

Smile Mum Study

Evaluation of 'Smile Mum'- a program to improve the oral health of pregnant women and reduce the risk of oral disease for them and their child.



Author

Elizabeth (Baldwin) Russell
DipDentalHyg/Ther, GradDipEd
Oral Health Services
Deniliquin NSW 2710
Associate Lecturer in Oral Health Therapy
Charles Sturt University
Wagga Wagga NSW 2650
Phone: 0430 055 533
Email: lrussell@csu.edu.au

Acknowledgements

The author would like to acknowledge the following people for their support:

- Linda Cutler for her vision in developing the Rural Research Capacity Building Program, Emma Webster for her excellent organisation of the program workshops and ongoing guidance, and all of the workshop presenters and participants for their generosity in sharing knowledge,
- Mary-Anne Menhennitt for editing and data management throughout the study process, and also for her kindness and encouragement,
- Jennifer Noller and the Centre for Oral Health Strategy for their ongoing support of the Smile Mum Program,
- Aaron Cashmore for help in achieving ethics approval,
- David Schmidt for his sustained interest and for helping me over the line,
- My wonderful Smile Mum dental team and,
- All the “Smile Mums” who made the story for this report.

This research was funded by the Health Education and Training Institute, Rural Division.

Abbreviations

CIPTN – Community Index of Periodontal Treatment Needs

DMFT – Decayed, Missing and Filled Teeth

DTH – Dental Therapist/Hygienist

ECC – Early Childhood Caries

OHT – Oral Health Therapist

SMP – Smile Mum Program

S Mutans – Streptococcus Mutans

Table of Contents

Section	Page
Abbreviations	2
Abstract	4
Executive Summary	5
Introduction	6
Background	7
Method	12
Results	16
Discussion	22
Conclusion and Recommendations	25
References	26
Appendices	29

List of tables

Figure 1: Percentages of the referral sources for participants in SMP.

Figure 2: Post SMP survey responses – Access.

Figure 3: Oral disease risk assessment score of High, Moderate and Low showing difference between pre and post SMP.

Figure 4: Box plot of median pre and post CIPTN scores.

Figure 5: Post SMP survey responses – Oral Health.

Figure 6: Mean ante-natal and post-natal oral hygiene quiz scores – 8 questions.

Figure 7: Responses to questions on health behaviours associated with maternal to baby oral bacterial transmission.”

Figure 8: Participant satisfaction with SMP.

Appendices

Appendix 1: Participant Information Sheet

Appendix 2: Participant Consent Form

Appendix 3: SMP Knowledge Quiz

Appendix 4: Post SMP Survey

Abstract

Background

A pregnant woman's oral health has implications for her child both before and after its birth. Good oral health during pregnancy is vital but not always a priority.

The Smile Mum Program, (SMP), is an oral health intervention for pregnant women. The aims of this study were to determine whether SMP resulted in improved access to dental services and better oral health for the study participants. It also examined whether the program increased knowledge of maternal oral health links to pregnancy outcomes and to early childhood caries. Finally it explored the participant satisfaction with the program components.

Methods

The study participants, n=17, were selected from women who completed both the pre and post natal SMP appointments. All participants were holders of a government concession card and the participation rate was 49% of those invited.

The study compared results from the Smile Mum data base which collected pre and post natal oral examination and lifestyle data.

As well, a 28 question, Likert scaled survey was distributed to the participants asking about their knowledge of mother and baby oral health links, their current oral health practices and their Smile Mum experience.

Results

The study showed that the SMP increased access to dental treatment for most participants and that ante natal health providers were an important referral pathway. There was a high level of satisfaction with the program and most had increased knowledge of maternal and child oral health links. The pre and post natal comparison showed that there was an overall improvement in oral hygiene and a significant improvement in the oral disease risk assessment scores pre and post program.

Conclusions

The Smile Mum Study provided a small but important body of evidence to support the value of oral health intervention for pregnant women in public oral health services. Whilst modest improvements were seen in clinical data, the overall increased oral health knowledge and improved attitude to dental treatment should result in a decrease in the risk of oral disease for the participants and their children. The study also demonstrated the value of the oral health practitioner as a smoking cessation counsellor. This report recommends a continuation of the SMP that includes a screening for the caries status of the children at age five.

Key words: caries, oral health, periodontal disease, pregnancy, S Mutans.

Executive Summary

The prevalence and severity of oral disease has decreased in New South Wales over the past fifty years, but improvement is not spread evenly across the population. Risk groups for oral disease remain and include those that live in rural and socially disadvantaged communities with restricted access to dental services. Deniliquin is a medium sized town that acts as a hub for a geographically large farming area of the Southern Riverina and has a degree of disadvantage that is currently associated with a community that relies on the farming sector.

The Deniliquin State Government public dental clinic, and the local private dental practice, both operate with long waiting lists for dental treatment. This situation makes it paramount that dental resources are targeted to those most in need.

Pregnancy has been identified as time of heightened oral health needs. Pregnant women are more likely to develop dental caries or periodontal infections than when not pregnant. Oral health during pregnancy also has implications for the unborn child as studies link gum disease to preterm and low birth weight babies. It is safer for a mother and her baby to have dental infection treated during pregnancy than to postpone such treatment.

A mother's oral health may also impact on that of her child via the transmission of decay causing bacteria, increasing the risk for the child to develop early childhood caries, (ECC).

Good oral health during pregnancy has the potential to achieve better health outcomes for both the mother and the baby in the short and longer terms. However, dental treatment is not routinely considered part of a woman's pre natal health care by either the pregnant woman or her doctor.

There is a need for dental professionals to place a focus on pregnancy, and to investigate ways to spread that focus through the obstetric community, to facilitate oral health for pregnant women.

One recent attempt has been the Smile Mum Program, (SMP) that was piloted and is ongoing at the Deniliquin Dental Clinic since March 2009. The SMP is an oral health intervention that offers dental treatment, oral health products and counselling to eligible pregnant women. It relies on partnerships created with the local pre natal care providers to refer eligible pregnant women to oral health services.

The Smile Mum Study is an investigation and evaluation of the SMP. The study method is via the analysis of the Smile Mum data base that collected pre and post natal clinical examination, lifestyle and oral health knowledge details from the study participants. The study also utilised a post program survey that examined participant's attitudes, knowledge of maternal and infant oral health links and their satisfaction with the SMP.

The characteristics of the study group support the efficacy of the SMP in reaching an identified, oral disease risk target group as evidenced by social disadvantage, (all were holders of a Government Concession card), and higher than normal smoking rates.

The study demonstrated that the SMP increased access to dental services for women who had not routinely sought dental treatment in the past. It was shown that most of the referrals to the SMP came from midwives and doctors, proving the value of these interdisciplinary partnerships.

The study results show that the SMP participants showed an improvement in their oral health measures at the post natal examination data collection. These improvements included less oral disease, better oral hygiene, greater oral health knowledge and a more positive approach to oral health and dental treatment.

The survey revealed a high level of satisfaction with the SMP and most participants reported being happy with the dental treatment that they received.

Of more long term significance, are the results that show an increase in the participant's knowledge of maternal and infant oral health links. It is hoped that this will determine low rates of ECC for the offspring of the Smile Mums.

The study highlighted the benefits of the team approach in the SMP with the collaboration of the dentist and the Dental Therapist, Hygienist, (DTH), providing an efficient and optimal treatment model for an identified risk group. The results also indicate that dental professionals have an important role in the provision of smoking cessation counselling.

Whilst the study shows clear benefits of the SMP, the sample size is small, and further investigation over a longer period of time should produce more compelling evidence. The author recommends a continuation of the program including ongoing data collection and analysis. It would also be pertinent to the aims of this study to assess the oral health SMP participant's offspring at age five as an indicator of the value of the SMP in the prevention of ECC.

The Smile Mum Study has shown promise and further strategies are recommended to permanently embed policy and treatment protocols for pregnant women in the NSW Oral Health Service.

Introduction

The NSW Oral Health Promotion Framework for Action 2010 document identifies strategies to address priorities for oral health for the people of NSW. These strategies helped to form the design of the SMP which aimed to increase access, improve oral health and increase awareness of the importance of oral health for the identified risk group – eligible pregnant women.

This report describes the Smile Mum Study which is an evaluation of the SMP for pregnant women that operates from a NSW rural public dental clinic.

This examination of a practical implementation of the afore-mentioned strategies provides evidence of the strengths and weaknesses of the program and should help in the formulation of future strategies aimed at achieving better health for mothers and babies. This study will be of interest to both policy makers and clinicians of the NSW Oral Health Service, particularly those that work in rural areas.

Background

Oral health in pregnancy

Pregnancy poses special challenges to a woman's oral health with an increase in the incidence of caries, gum disease and enamel erosion. ^(1,2) Nausea and vomiting are common symptoms of most pregnancies. Stomach acids associated with morning sickness can erode tooth enamel and cause tooth hypersensitivity. ⁽¹⁻³⁾ Cravings and changed dietary habits present a risk for the development of caries. Standard preventative measures including dietary advice, oral hygiene instruction and use of fluoride toothpastes should be recommended for pregnant women. ⁽⁵⁾

More profound and widespread than the effects on the teeth during pregnancy are the effects on the soft tissues that support the teeth. These soft tissues are made up of the gingiva, (gums) that surround the tooth and the periodontium that is part of the deeper tissues that surround and support the tooth root. Infections of both these tissues are called gingivitis and periodontitis respectively, and gum disease collectively.

A study by Christoffers et al (2003) showed that fluctuating and elevated hormonal levels during pregnancy increase the tissue response to the bacteria in plaque, cause inflammation and reduce the body's ability to repair and maintain gingival tissue. ⁽⁶⁾

Gingivitis is usually painless - the main symptom being bleeding gums. Bleeding gums are reported by most pregnant women but are not always recognized as a sign of poor oral health or as a condition needing dental attention. Plutzer et al (2007) identified that self-assessment of oral health during pregnancy is problematic for the self-initiation of dental care. ⁽³⁾

Untreated gingivitis will usually progress to periodontal disease and this disease has serious health implications. Chronic periodontal infection can act as a reservoir for inflammatory mediators which are thought to be linked to a range of systemic conditions such as heart disease, respiratory diseases, and diabetes and possibly to other inflammatory conditions. ^(4,6)

Implications for birth outcomes

Research now suggests maternal periodontitis during pregnancy can increase the risk of adverse pregnancy outcomes such as preterm delivery and low birth weight infant. ^(9,10,12)

There is a growing body of work that supports a relationship between maternal infection and foetal pathologies.⁽⁸⁻¹⁰⁾ One such study is that conducted by Leiff et al (2003) on the periodontal status and pregnancy outcomes of a cohort of pregnant women. This study enrolled healthy women at 26 weeks gestation and via a process of questionnaires, dental and periodontal examinations and the collection and analysis of serum. A total of 1117 women were enrolled. Data collected included demographic risk assessment and clinical measurements of periodontal disease. The serum was examined for the presence of specific inflammatory markers, (C Reactive Protein). It was not possible to conclusively link this marker to an oral infection as it may have been present due to some infection from another unidentified site. However, the results of this study showed a correlation between moderate to severe periodontitis during pregnancy and preterm births. ⁽¹¹⁾ A secondary analysis of the data by Boggess et al (2005), also

showed the same correlation of moderate to severe periodontal disease and low birth weight babies.⁽¹²⁾

In a review of the literature, Katz et al (2006), acknowledges that whilst not all studies support the periodontal disease and pregnancy complications links, the trend is to support the association, especially in disadvantaged populations. Negative studies occur mainly in more affluent communities.⁽¹¹⁾

In view of this trend it seems prudent for the dental profession to accept that the association between periodontal disease and pregnancy outcomes is likely and that this association should inform dental treatment protocols. This has significance for the target group for treatment in public Oral Health Services as eligibility is determined by a government concession card which indicates some socio-economic disadvantage. This approach has the potential to improve the birth outcomes of the target group but may also have some longer lasting health benefits for the offspring.

Maternal levels of cariogenic bacteria and the development of early childhood caries.

Whilst the general population has better oral health than that of 30 years ago, there exists a worrying trend in the oral health of some of our very young.⁽¹³⁾ Early childhood caries (ECC), is defined by the US National Institute of Health as the presence of one or more decayed, missing or filled teeth (DMFT), in a child 71 months of age or younger.

A critical review of the research of this trend was undertaken by Law et al (2007). He found that the condition was responsible for the majority of dental abscesses and toothache in children who often require invasive treatment and general anaesthesia. ECC affects up to 17% of 2 to 3 year olds and is more prevalent amongst children from disadvantaged circumstances.^(14,15)

Dental caries is a multi-factorial disease and one factor is the presence of cariogenic bacteria. Studies show the principle oral bacteria responsible for the initiation and development of ECC is Streptococci Mutans, (S Mutans). Streptococcus Mutans is not detected in the mouth of new-born infants but is transmitted to children from their mothers sometime after birth. The risk of inoculation increases with high maternal salivary levels of S Mutans and the frequency of contact with the mother's saliva. Clinical studies have shown the caries risk for the child to be co-related to the age of inoculation. Delaying the colonization of the infant's mouth with S Mutans should reduce their risk for developing ECC.⁽¹³⁻¹⁵⁾

Whilst the maternal to infant transmission of S Mutans is regarded to be a primary factor in the development of ECC, it is prudent to remember that other factors are also important. This is discussed in an article by Hallet et al, (2009), that examined the determinants of ECC. He used questionnaires and dental examinations in cross sectional study of 2515 pre-school aged children. The results of this study expanded on the microbial model of ECC development to include various social, behavioural and demographic factors.⁽¹⁵⁾ This research supports the evidence that caries is more prevalent among disadvantaged children. It also looked at feeding and oral hygiene habits and identified prolonged use of the bottle is the most important determinant for the development of ECC.⁽¹⁵⁾

The relevance of these aforementioned articles to this study is that there remains an importance to recognize the complex nature of oral disease. One cause and one solution is not a true fit for this problem. However, it is true that dietary advice, including that of

the correct use of bottle for infants, and oral hygiene instructions have been part of the treatment strategies by dental professionals for at least three decades and yet the rates of ECC in risk groups remains high.⁽¹⁵⁾ This study does not advocate “throwing the baby out with the bath water”. Adding the message of bacterial transmission from mother to baby, with existing dietary and oral hygiene advice, can enhance the oral health promotion message. It has the potential to at least delay the onset of ECC and make the mother more aware of the importance of her own oral hygiene.⁽¹³⁾

Dental care practices of pregnant women

Most women see pregnancy as a time for greater focus on their health but do not include their oral health in this focus.^(3,7,16)

The pregnancy risk assessment monitoring system is an ongoing data collection program running across four states in America and since 1998. One analysis report by Gaffield et al, 2001 found that less than half of the surveyed women accessed dental care when pregnant and were less likely to do so if from socially disadvantaged backgrounds. This is in spite of more than half of the respondents reporting some dental problems during pregnancy.⁽¹⁷⁾

Another survey completed by women in the post natal ward of an Adelaide Women’s Hospital support the results of the American study. The Adelaide study, Thomas et al (2008), found that most women had some knowledge of oral health issues, less knowledge about periodontal disease than about caries, and that whilst most agreed about the need to attend dental appointments, less than half actually did so during their pregnancy.⁽¹⁶⁾ The results also showed less knowledge and dental treatment access was related to low socio-economic and low income participants. This group would usually go to the dentist when they are experiencing pain in their mouth.⁽¹⁶⁾ This is hardly ideal as pregnant women experiencing such symptoms are already in a state of infection that could pose risks to their own general and oral health and to that of their unborn baby.^(1,2,8-10)

The challenge for the Oral Health Department is how to get pregnant women to come to the clinics in the early stages of their pregnancy, so that oral care becomes part of their general pre natal care and is delivered early enough to prevent oral health complications of pregnancy for both the mother and the baby.⁽¹⁸⁾

One strategy to achieve this is to recruit the support of other medical disciplines that routinely see a woman during her pregnancy.⁽¹⁹⁾

Understanding or responding to, oral health needs of pregnant women by non-dental, pre natal health care providers.

Gaffield et al (2001) states that a coordinated effort from the dental and the obstetric communities could benefit maternal oral health and perinatal outcomes.⁽¹⁷⁾

The primary health care provider to a pregnant woman is her G.P. or Obstetrician. The survey by Thomas et al (2008) found that although 64% of obstetricians reported a need for dental care during pregnancy only 40% of women were advised that a dental visit should be part of ante natal care.^(16.)

As part of the SMP, training sessions were delivered to the pre natal health care providers of the Deniliquin and surrounding areas. These sessions were attended by doctors and other staff of medical clinics, maternity wards, pre natal groups etc.

Education included pregnancy and oral health messages and information on how to incorporate these messages into the pre natal care they provided to their clients. They were also asked to refer their clients to the Oral Health Service and were provided with resources to help with the referral process and with oral health promotion. Various media was also used in the local area to promote Smile Mum.

This study will look at whether this initiative resulted in better access to dental services for eligible pregnant women.

Oral health interventions

It has been shown that oral health interventions work. In 2007 Plutzer and Spencer reported on a program they ran in Adelaide where a group of mothers were given oral health education during pregnancy and again when their child was 6 and 12 months. The results showed an ECC rate of 1.7% for the test group and 9.6% for the control group that did not receive the intervention. ⁽¹³⁾

The chief goal of oral health interventions during pregnancy is to achieve a mouth free of infection and inflammation for the pregnant women to reduce the risks to both her baby and to herself and the best time to have dental treatment is “as soon as possible”.^(1,2,9,12) There are reasons to schedule dental treatment during the middle trimester for the comfort of the mother and to limit exposures to the foetus, but studies show no relationship between adverse pregnancy outcomes and dental treatment.^(7,20) In fact, timely diagnosis and treatment of dental disease – including radiographs, periodontal care and the use of local anaesthesia – are highly beneficial and far outweigh the known risks of not obtaining care.^(1,9,10,12,20)

Team Approach

We know that oral health interventions can lower the burden of disease to both the population and to those responsible for providing a dental service to that same population.^(1,5,7,10,13,19,21) However there are barriers to implementing intervention strategies in the public dental system.^(22,23)

The number of Oral Health professionals falls short of that needed to meet the current community need. That need is expected to continue to increase along with the increase in an aging population. ⁽²³⁻²⁵⁾

This situation places extreme pressure on both the public and private sector dental services and this is especially felt in rural and remote populations. In the NSW Oral Health Service there exists long waiting periods for treatment.⁽²⁷⁾ By necessity, the treatment provided is often likely to be 'relief of pain', extractions or restorations of teeth, rather than on the more preventative treatment modalities. This approach does little to lower the demand for service, or to address the issue of the links between dentistry and general health. ^(23,24)

One strategy to improve this situation is by the full utilisation of the skills of the Oral Health Therapist, (OHT),- formerly the combination of both the Dental Therapist and Dental Hygienist qualifications.⁽²⁴⁻²⁶⁾

Traditionally Dental Therapists worked exclusively with children as part of various state and territory government's school dental programs. Consequently the majority of dental care for the majority of Australian children was provided by Dental Therapists. Dental

Hygienists have been mainly employed in the private sector and in the treatment of adult gum disease.^(25,26)

Since the 1990s the education of Dental Therapists moved to the tertiary sector and the addition of the hygiene and oral health components led to the creation of the OHT whose skills include those of both therapy and hygiene.^(24,25) The OHT brings an added dimension to the dental workforce with enhanced clinical skills and a strong focus on prevention.⁽²⁴⁻²⁶⁾

There is current debate as to how to best incorporate this new skilled worker into the public Oral Health service. The National Oral Health Plan, 2004, proposes that the “team model approach to providing the community with quality dental care is the way to progress.”⁽²⁷⁾

Rationale for the Smile Mum Program

Pregnancy is seen as an optimum time to facilitate change for health. This belief is founded on two major health promotion philosophies. The first is that the best health strategy is one of prevention and early intervention.⁽²⁸⁾ An intervention during pregnancy has the potential to prevent health problems for both the mother and her baby.^(1,2,6,7,10,12-15)

The second philosophy is that pregnancy is a time where a woman is more susceptible to health promotion messages. Maternal feelings make women more likely to accept information and to make changes for the betterment of the health of her unborn baby.⁽²¹⁾

The SMP intervention aimed to take advantage of this window of opportunity to access women while they were pregnant and increase their capacity to achieve best health outcomes for themselves and their babies.

The first Smile Mum participants attended the dental clinic in March 2009. The initial appointment included a general medical and social history questionnaire, an oral health knowledge quiz and an oral examination. This information was used to assign each participant with an oral disease risk assessment of Low, Moderate or High. All clients received a dental examination, treatment plan, clean and scale as required and oral hygiene instruction. They were given a personalized oral health home care plan and products pack. This treatment was provided by both the DTH and the Dentist. Clients were re-appointed to the Dental Officer for restorative work and to the DTH for further hygiene therapy. Efforts were made to have all dental treatment completed before the birth of the baby.

The Smile Mum participants were recalled after the birth of their baby and re-assessed using the same examination protocols as the initial appointment. All participants were assigned an individual recall after their post-natal appointment based on their risk assessment. In this way, Smile Mum aims to provide ongoing care to the Smile Mum participants. Future recall appointments will monitor their own and their baby's oral health status.

All clients who completed the SMP pre and the post natal dental appointments at the Deniliquin Dental Clinic were invited to be part of this study. This meant that all were residents of the rural town or surrounding district of Deniliquin in the NSW Riverina Region. It also meant that they were all holders of a Government Concession Card as per the eligibility criteria for treatment in the NSW Oral Health Service.

Both of these factors ensure that the study group is representative of risk groups for oral disease. It has been identified that people living in rural and remote areas generally have worse health than those living in metropolitan areas.^(15,16,17,18,19,22,27) NSW Department of Health research has found that when compared to non-card holders, concession card holders have 3.5 less teeth and their dependants have over 50 per cent more decayed teeth.

The Australian Institute of Health and Welfare Dental Statistics and Research Unit, 2006, investigated the geographic connection to the population's oral health. It found that people from outside capital cities have less access to dental care and fluoridation than residents of capital cities. Their report found greater tooth loss, poorer oral health and dental visiting patterns for rural residents than for capital-city dwellers.⁽²⁹⁾

A review of literature shows that maternal and infant health is a widely researched topic. The links between maternal oral health, pregnancy outcomes and a child's oral health are well established.^(1-3,6,9-4) So too are the links between with oral disease and socio-economic status.^(7,15,17,21,22,24) Research also shows that there is a variety of barriers to the access of dental treatment involving both circumstance and attitude.^(3,7,15,17-19,21,24,26,27) Papers also advocate for further study in these areas.^(9,12,16)

The Smile Mum Study examines the SMP to provide a small, but important body of evidence based around a 'grass roots' attempt at addressing the afore-mentioned issues surrounding the provision of an oral health intervention to "at risk" members of our community.

Research Question

Does the SMP improve the oral health of participating women and reduce the risks of dental disease for them and their child?

Aims of the Smile Mum Study

1. To assess whether the SMP increased access to NSW Health public dental services for eligible pregnant women.
2. To assess the efficacy of the SMP in improving the oral health of participating pregnant women.
3. To assess whether the program increased the participant's knowledge of maternal links to early childhood caries, ECC.
4. To explore participant satisfaction with the program components.

Methods

Study Design

The study is primarily a before and after evaluation of the SMP. It involved a retrospective analysis of the clinical outcomes of the program using the existing Smile Mum data base and a secondary exploration of program acceptability and behavior and attitude change using a post-program survey.

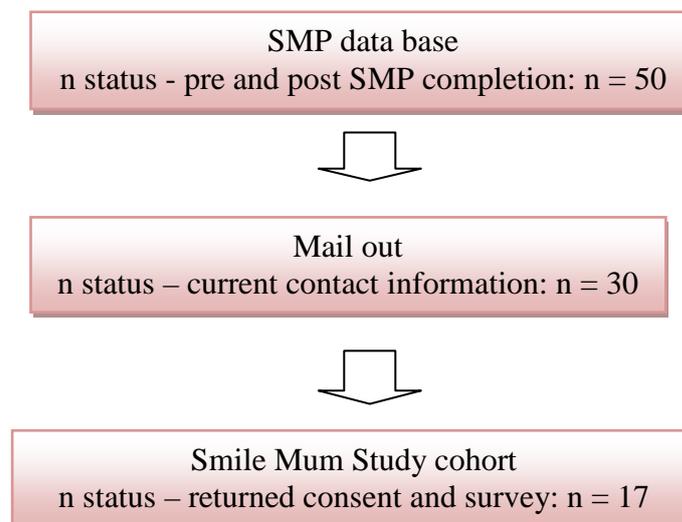
Participants

Participants of the research were selected from clients who had completed both the pre and post natal SMP at the Deniliquin Dental Clinic. All clients of SMP were holders of a Government Concession Card which is necessary for eligibility into the NSW Public Adult Dental Service. Having this concession card indicates some socio-economic disadvantage – low income or unemployment on the part of the holder.

The women were first seen in the dental clinic during their pregnancy and again after the birth of their baby in the time period between March 2009 and March 2011. This meant that all participants in the study were mothers of children less than two years of age. All the women lived in Deniliquin or the surrounding district.

Contact details and oral health data was collected for these clients and became the SMP data-base. Out of a possible 50, who had completed pre and post natal checks, the study group was reduced to a 30 as it was found that many contact details were no longer valid. It is possible that this may be related to the socio-economic status of the target group as transience is consistent with social disadvantage. People relocate to improve their life circumstances or to seek employment. It is also true that in NSW, towns the size of Deniliquin have a dwindling population. During 2010-2011 the Australian Bureau of Statistics found that the Local Government Areas experiencing population decline were in agricultural areas recovering from drought in the Murray and Murrumbidgee and in north western NSW. ⁽³⁰⁾

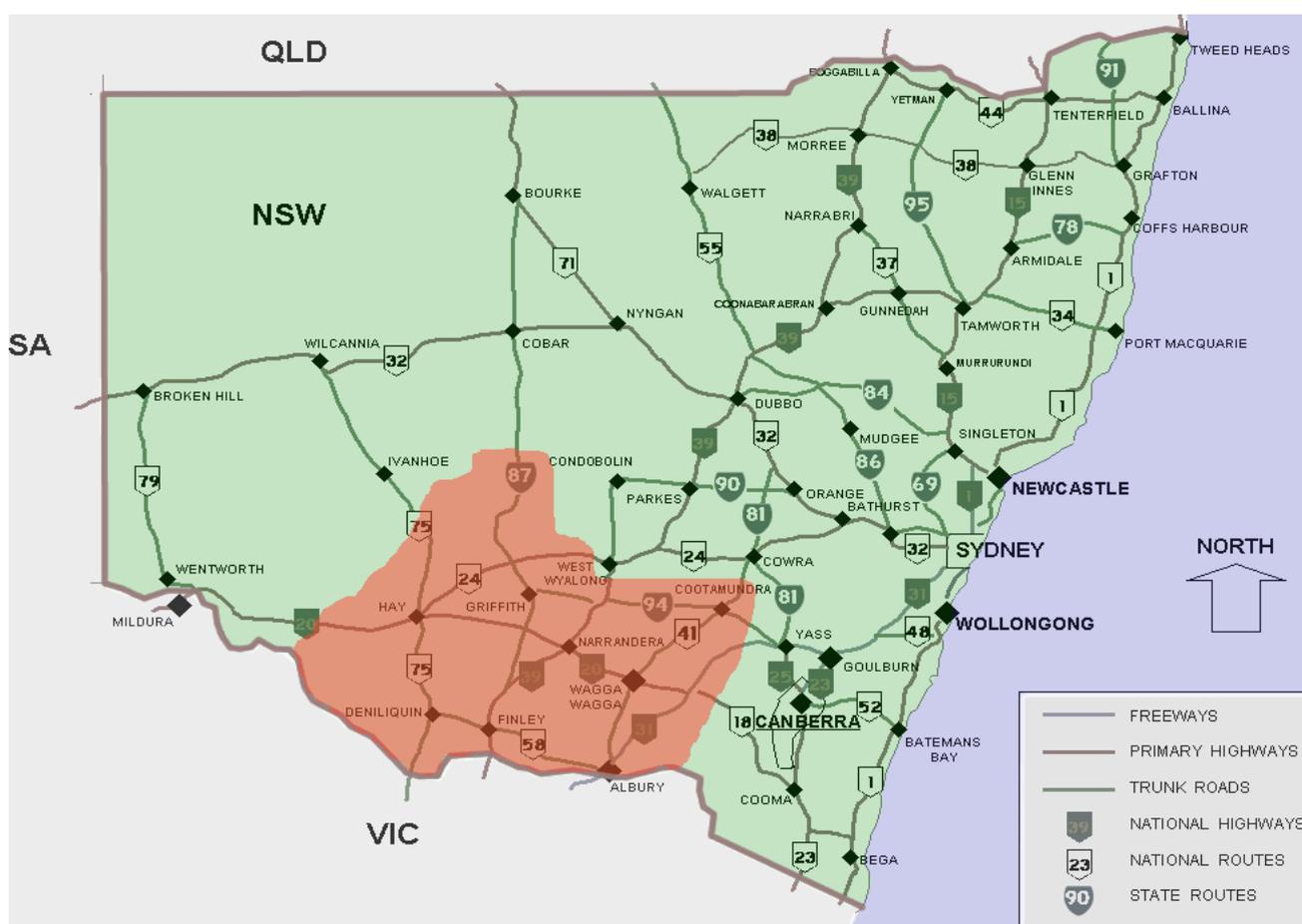
A mail out to the target of 30 women included the study participant information, the consent form and the evaluation survey. Involvement in the study was completely voluntary. Of these 30 a total of 17 returned both the consent and survey forms, (see appendices 2 and 4). These 17 participants became the study group, n = 17



Setting

Deniliquin is approximately 750 kilometres south-west of Sydney servicing a large rural and remote agricultural area, mostly without a fluoridated water supply, with a total population of 30,789. This population is spread over six local government areas and is part of the Murrumbidgee and Murray regions of NSW.

Map of NSW showing Murrumbidgee Local Health District as pink shaded area:



Public dental services for adults are available only in the town of Deniliquin. Clinical staff comprises one Dentist, one Dental Therapist and one Oral Health Therapist, all working part time. Access to dental services is difficult and can involve long waiting times for dental appointments and extensive travel distances. The nearest alternative public dental service is located in the town of Albury which is 211 kilometres away.

Ethics

Approval for the study was obtained from Southern NSW Local Health Network Human Research Ethics Committee in July 2011.
HREC reference number: HREC/11/GSAHS/29
SSA reference number: SSA/11/GSAHS/46

Funding

This study was funded with support from Health Education and Training Institute as part of the Rural Research Capacity Building Program. The SMP was funded through a demonstration grant from the NSW Health Department, Centre for Oral Health Strategy.

Data collection

The study data was collected from three sources:

the existing SMP data base, the knowledge quiz and the post program survey. Because of the small sample size descriptive statistics were used to represent the data analysis.

Smile Mum data-base

The SMP data base was created for use with the clients who attended the Deniliquin Dental Clinic as part of the SMP from the period March 2009 until March 2011. The data base was created by the SMP clinicians with assistance from the Health Service Information Technology department.

The data base included oral examination data, (including CIPTN, DMFT, Stillness and Loe Plaque Scoring, tooth enamel erosion and demineralization measurements), demographic and oral health practices and knowledge information. A saliva test was used that records a high level of oral S. Mutans. This comprehensive examination recorded evidence of baseline oral health status at the pre natal examination and any changes at the postnatal recall examination.

The knowledge quiz asked the clients to nominate either true or false to a series of seven statements relating to maternal and infant oral health. The SMP participants were asked to complete the knowledge quiz at the start of the pre natal check and then again at their post natal check. The total number of correct answers for each quiz were recorded in the SMP data base. This showed the difference between the pre and the post recorded totals.

All of this collected information was scored for each client to assign them an oral disease risk assessment score of high, medium or low at both the pre and the post natal collection point.

Of interest in this study are the pre and post natal data in the following fields:

- referral mode to Smile Mum, (how did they find out about us?)
- knowledge quiz score, (see appendix 3).
- oral disease risk assessment score
- oral hygiene
- smoking status
- S Mutans test

The study examined all measures for change between the two data recordings.

Survey

A further source of information from the study participants was obtained from a post program surveys. Study participants were asked to complete and return a survey that was included in the information and consent mail out, see appendix 4.

This survey sought to gain more understanding of how the SMP impacted on the oral health, knowledge and attitudes of the participants.

The survey questions were arranged in the following categories:

1. My Smile Mum Experience
2. Mother to Baby Oral Health
3. Oral Health Risk Factors

The surveys included a space for respondents to write comments about SMP. These qualitative comments provide a richer understanding of the participants experience and have been included here at the end of each section.

Labels containing identifying information were removed from all returned surveys before being passed on to the researcher. Seventeen surveys were included in the study.

Results

The results reflect data received from the 17 participants before and after the SMP. The results have been organised to address the study aims.

1. Increased access to NSW Health public dental services for eligible pregnant women.

Referral: Figures 1 and 2 show the SMP data base results and the survey questions relating to participants access to dental treatment before and after SMP.

Figure 1: Percentages of the referral sources for participants in Smile Mum.

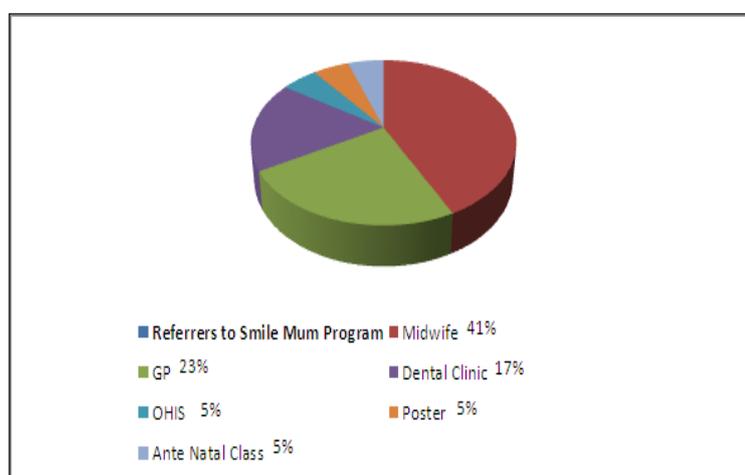


Figure 1 shows the referral pathways to SMP. The majority, 47%, of the referrals came from the midwife and the next highest percentage of 23% came from the GPs. 17% of the respondents found out about the program when accompanying their child to an appointment at the dental clinic. There was

one referral each from the Oral Health Intake Centre and from a respondents following up information seen on a poster.

This shows that most of these respondents came into the SMP from outside the normal channels of the dental service and following the advice from representatives of groups that received the SMP referral training. Only one participant reports coming into the program from a media promotion source, (poster).

Access: The issues around access to dental treatment are further explored in the survey results displayed in figure 2.

Figure 2: Post SMP survey responses - Access. (n=17) (question no's correspond to survey question no's)

	My Smile Mum Experience	Strongly agree/ Agree n (%)	Not certain n (%)	Disagree/ Strongly disagree n (%)
1	I am now more likely to seek a regular dental check-up than before Smile Mum	13(75)	3(19)	1(6)
3.	Smile Mum made it easier for me to attend dental appointments	13(75)	3(19)	1(6)

4	I would have sought a dental check-up during my last pregnancy even if I had not known about Smile Mum	7(41)	5(30)	4(23)
7	I intend to come to all of my future Smile Mum appointments	16(94)	1(6)	
8	My doctor or midwife helped to convince me about the importance of getting a check-up during pregnancy	7(41)	5(30)	5(30)

Seventy-five per-cent agreed that the SMP made it easier for them to attend dental appointments and that they are now more likely to seek a regular check-up and 94% intend to come to all future SMP appointments,(fig:2; q's1.3 and7).

The survey also shows a slight majority of 41% agreeing they would have sought a dental check-up during a previous pregnancy with just a slight difference, (30 – 23%),between being not certain and disagreeing respectively, (q'4). This result shows a variation to what actually happened with these women during a last pregnancy according to the record in the data-base. Of the 17 respondents, 11, (64%), had not sought a dental check-up during a previous pregnancy, four (23%), had sought a dental check-up and two (12%) had not had a previous pregnancy.

This discrepancy in data of actual practice recorded in the data base, and in post program survey answers, is also evident in the data around the referral mode to the SMP. The data base shows us that most referrals came from a midwife or a GP, (see fig:1), but the survey shows a fairly even spread of answers about the importance of these referral groups in convincing the respondents about the importance of a dental check-up during pregnancy, (fig: 2;q'8).

"I am so glad Smile Mum was introduced to me as I probably wouldn't have sought dental care otherwise. Now that it has – I will definitely visit the dentist often as I was too scared before."

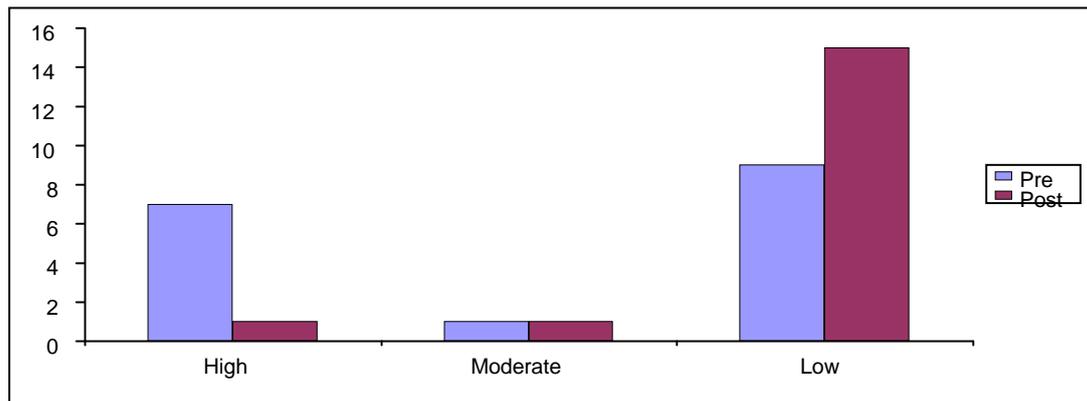
2. Improving the oral health of participating women

Oral disease risk assessment score: The information collected from each client in the SMP pre and post natal appointments was collated and scored to come up with an individual disease risk assessment score for each client. The score was either a High, Moderate or Low risk for oral disease. Figure 3 shows the totals of all the client risk assessment scores for both the pre and the post natal appointments.

The graph shows the totals of high risk at the pre-test was 37% and at the post test was 1% showing a large reduction in the risk assessment score. The pre and post low risk scores were 56% at the pre-test and 94% at the post test. These results show that most participants reduced their risk for developing oral disease during their involvement in the program. There was no change to the number of clients who had a moderate risk for oral disease.

A Fisher's exact test was used to determine whether there was a significant difference between the total pre and the post high and low risk assessment scores. The moderate columns were left out of the test as they showed no change. The association between the two test points and the test scores shows a statistically significant difference, $p = 0.0373$.

Figure 3: Oral disease risk assessment score of High, Moderate and Low showing difference between pre and post SMP.

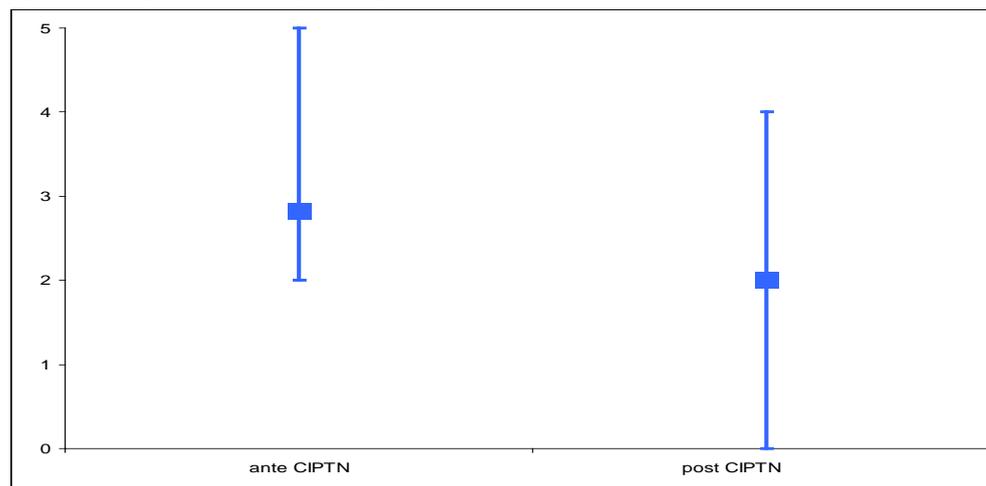


CIPTN: The periodontal classification score was an element of data that was collected and became part of the risk assessment for disease score criteria for each participant. The classification was by the use of the Community Index for Periodontal Treatment Needs, (CIPTN). This index assigns each examinant with one number only that ranges from 0 - being no sign of gum disease, to 5 - pathology consistent with severe gum disease.

This study has displayed the results of the CIPTN separate from the combined risk assessment score as gum disease is particularly relevant to pregnant women.

Figure 4 represents the combined total CIPTN scores of the group at both the pre and post measurement. A box plot has been used as the size of the group made the data unsuitable for statistical analysis.

Figure 4: Box plot of median pre and post CIPTN scores*



Median score indicated by central measure, with error bars showing range minimum to maximum.

The data point indicates the mean score and the error bars show the minimum and the maximum scores in each data set. The results do not show a big difference in the average score but when we look at the range of scores the difference is more noticeable. There was no zero score in the pre-test and no score of 5 in the post test. These changes in the

two extreme measures indicate an overall improvement in the clinical signs of periodontal infection in the participants between the pre and the post examination points.

Oral hygiene: There was a modest improvement in the number of respondents who reported brushing their teeth more than once a day from 42% at the pre-test and 52% at the post test. These numbers also show there are still nearly 50% of the respondents not brushing their teeth more than once a day post program.

The oral hygiene of the participants was also assessed by the DTH at the post natal appointment, and all but one participant was recorded as having improved oral hygiene at this assessment.

The results of the post program survey questions relating to participant’s oral hygiene are displayed in the table below.

Figure 5: Post SMP survey responses – Oral Health. (n=17)(question no’s correspond to survey questions)

	My Smile Mum Experience	Strongly agree/ Agree n (%)	Not certain n (%)	Disagree/ Strongly disagree n (%)
2	My mouth is now healthier than before Smile Mum	16 (94)	0 (0)	1(6)
9	The dental hygienist taught me how to brush my teeth and gums better than before Smile Mum	11 (64)	1 (6)	5 (30)

Figure 5 shows a mixed result to the survey question about the value of the chair side oral hygiene instruction that was delivered by the DTH as part of the program. Whilst most respondents agreed, 64% agreed, with the statement, there was a significant number, 30%, that were not sure and 6% that did not agree with the statement.

In spite of this, all but one participant,(94%), believed that their mouth was now healthier than before SMP when asked on the survey.

S Mutans: All participants took part in an S Mutans saliva test at both their Smile Mum risk assessment appointments. A positive result of this test indicates a high salivary level of S. Mutans. More than half of the sample (n=9) returned an invalid S Mutans test either pre or post SMP preventing analysis of these results. Reasons for the invalid tests included the room temperature and the quality of the saliva sample at the testing point. The high number of invalid tests disqualifies these results from being meaningful to the study.

Smoking: The post program survey recorded that four of the study group of 17 were smoking during their last pregnancy and four had subsequently quit. The data base recorded that 10 of the study group were smoking at their initial appointment and of these four had stopped smoking by the post natal appointment. The discrepancy between the data base and the survey in the recorded pregnancy smoking rates during pregnancy is not explained. What is consistent in both of the data collection sources is the number of four who have reported that they have quit smoking post program.

“I would like to say thank you for making my mouth and teeth healthier.”

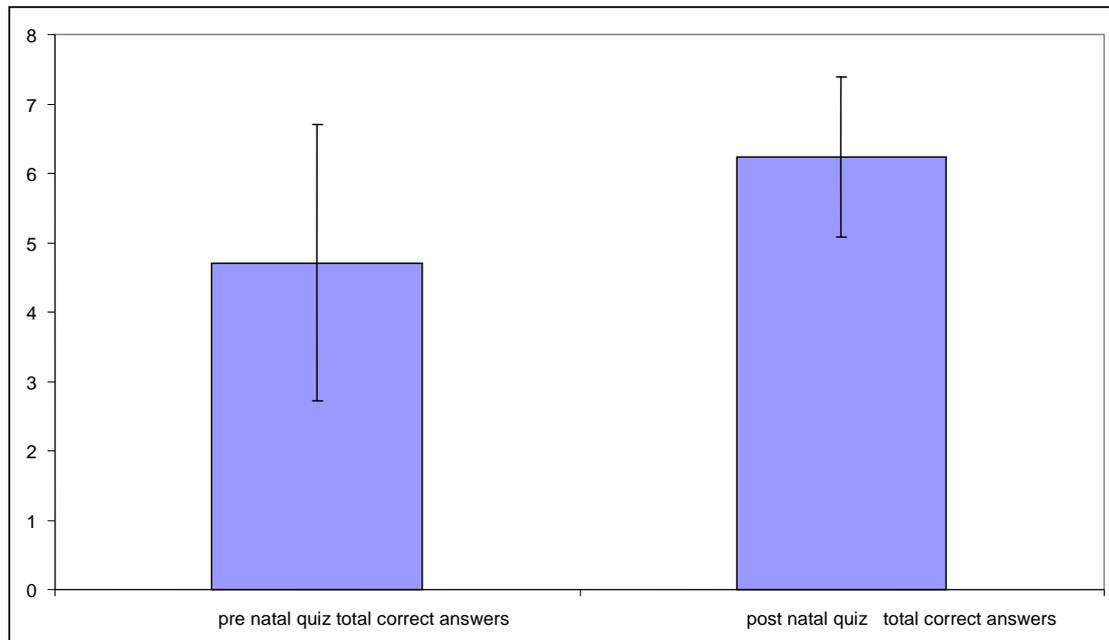
3. Increased participant's knowledge of maternal and infant oral health links

SMP Quiz:

Figure 6 displays a selection of data around the results of the pregnancy oral health knowledge quiz at both the pre and the post test. The two boxes show the totals and averages of the correct answers. The error bars indicate maximum and minimum scores. There is an improvement in the number of correct answers and the mean score increased from 4.7 to 6.2, (standard deviation of 1.14), between the pre and post-test. The error bars show less variation in the answers at the post test when compared to the pre-test.

These results demonstrate an upward trend in knowledge and more consistent knowledge post program.

Figure 6: Mean* pre natal and post natal quiz - total correct answers - 8 questions

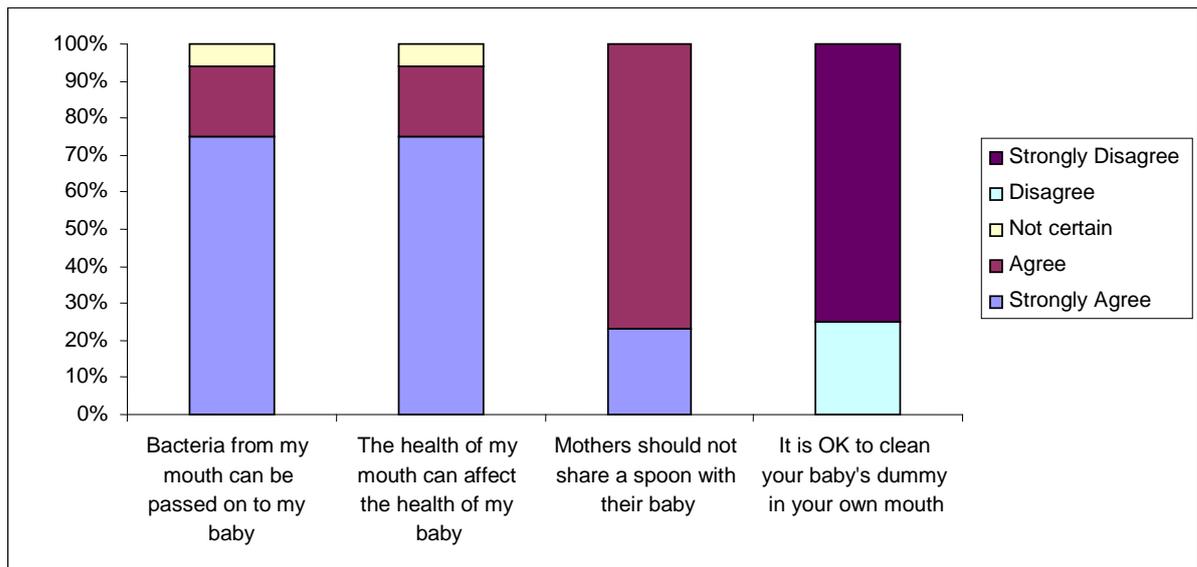


Post SMP Survey:

When asked on the post program survey, all respondents agreed that parents should provide a smoke free environment for their children.

Figure 7 shows that there is a high level of acceptance of messages aimed at decreasing the risk for a mother to pass on oral infection to her child as reported in the post program survey.

Figure 7: Responses to questions on health behaviours associated with maternal to baby oral bacterial transmission.

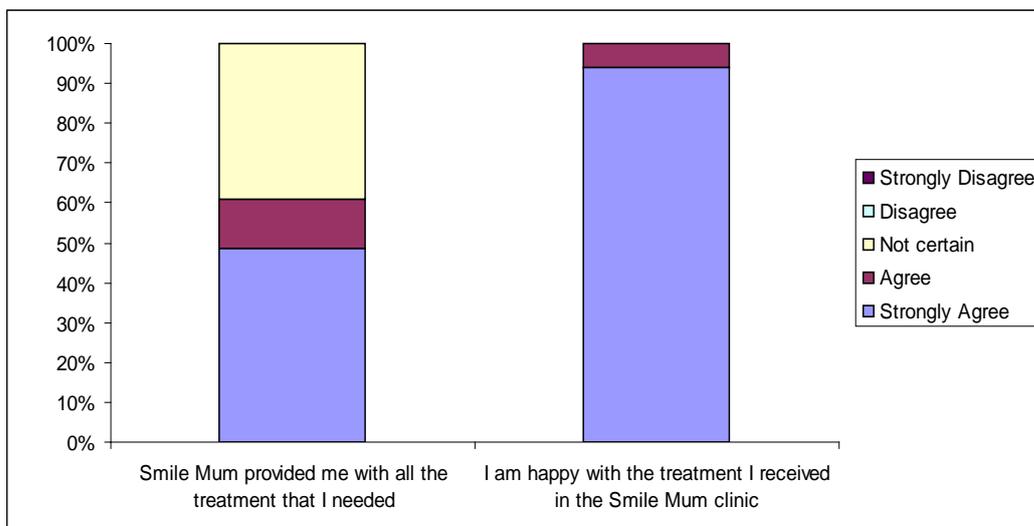


“Fantastic. Great advice. Makes you think about yourself more and the importance of taking care of yourself. Also makes you pass on the information to your children.”

4. Participant satisfaction with the Smile Mum program.

Figure 8 shows the results of responses to questions on the survey that dealt with participant satisfaction with the program. Sixty percent agreed that had been provided with all the treatment they needed while 40% were not sure. All of the respondents,(100%), agreed with being happy about the treatment they received in the SMP.

Figure 8: Participant satisfaction with the SMP



“During the treatment a tooth got infected and needed to be pulled out. I am still waiting for the denture plate and it is very embarrassing to smile and talk.”

I am happy with the treatment I have received and am more likely to have regular check-ups. The staff is friendly and made me feel comfortable.”

Discussion

The aim of this research was to assess the efficacy of the SMP intervention in improving the oral health of the participants and in reducing the risks of dental disease for them and their children. The disease risk assessment results show measurable improvements in the oral health of the participating women. These same women also demonstrated an increase in their oral health knowledge and a post program positive attitude to receiving dental treatment. The findings also present the value of cross discipline partnerships in the health sector and support the strategy of early intervention for disease prevention. However, the small samples size of the study places some limitations on the conclusions that may be drawn from the findings. Further studies looking at a larger study group and at more long term results would be helpful.

One positive finding from the study was the increase in the number of participants seeking dental treatment during pregnancy. The referral pathways show that most of the participants came into the SMP after a referral from either their doctor or their midwife. It was also shown that most of this group did not have any dental treatment during a previous pregnancy. This indicates that the involvement of these non-dental health care providers was the impetus for these pregnant women to make contact with the dental service. It also shows that the pre-program training and recruitment of these pre natal care providers was a worthwhile exercise endorses the literature that calls for a coordinated effort from the dental and obstetric community. ⁽¹⁶⁻¹⁹⁾

The study also revealed that an overall positive attitude to dental treatment and to future attendance of dental appointments. This is encouraging as the study group was representative of groups studied in the past who demonstrate negative attitudes to dental treatment and poor attendance records in spite of having high rates of dental problem. ⁽¹⁷⁾ Most agreed that Smile Mum had made it easier for them to attend dental appointments.

Previous literature does not reveal an emphasis on oral health during pregnancy from either pregnant women or their health care providers. ⁽¹⁶⁻¹⁹⁾ These findings show that it is possible to make an impact on long held views and practices. The health care providers passed on the oral health message to their pregnant clients and the pregnant women became more proactive in their own oral health. This greater focus led to better access to dental treatment for at risk pregnant women.

Whilst there was only a small increase in the reported number of times tooth brushing per day, oral hygiene improvement was recorded for all participants at the post natal check. This would indicate that tooth brushing was more effective post program. However, one third of the respondents did not agree that the Dental Therapist/Hygienist, (DTH) taught them how to brush their teeth better. It is possible that this improved oral hygiene came about as a result of a number of the intervention elements, ie; the chairside instruction from the DTH, the take home oral health brochures and a heightened oral health awareness and confidence on the part of the participants. Whatever the exact cause, the result of the intervention was cleaner and healthier mouths for the women.

The results show improvement in the total oral disease risk assessment score between the pre and the post natal examination. This is important because it demonstrates improvement over a range of measures. Both dental caries and periodontal infections are multifactorial diseases involving diet, oral hygiene and the oral environment bacteria. The risk assessment takes all these factors into account. The 40% increase in the Low Risk category would indicate better at home management of these risk factors by the participants and would also endorse the value of the dental treatment they received in the

program.

The CIPTN score showed a marked improvement post program. This score was of particular interest to the study group as it is a measure of gum health status which is relevant to pregnancy. The DTH felt that the CIPTN was a very effective for use in this intervention program. It takes a lot less time than a full periodontal examination and yet gives a good assessment of gum health and what treatment is needed. This is important as there were time constraints on appointments for pregnant women due to both their tolerance and the need to achieve some treatment outcomes for them at each visit. The CIPTN can identify those in need of a further periodontal treatment appointment and be done quickly allowing time for routine preventative treatments for those with minimum or moderate needs. The improvements in the pre and post CIPTN could be attributed to a both the treatment received in the clinic and the 'at home' improved oral hygiene of the participants.

The knowledge quiz results revealed that most of the women came into the program already having some knowledge about oral health but this knowledge increased post program. Smile Mum has equipped the participants with a better understanding of how to achieve and maintain oral health for themselves and their family. On an individual basis the DTH found the pre quiz instructional in helping to identify knowledge gaps and in developing counselling specific to client's individual needs.

One disappointment of the study was that the S Mutans test did not produce enough meaningful data to be useful. This was because at least half of the tests were invalid. A cool room temperature, or a sample of thick or viscous saliva, meant that the saliva did not flow into the reacting area of the test device and no result was obtained.

One finding of the study was the rate of smoking of between 25% and 50% for the Smile Mum participants. This compares to a smoking rate in the general community of 18%. This finding is consistent with other research that has found that smoking rates in disadvantaged groups remains high. ⁽¹⁷⁾ This finding is relevant for several reasons. The high smoking rate indicates that Smile Mum did reach the target group of those at risk of developing oral disease and also those at risk of adverse pregnancy outcomes as smoking is an independent risk factor for both. It also shows there is a real need to address the issue of smoking within public dental service clients.

All smoking participants received smoking cessation counselling as part of the program. The study found that four had reported quitting smoking at the post program recording. This reduction in smoking was subsequently reported at the post program survey which indicates that participants involved were able to sustain their non-smoking status for at least 6 months. This is a very encouraging result and supports the importance of the dental practitioner as a smoking cessation counsellor.

The aims of this research were not only measure the benefits to the mothers involved in Smile Mum but also to examine likely benefits to the children of these mothers. An informed and educated mother is more able to make choices for good health for her family. As well as providing the standard oral health messages the program sought to educate the mothers on how their own oral health can affect that of their child during pregnancy and after birth via the transmission of decay causing bacteria.

The results show this information was well accepted and retained by the participants as shown by the responses in the post program survey. There was complete agreement with the statements relating to bacterial transmission. It is worthy to note, however, that one respondent whilst having strong disagreement with the statement about it being OK

to clean the baby's dummy in your own mouth, also wrote a note on the survey form saying "but we all do it". It may be reasonable to expect that actual practice may be some way behind knowledge and that this comment may indicate that for this respondent, knowing does not yet mean doing. This dynamic is consistent with the principles of the Stages of Change Model and may reveal a contemplative stage where one is aware of the problem but is not yet or able ready to act on that awareness.

Generally the results were encouraging and showed a real acceptance of messages that were comparatively new in research until recent times. It remains to be seen whether or not this will result in better oral health for the children of the Smile Mums. However, as studies have found that delaying transmission of oral S Mutans from mother to baby delays the onset of caries in the child, a mother with a healthier and cleaner mouth will reduce the risk of caries for the child. It is hoped that a mother's increased awareness will also contribute to better oral health for her children. Further research on this study group is warranted.

A very pleasing result from the study was the unanimous response from the survey respondents stating that they were happy with the treatment they received in the Smile Mum clinic. This result was gratifying to the Smile Mum team responsible for the organisational and clinical aspects of the program. This team developed a very clear idea of how Smile Mum would be run and the client needs were paramount. This meant that the circumstances of the Smile Mum clients were always considered and efforts were made to make their experience positive and worthwhile. One example of this was when dental assistants doubled as baby sitters to maximise the time that the mother could spend with the DTH. Another advantage was that these clients received preventative treatments and oral care products, making their appointments more pleasant than if they were receiving treatment only.

In spite of the majority of the survey response showing satisfaction with the program components, this satisfaction was not consistent across all survey responses. Twenty-five per cent were not certain that the program had made it easier to attend appointments, 30% were not certain that they had been provided with all the treatment they needed and 6% did not feel that their mouth was healthier post program. This opinion is also highlighted by the comment that is included earlier in this report stating a negative outcome from the Smile Mum experience involving the loss of a tooth, the waiting for a denture plate and the associated embarrassment. These responses and comments show that it is not possible to totally meet the needs of all clients. This may be due to constraints that do apply in a Government Dental Service where treatment needs are prioritised and waiting times exist for some services. It may also be an expected outcome of a new intervention that would certainly benefit from the analysis and evaluation that this report will provide.

This research asked the question – Does the SMP improve the oral health of the participating women and reduce the risks of dental disease for them and their child? This report shows that more pregnant women received dental treatment because of the SMP. These same women became more informed about how to keep their own mouths healthy and the implications of this for their child. Across a range of measures these women also demonstrated better oral health.

The future for them and their child is an unknown - but their involvement in the SMP has better equipped them to maintain oral health for themselves and their families.

Conclusion and Recommendations

The Smile Mum Study has provided a small but important body of evidence to support the value of an oral health intervention for pregnant women in the public oral health service.

The program established successful interdisciplinary partnerships that resulted in better access to dental services for at risk pregnant women. This greater access to dental treatment indicates a positive shift in the understanding of the importance of good oral health during pregnancy from both the health care partners and the women.

The study recommends ongoing communication and feedback between the dental and obstetric care providers to ensure the continuation of the referral process and to promote the emphasis on the importance of oral health in general health.

These same women demonstrated an increase in their knowledge about the effect of bacterial transmission from their mouth to that of their baby. This is an important finding and should add to a broader understanding of oral disease and be a motivator for mothers to maintain their own oral health. It is recommended that this message becomes part of established oral health promotion.

The study reinforced some concerning trends including the high number of pregnant women who smoke during pregnancy. It also showed that before Smile Mum, the participants sought dental treatment only when in pain and many had active oral disease at the first appointment. The effects of both oral disease and of smoking on an unborn baby have been well researched and documented. It would seem imperative NSW Oral Health Services continue to place a priority on strategies aimed at pregnant women and including smoking cessation advice.

One encouraging result was the positive attitudes of the Smile Mum participants. Most felt that the program had benefited them and their child and generally displayed more confidence in receiving dental treatment. This is a gratifying result for the Smile Mum Team and endorses the approach of placing the needs of the women at the forefront of the program design and implementation.

The SMP achieved measurable improvements in clinical data, overall increased oral health knowledge and improved attitude to dental treatment and should result in a decrease in the risk of oral disease for the participants and their children. However it is yet to be seen if the children of Smile Mum will remain free from early childhood caries. This report recommends a continuation of the SMP and an expansion of the program to include a screening of the children for their caries status at age five.

It is hoped that evidence from this study will contribute to the formulation of policy on the treatment of pregnant women in the New South Wales Oral Health Service. Furthermore the Smile Mum Study describes a practical model for the development of oral health interventions, targeted to risk groups for oral disease, and using a dental team approach including an Oral Health Therapist.

References

1. Boggess KA. Maternal oral health in pregnancy. *Obstetrics and Gynecology*. 2008; 111:976-86
2. Laine MA. Effect of Pregnancy on periodontal and dental health. *Acta Odontologica Scandinavica*:2002; 60:257-64.
3. Pultzer K, Keirse MJ, Spencer AJ. Self-reported oral health and dental service utilisation in pregnancy. 2007; ARCPHO The University of Adelaide Publications www.arcpoh.adelaide.edu.au
4. Lukacs Jr, Largaespada LI. Explaining sex differences in dental caries prevalence: Saliva, hormones, and "life-history etiologies". 2006; *American Journal of Human Biology* 18: 540-555
5. Griffin SO, Griffin PH & Huntley V. Effectiveness of fluoride in preventing caries in adults. 2007; *Journal of Dental research* 86:410-15.
6. Christoffers AB, Kreisler M & Willershausen B. Effects of estradiol and progesterone on the proliferation of human gingival fibroblasts. 2003; *European Journal of Medical Research* 8:535-42.
7. Stafford KE, Shellhaas C, Hade EM. Provider and patient perceptions about dental care during pregnancy. 2008; *The Journal of Maternal-Fetal and Neonatal Medicine*:21(1): 63-71
8. Cullinan MP, Ford PJ, Seymour GJ. Periodontal disease and systemic disease: current status. 2009; *Australian Dental Journal*:54 S62-S69
9. Boggess KA, Beck JD, Murtha AP, Moss K, Offenbacher S. Maternal periodontal disease in early pregnancy and risk for a small-for gestational-age infant. 2006; *American Journal of Obstetrics and Gynecology*:194:1316-22
10. Katz J, Orchard AB, Ortega J, Lamont R, Bimstein E. Oral Health and Preterm Delivery Education: a New Role for the Pediatric Dentist. 2006; *Journal of Pediatric Dentistry*: 28: 494-498
11. Leiff V, Boggess KA, Murtha AP, Jared H, Madianos PN, Moss K, Beck J & Offenberger S. The oral conditions and pregnancy study: periodontal status of a cohort of pregnant women. 2004; *Journal of periodontology* 75:116-26.
12. Boggess KA, Edelstein BL. Oral health in women during preconception and pregnancy: implications for birth outcomes and infant oral health. 2006; *Maternal Child Health Journal* 10:S169-S174
13. Plutzer K, Spencer J. Efficacy of an oral health promotion intervention in the prevention of early childhood caries. 2009; *Community Dentistry and Oral Epidemiology*36(4): 335-346
14. Law V, Seow WK, Townsend G. Factors influencing oral colonisation of Mutans Streptococci in young children. 2007; *Australian Dental Journal* 52:(2):93-100

15. Hallett KB, O'Rourke PK. Social and behavioural determinants of early childhood caries. 2003; Australian Dental Journal 48:1
16. Thomas NJ, Middleton PF, Crowther CA. Oral and Dental Health care practices in pregnant women in Australia: a postnatal survey. 2008; BMC Pregnancy and Childbirth 8-13: 1471-2393-8 -13
17. Gaffield ML, Colley Gilbert BJ, Malvitz DM, Romaguera R. Oral health during pregnancy: An analysis of information collected by the Pregnancy Risk Assessment Monitoring System. 2001; Journal of the American Dental Association 132:1009-1016
18. Centre for Oral Health Strategy. NSW Oral Health Promotion Framework for Action 2010. 2006; NSW Department of Health.
Available from; <http://www.health.nsw.gov.au>
19. Meyer K, Geurtsen W, Husamettin G. An early oral health care program starting during pregnancy: results of a prospective clinical long-term study. 2010; Clinical Oral Investigations 14:257-264
20. Michalowicz B, D'Angelis A, Novak M, Buchanan W et al. Examining the safety of dental treatment in pregnant women. 2008; Journal of American Dental Association 139:685-695
21. Russell S, Mayberry L. Pregnancy and Oral Health: a review and recommendations to reduce gaps in practice and research. 2008; The American Journal of Maternal/Child Nursing:33(1)32-37.
22. NSW Parliament Legislative Council 2006
Standing Committee on Social Issues: Dental Services in NSW
Available from; <http://www.parliament.nsw.gov.au>
23. Cashmore A, Noller J, Ritchie J, Johnson B, Blinkhorn A. Reorienting a public paediatric oral health service towards prevention. 2010; Health Promotion Journal of Australia 22(1)17-21
24. ADOHTA (Australian Dental and Oral health Therapists Association)2011
Position Statement: Workforce
Version 1
25. Satur J, Gussy M. Patterns of dental therapist scope of practice and employment in Victoria, Australia.2008; Journal of Dental Education:73 (3) 416-425
26. Satur J, Australian dental policy reform and the use of dental therapists and hygienists. 2002;Ph.D. thesis, School of Health Sciences, Deakin University Melbourne.
27. National Advisory Committee on Oral Health. Australia's National Oral Health Plan 2004-2013. 2004; Australian Health Ministers Conference.
Available from: <http://www.adelaide.edu.au/oral-health-promotion/resources>
28. Halton J, Secretary of the Department of Health and Ageing, Health promotion in Australia - an overview. 2004; Speech archive 27 April 2004.

Available from: <http://www.gov.au/internet/main/publishing.nst>

29. Dental Statistics Research Unit. Oral health and access to dental care – rural and remote dwellers. 2006; AIHW Catalogue No DEN 144

Available from: <http://www.arcpoh.adelaide.edu.au>

30. Australian Bureau of Statistics. Regional Population Growth, Australia 2010-2011 2010-2011;

Available from: <http://www.abs.gov.au/austats>

31. Sullivan EA, Laws P, Grayson N. Smoking and Pregnancy. 2006; Cat no PER 33. Canberra Australian Institute of Health and Welfare, National Perinatal Statistics Unit.

Available from <http://www.aihw.gov.au/publication>

Appendices

Appendix 1: Information For Participants

Smile Mum Study

Research to improve the oral health of pregnant women and their children

Information for Participants

Before you decide whether or not you wish to participate in this study, it is important for you to understand why the research is being done and what it will involve. Please take the time to read the following information carefully and discuss it with others if you wish.

1. What is the purpose of this study

The purpose of this study is to investigate whether the women who participated in the Smile Mum Program during pregnancy improved their own oral health and reduced the risk for themselves and their child of developing dental problems in the future.

2. Why have I been invited to participate in this study?

You are invited because you have already been part of the Smile Mum Program.

3. What if I don't want to take part in this study?

It is your right to take part in this study or not. You can still receive treatment in the Smile Mum Program whether or not you wish to be part of the study.

4. What does this study involve?

If you agree to participate in this study you will be asked to sign and return the Participant Consent Form and the Survey Form.

The study will involve the analysis of the following information:

- Dental examination
- Dental treatment records
- Measurement of oral bacteria in a sample of your saliva
- Quiz of your oral health knowledge
- Personal Survey

This information was collected at both the pre-natal and post-natal dental visits and from Survey Form that you will complete at home.

5. How is this study being paid for?

This study is supported and funded by the following organisations:

- NSW Clinical Education and Training Institute, Rural Division
- NSW Health Centre for Oral Health Strategy
- NSW Health Murrumbidgee Local Health Network, Oral Health Service.

6. Are there risks to me in taking part in this study?

There are no risks associated with being part of this study.

7. Will I benefit from this study?

The benefits to you will mainly come from being part of the Smile Mum Program which should result in better oral health for you and your family. Being part of the Smile Mum Study also means that you will contribute to the development of better strategies to improve the oral health of families in the communities of NSW.

8. Will taking part in this study cost me anything, and will I be paid?

No - on both counts.

9. How will my confidentiality be protected?

The Smile Mum Study is bound by legislation and guidelines including the Health Records and Information Privacy Act and the NSW Health Privacy Manual. Any identifiable

information that is collected about you in connection with this study will remain confidential and will be disclosed only with your permission, or except as required by law. Only the researcher named above will have access to your details. Your personal records will be held securely at the Deniliquin Dental Clinic. Your personal details, (such as name and address), will be removed from any information before we use it in the study.

10. What happens with the results?

The Smile Mum Study results will remain the property of NSW Health Clinical Education and Training Institute, Rural Division. The study may be used in the advancement of health promotion via NSW Health publication or Health conferences. The NSW Health Centre for Oral Health may use the results of the study to help develop new strategies or policies to promote the oral health of mothers and children.

The research will be monitored by the Murrumbidgee Local Health Network, Health and Research Ethics Committee.

11. What happens to my treatment when the study is finished?

The study has no effect on your ongoing dental care from the Deniliquin Dental Clinic, and that will continue whilst you are eligible for treatment in the NSW Oral Health Service.

12. What should I do if I want to discuss this study further before I decide?

If you have any queries you wish to discuss, once you have read this information, you can contact the researcher;

Elizabeth Baldwin during business hours on 03 58822990.

13. Who do I contact if I have concerns about the conduct of this study?

This study has been approved by the Murrumbidgee Local Health Network Human Research Ethics Committee. If you have a concern or complaint about the conduct of the Smile Mum Study, you can contact the committee through and quote (HREC 11/GSAHS/29).

**Thank you for taking the time to consider this study.
This information section is for you to keep.
If you wish to take part in the Study,
please sign and return the attached consent form and the survey form.**

Appendix 2: Participant Consent Form

Dear

Participant Consent Form – Smile Mum Study

The Smile Mum Study is designed to provide important information about how to achieve healthy mouths for mothers, during and after pregnancy, and for their children.

As you were part of the Smile Mum Program we are asking you to take part in the Smile Mum Study. By completing, signing and returning this consent form you are agreeing to be part of the Smile Mum Study research.

The researchers seek your consent to participate in the above research

Please remember that your decision to participate is voluntary; you do not have to consent if you do not wish to participate. If you decide not to participate you do not have to give a reason.

The research team are:

Elizabeth Baldwin, Oral Health Therapist and

Mary-Anne Menhennitt, Dental Therapist

NSW Health Murrumbidgee Local Health Network Oral Health Service

Deniliquin Dental Clinic

Ph: 03 58 822 990
 Ms Jennifer Noller
 Oral Health Promotion Officer
 NSW Health Centre for Oral Health Strategy

YOUR CONSENT

As a participant in the above-named study:

- I have had the purpose of the research and any related benefits and risks explained to me by the researcher.
- I am aware that the research will involve
 1. The use of information collected from my dental appointments during the Smile Mum Program
 2. The use of further information from the completed survey form.
- I understand that as part of the study any information collected about me, as well as my personal details, is confidential, and that neither my name nor any other identifying information will be published.
- I understand that this study is concerning the information collected about me during the Smile Mum Program and from the enclosed survey, but will not be asking for any further information from me in the future.
- I understand that my decision about this study has no impact on any health care that I receive now or in the future.
- I have read and understood the written explanation provided to me in the participant information sheet and have been given this sheet to keep.

I agree to participate in the above study.

Name (print)			
Signature		Date today	
Postal Address			

Checklist

- I have signed the consent form
- I have completed the survey form

Please use the return envelope to get your form back to us as soon as possible.

Thank you for being part of the Smile Mum Study

**Elizabeth Baldwin
 Principal Researcher – Smile Mum Study**

Appendix 3: SMP Knowledge Quiz

client sticker

Welcome to the Smile Mum Program.

There are a few questions below about dental health - could you please take a couple of minutes to answer them.

1	Bleeding gums during pregnancy is normal	True	False
2	Pregnant women don't need a dental check-up during pregnancy unless it is an emergency	True	False
3	It is OK to share a spoon with your baby	True	False
4	A mother's bad teeth and gums may cause low birth weight baby and/or your baby to be born before it is due	True	False
5	You can expect to lose a tooth for each baby	True	False
6	Brush your teeth straight away if you vomit with morning sickness	True	False
7	Diet drinks are better for you than other sweet drinks when you are pregnant	True	False
8	If you have tooth decay (or holes in your teeth) you can pass the infection on to your baby after it is born	True	False

Smile Mum Study Survey

Participant identification sticker

(will be removed before this survey is used in the Study)

This survey will be made anonymous by removing all of your identifying details before we use the answers in our Study. Your answers will be completely confidential. You may choose to answer all or some of the question on this survey form.

Survey Questions

Please tick inside the box that best describes how you feel.

	My Smile Mum Experience	Strongly agree	Agree	Not certain	Disagree	Strongly disagree
1	I am now more likely to seek a regular dental check-up than before Smile Mum					
2	My mouth is now healthier than before Smile Mum					
3	Smile Mum has made it easier for me to attend dental appointments.					
4	I would have sought a dental check-up during my last pregnancy even if I had not known about Smile Mum.					
5	Smile Mum provided me with all the dental treatment that I needed					
6	I am happy with the treatment I received in the Smile Mum clinic					
7	I intend to come to my future Smile Mum appointments					
8	My doctor or midwife helped to convince me about the importance of getting a dental check-up during pregnancy					
9	The dental hygienist taught me how to brush my teeth and gums better than before Smile Mum					

	Mother/Baby Oral Health	Strongly agree	Agree	Not certain	Disagree	Strongly disagree
11	Bleeding gums is a sign of gum disease					
12	Bacteria from my mouth can be passed on to my baby					
13	It is just as important to have healthy gums as it is to have healthy teeth					
14	The health of my mouth can affect the health of my baby					
15	It is OK to clean your baby's dummy in your own mouth					
16	Mothers should not share a spoon with their baby					
17	Parents should provide a smoke free environment for their child					

Circle the answer that best applies to you

18	Yesterday I brushed my teeth	More than once	Once	Less than once
19	I floss my teeth	Daily	Occasionally	Never
20	I have sweet food or drinks between meals	More than once a day	Once a day	Less than once a day
Smoking status				
21	During my last pregnancy I was a	Smoker	Past smoker	Non smoker
22	Now I am a	Smoker	Past smoker	Non smoker
23	If I am a smoker - how important is it for me at the moment to QUIT	Very important	Don't know	Not important at all

	Tick if your treatment included	Mark the boxes 1 to 5 in order of importance to you
24	Teeth cleaning advice	
25	Dietary advice	
26	Advice on how to care for my baby's mouth	
27	Clean and scale	
28	Filling/s	

Do you have any other comments to make about Smile Mum?

Please return this form and the enclosed consent form to the Deniliquin Dental Clinic in the envelope provided before August 22 2011.

If we have not received the form by the above date, one of the Study team may ring to follow up.

Thankyou for being part of the Smile Mum Study

Elizabeth Baldwin

Principal Researcher – Smile Mum Study