

Assessment and validation of the oral impact on daily performance (OIDP) instrument among adults in Karnataka, South India

B.M. Purohit¹, A. Singh¹, S. Acharya², M. Bhat³ and H. Priya⁴

¹Department of Public Health Dentistry, People's College of Dental Sciences & Research Center, Bhopal, India; ²Department of Public Health Dentistry, Manipal College of Dental Sciences, Manipal, India; ³University of Adelaide, Australia; ⁴Department of Public Health Dentistry, Manipal College of Dental Sciences, Mangalore, India

Objectives: The objective of the study was to test the applicability of abbreviated version of the oral impact on daily performance (OIDP) inventory among the adults visiting dental outreach centre in Karnataka, South India. **Basic Research Design:** Cross sectional study. **Clinical setting:** Dental outreach centre in Udupi District, Karnataka. **Participants:** 312 adults aged 35–44 years attending the centre. **Interventions:** Face-to-face interview followed by oral health examination. The questionnaire in Kannada version of OIDP, perceived general and oral health and satisfaction with dental appearance were used. **Main outcome measures:** Reliability and Validity of OIDP instrument, Prevalence of oral impacts in study population. **Results:** Majority of the participants (71.2%) reported oral health problems affecting at least one daily performance in the 6 months preceding the survey. The performance most affected was 'eating' (52.2%) followed by 'cleaning teeth' (32.4%). Cronbach's alpha for the OIDP frequency items was 0.70. Construct validity was proved by significant association of OIDP scores and self-rated oral, general health status and perceived satisfaction with appearance of teeth; with those more satisfied having fewer oral impacts ($p < 0.001$). Criterion validity was demonstrated in that the OIDP scores increased significantly as the number of decayed and missing teeth increased ($p < 0.001$). **Conclusion:** The Kannada version of OIDP had excellent psychometric properties for applicability among the adults in Karnataka. Thus, the study highlighted the limits of focusing exclusively on normative needs and suggested the incorporation of oral quality of life measures into the oral healthcare services.

Key words: oral impacts, socio-dental indicators, quality of life, Kannada OIDP

Introduction

Health is no longer defined in terms of illness and disease, but the concept has been broadened to take into account physical, psychological, and social aspects of well-being (World Health Organization, WHO, 1986). It is now well recognised that there are serious limitations in solely using the clinical normative assessments for the measurement of oral health status and needs, as they do not consider the individual's perceived health status or needs (Sheiham *et al.*, 2001). Hence, a variety of socio-dental indicators or oral health-related quality of life measures (OHRQoL) have been advocated in the past 20 years which capture people's perceptions about factors that are important in their everyday lives and complement conventional clinical assessments (Adulyanon and Sheiham, 1997; Cohen and Jago, 1976; Locker, 1988, 1992; Nikias *et al.*, 1979). They include the Geriatric (General) Oral Health Assessment Index (GOHAI) (Atchison and Dolan, 1990), Child Oral Health Quality of Life Questionnaire (COHQOL) (Landgraf *et al.*, 1999), Oral Health Impact Profile (OHIP) (Slade and Spencer, 1994) and Oral Impacts on Daily Performance (OIDP).

The OIDP inventory is one of the commonly used inventories in population surveys being theoretically sound, brief and easy to measure in population surveys.

Based on an explicit conceptual framework (the WHO's International Classification of Impairments, Disabilities and Handicaps amended for dentistry by Locker in 1988) OIDP concentrates only on the third level i.e. 'pain and discomfort' demonstrating strong theoretical coherence and reduces the double scoring of the same oral impacts on different levels. It has nine items covering physical, psychological and social dimensions of daily performances, but one of them (carrying out physical activities) is considered redundant, therefore excluded from the questionnaire (Adulyanon and Sheiham, 1997).

In its original form, OIDP scores are calculated by multiplying frequency and severity scores of daily performances; but for simplicity and efficiency, it has been proposed to use either the frequency or the severity scores. Compared to using only the OIDP frequency or severity scores, applications of weighted scores revealed no improvement; also, other socio-dental indicators have been reported to be satisfactory in terms of unweighted instead of weighted scores. For these reasons the unweighted or abbreviated version of the OIDP frequency scale was applied in this study (Allen and Locker, 1997).

The OIDP has shown acceptable psychometric properties in various cross-sectional population based studies including adolescents in Thailand (Adulyanon *et al.*, 1996); Norway (Astrom *et al.*, 2005); Uganda (Astrom

and Okullo, 2003); Persia (Dorri *et al.*, 2007); Korea (Jung *et al.*, 2008); Tanzania (Masalu and Astrom, 2003); Japan (Naito *et al.*, 2007).

Its applicability in different socio-cultural context requires re-examination of psychometric properties, as both reliability and validity are influenced by cultural differences in attitudes, beliefs and values. In India, oral diseases are widely prevalent, often very painful and expensive to treat, causing loss of several working days. Besides, poor oral health affects masticatory function, speech, and ultimately overall well-being of an individual (Shah, 2004). Although OHRQoL is used, there are no previous studies reported on OIDP from this part of the subcontinent. Thus, the objective of the study was to examine the applicability of the abbreviated OIDP inventory among adults attending a dental outreach center in Karnataka, Southern India. This comprised of adaptation of the OIDP into Kannada language then assessment of its reliability and validity.

Materials and methods

A cross sectional survey was conducted among the subjects visiting a dental outreach center in Udupi District. The process of evaluating psychometric properties of OIDP inventory for Kannada language involved; linguistic translation of the original OIDP into Kannada, a pilot study then the main study.

The Kannada version of the OIDP was pilot tested among 40 subjects. According to the estimated prevalence of oral impacts in the pilot study (87%) and assuming a standard error of 4%, the minimum sample size of 271 subjects was calculated. In order to allow for non-response (assumed to be 10%) at least 298 people should be invited. Based on records of patient flow, a study duration of 2 months was needed to achieve this sample size. Over the 2 months 356 patients visited the health centre, of which 312 adults (88%) agreed to participate in the study. Their ages ranged 35-44 years.

Translation of the OIDP inventory into Kannada, the regional language of Karnataka, from English used a standard method of linguistic validation (Acquadro *et al.*, 2004) involving translation then independent translation back to English by two qualified translators. There were very few differences from the original and these did not affect the construct of the instrument. The resulting translated version of the OIDP questionnaire was answered by the subjects in face-to-face interviews conducted by one trained interviewer.

The questionnaire had three parts: information on age and gender of participants along with oral health behaviors like frequency of brushing and frequency of dental visits; the OIDP inventory, which included eight physical, social and psychological aspects of daily performance; and, perceptions of respondents' health and satisfaction with dental appearance.

The OIDP inventory section asked how often during the past 6 months patients' mouth and teeth caused any difficulty with: 'eating and enjoying food', 'speaking and pronouncing clearly', 'cleaning teeth', 'sleeping and relaxing', 'smiling and showing teeth without embarrassment', 'maintaining usual emotional state', 'carrying out major work and social role' and 'enjoying contact

with people'. With responses on a 5-point scale - never affected (1); less than once a month (2); once or twice a week (3); three to four times a week (4); every/nearly every day (5).

For analysis, the five ratings were divided into categories 0 = "never affected" or "no impact" and 1 = "affected" or "impacts". OIDP Simple count scores (SC) were created by adding the 8 dummy variables. Finally the OIDP SC scores were dichotomised into two categories (0) "no daily performance affected" and (1) "at least one daily performance affected". Additive scores (ADD) were created by adding the 8 OIDP items as assessed originally (Astrom and Okullo, 2003).

Regarding perceived general health, oral health (global health ratings) and satisfaction with dental appearance, a 3-point response scale was coded as (1) satisfied (2) average (3) dissatisfied.

The criterion validity is defined as the correlation of a scale with some other measure of the trait under study, ideally a 'gold standard'. As there is no universally accepted "gold standard" indicator against which to test the OIDP index, the caries experience was used as a proxy because of its key aspect of contribution to impact assessment. In such cases the role of construct, rather than criterion, validity becomes more crucial. The construct validity, described as probably the most important approach to validity, tests logical constructs by assessing the relationship of the instrument under test with measures of other related constructs. Perceived oral health status, general health status and appearance of teeth were used to assess the construct validity of the instrument (Dorri *et al.*, 2007).

Subjects were examined under adequate illumination (Type III) and clinical data were collected on dental caries, missing teeth and filled teeth using the DMFT index (WHO, 1997). Dental probes and plane mouth mirrors were used to assess carious lesions. Dental caries was recorded according to WHO (1997) criteria modified to include the use of a sharp probe and caries was considered present when a lesion in a pit or fissure or on a smooth surface had a detectable softened floor, undermined enamel, softened wall or a temporary filling. On proximal surfaces, the probe had to enter a lesion with certainty. A tooth was considered missing, if there was a history of extraction due to pain and/or the presence of a cavity.

Ethical clearance was obtained from the institutional review board. Informed written consent was taken from study subjects prior to questionnaire-led interviews and clinical examination. A single examiner performed all examinations having been trained and calibrated in the Department of Community Dentistry, Manipal College of Dental Sciences. Intra-examiner reliability, assessed by kappa statistic, was in range 0.78-0.82 for the parameters examined, showing a high degree of conformity.

Data were analysed using SPSS v.12.0 with the significance level set at 5%. The reliability of the instrument was assessed by standardised Cronbach's alpha, inter-item and item-total correlation coefficients. As the OIDP scores were not normally distributed, testing for criterion and construct validity was carried out using non-parametric tests; Mann-Whitney and Kruskal-Wallis, as applicable. Intra-group comparison for dental visit pattern and

brushing frequency were analysed using Kruskal-Wallis. Multiple logistic regression was used to assess the effect of missing and decayed teeth on oral impacts.

Results

A total of 312 patients, predominantly female (64% cf 35% male) aged 35-44 years (mean 39, sd 3) were examined during the study period. Table 1 gives the prevalence of oral impacts among these patients. Overall, 71% had experienced at least one impact in the past 6 months. The mean OIDP ADD score for the study population was 13.5 (sd 6.1, range 8-40) and mean OIDP SC score was 1.90 (sd 1.92, range 0-8). The most prevalent impact, reported by half of respondents, was 'on eating' followed by 'cleaning', reported by a third. The least affected daily performance was 'speaking' reported by 14% of respondents.

Age was associated with mean OIDP score ($p=0.02$). In case of gender the only association was in relation to 'difficulty in cleaning teeth' ($p<0.01$). In addition, dental visits and brushing frequency were associated only with 'difficulty in eating' ($p<0.05$).

The OIDP instrument showed very good reliability and demonstrated homogeneity of items with Cronbach's alpha of 0.70. All corrected item-total correlations were above the minimum recommended level of 0.02 to be included in the scale. All were positive and no correlation was high enough for any item to be redundant (Table 2). Construct validity of the instrument was demonstrated in that the mean OIDP scores showed a clear trend with OIDP scores; those with perceived 'dissatisfaction with general health', 'oral health', 'dental appearance' having higher OIDP score, indicating higher level of

oral impacts ($p<0.001$). Overall DMFT ranged from 0 to 14 (mean 7.4, sd 5.9) with 6.5% having a DMFT>0 and 26% having restorations. For criterion validity, as the number of decayed and missing teeth increased, the mean impact score also increased and was found to be statistically significant ($p<0.05$) (Table 3).

Table 4 shows the results of multiple logistic regression analyses with dichotomised OIDPSC scores as dependent variable and clinical indicators (decayed and missing teeth) as independent variables. Subjects with increased decayed or missing teeth had higher oral impacts.

Discussion

Cross-cultural studies integrating subjective measures with objective oral health measures are required to broaden the concepts of oral health. The present study was the first to apply OIDP inventory on population of Karnataka in South India. Here, the OIDP was tested among the adults aged 35-44 years visiting the dental outreach center in Karnataka. Cross-cultural adaptation of socio-dental indicators requires rigorous translation and validation to make the adopted instrument culturally relevant for the local population.

The Kannada version of OIDP had good reliability which was successfully tested in various ways. Cronbach alpha coefficient was 0.70 which was satisfactory and all corrected item-total correlations were above the minimum recommended level of 0.20 for being included in a scale. Previous applications of the OIDP scale among various populations have yielded internal consistency values ranging from 0.67 to 0.90 (Adulyanon *et al.*, 1996; Astrom and Okullo, 2003; Astrom *et al.*, 2005; Dorri *et al.*, 2007; Jung *et al.*, 2008; Masalu and Astrom, 2003).

Table 1. Prevalence of the components of the OIDP inventory (n=312)

Component of the OIDP inventory	Every day	3-4 times per week	1-2 times per week	Once per month	Total affected	Never affected
Difficulty in eating	25.2	7.1	8.7	11.2	52.2	47.8
Difficulty in cleaning	15.7	6.4	6.1	4.2	32.4	67.6
Emotional status	9.0	3.2	2.5	6.1	20.8	79.2
Smiling without embarrassment	10.3	1.9	2.9	4.8	19.9	80.1
Difficulty in sleeping	5.8	3.8	2.2	7.4	19.2	80.8
Carrying out main role or work	6.1	3.8	1.3	4.8	16.0	84.0
Enjoying the contact of other people	10.3	1.0	2.5	2.2	16.0	84.0
Difficulty in speaking	7.1	3.5	2.8	1.0	14.4	85.6

Table 2. Reliability analysis using Cronbach's alpha

OIDP Items	Corrected item-total correlation	Cronbach's Alpha if item deleted
Difficulty in eating	0.36	0.68
Difficulty in speaking	0.29	0.69
Difficulty in cleaning	0.31	0.69
Difficulty in sleeping	0.58	0.63
Smiling without embarrassment	0.54	0.64
Emotional state; becoming easily upset	0.38	0.67
Carrying out main role or work	0.50	0.65
Enjoying the contact with people	0.21	0.71
Standardised Cronbach's Alpha		0.70

For construct validity of the instrument, significant association was seen between the OIDP score and self-rated 'general health status', 'oral health status' and 'perceived satisfaction with appearance of teeth' ($p < 0.001$), suggesting those satisfied with their overall oral health, general health and appearance of teeth had lesser oral impacts. This implies that their perceived quality of life was better than those with higher impacts on oral health. The findings were similar to OIDP studies in Norwegian, Persian, Korean and Ugandan populations (Astrom and Okullo, 2003; Astrom *et al.*, 2005; Dorri *et al.*, 2007; Jung *et al.*, 2008).

The instrument also showed good criterion validity which was proved by the ability of the OIDP instrument

to discriminate between those having a score of '0, 1-5, ≥ 6 ' for 'decayed and missing teeth'. The result of multi-variate analyses confirmed these findings. Subjects with more missing and decayed teeth were at greater odds of having oral impacts than those with complete dentition and non carious teeth; which has an important policy and program implication.

Tooth loss and reported experience of oral problems have been widely found to be associated with a reduced OHRQoL (Leao and Sheiham, 1996). In Norway, self-reported measure of the number of remaining natural teeth was applied as a proxy for criterion validity. The proportion of subjects having oral impacts increased continuously with increasing number of missing teeth with

Table 3. Construct and criterion validity for OIDP inventory: comparison of mean OIDP with perceived general and oral health, appearance of teeth and caries experience

Variable		OIDP Mean (SD)	p value (Kruskal-wallis)
<i>Construct validity</i>			
Perceived general health status	Satisfied	12.3 (4.0)	< 0.001
	Average	16.3 (6.7)	
	Dissatisfied	18.4 (6.0)	
Perceived oral health status	Satisfied	11.1 (3.8)	< 0.001
	Average	13.8 (5.1)	
	Dissatisfied	19.8 (8.8)	
Perceived satisfaction with appearance of teeth	Satisfied	11.9 (3.1)	< 0.001
	Average	12.5 (5.4)	
	Dissatisfied	18.2 (7.9)	
<i>Criterion validity</i>			
Decayed teeth	0	11.5 (5.2)	0.03*
	1-5	13.6 (6.0)	
	≥ 6	14.7 (6.6)	
Missing teeth	0	12.6 (5.5)	0.04*
	1-5	13.8 (6.4)	
	≥ 6	14.9 (5.8)	
Filled teeth	0	13.6 (6.2)	0.76
	1-5	13.2 (5.9)	
	≥ 6	12.7 (4.5)	
DMFT	0	9.8 (2.1)	0.08
	1-5	12.8 (5.8)	
	≥ 6	14.2 (6.3)	

* $p \leq 0.05$

Table 4. Logistic regression analysis with OIDP as dependent variable (affected and not affected) and decayed and missing teeth as independent variables

Variables	Categories	p-value	Odds ratio	95.0% CI
Decayed teeth	0			
	1-5	0.056	1.95	0.98-3.85
	≥ 6	0.065	2.30	0.95-5.57
Missing teeth	0			
	1-5	0.014*	2.07	1.16-3.69
	≥ 6	0.038*	2.25	1.05-4.82

* $p \leq 0.05$; Analysis controlled for age and gender

the instrument discriminating significantly between those having '1-4, 5-10 and >10' missing teeth (Astrom *et al.*, 2005). In a study on Tanzanian students, discriminative and construct validity were demonstrated in that the OIDP frequency scale discriminated between students with and without clinically observed oral problems like decayed teeth, missing teeth, presence of calculus and tooth discoloration ($p < 0.05$). But the clinical indicators did not maintain their statistically significant correlation with the OIDP scores in the multivariate analysis indicating that they affect daily ($\beta = 0.08$, ns) performances only indirectly (Masalu and Astrom, 2003).

A Korean study assessed the validity of OIDP through its association with objectively assessed number of natural teeth present, need for restorative and prosthetic treatment, and presence or absence of denture (Jung *et al.*, 2008). A study of a Ugandan population, OIDP's validity was demonstrated by significant differences between students with $MT > 0$ and without missing teeth ($MT = 0$). Students with missing teeth were 3.4 times (95% CI 2.0–5.7) more likely to report difficulties with sleeping and relaxing than those with no missing teeth (Astrom and Okullo, 2003). Though clinical measures were excluded in other validation studies including Britain, in Greece it was used as a proxy measure when assessing Dental Impact on Daily Living scales (Astrom *et al.*, 2006). In study of a Persian population criterion validity was demonstrated as those perceiving a need for dental treatment had much higher OIDP scores than those who did not ($p < 0.001$).

The prevalence of oral impacts in the present study population was high with 72% of the participants having at least one oral impact affecting their daily life in the past six months preceding the survey. The most commonly affected daily performance was 'eating': a common finding in other population studies using OIDP. The prevalence was comparable to 73% observed by Adulyanon and colleagues, (1996) in a Thai population. It was higher than the prevalence of 64% in Persia, 62% in Uganda, 62% in Korea, 51% in Tanzanian students and 45% in Japanese adults.

The mean OIDP ADD score in the present study was 13.5 (sd 6.1) and mean OIDP SC score was 1.90 (sd 1.92). In a Persian study, the mean OIDP ADD score was 13.9 (sd 7.4) and comparable to the present study findings. Higher OIDP SC scores were reported in Persia (2.7, sd 2.9) and Japan (3.5, sd 7.1) but lower among Tanzanian students (1.2, sd 1.8). Variety in the results of studies using similar methods might be attributed to different disease levels, sample distributions or geographical differences but above all, different perceptions of oral health rooted in different social, cultural or psychological factors.

Age was considered in the present study was significantly associated with mean OIDP score ($p = 0.02$). OIDP was tested on various adult populations with varying age groups; for example 35-44 year adults in Thai population; 44 (sd 17) in Norway, 20-50 year olds in Persia; older groups of 63, 65 and 69 years in Tanzania, Japan and Korea; younger populations of 16 and 10–11 years in Uganda and Britain respectively.

A less favorable OIDP rating was associated with decreased brushing frequency; with those brushing less frequently experiencing more difficulty with eating. Simi-

larly, subjects who visited the dentist more frequently reported a higher impact on eating than did others.

Conclusion

The accuracy of reporting perceived impairments and symptoms in population based studies might be limited. The OIDP inventory using a recall period of six months and relying on self-reports implies that it can be prone to recall bias. Compared to shorter recall periods, longer recalls might result in an underestimation of health consequences but might provide valid estimates for severe outcomes. This might be the case with the OIDP covering ultimate impacts thus essentially measuring the disabilities and handicaps (Astrom *et al.*, 2005).

The study highlighted the limits of focusing exclusively on normative needs and suggested the incorporation of OHRQoL measures into the oral healthcare services. The Kannada version of OIDP seemed to preserve the overall concept of the original English version and was found to have acceptable psychometric properties for applicability among the adults in Karnataka, South India.

Acknowledgements

The authors thank all the subjects who gave their time to participate in the study. The support from Manipal University is highly appreciated.

References

- Acquadro, C., Conway, K., GirouDET, C. and Mear, I. (2004): *Linguistic Validation Manual for Patient-Reported Outcomes (PRO) Instruments* Lyon: Mapi Research Institute.
- Adulyanon, S. and Sheiham, A. (1997): Oral Impacts on Daily Performances. In *Measuring Oral Health and Quality of Life* Edited by: Slade, G.D.: pp151-160. University of North Carolina: Chapel Hill.
- Adulyanon, S., Vourapukjaru, J. and Sheiham, A. (1996): Oral impact affecting daily performances in a low dental disease Thai population. *Community Dentistry and Oral Epidemiology* **24**, 385-389.
- Allen, P.F. and Locker, D. (1997): Do weights matter? An assessment using the Oral Health Impact Profile. *Community Dental Health* **13**, 133-138.
- Astrom, A.N. and Okullo, I. (2003): Validity and reliability of the Oral Impacts on Daily Performances (OIDP) frequency scale: a cross-sectional study of adolescents in Uganda. *BMC Oral Health* **3**: 5.
- Astrom, A.N., Haugejorden, O., Skaret, E., Trovik, T.A. and Klock, K.S. (2005): Oral impacts on daily performance in Norwegian adults: validity, reliability and prevalence estimates. *European Journal of Oral Sciences* **113**: 289-296.
- Atchison, K. and Dolan, T. (1990): Development and evaluation of the oral impact profile. *Journal of Dental Education* **54**, 680-687.
- Astrom, A.N., Haugejorden, O., Skaret, E., Trovik, T.A. and Klock, K.S. (2006): Oral impacts on daily performance in Norwegian adults: the influence of age, number of missing teeth, and socio-demographic factors. *European Journal of Oral Sciences* **114**: 115-121.
- Cohen, L.K. and Jago, J.D. (1976): Towards the formulation of sociodental indicators. *International Journal of Health Services* **6**, 681-698.
- Dorri, M., Sheiham, A. and Tsakos, G. (2007): Validation of a Persian version of the OIDP Index. *BMC Oral Health* **7**: 2.

- Jung, S., Ryu, J., Tsakos, G. and Sheiham, A. (2008): A Korean version of the Oral Impacts on Daily Performances (OIDP) scale in elderly populations: Validity, reliability and prevalence. *Health and Quality of Life Outcomes* **6**: 17.
- Landgraf, J.M., Abetz, L. and Ware, J.E. (1999): *Child Health Questionnaire (CHQ): A User's Manual*. Boston: Health Act.
- Leao, A. and Sheiham, A. (1996): The development of a socio-dental measure of dental impacts on daily living. *Community Dental Health* **13**, 22-26.
- Locker, D. (1988): Measuring oral health: conceptual framework. *Community Dental Health* **5**, 3-18.
- Locker, D. (1992): The burden of oral disorders in a population of older adults. *Community Dental Health* **9**, 109-124.
- Masalu, J. and Astrom, A.N. (2003): Applicability of an abbreviated version of the oral impacts on daily performances (OIDP) scale for use among Tanzanian students. *Community Dentistry and Oral Epidemiology* **31**, 7-14.
- Naito, M., Suzukarno, Y., Ito, H.O. and Nakayama, T. (2007): Development of a Japanese version of the oral impacts on daily performance (IODP) scale: a pilot study. *Journal of Oral Science* **49**, 259-264.
- Nikias, M.K., Sollecito, W.A. and Fink, R. (1979): An oral health index based on ranking of oral status profiles by panels of dental professionals. *Journal of Public Health Dentistry* **39**, 16-26.
- Shah, N. (2005): Oral and dental diseases: Causes, prevention and treatment strategies. *NCMH Background Papers. Burden of Disease in India*. pp275-298. New Delhi, India: National Commission on Macroeconomics and Health Ministry of Health & Family Welfare, Government of India.
- Sheiham, A., Steele, J.G., Marcenes, W., Tsakos, G., Finch, S. and Walls, A.W.G. (2001): Prevalence of impacts of dental and oral disorders and their effects on eating among older people; a national survey in Great Britain. *Community Dentistry and Oral Epidemiology* **29**, 195-203.
- Slade, G.D. and Spencer A.J. (1994): Development and evaluation of the Oral Health Impact Profile. *Community Dental Health* **11**, 3-11.
- World Health Organization. (1986): *Health promotion: a discussion document on concepts and principles*. Copenhagen: WHO.
- World Health Organization (1997): *Oral health surveys: Basic methods*. 4th edn. Geneva: WHO.
- Yusuf, H., Gherunpong, S., Sheiham, A. and Tsakos, G. (2006): Validation of an English version of the Child-OIDP index, an oral health-related quality of life measure for children. *Health Quality Life Outcomes* **4**, 38-44.