

The impact of oral health status on the Oral Health-Related Quality of Life (OHRQoL) of 12-year-olds from children's and parents' perspectives

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Objectives: To assess the effect of dental caries, periodontal status and dental fluorosis on the oral health-related quality life (OHRQoL) of 12-year-olds and to assess the agreement between parents and children on the children's OHRQoL relative to the children's oral health status. **Methods:** A two-stage sampling method was used to select a sample of 12-year-olds from Binzhou, China. Their oral health status was recorded using the DMFT, CPI and Dean's Index. The Child Perception Questionnaire 11-14 (CPQ₁₁₋₁₄) and the Parental Perception Questionnaire (PPQ) were administered to the children and their parents, respectively, to assess the children's oral health-related quality of life. **Results:** The data used in the analysis were collected from 1,120 children. The prevalence of tooth decay was 31.6% and that of dental fluorosis was 29.7%; 4.1% of the children had healthy gums and 52.4% had dental calculus. There was a moderate to good correlation between the CPQ and PPQ (ICC=0.51-0.68). Having dental fluorosis and brushing teeth less than twice a day negatively influenced the emotional well-being domain of the CPQ, but was not related to this domain of the PPQ. Having calculus, dental fluorosis, brushing teeth less than twice a day and having dental visits negatively influenced the social well-being domain of the CPQ, but only tooth brushing was related to this domain of the PPQ. **Conclusions:** Children's self-reported CPQ₁₁₋₁₄ scores were more strongly associated with their oral health status and OHRQoL than their parents' PPQ scores were, especially in the social and emotional well-being domains. Having caries, dental fluorosis or dental calculus negatively affected children's oral health-related quality of life.

Key words: oral health, quality of life, dental caries, periodontal disease, dental fluorosis, China, CPQ, PPQ, OHRQoL

Introduction

Oral diseases are among the most common diseases suffered by children in developing countries. A 2005 China Ministry of Health national survey showed that 28.9% of 12-year-olds had experienced dental caries, and over half of them had bleeding gums and/or calculus (Qi, 2008). Traditionally, oral diseases in a population are measured by objective clinical examinations and instruments. However, these measures do not encompass the entire complex nature of oral health (Locker, 1988) with increasing attention being placed on the bio-psycho-social medical aspects, especially patients' perceptions of their oral health and its effect on their quality of life, (OHR-QoL). Since the 1990s, instruments have been available to assess OHRQoL (Atchison and Dolan, 1990; Slade and Spencer, 1994), mostly developed for adults with child and adolescent versions being slower to appear, as these respondents may have difficulty in recalling the relevant data and understanding some of the questions (Theunissen *et al.*, 1998; Ungar *et al.*, 2006). Thus, many instruments for measuring child OHRQoL use a parent-proxy report or a combination of a child self-report and a parent-proxy report. The Child Perception Questionnaire (CPQ) 11-14 assesses 11-14 year-olds' own perceptions of their oral health-related quality of life. The Parental Perception Questionnaire (PPQ) is a parallel questionnaire assessing parents' perceptions of their children's oral

health. The level of agreement between the CPQ and PPQ varies according to the characteristics of the child (Jokovic *et al.*, 2003a). Some studies suggest that both questionnaires should be used to get an overall view of children's oral health-related quality of life (Barbosa and Gavião, 2012; Kohli *et al.*, 2011).

The aim of this study was to assess the effect of dental caries, gum diseases and dental fluorosis on the oral health-related quality life of 12-year-olds in China, and to assess the agreement between parents and children on children's OHRQoL relative to the children's oral health status.

Methods

Approved by the Ethics Committee of Binzhou Medical University Hospital, Binzhou Medical University, this survey was conducted between December 2010 and February 2011 in Binzhou, a typical medium size city in eastern China (Song and Zhang, 2002). The population of this city was 3.75 million in 2010. The sample population of this study consisted of the grade 6 students in several primary schools in Binzhou to match the WHO index age of 12 years. Their selection was on a two-stage sampling method using Education Bureau support and data. The largest primary school in each of the seven Binzhou districts was selected. Then in each selected school, two

grade 6 classes were randomly selected from the ten or more in each school. Children per class numbered more than 80 and school attendance is compulsory. Children younger or older than 12 were excluded.

The CPQ 11-14 and PPQ were used to assess subjective oral health status and OHRQoL. There are two validated versions of the Chinese CPQ 11-14 and PPQ. The first was validated using a Hong Kong population whose mother language was Cantonese (McGrath *et al.*, 2008). The second was based on Putonghua in mainland China (Huang, 2007) and is a short, 16-item version, the CPQ 11-14-ISF: 16 (Jokovic *et al.*, 2006) which was more appropriate for this study because of its language. It permits participants to choose the option 'do not know' which others studies have found can be regarded as equivalent to 'not at all' without affecting the good discriminate and construct validity of questionnaire (Jokovic *et al.*, 2003b; Marshman *et al.*, 2007). So that approach was used in this study otherwise following the original CPQ 11-14-ISF: 16 scoring for the four domains: oral symptoms, functional limitations, emotional and social well-being.

The parent of each selected child received an invitation letter, a parental consent form and a two part questionnaire. For the child, part one included the short form of the CPQ 11-14 with questions about the frequency of daily tooth brushing and dental visit habits. For the parent, part two included a short form (16-item, CPQ 11-14-ISF 16) PPQ and questions about family income. For both CPQ 11-14 and PPQ the recall period was three months. After issuing the questionnaire, a dentist gave a short explanation to the children and instructions on how to fill out the questionnaire.

After gaining parental consent, participants completed the questionnaires before children were examined in their schools. The questionnaires were checked by an assistant for missing items and the child or parent was asked to remedy any errors during the clinical examination. Two trained and calibrated examiners conducted the clinical examination using dental mirrors and Community Periodontal Index (CPI) probes under natural light. Dentition status, dental fluorosis and periodontal status were assessed according to the World Health Organization (1997) methods and criteria including those for DMFT, Dean's Index and CPI measurement. About 5% of the students were re-examined to assess inter-examiner reliability using agreement on DMFT dichotomised as exact agreement or not. The DMFT score reported the dentition status. The Dean's Index was used to record the dental fluorosis with all teeth being examined, the two most affected teeth identified and scored (0, none; 1, questionable; 2, very mild; 3, mild; 4, moderate; 4, severe) and the lower score used. Students with a Dean's Index of 1 or greater were diagnosed with dental fluorosis. The CPI was used to report periodontal status of six examined index teeth (16, 11, 26, 36, 31, and 46), pockets were not recorded, only bleeding and calculus were considered.

A weighted Kappa was used to assess inter-examiner reliability with CPI discrepancies of 0, 1 and 2 weighted 0, ½ and 1 respectively for each sextant. Based on the responses on the CPQ and PPQ, the mean score of each domain and the overall CPQ and PPQ scores were calculated. The correlation between the CPQ and PPQ was

assessed using an intra-class correlation coefficient. To evaluate the effect of tooth decay, periodontal status and dental fluorosis on the CPQ and PPQ, an independent samples t-test was applied. A 95% confidence interval was calculated for the estimated prevalence. Multi-factor ANOVA was assessed the interactions and main effects of the independent variables. Clinical examination results, tooth brushing frequency, dental visit patterns and family income were added to the model as independent variables. The interactions and main effects of the independent variables with the largest p values were removed from the model one by one until all of the independent variables in the model were significantly associated with the dependent variable. All tests used SPSS v20.0 with the statistical significance level set to 5%.

Results

The sample consisted of 1,153 students from 14 classes with 1,120 children (573 boys, 547 girls) completing both the questionnaire and clinical examination, giving a response rate of 97.1%. The prevalence of tooth decay was 31.6%. Their oral health status is reported in Table 1. Only 4.1% of the children had healthy gums; 43.5% of them had bleeding gums and 52.4% had calculus in at least one sextant. The inter-examiner kappa coefficients of the dental caries, Dean's Index and CPI, based on 61 re-examined children, were 0.93, 0.79 and 0.73, respectively.

Based on the mean CPQ score being higher than the mean PPQ score in each domain and overall (Table 2) there was a tendency for parents to underestimate their

Table 1. Oral health status of the study children (n=1120: 573 boys and 547 girls)

Oral health status	mean	sd	n	%
Dental caries				
DT	0.51	1.18		
MT	0.06	0.40		
FT	0.04	0.35		
DMFT	0.61	1.18		
Periodontal status				
Healthy			46	4.1
Bleeding			487	43.5
Calculus			587	52.4
Dental fluorosis				
No			787	70.3
Yes			333	29.7

Table 2. Correlation between the CPQ and PPQ for each domain and the overall score

	CPQ mean (sd)	PPQ mean (sd)	ICC
Oral symptoms	6.8 (2.0)	6.5 (2.1)	0.57**
Functional limitations	5.5 (1.8)	5.1 (1.7)	0.67**
Emotional well-being	4.9 (1.7)	4.5 (1.4)	0.55**
Social well-being	4.7 (1.2)	4.5 (1.1)	0.51**
Overall score	21.8 (4.9)	20.6 (4.6)	0.68**

ICC: Intra-class correlation coefficient; **p<0.001.

children's OHRQoL, though children's and parents' perceptions in each domain were positively correlated.

As shown in Tables 3 and 4, the children were classified according to family income, dental service utilisation, tooth brushing frequency, dental caries experience, dental fluorosis status and periodontal status, and the mean scores of each domain of the CPQ and PPQ for each group was calculated. Children with dental caries had higher oral symptoms domain scores. Those with dental fluorosis had higher emotional well-being and social well-being domain. Children with dental calculus had higher oral symptoms domain scores. Children who never visited a dentist had lower mean scores in the oral

symptoms, functional limitations and social well-being domains. Those who brushed their teeth at least twice a day had better OHRQoL, as reflected in lower mean CPQ scores in the oral symptoms, functional limitations and emotional well-being domains. Children from families with monthly incomes under RMB3,000 had higher oral symptoms domain scores. The PPQ score was unrelated to children's dental fluorosis or periodontal status. The mean PPQ scores for functional limitations were higher in children with dental caries, who brushed their teeth less than twice a day and/or had lower family income; these differences were not found in the CPQ.

Table 3. Difference in domain scores of the CPQ by child's family income, oral health status, daily tooth brushing frequency and dental visits

	<i>n</i>	<i>Oral symptoms mean (sd)</i>	<i>Functional limitations mean (sd)</i>	<i>Emotional well-being mean (sd)</i>	<i>Social well-being mean (sd)</i>
Caries					
No	766	6.7 (1.9)*	5.4 (1.6)	4.8 (1.6)	4.7 (1.1)
Yes	354	7.0 (2.1)	5.6 (2.0)	5.0 (1.9)	4.8 (1.3)
Periodontal status					
No calculus	533	6.6 (2.0)*	5.4 (1.6)	4.8 (1.6)	4.7 (1.1)*
With calculus	587	6.9 (2.0)	5.5 (1.9)	4.9 (1.7)	4.8 (1.3)
Fluorosis					
No	787	6.7 (1.9)	5.4 (1.7)	4.8 (1.6)*	4.6 (1.0)*
Yes	333	6.9 (2.1)	5.5 (1.8)	5.1 (1.9)	5.0 (1.5)
Dental visit					
No	806	6.7 (1.9) *	5.3 (1.6) *	4.9 (1.7)	4.7 (1.1) *
Yes	314	7.0 (2.1)	5.8 (2.1)	5.0 (1.6)	4.9 (1.4)
Tooth brushing per day					
Less than twice	664	7.0 (2.0)*	5.5 (1.8)	5.0 (1.9)*	4.8 (1.2)*
Twice or more	456	6.5 (2.0)	5.4 (1.7)	4.7 (1.3)	4.6 (1.2)
Family income					
<RMB3,000	863	6.9 (2.0)*	5.5 (1.8)	4.9 (1.7)	4.8 (1.2)
≥RMB3,000	257	6.5 (1.9)	5.3 (1.7)	4.8 (1.5)	4.7 (1.2)

*p<0.05

Table 4. Differences in domain scores of the PPQ by child's family income, oral health status, daily tooth brushing frequency and dental visit

	<i>n</i>	<i>Oral symptoms mean (sd)</i>	<i>Functional limitations mean (sd)</i>	<i>Emotional well-being mean (sd)</i>	<i>Social well-being mean (sd)</i>
Caries					
No	766	6.4 (2.1)*	5.0 (1.5)*	4.5 (1.3)	4.4 (1.0)
Yes	354	6.7 (2.1)	5.4 (2.1)	4.6 (1.5)	4.6 (1.4)
Periodontal status					
No calculus	533	6.4 (2.0)	5.0 (1.6)	4.5 (1.3)	4.4 (0.9)
Calculus	587	6.5 (2.2)	5.2 (1.8)	4.6 (1.4)	4.5 (1.3)
Fluorosis					
No	787	6.4 (2.0)	5.1 (1.7)	4.5 (1.4)	4.4 (1.1)
Yes	333	6.5 (2.2)	5.2 (1.8)	4.6 (1.3)	4.5 (1.1)
Dental visit					
No	806	6.3 (2.0) *	5.0 (1.6) *	4.5 (1.4)	4.5 (1.2)
Yes	314	6.8 (2.2)	5.4 (2.0)	4.5 (1.3)	4.4 (1.0)
Tooth brushing					
Less than twice	664	6.6 (2.1)*	5.2 (1.8)*	4.6 (1.4)	4.5 (1.3)*
Twice or more	456	6.2 (2.0)	5.0 (1.6)	4.5 (1.2)	4.4 (0.9)
Family income					
<RMB3,000	863	6.5 (2.1)	5.2 (1.8)*	4.6 (1.4)	4.5 (1.2)
≥RMB3,000	257	6.3 (2.0)	4.8 (1.3)	4.4 (1.1)	4.4 (1.0)

*p<0.05

Table 5. Multi-factor ANOVA for overall CPQ score and PPQ score against child's family income, oral health status, daily tooth brushing frequency and dental visit

	CPQ			PPQ		
	β	95% CI	p value	β	95% CI	p value
Tooth brushing per day, Ref: <Twice						
Twice or more	-1.2	-1.8, -0.6	<0.001	-0.9	-1.4, -0.3	0.001
Dental visit, Ref: No						
Yes	1.2	0.6, 1.8	<0.001	0.9	0.3, 1.5	0.003
Caries experience, Ref: No						
Yes	0.8	0.2, 1.4	0.013	0.9	0.3, 1.5	0.002
Dental fluorosis, Ref: No						
Yes	0.8	0.2, 1.5	0.008	--	--	--
Periodontal status, Ref: No calculus						
With calculus	0.8	0.2- 1.4	0.006	0.6	0.1, 1.1	0.004
Family income, Ref: <RMB3,000						
≥RMB3,000	--	--	--	-0.8	-1.4, -0.1	0.005

The overall CPQ and PPQ scores were used as the dependent variables in two separate multi-factor ANOVAs (Table 5). As no significant interaction effect was found between the independent variables, only the main effects were considered in the final models. A child's dental caries experience, presence of dental fluorosis, periodontal status, dental service utilisation and tooth brushing frequency were the significant independent variables in the final CPQ model. The CPQ score was higher among children who had dental caries, had dental calculus, had dental fluorosis, brushed their teeth less than twice a day and had visited a dentist. A child's dental caries experience, dental service utilisation, tooth brushing frequency and family income were the significant independent variables in the final PPQ model. The PPQ score was higher among children who had dental caries, brushed their teeth less than twice a day, had visited a dentist and had a family income of less than RMB3,000 per month.

Discussion

The 12-year-olds in this study had a very low level of dental caries (Petersen, 2003). Their dental caries experience and periodontal status were similar to those reported in the third Chinese national survey (Qi, 2008) though their prevalence of fluorosis was higher than that reported by Qi (2008). It is noteworthy that some of the districts in Binzhou have higher than optimal levels of fluoride in drinking water (Chen *et al.*, 2009).

The overall CPQ and PPQ scores were high in this study compared to other studies. Both the parents and children reported fairly frequent effects of oral health on the children's quality of life, although dental caries and periodontal diseases were not severe. We suggest three possible reasons for this finding. First, dental fluorosis may have contributed to poor emotional well-being and social well-being in this population. Second, the eruption of the second permanent molars may have a negative effect on OHRQoL. During the examination many children reported pain or difficulty chewing caused by the eruption of their second permanent molars. The authors' are aware of a local custom encouraging children to bite erupting teeth hard on things and this may hurt children's gums and affect their ratings. Third, cultural differences may

lead to different mean CPQ scores in different regions. A cross-cultural comparison of the short form version of the CPQ 11-14 found variations in the mean CPQ score among different populations (Foster Page *et al.*, 2011). The variations do not appear to be related to the different samples' overall experience of caries. The authors suggest that the variations may reflect subtle socio-cultural differences in subjective oral health among these populations.

In this study, the children who had never visited a dentist had better oral health-related quality of life. Dental visits are generally problem-driven in China (Lo *et al.*, 2001). Brushing teeth twice a day is the most common recommendation in public oral health promotions and this study observed lower brushing frequencies were associated with poorer oral health-related quality of life.

With regards to the identification of associated oral health status, it is noteworthy that all of the clinical examination results, including having dental caries, dental fluorosis and dental calculus, were positively associated with CPQ scores. These findings confirm that the Chinese version of the CPQ 11-14 has validity. The results of this study are similar to those of many other studies focusing on children's oral health-related quality of life; reported dental caries and gum diseases affect the quality of life by creating pain, discomfort and bad breath (Foster Page *et al.*, 2005; Jokovic *et al.*, 2006). One study showed that an association between dental fluorosis and OHRQoL depended on the severity of the dental fluorosis (Robinson *et al.*, 2005) with fluorosis mainly affecting emotional well-being and social well-being domains, probably because the children's fluorosis was mainly mild and not leading to too many symptoms or to functional disability but the poor appearance may affect their emotional and social well-being. The correlations between the overall CPQ and PPQ were of medium to good strength (McDowell, 2006) but weaker for the emotional well-being and social well-being domains. These findings are consistent with the findings of Jokovic *et al.* (2003b), and may be related to the fact that peer-group dynamics are central to this age-group's lives in a way mothers may not appreciate. The parental proxies of the children's oral health-related quality of life had fewer significant correlations with oral health status than the children's self-reported OHRQoL, especially in

the emotional well-being and social well-being domains. These results are consistent with other studies evaluating the agreement between parents' and children's mental health and well-being reports (Jokovic *et al.*, 2004; Erhart *et al.*, 2009). These studies found that parents usually reported higher scores than the children. Interestingly, in this study, the PPQ detected functional limitations among children who had dental caries, brushed their teeth less than twice a day and had lower family income that were not reflected in the CPQ findings. In fact, most of the children with dental caries did not have deep caries or pulp-involved caries so they should not have too many functional limitations. Furthermore, it is unlikely that brushing teeth less than twice a day and lower family income will have functional effects. A review mentioned that parents and children have different perceptions on this issue: children may be unaware of the potential consequences of the disease, but parents may suspect there is a functional effect on their children (Eiser and Morse, 2001). These results suggest that parental proxies should be considered carefully when the child is old enough to complete a reliable self-report questionnaire.

In summary, the children's self-reported CPQ 11-14 detected more associations between subjective effects and their oral health status than the parent proxy PPQ, especially for social and emotional well-being. Having dental caries, dental fluorosis or dental calculus had negative effects on children's oral health-related quality of life.

References

- Atchison, K.A. and Dolan, T.A. (1990): Development of the Geriatric Oral Health Assessment Index. *Journal of Dental Education* **54**, 680-687.
- Barbosa, T.deS. and Gavião, M.B.D. (2012): Validation of the Parental-Caregiver Perceptions Questionnaire: agreement between parental and child reports. *Journal of Public Health Dentistry*. In press.
- Chen, P.Z., Yun, Z.J., Bian, J.C., Ma, A.H., Li, H.X. Gao H.X., Wang, Y.T. and Zhao, L.J. (2009): Epidemiological investigation on endemic fluorosis in Boxing County of Shandong Province in 2007. *Chinese Journal of Endemiology* **28**, 75-77.
- Eiser, C. and Morse, R. (2001): Quality-of-life measures in chronic diseases of childhood. *Health Technology Assessment* **5**, 1-157.
- Erhart, M., Ellert, U., Kurth, B.M. and Ravens-Sieberer, U. (2009): Measuring adolescents' HRQoL via self reports and parent proxy reports: an evaluation of the psychometric properties of both versions of the KINDL-R instrument. *Health and Quality of Life Outcomes* **7**, 77.
- Foster Page, L.A., Thomson, W.M., Jokovic, A. and Locker, D. (2005): Validation of the Child Perceptions Questionnaire (CPQ 11-14). *Journal of Dental Research* **84**, 649-652.
- Foster Page, L.A., Thomson, W.M., Mohamed, A.R. and Traebert, J. (2011): Performance and cross-cultural comparison of the short-form version of the CPQ11-14 in New Zealand, Brunei and Brazil. *Health Quality of Life Outcomes* **9**, 40.
- Huang, H.M. (2007): *Validation and application of a Chinese Version of the 11-14 years old Child Oral Health-Related Quality of Life (COHRQoL11-14)*. Guangzhou: Sun Yat-Sen University. http://d.wanfangdata.com.cn/Thesis_Y1086487.aspx
- Jokovic, A., Locker, D. and Guyatt, G. (2004): How well do parents know their children? Implications for proxy reporting of child health-related quality of life. *Quality of Life Research* **13**, 1297-1307.
- Jokovic, A., Locker, D. and Guyatt, G. (2006): Short forms of the Child Perceptions Questionnaire for 11-14-year-old children (CPQ 11-14): development and initial evaluation. *Health and Quality of Life Outcomes* **4**, 4.
- Jokovic, A., Locker, D., Stephens, M. and Guyatt, G. (2003a): Agreement between mothers and children aged 11-14 years in rating child oral health-related quality of life. *Community Dentistry and Oral Epidemiology* **31**, 335-343.
- Jokovic, A., Locker, D., Stephens, M., Kenny, D., Tompson, B., and Guyatt, G. (2003b): Measuring parental perceptions of child oral health-related quality of life. *Journal of Public Health Dentistry* **63**, 67-72.
- Kohli, R., Levy, S., Kummet, C.M., Dawson, D.V. and Stanford, C.M. (2011): Comparison of perceptions of oral health-related quality of life in adolescents affected with ectodermal dysplasias relative to caregivers. *Special Care in Dentistry* **31**, 88-94.
- Lo, E.C., Lin, H.C., Wang, Z.J., Wong, M.C., and Schwarz, E. (2001): Utilization of dental services in Southern China. *Journal Dental Research* **80**, 1471-1474.
- Locker, D. (1988): Measuring oral health: a conceptual framework. *Community Dental Health* **5**, 3-18.
- Marshman, Z., Rodd, H., Stem, M., Mitchell, C. and Robinson, P.G. (2007): Evaluation of the Parental Perceptions Questionnaire, a component of the COHQoL, for use in the UK. *Community Dental Health* **24**, 198-204.
- McDowell, I. (2006): *Measuring Health: a guide to rating scales and questionnaires, 3rd edn*. Oxford: Oxford University Press.
- McGrath, C., Pang, H.N., Lo, E.C., King, N.M. Hägg, U. and Samman, N. (2008): Translation and evaluation of a Chinese version of the Child Oral Health-related Quality of Life measure. *International Journal of Paediatric Dentistry* **18**, 267-274.
- Petersen, P.E. (2003): The World Oral Health Report 2003: continuous improvement of oral health in the 21st century—the approach of the WHO Global Oral Health Programme. *Community Dentistry and Oral Epidemiology*, **31**(s1), 3-24.
- Qi, X. (2008): *The third national oral health survey in China*. Beijing: People's Medical Publishing House.
- Robinson, P.G., Nalweyiso, N., Busingye, J. and Whitworth, J. (2005): Subjective impacts of dental caries and fluorosis in rural Ugandan children. *Community Dental Health* **22**, 231-236.
- Slade, G.D. and Spencer, A.J. (1994): Development and evaluation of the Oral Health Impact Profile. *Community Dental Health* **11**, 3-11.
- Song, S.F. and Zhang, K.H. (2002): Urbanisation and city size distribution in China. *Urban Studies* **39**, 2317-2327.
- Theunissen, N.C., Vogels, T.G., Koopman, H.M., Verrips, G.H., Zwinderman, K.A.H., Verloove-Vanhorick, S.P. and Wit, J.M. (1998): The proxy problem: child report versus parent report in health-related quality of life research. *Quality of Life Research* **7**, 387-397.
- Ungar, W.J., Mirabelli, C., Cousins, M. and Boydell, K.M. (2006): A qualitative analysis of a dyad approach to health-related quality of life measurement in children with asthma. *Social Science & Medicine* **63**, 2354-2366.
- World Health Organisation (1997): *Oral Health Surveys: Basic Methods 4th Edition*. <http://apps.who.int/iris/bitstream/10665/41905/1/9241544937.pdf>