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Dental Survey of Children in Ferozepur, India

Vishal Chhabra, BDS
(Baba Farid University of Health Sciences)

A thesis submitted in partial fulfillment of the requirements for the degree of

MASTER OF DENTAL SCIENCE
Community Oral Health and Epidemiology

Faculty of Dentistry
The University of Sydney Australia

2007
Dedication

I dedicate my thesis to my father Sh. Jagjeet Chhabra and to my mother Smt. Sudesh Chhabra for their constant support and helping me financially along with my friend Jaspreet Kaur who motivated me in studying further and helping me emotionally in completing my degree.
Acknowledgements

I would like to express my sincere thanks to the following people for their contribution and help towards the research and preparation of the thesis:

- Associate Professor Wendell Evans, Head of Discipline, Community Oral Health and Epidemiology, University of Sydney for his guidance and assistance in completing the thesis.

- Dr. Jaspreet Kaur, my friend, who acted as a research assistant.

- Ms Ramona Grimm, Administrative Officer, Community Oral Health and Epidemiology for her administrative support.

- Vasu Dev Chhabra, my brother, who helped in organizing the survey.

- All of the school principals and the children who participated in the survey.

- Dr. Choon Wong for conducting the analysis of water samples in Sydney.

**************************************************************************************************
Foreword

This thesis is divided into two parts:

Part One: A review of the literature on dental caries experience among 6- and 12-year-olds in different states of India.

Part Two: Part two of this thesis is a paper that will be submitted for publication in the Indian Dental Journal concerned with an epidemiological study of 6- and 12-year-olds Punjabi school children, India.
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<th>Abbreviation</th>
<th>Full Form</th>
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<tbody>
<tr>
<td>DMFT/dmft</td>
<td>Decayed, missing, and filled teeth</td>
</tr>
<tr>
<td>DMFS/dmfs</td>
<td>Decayed, missing, and filled surfaces</td>
</tr>
<tr>
<td>F</td>
<td>Fluoride</td>
</tr>
<tr>
<td>Mg/L</td>
<td>Milligram per litre</td>
</tr>
<tr>
<td>OR</td>
<td>Odds Ratio</td>
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<tr>
<td>ppm</td>
<td>Parts per million</td>
</tr>
<tr>
<td>ml</td>
<td>millilitre</td>
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***************
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Appendices

Appendix A: Letter of approval from the Human Research Ethics Committee, The University of Sydney, including, the Participant Information Sheet (English and Punjabi), the Parent/Guardian Consent Form (English and Punjabi), and the Need for Dental Care Form (English and Punjabi).

Appendix B: Letter to the District Education Officer seeking permission for conducting the survey.

Appendix C: Clinical Examination Form.

Appendix D: Questionnaire (English and Punjabi).

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Part One

Review of Literature
Review of literature on dental caries experience among Indian children

INTRODUCTION

India has a population of over 1026.7 million people and has high prevalence of oral diseases (Registrar General & Census Commissioner, 2003).

Dental caries is a public health problem in India. In some regions, the caries prevalence is as high as 60-80% in Indian children (Damle, 2002). It was reported by The World Health Organisation Oral Health Surveillance in 1992 (WHO, 1992), that nationally the DMFT index for 12-year-olds was 0.89. In addition, about 30% of children suffer from malocclusion (WHO, 2001) affecting proper functioning of the dento-facial apparatus. A lack of awareness about dental diseases has resulted in gross neglect of oral health (Parkash & Mathur, 2003).

According to Shah (Undated), the optimum concentration of fluorine in drinking water for caries risk reduction in India is 0.75–1 mg/L. A high fluoride content in ground water is endemic in some states, including Andhra Pradesh, Gujarat, and Rajasthan.

A survey was conducted in Punjab by the State Health Department during 1989-90 and it indicated that nearly 84% of the population was suffering from caries or periodontal disease (Department of Health & Family
Welfare, 2006). It was reported that this alarming level of dental diseases was mainly due to lack of awareness among the people about the prophylactic, interceptive, and curative treatment available in the existing infrastructure of the Dental Health Care Services in the state. It was also reported that the dentist to population ratio was 1: 30,000 in the urban areas and 1:119,000 in rural areas.

The following review of dental caries experience among children in different Indian states refers mostly to cross-sectional studies. Prior to the partition of India, Pakistan belonged to the Punjab province. Ferozepur is directly on the Indian side of the border with Pakistan and has similar demographic and geographic variations like that of Pakistan. Therefore, for the purpose of making relevant contrasts related to oral health features, Pakistan was included.

REVIEW OF STUDIES

The dental caries status of Indian children

Primary dentition caries experience: The data in Table 1.1 shows that the 3-6-year-olds in Tamil Nadu had the lowest mean dmft of nearly zero (Gopinath et al., 1999). The 5-6-year-olds in Karnataka had the highest mean dmft and dmfs scores of 3.5 and 10.2, respectively (Shetty & Tandon, 1988). A similar mean dmft score of 2.7 was reported for 5-8-year-olds in Orissa and children aged 9 years in Kerala (Dash et al., 2002; Retnakumri, 1999). Two studies gave results for males and females separately, and show that males had higher dmft scores compared with females (Gopinath et al., 1999; Saravanan et al., 2003). Children living in urban areas had higher dmft scores compared with the children living in rural areas. For example, the dmft score
of 2.5 for 5-6-year-olds living in an urban area of Sikkim was much higher than for children of the same age group living in rural area; their dmft score was 0.7 (Mandal et al., 2001).

**Mixed dentition caries experience:** The data in Table 1.2 shows that in two of the studies (Gopinath et al., 1999; Khan, 1992) males and females had same caries prevalence. In five of the eight studies shown in Table 1.2, males had higher caries prevalence rates as compared with females, however, the significance of the differences between both the genders was not reported. One of the studies (Singh et al., 1999) showed that females had a non-significantly higher caries prevalence as compared with males. A study (Gopinath et al., 1999) showed that among the studies including 6-year-olds, the 3-6-year-olds in Tamil Nadu had the lowest caries prevalence (36.2 in males and 36.0 in females), and 9-12-year-olds from the same state had the highest caries prevalence (80.4 in males and 68.8 in females).

**Permanent dentition caries experience:** Table 1.3 shows that the 6-9-year-olds in Tamil Nadu had the lowest mean DMFT score of 0.4 (Gopinath et al., 1999). The 12-year-olds in different states of India had DMFT scores in the range of 0.4 to 1.1, but those in Pakistan had higher DMFT scores in the range of 1.2 to 1.8 (Khan, 1992; Maher, 1992). The 7-17-year-olds in Punjab had the highest mean DMFT and DMFS scores of 3.8 and 5.8, respectively (Gauba et al., 1986). Children living in urban areas had higher DMFT scores compared with rural children. For example, those aged 15-16-year-olds living in the urban area of Sikkim had a mean DMFT score of 0.5, while children of the same age group living in rural areas had a mean DMFT score of 0.3 (Mandal et al., 2001).
Dental treatment needs

Table 1.4 shows that the need for restorative treatment on one or more surfaces was the most prominent of the dental treatment needs shown across the studies and accounted for 60-80% of the various treatment need types (Dash et al., 2002; Gauba et al., 1986). The treatment needs of children in Pondicherry were about half that of children in Orissa (Sarvanan et al., 2003; Dash et al., 2002). Tooth extractions were needed by 3-15% of the children (Sarvanan et al., 2003; Dash et al., 2002). Only one study showed that the need for preventive/sealant treatment accounted for 11% of the various dental treatment needs (Sarvanan et al., 2003). Mandal et al., (2001) reported that the children living in both urban and rural areas had similar dental treatment needs.

Dental caries and oral hygiene methods

The data in Table 1.5 refer to methods of oral hygiene practised by children in India. The reports indicate that more than two-thirds of the children claimed that they practised tooth brushing with toothpaste and that less than one-third of the children practised tooth brushing with tooth powder. The children in Tamil Nadu did not use any traditional or other mode of oral hygiene practise (Gopinath et al., 1999). Less than 1% of children in Pondicherry reported using a traditional method of oral hygiene practise (Sarvanan et al., 2003).

The data in Table 1.6 shows that except in Kerala (Retanakumri, 1999; Kuriakose, 1999), more than 90% of the children claimed that they brushed once daily while less than 10% of children brushed twice daily. In Kerala, two thirds of the children claimed that they brushed their teeth once daily and one-third of the children brushed twice. Almost all children brushed once or twice daily. Shetty & Tandon (1988) reported that 0.2% of children they studied in Karnatka never brushed their teeth.
Caries experience and fluoride concentration in drinking water

**Primary dentition:** Table 1.7 shows that in one study, the fluoride levels were less than 0.1 mg/L at which point a therapeutic effect would not be expected. In this study, which was conducted in urban area of West Bengal where the fluoride level was 0.007 the dmft score of 1.9 was observed, whereas in rural area of the same state which had a fluoride level of 0.011 a dmft score of 1.5 was noted. These dmft scores did not correlate with the fluoride concentration (Mandal *et al.*, 2001). In the other studies reported in Table 1.7, the fluoride concentrations ranged from 0.00 – 0.38 mg/L but, in fact, the dmft score of 3.5 in Karnataka where the fluoride level was 0.00 and dmft score of 2.7 in Chandigarh where the fluoride level was 0.38 did not correlate with the fluoride concentration (Shetty & Tandon, 1988; Chawla *et al.*, 2000).

**Permanent dentition:** The studies reported in Table 1.8 demonstrate that caries experience in the permanent dentition was inversely related to the fluoride concentration in drinking water. This relationship was significant in only one study in which the DMFT scores, where for example, the DMFT scores for 12-year-olds decreased from 1.0 (0.7 mg/L) to 0.3 (>3.0 mg/L) (Acharya, 2003). The significance status of the caries-fluoride relationship was not reported in rest of the studies (Chawla *et al.*, 2000; Shetty & Tandon, 1988; Mandal *et al.*, 2001). There were no differences in the DMFT scores of children living in rural or urban areas (Mandal *et al.*, 2001).
<table>
<thead>
<tr>
<th>Reference</th>
<th>State</th>
<th>Class</th>
<th>Age</th>
<th>Sex</th>
<th>n</th>
<th>dmft</th>
<th>sd</th>
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<tr>
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<td>M</td>
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<td></td>
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<td></td>
<td>5</td>
<td>F</td>
<td>482</td>
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Table 1.1: Primary dentition caries experience of children in various Indian states
Table 1.2: Mixed dentition caries prevalence* by gender in various Indian states including Lahore and Karachi, Pakistan

<table>
<thead>
<tr>
<th>Reference</th>
<th>State</th>
<th>Age</th>
<th>Gender</th>
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<th>p value</th>
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<tr>
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<td>50</td>
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<td>36.0</td>
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<td>97</td>
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<td>Females</td>
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*a dmft or DMFT > 0

b Not reported

Continued over
Table 1.2 (continued): Mixed dentition caries prevalence* by gender in various Indian states including Lahore and Karachi, Pakistan

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*a dmft or DMFT > 0

b Not reported
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Continued over
Table 1.3 (continued): Permanent dentition caries experience of children in various Indian states including Lahore and Karachi, Pakistan

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<th>SD</th>
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### Table 1.4: Dental treatment needs of Indian children by age and state (percentages)

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<th>Pulp care</th>
<th>Exo</th>
<th>Sealant/ preventive</th>
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</table>

**Note** — Totals do not add to 100%

% of teeth

1. Saravanan et al., 2003
2. Dash et al., 2002
3. Gauba et al., 1986
4. Mandal et al., 2001
Table 1.5: Percentage distributions of oral hygiene methods that were reported to have been practised by children in various Indian states

<table>
<thead>
<tr>
<th>Reference</th>
<th>State</th>
<th>Age</th>
<th>N</th>
<th>Tooth brushing with toothpaste</th>
<th>Tooth brushing with tooth powder</th>
<th>Traditional/a/other methods</th>
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<td>Gopinath et al. (1999)</td>
<td>Tamil Nadu</td>
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<td>87.6</td>
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<td>31.8</td>
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*a* Includes use of mango leaves, salt, finger, charcoal, brick powder, and ash.
Table 1.6: Percentage distributions of tooth brushing frequency practised by children in various Indian states who claimed that they brushed their teeth

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<th>Twice</th>
<th>Never</th>
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Table 1.7: Primary dentition caries experience of children from various Indian states by fluoride concentration (mg/L) in drinking water

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<th>F(mg/L)</th>
<th>Age</th>
<th>N</th>
<th>Prevalence</th>
<th>Mean dmft</th>
<th>p value</th>
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³ Not reported
Table 1.8: Permanent dentition caries experience of children from various Indian states by fluoride concentration (mg/L) in drinking water

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<th>Reference</th>
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<th>N</th>
<th>Prevalence</th>
<th>Mean DMFT</th>
<th>p value</th>
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* Not reported

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SUMMARY AND CONCLUSIONS

The development of a policy for oral care in India commenced in 1984 at a workshop in Bombay organized by the Indian Dental Association. A draft policy was completed in 1986 (Ministry of Health and Family Welfare, 1995). This policy was considered by the Dental Council of India at two national workshops held in Delhi and Mysore in 1991 and 1994, respectively. The outcome was that a National Oral Health Policy for India was formulated (Bali et al., 1994). A core committee appointed by the Ministry of Health and Family Welfare (MOH&FW) was established to move this policy forward in 1995. A National Oral Health Policy containing 10 resolutions was then drafted. This was accepted by the Government of India and was included as part of the National Health Policy in the same year (Lal et al., 2004). In implementing this policy, the MOH&FW instituted a National Oral Health Care Programme (NOHCP) which had nine goals. This was launched as a pilot project, initially in five states, including Delhi, Punjab, Maharashtra, Kerala, and the North Eastern States (Parkash & Shah, undated).

The dental caries experience among 6- and 12-year-olds was low in comparison to the level corresponding to Goal 3 of the National Oral Health Care Programme (NOHCP) 'To bring down the DMFT (decayed, missing, filled teeth) in school children aged 6-12 years from approximately 4 at present to less than 2' (Parkash & Shah, undated). In all the studies, except one (Gauba et al., 1986), DMFT scores were two or less.

The restoration of tooth surfaces was the most common dental treatment need identified among children in various parts of India since the majority of the DMF teeth presented as untreated decay. Whereas Goal 3 of the NOHCP has been met, Goal 1 'Oral Health for all by the year 2010'
has yet to be reached; the current health services are clearly not sufficient to manage the untreated decay. In addition to the lack of preventive and other dental care services, a lack of awareness about oral health among population may be responsible for the problem of untreated decay. Clearly, there is a need to implement NHCOP Goal 2 'To bring down the incidence of oral and dental diseases to less than 40% from the existing prevalence of 90%'. The National Oral Health Policy resolutions should become an integral part of the National Health Policy (Lal et al., 2004).

Overall, the studies showed that children living in urban areas had higher caries experience compared with the children in rural areas. There is a need for the NOHCP to be launched 'to provide oral health care in urban areas' as stated in Resolution 2 (see Appendix) of the National Oral Health Policy (Lal et al., 2004).

There was an inverse relationship of the dental caries experience among 6-and 12-year-olds with water fluoride concentration (mg/L) in drinking water. This result should be used in health promotion to encourage water fluoridation in regions where the community water supplies have naturally low fluoride levels. This conclusion is supported by the results of a meta-analysis on the role of water fluoridation in caries risk reduction (Cochrane, 2003).
Reference:


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Part Two

Dental Survey of Children in Ferozepur, Punjab, India
Dental Survey of Children in Ferozepur, Punjab, India

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Community Oral Health and Epidemiology
Faculty of Dentistry
The University of Sydney, Australia

Key words: Dental caries, dental fluorosis, caries risk
Prepared for publication in the Indian Dental Journal.

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ABSTRACT

Objectives: A study was conducted in Ferozepur, Punjab. The objectives of this study were to determine (1) the oral health status (caries and fluorosis experience) and treatment needs of children in Ferozepur, (2) the fluoride concentration in drinking water sources in Ferozepur, and (3) possible caries risk factors.

Materials and methods: Children aged 6 and 12 years from four socio-demographic areas were targeted in this study. Schools were stratified on the basis of socio-demographic status: rural, urban-upper middle class, -lower middle class, and -lower class. A total of 1600 children aged 6 and 12 years, that is, 400 in each of the socio-demographic classes constituted the sample size of study. Dental caries and fluorosis experience was determined according to WHO guidelines. A questionnaire was completed by the 12-year-olds to obtain information on oral health behaviour and exposure to caries risk factors.

Results: The mean dmft scores for 6-year-olds was 1.01. 60% were caries-free. The equivalent DMFT scores for 12-year-olds were 0.50 and 72%, respectively. Fluorosis prevalence (very mild or more) was 51.5%. The results of the multiple variable logistic regression analysis indicated that most degrees of fluorosis were associated with significantly less caries experience compared with no fluorosis (ORs of 0.56 or less). Socio-demographic status was also a significant independent predictor of caries experience of caries. Compared with rural children, urban-upper middle class children were more than 50% likely to experience one or more DMFT (OR=1.56).

Conclusions: Caries experience in the primary and permanent dentitions of children is lower than the goals set by National Oral Health Care Programme (NOHCP). High levels of fluorosis are probably due to high levels of fluoride naturally occurring in drinking water (0.60-1.25 mg/L) in urban and rural area respectively, and this indicates that further control of dental caries in Ferozepur must be achieved by means other than water fluoridation. Urban children are more likely to experience caries compared with rural children because of easy access to a rich sugar diet.
INTRODUCTION

India is a country with rich cultural heritage and a population of 1027 Million 2001 (Census), distributed in 28 States, 7 Union Territories, 5564 tehsils/talukas, 640,000 villages and 5161 towns and cities (Bose, 2001). The Indian population is predominantly rural as over 72% of people continue to live in rural areas (Department of Family Welfare, 2003).

Dental caries is one of the most prevalent diseases in children worldwide (Marthaler, 1990). The prevalence of dental caries has declined in developed countries and the reverse pattern is following in developing countries (Rugg-Gunn, 1993).

The dentist to population ratio in India is 1:30,000 which is unevenly distributed. More than 90% of dentists are based in urban settings and only 10% serve the populous rural communities (Ministry of Health and Family Welfare, 1995). Besides this, there is also an acute shortage of equipment, material and other essential facilities to run the minimal curative services for the vast population (Lal et al., 2004).

Dental health services are provided by tertiary level hospitals, district hospitals, private practitioners and non governmental organizations (Lal et al., 2004).

Study objectives

In response to Goal 3 of the NOHCP 'To bring down the DMFT (decayed, missing, filled teeth) in school children aged 6-12 years from approximately 4 at present to less than 2', a study was conducted and the objectives of the study were to determine (1) the oral health status (caries and fluorosis experience) and treatment needs of children in Ferozepur, Punjab, one of the five states to be included in the NOHCP pilot project (Parkash & Shah,
undated), (2) the fluoride concentration in drinking water sources in Ferozepur, and (3) possible caries risk factors.

MATERIAL AND METHODS

Study Population

This study was conducted in Ferozepur district, Punjab in 2007. Ferozepur encompasses four towns and many villages and has a population of around 700,000. The ground water in Ferozepur has a high fluoride concentration, ranging from 0.60 to 1.25 mg/L. Children from Grades 1 and 7 from four socio-demographic classes (urban upper middle, urban lower middle, urban lower class and rural) classes were targeted in this study. Schools were stratified on the basis of socio-demographic class, where urban upper middle, urban lower middle and urban lower class equated with school fees of Indian Rupees 700-1000, 400-700, and 200-400 per month respectively. Rural children attended schools situated more than 5 km from the city boundary where school fees are minimal or not charged.

Sampling

A total of 1600 children from Grades 1 and 7 constituted the sample size, including 400 subjects in each of the four socio-demographic classes. A total of nine schools were selected (two from urban upper middle, two from urban lower middle, two from urban poor, and three from the rural area). They were selected randomly from the list of all schools that included all the government and private schools. At each school, all Grade 1 children were selected. These children were mostly aged 6 year but included some aged 5 and 7 years. Similarly, all the children from Grade 7 were selected. They were mainly aged 12 years along with some 11- and 13-year-olds.
Assessment of caries risk factors

A seven item questionnaire was completed during school hours by the 12 year olds. Information was collected on the potential risk factors for caries experience including use of tooth brushes, tooth brushing frequency, type of toothpastes, and consumption of sugar containing food items, beetle nut chewing, dental visits and reasons for dental visits.

The questionnaire was completed by each child without discussion among themselves. However, prior to its completion they were given an opportunity ask questions to clarify any related matters.

Caries assessment

Caries assessment was conducted according to W.H.O guidelines (1997). Dental caries was diagnosed by tactile examination with the use of plain mouth mirror and a probe. The decayed component of DMFT was divided in two parts D1mm and D 4mm (depending on the diameter of cavity). Initial caries (incipient/ early caries lesions) was not recorded.

The dental examination was performed in the natural daylight by a single examiner (VC) who had been calibrated in Australia during a similar survey of school children before the survey. The instruments were disinfected by chemical procedures during the day.

Fluorosis assessment

Fluorosis was graded by using Dean's index of fluorosis. The fluorosis examination was also performed in good natural day light by the same examiner (VC). Photographs were also taken.
Fluoride concentration assessment

Ground water samples from both the urban and rural areas were collected from the hand pumps (main source of drinking water). They were analyzed in a laboratory in Sydney, Australia for the determination of fluoride concentration (mg/L) in drinking water. The concentration of fluoride in the samples taken from the urban and rural areas were 0.60 and 1.25 mg/L, respectively.

Statistical analyses

The data were later entered into an electronic database for subsequent data analysis using Epi Info™ (Version 3.2.2) software. The total number of decayed, missing or filled permanent teeth (DMFT index) was calculated by this criterion.

Following the data checking, the mean DMFT scores were calculated. Firstly, bivariate associations between DMFT scores and the caries risk factors were explored which included use of tooth brush, frequency of tooth brushing, type of toothpastes, and consumption of sugar containing food items, beetle nut chewing, dental visits and reasons for dental visits. Secondly, the risk factors that were significantly associated in the bivariate analysis with the differences in DMFT groups were explored further in a logistic regression analysis to model potential predictors for caries experience in Grade 7 children.
RESULTS

The principals of the nine selected schools all agreed to include their schools in survey and on behalf of the parents, gave their consent for the oral examination of the children.

Primary dentition caries experience

A total of 200 Grade 1 children were examined in each of the socio-demographic groups. Overall, 60% of the Grade 1 children were caries free and although the level of caries freedom was greater in females, this gender difference was not significant (Table 2.1). There were more decayed teeth than missing teeth whereas the number of filled teeth were negligible. Among the decayed teeth, there were more 4mm sized cavities than 1mm.

The overall mean dmft score was 1.01. Children, both male and female, from the urban lower middle class had higher dmft scores, 1.45 and 1.17, respectively, compared with children in the other socio-demographic groups. The difference across the socio-demographic groups was significant (p = 0.010). Caries experience was lowest among the rural children.

Permanent dentition caries experience

Similarly, 200 Grade 7 children were examined in each of the socio-demographic groups (Table 2.2). The overall caries experience in this was 0.50 DMFT and 72 per cent were caries free. The DMFT score was highest (0.71) among children from the urban upper middle class and lowest (0.38) among those from the rural area. The differences across the groups was significant (p=0.030). Distributions of the caries experience statistics were similar across both male and female socio-demographic groups.
Caries experience and risk factors

Caries experience by oral health related behaviours and socio-demographic factors of the Grade 7 children are shown (Table 2.3). As noted in relation to the data in Table 2.2, socio-demographic status was significantly (p=0.030) associated with caries experience. No other variable was significantly associated, however, the association between fluorosis and DMFT approached significance (p=0.06).

Fluorosis prevalence was 51.5%. This proportion includes those with very mild or more severe fluorosis. Only 13.8% were classified as having normal tooth enamel and 33.9% were borderline and classified as questionable. Respective proportions having very mild, mild, moderate, and severe degrees of fluorosis were: 19.8, 17.4, 10.0 and 4.4%. Children without fluorosis had a mean DMFT score of 0.70 whereas children who had severe fluorosis had nearly half that score.

As a result of the dichotomisation of caries experience in the logistic regression analysis, the unadjusted odds ratios revealed that most degrees of fluorosis were associated with significantly less caries experience compared with no fluorosis (Table 2.4). This outcome was maintained (ORs of 0.56 or less) in the multiple regression analysis to control for potential confounding. Similarly, socio-demographic status remained as a significant independent predictor of caries experience of caries (OR=1.56) in children residing in Ferozepur while gender remained as a non-significant predictor.
Table 2.1: Primary dentition caries experience of Grade 1 children by socio-demographic status

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<th>d4mm&lt;sup&gt;b&lt;/sup&gt;</th>
<th>d</th>
<th>m</th>
<th>f</th>
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<sup>a</sup> Cavity diameter at least 1mm
<sup>b</sup> Cavity diameter of 4mm or more
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<th>$D_{4mm}$</th>
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<th>M</th>
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<td>0.75</td>
<td>0.010</td>
</tr>
<tr>
<td>Urban poor</td>
<td>90</td>
<td>82</td>
<td>0.10</td>
<td>0.16</td>
<td>0.28</td>
<td>0.04</td>
<td>0.00</td>
<td>0.32</td>
<td>0.83</td>
<td></td>
</tr>
<tr>
<td>Urban lower middle class</td>
<td>94</td>
<td>67</td>
<td>0.06</td>
<td>0.33</td>
<td>0.46</td>
<td>0.10</td>
<td>0.04</td>
<td>0.60</td>
<td>1.10</td>
<td></td>
</tr>
<tr>
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<td>99</td>
<td>67</td>
<td>0.25</td>
<td>0.33</td>
<td>0.66</td>
<td>0.03</td>
<td>0.01</td>
<td>0.69</td>
<td>1.17</td>
<td></td>
</tr>
<tr>
<td><strong>Both</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Rural</td>
<td>200</td>
<td>77</td>
<td>0.09</td>
<td>0.20</td>
<td>0.30</td>
<td>0.06</td>
<td>0.01</td>
<td>0.38</td>
<td>0.79</td>
<td>0.030</td>
</tr>
<tr>
<td>Urban poor</td>
<td>200</td>
<td>76</td>
<td>0.13</td>
<td>0.23</td>
<td>0.40</td>
<td>0.05</td>
<td>0.00</td>
<td>0.46</td>
<td>0.94</td>
<td></td>
</tr>
<tr>
<td>Urban lower middle class</td>
<td>200</td>
<td>70</td>
<td>0.08</td>
<td>0.26</td>
<td>0.40</td>
<td>0.07</td>
<td>0.02</td>
<td>0.49</td>
<td>0.94</td>
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</tr>
<tr>
<td>Urban upper middle class</td>
<td>200</td>
<td>67</td>
<td>0.26</td>
<td>0.35</td>
<td>0.64</td>
<td>0.04</td>
<td>0.02</td>
<td>0.71</td>
<td>1.18</td>
<td></td>
</tr>
<tr>
<td><strong>Males</strong></td>
<td>423</td>
<td>71</td>
<td>0.16</td>
<td>0.26</td>
<td>0.46</td>
<td>0.04</td>
<td>0.01</td>
<td>0.52</td>
<td>0.97</td>
<td></td>
</tr>
<tr>
<td><strong>Females</strong></td>
<td>377</td>
<td>74</td>
<td>0.12</td>
<td>0.25</td>
<td>0.41</td>
<td>0.06</td>
<td>0.01</td>
<td>0.49</td>
<td>0.99</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>800</td>
<td>72</td>
<td>0.14</td>
<td>0.25</td>
<td>0.44</td>
<td>0.05</td>
<td>0.01</td>
<td>0.50</td>
<td>0.98</td>
<td>0.398</td>
</tr>
</tbody>
</table>

a  Cavity diameter at least 1mm
b  Cavity diameter of 4mm or more
Table 2.3: Caries experience by oral health related behaviours and socio-demographic factors of Grade 7 children

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>%</th>
<th>%CF&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Mean DMFT</th>
<th>SD</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>How do you clean your teeth?</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Use of tooth brush</td>
<td>737</td>
<td>92.1</td>
<td>73</td>
<td>0.50</td>
<td>0.99</td>
<td>0.940</td>
</tr>
<tr>
<td>Other method or don't clean</td>
<td>63</td>
<td>7.8</td>
<td>71</td>
<td>0.49</td>
<td>0.95</td>
<td></td>
</tr>
<tr>
<td><strong>How often do you clean your teeth?</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>More than once daily</td>
<td>257</td>
<td>32.1</td>
<td>71</td>
<td>0.59</td>
<td>1.08</td>
<td>0.290</td>
</tr>
<tr>
<td>Once daily</td>
<td>466</td>
<td>58.2</td>
<td>75</td>
<td>0.47</td>
<td>0.95</td>
<td></td>
</tr>
<tr>
<td>Less than once daily or never</td>
<td>77</td>
<td>9.6</td>
<td>71</td>
<td>0.40</td>
<td>0.78</td>
<td></td>
</tr>
<tr>
<td><strong>Which of the type of toothpaste you use?</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fluoridated</td>
<td>730</td>
<td>91.2</td>
<td>74</td>
<td>0.50</td>
<td>0.99</td>
<td>0.240</td>
</tr>
<tr>
<td>Non-fluoridated</td>
<td>42</td>
<td>5.2</td>
<td>71</td>
<td>0.50</td>
<td>0.80</td>
<td></td>
</tr>
<tr>
<td>Don't use toothpaste</td>
<td>28</td>
<td>3.5</td>
<td>64</td>
<td>0.67</td>
<td>0.94</td>
<td></td>
</tr>
<tr>
<td><strong>Which sugar containing food items do you usually take between meals?</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sweets</td>
<td>122</td>
<td>15.2</td>
<td>75</td>
<td>0.48</td>
<td>1.02</td>
<td>0.200</td>
</tr>
<tr>
<td>Chocolates</td>
<td>60</td>
<td>7.5</td>
<td>60</td>
<td>0.78</td>
<td>1.09</td>
<td></td>
</tr>
<tr>
<td>Soft drink</td>
<td>72</td>
<td>9.0</td>
<td>71</td>
<td>0.48</td>
<td>0.94</td>
<td></td>
</tr>
<tr>
<td>Hot drinks</td>
<td>298</td>
<td>37.2</td>
<td>73</td>
<td>0.48</td>
<td>0.92</td>
<td></td>
</tr>
<tr>
<td>Biscuits</td>
<td>238</td>
<td>29.7</td>
<td>76</td>
<td>0.49</td>
<td>1.02</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>10</td>
<td>1.2</td>
<td>80</td>
<td>0.30</td>
<td>0.44</td>
<td></td>
</tr>
<tr>
<td><strong>How often do you chew betel/nut/pan?</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Daily or more than once daily</td>
<td>102</td>
<td>12.7</td>
<td>77</td>
<td>0.46</td>
<td>0.98</td>
<td>0.570</td>
</tr>
<tr>
<td>Once or twice a week</td>
<td>196</td>
<td>24.5</td>
<td>70</td>
<td>0.55</td>
<td>0.99</td>
<td></td>
</tr>
<tr>
<td>Never</td>
<td>502</td>
<td>62.7</td>
<td>74</td>
<td>0.50</td>
<td>0.98</td>
<td></td>
</tr>
</tbody>
</table>

*a* Caries Free

Continued over
<table>
<thead>
<tr>
<th>Have you been to a dentist?</th>
<th>N</th>
<th>%</th>
<th>%CF&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Mean DMFT</th>
<th>SD</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>358</td>
<td>44.7</td>
<td>71</td>
<td>0.56</td>
<td>1.01</td>
<td>0.120</td>
</tr>
<tr>
<td>No</td>
<td>442</td>
<td>55.2</td>
<td>75</td>
<td>0.46</td>
<td>0.95</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Why did you visit a dentist?</th>
<th>N</th>
<th>%</th>
<th>%CF&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Mean DMFT</th>
<th>SD</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Caries</td>
<td>339</td>
<td>94.7</td>
<td>71</td>
<td>0.57</td>
<td>1.02</td>
<td>0.870</td>
</tr>
<tr>
<td>Orthodontic reasons</td>
<td>19</td>
<td>5.3</td>
<td>68</td>
<td>0.58</td>
<td>0.96</td>
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</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Fluorosis score</th>
<th>N</th>
<th>%</th>
<th>%CF&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Mean DMFT</th>
<th>SD</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>No fluorosis</td>
<td>110</td>
<td>13.8</td>
<td>61</td>
<td>0.70</td>
<td>1.04</td>
<td>0.060</td>
</tr>
<tr>
<td>Questionable</td>
<td>271</td>
<td>33.9</td>
<td>76</td>
<td>0.41</td>
<td>0.85</td>
<td></td>
</tr>
<tr>
<td>Very mild</td>
<td>158</td>
<td>19.8</td>
<td>72</td>
<td>0.53</td>
<td>0.99</td>
<td></td>
</tr>
<tr>
<td>Mild</td>
<td>139</td>
<td>17.3</td>
<td>76</td>
<td>0.49</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>Moderate</td>
<td>80</td>
<td>10.0</td>
<td>76</td>
<td>0.56</td>
<td>1.19</td>
<td></td>
</tr>
<tr>
<td>Severe</td>
<td>35</td>
<td>4.3</td>
<td>80</td>
<td>0.34</td>
<td>0.80</td>
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</tr>
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<td>Missing values</td>
<td>7</td>
<td>0.1</td>
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<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Socio-demographic status</th>
<th>N</th>
<th>%</th>
<th>%CF&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Mean DMFT</th>
<th>SD</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rural</td>
<td>200</td>
<td>25.0</td>
<td>78</td>
<td>0.37</td>
<td>0.80</td>
<td>0.030</td>
</tr>
<tr>
<td>Urban poor</td>
<td>200</td>
<td>25.0</td>
<td>76</td>
<td>0.45</td>
<td>0.94</td>
<td></td>
</tr>
<tr>
<td>Urban lower middle</td>
<td>200</td>
<td>25.0</td>
<td>72</td>
<td>0.49</td>
<td>0.94</td>
<td></td>
</tr>
<tr>
<td>Urban upper middle</td>
<td>200</td>
<td>25.0</td>
<td>68</td>
<td>0.71</td>
<td>1.18</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Gender</th>
<th>N</th>
<th>%</th>
<th>%CF&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Mean DMFT</th>
<th>SD</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Males</td>
<td>423</td>
<td>52.9</td>
<td>72</td>
<td>0.52</td>
<td>0.97</td>
<td>0.390</td>
</tr>
<tr>
<td>Females</td>
<td>377</td>
<td>47.1</td>
<td>74</td>
<td>0.48</td>
<td>0.99</td>
<td></td>
</tr>
</tbody>
</table>

<sup>a</sup> Caries Free
Table 2.4: Logistic regression analysis of potential predictors for caries experience in Grade 7 children

<table>
<thead>
<tr>
<th>Variables</th>
<th>N</th>
<th>Unadjusted</th>
<th></th>
<th></th>
<th>Adjusted</th>
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<th></th>
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</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>OR</td>
<td>95% CI</td>
<td>p value</td>
<td>OR</td>
<td>95% CI</td>
<td>p value</td>
</tr>
<tr>
<td><strong>Socio-demographic status</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Urban upper middle</td>
<td>200</td>
<td>1.64</td>
<td>1.05</td>
<td>2.56</td>
<td>0.025</td>
<td>1.56</td>
<td>1.00</td>
</tr>
<tr>
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<td>1.46</td>
<td>0.94</td>
<td>2.29</td>
<td>0.090</td>
<td>1.40</td>
<td>0.89</td>
</tr>
<tr>
<td>Urban poor</td>
<td>200</td>
<td>1.05</td>
<td>0.66</td>
<td>1.67</td>
<td>0.810</td>
<td>0.96</td>
<td>0.60</td>
</tr>
<tr>
<td>Rural</td>
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<td>1.00</td>
<td></td>
<td></td>
<td></td>
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<td>1.00</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Questionable</td>
<td>271</td>
<td>0.38</td>
<td>0.15</td>
<td>0.97</td>
<td>0.040</td>
<td>0.52</td>
<td>0.32</td>
</tr>
<tr>
<td>Very mild</td>
<td>158</td>
<td>0.65</td>
<td>0.39</td>
<td>1.10</td>
<td>0.110</td>
<td>0.67</td>
<td>0.40</td>
</tr>
<tr>
<td>Mild</td>
<td>139</td>
<td>0.54</td>
<td>0.31</td>
<td>0.93</td>
<td>0.020</td>
<td>0.56</td>
<td>0.32</td>
</tr>
<tr>
<td>Moderate</td>
<td>80</td>
<td>0.48</td>
<td>0.25</td>
<td>0.92</td>
<td>0.020</td>
<td>0.52</td>
<td>0.27</td>
</tr>
<tr>
<td>Severe</td>
<td>35</td>
<td>0.38</td>
<td>0.15</td>
<td>0.97</td>
<td>0.040</td>
<td>0.39</td>
<td>0.15</td>
</tr>
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<td></td>
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<td>1.00</td>
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<tr>
<td><strong>Gender</strong></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
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<td>423</td>
<td>1.13</td>
<td>0.83</td>
<td>1.55</td>
<td>0.415</td>
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<td></td>
<td></td>
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<td>1.00</td>
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</tbody>
</table>

Caries experience dichotomised as DMFT = zero or 1 plus
DISCUSSION

The overall caries prevalence in 6 and 12 year old was low in comparison to the Goal 3 of the NOHCP 'To bring down the DMFT (decayed, missing, filled teeth) in school children aged 6-12 years from approximately 4 at present to less than 2'.

Risk of caries was significantly associated with socio-demographic status and fluorosis. The important question is whether the association is casual or not. As this is cross-sectional study, the caries experience outcome was measured directly on the day of survey, while exposures to the variables of interest were inferred on the basis of the current habits of the children. The weakness of this research design is the assumption that measures of exposure, based on current habits, may be biased estimates of previous habits. Hence, the inference we have drawn on the basis of the exposure estimate can only be interpreted as suggestive of a casual link, rather than proof of one. To prove causation, the ideal research design would be that of controlled cohort study in which the children would be followed for a period, throughout which their exposures to socio demographic factors and other oral health related behaviors along with confounding factors would be assessed at regular intervals. In this way, the exposures could be better quantified.

The inverse association between exposure to fluoride and caries prevalence has been well established in number of studies (Shetty & Tandon, 1998; Chawla et al., 2000; Acharya & Anuradha, 2003) and was confirmed in this study.

The higher caries experience of children living in urban areas, as shown in this study, has been observed in many other studies conducted in developing countries (Kuriakose & Joseph, 1996; Subrata & Subrata,
1996; Mandal et al., 2001) and they suggested that this was due to combination of (1) use of filter water in urban areas, (2) easy accessibility of fast food, candy and other sweets to urban children, (3) no or less pocket money given to rural children, or (4) a fibrous diet taken by rural children including use of sugarcane. However, although the caries experience of children was found to be higher in urban areas than in rural areas in this study, it was not confirmed that this was due to dietary or oral hygiene factors.

It is recommended, in line with the National Oral Health Policy resolution that a National Institute for Dental Research should be established to determine national oral health needs of the population (Lal et al., 2004).

**Conclusion**

Caries experience in the primary and permanent dentitions of children is lower than the goals set by National Oral Health Care Programme (NOHCP). High levels of fluorosis are probably due to high levels of fluoride naturally occurring in drinking water (0.60-1.25 mg/L) in urban and rural area respectively, and this indicates that further control of dental caries in Ferozepur must be achieved by means other than water fluoridation. The low caries experience of the children was most likely due to the high concentration of fluoride naturally occurring in drinking water. Urban children are more likely to have caries as compared with rural children because of the easy availability of refined rich sugar diet and use of filter water for drinking. Fluorides have once again proved to provide a caries preventive effect.
Acknowledgements

We are grateful to the school principals, parents, and children for their co-operation during the survey, and we thank the water engineer for data on the fluoride concentration in the water supplies in the survey regions.
Reference:


******************
Appendix A.

Letter of approval from the Human Research Ethics Committee, The University of Sydney, including, the Participant Information Sheet (English and Punjabi), the Parent/Guardian Consent Form (English and Punjabi), and the Need for Dental Care Form (English and Punjabi).
19 December 2006

Associate Professor W Evans
Community Oral Health and Epidemiology
Faculty of Dentistry
Westmead Centre for Oral Health
Westmead Hospital
C24

Dear Professor Evans

I am pleased to inform you that the Human Research Ethics Committee (HREC) at its meeting on 12 December 2006 approved your protocol entitled “Dental Survey of 6 year olds and 12 year olds in India”

Details of the approval are as follows:

Ref No.: 12-2006/9740
Approval Period: December 2006 – December 2007
Authorised Personnel:
Associate Professor W Evans
Dr M G Varkey
Dr B Christian
Dr A S Badwal
Dr P Grover
Dr P Mehta
Dr V Chabbra

The HREC is a fully constituted Ethics Committee in accordance with the National Statement on Ethical Conduct in Research Involving Humans-June 1999 under Section 2.6.

The approval of this project is conditional upon your continuing compliance with the National Statement on Ethical Conduct in Research Involving Humans. We draw to your attention the requirement that a report on this research must be submitted every 12 months from the date of the approval or on completion of the project, whichever occurs first. Failure to submit reports will result in withdrawal of consent for the project to proceed.

Special Condition of Approval
- Notify the name of schools in India when they become available.
Chief Investigator / Supervisor's responsibilities to ensure that:

(1) All serious and unexpected adverse events are to be reported to the HREC as soon as possible.

(2) All unforeseen events that might affect continued ethical acceptability of the project are to be reported to the HREC as soon as possible.

(3) The HREC must be notified as soon as possible of any changes to the protocol. All changes must be approved by the HREC before continuation of the research project. These include:

- If any of the investigators change or leave the University.
- Any changes to the Participant Information Statement and/or Consent Form.

(4) All research participants are to be provided with a Participant Information Statement and Consent Form, unless otherwise agreed by the Committee. The Participant Information Statement and Consent Form are to be on University of Sydney letterhead and include the full title of the research project and telephone contacts for the researchers, unless otherwise agreed by the Committee and the following statement must appear on the bottom of the Participant Information Statement. Any person with concerns or complaints about the conduct of a research study can contact the Senior Ethics Officer, University of Sydney, on (02) 9351 4811 (Telephone); (02) 9351 6706 (Facsimile) or gbriody@usyd.edu.au (Email).

(5) The HREC approval is valid for four (4) years from the Approval Period stated in this letter. Investigators are requested to submit a progress report annually.

(6) A report and a copy of any published material should be provided at the completion of the Project.

Yours sincerely

[Signature]

Associate Professor J D Watson
Chairman
Human Research Ethics Committee
PARTICIPANT INFORMATION STATEMENT

1. **What is this study about?**
   Oral health is an essential part of general health. This study will show the amount of tooth decay in children aged 6 and 12 years.

2. **Who is carrying out the study?**
   This study is being conducted by an Indian dentist, who is training to be a dental specialist. Associate Professor Wendell Evans at the University of Sydney – Australia supervises his training.

3. **What does the study involve?**
   This study is part of a big study carried out in four states of India. The study involves a dental examination of your child conducted according to World Health Organization standards. Dr Vishal Chhabra will also ask questions about your child’s oral habits.

4. **How much time will the study take?**
   It will take only few minutes to complete everything.

5. **Can I withdraw from the study?**
   Yes, you can withdraw anytime without penalty.

6. **What if I require further information?**
   Please contact Dr Vishal Chhabra by telephone 9216052700 for any further information.

Any person with concerns or complaints about the conduct of the research study can contact Manager for Ethics Administration, University of Sydney on (612) 9351 4811.

Page 1 of 1
PARENT/GUARDIAN CONSENT FORM

Title of research project: “Dental survey of 6 year olds and 12 year olds in India”
Name of Investigator: Dr Vishal Chhabra
Chief Investigator: Associate Professor Wendell Evans

I permit ....................., who is aged ............ years, to participate in the survey.

In giving consent I acknowledge that:

1. I have received the Patient Information Statement and that I have read and understood the information given.
2. Dr Vishal Chhabra has given me the opportunity to discuss this information and to ask questions about the project, and they have been answered to my satisfaction.
3. I understand that I can withdraw my child from the study at any time without penalty now or in the future.
4. I understand that if I have any further questions relating to my child’s participation in this survey I may contact Dr Chhabra who will be happy to answer them.

Signature of Parent/Guardian

.................................................. Date ......................................
Dental survey of 6 year olds and 12 year olds in India

NEED FOR DENTAL CARE

Dear Parent,

I have examined your child today and wish to inform you that he/she needs to attend the dental clinic at for dental treatment.

Sincerely,

Dr Vishal Chhabra
Dentist
1) दिल्ली दिशिताभ वेतन विवाह वर्ने है?
दिल्ली दिशिताभ वेतन विवाह 6 माघ 9 12 माघ देखी दिशिताभ देश देश दिशिताभ दी भावना बग़ा रही चमेली।

2) दिल्ली दिशिताभ वेतन बेच वर विलग है?
दिल्ली दिशिताभ वेतन वर दामदार दमदार बत विलग है। तेवह दिल्ली बाज़ी देश देश बाज़ी देश अड़े पीड़हिती। आमदीनाभ दी पूरीदिशिता देश देश दी दिशिता धारणी बत विलग है।

3) दिल्ली दिशिताभ वेतन दिल्ली वी वी भ्रमण है?
दिल्ली दिशिताभ वेतन दिल्ली पीड़ी देश देश दिल्ली है। तेवह दिल्ली वेतन पीड़हिताभ देश देश पूर्णाभ दिल्ली दो दिल्ली है। दिल्ली हिंदी देश देश देश देश अड़े पीड़हिती अड़े पीड़हिती वर धारण है।

4) दिल्ली दिशिताभ वेतन विवाह घरी देशी देशी है?
दिल्ली दिशिताभ वेतन विवाह विवाह दी वी देशी देशी है।

5) वी में दिल्ली दिशिताभ वेतन दूर देश में देश में?
उसी दिल्ली दिशिताभ वेतन दूर देशी ही देशी ही दिशिताभ देश देश में देश में है।

6) नेवल में दिल्ली दिशिताभ वेतन वर्ण दूर वर्ण वर्ण देश देश उं में विवाह करना?
देश देश दमदार दमदार देश देश देश तेलिफ़न है: 92160-52700 दे माघी बाज़ी।

नेवल देश है। दिल्ली वेतन वर्ण वर्ण हेती दिशिताभ हेतु उं दूर में वेश दप ओविस्म प्रेयरियल देश देश पूरीदिशिता भाव मिलती। देश है: (612) 93514811
मित्री जुलैहमिटी

देवदत्र अभ्यास समाप्ति

बक्का मणि जैजा मापण

6 अधुं 12 मास की दीवार की धीवारियाँ बनाएं थीं। जबकि दिन
भ-सिद्ध से आमरिति वे मैंहुनी ते रूपान

में दिया, मंतुवी दिसं ते वि मंका गा/नगर...... . . . . . . . . . . . . . . . . . .
मास
को दीवार की धीवारियाँ बनाए बेस दिन दिया है सबसे है।
में दिया भस्तुवी देत करी दित नेश दिस्निष्का महिमी धुंध बनता है।
1) में हिंग सेट हरी जोकार की सबक 6 दे 12 मास की दीवारें दीवार
धीवारियाँ बनाए वन की मुख्य पुष्व बन रही है। हिंग हूं वनवी मुख़
पर अन्य अन्य समझ सिद्ध है।
2) जहतं दिस्निष्का नाभपत के भेजू दिया भेजा दिता है विं में हिंग फूंशेट
बने छोटे रुपा मधुक बन सबक आए छोटा हूं हिंग। बने समझ आ
को सबक आ छोटा है दिता समझता ते संबंध में ओली ओलेभेजा ते दिता रधा
3) में दिया समझ दिस्निष्का है विं में आपके बेही हूं हिंग सिद्धशक्ति वन हैं
विं हूं वने देही जिमे। महाम्यां उ बुझा मधुक/मधुकी रां।
4) में समझ दिस्निष्का है नेबुज में थेट बेही हूं हिंग दिस्निष्का वन हैं
महाम्यां बने मधुक धूरा धूरा है उ। में जहतं दिस्निष्का नाभपत हूं
सभूवान बने मधुक/मधुकी रां। सब हिंग मधुकता का धारां धारां
समझता बनती है।

उमनाध्यक्ष भान्जा दिया में आमरिति...........

भिड़ी ..................
भिड़ती युगलितान्तरी
द्वारकादेव अहिलेमानी
बनबन अहिल वेशम नम्बिन

6 अंदे 12 मण्डल दिल के देशाँ में विभक्तियाँ घाते तो उच्च हिंद
देशाँ में मूँड़ख घाते

थिमा भेंडा प्रिया,
मैं इंग्लैंड बेंग एक... एक चावला चलाया यूरोप हो तो अपे
इंग्लैंड चमंटू चर्चित तां तिरंगा चमंटू तरस ए वलीमित्व

हिंदी
नूतनी दिलक्षण दमने रचणा मूँड़ख है।

आध ती द नजरियचर

मन. विक्रमशंकर वनक्षेत्र
दैर्घ्यमूर्त
Appendix B.

Letter to the District Education Officer seeking permission for conducting the survey.
21 February 2007

The District Education Officer
Ferozepur
Punjab
INDIA

Dear Sir,

**Dental survey of 6 year olds and 12 year olds in India**

I am the director of the Master of Dental Science (MDsc) program in the discipline of Community Oral Health and Epidemiology, Faculty of Dentistry, University of Sydney. Most candidates enrolled in this program are international students preparing to become specialists in Public Health Dentistry. During year 2 of the MDsc program, international students conduct a research project in their country of origin, relevant to a Public Health Dentistry theme of importance in that country.

My MDsc student, Dr Vishal Chhabra from India, graduated in dentistry from Baba Farid University of Health Sciences and Research and he is registered to practice dentistry with the Punjab Dental Council, India. He wishes to conduct his research project in Ferozepur in 2007. This will entail a dental survey of children attending schools in Ferozepur. The survey will comprise (1) a brief dental examination of the children that will be conducted according to World Health Organisation protocols, and (2) a short set of questions on oral habits and sugar intake to be answered by the children.

Altogether we plan to survey 1600 children; 400 in rural areas (200 6-year olds and 200 12-year olds) and 1200 in urban areas 3 x (6-year olds and 200 12-year olds) that is 400 in poor urban areas, 400 in lower middle-class areas and 400 in upper middle-class areas.

It is anticipated that this survey will take place during the months of February to August 2007.

I would be grateful if you advice on two matters. Firstly, what is the process for obtaining permission from your office for Dr Chhabra to conduct this proposed survey? Secondly, what are the requirements in relation to obtaining consent from the school principals and the parents of the children?

Thank you for your help and I look forward to hearing from you shortly.

Yours faithfully,

Wendell Evans
Appendix C.

Clinical Examination Form.
All India Dental Survey

Clinical examination for children aged 12

Name

School

ID

SEX

CLASS

AGE

0 = Sound
1 = Cavity at least 1mm diameter as seen using sharp eyes.
2 = Cavity of this size O (4mm) or greater (indicating need for urgent care)
3 = Filled and decayed
M = Missing due to caries
F = Filled and sound
T = Tooth that is fractured, discoloured, or missing due to trauma
8 = Unerupted permanent tooth and any remaining primary tooth
9 = Tooth extracted for orthodontic reasons

Fluorosis score

0 = Normal
1 = Questionable
2 = Very mild
3 = Mild
4 = Moderate
5 = Severe
X = Not recorded for any reason
Appendix D.

Questionnaire (English and Punjabi).
All India Dental Survey

Name

School

Class/Grade

ID

School

Age

1. How do you clean your teeth?
   1. Use a toothbrush.
   2. Use finger.
   3. Use neem sticks.
   0. Do not clean.

2. Some children clean their teeth...
   1. Once a week
   2. Twice a week
   3. Daily
   0. Never

   ..... how often do you clean your teeth?

3. Which of the following toothpastes do you use?
   (To be selected from a basket containing commonly used toothpastes, and other tooth cleaning items used in India)

5. Which of the following sugar containing food item you consume during meals?
   (Food items to be included will be those food items commonly consumed in community under investigation.)

6. Some children chew or use betel nut/pan?
   1. Once a week
   2. Twice a week
   3. Once daily
   4. More than once daily
   0. Never

   ..... how often do you chew or use betel nut/pan?

7. Have you been to a dentist?
   0. No
   1. Yes

8. Why did you visit a dentist?
   1. Had toothache
   2. Needed a filling
   3. Need a checkup
   4. To have my teeth straightened
   5. Other ___________________________

54
12 मास के दौरान छोटी घीमैलीक्रा घाते पेंश पुष्टवटकी

1) कमी अफटे सेंट लिम उल्लाम मास बतले दे ।
   1) त्रुष गूण रक्ष 2) त्रिगोल रक्ष 3) तौर दी चुनूल रक्ष 4) बलचे कदी

2) कमी विलींग घात सेंट मास कबले दे ।
   1) उद्वेल ए दिव घाती 2) उद्वेल दे घाती 3) देस दिव घाती 4) देस दे शिखरण घाती 5) बलचे कदी ।

3) कमी विलुप्त  दिव पेंट बलचे दे ।

4) कमी विलींग घात गिरीक्रा चीम घाते दे हिलागट घाते दे ।
   1) चलहेट 2) बेलकड बिन्ह 3) बिन्हवट 4) भिन्धविभा 5) चाव सां देखी 6) देस बुख

5) 1) कमी धात सां दिखनी विलींग घात बनने दे ।
   1) उद्वेल दिव धात 2) उद्वेल दे धात 3) उद्वेल दिव धात 4) देस दिव दे धात 5) बलचे कदी

6) वी कमी सेंट दे ज्वरवट वेल जाखे दे ।
   1) ता 2) तही

7) कमी सेंट दे ज्वरवट वेल भिझ जाखे ।
   1) सेंट ज्वरवट भी 2) सेंट ज्वरवट भी
   3) सेंट ज्वर ज्वरवट भी 4) निपो ज्वरवट भी
Appendix E.

Letters regarding survey and consent from respective schools.
TO WHOM IT MAY CONCERN

Certified that Dr. Vishal Chhabra from the University of Sydney (Australia) performed a dental check up of the students (age group of 6 to 12) on 3rd April 2007, at our school premises.

We extend our sincere thanks to him for the same and wish him a bright future.

Principal
Assumption Convent School
(Recognised)
ABOHAR-152116
TO WHOM IT MAY CONCERN

Certified that Dr. Vishal Chhabra from the University of Sydney (Australia) did dental examination of 6 to 12 years old children in this school on 30.04.2007.

The school administration, staff and the students are thankful to him for the same and wish him a bright future.

PRINCIPAL

L.R.S. D.A.V. Sr. Sec. Model School
ABOHAR-152116

Vjay Luxmy
TO WHOM IT MAY CONCERN

Certified that Dr. Vishal Chhabra from the University of Sydney (Australia) did dental examination of 6 to 12 years old children in this school on April 16 & 17, 2007.

The school administration, staff and the students are thankful to him for this good cause and wish him a bright future.

Principal
Amrit Model Sr. Sec. School
ABOHAR-152116 (PB.)

PRINCIPAL
To whom it may concern.

Certified that Dr. Vishal Chhabra from the University of Sydney (Australia) performed a dental check up of the students (age group of 6 to 12) on 11th April 2007, at our school premises.

We extend our sincere thanks to him for the same and wish him a very bright future.

[Signature]
Principal
Flower Valley Public School
(Affiliated to Punjab School Education Board, Mohali)
G, Patel Nagar, ABOHAR-15211
Ph.: 01634-22192

Dated 02/05/07
To whom it may concern

Dr. Vishal Chabra from the University of Sydney did dental examination of 6 and 12 year old children in our school on 21/4/07.

We are thankful to him in this regard.
To whom it may concern

Certified that Mr. Vishal Chabbra from the University of Sydney (Australia) sat their exam on 6 to 12 years section on 28th April 2017. The exam was conducted thoroughly and we are happy with the results. We wish him all the best for his life and bright future.

Principal
ANMOL HIGH SCHOOL
Affiliated to PSEB
Nai Abadi, Abohar
Dental Survey of 6 and 12 year old children

To whom it may concern,

Dr. Vishal Chhabra from the University of Sydney did dental examination of 6 and 12 year old children in our school on 21/4/07.

We are very thankful to him in this regard.

[Signature]
Govt Middle School
Mamau-khera

Subject - Dental Survey of 6 and 12 year old children.

To Whom it may Concern,

Dr. Vishal Chhabra from the University of Sydney, did dental examination of 6 and 12 year old children in our school on 3/5/07.

We are very thankful to him in this regard.

Anita Kaur
3/5/07

[Signature]
Dental survey of 6 year olds and 12 year olds in India

CONSENT FORM

Consent to allow for the Dental Survey

I agree for the Dental Survey of children aged 6 and 12 years to be conducted in my school.

On behalf of the children and their parents who are not English literate, I give consent for the children to be examined.

I acknowledge that the purpose of the survey and how it will be conducted has been explained to me.

I understand that the examination is not compulsory and that any child who is not willing to be examined may refuse without prejudice.

Name of School ____________________________

Name of School Principal ____________________________

Signature ____________________________

Date ____________________________
Dental survey of 6 year olds and 12 year olds in India

CONSENT FORM

Consent to allow for the Dental Survey

I agree for the Dental Survey of children aged 6 and 12 years to be conducted in my school.

On behalf of the children and their parents who are not English literate, I give consent for the children to be examined.

I acknowledge that the purpose of the survey and how it will be conducted has been explained to me.

I understand that the examination is not compulsory and that any child who is not willing to be examined may refuse without prejudice.

Name of School: Assumption Convent School

Name of School Principal: Sr. Ambrosia

Signature: [Signature]

Date: 29.3.2007
Dental survey of 6 year olds and 12 year olds in India

CONSENT FORM

Consent to allow for the Dental Survey

I agree for the Dental Survey of children aged 6 and 12 years to be conducted in my school.

On behalf of the children and their parents who are not English literate, I give consent for the children to be examined.

I acknowledge that the purpose of the survey and how it will be conducted has been explained to me.

I understand that the examination is not compulsory and that any child who is not willing to be examined may refuse without prejudice.

Name of School  
L.R.S. D.A.V. SR. SEC. MODEL SCHOOL, ABHAR

Name of School Principal  
Mrs. KUSUM KHUNJARI

Signature

Date  
24th April, 2007

Vijay Laxmi
Dental survey of 6 year olds and 12 year olds in India

CONSENT FORM

Consent to allow for the Dental Survey

I agree for the Dental Survey of children aged 6 and 12 years to be conducted in my school.

On behalf of the children and their parents who are not English literate, I give consent for the children to be examined.

I acknowledge that the purpose of the survey and how it will be conducted has been explained to me.

I understand that the examination is not compulsory and that any child who is not willing to be examined may refuse without prejudice.

Name of School: Amrit Model School

Name of School Principal: [Signature]

Signature: [Signature]

Date: [Date]

Page 1 of 1
Dental survey of 6 year olds and 12 year olds in India

CONSENT FORM

Consent to allow for the Dental Survey

I agree for the Dental Survey of children aged 6 and 12 years to be conducted in my school.

On behalf of the children and their parents who are not English literate, I give consent for the children to be examined.

I acknowledge that the purpose of the survey and how it will be conducted has been explained to me.

I understand that the examination is not compulsory and that any child who is not willing to be examined may refuse without prejudice.

Name of School: Flower Valley Public School

Name of School Principal: [Signature]

Date: 12 April 2007.
Dental survey of 6 year olds and 12 year olds in India

CONSENT FORM

Consent to allow for the Dental Survey

I agree for the Dental Survey of children aged 6 and 12 years to be conducted in my school.

On behalf of the children and their parents who are not English literate, I give consent for the children to be examined.

I acknowledge that the purpose of the survey and how it will be conducted has been explained to me.

I understand that the examination is not compulsory and that any child who is not willing to be examined may refuse without prejudice.

Name of School: Government middle school, Mammurea
Name of School Principal: Anil Kumar
Signature: [Signature]
Date: 3/5/07
Dental survey of 6 year olds and 12 year olds in India

CONSENT FORM

Consent to allow for the Dental Survey

I agree for the Dental Survey of children aged 6 and 12 years to be conducted in my school.

On behalf of the children and their parents who are not English literate, I give consent for the children to be examined.

I acknowledge that the purpose of the survey and how it will be conducted has been explained to me.

I understand that the examination is not compulsory and that any child who is not willing to be examined may refuse without prejudice.

Name of School: Agnaol High School, Abhav

Name of School Principal: Kailesh Chandran Wadhwa

Signature: [Signature]

Date: 30, 11, 2023
Dental survey of 6 year olds and 12 year olds in India

CONSENT FORM

Consent to allow for the Dental Survey

I agree for the Dental Survey of children aged 6 and 12 years to be conducted in my school.

On behalf of the children and their parents who are not English literate, I give consent for the children to be examined.

I acknowledge that the purpose of the survey and how it will be conducted has been explained to me.

I understand that the examination is not compulsory and that any child who is not willing to be examined may refuse without prejudice.

Name of School: ESI H S Bejulpur Kanhiyawan

Name of School Principal: OM PARRASH

Signature: [Signature]

Date: [Date]
Dental survey of 6 year olds and 12 year olds in India

CONSENT FORM

Consent to allow for the Dental Survey

I agree for the Dental Survey of children aged 6 and 12 years to be conducted in my school.

On behalf of the children and their parents who are not English literate, I give consent for the children to be examined.

I acknowledge that the purpose of the survey and how it will be conducted has been explained to me.

I understand that the examination is not compulsory and that any child who is not willing to be examined may refuse without prejudice.

Name of School ____________________________

Name of School Principal _______________________

Signature _______________________

Date 16/02/07

Page 1 of 1
Appendix F.

Map of Ferozepur (Punjab).
Jammu & KASHMIR

PAKISTAN

Gurudaspur
Hoshiapur

Amritsar

Kapurthala

Firozpur
Ludhiyana

Rupnagar

Chandigarh

Jalandhar

Punjab

Bathinda
Sangrur

Mansa


distressed

Rajasthan

Haryana

Travelite

Map not to scale
Appendix G.

Press cutting regarding survey.
राष्ट्रीय औद्योगिक समिति में विभाग, वाराणसी जिला, उन्नति ध्वनि, वित्त और संयुक्त स्थानीय गठबंधन के बीच विवाद द्वारा निर्णय निर्णय
NEWS IN INDIAN NATIONAL NEWSPAPER (AJEET)

FLUORIDE A BIG ENEMY OF DENTAL CARIES- Dr.CHHABRA

Village Arniwala, 7 May (Sandhu)- Dr Vishal Chhabra who is doing dental specialization from University of Sydney, has done dental check up of 55 children among 6 and 12 year old age group. He told that the ground water in this area is unfit to drink as it has high levels of fluoride concentration which is leading to discoloration and loss of tooth structure. In order to protect teeth from decay water must have ideally 1ppm levels of fluoride. More than that can cause systemic side effects. Even toothpastes companies add fluoride. So people of this area must use filter water for drinking. Dr.Chhabra is the son of Mr. Jagjeet Chhabra from Abohar (Firozepur). He has altogether examined 1600 children from different villages and towns in Firozepur, Punjab. His team includes Anita chhabra, Ragini Chhabra and Simar Kaur.

(Photograph Enclosed)

Sd. Jagjeet Chhabra

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TRANSLATION FROM HINDI TO ENGLISH IS CORRECT

ATTESTED
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Appendix H.

The [Indian] National Oral Health Policy resolutions

1. Oral health policy to become an integral part of National health policy.
2. A National Oral Health Program to be launched to provide oral health care in rural and urban areas.
3. To create a Dental Advisor post in the Directorate of General Health Services.
4. To prevent the rising trend of dental diseases in India through preventive and promotive oral health services at the primary care level.
5. To establish a pilot project in five districts in five state to implement the services identified in (4) above initially, and later in all states.
6. To legislate for statutory warnings about the causes of oral disease to be placed on confectionary and tobacco products.
7. To establish a National Training Centre to oversee the training of oral health care personnel.
8. Dental clinics to be set up in all District Hospitals and Community Health Centers.
9. All dental colleges should train dental hygienists and dental technicians.
10. To establish a National Institute for Dental Research to determine national oral health needs.
Appendix I.

The [Indian] National Oral Health Care Programme (NOHCP) Goals

1. Oral Health for all by the year 2010.
2. To bring down the incidence of oral and dental diseases to less than 40% from the existing prevalence of 90%.
3. To bring down the DMFT (decayed, missing, filled teeth) in school children aged 6-12 years from approximately 4 at present to less than 2.
4. To reduce high prevalence of periodontal diseases to lower prevalence.
5. At the age of 18 years, 85% should retain all their teeth.
6. To achieve 50% reduction in edentulousness between the age of 35-44 years.
7. To achieve 25% reduction in edentulousness at the age of 65 years and above.
8. To achieve 50% reduction in the present level of malocclusion and dento-facial deformities.
9. To reduce the number of new cases of Oral Cancers and precancerous lesions from the existing levels.

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