first submitted to the Faculty Research Committee, University of the Western Cape for approval. Consent for undertaking the research was obtained from the school principals. The survey and aim was explained to them and permission asked to perform the examinations. Permission was also obtained in writing from the parents or guardians to perform the examinations. Only children of parents or guardians, who gave permission or returned permission forms, were included in the study, thus giving informed consent. Parents/guardians had the right to withdraw at anytime.

CHAPTER 4: RESULTS

The results of the survey are presented in this chapter as well as the results of the questionnaire distributed to the parents or guardians. The purpose of the study was to see if the teeth pattern normally seen in children with ECC could be found amongst children at these schools.

SECTION A

Demography of the sample

A total of 142 subjects were examined. There were 88 boys and 53 girls in the sample aged between 2-5 years. The age distribution is shown in the following table:

Table 3: Age distribution for this sample in three selected areas

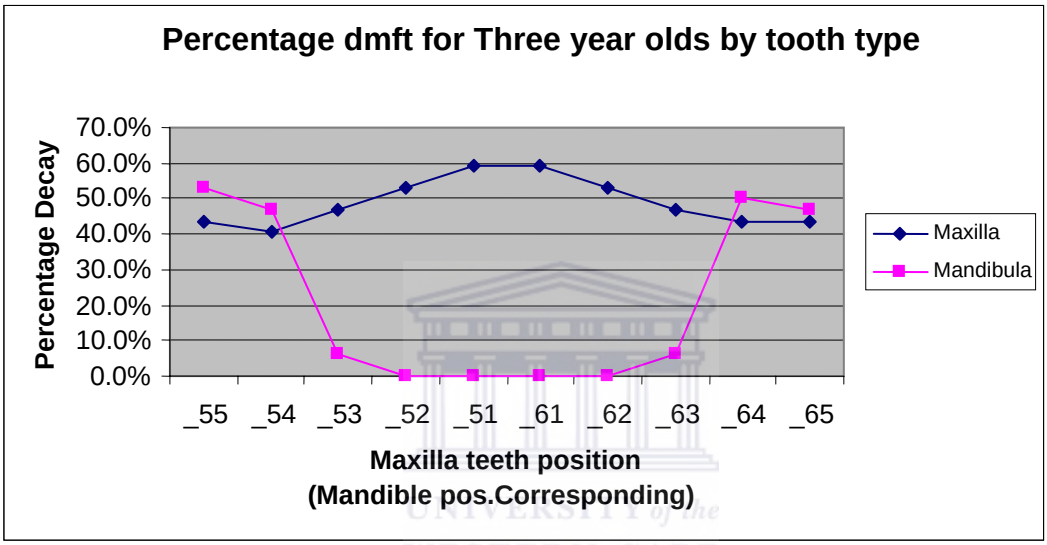
	Age categories in years				
Origin	**2-3**	**4**	**5**	**Blank forms returned**	**Total**
Heidelberg	13	16	22	2	**53**
Ladismith	7	20	12	4	**43**
Riversdale	22	18	3	3	**46**
Total	**42**	**54**	**37**	**8**	**142**

	Age categories in years				
Origin	**2-3**	**4**	**5**	**Blank forms returned**	**Total**
Heidelberg	25%	31%	41%	3%	37%
Ladismith	16%	46%	28%	10%	30%
Riversdale	48%	40%	6%	6%	33%
Total	**31%**	**38%**	**26%**	**5%**	**100%**

Of the sample 32% were in the 2-3 year age group, 41% in the 4 year old group and 28% in the 5 year old group.

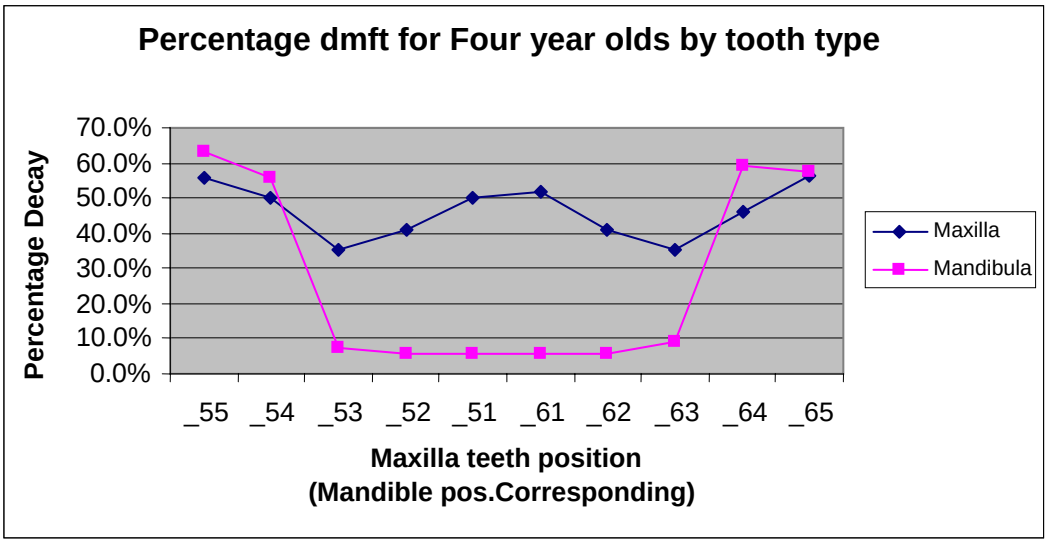
To determine the caries experience, the dmft index was used. This scored the number of decayed, missing and filled teeth for the primary dentition respectively (WHO, 1977). The combined dt (decayed teeth) and mt (missing teeth) is represented in the following tables.

Figure 1:



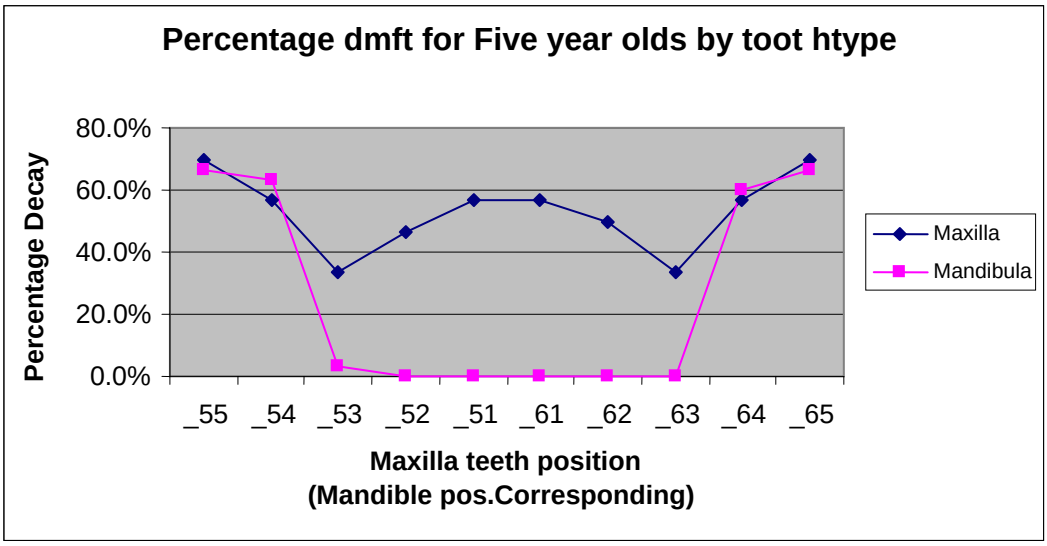
In the three year olds the maxillary incisors are more affected than the molars of the maxilla and mandible teeth. The mandibular molars are more affected than the maxillary molars. The mandibula canines and incisors are least affected.

Figure 2:



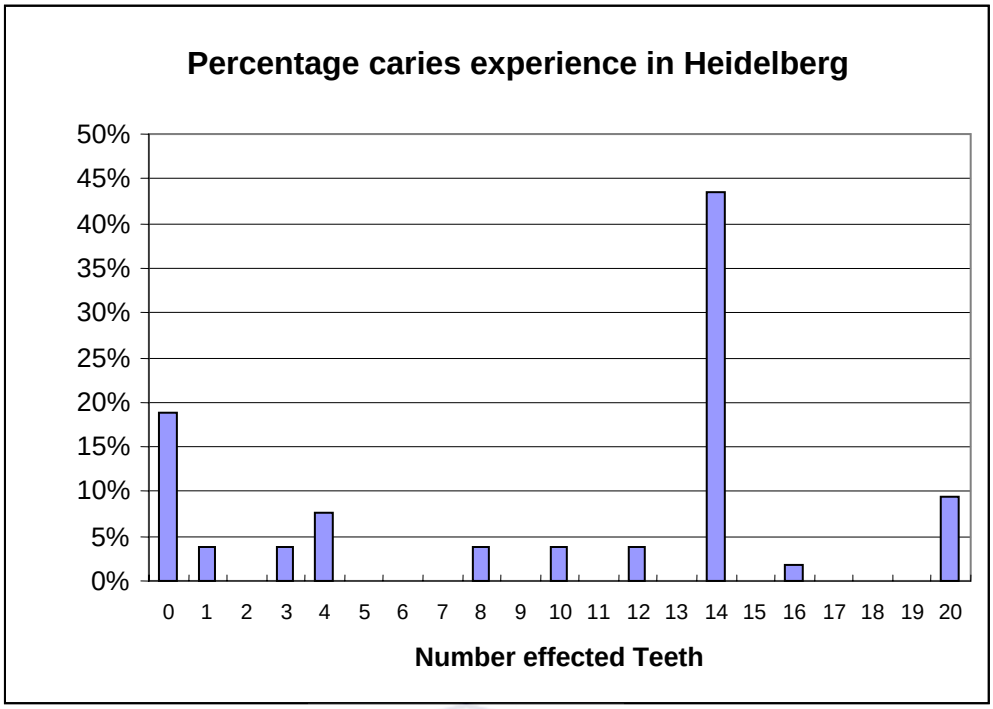
In the four year olds the first and second molars of the mandible were more affected than the maxillary incisors. Only the second molars of the maxilla were more affected than the incisors of the maxilla. The mandibular incisors and canines were least affected.

Figure 3:



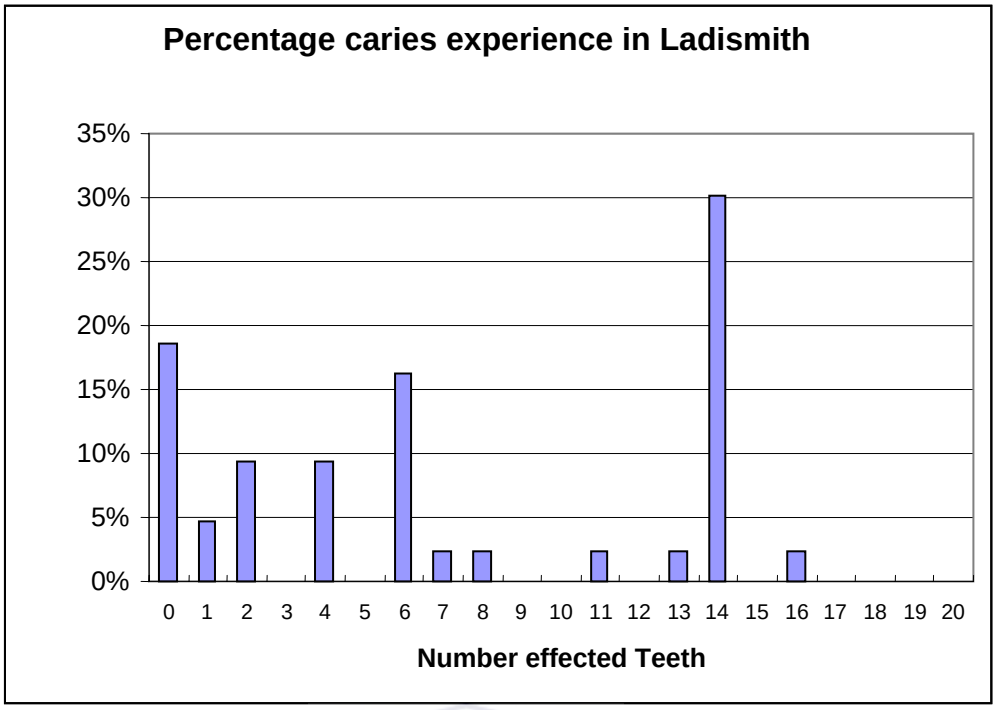
The first and second molars of the mandible in five year olds were more affected than the incisors and canines of the maxilla. Only the second molars of the maxilla were more affected than the incisors and canines of the maxilla. The mandibula canines and incisors were least affected.

Figure 4:



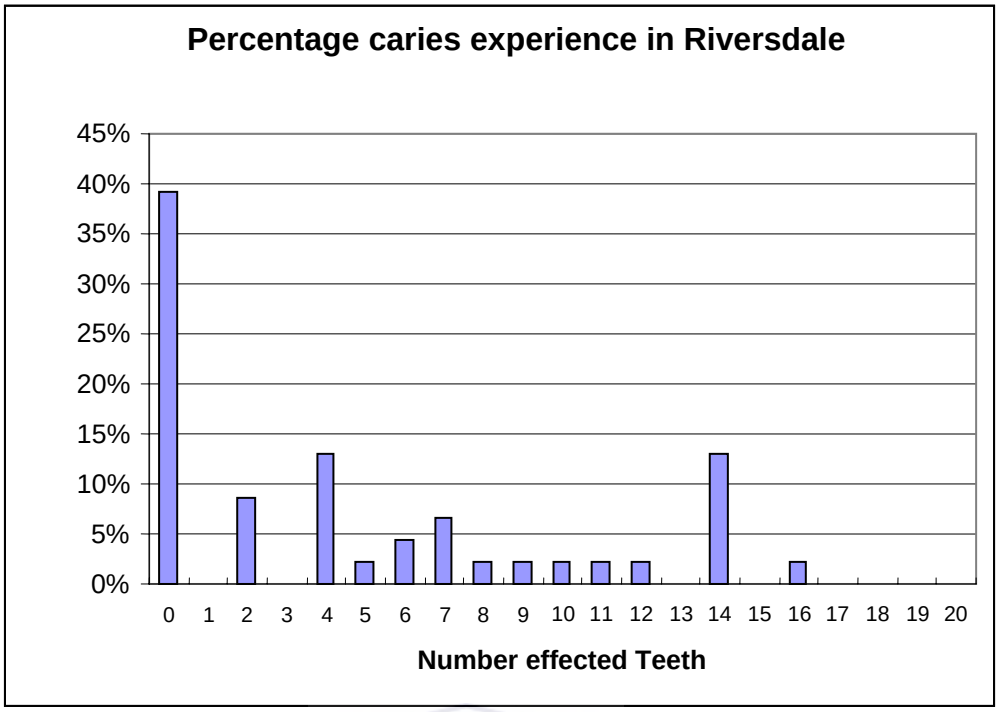
No teeth were affected in 19% of children, 14 teeth affected in 43% of children.

Figure 5:



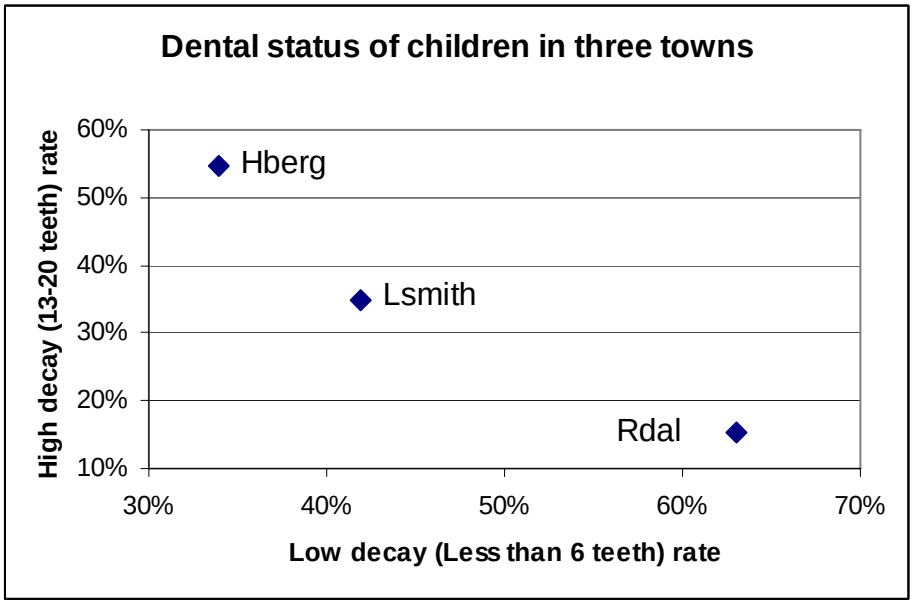
19% of children had no affected teeth and 30% had 14 affected teeth.

Figure 6:



No decay was detected in 39% of children and 13% had 14 teeth affected and another 13% had 4 teeth affected.

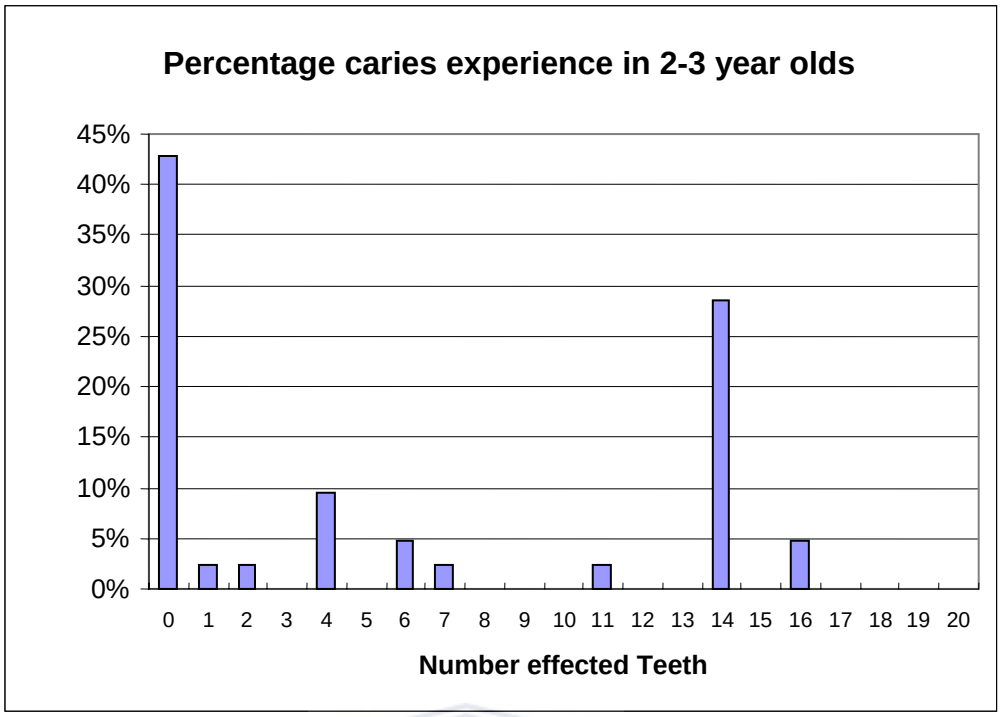
Figure 7:



The dental status of the children in the 3 towns is shown in the above table.

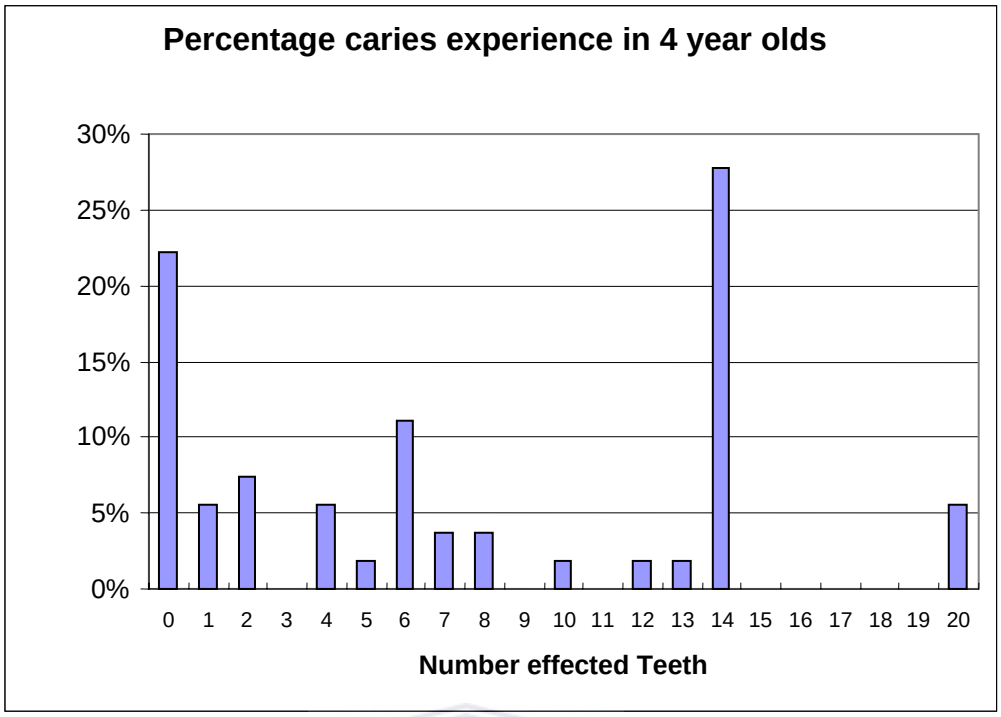
Low decay (less than six), was the highest in Riversdale, (63%), followed by Ladismith (42%) and then Heidelberg (34%). High decay (13-20 teeth) was highest in Heidelberg (55%), followed by Ladismith (35%) and then Riversdale (15%).

Figure 8:



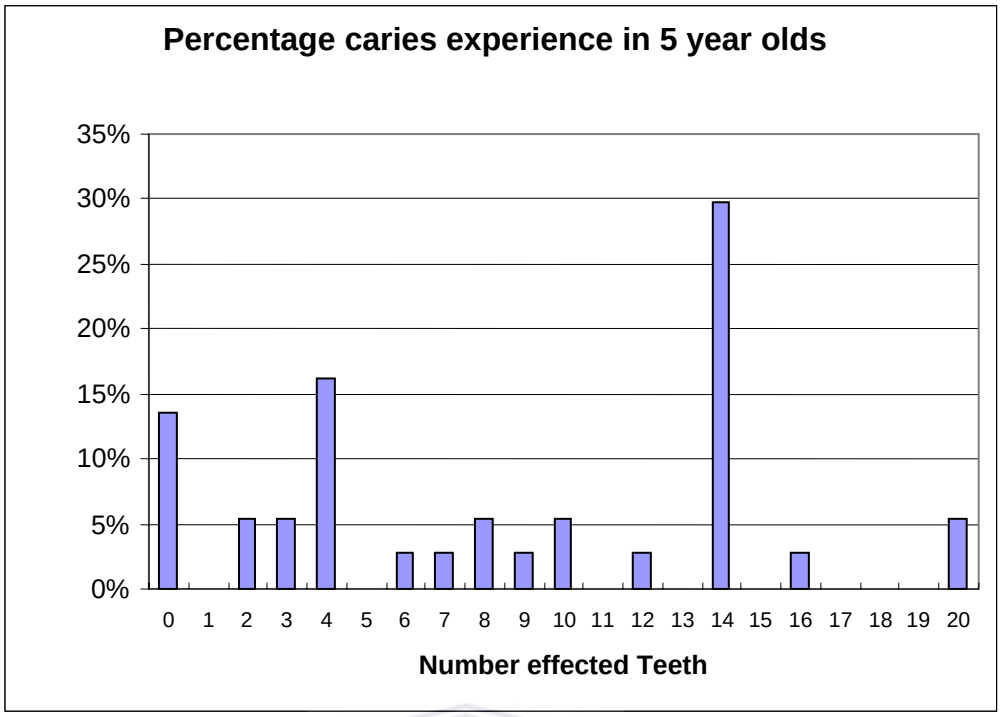
Out off a total of 42 children aged 2 & 3, 43% had no caries and 29% had 14 affected teeth.

Figre 9:



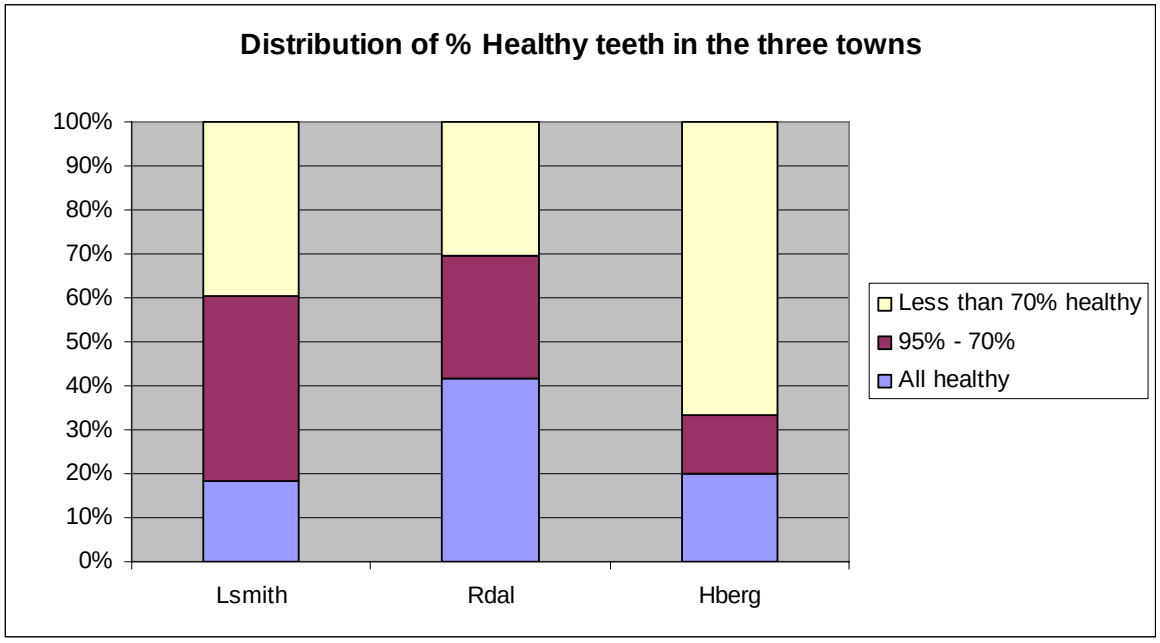
At age 4, 22% had no affected teeth, 28% 14 teeth and 11% 6 teeth affected.

Figure 10:



No affected teeth were noticed in 14% of subjects. A total of 30% had 14 teeth affected and 16% 4 teeth.

Figure 11: Number of sound teeth in Towns



Key: Lsmith - Ladismith

Rdal - Riversdale

Hberg - Heidelberg

The average number of sound teeth of children of Riversdale was the highest of the three towns for all age groups. It was interesting to observe that Riversdale had the smallest SD of the three towns for all age groups.

SECTION B

4.1.1 Reason for tooth decay

Table 4: Parents response to tooth decay in %

Question	Yes	No	Did not know	No Response
Born with bad teeth	26	31	36	7
Inherited bad teeth	8	56	31	5
Children susceptible to decay	47	32	21	0
Unhealthy foods leading to decay	89	2	9	0
No brushing leading to decay	80	2	18	0
Flu cause of decay	6	30	16	48
Medicine cause of decay	39	10	9	42
Sleeping with bottle cause of decay	37	14	15	34
Sweet substance cause of decay	54	7	9	30

Sleeping with a bottle leading to decay was acknowledged by 37%, 14% did not believe so and 15% knew not what caused tooth decay. The question was not answered by 33%.

4.1.2 The cause of tooth abscess

Table 5: Parents response of teeth in percentage

Question	Yes	No	Did not know	No Response
Food and drink as cause of abscess	42	6	40	12
Tooth decay as cause of abscess	83	2	2	13
Medicine as cause of abscess	16	10	11	63
Bottle with sweetener as cause of abscess	28	9	13	50
Flu as cause of abscess	9	10	23	58

4.1.3 Parents' knowledge concerning teeth and brushing

Table 6: Absence of teeth in percentage

Question	Yes	No	Did not know
Problems eating with teeth absent	83	10	7
Absence of teeth affecting appearance	8	6	86

Table 7: Whom to consult with decay in percentage

Question	Dentist	Doctor	Nurse
Health worker consulted	88	6	6

Table 8: Methods of cleaning teeth in percentage

Question	Salt + toothpaste	Tooth		No Response
Methods used in cleaning in all three towns	5	95	96	4

Table 9: Frequency of cleaning teeth in percentage

Question	Once a day	Twice a day	No Response
How often are teeth cleaned	65	28	7

Table 10: Children claiming to brush own teeth in percentage

Question	3 year old	4 year old	5 year old
Children brushing own teeth	22	63	76
Parents brushing childs teeth	78	37	29

Table 11: When do children brush teeth in percentage

Percentage children	3 year old	4 year old	5 year old
Morning after breakfast	60	48	60
After supper	25	15	10
No response	15	37	30

Whether parents considered teeth important for children, 98% replied indeed so.

SECTION C

4.1.4 Eating and drinking habits

A total of 64% of all children from the 3 towns were breast fed and 76% were bottle fed. Thus some breasfeeders were also bottle feeders and vice versa.

Table 12: Feeding habits in percentage (breast)

Breastfeeding	Breast	No Breast
Heidelberg	41	59
Ladismith	20	80
Riversdale	39	61

Table 13: Feeding habits in percentage (bottle)

Bottle feeding	Bottle	No Bottle
Heidelberg	39	61
Ladismith	31	69
Riversdale	30	70

Table 14: Using dummy as pacifier in percentage and placed in sweetener

Dummy pacifier used:	Yes	Dummy placed in sweet substance
Heidelberg	47	67
Ladismith	13	22
Riversdale	40	11

Table 15: Using bottle as pacifier in percentage

Bottle pacifier used:	Yes	No	No Response
Heidelberg	33	53	14
Ladismith	58	28	14
Riversdale	24	63	13

Table 16: Contents of bottle in percentage

Contents of bottle:	Milk	No Response
Heidelberg	32	68
Ladismith	53	47
Riversdale	14	85

Table 17: Eating in bed in percentage

Do children eat in bed:	Always	Sometimes	No Response
Heidelberg	37	24	34
Ladismith	30	14	56
Riversdale	33	6	61

SECTION D

4.1.5 Parents' demographic information

Table 18: Parents demographic information in percentage

Town	Married	Single	Divorced/ Widowed	No Response
Heidelberg	43	40	2	15
Ladismith	16	34	2	48
Riversdale	41	26		33

Table 19: Parents working in percentage

Town	Always	Sometimes	Not Working
Heidelberg	34	44	43
Ladismith	26	67	30
Riversdale	40	33	27

Table 20: Number of children in family in percentage

All 3 towns	1 child	2 children	3 children	4 children	No Response
Number of children in family	24	34	16	9	17

Table 21: Children living with mother, father and grandparents in percentage

All 3 towns	Mother	Father	Grandparents
Living with elders	80	16	4

CHAPTER 5: DISCUSSION

Demography of the sample

The sample taken from this study only represented the children attending the crèches. It does thus not include children of this age of the entire community. The number of children examined in the crèches was large enough to represent the population attending the crèches.

5.1 CARIES EXPERIENCE

A combined total of 25% of all subjects in the towns: Heidelberg, Ladismith and Riversdale, had no caries. The combined maximum of teeth of all subjects affected was 14. This amounted to 30% affected teeth. Thereafter a substantial drop to 12% was noted where subjects had 4 teeth affected. This pattern of ECC where all the upper teeth and four bottom molars are affected, is typical of rampant caries for ECC. The 10% with the 4 teeth affected is often seen in the initial stage of ECC (Tinanoff, 1998).

The number of subjects with the highest percentage of no caries was Riversdale with 39%. Both Heidelberg and Ladismith had 19% caries free teeth. All three crèches are visited by an oral hygienist who supervises a brushing program. This program is maintained daily by the teachers. It could be that Riversdale teachers are adhering more consistently to the program. Possibly it could be that the teachers are paying more attention to the children during brushing sessions and seeing that it is done correctly.

Heidelberg, however, seems to increase from an initial 34% with less than 6 to 55% with 13-20 decayed teeth. Either eating habits are deteriorating or brushing is neglected at crèches or home. Riversdale also had 63% of children with less than 6 decayed teeth, and only 15% between 13-20 decayed teeth. Ladismith had an almost equal number of children with less than 6 and 13-20 decayed teeth. It seems as though further caries activities are halted. However, there is a decline in caries free children from 43% for ages 2-3, to 22% for age 4, down to 14% for age 6.

According to Van Wyk et al (2004) 77% of 4-5 year olds in the Western Cape had caries. A pooled average of 4-5 year olds in this study showed 82% caries prevalence - very similar to the finding of Van Wyk. This finding is not consistent with 95% of parents claiming to brush their children's teeth and 65% claiming at least once a day. Such a decline from 43% to 14% is not a sign of ideal oral health maintenance. The caries pattern corresponds with the global trend where the upper incisors, followed by the lower molars then the upper molars and least affected being the lower incisors (Wanjay and Du Plessis, 2006).

5.2 QUESTIONNAIRE

5.2.1 Oral health knowledge

Parents' poor dental health history and dental hygiene habits also had associations with the child's poor oral health (Matilla, 1999). Studies demonstrated that lower-income families have more fatalistic beliefs about health and lower need for care (Reisine and Douglass, 1998).

A total of 67% of parents considered children to be born with bad teeth or were not sure. Also 68% of parents believed all children were susceptible to decay.

Conditions conducive to caries are necessary for caries to develop (Reisine and Douglass, 1998). This is often attributed to the use of a sweetened comforter (Veerkamp and Weerheijm, 1995). Using a bottle filled with sugared juices, a baby's teeth are constantly exposed to fermentable carbohydrates (Van Everdingen et al, 1996). To remove these carbohydrates, it is necessary to brush regularly (Rugg-Gunn, 1994).

A high portion (89%) of parents in all three towns believed unhealthy foods and cold drinks to cause decay. Many people are raised without understanding the value of proper nutrition or lacking the correct education to value good eating patterns. Neglecting to brush teeth, which leads to decay was agreed upon by 80% of people filling in the questionnaire. Also adding sweet substances leading to decay, in baby bottles was agreed by 54% of parents in all three towns. This is interesting as decay was high in spite of this knowledge in these areas. Brushing methods are clearly not adequate. Either parents are not applying their

knowledge, not concerned about their child's oral health or being sincere in their answers.

Fewer people (28%) believed a sweetened bottle to cause tooth decay, whilst 42% of people believed food and cooldrinks to cause tooth decay. Previously 54% of parents stated sweet substances caused decay. Thus it seems as though parents are not aware of the dangers of sweeteners in baby bottles.

5.2.2 Questions on tooth brushing

The surfaces of teeth should be carefully scrubbed after each feeding (Ripa, 1988). Two other factors needed for good oral health is to brush teeth regularly with fluoride toothpaste and to visit a dental professional regularly (Rugg-Gunn, 1994).

The prevalence of caries was alarmingly high according to the data in all three towns. Therefore either the parents are not being honest with their answers, or the brushing methods are not effective. It was noticed in the survey that 45% of parents mentioned that their children brush their own teeth. This included the combined spectrum from 2-5 year olds. The age when tooth brushing began, did not show a significant effect on the incidence of the nursing caries. This shows that the effectiveness of the children's tooth brushing is doubtful. The 3 year olds had a 22%, 4 year olds 63% and 5 year old 76% brushing rate.

Children at this age have no idea as to proper brushing regimes and need supervision. No child at this age can effectively cleanse his/her own mouth. This also probably partly explains emphasizes the high caries rate (Unkel et al, 1995).

5.2.3 Eating and drinking habits

ECC is a result of improper nursing bottle habits and night time feeding or prolonged unrestricted bottle and breastfeeding. As mentioned, improper feeding habits are at play here, such as addition of sugar, honey or other sweeteners to the nursing bottle or the use of a pacifier dipped in sweeteners (Lamis and Hamdan, 2002). Children who had been fed without sweetener in bottles or dummies experienced less caries than those who had been fed with it. Snacking at night or sleeping with a bottle had a higher dmft score than those who did not. According to Rugg-Gunn (1994) dummies dipped into sugary liquids was the most important cause of caries of the deciduous incisor teeth.

In all three towns, 64% reported to breastfeeding and 76% to bottle feeding. Nursing caries is definitely associated with inappropriate breastfeeding patterns, such as prolonged feedings once teeth have erupted (Goepferd, 1996). There is also little doubt that a prolonged use of nursing bottle in the susceptible infant will result in rampant caries in the primary dentition (Ayhan, 1996).

Seen to be contributing to the situation of ECC is the 56% of children in the survey sleeping with bottles.

5.2.4 Socio-economic background

Tinahoff (1997) suggested that socio-demographic factors might have an effect on caries risk with children. Children from disadvantaged groups have the lowest levels of dental health.

Children whose parents had attained a higher education level also had lower dmft scores. Similarly an increased number of children living in the household was related to a higher caries experience (Lamis and Hamdan, 2002). Weinstein, et al (1996) suggested that families with complicated relationships, and parents lacking resources to pay for adequate attention to their children, are families typical of whose children may develop caries. Young parents were also ill equipped to bring up children and prone to frequent feeding of sugar and sweets, and also by using sweets to comfort the child during tantrums.

With an average of 54% parents being single and 18% working this scenario seems to fit in the above mentioned statements. It was found that 51% of parents were in the 20-30 age group. Young parents, unemployed and being single have most likely had an impact on ECC in the three towns.

CHAPTER 6: CONCLUSION

ECC is clearly a problem in all three towns: Heidelberg, Ladismith and Riversdale. In spite of parents' claming to clean their children's teeth, caries is still rampant. Incorrect diets are still adhered to and knowledge seems to be lacking concerning ECC. Culture and family structure determine feeding behaviours after the baby is born. It can be difficult for counselors to change these behaviours. There should be understanding for their life circumstances and suggestions for changing behaviour.

Caries largely remain untreated. In emergency circumstances parents do tend to bring their children to the clinic for treatment. This is a very limited service as only a few children can be treated at a time. The problem leads to pain, poor nutrition and often abscess leading to a decrease in the Childs health.

These three towns are typical of a rural setting. Socio-economic growth is small. Conditions of the lower income families are not likely to improve. It is of utmost importance that parents are instructed on how to avoid ECC and to take care of their children's dental needs at an early age, and so instill oral health habits. Parents should be taught to brush their child's teeth with toothpaste after each meal.

The availability of dentists in the state sector is low compared to the population density. Oral hygiene instructions should not be the sole responsibility of the dentist. Parents to be should be instructed at clinics by dieticians, sisters and

social workers to maintain healthy mouths for their children. These health care workers could be trained by dentists.

Parents should be taught that primary teeth are important and that the dentists are concerned about their children and family's well being.

Caries is a serious situation, because despite the fact that caries is not life threatening, the consequences include poor nutrition, pain, damage to secondary teeth, and potential risk to the child's overall well being.

Although future community initiatives have the potential to increase community knowledge of ECC, the ultimate challenge will be sustaining long-term behavioural change among parents, caregivers and the community at large.

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APPENDIX I

Dr T. K. Jacobs
Privaatsak X2
Heidelberg 6665
Tel. (028) 722-1441

Toestemming vir ondersoek van u kind se tande en mondgesondheid

Geagte Ouer/voog

Dit sal baie waardeer word as u die aangehegde vraelys sal voltooi. Dit sal slegs ‘n paar minute van u tyd in beslag neem.

Sodoende kan ons die behoefte van die kinders in die omgewing bepaal en evalueer hoe ons dienste moontlik kan verbeter.

Dankie vir u samewerking.

Dr. T. K. Jacobs

APPENDIX II

Oral health status of two to five year old children in the Southern Cape Towns of Ladismith, Riversdale and Heidelberg Crèches

Assessment form

General information

School .....

Name of child .....

Age in years .....

Sex (M = 1 ; F = 2)	
Geographical location (urban = 1 ; rural = 2)	

Clinical assessment

Extra-oral assessment	
0 = normal appearance	
1 = ulceration sores, erosions (head, neck)	
2 = cancrum oris	
3 = abnormalities of upper and lower lips	
4 = swellings of face and jaws	
5 = not recorded	

Intra-oral assessment

Oral mucosa	
0 = no abnormal condition	
1 = ulceration (aphthous, herpetic, traumatic)	
2 = candidiasis	
3 = abscess	
4 = not recorded	

Enamel opacities/hypoplasia

0 = normal

1 = demarcated opacity

2 = diffuse opacity

3 = hypoplasia

4 = other defects

5 = not recorded

Dental status and treatment needed

55	54	53	52	51	61	62	63	64	65
85	84	83	82	81	71	72	73	74	75

0 = sound
1 = decay
2 = interrupted tooth
3 = trauma fracture
4 = missing as result of caries

Summary of dental status

dmft

mt

ft

dt

Dentofacial abnormalities

Dentition

Missing incisor, canine, premolar, molar – enter number

Space

Crowding in the incisal segments

Spacing in the incisal segments

Diastema in mm

Largest anterior maxillary irregularity in mm

Largest anterior madibular irregularity in mm

0 = No crowding
1 = One segment crowded

0 = No spacing
1 = One segment spaced

2 = 2 segments crowded 2 = 2 segments spaced

Occlusion

Anterior maxillary overjet in mm	Anterior mandibular overjet in mm	Vertical anterior openbite in mm	Antero-posterior molar relation	0 = Normal 1 = Half cusp 2 = Full cusp
☐	☐	☐	☐	

Need for immediate care

Life threatening condition ☐

Pain or infection ☐

Other conditions (specify) ☐

0 = absent
1 = present
2 = not recorded

Referral ☐

0 = no
1 = yes
2 = not recorded

Notes

.....

.....

APPENDIX III

VRAELYS

Afdeling A
Algemene Inligting

Naam van kind: .....

Geslag: Manlik ☐ Vroulik ☐

Geboortedatum: .....

Afdeling B
Mondgesondheids kennis

Party kinders word gebore met sagte tande.

Ja ☐ Nee ☐ Weet nie ☐

Slegte tande is oorerflik van die ouers.

Ja ☐ Nee ☐ Weet nie ☐

Alle kinders se tande sal sleg word.

Ja ☐ Nee ☐ Weet nie ☐

Waarom raak kinders se tande sleg?

Ongesonde kos (lekkers en koeldrank):	Ja	☐	Nee	☐	Weet nie	☐
Tande word nie geborsel nie:	Ja	☐	Nee	☐	Weet nie	☐
Verkoue en griep is rede:	Ja	☐	Nee	☐	Weet nie	☐
Dokter se medisyne is oorsaak:	Ja	☐	Nee	☐	Weet nie	☐
Omdat hulle met ‘n bottel slaap:	Ja	☐	Nee	☐	Weet nie	☐
Omdat daar koeldrank, soet tee, koffie of melk in die bottel is:	Ja	☐	Nee	☐	Weet nie	☐
Weet nie:	Ja	☐	Nee	☐	Weet nie	☐

Wat veroorsaak tandabsesse (gumboils)?

Ongesonde kos (lekkers en koeldrank):	Ja		Nee		Weet nie	
Slegte tande:	Ja		Nee		Weet nie	
Dokter se medisyne:	Ja		Nee		Weet nie	
Kind wat heeldag met ‘n bottel koeldrank, soet tee of koffie loop en slaap:	Ja		Nee		Weet nie	
Verkoue en griep, kindersiektes:	Ja		Nee		Weet nie	

Afdeling C
Vrae oor tande en tandeborsel

Is tande vir my kind belangrik?

Ja	
Nee	

Sonder tande sal my kind…

Moeilik eet	
Lelik lyk	
Moeilik eet en lelik lyk	
Beter af wees	

As my kind se tande sleg is gaan ek na…

Die tandarts	
Sisters by die kliniek	
Dokter by die kliniek	
Ander (noem)	

Gaan u met u kind na die tandarts om:

Slegte tande te stop	
Slegte tande te trek	
Slegte en seer tande gesond te maak	
Tande wat skeef uitkom of groei te trek	

Waarmee maak u u kind se tande skoon?

Tandeborsel

Lappie

Ander (noem)

Niks nie

Wat gebruik u nog?

Tandepasta

Soutwater

Niks nie

Ander (noem)

Hoe gereeld maak u u kind se tande skoon?

Eenkeer ‘n dag

Tweekeer ‘n dag

Elke tweede dag

Nie elke dag nie

Nooit nie

<u>Maak u kind self sy tande skoon?</u>

Ja

Nee, iemand help

Maak nie tande skoon nie

Wanneer word u kind se tande skoongemaak?

Sodra hy/sy opstaan soggens

Na ontbyt

Na aandete

Voor hy/sy gaan slaap

<u>Afdeling D</u>

Eet en drinkgewoontes

Is u kind geborsvoed?

Ja

Nee

Het u kind ooit die volgende gebruik?

Bottel	Ja		Nee	
Fopspeen	Ja		Nee	

Is die fopspeen in soetgoed gedoop?

Ja	
Nee	

Indien JA, wat was dit?

Konfyt		Heuning		Kondensmelk		Ander (noem asb.)	

Gee u u kind ‘n bottel as hy huil of skreeu?

Ja	
Nee	

Slaap u kind met ‘n bottel saans?

Elke dag	
Die meeste dae	
Soms	
Nooit	

As u kind met ‘n bottel slaap, wat is daarin?

Melk	
Melk met suiker	
Tee/Koffie	
Vrugtesap	
Koeldrank	
Water	
Ander (noem)	

Wat van die volgende sal u soetmaak?

Tee/Koffie	
Melk	
Water	
Ander (noem)	

Hoe gereeld eet u kind in die bed gedurende die nag?

Elke aand ☐
Die meeste aande ☐
Nou en dan ☐
Nooit ☐

As u kind iets eet saans, wat is dit?

Lekkers ☐
Beskuitjies ☐
Brood ☐
Vrugte ☐
Ander (noem) ☐
Eet nooit in die bed nie ☐

Afdeling E

Inligting oor ouer

Is u 'n enkel ouer?

Ja ☐
Nee ☐

Werk u?

Ja ☐
Nee ☐

Indien u werk, wat is u beroep?

Wat is u oudersom:

Onder 20 ☐ 20-30 ☐ 31-40 ☐ Oor 40 ☐

Is u:

Getroud ☐
Enkel ☐
Geskei ☐
Weduwee ☐

Wat is die opvoedingsvlak: Moeder?

Laerskool	
Hoërskool	
Kollege/Universiteit	
Geen formele opleiding	

Wat is die opvoedingsvlak: Vader?

Laerskool	
Hoërskool	
Kollege/Universiteit	
Geen formele opleiding	

Hoeveel kinders in u gesin?

Is hierdie u 1ste, 2de, 3de ens. kind?

.....

Is u die kind se ma of pa?

Ma	
Pa	

Woon u kind met:

Moeder	
Vader	
Groot ouers	
Moeder & Stiefvader	
Vader & Stiefmoeder	
Ander familie (spesifiseer asb.)	

Dankie vir u samewerking.

Dr. T.K. Jacobs