ORIGINAL ARTICLE

Differences of oral health scoring among pregnant women at two basic emergency obstetric and neonatal services centers: a cross-sectional study

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ABSTRACT

Introduction: In Indonesia, the prevalence of oral health issues remains high, reaching 63.4% in West Java. Differences exist between regions, with Bandung Regency at 64.67% and Bandung City at 47.88%. These regional disparities, influenced by social determinants such as access to care, socioeconomic status, and health literacy, contribute to unequal outcomes. Pregnant women are particularly vulnerable due to physiological and hormonal changes, with poor oral health increasing the risk of preterm birth, low birth weight, and preeclampsia. Community health centers (puskesmas), as primary care facilities emphasizing promotive and preventive services, employ the Oral Health Scoring (OHS) method to assess both felt and normative needs. This study analyzes the differences of oral health scoring among pregnant women at two basic emergency obstetric and neonatal services centers. **Methods:** A cross-sectional, comparative analytical quantitative design was used. The subjects were pregnant women attending the two puskesmas, selected by accidental sampling. Oral health status was assessed using the OHS method. Data were analyzed with an independent t-test to compare groups. **Results:** A total of 100 pregnant women participated, mostly aged 26–35 years. Half reported discomfort (50%) and nearly half were dissatisfied with appearance (48%), though most had no eating difficulties (67%). Normative findings showed 85% of the women had 1–8 decayed teeth, 54% of them had enamel erosion, and 19% of them had inflammation/ulceration. Significant differences were found in caries (p=0.020), erosion (p=0.005), and inflammation/ulceration (p=0.010), but not in occlusion. Overall, 75% of the women were categorized as healthy, with no significant difference between centers (p=0.253). **Conclusion:** There are differences in the examination of caries, wear, and inflammation among pregnant women. There are no differences found on OHS category results in two basic emergency obstetric and neonatal services centers.

KEYWORDS

Oral health, oral health scoring, pregnancy, obstetric services, neonatal services

INTRODUCTION

Oral health is the state of the teeth, mouth, and orofacial structures that supports essential functions such as eating, breathing, and speaking, while also influencing an individual's overall well-being by enabling social interaction and daily activities without pain.[1] Problems related to oral health can have a significant negative impact on individuals, communities, and society at large.[2] According to the World Health Organization, oral diseases affect nearly 3.5 billion people worldwide.[1] The 2023 Indonesian Health Survey (SKI) reported that 56.9% of the population experienced oral health problems, with West Java having a higher proportion at 63.4%.[3] Data from the 2018 West Java Basic Health Research

(Riskesdas) indicated that Bandung Regency had an oral health problem rate of 64.67%, while Bandung City recorded 47.88%, highlighting a regional disparity.[4]

Each individual has a different level of vulnerability to oral health problems, with certain groups being more at risk, including preschool children, school-age children, pregnant women, and the elderly.[5,6] Pregnant women undergo various physiological changes in the oral cavity alongside other systemic changes, making them more susceptible to oral health issues that may affect fetal health.[7] Numerous studies have shown that between 30% and 98.8% of pregnant women experience common oral health problems such as dental caries, periodontal disease, xerostomia, halitosis, and tooth mobility.[8,9]

The oral health of pregnant women in urban areas is generally better than that of rural areas.[10] At Ibrahim Adjie Public Health Center (Puskesmas) in Bandung City, the DMF-T index among pregnant women is considered moderate (9.86), with 100% requiring periodontal treatment such as oral hygiene instruction (OHI), scaling, and removal of plaque-retentive factors.[11] At Garuda Public Health Center in Bandung City, the DMF-T index is lower (7.26), and the majority of pregnant women reported no dental pain.[12] A similar result was found at Cibeunying Public Health Center in Bandung Regency, with a DMF-T index of 7.68, which also falls into the low category.[13] These findings indicate that there are differences in the oral health status of pregnant women across different regions, with access and utilization of dental health services potentially acting as a determining factor.[14]

Dental and oral examinations during pregnancy are important for early detection and to assess overall health status. The government provides services at public health centers for pregnant women, including basic emergency obstetric and neonatal services (*Pelayanan Obstetri Neonatal Emergensi Dasa*r PONED), which manage maternal emergencies. Ibrahim Adjie health center in Bandung City and Cikancung health center in Bandung Regency are both designated as PONED centers. These facilities have implemented service workflows through Primary Care Integration and antenatal care (ANC) examinations, where pregnant women are required to undergo screenings, including at least one dental check-up during pregnancy.

Dental and oral examinations for pregnant women have traditionally relied solely on normative clinical parameters, without incorporating measurements of perceived or felt needs. In recent years, several countries have developed assessment tools that combine both components, one of which is the Oral Health Scoring (OHS) system. OHS evaluates patients' felt needs such as pain, function, and aesthetics, along with normative needs based on common oral diseases.[15] The first part of the index measures self-reported needs related to pain, discomfort, function, and aesthetics. Other components include the clinical recording of conditions such as caries, tooth wear, occlusion, and soft tissue status.[15]

Previous studies have assessed oral health conditions in several public health centers, but none have applied the OHS method. As a more comprehensive approach, OHS combines perceived needs with normative clinical findings, making it especially important for pregnant women, it provides an objective and holistic assessment that captures both clinical indicators and subjective experiences, thereby supporting early detection and targeted interventions.

This study, conducted from March to April 2025, examines differences in oral health scoring among pregnant women at PONED Ibrahim Adjie Health Center in Bandung City and PONED Cikancung Health Center in Bandung Regency, aiming to reveal oral health distribution and disparities in service access between the city and regency areas. This study analyzes the differences of oral health scoring among pregnant women at two basic emergency obstetric and neonatal services centers.

METHODS

This cross-sectional study involved pregnant women attending antenatal care at Ibrahim Adjie Health Center in Bandung City and Cikancung Health Center in Bandung Regency. Samples were selected using a non-random sampling method, specifically accidental sampling. The minimum required sample size was calculated using the Lemeshow formula, with each health center contributing 50 respondents, resulting in a total of 100 participants.

Samples included in the study were required to meet both inclusion and exclusion criteria. The inclusion criteria were pregnant women in their first, second, or third trimester; those who visited either Ibrahim Adjie Health Center in Bandung City or Cikancung Health Center in Bandung Regency; and those who provided informed consent and agreed to follow the study procedures. The exclusion criteria included: pregnant women who were unable to complete all stages of the survey and those diagnosed with systemic diseases such as diabetes mellitus and hypertension.

Table 1. Assessment criteria for oral health scoring at two basic emergency obstetric and neonatal services centers.

Component	Description	Criteria
Patient comfort	No pain or sensitivity reported	Patient report
Patient aesthetics	Feels satisfied with appearance	Patient report
Patient functionality	Feels comfortable and able to chew food properly	Patient report
Caries	Presence or absence of active caries or discolored, softened, cavitated lesions	Presence or absence of lesions
Damage from use	Enamel, dentin, and crown damage. Damage is scored based on location, size, and loss of tooth structure integrity	Lesion depth > 2 mm (visually), Lesion width: >1/3 of entire tooth surface, exposed dentin; Enamel fracture with exposed dentin; Crown fracture with visible exposed dentin
Occlusion	Presence of opposing teeth (both natural and artificial teeth)	At least 10 pairs of functional teeth
Mucosa	Presence or absence of inflammation or ulceration	Operator observation. Inflammation indicated by signs of gingivitis: red (erythematous), swollen (edematous), easily bleeding gums, pus accumulation, or pain. Ulceration scored based on visible ulcers on mucosa, appearing crater-like and covered with a gray-white membrane.

Prior to the start of data collection, a calibration test was conducted to ensure consistency between the researchers' assessments and expert evaluations. The calibration results were analyzed using the Kappa test, which showed an agreement score of 0.839, indicating a near-perfect level of agreement. The research procedure began with providing information about the study, informed consent, completion of an examination form covering respondent identity and self-assessed felt needs, followed by clinical evaluation of caries, tooth wear, occlusion, and soft tissue using a mouth mirror and ball-end probe. The assessment criteria used in OHS are presented in Table 1.

The collected data were analyzed using an independent t-test with IBM SPSS version 26.0. The results were presented in frequency distribution tables with comparative descriptions. A p-value of less than 0.05 was considered statistically significant.

RESULTS

The study on differences in oral health scoring among pregnant women at Ibrahim Adjie Health Center and Cikancung Health Center was conducted among those attending the Maternal and Child Health (MCH) units at both facilities. A total of 100 respondents participated in the study, consisting of 50 pregnant women from Ibrahim Adjie Health Center and 50 from Cikancung Health Center. The results covered respondent characteristics and oral health scores, assessing both felt needs and normative needs.

Table 2. Demographic characteristics of the respondents from two basic emergency obstetric and neonatal services centers.

Characteristic	Ibrahim Adjie Health Center (n=50)		Cikancung Health Center (n=50)		Total (n=100)	
	n	%	n	%	n	%
Age						
17 – 25	11	22	16	32	27	27
26 – 35	32	64	29	58	61	61
36 – 45	7	14	5	10	12	12
Last Education						
Elementary School	1	2	6	12	7	7
Junior High School	4	8	14	28	18	18
Senior High School	30	60	23	46	53	53
Diploma	6	12	2	4	8	8
Bachelor's Degree	8	16	5	10	13	13
Master's Degree	1	2	0	0	1	1
Occupation						
Housewife	29	58	41	82	70	70
Employee	9	18	4	8	13	13
Others	12	24	5	10	17	17
Gestational Age						
First Trimester	9	18	15	30	24	24
Second Trimester	10	20	11	22	21	21
Third Trimester	31	62	34	48	55	55

The general characteristics of respondents are summarized in Table 2, covering age, education, occupation, and gestational age. More than half of the participants were 26–35 years old (61%), indicating that most were in the reproductive age group most commonly associated with pregnancy. In terms of education, the largest proportion had completed senior high school or an equivalent level (53%), reflecting a moderate educational background. Regarding occupation, the majority were housewives (70%), while more than half were in their third trimester of pregnancy (55%).

The assessment of pregnant women's felt needs revealed that half of the respondents (50%) reported discomfort regarding their oral health. Nearly half (48%) also expressed dissatisfaction with the appearance of their teeth and mouth. In contrast, a larger proportion (67%) indicated no functional difficulties in using their teeth and mouth during eating, suggesting that aesthetic and comfort issues were more prominent than functional limitations.

Table 4 indicates that there was no significant difference in the felt needs of pregnant women between Ibrahim Adjie Health Center in Bandung City and Cikancung Health Center in Bandung Regency.

Table 5 presents the findings related to normative needs, including assessments of caries, tooth wear, occlusion, inflammation, and ulceration. Caries was the most prevalent finding, with 85% of pregnant women having 1–8 decayed teeth. Enamel erosion affected more than half of the respondents (54%), whereas deep erosion was uncommon (13%). Most participants (80%) maintained adequate occlusion with more than ten articulated teeth. Participants with signs of inflammation or ulceration were relatively uncommon (19%) compared to other oral health problems.

Table 3. Felt needs among pregnant women at two basic emergency obstetric and neonatal services centers.

Variable	Ibrahim Adjie Health Center (n=50)		Cikancung Health Center (n=50)		Total (n=100)	
	n	**%**	**n**	**%**	**n**	**%**
Do you feel comfortable with the condition of your teeth and mouth?						
Very Uncomfortable (0)	1	2	2	4	3	3
Uncomfortable (1)	26	52	24	48	50	50
Comfortable (2)	23	46	24	48	47	47
Are you satisfied with the appearance of your teeth and mouth?						
Very Dissatisfied (0)	3	6	3	6	6	6
Dissatisfied (1)	23	46	25	50	48	48
Satisfied (2)	24	48	22	44	46	46
Can your teeth and mouth be used to chew food properly, or do you feel any discomfort while eating?						
Severe Discomfort (0)	0	0	3	6	3	3
Discomfort (1)	14	28	16	32	30	30
No Discomfort (2)	36	72	31	62	67	67

Table 4. Differences in felt needs among pregnant women at two basic emergency obstetric and neonatal services centers.

Variable	t	P Value	Mean Difference
Comfort	0,000	1,00	0,000
Statisfication	0,330	0,742	0,040
Functioanlity	1,486	0,140	0,160

Table 5. Normative needs among pregnant women at two basic emergency obstetric and neonatal services centers.

Variable	Ibrahim Adjie Health Center (n=50)		Cikancung Health Center (n=50)		Total (n=100)	
	n	%	n	%	n	%
Caries						
25 – 32 decayed teeth (0)	0	0	0	0	0	0
17 – 24 decayed teeth (1)	0	0	0	0	0	0
9 – 16 decayed teeth (2)	0	0	6	12	6	12
1 – 8 decayed teeth (3)	44	88	41	82	85	85
0 decayed teeth (4)	6	12	3	6	9	9
Tooth Erosion						
Dentin erosion (1 – 32 teeth) (0)	2	4	11	22	13	13
Enamel erosion (1 – 32 teeth) (1)	27	54	27	54	54	54
No sign of erosion (2)	21	42	12	24	33	33
Dental Occlusion						
Not found more than ten articulated teeth (0)	8	16	12	24	20	20
Found more than ten articulated teeth (1)	42	84	38	76	80	80
Inflammation/Ulcer						
Found inflammations and ulcer (0)	1	2	0	0	1	1
Found only inflammation/ulcer (1)	14	28	5	10	19	19
Not found any inflammations/ulcer (2)	35	70	45	90	80	80

Table 6 shows that significant differences were observed in caries (p=0.020), dental erosion (p=0.005), and inflammation/ulceration (p=0.010) between pregnant women from Ibrahim Adjie and Cikancung Health Centers. However, no significant difference was found in dental occlusion (p=0.322). These findings suggest that dental decay, tooth wear, and soft-tissue conditions were more variable across the two populations compared to occlusal problems

Table 6. Differences in normative needs among pregnant women at two basic emergency obstetric and neonatal services centers.

Variable	t	P Value	Mean Difference
Caries	-2,373	0,020	-0,180
Dental Erosion	-2,862	0,005	-0,360
Dental Occlusion	-0,995	0,322	-0,800
Inflammation/ulcer	2,612	0,010	0,220

Table 7. Oral health scoring categories among pregnant women at two basic emergency obstetric and neonatal services centers.

Category	Ibrahim Adjie Health Center (n=50)		Cikancung Health Center (n=50)		Total (n=100)	
	n	%	n	%	n	%
Unhealthy (0 – 5)	0	0	0	0	0	0
Moderate (6 – 10)	10	20	15	30	25	25
Healthy (11 – 15)	40	80	35	70	75	75

Table 7 displays the overall oral health scoring categories of the respondents, with the majority (75%) classified in the healthy category.

Table 8. Differences OHS categories among pregnant women two basic emergency obstetric and neonatal services centers.

Variable	t	P Value	Mean Difference
Categories	1,151	0,253	0,100

Table 8 indicates that there was no significant difference in oral health scoring categories between pregnant women at Ibrahim Adjie Health Center in Bandung City and Cikancung Health Center in Bandung Regency.

DISCUSSION

This study involved 100 respondents, consisting of pregnant women attending antenatal care at Ibrahim Adjie Health Center in Bandung City and Cikancung Health Center in Bandung Regency. The results revealed variations among the respondents. As shown in Table 2, which outlines the general characteristics of the respondents, the majority of pregnant women were between the ages of 26 and 35, totaling 61 individuals. Of these, 32 were from Ibrahim Adjie Health Center and 29 were from Cikancung Health Center. This finding is consistent with a study by Rahmayanti et al., which reported that most of the study subjects were pregnant women aged 26 to 35.[11] This age range is considered ideal for pregnancy, as the reproductive organs are fully mature and the mother is psychologically ready, making her physically and mentally prepared for pregnancy.[16]

Table 2 also shows that in both health centers, the majority of pregnant women were senior high school graduates or equivalent, with 30 at Ibrahim Adjie and 23 at Cikancung. This supports the findings of Asmare et al., who also reported that most pregnant respondents were high school graduates.[17] A higher level of education is associated with better access to and understanding of health information, which encourages more regular antenatal care visits.[17]

Nine pregnant women were employed at Ibrahim Adjie Health Center, while at Cikancung Health Center, there were four. Pregnant women with occupations other than employee or housewife totalled 12 at Ibrahim Adjie and nine at Cikancung. The majority of respondents were housewives, with a total of 70 women, 29 from Ibrahim Adjie and 41 from Cikancung. This finding aligns with the study by Reynolds et al., which reported that most respondents were housewives.[18]

The most common stage of pregnancy among participants was the third trimester, comprising 55 pregnant women, 31 from Ibrahim Adjie Health Center

and 24 from Cikancung Health Center. This result aligns with the research conducted by Rahmayani et al., which found that pregnant women in their third trimester are the most frequent visitors to health centers, largely due to participation in antenatal care programs.[19] During the third trimester, pregnant women are required to attend at least two antenatal visits to facilitate early risk detection and ensure proper delivery preparation.

Table 3 presents the self-assessment results regarding felt needs among pregnant women. The data show no significant difference between respondents at Ibrahim Adjie Health Center in Bandung City and those at Cikancung Health Center in Bandung Regency. A total of 50 pregnant women (50%) reported feeling discomfort related to their oral health, with 26 women (52%) from Ibrahim Adjie and 24 women (48%) from Cikancung expressing similar concerns. This finding is consistent with studies by Nugraha et al. and Suwargiani et al., which indicated that pregnant women often experience discomfort related to oral health.[10,15] This is in line with the theory that hormonal and physiological changes during pregnancy make the oral cavity more vulnerable, potentially leading to functional limitations and discomfort.[9] Many pregnant women experiencing dental pain do not seek treatment or consume adequate medication due to concerns about fetal safety.

At Ibrahim Adjie Health Center, 23 pregnant women and at Cikancung, 25 pregnant women reported dissatisfaction with the appearance of their teeth and mouth. In total, 48 respondents (48%) expressed dissatisfaction with their dental appearance. This is in agreement with findings from Suwargiani et al., who reported that 51.2% of pregnant women experienced aesthetic concerns related to their oral condition.[15] Changes during pregnancy may also influence women's perception of their oral health, potentially leading to social barriers and a negative impact on quality of life.[9]

The findings of this study indicate that the majority of pregnant women did not perceive any issues with their oral health, with 67 respondents (67%), 36 from Ibrahim Adjie Health Center and 31 from Cikancung Health Center, reporting no discomfort. This result aligns with Corchuelo et al., who reported that 73.68% of pregnant women experienced no oral health problems during pregnancy.[20] This may be attributed to a lack of awareness of early signs of dental and oral health issues.[20]

However, data presented in Tables 5 and 6 show significant differences in the normative oral health needs of the respondents. This percentage is higher than the findings of Msagati et al., who reported that 60.5% of pregnant women had at least one decayed tooth, varying in severity and requiring treatment.[21]

Physiological and behavioral changes during pregnancy generally increase vulnerability to dental caries, including increased oral acidity from nausea and vomiting, as well as reduced attention to oral hygiene caused by fatigue or discomfort. Moreover, limited access to or willingness to undergo restorative dental care during pregnancy can worsen existing lesions, increasing the risk of oral health complications.[9,21]

This study found that most pregnant women experienced enamel-level tooth wear, with 54 participants (54%) evenly distributed between Ibrahim Adjie and Cikancung Health Centers. A total of 33 women (33%) showed no signs of wear, while 13 women (13%) experienced tooth wear reaching the dentin layer, 11 of whom were from Cikancung. These results indicate a lower prevalence compared to the study by Suwargiani et al., which reported that 78.8% of pregnant women experienced tooth wear.[15] In contrast, the findings oppose those of Behluli et al., who found that most pregnant women exhibited no signs of wear.[22] Tooth wear is influenced by multiple factors, including dietary habits, parafunctional activities such as bruxism, oral hygiene practices, and brushing techniques.[23] Individual responses to these factors vary, and differences in group characteristics across the two health centers may have contributed to the variation in tooth wear observed.

In terms of occlusion, the study revealed that 80 pregnant women (80%) had ten pairs of opposing teeth in contact, 42 from Ibrahim Adjie and 38 from Cikancung, while the remaining 20 participants (20%) had fewer than ten pairs. This contrasts with Suwargiani et al., who reported a higher proportion of pregnant women with fewer than ten occluding pairs.[15] In the present study, most pregnant women had caries but had not experienced significant tooth loss, which likely explains the high number of functional tooth pairs.

The examination of inflammation (gingivitis) and ulceration revealed that the majority of pregnant women showed no signs of either condition, with 80 women (80%) unaffected, 35 from Ibrahim Adjie Health Center and 45 from Cikancung Health Center. Meanwhile, 19 pregnant women (19%) exhibited signs of either inflammation or ulceration, including 14 from Ibrahim Adjie and 5 from Cikancung. Additionally, one woman from Ibrahim Adjie presented with both inflammation and ulceration in the oral cavity. These findings are consistent with those of Rahmawati et al., who reported that 15% of pregnant women had inflammation in the oral cavity.[24] This aligns with the theory that hormonal changes during pregnancy affect gingival tissue responses to irritation, which explains why most pregnant women maintain healthy gingiva or experience only mild inflammation.[25]

The overall results from the normative oral health assessments indicate that many pregnant women had dental and oral health issues. These findings support the theory that pregnant women exhibit varying degrees of vulnerability to oral health disorders. This susceptibility is influenced by multiple factors, including complex physiological changes such as hormonal fluctuations.[9,26]

There was no significant difference in the categories of oral health scores among pregnant women at Ibrahim Adjie Health Center in Bandung City and Cikancung Health Center in Bandung Regency. A total of 75 pregnant women (75%) were classified as having good oral health, consisting of 40 women from Ibrahim Adjie and 35 from Cikancung. Meanwhile, 25 women (25%) were in the moderate category, with 10 from Ibrahim Adjie and 15 from Cikancung. These findings are consistent with those of Jahangiry et al., who reported that 63.5% of the sample self-reported having good dental health.[27-30] In the present study, a similar trend was observed because self-reported assessments were also incorporated into the scoring system, and many respondents perceived their oral health as good, which may explain the high proportion classified in the healthy category.

The oral health scoring of pregnant women at both health centers showed variation across several components, with some variables differing significantly. Overall, Ibrahim Adjie Health Center yielded more favorable results. More women at this site reported satisfaction in the self-assessment, and fewer had decayed teeth, tooth wear, or less than ten opposing functional tooth pairs in the normative assessment.

Despite most women being in generally good oral health, the high rates of caries and tooth wear highlight ongoing challenges in maintaining oral hygiene during pregnancy. This calls for stronger oral health promotion through collaboration among dentists, dental nurses, and healthcare providers. Education on hygiene, routine dental visits, and early prevention is key to increasing awareness and encouraging better care.

Study limitations include participants' refusal to undergo oral examinations, potential bias in self-assessment responses, and limited scoring categories that may not fully reflect the complexity of oral health conditions. In addition, the sample was limited to pregnant women attending two health centers, which may introduce selection bias and reduce the generalizability of the findings.

CONCLUSION

The oral health scores showed significant differences in caries, tooth wear, and inflammation, but not in self-assessment or occlusion, between the two health

centers. While most pregnant women had generally good oral health, high rates of caries and wear suggest ongoing challenges. The study's research implications point to the significant influence of geographic location, healthcare access, socio-demographic factors on the oral health status of pregnant women, and the need for targeted oral health programs. Broader studies are recommended to improve generalizability.

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