

## Indonesian Short Version of the Oral Health Impact Profile (OHIP-14)

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### Abstract

To measure individual oral health perception toward daily activities capability, an evaluation of Oral Health Related Quality of Life is made. The most commonly used instrument is the short version of Oral Health Impact Profile (OHIP-14), developed by Slade. This study aimed to validate an Indonesian short version of OHIP-14 in elderly population.

The original English version of OHIP-14 was translated into Indonesian language (OHIP-14ID) and applied in the elderly populations in government nursing homes. Reliability was examined by test-retest with evaluated by Cronbach's alpha and average inter-item correlation coefficients. Convergent validity was established by examining relationships between the OHIP domain, total OHIP scores, and self-reported satisfaction on general dentition, chewing function, and aesthetics. Discriminant validity was examined by comparing OHIP scores and dental status.

Internal consistency coefficient of the total OHIP-14ID score as absolute agreement was 0.770. The Cronbach's alpha value for total OHIP-14ID scores was 0.932. All domain of OHIP-14ID confirmed significant value.

This study suggested that the OHIP-14ID can be used as a valid and reliable instrument for evaluating the impacts of oral condition to quality of life in epidemiological studies among the elderly in Indonesia.

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### Introduction

The elderly is a population vulnerable to impairment in health and quality of life. In Indonesia, the elderly population is increasing and will inevitably lead to an increase in geriatric patient and health service needs.<sup>1</sup> The World Health Organization (WHO) has stated that oral health is integral and essential to general health. Oral health condition is also an important factor in supporting general health and achieving good quality of life.<sup>1,2</sup> Quality of life (QoL) is one of the most important measures of health care, and oral health is an important aspect of QoL in the elderly.<sup>3,4</sup>

Oral health-related quality of life

(OHRQoL) can be described as the absence of oral conditions negative impacts on social life and a positive perception of dentofacial self-confidence.<sup>5</sup> OHRQoL is also influenced by socioeconomic status, dental visit schedule or treatment-seeking behavior, difficulties in daily activities, and the severity of systemic diseases. Poor oral health status in the elderly can reduce self-esteem and/or social interactions.<sup>6</sup> It is important to evaluate the impact of oral diseases or treatment because they influence physical and psychosocial condition and can result in negative impacts on health perceptions.<sup>7,8</sup> In turn, such impacts are also correlated with an individual's quality of life.<sup>8</sup>

Several instruments are used to measure OHRQoL. One commonly used instrument is the Oral Health Impact Profile (OHIP), developed by Slade and Spencer in 1994.<sup>9</sup> The questionnaire was constructed to measure and evaluate patient perceptions of oral health impact problems on their lives, including pain, reduced function, and diminished psychosocial well-being.<sup>10,11</sup> The instrument involves seven conceptual dimensions

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based on Locker's theoretical model of oral health.<sup>4</sup> The seven dimensions were adapted from the WHO's International classification of impairments, disabilities, and handicaps: functional limitation, physical pain, psychological discomfort, psychological disability, social disability, and handicap.<sup>5</sup> Each domain reflects the occurrence of individual perception about the impacts generated by oral problems. The questionnaire is concerned with the frequency of oral health impacts experienced by subjects within the last one year. Perceptions of oral health were measured using self-ratings on a 5-point Likert scale: never, hardly ever, occasionally, fairly often, and very often. The total OHIP score was calculated, with a higher score indicating a greater impact of OHRQoL.<sup>11</sup>

The original OHIP consists of 49 questions; the shortened version consists of 14 questions that were investigated and confirmed as being as effective as the OHIP-49 but requiring less time for people to complete the questionnaire.<sup>4</sup> Moreover, the shortened questionnaire minimizes the cost of administration and data management, is more convenient for respondents, and minimizes the likelihood that some items will not be completed due to questionnaire length.<sup>12</sup> Several statistical techniques were used to develop the short form, including internal reliability analysis, regression analysis, and factor analysis.<sup>4</sup> The OHIP-14 displayed the same pattern of variation among socio demographic groups that was observed using the OHIP-49. In addition, the OHIP-14 and OHIP-49 resulted in similar multivariate models relating oral status and socio demographic variables to social impacts.<sup>4</sup>

Originally, the OHIP-14 was validated in Australia for the elderly.<sup>13</sup> Since then, the OHIP-14 has been translated and cross-culturally validated in various languages.<sup>3,5,14-16</sup> Here, we report on the process of translating and validating the OHIP-14 into the Indonesian language (OHIP-14ID) in a study conducted among the institutionalized elderly in a government nursing home in West Jakarta, Indonesia.

## Materials and methods

**Translation procedure.** The translation process required several steps to adapt the language and cross-cultural context. We initially sent an adaptation request to the original

developer, which has been approved. Next, the original version of the OHIP-14 was translated into the Indonesian language, and then back-translated by a native speaker of the target language with standardized English ability, as shown by a TOEFL score above 550. They were Oral Medicine specialists at Faculty of Dentistry, Universitas Indonesia. The back-translator, who had never read the original or any other version of the OHIP, back-translated the Indonesian version into English. The translation and backward translation were done repeatedly until it conformed to the original questionnaire. The Indonesian and original English version were discussed and evaluated by experts in gerontology and dentistry. In an expert panel, the content and language used in the translation were discussed and revised. The experts were then asked to provide comments on the quality of the translation and to analyze the sentences to make them simpler or more comprehensible without changing the original purpose of the OHIP. The final, validated OHIP-14ID featured minor modifications without altering the principles of the questionnaire.

**Respondents and study design.** This was a cross-sectional study among institutionalized elderly respondents in Cengkareng, West Jakarta, Indonesia. The inclusion criteria were as follows: aged 60 years or older, no history of dementia or cognitive impairment as tested by a mini mental state examination (MMSE), able to communicate in the Indonesian language, and agree to participate in the study. Consequently, 51 elderly subjects who met the inclusion criteria were included in this study, consisting of 28 males and 23 females ranging in age from 60 to 94 years old. These subjects completed tests and retests. Most of the subjects had vision impairment due to cataracts or blurry vision, although they were all literate.

The examiner interviewed the subjects individually by reading aloud the OHIP-14ID questionnaire and then subjects' answers were recorded. The subjects were asked how often in the last year they had experienced the problem described by each item using the following response format: very often = 4, often = 3, occasionally = 2, hardly ever = 1, and never = 0. The scores were obtained by summing the response codes to the 14 items comprising the measure.

Besides the OHIP-14ID, the questionnaire also included global questions concerning life satisfaction, the care received from institution's staff, and health services with the same Likert scale responses as the OHIP-14ID. For discriminant validity, the subjects were also asked about general self-perceptions of dentition, chewing function, and aesthetics by "yes" or "no" responses.

After completed the questionnaire, the subjects were seated in a standard chair for oral examination. LED headlamps were used for the oral exams. Two specialists in oral medicine and two dentists performed the oral examination. They were all had been calibrated in performing the oral examination. The oral examination included dental status and salivary flow rate. IBM Statistic SPSS 22 (IBM Corp, USA) was used to analyze the study results. This study has undergone review and was approved by the Ethical Committee of the Faculty of Dentistry, Universitas Indonesia, Jakarta, Indonesia.

**Validity.** Dimensional validity is an important factor in using and interpreting an instrument.<sup>5</sup> Validity tests were established to confirm that the instrument measured what it was intended to measure.<sup>14</sup> Construct validity was employed to measure the main idea of the questionnaire: predicting OHRQoL. The validity of constructs was measured by examining the relationship between OHIP scores and global questions about oral health satisfaction.<sup>13</sup> Two types of construct validity tests were implemented: convergent and discriminant validity.<sup>14</sup> Convergent validity refers to how strictly a measure is related to other measures within the same construct. Discriminant validity determines how well a measure differentiates between groups in terms of their respective differences.<sup>14</sup> Discriminant validity was assessed by associating the OHIP scores with objectively assessed dental status.<sup>13</sup> Convergent validity was evaluated by calculating the correlation between the global question and the OHIP-14ID scores using Spearman's rank. The response of global question used the same Likert rating as the OHIP-14ID.

In this study, discriminant validity was assessed via questions about satisfaction with general health, institutionalized home living, and staff concerns. For objective assessment purposes, discriminant validity was also evaluated by total OHIP scores with two

dichotomized oral conditions: (1) number of decay  $\leq 2$  or  $\geq 3$ , (2) missing teeth  $\leq 20$  or  $> 20$ , (3) hyposalivation or no hyposalivation in unstimulated and stimulated salivary flow rate, and (4) remaining teeth  $\geq 20$  or  $< 20$ . Discriminant validity used "yes" or "no" responses.

**Reliability.** Reliability was examined by test-retest reliability and internal consistency.<sup>14,13</sup> Internal consistency was examined by calculating the Cronbach's alpha reliability coefficient based on initial data collection.<sup>14</sup> Reliability can also be assessed by internal consistency via the measurement of inter-item and item-score correlations.<sup>13</sup>

Test-retest reliability was assessed for all 51 subjects. Convergent validity was confirmed by the association between the seven domains of OHIP-14ID scores and self-reported satisfaction with teeth, chewing function, and aesthetics.

## Results

### Demographic data

Demographic information is described in Table 1. These subjects included 28 males (54.9%) and 23 females (45.1%), ranging between 60-94 years of age. According to data from the Jakarta Social Services, the elderlies who live in government nursing homes have various backgrounds, including the homeless and beggars. Some of those who still have a family might have been rejected due to internal family problems or loss-of-contact because of cognitive impairment. Table 1, which shows the demographic backgrounds of the subjects, identifies most of them as having a low level of education.

		Subjects n (%)
Gender (%)	Male	28 (54.9)
	Female	23 (45.1)
Education (%)	No education	11 (21.6)
	Elementary school	21 (41.2)
	Junior high school	7 (13.7)
	Senior high school	12 (23.5)
Ethnic group (%)	Javanese	19 (37.3)
	Sundanese	12 (23.5)
	Betawi	8 (15.7)
	Batak	4 (7.8%)
	Melayu-Minang	5 (9.8%)
	Others	3 (5.9%)

**Table 1** Demographic Background of Subject Study.

Some were literate but had limited eyesight due to cataracts or other diseases. One-half of the subjects had hearing impairment due to physiological degeneration or systemic diseases. Most of the subjects were Javanese (37.3%), but could speak and understand the Indonesian language fluently.

OHIP domain	Mean score ± (SD)	r*
Functional limitation	0.84 (1.461)	0.659
Physical discomfort	1.12 (1.583)	0.841
Psychological discomfort	1.37 (1.98)	0.823
Physical disability	1.51 (1.974)	0.857
Psychological disability	1.42 (1.974)	0.807
Social disability	1.25 (1.798)	0.833
Handicap	0.92 (1.695)	0.706
OHIP total	8.45 (10.433)	0.508

**Table 2** Overall Mean OHIP Domain Score. \*Spearman correlation  $P < 0.05$

Intra oral condition	Median (min-max)	p-value*
Tooth Decay		0.85
Decay $\geq 3$	4 (0-22)	
Decay $\leq 2$	3 (0-36)	
Missing teeth		0.99
Missing teeth $> 20$	3 (0-36)	
Missing teeth $\leq 20$	3.5 (0-22)	
Unstimulated Salivary flow rate:		0.57
Hyposalivation	2 (0-36)	
Normal	4 (0-36)	
Stimulated Salivary flow rate:		0.62
Hyposalivation	2 (0-36)	
Normal	4 (0-36)	
Remaining teeth		0.05
$< 20$ teeth	4.5 (0-36)	
$\geq 20$ teeth	1 (0-17)	

**Table 3** Total Score on Different Oral Condition Group. \*Mann-Whitney Test.

**Validity results.** The responsiveness of the subjects who completed the test and retest was 100%. The OHIP score given by the subjects was 0 (never) to 4 (very often) for the 14 questions. The maximum total score in this study was 36. Table 2 shows that the mean total OHIP was 8.45. The maximum mean was 1.51 in the physical disability domain, while the smallest was 0.84 in the functional domain. Each domain had a  $P$  value of  $< 0.005$ . The significance value means that the questionnaire can be established to measure OHRQoL. The Indonesian version of the OHIP14-ID is available by request.

Construct validity was analyzed by convergent and discriminant validity, and the global question was already decided by the panel expert. Convergent validity was analyzed through Spearman's correlation to determine the confounding factors that could have affected the answers on the questionnaire. The suspected confounding factors were included in the questionnaire as several questions which response used the same Likert scale as the OHIP-14ID. Dental health and general health and services carried out by the institution are suspected to be the confounding factors.

As shown in Table 2, no confounding factors were found for subjects in completing the questionnaire. The data confirmed that the total OHIP score and the entire domain were significant (Table 2), which in turn means that the questionnaire was adequate for asking about the impact of oral health on the subjects' lives.

Discriminant validity was used to differentiate the total OHIP score based on the variable group with dichotomous answers of "yes" or "no." A non-parametric Mann-Whitney test was used to analyze the discriminant validity of the data. Table 2 shows that the total OHIP score was significant can distinguish ( $P < 0.05$ ) between satisfied and unsatisfied subject group perceptions.

In Table 3, the total OHIP score with different oral conditions is shown based on the Mann-Whitney test. The variable of oral conditions were decay ( $\geq 3$  and  $\leq 2$  teeth), missing teeth ( $\leq 20$  and  $> 20$ ), remaining teeth ( $< 20$  and  $\geq 20$ ), and stimulated and unstimulated salivary flow rate (hyposalivation and normal). The Mann-Whitney test showed that the total OHIP score was significant in distinguishing groups with remaining teeth ( $< 20$  and  $\geq 20$ ).

Analysis of convergent and discriminant validity determined that the questionnaire was adequate to measure and distinguish different groups in terms of oral health related to quality of life.

**Reliability results.** The internal coefficient correlation (ICC) per domain indicated agreement at 0.521–0.770, which is quite good (good agreement:  $> 0.51-0.8$ ). The limits of agreement represent the test-retest differences that can be expected for 95% of the individuals in the sample. ICC were interpreted as ICC  $< 0.40$  = poor reliability, ICC  $\geq 0.40$  but  $\leq 0.75$  = fair to good reliability, and ICC  $> 0.75$  = excellent reliability.<sup>16</sup>

The reliability of the questionnaire was analyzed by Cronbach's alpha and ICC. The value of Cronbach's alpha for each question reached 0.932 (Table 4). Each domain varied between 0.755 and 0.781. This value is acceptable because all questions were considered to be valid (corrected item total correlation >0.3). These results indicate a significant correlation value. The Cronbach's alpha of 0.70-0.80 were satisfactory for a reliable comparison between groups.<sup>16</sup>

OHIP domain	Mean score TES RETES	ICC	95% CI	Cronbach's Alpha	Average inter- item correlation
Functional limitation	2.22	0.521	0.173-0.724	0.781	0.711
Physical discomfort	2.8	0.62	0.343-0.782	0.775	0.784
Psychological discomfort	3.16	0.727	0.525-0.844	0.755	0.908
Physical disability	3.41	0.67	0.46-0.811	0.757	0.898
Psychological disability	3.27	0.725	0.522-0.842	0.767	0.821
Social disability	2.9	0.777	0.611-0.872	0.764	0.856
Handicap	2.53	0.739	0.532-0.853	0.768	0.835
OHIP total	10.07	0.77	0.596-0.869	0.932	

**Table 4.** Test-retest Reliability (test-retest subject n=51), Intra-class Correlation Coefficients (ICC) for the OHIP Domain and Total Scores.

## Discussion

Numerous studies have shown that the elderly have many decayed, missing, and filled teeth (DMF-T), as well as a large number of root surface caries. Moreover, for many reasons, elderly people also use dental services less often than other age groups.<sup>2</sup> Self-perceptions of general health status are influenced by oral health, especially among the elderly. Various oral health problems, such as missing teeth, dry mouth, and mastication limitation, mostly affect the elderly.<sup>6</sup> Oral problems are correlated with worse quality of life.<sup>6</sup>

Quality of life is well-recognized as a valid parameter of assessment in almost every area of physical and mental health care, including oral health. Specific OHRQoL models and measures have been developed to evaluate the impact of oral conditions on OHRQoL.<sup>17</sup> The OHIP-14, which measures perceptions of the social impact of oral disorders on well-being, is one such instrument.<sup>4</sup> The questionnaire is self-administered but respondents can also be assisted.<sup>15</sup> In this study, some of the participants were assisted in completing the questionnaire due to certain limitations. This study involved 51 elderly respondents, aged 60 years and older, who were independent and had no history of

dementia or psychotic drug use. All respondents who completed the interview were then retested to check the reliability.

Construct validity represents how well the main idea of a measuring instrument can be applied to assess QoL.<sup>18</sup> We examined convergent and discriminant validity to create the construct validity of the OHIP-14ID. Convergent validity was evaluated by examining the association between the OHIP score and the global question on oral health satisfaction.<sup>13</sup> Discriminant validity was evaluated by comparing the OHIP scores with objectively assessed dental status.<sup>13</sup>

Tooth loss is a major public health problem across societies that affects quality of life due to loss of functional capacity and pain. Tooth loss also has many health-related and socioeconomic consequences that are associated with oral and systemic diseases.<sup>17</sup> The number of teeth can be used as a common variable in OHRQoL studies. Tooth retention can be used to confirm OHRQoL among adults and enable the development of appropriate oral health care at the population level.<sup>17</sup> Several studies have found that participants with < 20 teeth showed worse OHRQoL than those with ≥ 20 teeth.<sup>17</sup>

Discriminant validity demonstrated that the questionnaire can distinguish between groups with satisfaction differences in general dentitions, dental esthetic, chewing capability, good quality of life, and also between groups with ≥20 and <20 remaining teeth. Epidemiological studies that have used the OHIP have found that missing teeth, untreated decay, periodontal attachment loss, and barriers to dental care are associated with increasing levels of impact on well-being.<sup>4</sup>

Cronbach's alpha was used in internal reliability analysis to capture the extent of agreement between all possible subsets of questions. Consequently, high inter-correlations meant that the OHIP had very high values that could not be substantially improved by deleting items.<sup>4</sup> Internal consistency of the total OHIP-14ID with its seven constituent domains was assessed by calculating the Cronbach's alphas. According to Bland and Altman et al., a Cronbach's alpha of 0.70-0.80 is considered satisfactory for a reliable comparison between groups.<sup>16,19</sup> A high Cronbach's alpha value in this study also reflected that the items were

homogenous in measuring OHRQoL. The results also demonstrated that the OHIP-14ID was valid in terms of discriminating between groups.

In this study, the respondents differentially experienced the effects of oral disorders by each domain. Hypothetically, lower OHIP scores demonstrate good oral health, while higher OHIP scores demonstrate poor oral health.<sup>4,11</sup> This study, however, showed that the respondents with lower OHIP scores had poor oral health. In general, the subjects never complained about the impact of oral cavities even though oral examinations revealed high decay and missing teeth scores. This was probably due to the elderly's lack of awareness regarding their oral cavity condition because of a low level of education or other factors as also been shown in a study by Kridaningrat et.al.<sup>20</sup> Globally, the elderly have poor oral health, which can be divided into four causal categories—namely, the existence of pain and health-related factors; socio-demographic factors, including current residence; health services, including access to oral dental services; and behavioral or subjective factors, including feeling no need to take care of oral cavities, or fearing or not wanting to change.<sup>21</sup> The OHRQoL measurement can generate a positive evaluation but does not a guarantee good oral health upon clinical evaluation.<sup>6</sup>

A study in the elderly population in some countries reported that elderly usually feel to have a good OHRQoL although clinically found in poor oral health conditions.<sup>22,23</sup> This perception indicates a difference in oral health status with OHRQoL results. The perception can be influenced by individual and environmental factors such as social support. Any change in importance to health perception can be influenced by the coping process or adaptation including adaptation to oral disorders.<sup>23</sup> The presence of oral health disorders becomes less impact in quality of life in dependent elderly groups or elderly people who have limitations.<sup>23</sup> This study, in general, found that institutionalized elderly people felt that the needs of food, shelter, and health maintenance were sufficiently available in their institution, although there is not much choice. This perhaps due to the fact that most of the residents once lived on the street or did not have jobs so their current living situation were deemed as an improvement. In some research, OHRQoL has a positive influence on

happiness after controlling for demographic and socioeconomic factors.<sup>6</sup> The respondents were living in the same nursing home where they have similar daily activities and the type of food provided was adapted according to the chewing ability of the subjects. Thus, the food could be eaten easily by the subjects with poor oral condition.

Although the respondents had many oral cavity problems, most of their responses in the psychological discomfort domain indicated never experiencing embarrassment or anxiety due to poor oral conditions. This could be because in general, most institutionalized elderly have poor oral conditions and are thus accustomed to others having them as well.

Factors that were originally thought to be confounding were not proven. This is shown in Table 4 through partial and bivariate correlation analysis of total OHIP-14ID scores, with global questions and the number of domains having obtained equally significant results. This means that the respondents in this study completed the questionnaire without being affected by general health conditions or services in the institution.

Finally, we have shown that OHIP-14ID has been validated. This questionnaire can be used to gain the OHRQoL profile of Indonesian elderly so it can be compared with data from other countries.

## Conclusions

Based on statistical analysis, the validation of the OHIP-14ID questionnaire expressed good construct validity and reliability for the total OHIP score. This study suggested that the OHIP-14ID can be used as a valid and reliable instrument for evaluating the impacts of oral condition to quality of life in epidemiological studies among the elderly in Indonesia. The final OHIP score should be interpreted carefully based upon a combination of difficult statistical reasoning and clinical judgment.

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### Declaration of Interest

The authors report no conflict of interest.

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