

## THE GESTATIONAL AGE, LEVEL OF EDUCATION, LIVING PLACE AND WORKING STATUS AS THE DETERMINANT FACTORS OF DENTAL CARIES AMONG PREGNANT WOMEN IN INDONESIA

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### ABSTRACT

*Dental caries is a major dental and oral health problem especially in pregnant woman. The physiological and hormonal changes during pregnancy may contribute to the incidence of dental caries. The aim of this study was to analyze the determinant caries in pregnant women in Indonesia based on Riskesdas 2018. The study was a cross sectional survey and used the secondary data sourced from Riskesdas 2018. The population in the study were all pregnant women from the Riskesdas team in 2018 totaling 519 samples using the PPS (probability proportional to size) - linear systematic sampling method, with two stage sampling. The statistical analysis using Chi-square test and multiple logistic regression test. The study showed the significant relationship between gestational age, level of education, place of the residence and working status and the incidence of dental caries in pregnant women in Indonesia ( $p < 0.05$ ). The study concluded that several factors had a significant relationship with the in incidence of caries among pregnant women in Indonesia.*

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**Keyword :** *Dental Caries, gestational age, living place, working status*

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### Introduction (Pendahuluan)

Dental caries is one of the most common preventable oral diseases worldwide, affecting individuals across all age groups. Pregnant women, however, may be at heightened risk due to physiological and hormonal changes during pregnancy, including increased levels of progesterone and estrogen, which can affect oral health. Pregnancy may also be associated with

changes in dietary habits, including cravings for sugary foods and snacks, as well as alterations in oral hygiene practices, all of which can contribute to the development of dental caries<sup>1,2</sup>. Given the potential implications for maternal and fetal health, understanding the factors influencing dental caries among pregnant women is critical for preventing long-term oral and systemic health issues.

In Indonesia, a rapidly developing nation with diverse socio-economic and cultural contexts, the prevalence of dental caries among pregnant women remains a significant public health concern. According to the World Health Organization (WHO), oral health problems

during pregnancy can lead to complications such as premature birth and low birth weight<sup>3</sup>. However, several determinants have been identified as the associated factors of prevalence and severity of dental caries, including gestational age, level of education, living place (urban vs. rural), and working status.

Basic Health Research (Riskesdas) is community-based health research whose indicators can describe the national level up to the district/city level. Implementation once every five years is considered an appropriate interval to assess developments in community health status, risk factors, and progress in health development efforts. Riskesdas 2018 has been ethically approved by the Ethics Committee of the Health Research and Development Agency, Ministry of Health of the Republic of Indonesia. Informed consent was obtained from all subjects prior to Riskesdas participation<sup>4</sup>.

Gestational age is an important factor to consider, as it may correlate with the severity of caries. During different trimesters, the increased hormonal fluctuations and changes in saliva composition can alter oral conditions, potentially contributing to a higher risk of caries<sup>5</sup>. The level of education is another key determinant, as higher education levels are often associated with greater health literacy, better access to dental care, and improved health practices, all of which can influence oral health<sup>6,7</sup>. The living place, whether urban or rural, also plays a critical role, as access to dental care, health facilities, and preventive services may differ significantly between these areas<sup>8</sup>. Finally, working status may impact a pregnant woman's ability to prioritize oral health care, with working women

potentially having less time or resources to maintain regular dental visits or proper oral hygiene practices.

This study aims to explore the relationship between these socio-demographic and behavioral factors gestational age, level of education, living place, and working status and the prevalence of dental caries among pregnant women in Indonesia. By identifying and understanding the determinants of dental caries in this population, this research seeks to contribute to developing targeted public health policies and interventions to improve maternal oral health and reduce the burden of dental caries during pregnancy.

Understanding these factors will not only help in the development of preventative strategies but also in promoting better healthcare practices for pregnant women in Indonesia, ultimately contributing to improved maternal and child health outcomes.

## **Methods (*Metode Penelitian*)**

The variables of the study were the incidence of caries in pregnant women and the determinant factors that cause caries in pregnant women in Indonesia, including age, education, occupation and place of residence. The stages of survey was carried out by the Riskesdas team were then continued by the researchers in the following stages: 1) data collection, we sent email to Ministry of Health to collect the data source of Riskesdas 2018; 2) data request, we obtain data according to the desired variable; 3) data analysis and review, we analyze the obtained data using

The data was analyzed using with bivariate (*chi-square*) and multivariate (multiple regression) analysis.

**Results and Discussion (Hasil dan Pembahasan)**

The results obtained a frequency distribution of determinant factors caries in pregnant women in Indonesia based on the 2018 Riskesdas can be described as follows:

Table 1. Frequency Distribution of Determinant Factors Caries in Pregnant Women in Indonesia Based on 2018 RISKESDAS

Factors of Caries in Pregnant Women	n	%
<b>Caries Occurrence</b>		
Healthy	84	16,18
Caries	435	83.82
<b>Gestational Age</b>		
Trimester 1	120	23.12
Trimester 2	198	38.15
Trimester 3	201	38.73
<b>Level of education</b>		
Low	304	58.57
High	215	41.43
<b>Work</b>		
Housewife	350	67.44
Work	169	32.56
<b>Residence</b>		
Urban	254	48.94
Rural	265	51.06
<b>Total</b>	<b>519</b>	<b>100,0</b>

The incidence of caries in pregnant woman was 436 respondents (83.82 %), the highest gestational age was the 3<sup>rd</sup> trimester (201/38.73 %), the pregnant woman with low education was higher compared to the high education level (304/58.57%), the housewife was higher compared to the workers pregnant woman

and the pregnant woman live in rural area was higher compared to the woman who lives in urban area

The results showed that the distribution of gestational age as the associated factors of the incidence of caries in pregnant women in Indonesia is described in table 2.

Table 2. Distribution of gestational age which can influence the incidence of caries in pregnant women in Indonesia

Gestational Age	Caries Occurrence						P value
	Healthy		Caries		Amount		
	n	%	n	%	n	%	
Trimester 1	18	3.5	102	19.7	120	23.1	0,000
Trimester 2	36	6.9	162	31.2	198	38.2	
Trimester 3	30	5.8	171	32.9	201	38.7	
<b>Total</b>	<b>84</b>	<b>16.2</b>	<b>435</b>	<b>83.8</b>	<b>519</b>	<b>100.0</b>	

The incidence of caries occurred more frequently among respondents with gestational age in the third trimester ( 32.9 %) compared to the others . The results of statistical tests using the *chi square test* showed a *p-value* = 0.00 (*p* < 0.05), which indicated a relationship between gestational age

and the incidence of caries in pregnant women in Indonesia .

The results showed that the distribution of education levels as the associated factors of the incidence of caries in pregnant women in Indonesia (table 3)

Table 3 . Distribution of education levels that can influence the incidence of caries in pregnant women in Indonesia

Level of education	Caries Occurrence						P value
	Healthy		Caries		Amount		
	n	%	n	%	n	%	
Didn't go to school until after graduating from junior high school	45	8.7	259	49.9	304	58.6	0,000
Graduated from high school to Bachelor's degree	39	7.5	176	33.9	215	41.4	
<b>Total</b>	<b>84</b>	<b>16.2</b>	<b>435</b>	<b>83.8</b>	<b>519</b>	<b>100.0</b>	

The table 3 shows incidence of caries occurred more frequently among respondents with an education level of no school to complete junior high school (49.9 %) compared to a higher education level (33.9%) . The results of statistical tests using the *chi-square test* obtained *p value* = 0,000 ( *p* < 0.05) , which demonstrated

relationship between the level of education and the incidence of caries in pregnant women in Indonesia .

The results showed the distribution of work has relationship with the incidence of caries in pregnant women in Indonesia (table 4)

Table 4 . Occupational Distribution That Can Influence Caries Incidence In Pregnant Women in Indonesia

Work	Caries Occurrence						P value
	Healthy		Caries		Amount		
	n	%	n	%	n	%	
Housewife	50	9,6	300	57,8	350	67,4	0,000
Work	34	6,6	135	26,0	169	32,6	
<b>Total</b>	<b>84</b>	<b>16,2</b>	<b>435</b>	<b>83,8</b>	<b>519</b>	<b>100,0</b>	

Based on table 4 , it can be concluded that out of 519 respondents caries occurred more frequently among housewife respondents ( 57.8 %) compared to those who work (26.0%). The results of statistical tests using the *chi square test* obtained a value of *p* = 0,000 ( *p* < 0.05). It

reported a relationship between work and the incidence of caries in pregnant women in Indonesia. The results showed the distribution of residences which can influence the incidence of caries in pregnant women in Indonesia (table 5)

Table 5. Distribution of residence which can influence the incidence of caries in pregnant women in Indonesia

Residence	Caries Occurrence						P value
	Healthy		Caries		Amount		
	n	%	n	%	n	%	
Urban	40	7.7	214	41.2	254	48.9	0,000
Rural	44	8.5	221	42.6	265	51.1	
<b>Total</b>	<b>84</b>	<b>16.2</b>	<b>435</b>	<b>83.8</b>	<b>519</b>	<b>100.0</b>	

Based on table 5, it can be explained that the caries occurs more often in respondents living in rural areas (42.6 %) compared to those living in urban areas (41.2%) . The results of statistical

tests using the *chi square test* obtained a value of *p* = 0,000 ( *p* < 0.05) , which means there is a relationship between place of residence and the

incidence of caries in pregnant women in Indonesia .

The results showed that the distribution of gestational age, education, work and place of residence which can influence the incidence of

caries in pregnant women in Indonesia (table 6)., it can be concluded that all variables (gestational age, education, employment, and place of residence) have a relationship with the incidence of caries in pregnant women in Indonesia.

**Table 6 .** Distribution of gestational age and toothbrushing behavior that can influence the incidence of caries in pregnant women in Indonesia

Variable	B	S.E	Wald	df	P	OR
Gestational age, education, employment, and place of residence	1,645	0.119	190,408	1	0,000	5,179

The results of statistical tests using the *chi square test* showed a significant relationship between gestational age and the incidence of caries in pregnant women in Indonesia. Hormonal changes in pregnant women can cause various complaints such as cravings, nausea, vomiting and including complaints of toothache (tooth caries) as a result of the habit of ignoring dental and oral hygiene. Hyperemesis and the desire to eat sweets also cause poor oral hygiene, so these factors are associated with pregnancy complications. Pregnancy complications that have been linked to periodontal disease include premature birth, low birth weight, miscarriage, and preeclampsia<sup>1,9</sup>.Kumar and Semelson, suggested that nausea and vomiting in pregnancy can cause extensive erosion. More than 30 % of caries and gingivitis is present in pregnant women in the first trimester of pregnancy. Any increase in tooth decay during pregnancy can be caused by changes in diet and dental health<sup>10</sup>

The results of statistical tests using the *chi square test* indocated a relationship between the level of education and the incidence of caries in pregnant women in Indonesia. Mothers with low knowledge regarding dental and oral hygiene is a

predisposing factor for behavior that does not support dental and oral hygiene during pregnancy<sup>11,12</sup>. In this study, it was proven that there is a relationship between knowledge and the incidence of dental caries in pregnant women. So midwives need to provide education to pregnant women about dental caries and its prevention in language that can be understood, and encourage pregnant women who experience dental caries to check with a dentist to get appropriate treatment. Pregnant women should always take care of their teeth by brushing their teeth regularly every day and avoiding foods that can accelerate caries and consulting a health worker if they have complaints<sup>13</sup>

Education can influence the level of cleanliness of their teeth and mouth, someone with low education has less knowledge in maintaining the cleanliness of their teeth and mouth, in contrast to people with higher abilities in maintaining dental hygiene. and their mouths are higher because they pay more attention to the condition of their mouths. This study showed an influence of education level on the incidence of caries in pregnant women. This shows that the level of education of pregnant women is one of

the influencing factors and there are also motivation factors and habits of pregnant women in maintaining oral hygiene<sup>14</sup>.

The results showed that caries occurred more frequently among housewife compared to those who work. Previous study demonstrated the working pregnant women had a good oral hygiene index<sup>15</sup>. In accordance with the work environment can enable a person to gain experience and knowledge both directly and indirectly. In line with the results of previous study most of whom are working, according to the author, this work shows that mothers interact a lot with other people so they gain direct experience and knowledge, especially experience and knowledge regarding their health<sup>16</sup>. This shows that work is one of the influencing factors, such as educational level and habits of pregnant women in maintaining oral hygiene.

The results showed that caries occurred more frequently among respondents with residence in rural areas compared to residence in urban areas. This shows that pregnant women in urban areas have a higher awareness of dental care. Another factor could also be since dental examination facilities in urban areas are more complete compared to rural areas so that pregnant women in urban areas will find it easier to undergo dental examinations so that the incidence of caries can be overcome.

The results of the study concluded that all variables had a relationship with the incidence of caries so that gestational age, education, employment, and place of residence had a relationship to the incidence of caries in pregnant women in Indonesia. The condition of pregnant women is that they feel nauseous so they tend to

want to especially sweet ones, which can cause deposits of debris and plaque which is more abundant, especially on tooth surfaces that are difficult to clean with toothbrush. This can affect the dental and oral hygiene of pregnant women. Mothers with low knowledge regarding dental and oral hygiene is a predisposing factor for behavior that does not support dental and oral hygiene during pregnancy

### **Conclusions (Simpulan)**

The study concludes that several factors, including gestational age, education level, employment status, and place of residence, are significantly associated with the incidence of dental caries in pregnant women in Indonesia. Hormonal changes during pregnancy, such as cravings, nausea, and vomiting, contribute to dental issues, including caries, due to neglect of dental hygiene. Low education levels correlate with poor dental hygiene knowledge and behaviors, increasing the risk of caries in pregnant women. Education about dental hygiene, provided in accessible language by healthcare professionals, could mitigate this risk. Pregnant women who are housewives experience higher rates of caries compared to those who work. Interaction in a workplace environment provides indirect health benefits, such as better awareness and knowledge of oral hygiene. Rural pregnant women have a higher prevalence of caries than those in urban areas, likely due to limited access to dental care facilities and lower awareness of dental hygiene practices. In conclusion, this study emphasizes the importance of gestational age, education, employment, and



residential location as influential factors in the prevalence of dental caries in pregnant women.

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