



## 'Indigie-Grins': an Indigenous youth oral health research project

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## Abstract

**Objectives:** To implement and trial a new model of care within an Indigenous sample of children aged 5-12 years over a period of 12 months. This model would assess dental indices and status at intervention and at 10 month intervals.

**Methods:** This study represents a combination of quantitative and qualitative methodologies. The 'Indigie-Grins' program collected demographic data, nutrition assessment, education status and current oral health care behaviours researched. A full oral health assessment was undertaken by the dental therapist at baseline and after 10 months to assess the model's impact on dental and periodontal indicators. Clinical measures considered in this study included; coronal dental caries; periodontal assessment; and plaque index. Comprehensive focus group discussions were collated at pre and post interventions with parents and children.

**Results:** A total of 17 children were recruited to the research with seven males and ten females within the sample. The overall mean dmfs was 3.7 (s.d. 3.3) tooth surfaces and 3.5 (s.d. 3.5) tooth surfaces, before and after the intervention, respectively. After participating in the *Indigie-Grins* program, participants showed statistically significant improvements in the proportion of unmet restorative needs compared to baseline (71.0 vs. 34.4;  $p < 0.05$ ).

**Conclusion:** The model of care supported greater awareness, access and reinforcement of positive oral health behaviours within the sample. Oral health indicators revealed significant improvement for image and preventative strategies for dental disease with the use of fissure sealants, extractions and restorations. Children and

parents became more engaged with local dental services through collaboration and improved awareness of oral health factors.

**Implications:** A great deal of information can be taken from this study in relation to perceptions, trust, access and service provision of dental services to Indigenous children and their families. This model of care warrants further investment into its feasibility within a larger cohort to truly assess its ability to replicate the finding within this research. *Indigie-Grins* has implications for policy, clinicians, health promotion and Indigenous health workers.

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## Introduction

The oral health status of Indigenous children has been well recognised as a priority across Australia. In fact, Indigenous oral health is among the seven priority areas established by Australia's *National oral health plan 2004-2013*<sup>1</sup>. Oral health is also a priority area in the *National strategic framework for Aboriginal and Torres Strait Islander health 2003-2013*<sup>2</sup>. The Australian Institute of Health and Welfare highlights that the oral health status of Aboriginal and Torres Strait Islander children showed significantly higher levels of disease in deciduous and permanent teeth than for non-Indigenous children<sup>3</sup>. It also reports that Indigenous children aged five years and above required hospitalisation for dental care at a rate of one and a half times that for non-Indigenous children. The report also alluded to the fact that less than 5% of Indigenous children brush their teeth regularly and the need for acute hospital treatment rose proportionally with remoteness.

The Australian experience has clearly demonstrated that prevention of the most prevalent oral diseases (e.g. dental caries and periodontal disease) is possible. Its benefits, however, have not reached all Australian communities to the same degree. Within Indigenous communities this effect has been minimal. Furthermore, Australia boasts one of the most advanced healthcare systems in the world yet we have a population group with oral health standards equivalent to many third world nations. The AIHW highlights that the direct annual expenditure on oral health treatments in Australia was \$6.7 billion in 2008-09, making oral health conditions the second-most expensive disease to treat in Australia<sup>4</sup>. Despite this, current oral health indicators reveal the existing oral health care system is in crisis with 25% of people with health care cards waiting between 1 and 2 years for dental treatment and a further 32% waiting for more than 2 years<sup>5</sup>.

National research focusing on the oral health of Indigenous children has revealed key factors that could improve clinical outcomes for Indigenous youth. These include: optimising access; using specific Indigenous resources; stringent clinical follow-up; and effective linkage between Indigenous and non-Indigenous health care providers. For example, Slade et al used a model of care of health workers applying protective varnish to Indigenous children's teeth in their *Strong teeth for little kids program*<sup>6</sup>. Additional research in Northern Queensland, *Crocodile smiles project*<sup>7</sup> used Aboriginal health workers to be oral health champions in Indigenous communities with some success in building capacity amongst its core target of children aged 0-4 years. Other programs directed at the school based setting include the *Clean teeth wicked smiles project*<sup>8</sup> where tooth brushing and oral health promotion resulted in a significant increase in the number of children brushing twice per day. Variable success was found with the *Top tips for teeth program*<sup>9</sup> promoting brushing at lunch times within the school setting.

Reporting by the Victorian Department of Health *Evidence-based oral health promotion resource*<sup>10</sup> has varying levels of evaluation and research evidence ratings. Within each of the mentioned research studies, all showed merit and good intention, but trends appeared in relation to longer term sustainability, staff retention, funding scope and the rigors of evidence. Thus, despite recommendations emphasising the need for epidemiology studies in the area of Indigenous health, little is known of how to intervene effectively to improve oral health and provide the best possible level of oral health for rural, remote and Indigenous communities. Our belief was that '*the current oral health of local Indigenous youth is poor and by using Indigenous specific oral health education in collaboration with Indigenous health professionals we can improve oral health outcomes*'.

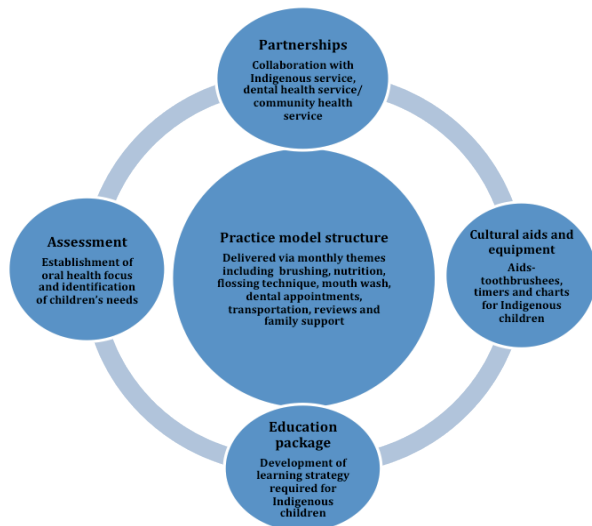
Accordingly, it was evident in the development of the *Indigie-Grins* model of care that four key concepts must occur to gain success. These included; the need for Indigenous health professionals; mainstream dental funding and recognition; the use of specific Indigenous oral health care products; and the need for an evidence based model to assess the intervention outcome. Considering these challenges, the aim of this study was to assess the oral status of Indigenous oral health in children aged 5-12 years living in Southern Grampians Shire of Western Victoria; and to develop and provide a culturally appropriate community intervention program targeted at children from an Indigenous background to increase their oral health knowledge, attitudes, and preventive oral-health behaviors.

In addition, we aimed to reveal the processes by which Indigenous populations construct their oral health experience, identify perceptions and concerns about oral health needs, and assess the appropriateness of the information provided through this community-based oral health promotion program.

## Methodology

Acknowledging previous studies in the area of Indigenous oral health, it was set to draw on key learnings to develop a model of care that would be implemented and trialled as part of our program. The structured model of care focused upon four key elements as highlighted in Figure 1.

Figure 1. Indigie-Grins model of care.



The first component involved community consultation and building and strengthening of partnerships. In the second component, cultural aids and equipment were designed. A third component considered the development of a specific Indigenous education package, and clinical assessment to formulate the research development. The last component considered the evaluation of the model.

This study represents a combination of quantitative and qualitative methodologies. The strategy employed sought cultural sensitivity through the use of a team that included Koori researchers and field workers. Standardisation was through the use of training, calibration, and supervision of work by the Principal investigator, and well defined material and procedures. The *Indigie-Grins* program collected demographic data, details of education status and current oral health care behaviours and a nutrition assessment. A full oral health assessment was undertaken by the dental therapist at baseline and after 10 months to assess the model's impact on dental and periodontal indicators. Clinical measures considered in this study included:

Coronal dental caries: decayed, missing, and filled surfaces (dmfs); decayed, missing and filled teeth (dmft) indices for the primary dentition<sup>a</sup>. To complement and further explore dental health

a The dmfs index, represents the arithmetic average number of tooth surfaces (s) that are decayed (d), missing (m), and filled (f) as a result of caries occurring in temporary dentition. The dmft index uses the tooth (t) as the unit of study. The equivalent indexes for permanent dentition are the DMFS and DMFT.

status, the restorative unmet normative needs index, to measure restorative needs by dividing the sum of carious surfaces by the sum of carious and filled surfaces -  $[DS/(DS + FS)]$ <sup>11</sup>

Periodontal assessment i) The gingival index used in this study was based on the modified gingival index (MGI) described by Lobene et al.<sup>12</sup> which permits non-invasive evaluation of early visual changes in severity and extent of gingivitis; and ii) Community periodontal index (CPI). The CPI is an index developed by the World Health Organization (WHO) to establish the needs of a community for periodontal treatment; and the plaque index based on that described by Silness and Løe<sup>13</sup>. A CPI probe was used to aid assessment.

To optimise assessment and reporting, the clinical examiner undertook a training and calibration exercise to ensure accuracy of her clinical assessment. Intra-examiner reproducibility achieved in the duplicate examinations of 25 children reached 'fair to good agreement' levels according to Cohen criteria and the requirements for adequate examiner reliability.<sup>14</sup>

## Population and sample

This cross-sectional study targeted a convenience sample of Indigenous background males and females, 5-12 years, living in the Southern Grampians Shire, and who had not visited or engaged with oral health care services within the last 12 months. Local demographics revealed a shire population of 16,000 with approximately 1.0 – 1.5% being Aboriginal or Torres Straight Islanders<sup>15</sup>. Using a collaborative approach, an Indigenous health worker assisted in recruitment, retaining and education of the children and families within the research period.

In order to achieve the study's objectives, a sample size of 20 children aged (5-12 years) was required. In essence, sample size calculations are not necessary for a pilot study. However, a sample size of 20 at a conventional one-tail significance criterion of 0.05 would provide power equal to 0.80, to detect differences at an effect size of 0.60, which is considered between 'large' and 'medium' effect size<sup>16</sup>.

With the approval of the South West Ethics Committee, de-identified dental health records were collected for each participant by an Indigenous health professional/principal researcher. Additional health information was gathered using the Victorian Department of Human Services (SCOT) tool assessing demographic and socio-economic information. Digital images were used to give a visual representation of oral health of each of the children.

The Indigenous health worker undertook the role of principal researcher for the project and also designed the culturally specific art work used to promote oral health for the children. The health worker was also responsible for bridging the gap between mainstream dental services and assisting in data collection and

education of the children and parents over a 12-month period. The health worker worked closely with the dental therapist to design specific learning goals for the children and families and was also a key component in the collaborative partnership with Winda Mara and the research agency.

## Intervention

After the initial assessment, monthly visits were coordinated between the dental therapist and Indigenous health worker at the children's homes. At each visit, a structured education, assessments, oral health aids, and equipment were delivered to the children and families. Included in the sessions were topics regarding nutrition, flossing, brushing, disclosing tablets, mouth wash, and advice on required clinical treatments. Children were given encouragement through the provision of dental aids such as toothbrushes, toothpaste, Indigenous brushing charts, timers and art work throughout the research phase. Rewards such as pencils, stickers, hair bands, and temporary tattoos were given to the children for positive oral health behaviours. A mid cycle (5 month) visit was also made by the dental therapist and the Indigenous health worker to the home to support learning and clinical advice. Dental treatments that were required following the initial assessment were offered in accordance with standard dental health services practices.

To obtain a more comprehensive understanding of the community-based program, focus group discussions were organised at baseline and at 10 months to assess the participants' views about the format, content, and delivery of the program, as well as to ascertain the impact of the model of care. Initial focus groups sessions were conducted with collection of demographic information and an outline of the project given to participants prior to any clinical evaluation or treatment. Four key questions presented to the focus groups for discussion: Can you explain what good oral health is? What current oral health measures do you currently use with your children? What do you believe to be barriers to good oral health of your children? And, how can the oral health of Indigenous children in Australia be improved?

Focus group sessions were independently documented to support the findings and interpretation of the group discussion. Focus group data were thematically analysed to clearly represent both pre and post intervention knowledge and opinions of the group.

Children were escorted with their parents and the Indigenous health worker to the local dental clinic for a comprehensive examination, digital imaging and initial oral health screening. De-identified data were collected and clinical indicators tracked for evaluation.

## Results

A total of 17 children were recruited to the research with seven males and ten females within the sample. The mean age of 7.5 years was recorded. Of the sample 100% were eligible for health care cards, resided in the shire of Southern Grampians and were registered as Indigenous per the Victorian Department of Health SCOT registration tool.

### Clinical results

#### Dental caries history

The overall mean dmfs was 3.7 (s.d. 3.3) tooth surfaces and 3.5 (s.d. 3.5) tooth surfaces, before and after the intervention, respectively. Interestingly, before the intervention, the mean number of missing teeth was 0.4 (s.d. 1.7) and increased to 0.9 (s.d. 2.3) missing teeth after the intervention. Before the intervention, about one third (35.0%) of the sample had their restorative needs met. On the other hand, 29.4% had all their restorative needs unmet. Overall, before the intervention participants with unmet needs had an average of 71.0% of their restorative needs unmet. After the intervention the majority had their restorative needs met (76.5%) and the proportion of those who had all their restorative needs unmet decreased to 17.3%. Among participants with unmet needs after the intervention, the average decreased to 34.4%. Thus, after participating in the *Indigie-Grins* program, participants showed statistically significant improvements in the proportion of unmet restorative needs compared to baseline (71.0 vs. 34.4;  $p < 0.05$ ).

Both gingival and plaque index measures were taken pre and post data and the following Figures 2 and 3 represent the values for both indicators. These indices reveal the level of change for both indicators at completion of the project compared to initial scoring. Level of change indicates both gingival and plaque change since initial assessment. A High 1 or 2 change indicates the level of improvement from initial baseline assessment. A Less 1 indicator indicates a marginal level of decline to Less 2 significant decline in index score.

Figure 2. Gingival Index. Clinical index change from baseline assessment.

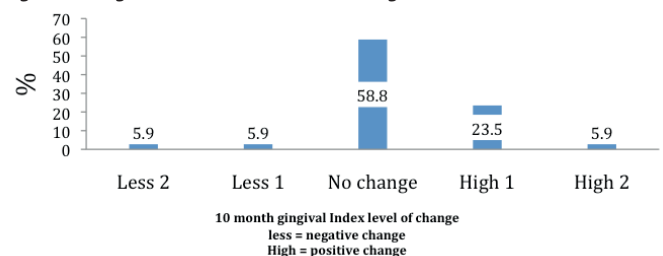
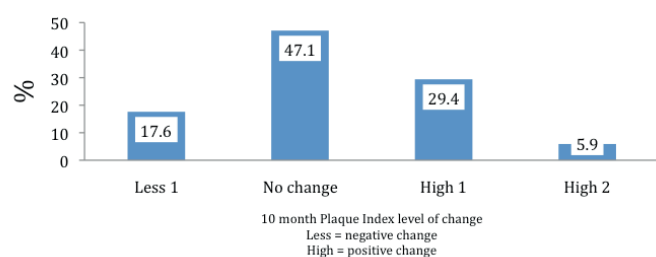


Figure 3. Plaque Index. Clinical index change from baseline assessment



## Dental sealants

The average numbers of fissure sealants present in permanent teeth increased significantly after the intervention, from 0.4 surfaces to 1.6 surfaces ( $p < 0.01$ ). Before the intervention, the majority had no teeth sealed (76.5%), after the intervention only 35.5% had no tooth surface sealed. Those with sealed teeth after the intervention ranged from 1 to 4 teeth with sealants.

## Qualitative findings

Qualitative findings provided insight into the current perceptions and attitudes related to oral health within the Indigenous sample. Four major themes emerged from the group discussions: 1) perceptions; 2) dental aids and products; 3) trust; and 4) knowledge. A summary of findings, with selected illustrative quotes, is presented in Table 1.

## Perceptions

The perception that deciduous teeth were meant to 'fallout' was a common trait amongst parents and thus did impact on the level of care and setting of oral health care methods encouraged by parents to their children. Parents and children believed that preventative oral health care and screening was over emphasised in community and also difficult to access for Indigenous communities.

There was no cultural significance related to oral health and oral health care and therefore believed to be a significant barrier to the importance of oral health in this Indigenous sample. Participants asked local elders as to the relevance of oral health care in 'Dreamtime' stories to which no records or stories were found. Parents reported that this could be a reason why there is a lack of recognition of the importance of oral health in their culture.

## Dental aids and products

Informants indicated that there was no understanding as to the role of floss, mouth wash or the difference between age specific toothpastes. Furthermore, dental hygiene products (oral care) were seen as expensive to buy and often misleading in their advertising according to the group. Parents reported not buying products due to potential wastage that may occur by their children. Chewing gum ('extra') was seen by children and parents as being as good as brushing teeth. This was highlighted by many of the children through television advertising of whitening agents and fresh breath gums.

The use of oral health aids and equipment specific to Indigenous culture was not recognised by any of the sample and this was found to be an issue when discussed in the focus groups.

## Trust

Trust was a perceived barrier observed in all focus group sessions with many parents using the Aboriginal health clinic located in Melbourne as their oral health provider, preferring an eight hour return bus trip for any dental treatments rather than attending local public dental services. Further questioning found this to be centred on trust and awareness of local service delivery rather than cultural ties. Anecdotally, following the project the numbers of Indigenous children and adults using the local service has increased significantly.

## Knowledge

The final key area focused on knowledge of the sample with large gaps in understanding of oral health care, needs, services, nutrition and ongoing preventative maintenance noted. There was a lack of specific oral health education and awareness promoted in maternal and child health, schools and cultural meeting places, reported by the group.

The question about water consumption discovered that all parents stated that they buy bottled water or use tank water rather than use the fluoridated water supply in the region. They claimed the taste and perceived risk of fluoridated water was the predominant factor for this decision. Most families had tank water with many reporting they purchased water regularly from shops or commercial providers. All participants lived in an area where town fluoridated water was available. Further information related to the safety and importance of fluoridated water was provided yet all participants claimed it would not curve their choice in water for their children and families.

The level of knowledge gained over the course of the research was highlighted by all participants and their children. For example, parents reported great improvement in oral health care when Indigenous specific products such as brushing charts, toothbrushes and timers were used in the project. They claimed there was a greater sense of pride in their children when using these products. Participants also found the concept of pre- and post-intervention images of their mouths to be a positive reinforcement to continue good oral health practices.

*Table 1. Summary of findings from focus group discussion, with selected illustrative quotes*

Common themes	Illustrative quote(s)
Perceptions	'I just assume that their baby teeth are meant to fall out and then the new ones come through' Mother of 3 children
Dental aids and products	'we don't buy our kids toothbrushes and toothpaste because they only waste them and then I've got to buy more of the stuff and its expensive' mother of two
Trust	'we go to the Aboriginal health centre in Melbourne because we trust them and they can sort them out there and then' 'our local services – you can't get in for 1-2 years here' mother of four children
Knowledge	'I didn't know teeth were so important- especially the baby ones' mother of two

## Discussion

The present experience suggests that use of Indigenous health worker, a dental therapist and the use of mainstream oral health care services and existing community facilities can stimulate greater awareness and involvement of participants in improving their oral health care. This collaborative approach provides support to the merit of the model and its ability to engage, retain and support oral health actions over a significant period of time. Children and parents were engaged, interested and supportive of the model. A 100% retention rate was achieved after 12 months.

The data gathered relating to deciduous teeth reveal a high level of decay at baseline. After the intervention, there was a significant decrease in the average number of unmet restoratives needs of children. Additionally, there was a significant increase in the number of dental sealants placed under this model. This would support the notion that when communities are afforded greater consideration in an accessible and culturally relevant manner, the results in terms of awareness, ownership, and empowerment are likely to be positive. Children at risk of decay and long term oral health disease had the potential to reduce ongoing dental disease with the use of sealants.

Additionally, there was a 'trend to improvement' in the pre-post-test evaluation of the dental plaque and gingival health. The results for both gingival and plaque indices showed moderate levels of improvement over the course of the research. A positive aspect to both indicators was that levels of plaque and gingivitis had not declined over the period of 12 months supporting the notion that these individuals had made some oral health changes over the year. Results in this regard are encouraging, although not significant. Larger samples are required to assess whether this intervention may produce significant results.

However, the main objective of this study was not as much to evaluate the effectiveness of the intervention program, but to develop recommendations on the implementation of an individualised prevention protocol for Indigenous children and adolescents and test their acceptability in a small sample of Indigenous children. It was hypothesised that if this program was accepted by the community and refined this would support the future evaluation of its long-term effects, sustainability and viability. Furthermore, any intervention program that results in even small improvements to oral disease prevention or oral functional health maintenance in high-risk populations will have both economic benefits, as well as improving the quality of life and well-being of participants<sup>17</sup>. A major element of *Indigie-Grins* was that, while it might be scientifically justified to use the same preventive and treatment intervention as the mainstream Australian culture, little is known of the feasibility of the implementation of the various preventive options and oral health programs within specific Indigenous communities. In this respect, the focus group discussions (FGD)

formed the most important learning tool for both participants and researchers. FGD participants provided valuable information about the state of oral health in the Indigenous community. Key learnings about fluoridation were both surprising and concerning given the investment in fluoridation as a key to improving oral health by governments. Another misconception, as highlighted in the focus group discussion amongst parents, was that deciduous or 'baby' teeth were there to fall out gives some reason to their poor clinical assessment.

Additionally, FGDs explored Kooris' understanding of the causes, deterrents, course, and consequences of oral diseases, which mechanism they have used to prevent and treat oral diseases or their consequences, with specific interest of utilising existing oral health knowledge, beliefs and practices in developing the intervention. Nonetheless, we found a lack of linkage to dreamtime stories of oral health and the significant trust issues that still exist between mainstream and Indigenous health care provision.

This is an element which requires further exploration as information collected under such protocol will be useful to provide a more accurate input to health programmers and service providers, it will facilitate the expansion of the patients base, while providing useful suggestion for further research and alternative public health interventions that may be more culturally sensitive and appropriate to deal with oral health conditions in Aboriginal populations.

When analysing the result of this study, there were limitations of intervention and assessment. The most obvious ones were the small sample size and the length of the assessment period. Thus, it would be difficult to determine long term effect and sustainability of the intervention. With Australia's growing Indigenous population, it is important to investigate methods of ensuring delivery of oral health programs that are acceptable through targeting the needs of particular cultural groups and using culturally appropriate settings. Qualitative and quantitative data collected were used to improve oral health in Aboriginal populations, filling the gaps in the existing data and knowledge, and improving the health of the community as a whole.

## Conclusion

In conclusion the *Indigie-Grins* program although small in size and with noted limitations has merit as a new oral health care model that can improve outcomes for Indigenous children. Using a combination of past research pioneers; involving Indigenous health workers, local clinical services, education, ongoing support and Indigenous specific aids, this model has potential to address the trend of poor oral health status in our Indigenous children.

The model of care supported greater awareness, access and reinforcement of positive oral health behaviours within the sample. Oral health indicators revealed significant improvement for image and preventative strategies for dental disease with the use of fissure sealants, extractions and restorations. Children and parents became more engaged with local dental services through collaboration and improved awareness of oral health factors.

Focus group findings gave a clearer understanding of Indigenous oral health awareness, behaviours and implications for policy makers to address. In particular, the concept of fluoridation, access to oral health products and potential for more Indigenous specific aids, that have direct influence on oral health. Trust, access and knowledge are potential keys to the future of Indigenous oral health.

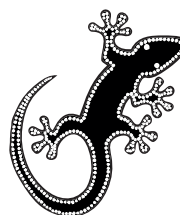
Given the project was to determine the feasibility of the new model of care the results obtained are very encouraging and support further interest in the area of Indigenous oral health. The results obtained in this research support further research using this model with a control sample and more statistically significant sample to determine the effectiveness of the model.

## References (Endnotes)

1. Australian Health Ministers' Advisory Council, *Healthy mouths healthy lives*. Australia's National Oral Health Plan 2004-2013. South Australian Department of Health, 2004
2. Department of Health. *National Strategic Framework for Aboriginal and Torres Strait Islander Health 2003-2013*. 2007. Available at: [www.health.gov.au/internet/main/publishing.nsf/Content/health-oatsih-imp07-13](http://www.health.gov.au/internet/main/publishing.nsf/Content/health-oatsih-imp07-13)
3. Jamieson L, Armfield JM & Roberts-Thomson KF 2007. *Oral health of Aboriginal and Torres Strait Islander children*. Cat. no. DEN 167. Canberra: AIHW. ISSN 1321-0254; ISBN 978 1 74024 618 7; Cat. no. DEN 167; 131pp
4. AIHW. 2010, *Health Expenditure Australia 2008-09*, Catalogue Number HWE 51. Canberra, Australian Institute of Health and Welfare
5. Stewart JF & Ellershaw AC 2012. *Oral health and use of dental services 2008: findings from the National Dental Telephone Interview Survey 2008*. Dental statistics and research series no. 58. Cat. no. DEN 216. Canberra: AIHW.
6. Slade, G, Baile R, Rutherford L, Leach A, Raye I, Endean C, Simmons B, Morris P. 2010. Effect of health promotion and fluoride varnish on dental caries among Australian Aboriginal children; results from community-randomised control trial. *Community Dentistry and Oral Epidemiology*, doi: 10.1111/j.1600-0528.210.00561.x.
7. Queensland Health. 2007. *Crocodile smiles: Evaluation report*. Brisbane.
8. Buckland A and Kennedy C. 2008. *Clean teeth wicked smiles 2007 toothbrush program evaluation*. Maari Ma Aboriginal Corporation.
9. La Trobe community Health Services. 2002. "Top Tips for Teeth" at the Woolloomooloo Bellum Kode School. Victorian Oral health Promotion Grants Program. La Trobe Community Health Centre and Victorian Department of Human Services.
10. Rogers JG. *Evidence based oral health promotion resource. Prevention and Population Health Branch*. Government of Victoria. Department of Health. Melbourne, 2011.
11. Todd, R., Gelbier, S. (1991). Dental caries and dental attendance patterns in Vietnamese children aged 11-12 years resident in three inner London boroughs, UK. *Community Dental Health*, 8, 163-5.
12. Lobene, R., Weatherford, T., Ross, W., Lamm, R. and Menaker, L. (1986) A modified gingival index for use in clinical trials. *Clinical Preventive Dentistry* 8, 3-6
13. Silness J, Løe H. Periodontal disease in pregnancy. II. Correlation between oral hygiene and periodontal condition. *Acta Odontol Scand* 22:533-51, 1963
14. Gertsmann, B.B. (1998): *Epidemiology kept simple: an introduction to classic and modern epidemiology*. pp55-57. Toronto: John Wiley & Son.
15. Southern Grampians Population Profile. (2011). Accessed on 21/11.2012, at <http://profile.id.com.au/southern-grampians/population>
16. Cohen, J. *Statistical power analysis for the behavioural sciences*. 2nd edn. Hillsdale, NJ: Erlbaum. 1988
17. Brice GC, Gorey KM, Hall RM, et al. The STAYWELL program—maximizing elder capacity for independent living through promotion and disease prevention activities. *Res Aging* 1996; 18: 202–218.



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**HealthBulletin**



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The Australian Indigenous *HealthBulletin* (ISSN 1445-7253) is the electronic journal of the Australian Indigenous *HealthInfoNet*.

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