

## ORIGINAL REPORT: QUALITATIVE RESEARCH

# Impact of Periodontal Disease on the Quality of Life of Older People in Indonesia: A Qualitative Study

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**Abstract:** **Introduction:** *The impact of periodontal disease on oral health-related quality of life (OHRQoL) has often been investigated from a quantitative research perspective, which is based on clinical findings and an OHRQoL questionnaire. Very few studies have examined the issue from the view of qualitative research. To our knowledge, there have been no previous qualitative studies focusing the effect of periodontal disease on OHRQoL in Indonesian older people.*

**Objectives:** *To explore and understand the impact of periodontal disease on the OHRQoL of older people as a subjective reflection in relation to periodontal disease experiences.*

**Methods:** *Semi-structured interviews were conducted in a sample of 31 older people with generalized chronic periodontitis. Thematic analysis was used to identify the key issues in participants' accounts. The analysis was undertaken by 2 independent*

*coders to ensure reliability. To achieve thematic saturation, successive interviews were undertaken until 5 sequential interviews did not bring new themes.*

**Results:** *Participants reported the negative effects likely related to periodontal disease. The impacts of periodontal disease were described by these older people as affecting more than pain, physical discomfort, and physical function restrictions. Periodontal disease also affected their psychological and social aspects of daily living. In addition, this study identified themes related to individual and environmental factors that may modify and personalize periodontal disease experiences. Furthermore, this study identified a misleading belief that problems related to periodontal disease were a normal part of aging, which might influence individuals' expectations toward oral health. Relatedly, participants frequently*

*reported that the progression of tooth mobility to tooth loss was an inevitable part of the aging process.*

**Conclusions:** *Periodontal disease negatively affected participants' OHRQoL. It is fundamental to understand older people's perceptions toward their periodontal disease as well as individual and environmental factors that may have an influence on their periodontal disease experiences.*

**Knowledge Transfer Statement:** *This study is a reflection of Indonesian older people's subjective periodontal disease experiences. Therefore, the present study can be used to understand older people's perceptions, attitudes, behaviors, and experiences toward periodontal disease and how this disease may affect their quality of life. This study also highlights a widespread and misleading belief that oral problems related to periodontal disease are an inevitable part of aging in this study population.*

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A supplemental appendix to this article is available online.



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**Keywords:** periodontal disease(s)/periodontitis, quality of life, chronic periodontitis, geriatric dentistry, qualitative research, interview

## Introduction

It is estimated that untreated caries, severe periodontitis, and tooth loss affected around 3.9 billion people worldwide in 2010 (Marcenes et al. 2013; Jin et al. 2016). Previous studies indicated that the global burden of periodontal disease increased by 57.3% from 1990 to 2010 (Murray et al. 2012; Jin et al. 2016; Tonetti et al. 2017).

Periodontal disease as a chronic disease is highly prevalent worldwide and universally prevalent in adults (Petersen and Ogawa 2012; Kassebaum et al. 2014). This disease has been described as the second most important global oral disease burden after dental caries (Petersen and Ogawa 2012). Furthermore, it is estimated that more than 750 million people are affected by periodontal disease, making this disease the 11th most prevalent disease and the 7th most prevalent non-communicable disease worldwide, based on the Global Burden of Disease Study in 2016 (Vos et al. 2017).

Two recent systematic reviews have underlined the negative impact of periodontal disease on oral health-related quality of life (OHRQoL). The relationship between periodontal disease and OHRQoL has been investigated from a quantitative perspective, based on clinical findings and OHRQoL measurements (Buset et al. 2016; Ferreira et al. 2017). However, very few qualitative studies have been done to understand subjective periodontal disease experiences and the impact of this disease on people's quality of life, especially in the context of developing countries.

Previous research has suggested that the overall prevalence of periodontitis increases with age (Kassebaum et al. 2014; Tonetti et al. 2017). Thus, the burden of periodontal disease is expected to increase as the aging population grows worldwide due to

increased tooth retention into old age (Tonetti et al. 2017). Quantitative research findings may not be solely sufficient to understand the complexity of the relationship between periodontal disease and OHRQoL, particularly in older people. Therefore, there is a need to conduct qualitative research that can provide rich and in-depth data regarding subjective experiences toward periodontal disease. Qualitative research will potentially add important perspectives to the previous quantitative studies in understanding the impact of periodontal disease on OHRQoL from the subjective experiences of older people toward periodontal disease.

Indonesia is the fourth most populous country in the world. Like many other developing countries in Asia, Indonesia has witnessed population aging and a growing number of older people. The universal health coverage insurance program for Indonesian, namely, Badan Penyelenggara Jaminan Sosial Kesehatan (BPJS) health insurance, was introduced in 2014. Although health insurance covers primary oral health treatment and services, 75.6% of Indonesians reported that they did not see a dental health professional when they had oral health problems. Currently, there is limited information regarding periodontal disease in Indonesia. Before 2019, there was no published prevalence of periodontal disease in Indonesia (Badan Penelitian dan Pengembangan Kesehatan 2019). Furthermore, oral health studies in Indonesia have focused mainly on dental caries, with less attention given to periodontal disease. To our knowledge, no previous studies have used a qualitative approach to investigating the relationship between periodontal disease and OHRQoL with Indonesian older people as a research background. Therefore, this study attempts to address this gap in the literature through understanding the potential impact of periodontal disease on older people's OHRQoL as a subjective reflection toward the periodontal disease experience, focusing on the older population in Indonesia as an example of a developing country.

## Methods

Ethical approval for the pilot study was obtained from the Ethics Review Committee Centre for Population Health Sciences, the University of Edinburgh, UK. Ethical approval for the main study, which consisted of data collection in Indonesia, was obtained from the Ethics Committee of Faculty Dentistry, Universitas Indonesia, Indonesia (ref: 138/Ethical Approval/FKGUI/XI/2017). All participants provided written informed consent for this study. This study followed the Standards for Reporting Qualitative Research (SRQR) guidelines for a qualitative study.

### Pilot Study

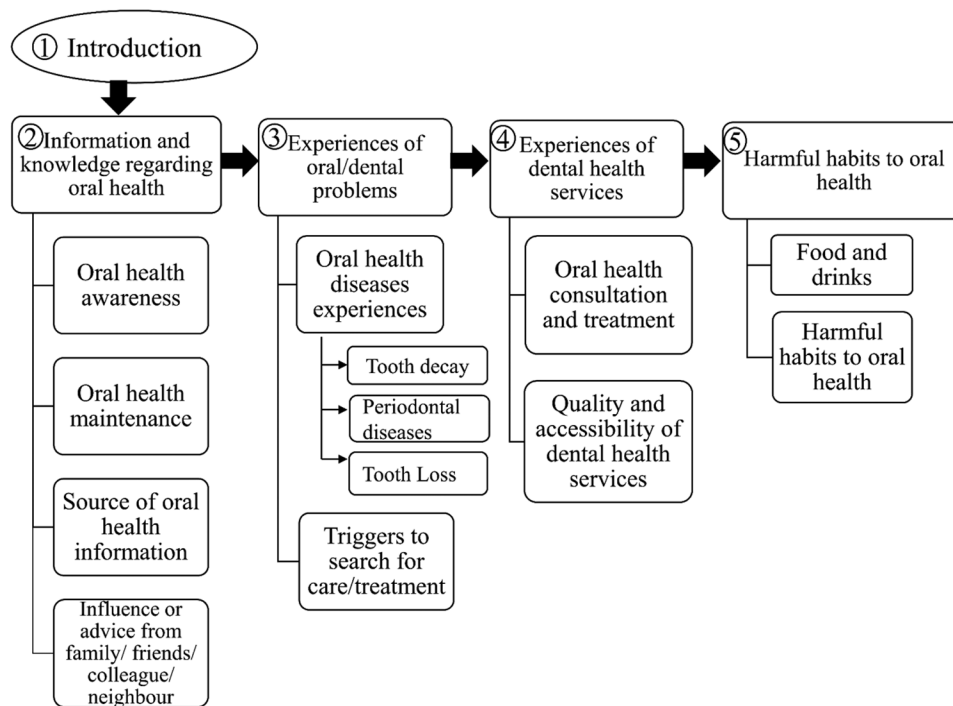
Before data collection in Indonesia, a pilot study was conducted in Edinburgh (UK) to assess the effectiveness and appropriateness of the questions in the interview topic guide developed for this study. Detailed information about the development of the interview topic guide for the study is presented in the Appendix.

This pilot study recruited 7 Indonesian nationals residing in Edinburgh. Social media were used to recruit a convenience sample of participants for this study through a Facebook community group for the Indonesian Students and Citizens Association in Edinburgh. The members of this community group are Indonesian students, employees, and dependents currently living in Edinburgh. The pilot recruited 7 Indonesians aged 25 to 50 years.

Participants involved in the pilot provided feedback regarding the questions in the interview through a self-completion interviewee feedback form. These were the expected feedback from participants after they had completed their interviews (World Health Organization 2016):

- Participants' understanding of the questions in interviews (clarity of the questions)
- Participants' opinions if there were any difficult words or phrases that they could not/did not understand

**Figure 1.** Interview topic guide framework. The introduction part was intended to give a brief description of the research to the participants. This part was followed by the main part of the interview topic guide, which includes main questions, prompts, and probes. The main questions gave information about the participant’s overall experience and understanding but might not provide the necessary depth of explanations to understand the relationship between oral health–related quality of life and periodontal disease experienced by the participants. Prompts and probes for each of the main questions were intended to provide a better and deeper understanding of the participant’s answers.



- Participants’ opinions if there were any words, phrases, or expressions that they might think offensive or unacceptable
- Participants’ suggestions regarding alternative words, phrases, or expressions that may be needed in this context

After the questions in the interview topic guide had been revised based on participants’ feedback, all participants were invited again to attend a focus group discussion. This discussion was used to verify any modifications to the topic guide to improve the interview experience for the data collection in Indonesia.

**Main Study**

The main study used Depok’s population of men and women aged 50 years and older as a target population to represent an urban older population in developing countries.

The interview topic guide of this study can be found in Appendix Table 1, while the interview topic guide framework is presented in Figure 1.

Semi-structured interviews for the main study were conducted in Depok, Indonesia. A stratified purposeful sampling approach was used to select participants to be interviewed to capture both similarity and major variations in participants (Palinkas et al. 2015). The interviewees were selected based on their periodontal condition, gender, level of education, and age. This information was obtained from the quantitative data collection, oral health examination, and questionnaire, which was administered before the selection of interviewees. The quantitative study recruited 369 participants selected randomly from the data of older people registered at 12 elderly community health centers (*posyandu lansia*) in 3 districts of Depok: Beji, Pancoran Mas,

and Sukmajaya. As the inclusion criteria of the quantitative study, participants were accepted if they met the following inclusion criteria: native Indonesian aged 51 years old and older, able to provide consent, and had at least 1 natural tooth in the mouth. Six participants were excluded from the analysis because of edentulism; thus, the quantitative study analysis was performed based on the 363 participants who met the inclusion criteria. Data from the oral examinations included Basic Periodontal Examination (BPE), DMF-T index (decayed, missing, and filled teeth index), Simplified Oral Hygiene Index (OHI-S), tooth mobility status, and furcation involvement status. The questionnaire collected data about participants’ background, smoking and tobacco use status, diabetes status, oral health behavior, pattern of dental attendance, perception of their oral health, and Oral Health Impact Profile-14 (Hijryana et al. 2021).

Four community health centers for elderly patients agreed to take part in the qualitative data collection. Thus, data from older people who participated in the quantitative data collection from those 4 community health centers were screened to obtain a list of participants with generalized periodontitis. Among the total of 124 older people who participated in the quantitative data collection, 87 had generalized periodontitis.

Community health workers contacted the 87 potential participants to ask them to participate in qualitative research as interviewees. Fifty-five older individuals approached by the community health workers confirmed their willingness to contribute as interviewees for the qualitative data collection. To accommodate major variations in participants, the researcher created a priority selection list of participants to be interviewed. The selection order of the participants was based on stratified purposeful sampling, which not only considered the generalized periodontitis diagnoses of the participants but also took into account a balanced proportion of the major variations, such as gender, education level, and age. The threshold for generalized chronic periodontitis used in this study was defined as participants with  $\geq 30\%$  of their remaining teeth affected by periodontitis (probing depth  $\geq 3.5$  mm [BPE scores  $\geq 3$ ]; British Society of Periodontology and Implant Dentistry 2018).

One member of the research team (M.H.) worked with the community health workers to schedule the interviews. Then, the consent process was conducted for each participant before the interview was held. The researcher did not interview all 55 potential interviewees, as the data had reached thematic saturation before all individuals on the selection list were interviewed. Data collection was stopped after data were collected from 32 participants and reached thematic saturation.

The principles proposed by Francis and colleagues to achieve thematic saturation were used as criteria to stop data collection (Francis et al 2010). The

details of the principles adopted in this research for specifying saturation in themes are as follows:

- Ten interviews were conducted as initial samples. These initial samples were analyzed for emerging themes before the next interviews were conducted.
- Francis et al. (2010) suggested continuing data collection until 3 further sequential interviews did not reveal new themes, which is an indication that the data have reached thematic saturation. To be more conservative, we conducted 5 further interviews in this study to ensure that the point of saturation had been reached. This was achieved after reviewing 26 transcriptions (data transcriptions from participants 1 to 27, excluding participant 24). Participant 24 was unable to continue the interview because she felt tired and her data were therefore excluded from the analysis. Thematic saturation was determined and ensured when 5 consecutive interviews did not elicit new themes or ideas (interviewees 28–32).
- The thematic coding was conducted by 2 independent coders, and the agreement levels were reported.

This study was analyzed using an inductive process in which themes and explanations were derived primarily from reading the transcribed interviews and comparing them with one another. We used thematic analysis to identify the key issues in participants' accounts by looking for patterns or emerging themes in these data (Braun and Clarke 2006; Charmaz 2014; Green 2014).

As the initial step of data processing, all interviews were recorded on a digital recorder. Audio recordings were then transcribed verbatim. The analysis followed these steps, including becoming familiar with the data, generating initial codes, and identifying and reviewing themes (Braun and Clarke 2006; Green 2014). The first step is becoming familiar with the data, the researchers listened to the audio recordings and read each transcription carefully to become close to

the data, and they noted any initial ideas. This step allowed the researchers to see the range of participants' experiences regarding oral health problems, oral health services, their views about the OHRQoL, and the impact of oral health problems on their well-being. Moreover, the researchers also paid more attention to the various problems related to periodontal disease.

The next step was generating initial codes, in which the text was explored segment by segment for potential emerging themes. The researchers considered any regularities within the data and asked themselves, "What is the segment of text about?", "What are the similarities and the differences of this segment with the other segments?", "What do the data suggest?", "What are the oral health problems mentioned by the participants?", "What do participants think and feel about their oral health problems, particularly periodontal disease?", "How do participants' react to their oral health problems?", "What are the consequences of their actions?", and "What are the implications of oral health problems for their quality of life?" This step was a repetition and comparison process that was conducted within and between the participant's transcriptions.

Identifying and reviewing themes was the third step. This step requires decisions to identify the most significant and frequent themes that the researchers discovered from the initial coding. This step aims to sort and categorize the large amounts of data from the participants' transcriptions. The initial themes identified from the initial coding were edited and merged when necessary. Then the most significant and frequent themes were collected. This step involved ongoing analysis to refine and identify the themes and subthemes. Furthermore, researchers were able to return to each participants' transcriptions and explore participants' oral health experiences, their reaction to their oral health problems, and their interpretation and views regarding OHRQoL. This step allowed researchers to compare the data horizontally within the participant and vertically between participants.

The 2 members of the research team (M.H and N.A.) who performed the data analysis (as the first and second coder, respectively) for the interview data were native Indonesians. The first coder used software NVIVO 10 for qualitative data to perform the theme-coding process, whereas the second coder performed theme coding manually without qualitative software. After these 2 researchers had independently completed their thematic coding, a table was created to compare their respective thematic findings, including themes and subthemes. All themes and subthemes (the codes) were translated from Indonesian into English. Both coders discussed the themes and subthemes identified from the interview transcriptions, particularly when there were any discrepancies between the 2 coders and when there were themes or subthemes that needed to be compared or combined. At the end of the discussion, the coders reached an agreement on the final themes and subthemes to be presented for this study.

#### Management of the Interview Process and Translation of Theme Findings into English

The interviews in this study were conducted in Indonesian. Thus, careful attention was given by both researchers who conducted the coding of the themes to overcome the challenges of translation in data coding and quotes presented in the qualitative study report.

The researchers used 3 coding strategies. First, both researchers completed coding the themes and subthemes in the original language of the interview transcriptions, which was Indonesian. This step was taken to avoid losing the original meaning and natural setting of the participants' perceptions and experiences of periodontal disease and how this disease may have affected their OHRQoL. As both coders were native Indonesians, they had the prerequisite knowledge of linguistic and cultural affiliations to appreciate the contexts to which interviewees were referring without the

**Table 1**  
Characteristics of the Interviewees.<sup>a</sup>

Characteristic	n (%) or Range (Median)
<b>Sex, n (%)</b>	
Female	16 (51.6)
Male	15 (48.4)
<b>Age, years, range (median)</b>	
Female	60–80 (66.5)
Male	60–77 (70)
<b>Generalized periodontitis, BPE score, n (%)</b>	
3	14 (45.2)
≥3	17 (54.8)
<b>Educational background, n (%)</b>	
Never attended formal school	1 (3.2)
Not completed elementary school	3 (9.7)
Elementary school	5 (16.1)
Junior high school	8 (25.8)
High school/vocational school	10 (32.3)
College/university	4 (12.9)

<sup>a</sup>Characteristics were based on the 31 participants who completed the interviews and were included in the analysis. BPE, basic periodontal examination.

need for an interpreter. Second, after the coders agreed on the final themes and subthemes, the first coder translated these themes and subthemes from Indonesian into English and reported the translated themes and subthemes to the second coder for discussion. Then, final agreement of the themes and subthemes in English are reported in this study. Third, the quotes to be used as illustrations of the themes and subthemes of this study were translated from Indonesian into English. Any challenges or problematic words in the quote translations were also discussed and agreed upon by the coders.

#### Reflexivity Process

M.H., as the first author and researcher who conducted the interviews for the data collection of this study, was engaged in the reflexivity process

by making notes about her thoughts and subjectivity during the interviews as soon as possible after interviews were conducted. She then consciously reflected on the notes periodically to recognize the influences that she brought to the research process.

#### Results

Thirty-one elderly individuals (16 women and 15 men) completed the interviews in the study as interviewees. The age range of the participants was 60 to 80 years. Table 1 describes the characteristics of the study participants.

As the interviews progressed, it became apparent that the data gathered from the interviews could be grouped into 2 domains: data related to the impact of periodontal disease on the quality of life and data related to individual and environmental factors that might



affect the interviewees' periodontal disease experiences. From these data, participants reported the extent of their periodontal disease symptoms. These symptoms of periodontal disease resulted in impacts on their physical, psychological, and social functions. These effects of periodontal disease were also potentially modified by characteristics of the individuals and their environments. These integrated aspects of the effects of the periodontal disease, individual characteristics, and environmental characteristics affected the overall quality of life of the older people.

The themes and subthemes identified regarding the impact of periodontal disease on the quality of life are presented in Appendix Table 2. Themes and subthemes identified regarding individual and environmental factors that may affect periodontal disease experiences can be found in Appendix Table 3.

The themes identified from the data analysis were not limited to periodontal disease, as participants also reported their experiences with other oral health disease. However, in this study, we focus on the reported effects likely related to periodontal disease and will not discuss other effects related to other oral health problems.

Table 2 lists quotes from the interviews to illustrate the identified themes and provide detailed information about participants' periodontal disease experiences.

#### **Impairments Related to Periodontal Disease**

Impairment is defined as the extent of anatomical loss or structural abnormality. Bleeding gums, dental plaque and calculus, dental abscess, drifting tooth, missing teeth, receding gums, redness and swollen gums, tooth mobility, and sensitive teeth were the impairments mentioned by the participants.

Almost all participants mentioned that they had experienced at least 1 of the impairments that were likely to be related to periodontal disease (29 participants from the total 31

participants; 93.5%). Impairment was often identified as the earliest sign of the impact of periodontal disease on the quality of life.

The impairments likely related to periodontal disease were neglected because of misleading perceptions and lack of dental health awareness. For instance, although gingival bleeding was one of the early signs of chronic periodontitis noticed by the participants, it was not taken seriously by some participants. Gum bleeding was commonly accepted by the participants, especially if it happened while brushing. The progression of chronic periodontal disease leading to tooth mobility and tooth loss was accepted and understood by many of the participants to be part of the aging process. Some of the participants also showed a lack of oral health awareness, as they preferred to leave their dental plaque, stain, and calculus untreated.

#### **Pain and Physical Discomfort Related to Periodontal Disease**

Pain and physical discomfort are defined as physical distress due to the extent of the impairments from chronic periodontitis. Thus, many of the subthemes in this section are similar to the subthemes in the previous section: impairments related to periodontal disease.

The types of pain reported by the participants were varied, including painful aching/acute pain; pain associated with bleeding gums; constant pain associated with a dental abscess; sensitivity to hot and cold foods or drinks; sensitivity while brushing teeth; extreme sensitivity when breathing the air; sensitivity when chewing; a pain intensified by eating spicy, hot, oily, or sweet foods; and burning sensation in the gums.

The participants also mentioned discomfort related to chronic periodontitis, such as discomfort associated with calculus or missing teeth or loose teeth and headaches.

Pain was the most common trigger reported by these participants that led them to search for care and treatments

to overcome their dental problems. The absence of pain was perceived by some of the participants as not having any oral health problems.

#### **Functional Limitations and Physical Activity Restriction as a Result of Periodontal Disease**

Awareness of functional limitations and physical activity restrictions is related to a limitation of the normal function of the mouth, which has an impact on participants' daily living.

The themes related to functional limitations and physical activity restrictions were bad breath, inability to chew foods properly, eating on one side, food catching between teeth, altered eating and food choice, altered drinking, difficulty falling asleep, and limitations in performing daily activities.

Some of the older participants also expressed they had adapted to their oral problems and suggested some daily coping strategies they used to deal with the conditions related to periodontal disease. As an illustration from the qualitative data, participants ate on the side of the mouth with fewer problems, swallowed foods together with water, only ate softly textured foods, cooked food until it was very soft, and avoided hot or cold foods as strategies to cope with their eating difficulties caused by sensitive teeth, loose teeth, and tooth loss.

#### **Psychological Discomfort as a Result of Periodontal Disease**

The impact of periodontal disease was not limited to physical function but also included psychological function. The reported problems related to the impacts of periodontal disease on participants' psychological well-being can be divided into psychological discomfort and psychological disability. Psychological discomfort is defined as self-reported psychological distress and uncomfortable feelings experienced by the participants. More than half of the participants reported that they had experienced some psychological discomfort that they associated with their periodontal disease, such as self-consciousness about

**Table 2.**Themes Identified and Corresponding Representative Quotations Regarding the Impact of Periodontal Disease on OHRQoL.<sup>a</sup>

Component of Oral Health Affected by Periodontal Disease	Reported Effects of Periodontal Disease	Representative Quotation (Participant Identifier: SN, Gender, Age)
Impairments likely related to periodontal disease	Bleeding gums	<i>I often have bleeding gums while brushing my teeth. I am not really sure what the cause of it, can it be ulcers? But it might be because I brush my teeth. (SN18, male, 73 y)</i>
	Dental plaque, stain, and calculus	<i>I have never had my teeth cleaned by a dentist. I leave it [dental plaque and calculus] like that because it did not bother me. If it causes me pain, then I will go to the health centre to see a dentist. (SN1, male, 76 y)</i>
	Dental abscess	<i>I had experience with swollen gums. It was really sore. There was pus as well, which I thought the pus was the reason why it was so painful, and I could not sleep all night. (SN 22, female, 65 y)</i>
	Drifting tooth	<i>When I was still working, I had some of my teeth extracted. I did not get any denture to replace the teeth. Now, I have realized that my teeth have migrated to sideways. (SN 5, female, 80 y)</i>
	Missing teeth	<i>These teeth eventually fell out by themselves. It was not painful. Maybe it is because they had been outworn and I am old. (SN 14, male, 76 y)</i>
	Receding gums	<i>These teeth are long because it grows out of gums. At first, I felt my teeth were loose, then through the time they become longer than usual. (SN 11, female, 65 y)</i>
	Redness and swollen gums	<i>Usually, my gums bleed when they are swelling. First, it starts with swelling gums, then gums bleeding, and after that, my teeth feel brittle. (SN 10, female, 68 y)</i>
	Tooth mobility	<i>I didn't go to the dentist. These teeth are loose now, and I think it won't be long until they fall out by themselves. I won't search for any treatment. It will fall out. (SN 29, female, 70 y)</i>
	Sensitive teeth	<i>I drink water which is not too cold nor too hot because it will cause me pain. (SN14, male, 76 y)</i>
	Pain and physical discomfort likely related to periodontal disease	Painful aching
Bleeding gums		<i>I eat really carefully and very slowly because I have loose teeth. These loose teeth are often bleeding and feel painful. (SN 18, male, 73 y)</i>
Dental abscess		<i>There was pus as well, which I thought the pus was the reason why it was so painful, and I could not sleep all night. (SN 22, female, 65 y)</i>
Receding gums		<i>It feels really ache because my teeth are stretch. They were short, but now they look long. Sometimes they fell out by themselves when I brush my teeth. (SN 30, female, 73 y)</i>
Redness and swollen gums		<i>I saw that my gums were all red, so it was painful when I ate my food. (SN 23, female, 65 y)</i>
Tooth mobility		<i>I feel pain every time I brush my teeth because the brush shakes my wobbly teeth. (SN 11, female, 65 y)</i>
Sensitive teeth		<i>My teeth are very sensitive. Sometimes, I can feel ouch painful when I breathe the air. (SN 12, female, 66 y)</i>
Calculus and dental stain		<i>My teeth have become loose because of the tartar. I tried to clean it when I brushed my teeth, but it was so hard to remove them. (SN 22, female, 65 y)</i>
Headaches		<i>My chief complaint was dizziness and headache. I became more emotional when hearing people talk. I didn't think the pain came from my teeth, but it came from my gums. (SN 23, female, 65 y)</i>
Bad breath		<i>Sometimes, I feel insecure when I talk with others. I am afraid my mouth is smelly . . . then they will make a gesture to cover their nose. I feel terrible. (SN 28, male, 71 y)</i>

(continued)

**Table 2.**  
(continued)

Component of Oral Health Affected by Periodontal Disease	Reported Effects of Periodontal Disease	Representative Quotation (Participant Identifier: SN, Gender, Age)
Functional limitations likely related to periodontal disease	Cannot chew foods properly	<i>I feel these loose teeth are bothersome. I couldn't eat hard texture foods. I need liquid to be able to eat.</i> (SN 30, female, 71 y)
	Eating on one side	<i>I can't eat with this side [right side of the jaw]. If I chew with this side, I can feel my teeth mobile.</i> (SN 27, male, 68 y)
	Food catching between teeth	<i>I always use toothpicks after eating. I am afraid the rice will be stuck there.</i> (SN 3, female, 66 y)
	Altered eating and food choice	<i>I only eat what I can still eat. If I don't know what to eat, then I will eat porridges.</i> (SN 10, female, 68 y)
	Difficulty falling asleep	<i>All of my activities were interrupted. I couldn't do anything. Even sleep felt wrong and still painful. That was awful that I couldn't do my activities. I couldn't do anything before the teeth came out by themselves.</i> (SN 16, male, 63 y)
	Limitation in performing daily activities	<i>That was a big problem for me . . . I couldn't work. I couldn't speak. Especially, I couldn't eat.</i> (SN 2, female, 64 y)
	Psychological discomfort as a result of periodontal disease	Self-conscious about having bad breath or dirty teeth
Anxiety about losing mobile teeth.		<i>I was at my friend's house. She asked, "Would you like to eat something?" I replied, "No, I am fine. I currently have loose teeth." I was so afraid that my teeth would fall out there.</i> (SN 9, female, 67 y)
Worry about fainting possibility		<i>I didn't feel dizzy, but I felt I could faint because too much blood came out [from her gums].</i> (SN 4, female, 68 y)
Poor appearance		<i>Obviously, my teeth condition disturbs me, especially when I smile or talk. Because of this, I don't dare to laugh wide open.</i> (SN 16, male, 63 y)
Psychological disability as an impact of periodontal disease	Affect mood and emotion	<i>I didn't want to eat and drink. All I want was just to sleep. If someone wants to talk with me, I tend to avoid it as I didn't want to talk with anyone when I have got a toothache. I felt I didn't have any interest to talk with anyone.</i> (SN 2, female, 64 y)
Social disability due to oral health problems	Affect interaction with others and self-confidence	<i>Normally, I cover my mouth with my hand when I am aware. I feel shame because I have got lots of missing teeth. I feel different from who I was before. I was confident, but I feel shy now. I can see that I lost so many teeth when I look in the mirror. I think it looks like I only got two teeth when I smile. In the past, I can laugh freely because I still have all of my teeth, but now there is a lack of confidence feeling.</i> (SN 27, male, 68 y)

<sup>a</sup>OHRQoL, oral health-related quality of life; SN, study number.

having bad breath or dirty teeth, anxiety about losing mobile teeth, worry about the possibility of fainting, and poor appearance.

**Psychological Disability as an Impact of Periodontal Disease**

Psychological disability in this context refers to detrimental changes in an individual's mood or emotion as a

result of their experiences of chronic periodontitis. Eleven participants mentioned that they were more likely to lose their temper and avoided social interactions with others as an impact of their chronic disease. This disturbance to the psychological state of the participants was mainly due to pain and functional limitations caused by their periodontitis. Moreover, some participants also

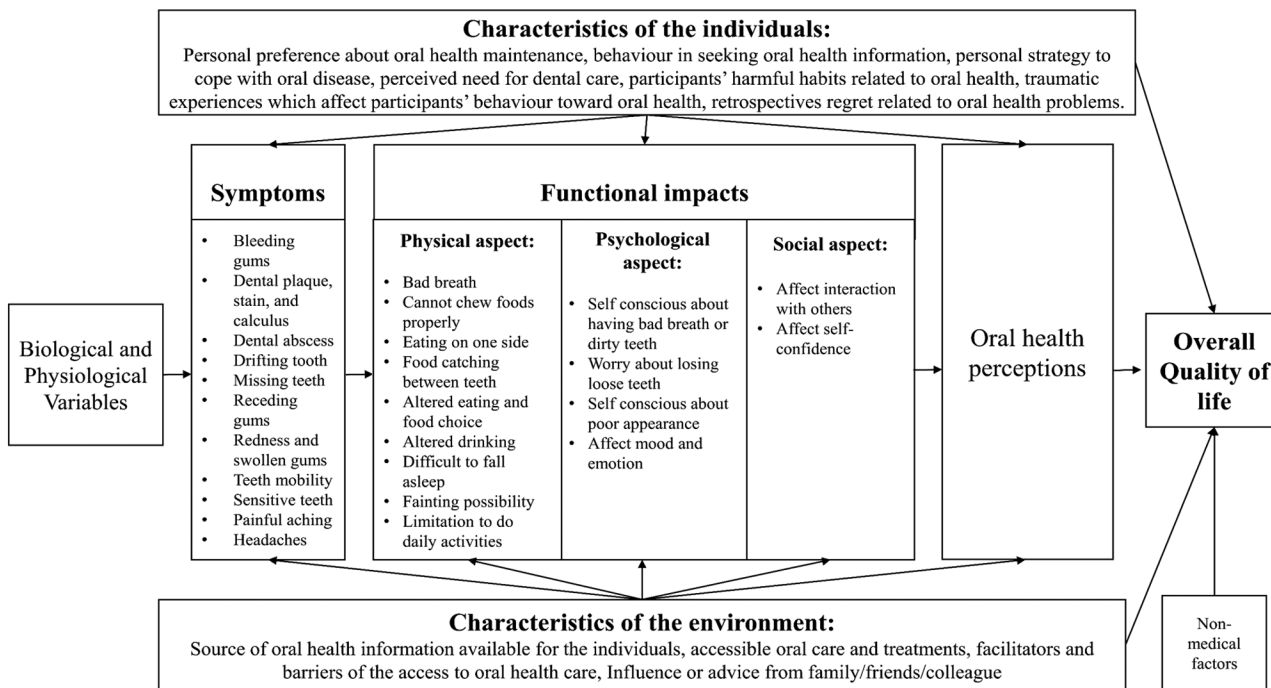
reported other oral health problems alongside their periodontal conditions as the factors that reinforced the pain and disturbance to their mental state.

**Social Disability due to Oral Health Problems**

In addition to impacts on physical oral function and psychological state, some participants also perceived that



**Figure 2.** Summary identified data findings of this study in the Wilson and Cleary model with additional details as modifications. The interactions between the impacts of periodontal disease, individuals' characteristics, and environmental characteristics might affect participants' overall subjective quality of life.



their social life was negatively affected by chronic periodontitis. Avoiding interactions with others and decline in self-confidence were among the reported social disabilities mentioned by the participants.

**Discussion**

Our study findings are in accordance with the Wilson and Cleary conceptual model of health-related quality of life, which highlights the importance of individual and environmental factors in determining the relationship between disease and overall quality of life (Wilson 1995). To summarize the identified data findings, the Wilson and Cleary model, which was populated with the findings from this study with additional details, is presented in Figure 2.

Most of the data related to the periodontal impact on the quality-of-life aspects in this study are in accordance with Locker's model. The impacts on quality of life were not limited to those caused by periodontal disease but

also included those associated with other oral health problems reported by the participants. Four components of Locker's model were found in the analysis of these data, namely, impairments, pain and discomfort, functional limitations, and disability (Baker 2007; Daly et al. 2013). However, the fifth element of the Locker model, handicap, was not mentioned by the participants. Handicap was defined as a state of not being able to function in this study. This finding can be understood as a handicap can be caused only by a very high impact on someone's lives, and whilst individuals may be handicapped by tooth loss, they may not relate this specifically to periodontal disease.

Locker's original model suggested that the components of the model are sequentially related. However, our data indicate that participants' beliefs and expectations might strongly influence the linear direction described by Locker's model. Although increased teeth mobility and missing teeth in older

people are commonly associated with the advanced progress of oral health diseases, such as caries and periodontal disease, this permanent functional limitation was not always perceived as discomfort, disability, or handicap by the participants. The progression of tooth mobility leading to tooth loss was widely accepted by many of the participants as an inevitable part of the aging process. Thus, increasing tooth mobility as a sign associated with the progression of periodontal disease was neglected. This misleading perception might be a potential explanation for the acceptance and passive reaction of some of these older people toward their periodontal disease-related problems. This hypothesis is supported by an observation that some of the participants mentioned that they had realized they had loose teeth over a period of time before they went to the dentist. Indeed, some participants indicated that they would rather wait until the loose teeth fell out on their own rather than seeking dental care.

The perception that periodontal disease is an inevitable part of the aging process and could not be prevented might prevent these older people from seeking periodontal treatment for their periodontal problems in the early stage of the disease. Moreover, the lack of oral health awareness might worsen this condition. In fact, treating their periodontal disease may prevent disease progression and increase their chance of retaining their natural teeth in a healthy functional state. Furthermore, this widely accepted misconception alongside the individual and environmental characteristics of the participants might contribute to the older people's resilience toward oral impairments likely related to periodontal disease.

Most of the participants mentioned that they would consider going to the dentist when they had unbearable pain and self-care did not seem to relieve the pain. The extent of chronic periodontal disease also brought psychological discomfort, psychological disability, and social disability for the participants. Psychological discomfort and disability, such as being self-conscious about having bad breath or dirty teeth, worry about losing loose teeth, poor appearance, and emotional feelings changed their social interactions and negatively affected their self-confidence. The realization that they had bad breath or dirty teeth led to a restriction in their daily socialization. We can also highlight that periodontal disease changed the way these older people behaved in social interactions. Some of the participants briefly mentioned their habits of selectively concealing their mouths in daily interactions. These strategies include covering their mouth while talking, keeping a distance from people while talking, covering their mouth when smiling or laughing, and a reluctance to smile. Feeling insecure about having bad breath or poor appearance of their teeth and gums might limit their willingness to engage in casual social interactions and sap their self-confidence. These findings are in accordance with a previous qualitative study that reported

psychological discomfort and disability related to periodontal disease might affect social interactions and self-esteem (O'Dowd et al. 2010).

As a limitation to this study, the context-specific nature of this qualitative study that enrolled urban older individuals as participants might limit the generalizability of the findings. Thus, it would be interesting to ascertain whether these outcomes would be observed in the general population in Indonesia and other developing countries. In addition, it is important to underline that our findings related to the impacts on OHRQoL were not necessarily limited to those caused by periodontal disease but could be a reflection of a combination of problems in the subjects' mouths caused by both periodontal disease and other oral health problems.

Among the strengths of this study, this study is the first qualitative study, to our knowledge, to focus on the OHRQoL of older people with generalized periodontitis in Indonesia. Selection bias was minimized by including participants with a range of BPE scores associated with generalized periodontitis, varying educational backgrounds, a range of ages, and appropriate gender representation. This purposeful sampling approach increased the depth and richness of the data collected related to periodontal disease experiences and the OHRQoL in this study population.

Furthermore, we also highlighted the reflexive process of the researcher who conducted the interviews (M.H.). M.H. developed a reflexive journal in which she noted reflections of her values and interests and to what extent these might have influenced the study. She acknowledged that she might bring influences to the phenomena being studied based on her educational and professional background in dentistry and public health. As an Indonesian, she shared the same ethnic background as the participants, which allowed her to understand the sociocultural meanings in her interactions with the participants and to reach more in-depth insight into the phenomenon being studied.

Although she is a dental professional, the participants were not her patients in a dental practice. Thus, this could minimize the potential influence from the health professional and patient relationships on the shape of the data being collected.

## Conclusion

Our findings showed that periodontal disease results in negative impacts on older people participating in this study. The outcomes were in accordance with Locker's model of oral health: impairment, functional limitation, discomfort/pain, and disability. However, we did not find any themes related to handicap, which is the fifth component of Locker's model.

Furthermore, our data demonstrated both a low awareness of periodontal disease and a widespread and misleading belief that the oral problems related to periodontal disease were an inevitable part of aging in this study population. Moreover, there were inevitably certain individual and environmental factors that would personalize participants' periodontal disease experiences, their reactions toward periodontal disease, and their expectations toward oral health conditions and normal function in old age.

## Author Contributions

M. Hijryana, contributed to conception, design, data acquisition, analysis, and interpretation, drafted and critically revised the manuscript; M. MacDougall, A.W.G. Walls, contributed to conception, design, and data interpretation, critically revised the manuscript; N. Ariani, contributed to data analysis, critically revised the manuscript; L.S. Kusdhany, contributed to data interpretation, critically revised the manuscript. All authors gave final approval and agree to be accountable for all aspects of the work.

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