Impact of school-based dental program performance on the oral health-related quality of life in children

Rosa Amalia¹, Rob M. H. Schaub², Roy E. Stewart³, Niken Widyanti¹ & Johan W. Groothoff³

¹ Community and Preventive Dentistry Faculty of Dentistry, Universitas Gadjah Mada, Yogyakarta, Indonesia
² Center for Dentistry & Oral Hygiene, University Medical Center Groningen, University of Groningen, Groningen, The Netherlands
³ Department of Health Sciences, Community and Occupational Health, University Medical Center Groningen, University of Groningen, Groningen, The Netherlands

Keywords
dental caries, OHRQoL, school-based dental program.

Correspondence
R. Amalia, Community and Preventive Dentistry Faculty of Dentistry, Universitas Gadjah Mada, Denta Sekip Utara No. 1 Yogyakarta, 55281 Yogyakarta, Indonesia.
Tel: +62 81578804082
Fax: +62 2742830274
Email: rosadewanto@yahoo.com

Received 17 January 2015; accepted 25 June 2015.
doi: 10.1111/jicd.12179

Abstract
Objective: To assess the association between the performance of school-based dental programs (SBDPs) and oral health-related quality of life (OHRQoL) in school children, in the province of Yogyakarta, Indonesia, taking into account untreated caries and sociodemographic factors.

Methods: A cross-sectional survey was administered with 1906 children aged 12 and participating in SBDPs. Four SBDPs were chosen to represent good and poor performance in urban and rural areas. Caries was assessed using World Health Organization (WHO) criteria, whereas the children were interviewed for the OHRQoL and sociodemographic data. The OHRQoL was assessed using the Condition-Specific Child-Oral Impact on Daily Performances (CS Child-OIDP) index related to dental caries.

Results: The mean CS Child-OIDP score was 1.63 (SD ± 3.20) for good performance SBDP and 6.89 (SD ± 8.85) for poor performance SBDP. Analysis by negative binomial regression showed that being served by a poorly performing SBDP (RR = 4.45, 95% CI = 3.87–5.13), and to some extent living in a rural area and being a girl, were significantly associated with a greater risk of having a lower quality of life than were the counterparts. Untreated caries did not show an association with OHRQoL.

Conclusion: There are substantial indications that SBDP performance is related to children’s OHRQoL.

Introduction
For many years, oral healthcare for children in primary schools in Indonesia has been provided through a national school-based dental program (SBDP). Community Health Centers (CHCs) deliver the SBDP as a part of a national strategy for school health. According to a manual issued by the Ministry of Health, SBDP aims to promote oral health by preventing oral disease and establishing healthy behavior. The main activities of SBDP are: (a) screening individual children in school for oral diseases; (b) providing oral health education, including oral hygiene instruction in schools; (c) training teachers to teach oral health matters; and (d) curative treatment in CHC dental clinics upon referral. However, the results of a national survey show that in the province of Yogyakarta, on the island of Java, caries experience (DMFT) in ≥ 12 year olds was 6.5, compared to the average caries experience in Java of DMFT = 4.8 and DMFT = 4.9 for the nation.¹ The reasons for the high caries experience in Yogyakarta are numerous. In particular, the traditional food of Yogyakarta is renowned for and characterized by its sweetness.² Moreover, dental caries are expected to increase in the coming years, as there has been a significant increase in sugar consumption in developing countries.³ It is known that major constraints on the
performance of SBDPs include insufficient resources and the low priority of oral health at the district level. The increasing caries rate raises questions regarding the performance of SBDP as a major provider of children's oral health care in Yogyakarta. The performance of SBDP has therefore been evaluated in a number of CHCs by comparing the results achieved, as stated in annual reports, to national targets. A SBDP is classified as having good performance when:

(a) 80% of schools in the working area of the CHC participate in the program.
(b) Oral health screening followed by oral health education in classrooms is carried out at least twice a year in each school.
(c) 80% of schools practise classroom tooth brushing.
(d) 80% of children found to have caries receive full treatment upon referral.
(e) All teachers are trained in matters of oral health at least once a year.

A CHC is considered to be performing poorly in relation to its SBDP when the above targets are achieved to a level of < 60% for activities 1, 3, and 4, and when activities 2 and 5 are not implemented. The province of Yogyakarta covers an area of 3185.8 km², with an approximate population of 3.5 million; 117 CHCs run SBDPs in this area. The evaluative SBDP study reveals that caries experience is higher in poor performance SBDPs (DMFT = 3.8 ± 3.4) than in good performance SBDPs (DMFT = 2.8 ± 2.4); however, the highest proportion of caries experience for both consists of untreated caries (DT), at 3.6 (SD ± 3.4) and 2.5 (SD ± 2.3) respectively.

According to modern concepts in the field of dentistry and the perceived impact of oral health, oral disease and oral healthcare have gained importance in complementing clinical indicators. Oral health-related quality of life (OHRQoL) is one aspect of this multidimensional construct. A study in the United States showed that adult participants benefit from an oral health intervention program not only in clinical terms, but also in terms of OHRQoL. For a broader understanding of the consequences of SBDP performance, it is therefore important to expand the assessment of the performance of SBDPs using an OHRQoL measure. To this end, the Child-Oral Impact on Daily Performances (Child-OIDP) was chosen, as it is a well-established instrument. The presence of untreated caries may have a negative impact on the OHRQoL. In addition, a number of possibly influential sociodemographic factors are taken into account in the analysis, as this has been indicated as being related to children’s OHRQoL. In terms of sociodemographic factors, rural residents are more likely to have lower OHRQoL than urban residents, and higher levels of parental education have been associated with higher levels of OHRQoL. It has also been suggested that girls have lower OHRQoL than boys. Therefore, the objective of this study was to examine the association between SBDP performance and OHRQoL in primary school children, while also considering the impact of untreated caries and sociodemographic factors.

**Methods**

Data from a cross-sectional evaluative study in the province of Yogyakarta in 2010 were used. Of the 12 CHCs originally included, four were selected, due to their convenience and the following characteristics: one CHC with good SBDP performance and one CHC with poor SBDP performance from an urban and rural area respectively; the SBDP performance was assessed by comparing data from the CHCs' annual reports from the previous year with the national targets outlined in the SBDP manual mentioned in the introduction. All 12 year olds, from both primary public and private schools in the working areas of the four CHCs, were invited to participate in the study.

The Child-OIDP measure was used to acquire information relating to the children's OHRQoL using structured interviews in schools, whereby four dental nurses were trained to collect the data. The training comprised imparting sufficient background knowledge about the study and ensuring the nurses could follow the standardized procedures of the questionnaire, for instance determining how a point on a scale should be applied.

Children were asked to indicate from a list of common oral problems, those they had experienced in the preceding 3 months. The interviewer then asked, for each of the oral problems experienced, about their impact on eight daily performances: eating, speaking, mouth cleaning, relaxing, smiling, studying, emotion, and social contact. Upon the indication of the presence of an impact, the frequency and the severity of its effect on daily life were scored. These frequency scores were: 0 (never), 1 (once or twice a month), 2 (once or twice a week) or 3 (every day/nearly every day). The severity scores were 0 (none), 1 (little), 2 (moderate) or 3 (severe). For each daily performance, both scores were multiplied to produce a performance score (0–9). The aggregate impact is the sum of the impacts on all eight performances divided by 72 and multiplied by 100 to arrive at a range of aggregate impacts ranging from 0 to 100.

The Child-OIDP also permits analysis of condition-specific (CS) impacts on daily performances. The causes of oral impacts related to caries chosen here were “toothache,” “sensitive teeth,” and “cavity.” To yield a more meaningful picture of impact than the aggregate CS Child-OIDP score, the variable “intensity” was used.
Intensity is a classification of the highest performance score: 0 = no impact, 1 = very little, 2 = little, 3 and 4 = moderate, 6 = severe and 9 = very severe.15

Prior to its use in this study, the Child-OIDP questionnaire was subjected to a cross-cultural translation into Indonesian and an adjustment process following the published guidelines.16 Teachers were consulted regarding the phrasing of the questions. The version adopted was piloted with a sample of 150 children aged 12, from two primary schools not included in the study. The students were able to respond to the questionnaire, and had no difficulty understanding the content in general, or particular words. To assess the reliability of the measurements, test-retest reliability (the intraclass correlation coefficient for the total score) was checked in a pilot study through repeated testing of 65 randomly selected children 2 weeks after the initial administration. In addition to test-retest reliability, internal consistency was estimated by calculating Cronbach’s alpha. Cronbach’s alpha values of above 0.50 are considered acceptable in a child population with a small number of items on the scale,17 and a correlation coefficient of > 0.70 is desirable.18 The intraclass correlation shows satisfactory results for the eight categorical CS Child-OIDP items, with a correlation coefficient of 0.87 and an internal consistency reliability (Cronbach’s alpha) of 0.64. The corrected item-total correlation for each item ranges from 0.65 (for eating) to 0.27 (for speaking), which is above the minimum level of 0.20 required for an item to be included into a scale.19

The DT component for untreated caries was taken as part of the structured interview to collect information according to WHO standards.21 A questionnaire was used for this was carried out in the classroom using plane mouth mirrors, standard explorers and battery-powered torches, the batteries for which were replaced every 2 days. Prior to the study, the first author (RA) and three dentists (examiners) were trained in Faculty of Dentistry Universitas Gadjah Mada Yogyakarta and their assessments were calibrated to ensure the reliability of the examination results. The trainer, a senior lecturer in dental public health at Universitas Gadjah Mada Yogyakarta with extensive experience in oral health surveys, provided the benchmark standard for the examinations. An assessment of interexaminer reliability was first conducted on 12 year olds who were not included in the actual clinical survey. An examiner and the trainer performed the caries examination independently on a minimum of 20 children. Kappa values for interexaminer agreement for the clinical assessment of DMFT during training ranged from 0.88 to 0.91. During the fieldwork, intraexaminer reliability was calculated for a randomly selected 10% sample of the subjects from each school included in this study, who were examined twice on the same day. The Kappa value of intraexaminer agreement throughout the survey ranged from 0.89 to 0.94; both of these values are acceptable according to WHO standards.21 A questionnaire was used as part of the structured interview to collect information relating to sociodemographic characteristics, including place of residence, specifically rural or urban, length of mother’s education, and gender.

Table 1. Prevalence and intensity of oral impacts on children, by CS Child-OIDP (N = 1906)

<table>
<thead>
<tr>
<th>SBDP performance</th>
<th>Oral impacts</th>
<th>Eating</th>
<th>Speaking</th>
<th>Cleaning</th>
<th>Sleeping</th>
<th>Emotion</th>
<th>Smiling</th>
<th>Studying</th>
<th>Contact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Good (N = 1012)</td>
<td>Prevalence</td>
<td>42.4‡</td>
<td>18.4*,†</td>
<td>30.5*,†</td>
<td>1.6*,†</td>
<td>1.8*,†</td>
<td>1.4*,†</td>
<td>3.0*,†</td>
<td>1.0*,†</td>
</tr>
<tr>
<td>Impact intensity</td>
<td>Very little</td>
<td>49.0</td>
<td>50.8</td>
<td>82.7</td>
<td>73.3</td>
<td>52.9</td>
<td>69.2</td>
<td>71.4</td>
<td>77.8</td>
</tr>
<tr>
<td></td>
<td>Little</td>
<td>45.5</td>
<td>44.3</td>
<td>13.5</td>
<td>13.3</td>
<td>41.2</td>
<td>30.8</td>
<td>17.9</td>
<td>22.2</td>
</tr>
<tr>
<td></td>
<td>Moderate</td>
<td>5.0</td>
<td>1.6</td>
<td>2.1</td>
<td>13.4</td>
<td>5.9</td>
<td>0.0</td>
<td>10.7</td>
<td>0.0</td>
</tr>
<tr>
<td></td>
<td>Severe</td>
<td>0.3</td>
<td>3.3</td>
<td>1.7</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td></td>
<td>Very severe</td>
<td>0.3</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Poor (N = 894)</td>
<td>Prevalence</td>
<td>38.6‡</td>
<td>6.8*</td>
<td>19.9*</td>
<td>13.0†</td>
<td>5.3‡</td>
<td>4.3†</td>
<td>1.0†</td>
<td>2.7†</td>
</tr>
<tr>
<td>Impact intensity</td>
<td>Very little</td>
<td>28.9</td>
<td>50.0</td>
<td>24.9</td>
<td>32.4</td>
<td>38.0</td>
<td>45.3</td>
<td>77.8</td>
<td>55.7</td>
</tr>
<tr>
<td></td>
<td>Little</td>
<td>42.3</td>
<td>33.6</td>
<td>50.4</td>
<td>50.5</td>
<td>38.0</td>
<td>37.9</td>
<td>22.2</td>
<td>13.8</td>
</tr>
<tr>
<td></td>
<td>Moderate</td>
<td>15.0</td>
<td>11.8</td>
<td>10.9</td>
<td>15.8</td>
<td>8.3</td>
<td>14.7</td>
<td>0.0</td>
<td>8.9</td>
</tr>
<tr>
<td></td>
<td>Severe</td>
<td>5.9</td>
<td>2.0</td>
<td>7.6</td>
<td>3.4</td>
<td>5.8</td>
<td>0.0</td>
<td>0.0</td>
<td>7.3</td>
</tr>
<tr>
<td></td>
<td>Very severe</td>
<td>7.8</td>
<td>2.6</td>
<td>6.2</td>
<td>2.0</td>
<td>9.9</td>
<td>2.1</td>
<td>0.0</td>
<td>6.2</td>
</tr>
</tbody>
</table>

*Significant at P < 0.05.
†Chi-square test.
The prevalence of impacted daily performance resulting from caries was compared between the good performance SBDP and poor performance SBDP groups, using the Chi square test (Table 1). Regression was used to examine the relationship between CS Child-OIDP (the outcome variable) and SBDP performance affected by sociodemographic factors and untreated caries (Table 2). However, since the distribution of CS Child-OIDP scores appeared skewed, a negative binomial regression analysis was used for modelling to allow the dispersion to be estimated. The rate ratios (RR), with 95% confidence intervals, were computed, and the predictor variables were coded as follows: SBDP performance (0 = good, 1 = poor), place of residence (0 = urban, 1 = rural), gender (0 = boy, 1 = girl), and mother’s education (0 = < 10 years of education, 1 = ≥ 10 years of education). The level of mother’s education was standardized in terms of the basic level of education in Indonesia. Untreated caries was coded as: 0 = having no untreated cavities, 1 = having one or two untreated cavities, and 2 = having more than two untreated cavities. First, a crude (unadjusted) analysis was performed by way of comparison with an analysis using all the predictors (adjusted), using SPSS version 20.0. Statistical significance was set at a $P$-value of < 0.05.

The protocol for the original evaluative study received approval from the Ethical Committee of the Faculty of Dentistry at Universitas Gadjah Mada Yogyakarta, Indonesia. As part of this protocol, parents and children were given information about the study and clearly informed of the fact that participants could withdraw from the study at any time. The research team also assured parents that the information obtained would remain confidential.

### Results

A total of 1906 primary school children aged 12 (1000 from urban areas and 906 from rural areas) completed the questionnaire and were clinically examined. Children who did not have a consent letter from their parents, or who were not at school at the time of the data collection, were not included, yielding a response rate of 81.3%. Of the 1906 children included, 54% were male, 56% had 10 years of education and 53% resided in an urban area. The impacts felt by the children produced CS-OIDP scores ranging from 0 to 50, out of a maximum of 72. The mean CS-OIDP score was 1.63 (SD 3.20) for a well performing SBDP and 6.89 (SD 8.85) for a poorly performing SBDP. The experience of problems related to caries for all children was reported as the following: toothache ($N = 821$ or 43.1%), cavity ($N = 493$ or 25.9%) and sensitive teeth ($N = 465$ or 24.4%). Some of the children did not describe any adverse impacts. The average DT was $3.04$ (SD $2.9$), with an average DT for boys of $2.83$ (SD $2.72$) and $3.29$ (SD $3.10$) for girls. Of the 1476 children with untreated cavities, only 833 indicated an impact on any of the eight performances. On the other hand, of the 430 children who were free from untreated cavities, 227 indicated one or more impacts related to caries.

Figure 1 shows percentage distribution of impact on daily performances in children for both levels of SBDP performance. The data in Table 1 show that difficulty with eating is the most prevalent oral impact for both levels of SBDP performance, at 42.4% for good SBDPs and 38.6% for poor, while impacts on smiling, study, and contact with other people are rare. The prevalence of oral impacts on speaking, teeth cleaning, sleeping, emotion,

### Table 2. Relationship between SBDP performance and CS Child-OIDP with and without adjustment for predictor variables (negative binomial analysis)

<table>
<thead>
<tr>
<th>Variables</th>
<th>Response</th>
<th>$N$</th>
<th>Mean (SD)</th>
<th>RR unadjusted</th>
<th>95% CI</th>
<th>$P$</th>
<th>RR adjusted</th>
<th>95% CI</th>
<th>$P$</th>
</tr>
</thead>
<tbody>
<tr>
<td>SBDP performance</td>
<td>Good</td>
<td>1012</td>
<td>1.63 (3.20)</td>
<td>1</td>
<td>1</td>
<td></td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Poor</td>
<td>894</td>
<td>6.89 (8.85)</td>
<td>4.22</td>
<td>3.67–4.84</td>
<td>&lt;0.001*</td>
<td>4.45</td>
<td>3.87–5.13</td>
<td>&lt;0.001*</td>
</tr>
<tr>
<td>Place of residence</td>
<td>Urban</td>
<td>1000</td>
<td>4.08 (6.59)</td>
<td>1</td>
<td>1</td>
<td></td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Rural</td>
<td>906</td>
<td>4.12 (7.45)</td>
<td>1.01</td>
<td>0.87–1.18</td>
<td>0.92</td>
<td>1.44</td>
<td>1.21–1.70</td>
<td>&lt;0.001*</td>
</tr>
<tr>
<td>Gender</td>
<td>Boy</td>
<td>1026</td>
<td>3.84 (6.96)</td>
<td>1</td>
<td>1</td>
<td></td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Girl</td>
<td>880</td>
<td>4.41 (7.05)</td>
<td>1.15</td>
<td>0.99–1.34</td>
<td>0.07</td>
<td>1.15</td>
<td>1.01–1.33</td>
<td>0.04*</td>
</tr>
<tr>
<td>Mother’s education (years)</td>
<td>&lt; 10</td>
<td>1062</td>
<td>4.32 (7.48)</td>
<td>1</td>
<td>1</td>
<td></td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>≥ 10</td>
<td>1044</td>
<td>4.26 (6.35)</td>
<td>0.88</td>
<td>0.76–1.03</td>
<td>0.12</td>
<td>0.94</td>
<td>0.81–1.08</td>
<td>0.36</td>
</tr>
<tr>
<td>Having untreated caries (DT)</td>
<td>DT = 0</td>
<td>430</td>
<td>3.81 (7.39)</td>
<td>1</td>
<td>1</td>
<td></td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>DT 1 and 2</td>
<td>551</td>
<td>3.76 (6.80)</td>
<td>0.99</td>
<td>0.80–1.23</td>
<td>0.92</td>
<td>0.92</td>
<td>0.75–1.12</td>
<td>0.39</td>
</tr>
<tr>
<td></td>
<td>DT &gt; 2</td>
<td>925</td>
<td>4.44 (6.94)</td>
<td>1.17</td>
<td>0.96–1.42</td>
<td>0.12</td>
<td>1.13</td>
<td>0.93–1.39</td>
<td>0.23</td>
</tr>
</tbody>
</table>

RR, rate ratios; CI, confidence interval. 
*Significant at $P < 0.05$. 

---

4 of 8 © 2015 Wiley Publishing Asia Pty Ltd
smiling, studying, and contact in the good SBDP group versus the poor SBDP group is statistically significant. Intensity is mostly very little to little, for all impacts. In terms of the aggregate impact (CS Child-OIDP) scores, a tendency for a greater frequency of moderate intensity in poor SBDPs is evident.

Figure 2 shows percentage distribution of dental caries in children for both levels of SBDP performance. The analysis of associations between the CS Child-OIDP scores and predictor variables using negative binomial regression are presented in Table 2. Without adjustment for predictor variables, SBDP performance is the only predictor that is statistically significantly in relation to the CS Child-OIDP score. Children participating in a poorly performing SBDP have a greater likelihood (unadjusted RR = 4.2) of experiencing an oral impact on their quality of life. The predictor variables were adjusted for each other in the second analysis. It appears that in addition to SBDP performance having a high predictive value, place of residence and gender are also significantly related to CS Child-OIDP scores. For instance, children living in rural areas (adjusted RR = 1.44) and girls (adjusted RR = 1.15) have a greater likelihood of experiencing an oral impact on their quality of life than boys, or those living in urban areas. However, the findings indicate no significant relationship between oral impact and the degree of untreated caries.

Discussion

The results show that SBDP performance is related to CS Child-OIDP scores. Specifically, poor performance is significantly associated with a lower quality of life in children. This is influenced, however, by place or residence and gender. Poor SBDP performance therefore seems not only to result in clinically undesirable results, but also in causing a greater intensity impact on quality of life, which to a lesser extent can also be said of living in a rural area, and being a girl. Surprisingly, the degree of untreated caries as such appears not to be associated.

The results of this study show that in the total child population studied, the prevalence of oral impact related to caries experienced during 3 months preceding the study was 56%, which is slightly higher than results for the same age group in Thailand (47%). In the present study, the most frequently indicated cause of impairment is toothache, and the most prevalent impact is on eating. This result is consistent with studies from Tanzania and Sudan in comparable populations using the CS-Child-OIDP. The present study also shows that SBDP performance is indicated as a predictor for impact on daily life related to caries, and at the same time there is no relationship between the presence of untreated caries and impact on daily life. A possible explanation for this finding lies in the implementation of oral health education in the classroom and teacher training as regular activities in good SBDPs, both of which raise children’s awareness of oral health and related problems, and thus they may become more inclined to follow treatment upon referral and develop other behaviors to inhibit caries progression. In turn, this can result in good OHRQoL, as the children do not experience symptoms or disturbances in terms of their physical functions. More generally, regular activities conducted in good SBDPs can have positive psychological effects on children’s self-esteem, as they have close contact with health professionals. In addition, reg-

© 2015 Wiley Publishing Asia Pty Ltd
ular oral health education, specifically cognitive behavioral mechanisms such as skills mastery, for instance tooth brushing, and increased self-efficacy are also important to counter the progressive deterioration of caries and the consequent impact on OHRQoL. This finding suggests that aspects other than purely clinical measures are important in an oral health program.

These findings and considerations can form the basis for improving SBDPs, for instance through oral health education and other preventive measures. However, other factors also need to be considered. For example, rural living is related to a lower perceived quality of life; this is in agreement with findings that children living in rural areas face significant health disadvantages and impaired living conditions, consequently leading to poorer health quality of life. Furthermore, living in a rural area is related to lower socioeconomic circumstances such as less income, but also less favorable conditions for transportation, and so less access to oral care. Gender is also shown to have an independent influence, which is inconsistent with the findings of other studies. However, these influences are not consistent; sometimes girls show higher impact of oral disease on their daily lives, sometimes boys show greater impact. Explanations for these gender differences are not conclusive; it is argued that boys are more active than girls, and regular physical activity has been associated with a better perception of health; on the other hand, being female is associated with a greater awareness of the mouth and possible oral problems. Thus, as the influence is not significant and explanations are inconclusive, it is difficult to explain the role of gender in improving SBDP.

Certain limitations should be highlighted regarding the interpretation of the analysis of this study. The data were collected from a small number of CHCs that carry out SBDPs, with a convenience sample rather than a random sample. The CHCs were chosen on the basis of their willingness to be involved in this project evaluation; the number of children involved was therefore not based on power analysis. However, the CHCs and children represent a variation in performance and location that is representative of the level of variation to be expected. Nonetheless, the results of this study should be taken as indications that require further exploration in designs that can provide greater generalizability. However, in such designs, it is advisable to take the possible skewness of data into account. Using CS Child-OIDP as an outcome variable of an oral health care program is not yet common, and its validity as an outcome-measure of OHRQoL is not yet established. Another important suggestion for future studies is to include type of school, such as public or private, as a variable, to provide further explanation of

In addition, untreated caries is found not to be related to CS Child-OIDP scores, and only a small percentage of children described moderate or severe intensity impacts. Comparable findings were reported in a study carried out in Thailand on the same age group. There is a possible explanation for this finding: as the prevalence is high, untreated caries could be socioculturally accepted as a “norm” by children, influenced by the value placed on oral health and availability of dental services. Another possible explanation is that many children experience no significant impact on their daily living, as the caries lesions are asymptomatic, which could also explain why a large number of children in this study leave cavities untreated. To examine these issues, a more detailed measurement of caries is required than the relatively crude DT used in this study. For instance, measurement per surface (DS) could help differentiate untreated caries with respect to OHRQoL. By contrast, many children without caries indicated some impact, which could be caused by the choice of impacts used in this study. For instance, “toothache” was a frequently indicated impact; however, this could also be related to other causes of pain. To remedy this issue in a further study would require an adaptation of the impacts chosen to measure Child-OIDP.

Conclusions

The findings of this study indicate that SBDP performance influences OHRQoL in relation to caries in 12 year olds. The findings suggest that OHRQoL could be combined with clinical data to provide a better understanding of the effect of SBDP performance on children’s oral health. Moreover, it might be useful to also consider the role of place of residence and gender in relation to oral health.

Acknowledgments

The authors would like to acknowledge and thank the participating Yogyakarta provincial and district administrative authorities, CHCs, and primary schools for their support of this study. We would also like to thank the University of Groningen, The Netherlands, for its support. We especially thank all of the children who gave their time to participate in this survey.

Conflict of interest

None of the authors have any conflicts of interest.
References

29 Mtaya M, Astrom AN, Tsakos G. Applicability of an abbreviated version.
of the Child-OIDP inventory among primary schoolchildren in Tanzania. 
