Adaptation and validation of a Nepali version of the Child-Oral Impacts on Daily Performances Index (C-OIDP)

Karki Saujanya[1,2], Laitala Marja-Liisa[1], Humagain Manoj[2], Päkkilä Jari[3] and Anttonen Vuokko[1,4]

[1]*Research Unit of Oral Health Sciences, Department of Cariology, Endodontology and Pediatric Dentistry, University of Oulu, Finland,* [2]*School of Medical Sciences, Kathmandu University, Nepal,* [3] *Department of Mathematical Sciences, University of Oulu, Finland,* [4]*Medical Research Center, University of Oulu and Oulu University Hospital, Finland*

The need for culturally validated measures of Oral Health-Related Quality of Life (OHRQoL) has been increasing in recent years. ***Objectives:*** To adapt the Child-Oral Impacts on Daily Performances (C-OIDP) index into the Nepali language and to validate it, to assess and compare the outcomes of self-reported oral problems, and to validate a structured questionnaire on general hygiene practices, oral hygiene practices, dietary habits, and use of tobacco. ***Basic research design:*** A school-based cross-sectional study on pilot and national samples. ***Participants:*** Nepalese schoolchildren representing WHO index age groups (5–6-year-olds, 12-year-olds, and 15-year-olds). The study was conducted on a pilot sample (n=128) selected conveniently and a national sample (n=1,052), selected from 18 sampling sites on the basis of the stratified random sampling method. ***Main outcome measures:*** Adapted and validated Nepali C-OIDP ***Results:*** The Nepali C-OIDP showed excellent validation and reliability tests in both studies. The Cronbach's alpha coefficients were 0.82 and 0.71 respectively in the pilot and national study. The most common self-reported oral problem was toothache, which was statistically significantly higher in the national sample. ***Conclusions:*** The Nepali C-OIDP index is valid and reliable for measuring oral impacts on daily performance among schoolchildren of Nepal.

Key words: Adaptation, children, cross-cultural, linguistics, oral health, psychometrics, quality of life, self-report, Nepal

Introduction

The concept of oral health-related quality of life (OHRQoL) measures both functional and psychological outcomes of oral diseases (McGrath, *et al.*, 2004; Sischo and Broder, 2011). OHRQoL is a multidimensional construct that includes a subjective evaluation of the individual's oral health, functional, and emotional well-being, expectations and satisfaction with care, and sense of self (Sischo and Broder, 2011). OHRQoL gives a wider understanding on the impact of oral diseases on child's well-being and everyday life, which differ from the traditional clinical indices to measure oral health. To broaden the OHRQoL paradigm, different theoretical models have been described. These conceptual models incorporate the dimensions of OHRQoL and present the consequences of oral conditions that have an impact on ability to perform daily activities (Adulyanon and Sheiham, 1997; Sischo and Broder, 2011). Oral symptoms, including pain cause considerable functional limitations on chewing or eating food, or smiling, as well as psychosocial impacts on self-esteem, social interaction, or emotional state. For example, Thai schoolchildren with toothache reported impacts on eating, studying, social contact and emotion while those who reported problems concerning the color or position of teeth reported impacts on smiling (Gherunpong, *et al.*, 2004b).

The development, adaptation, and validation processes for OHRQoL instruments differ, but they all measure the consequences of oral conditions. Gherunpong *et al.* (2004a) developed and tested the Child-Oral Impact on Daily Performance (C-OIDP) index to measure the OHRQoL of Thai children (Gherunpong, *et al.*, 2004a). The C-OIDP is a modification of the Oral Impact on Daily Performance (OIDP) scale intended for adults. The OIDP investigates the frequency and severity of oral impacts experienced in past six months using a 5 point Likert scale, while the C-OIDP assesses the oral impact experienced in the past three months using a 3 point scale (Adulyanon and Sheiham, 1997; Gherunpong, *et al.*, 2004a).

The eight items (assessing eating, speaking clearly, cleaning mouth, sleeping, emotional stability, smiling, carrying out schoolwork, and contact with people) are considered to be brief, simple to understand, and easy to implement. The measure has been validated in many countries and in different languages (Yusuf, *et al.*, 2006; Castro, *et al.*, 2008; Nurelhuda, *et al.*, 2010; Yusof and Jaafar, 2012). There is no previous literature of OHRQoL studies conducted on a nationally representative sample of children in Nepal.

The C-OIDP, was to be used for a nationwide study in 2016. Therefore, the primary aim of this study was to adapt and validate the C-OIDP in Nepal. A secondary aim was to investigate the prevalence of self-reported oral health problems of Nepalese children and compare the outcomes between the pilot and national surveys.

Correspondence to: Saujanya Karki, Research Unit of Oral Health Sciences, University of Oulu, Aapistie 3, FI90220 Oulu, Finland, P.O. Box: 5281. Email: saujanya.karki@oulu.fi

The third aim was to develop, translate, and validate a questionnaire on general hygiene, oral hygiene practices, dietary habits, and use of tobacco in Nepali. The hypothesis of the present study was that the Nepali version of the C-OIDP and the questionnaire on self-reported oral health problems, are valid, reliable and similar outcomes would be derived in both the pilot and the national studies.

Method

The pre-pilot and pilot studies were conducted during the winter 2015, before the national cross-sectional population-based study on oral health and OHRQoL of Nepalese schoolchildren in 2016. The survey forms (http://www.oulu.fi/medicine/node/48261) assessing the OHRQoL of Nepalese children and their self-reported oral health problems, general hygiene, oral hygiene practices, dietary habits, and use of tobacco in three WHO index age groups (5–6-year-olds, 12-year-olds, and 15-year-olds) were piloted and validated among conveniently selected samples.

The pre-pilot study was conducted ahead of the implementation of the Nepali C-OIDP and the questionnaire on general hygiene, oral hygiene practices, dietary habits, and use of tobacco.

Parents of the 5-6-year-olds were asked verbally about their literacy status during the pre-pilot study. Accordingly, literate parents self-administered (i.e. they answered the questions independently) the questionnaires and the Nepali C-OIDP survey, while parents who were not literate were interviewed face-to-face. During the pre-pilot study, schoolchildren belonging to the 12- and 15-year-age groups completed self-administered questionnaires. The participants and parents of the youngest age group were given a chance to comment on the questionnaires. Then, identified deficiencies were improved upon and minor modifications in the wording were made. Finally, the questionnaires were back-translated into English, reviewed and verified before the pilot study.

Due to the observations of the pre-pilot study that some parents were not literate, a face-to-face interview administered all the survey forms in the pilot study. All the parents of the children in the youngest age group (5–6-year-olds) were interviewed in a quiet classroom or office provided by the school authorities. The children in the two older age groups (12- and 15-year-olds) completed self-administered questionnaires on general hygiene, oral hygiene practices, dietary habits, and use of tobacco in separate classrooms. For the 12- and 15-year-olds, the investigator recited the questionnaires before anyone answered them, and the respondents had a chance to clarify the questions if they were not understood. After completing the questionnaire, the participants returned them to an inspector, who checked that all the questions were properly completed. Next, the 12- and 15-year-olds were interviewed face-to-face to investigate their self-reported oral health problems in the past three months and to ask questions concerning the Nepali C-OIDP.

After completing the questionnaire on perceived oral health problems in the past three months, all the participants (children and parents) who had experienced oral problems were asked about the severity and frequency of the impacts of the oral health problems on their daily life. No pictures were used, but examples were given to explain the impacts on each performance e.g. "Does it feel like your mouth burns while eating due to sores in mouth?" OR "While you brush your teeth do your gums bleed?".

The English version of the C-OIDP (including the questionnaire on self-reported oral health problems in the past three months) was translated into Nepali for cross-cultural adaptation and linguistic validation, following the forward-backward translation method and standard protocols (Guillemin, *et al.*, 1993; Callegaro, *et al.*, 2012). Instructions were also obtained from one of the authors of the article concerning the original instrument (Gherunpong, *et al.*, 2004a). The original survey instrument was translated by one pediatric dentist and one team member/periodontist separately. Both were Nepali native speakers and were fluent in English. Later, both versions were compiled into a single consensus version by the two translators and a member of the research team. The consensus version was then backward translated into English. This version was carefully reviewed by the research team members and was verified.

The eight daily performances of the C-OIDP are eating, speaking, cleaning one's mouth, sleeping, emotional status, smiling, studying, and social contacts. The daily topics were translated into the Nepali language so that children could easily understand the impact of oral problems on each performance as follows: eating food (*problems during major meals or while eating hot or cold foods*); speaking clearly (*difficulty in speaking or pronouncing words*); cleaning mouth (*difficulty during tooth brushing or when rinsing mouth)*; sleeping (*problems while sleeping during the night, lying down, or relaxing*); emotional status (*problems with emotional stability)*; smiling (*problems concerning smiling or laughing or showing your teeth without any embarrassment*); studying (*problems in carrying out schoolwork*), and social contact (*problems while playing with friends and going out or roaming with friends*).

Each participant first responded if he/she had experienced any impacts on each of the performances (*yes/ no)*. Those who had were further asked for the severity and frequency of the reported impacts. The severity and frequency were scored on Likert scales ranging from 0 to 3, as in the original instrument (Gherunpong, *et al.*, 2004b). The severity scores were 0 = *no impact*, 1 = *little effect*, 2 = *moderate effect,* and 3 = *severe effect*, and the frequency scores were 0 = *no impact*, 1 = *once or twice a month*, 2 = *three or more times a month, or once or twice a week*, 3 = *three or more times a week.* The impact score for each performance was calculated by multiplying the severity and frequency scores (range 0 to 9). The overall impact score was the sum of the impact scores of all eight performances (range 0 to 72). This overall score was divided by 72 and multiplied by 100 to obtain the total percentage score.

The questionnaire developed to investigate the general hygiene, oral hygiene practices, dietary habits, and use of tobacco incorporated the World Health Organization (WHO) Oral Health questionnaire for children (WHO, 2013) and a questionnaire developed at the University of Oulu, Finland (Anttonen, *et al.*, 2014). This modified questionnaire was translated into the Nepali language.

The questionnaire highlighted general hygiene practices: frequency of bathing (never, once a month, 2–3 times a month, once a week, 2–6 times a week, or once a day), occasions when hands are washed (before eating, after games/playing, or after going to toilet), agents for washing hands (water only, ash and water, mud and water, or soap and water). Oral hygiene practices were assessed based on the frequency of tooth brushing (never, once a month, 2–3 times a month, once a week, 2–6 times a week, once a day, or twice or more a day), materials used for tooth brushing (toothbrush, wooden toothpick, plastic toothpick, charcoal, meswak (twigs), or other), use of toothpaste (yes or no), and use of fluoridated toothpaste (yes, no, or don't know). The questions on dietary habits concerned the types of foods and drinks consumed (fresh fruits, sweet bakery products, fizzy drinks, chewing gum, sweets/candies, tea with sugar, milk with sugar, and coffee with sugar) and frequency of intake (never, several times a month, once in a month, several times in a week, every day, or several times a day). The questionnaire also enquired about the types of tobacco products used (smoking and smokeless) and their frequency of use (never, seldom, several times a week, once in a month, every day, or several times in a day), except from the parents of the 5-6-year-olds.

The survey forms were pre-piloted (n=30) among ten volunteer schoolchildren in each age group. After the necessary modifications and revisions, the final versions were used in the pilot study. The pilot study sample (n=128) comprised volunteer schoolchildren from two conveniently selected schools representing the Hilly (Kavrepalanchwok district) and Himalayan (Sindhupalchwok district) ecological regions.

Nepal is divided into three ecological regions, five administrative developmental regions, and 75 districts. In the national study (n=1,052), stratified random sampling was applied to represent the three ecological regions (Terai, Hill, and Himalayan) and five administrative developmental regions (Eastern, Central, Western, Mid-western and Far-western). Three districts were selected randomly from each administrative developmental region to represent all the ecological regions. As an exception, all three (Kathmandu, Lalitpur, and Bhaktapur) districts of Kathmandu Valley were included. After obtaining a list of schools in every district, sample sites were selected (one to two schools per district). The national survey was conducted by trained enumerators, following the protocol used in the pilot study.

The schools were approached with a letter about the study, requesting the participation of children and parents of the children in younger age-group. The children were recruited with the help of the school authorities, who invited them and sent messages to parents with a request for participation. Volunteer children and parents within the age groups were recruited. Children aged 5-6-years, whose parents did not attend, were excluded.

Face and content validity of the Nepali C-OIDP and questionnaire on the general hygiene, oral hygiene practices, dietary habits, and use of tobacco were assessed. As there was no gold standard to measure the oral health related quality of life, construct validity was evaluated by measuring the association between the overall impact on the Nepali C-OIDP scores with two proxy measures (perceived pain and perceived restorative treatment need), using the Mann-Whitney U-test both on the pilot and on the national study populations. Internal reliability was assessed with Cronbach's alpha, standardized alpha, corrected item-total and alpha if item deleted. The Pearson correlation coefficient was used to test the inter-item correlations. The Fisher's exact test was used to compare the proportions between the pilot and national studies. The data were analyzed using the Statistical Package for the Social Sciences (IBM SPSS Statistics for Windows, version 24.0. Armonk, NY: IBM Corp.).
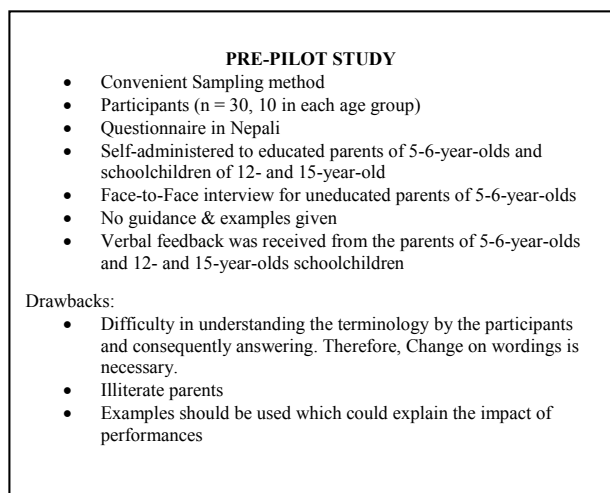
The study protocol was approved by the Institutional Review Committee, Kathmandu University School of Medical Sciences (IRC No. 60/15, KUSMS). Written permission to conduct the national study was obtained from the Ministry of Health and Ministry of Education, Nepal. The district health and education authorities also gave their permission. The Northern Ostrobothnia Hospital District also gave a permission to conduct the study (18/2016). A written consent was also obtained from the school principals and parents of the children in the youngest age group, and a verbal consent was obtained from the schoolchildren in the older age groups.
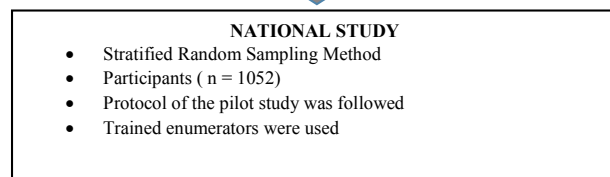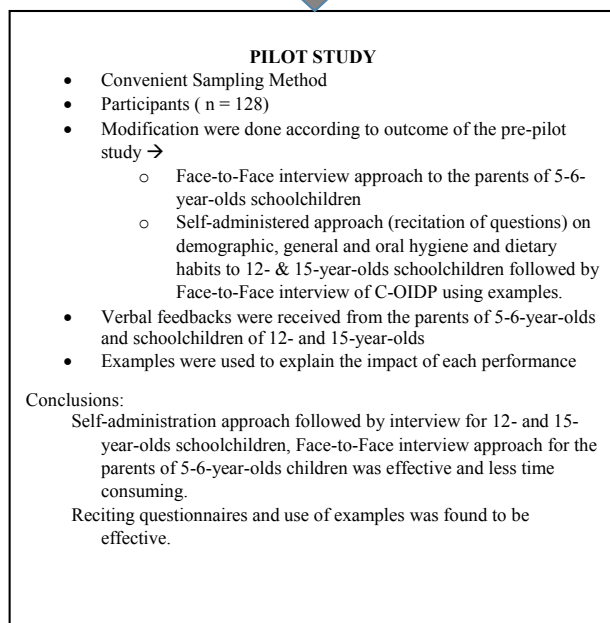
Results

The pilot study sample was slightly dominated by girls (n=128, 53.9% girls) whereas the opposite was true for the national study (n=1,052; 52.6% boys). In the pilot study, the proportion of 5–6-year schoolchildren was 24.2%, 12-year-olds 36.0%, and 15-year-olds 39.8%. The respective figures in the national study were similar: 23.3%, 39.6%, and 37.1%.

The principle problems during the pre-pilot study concerned difficulty in understanding the terminology and answering the questions, as well as explaining the impact of different issues on daily performances (C-OIDP) to parents who were illiterate. Modifications made to the wording concerning perceived oral problems included changing "exfoliating of primary tooth" to "loose milk tooth", "shape or size" to "larger or smaller", "fractured" to "broken", "ulcers" to "sores", "missing" to "extracted". Similarly, modifications were made to the C-OIDP record form. Ice cream was changed to cold & hot food, relaxing to sleeping or relaxing, going out with friends to going to a friend's house; roaming around or going out to play with friends. No further modifications were needed for the questionnaires or protocol after the pilot study (Figure 1).

The inter-item correlation coefficients ranged from 0.04 (speaking clearly, maintaining usual emotional state) to 0.83 (maintaining usual emotional state, contact with people) in the pilot study and from 0.08 (carrying out schoolwork, smiling, or laughing) to 0.48 (carrying out schoolwork, sleeping/relaxing) in the national study. There were no negative correlations in either study (Tables 1 (a) and (b)). The corrected item-total correlations were above 0.38 and 0.34 in the pilot and national studies, while the standardized alpha values were 0.84 and 0.75, respectively. Deletion of any item had no influence on the alpha value (Table 2a).

PRE-PILOT STUDY
- Convenient Sampling method
- Participants (n = 30, 10 in each age group)
- Questionnaire in Nepali
- Self-administered to educated parents of 5-6-year-olds and schoolchildren of 12- and 15-year-old
- Face-to-Face interview for uneducated parents of 5-6-year-olds
- No guidance & examples given
- Verbal feedback was received from the parents of 5-6-year-olds and 12- and 15-year-olds schoolchildren

Drawbacks:
- Difficulty in understanding the terminology by the participants and consequently answering. Therefore, Change on wordings is necessary.
- Illiterate parents
- Examples should be used which could explain the impact of performances

Revised and Reviewed

PILOT STUDY
- Convenient Sampling Method
- Participants (n = 128)
- Modification were done according to outcome of the pre-pilot study →
  - Face-to-Face interview approach to the parents of 5-6-year-olds schoolchildren
  - Self-administered approach (recitation of questions) on demographic, general and oral hygiene and dietary habits to 12- & 15-year-olds schoolchildren followed by Face-to-Face interview of C-OIDP using examples.
- Verbal feedbacks were received from the parents of 5-6-year-olds and schoolchildren of 12- and 15-year-olds
- Examples were used to explain the impact of each performance

Conclusions:
  Self-administration approach followed by interview for 12- and 15-year-olds schoolchildren, Face-to-Face interview approach for the parents of 5-6-year-olds children was effective and less time consuming.
  Reciting questionnaires and use of examples was found to be effective.

NATIONAL STUDY
- Stratified Random Sampling Method
- Participants (n = 1052)
- Protocol of the pilot study was followed
- Trained enumerators were used

Flow-chart of the validation process of the questionnaires used in the national study on oral health and oral health-related quality of life of children in Nepal.

Both studies revealed that participants who had perceived dental pain or restorative treatment need had higher C-OIDP scores than those who had not perceived dental pain or restorative treatment need (Table 2b).

The impact of oral conditions was highest on eating food in both studies, whereas impacts on speaking clearly and cleaning the mouth were higher in the national study. The impact of oral health on maintaining emotional stability, carrying out schoolwork, and social contacts was less distinct in the national study compared to the pilot study (Table 3). One-fourth (26.6%) of participants in the pilot and 39.2% in the national study reported at least one oral impact affecting their daily performance in the past three months. There was a significant positive association (p<0.01) between the severity and frequency of all the variables concerning oral health-related quality of life and daily performances both in the pilot and in the national studies.

In both studies, the most common self-reported oral health problem was toothache, followed by tooth decay and sensitivity. In the national study, bleeding gums and bad breath were also common complaints in all age groups. Self-reported toothache, malposition of teeth, bleeding gums, calculus, bad breath and tooth decay were more common in the national study. Discoloration of the teeth and fractures of the permanent teeth were at a similar level in both studies (Table 4).

In the pilot study, two in three children reported bathing only once a week and brushing teeth once daily. All participants reported washing their hands before eating and after going to the toilet. In addition, all participants in the pilot study reported using soap and water for washing their hands and using toothbrush and toothpaste for cleaning their teeth. Some also used miswak or twigs (5.5%), toothpicks (3.9%), and charcoal (3.1%) for cleaning their teeth. One in four participants brushed their teeth twice or more often daily. Most participants did not know if their toothpaste contained fluoride. The consumption of sugar-containing foods was high for one in three children consuming sweet bakery products (biscuits, cakes, and sweet rolls), sweet/candies, and milk with sugar daily and three in four children consuming tea with sugar daily. No participants (in the 12- and 15-year-olds) used any tobacco products (smoking or smokeless).

Table 1 (a). Correlations between impacts recorded using C-OIDP in the pilot study (n = 128).

Performance Scores	Eating food	Speaking clearly	Cleaning mouth	Sleeping or relaxing	Maintaining usual emotional state	Smiling or laughing	Carrying out school-work	Contact with people
Eating food	1.00							
Speaking clearly	0.31**	1.00						
Cleaning mouth	0.41**	0.45**	1.00					
Sleeping or relaxing	0.55**	0.46**	0.34**	1.00				
Maintaining usual emotional stability	0.24**	0.04	0.46**	0.31**	1.00			
Smiling or laughing	0.14	0.18*	0.40**	0.12	0.40**	1.00		
Carrying out schoolwork	0.43**	0.31**	0.47**	0.65**	0.58**	0.39**	1.00	
Contact with people	0.33**	0.17	0.53**	0.45**	0.83**	0.56**	0.80**	1.00

*p< 0.05; **p< 0.001 Pearson correlation coefficient

Table 1 (b). Correlations between impacts in the national study (n = 1052).

Performance Scores	Eating food	Speaking clearly	Cleaning mouth	Sleeping or relaxing	Maintaining usual emotional state	Smiling or laughing	Carrying out school-work	Contact with people
Eating food	1.00							
Speaking clearly	0.27**	1.00						
Cleaning mouth	0.47**	0.31**	1.00					
Sleeping or relaxing	0.45**	0.21**	0.28**	1.00				
Maintaining usual emotional stability	0.35**	0.16**	0.23**	0.27**	1.00			
Smiling or laughing	0.29**	0.23**	0.20**	0.20**	0.25**	1.00		
Carrying out schoolwork	0.32**	0.16**	0.16**	0.48**	0.14**	0.08*	1.00	
Contact with people	0.30**	0.19**	0.21**	0.31**	0.31**	0.31**	0.39**	1.00

*$p < 0.05$; **$p < 0.001$ Pearson correlation coefficient

Table 2a. Internal reliability of C-OIDP in the pilot and national surveys

Items	Corrected Item – Total Correlation		Alpha if Item Deleted	
	n=128	n=1052	n=128	n=1052
Eating food	0.52	0.61	0.81	0.65
Speaking clearly	0.43	0.37	0.81	0.70
Cleaning mouth	0.60	0.46	0.79	0.69
Sleeping or relaxing	0.62	0.51	0.79	0.67
Maintaining usual emotional state	0.55	0.40	0.80	0.70
Smiling or laughing	0.38	0.34	0.82	0.70
Carrying out schoolwork	0.75	0.38	0.77	0.70
Social contact	0.73	0.44	0.79	0.70
Cronbach's Alpha	0.82	0.71		
Standardized Alpha	0.84	0.75		

Table 2b. C-OIDP scores in children with perceived dental pain and perceived restorative treatment need in pilot and national study

Variables	Frequency	C-OIDP Mean (SD)	P-value
Pilot, n = 128			
Perceived Dental Pain			
Yes	28	10.43 (10.00)	< 0.001
No	100	0.43 (1.93)	
Perceived Restorative Treatment Need			
Necessary	33	9.67 (9.63)	< 0.001
Not Necessary	95	0.17 (0.92)	
National study, n = 1052			
Perceived Dental Pain			
Yes	346	5.93 (6.54)	< 0.001
No	706	0.63 (2.58)	
Perceived Restorative Treatment Need			
Necessary	329	5.75 (6.59)	< 0.001
Not Necessary	723	0.84 (2.94)	

Discussion

The primary intention of this study was to adapt and validate the Nepali C-OIDP and to investigate and compare the self-reported oral health problems between the two study populations. We also developed, translated, and validated a questionnaire on general hygiene, oral hygiene practices, dietary habits, and use of tobacco in the Nepali language.

The Nepali C-OIDP showed excellent validity and reliability in both the pilot and the national studies. Most of the Nepalese children experience toothache, tooth decay, or tooth sensitivity. The oral health-related impact on daily performances is high, especially as for eating food, speaking clearly, and carrying out schoolwork. Similarly, the impact of oral problems on sleeping and relaxing cannot be ignored. Hand washing habits were at a good level, but an improvement in bathing habits is necessary. The oral hygiene practices were good with only a few children still using the traditional methods like miswak (twigs) and charcoal for cleaning teeth. Knowledge about fluoride and its importance should be increased markedly.

The internal reliability of the Nepali C-OIDP showed good inter-item correlation with all the scores being positive: above 0.04 in the pilot study and 0.08 in the national study. The values of Cronbach's alpha were within the acceptance range (0.70–0.80) (Nunnally and Bernstein, 1994). As for the alpha values, our findings are in line with those obtained in other validation studies (Nurelhuda, et al., 2010; Yusof and Jaafar, 2012). The relationship between C-OIDP scores and proxy measures (perceived dental pain and perceived restorative treatment need) demonstrated good construct validity.

The sample used in the pilot study can be considered small, but the alpha value computed after the national study with a large sample seems to justify the validity and reliability of the Nepali C-OIDP. In addition, no studies have been published to support determination of sample sizes in the validation of psychometric scales (Anthoine, et al., 2014). The alpha value in the national study is slightly lower than in the pilot study, which may be due to the geographical and ethnic heterogeneity of the national sample. The sample available for the pilot study may have been restricted as this study was conducted during the post-earthquake period and period of political instability throughout the country (during winter 2015). In the national study, all three districts of Kathmandu Valley were selected as sample sites to represent the densely populated urban area in the country. Furthermore, information from these sites will facilitate correlation of OHRQoL with clinical parameters in the future.

Table 3. Severity & frequency of impacts of the mouth on daily performance

Problems in following actions	Study Population Pilot Study (n=128) National Study (n=1052)	Severity of Condition (%)				Frequency (%)			
		None	Little	Moderate	Severe	None	1-2 times/ month	3-4 times/ month	3-4 times/ week
Eating food	Pilot Study	75.8	11.7	7.0	5.5	75.8	11.7	12.5	0.0
	National Study	66.4	16.7	12.0	4.8	66.4	22.6	8.0	2.9
Speaking clearly	Pilot Study	96.1	0.8	2.3	0.8	96.1	2.3	1.6	0.0
	National Study	93.3	4.8	1.0	0.9	93.3	4.9	1.3	0.4
Cleaning mouth	Pilot Study	86.7	5.5	6.3	1.6	86.7	7.0	6.3	0.0
	National Study	76.3	13.6	7.4	2.7	76.3	13.7	6.9	3.0
Sleeping or relaxing	Pilot Study	88.3	4.7	2.3	4.7	88.3	3.9	7.0	0.8
	National Study	91.5	3.7	2.5	2.3	91.5	5.7	2.1	0.7
Maintaining usual emotional stability	Pilot Study	94.5	1.6	3.1	0.8	94.5	4.7	0.8	0.0
	National Study	96.7	1.5	1.5	0.3	96.7	2.1	1.0	0.3
Smiling or laughing	Pilot Study	95.3	0.8	2.3	1.6	95.3	1.6	3.1	0.0
	National Study	93.0	3.8	1.6	1.6	93.0	4.1	1.4	1.5
Carrying out schoolwork	Pilot Study	93.0	1.6	1.6	3.9	93.0	3.1	3.9	0.0
	National Study	95.0	2.4	1.0	1.6	95.0	3.9	1.0	0.2
Contact with people	Pilot Study	93.0	3.9	1.6	1.6	93.0	5.5	1.6	0.0
	National Study	96.7	1.7	1.1	0.5	96.7	1.8	1.2	0.3

Table 4. Prevalence of self-reported oral health problems in the pilot and national studies

Self-reported oral health problems	Pilot Study (n=128)	National Study (n=1052)	p-value (Chi sq.)
Toothache	21.9	32.9	0.012
Sensitive tooth	14.8	22.1	0.067
Tooth decay, hole in tooth	25.8	31.3	0.224
Loose milk tooth	7.0	10.9	0.221
Tooth space (due to a non-erupted permanent tooth)	1.6	3.1	0.419
Broken permanent tooth	2.3	2.3	1.000
Discolor of tooth	7.8	7.6	0.861
Larger or smaller tooth	6.3	12.2	0.055
Malposition of tooth (e.g. crooked or projecting, gap)	4.7	16.4	< 0.001
Bleeding gum	8.6	17.8	0.008
Swollen gum	8.6	14.4	0.077
Calculus	0.0	4.3	0.012
Oral sores	8.6	13.7	0.127
Bad breath	7.8	17.0	0.007
Erupting permanent tooth	3.9	8.0	0.111
Extracted permanent tooth	0.0	2.0	0.156
Deformity of mouth or face (e.g. cleft lip, cleft palate)	0.8	0.4	0.437
Others	0.0	0.6	1.000

Krisdapong *et al.* (2009) used the C-OIDP index among 12-year-old and the OIDP index among 15-year-old Thai children. In contrast, the Nepali C-OIDP was used among three different age groups. The C-OIDP scale is somewhat simpler to use, although it is different from the OIDP. The aim of the pre-pilot study was to determine the face validity of the translated and adapted C-OIDP and background questionnaires. In fact, only minor revisions were made to the questionnaires and protocol. Juniper *et al.*'s (1999) protocol for a multistage validation method, could have been used, but instead the protocol introduced by Gherunpong *et al.* (2004a) was followed.

A large proportion of Nepali schoolchildren reported oral health conditions impacting on their daily performance. This is in concordance with findings among British schoolchildren but lower than among Malaysian and Brazilian schoolchildren (Yusof and Jaafar, 2012; Yusuf, *et al.*, 2006; Castro, *et al.*, 2008). The most prevalent impacts concerned eating food, cleaning the mouth, and sleeping; with impacts similar to previous studies (Yusuf, *et al.*, 2006; Yusof and Jaafar, 2012; Yee, *et al.*, 2006; Jürgensen and Petersen, 2009). Impacts on emotional stability were more prevalent among the British, Malaysian, and Brazilian schoolchildren than among the Nepali schoolchildren.

This might be because understanding emotional stability may be difficult for children of these age groups (Yusuf, *et al.*, 2006; Yusof and Jaafar, 2012; Castro, *et al.*, 2008) Emotional status in the past three months may also have been influenced by other factors than oral health. In addition, measuring emotional stability is challenging *per se*.

The impact on daily performance seems to be remarkably high in all parts of the world. The prevalence of at least one oral impact on daily performance here, is similar to that reported by Yusuf *et al.* (2006) among 10-11-year-old English children, but lower than reported by Castro *et al.* (2008) in Brazil among 11-14-year-olds and by Yusof and Jaafar (2012) among Malay 11-12-year-old children.

Dental caries (toothache and tooth decay) was the most frequent cause of impacts. The other causes (sensitivity, gingivitis (bleeding gum), halitosis (bad breath), and malocclusion are consistent with other studies (Gherunpong, *et al.*, 2004b; Krisdapong, *et al.*, 2009; Nurelhuda, *et al.*, 2010).

Most participants in the pilot study brushed their teeth once daily and used toothbrush and toothpaste, which is comparable to previous studies (Yee, *et al.*, 2006; Prasai *et al.*, 2013). The present study also revealed that most children did not know about fluoride, which is higher than among Chinese schoolchildren (Liu *et al.*, 2007).

A study conducted in rural Lalitpur, Nepal in 1990 concluded that 47% of schoolchildren had a habit of bathing twice or more a week and the rest once a week or less, which is similar to the findings in the present study (Westbacke, 2006). Likewise, the findings on the consumption of sugar-containing foods and drinks (based on cumulative frequency of intake) are similar to other studies (Jürgensen and Petersen, 2009; Anttonen, *et al.*, 2014). These findings emphasize the importance of health and oral health promotion among children and teenagers in Nepal; where the emphasis is on avoiding infections via good hygiene. None of the adolescents used tobacco products, which varies from a questionnaire-based study conducted in Terai region of central Nepal (Bhaskar, *et al.*, 2016). The data may be prone to social desirability bias, which will be further investigated in the national study.

The practice of interviewing parents of 5–6-year-olds instead of the children themselves is based on an understanding their cognitive development (Kuther, 2016). At a young age children are not capable of recalling, for example, the concept of time or cause-consequence. Similar protocols have been used in various previous studies assessing the OHRQoL of children (Pahel *et al.*, 2007; Jokovic *et al.*, 2003).

Earlier studies, have shown self-administered questionnaires to be less time consuming than interviews (Akbayrak, 2000; Tsakos *et al.*, 2008). In this study, however, we used face-to-face interviews to gain relevant responses regardless of costs and time. This was necessary among the 5-6-year-olds as some of the parents were illiterate. It is a shortcoming of this study, that we did not register the proportion of illiterate parents. Another motivation for using interviews was to achieve as high a response rate as possible and to minimize the likelihood of children conferring during the self-administered approach, which would have been conducted in a classroom.

The concept of resilience has added a new dimension in the study of quality of life as it involves the psychological adaptation, psychological habituation, self-efficacy and effective coping strategies to adapt the adversity and stress. Unfortunately, this aspect is not included in the C-OIDP (Rutter, 2006). The inclusion of risk experiences and protection strategies could have brought the positive outcomes of OHRQoL in Nepalese children. Manne *et al.* (2015) demonstrated that resilient to diseased conditions may protect quality of life, whereas no association between resilience and OHRQoL was found among Brazilian elders (Teixeira *et al.*, 2015).

Nepal is a multiethnic country with 123 languages. A limitation of this study was not being able to adapt the questionnaire to each spoken language. Finally, the sample consisted of children and parents who agreed to participate, whereas those without escorting parents were excluded. Hence there is a chance of potential bias. Unfortunately, the number of those excluded was not registered either.

Conclusions

The adapted Nepali version of the C-OIDP was found valid and reliable when the outcomes of the pilot and national studies and previous literature are compared. According to this preliminary report, oral problems are common among Nepali schoolchildren. These findings justify a national study focusing on both oral and general health indicators, in association with geographic and sociodemographic factors as well as health behaviors. The relationship between oral problems, quality of life and treatment need may provide information about the resources needed for the provision of dental services and sustainable school based on oral health promotion programs.

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