Social gradient in child oral health: individual, school and area variation.

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<table>
<thead>
<tr>
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<th>Description</th>
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<tbody>
<tr>
<td>ABS</td>
<td>Australian Bureau of Statistics</td>
</tr>
<tr>
<td>ACARA</td>
<td>Australian Curriculum, Assessment and Reporting Authority</td>
</tr>
<tr>
<td>ACORN</td>
<td>Acorn is a Geo-demographic Index used in the UK</td>
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<tr>
<td>AIHW</td>
<td>Australian Institute Health and Welfare</td>
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<tr>
<td>AHS</td>
<td>Area Health Service</td>
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<tr>
<td>AIC</td>
<td>Akaike Information Criterion</td>
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<tr>
<td>ARCPOH</td>
<td>Australian Research Centre for Population Oral Health</td>
</tr>
<tr>
<td>CDBS</td>
<td>Child Dental Benefits Schedule</td>
</tr>
<tr>
<td>CDHS</td>
<td>Child Dental Benefits Schedule</td>
</tr>
<tr>
<td>CI</td>
<td>Confidence Interval</td>
</tr>
<tr>
<td>COHS</td>
<td>Centre for Oral Health Strategy</td>
</tr>
<tr>
<td>DAG</td>
<td>Diagrammatic Acyclical Graph</td>
</tr>
<tr>
<td>DMFS</td>
<td>Decayed Missing Filled Surfaces</td>
</tr>
<tr>
<td>DMFT</td>
<td>Decayed Missing Filled Teeth</td>
</tr>
<tr>
<td>NSW</td>
<td>New South Wales</td>
</tr>
<tr>
<td>ICC</td>
<td>Intra-Class Correlation</td>
</tr>
<tr>
<td>ICSEA</td>
<td>Index of Community SocioEducational Advantage</td>
</tr>
<tr>
<td>IRSAD</td>
<td>Index of Relative Socio-economic Advantage and Disadvantage</td>
</tr>
<tr>
<td>LHD</td>
<td>Local Health District</td>
</tr>
<tr>
<td>LIFESTYLE</td>
<td>LIFESTYLE is a demographic Index used in Canada</td>
</tr>
<tr>
<td>NT</td>
<td>Northern Territory</td>
</tr>
<tr>
<td>OHE</td>
<td>Oral Health Education</td>
</tr>
<tr>
<td>OMR</td>
<td>Optical Mark Reader</td>
</tr>
<tr>
<td>OR</td>
<td>Odds Ratio</td>
</tr>
<tr>
<td>PAF</td>
<td>Population Attributable Fraction</td>
</tr>
<tr>
<td>PAS</td>
<td>Priority Action Schools</td>
</tr>
<tr>
<td>PR</td>
<td>Prevalence ratio</td>
</tr>
<tr>
<td>PSP</td>
<td>Priority Schools Program</td>
</tr>
<tr>
<td>QLD</td>
<td>Queensland</td>
</tr>
<tr>
<td>RR</td>
<td>Rate Ratio</td>
</tr>
<tr>
<td>SA</td>
<td>South Australia</td>
</tr>
<tr>
<td>SAP</td>
<td>School Assessment Program</td>
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<tr>
<td>SCUDS</td>
<td>Study into the Child Use of Dental Services</td>
</tr>
<tr>
<td>Abbreviation</td>
<td>Description</td>
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<tr>
<td>--------------</td>
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<tr>
<td>SEIFA</td>
<td>Socio-economic Indexes for Areas</td>
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<tr>
<td>SES</td>
<td>Socio-economic Status</td>
</tr>
<tr>
<td>SiC</td>
<td>Significant Caries Index</td>
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<tr>
<td>SOKS</td>
<td>Save Our Kids Smiles</td>
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<tr>
<td>TAS</td>
<td>Tasmania</td>
</tr>
<tr>
<td>VIC</td>
<td>Victoria</td>
</tr>
<tr>
<td>VIF</td>
<td>Variance Inflation Factor</td>
</tr>
<tr>
<td>WA</td>
<td>Western Australia</td>
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<tr>
<td>WHO</td>
<td>World Health Organisation</td>
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ABSTRACT
This thesis describes the oral health of New South Wales (NSW) children aged 5–12 years by socioeconomic (SES) characteristics utilising the individual-, school- and area-level socioeconomic indicators. It also quantifies the usefulness of SES indicators for targeting of dental services.

Methods
A cross-sectional study of NSW 5–12 year-olds was conducted in 2007 using a multi-stage, stratified, cluster sample approach. Explanatory SES variables were explored at three levels: individual, school and area. Caries prevalence, caries severity and significant caries were calculated. Bivariate analysis was undertaken. Prevalence ratios (PR) of caries prevalence and SiC_{10} were modelled by Poisson regression (PROC LOGLINK, SUDAAN 10.0). Rate ratios (RR) of caries severity were modelled using Poisson regression (PROC GENMOD, SAS 9.2). Multi-level analysis (SAS PROC GLIMMIX) was undertaken accounting for the nested structure. Use of SES variables to target dental services was examined using number of cases, relative risk and population attributable fraction (PAF%).

Results
Just under 40% of NSW children had a prevalence of deciduous caries with mean dmfs of 3.18 surfaces and just over 22% had experienced permanent caries with mean DMFS of 0.61 surfaces.

Variation in oral health by SES indicators
There was significant variation in caries prevalence, caries severity and SiC_{10} by socioeconomic characteristics; children from the lowest SES category had significantly higher caries prevalence and severity compared to the highest SES category for all SES indicators in both the deciduous and permanent dentition. Membership of the SiC_{10} group showed lower SES groups had a higher proportion of children who formed part of the SiC_{10} group.

Associations across individual, school and area-level SES indicators
In the final models, income was significant for all three caries measures for both dentitions. The children from the lowest income category had significantly higher odds of caries, more severe caries and membership of the SiC_{10} group. School type as an explanatory factor was not significant for caries prevalence and SiC_{10} in the multi-level model, although the
children attending a disadvantaged public school had significantly higher odds of permanent caries severity.

**Effectiveness of targeting by SES indicators**

In both the deciduous and permanent dentition there were fewer cases of caries and \( \text{SiC}_{10} \) cases in the designated SES target group, the lowest SES group, than outside the designated target group. SES demonstrated a low population attributable fraction for deciduous and permanent caries prevalence, caries severity and significant caries.

**Conclusions**

The study demonstrated that caries was higher among lower SES groups whether measured by individual, school or area characteristics. In many instances there were three and five-fold differences among those in the lowest SES categories providing a consistent association with poor oral health. Income was independently associated with variation in child oral health when adjusting for the nested structure. Low SES categories did not identify the majority of those with caries or the highest levels of caries and would therefore be limited as a basis for a targeted oral health strategy and a population health focus that uses a social determinants approach would be more appropriate.
SIGNED STATEMENT

I certify that this work contains no material which has been accepted for the award of any other degree or diploma in my name, in any university or other tertiary institution and, to the best of my knowledge and belief, contains no material previously published or written by another person, except where due reference has been made in the text. In addition, I certify that no part of this work will, in the future, be used in a submission in my name, for any other degree or diploma in any university or other tertiary institution without the prior approval of the University of Adelaide and where applicable, any partner institution responsible for the joint-award of this degree.

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Signed:

Jennifer Miller

Date: 4-11-2015
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THESIS FORMAT

This thesis presents an introductory chapter that provides background information on child oral health in Australia, literature on social gradients in oral health and the various indicators of SES and the association of socioeconomic factors with oral health. It highlights the provision of dental services for children and the variation across Australian states and territories. It also introduces the rationale and conceptual framework, aims, study objectives, hypotheses and rationale. The second chapter describes the study design, sampling procedures and requirements, data collection methods, including details of mail questionnaire SES indicators and oral epidemiological examinations. Data management incorporates data linkage, data weighting, analysis plan and the conceptual model. The third chapter includes responses from the schools in the sampling frame, including the examination and questionnaire phase. The results are described using three caries measures in relation to individual-, school- and area-level characteristics. The fourth chapter discusses the major findings of the study on the associations of SES indicators at an individual-, school- and area-level with caries measures and compares those findings with the available literature. It also includes limitations of the data and further research. The final chapter concludes with the major themes, implications of the findings and principal conclusions.

Tables and figures are presented together with their corresponding text where possible. References to published work are in the text with the author name(s) and the year of publication in parenthesis. Where there were three or more authors, the first author is listed, followed by et. al., in the text. The complete list of authors is listed in the reference list at the end. Where there were multiple references for an author, references are listed in the bibliography in alphabetical order of authors and then by year of publication. The appendices include: consent form; primary approach letter to study participants with the enclosed questionnaire; reminder card and follow-up letters; oral epidemiological examination form; letters for ethical approval of the study; Diagrammatic Acyclical Graphs; and, model selection tables (Appendices 1-8).