

## Personal Hygiene and Environment Sanitation of Pregnant Mothers and Their Relationship to Birth Outcomes

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### ABSTRACT

This study aims to analyze the relationship between the personal hygiene practices of pregnant mothers and household environmental sanitation with birth weight and height. This observational study was conducted at Ciampea, Bogor Regency in September 2019–January 2020. The subjects were 46 pregnant mothers which were selected through purposive sampling with the inclusion criteria of having a gestational age of 28–36 weeks, aged 18–35 years, and willing to be a subject. The exclusion criteria were multiple pregnancies, suffering from hypertension and diabetes mellitus, and the fetus had congenital abnormality. Data were collected using questionnaires on the subjects' characteristics, personal hygiene practices, and household environment. Meanwhile, birth weight and height of the babies were obtained from direct measurements using a digital baby scale. The data were analyzed using the Fisher's exact test. The results showed that the age of most of the pregnant mothers (89.1%) were in the suitable category, which means that the subject was in good condition to be pregnant. All subjects were in the third trimester, and 56.5% of them had adequate pregnancy spacing, and 95.7% were in the no-risk parity category. Almost all subjects (95.7%) were in the small family category and more than half had <12 years of education. In terms of household income per month, 69.6% of the subjects' families received less than the 2018 regional minimum wage. The subjects' hygiene practices were mostly acceptable (60.9%). Meanwhile, the subjects' household environmental sanitation for clean water facilities were already good (58.7%), while most of the subjects' sewage (63.1%) and waste disposal (89.1%) facilities were not good. Pregnancy outcomes seen through the birth weight (89.1%) and length (71.1%) of the babies were mostly in the normal category. Thus, there was no association between the personal hygiene and household environment sanitation of the subjects with birth weight and height ( $p>0.05$ ).

**Keywords:** birth outcome, household environment sanitation, personal hygiene, pregnant mothers

### INTRODUCTION

The first 1000 days of life is the most critical period, which starts from the pregnancy phase until the child is two years old. Nutritional deficiencies that occur in this period will cause permanent and long-term effects. Malnutrition is a condition that occurs due to an imbalance of nutrient intake with dietary needs (Husnah 2017). The incidence of malnutrition in a child can be seen from their nutritional status. Measurement of children's nutritional status is determined based on several indicators, namely length/height-for-age, weight-for-age, and weight-for-length/height (MoH RI 2013).

Based on the UNICEF framework, the main factors for nutritional problems are inadequate food consumption and infectious

diseases. Currently, there is an increasing tendency for the incidence of Low Birth Weight (LBW) in Indonesia. The Basic Health Research in 2018 reported a national LBW rate of 6.2%. LBW babies have a higher risk of experiencing morbidity, growth disorders, and death. Those who survive without adequate nutritional intake due to family disability and repeated infections will have a growth disorder in the form of stunting (Rahayu *et al.* 2015). According to the 2018 Basic Health Research, 30.8% of babies were born stunted (MoH RI 2018). The prevalence of stunting of children under five decreased from the previous survey in 2013, which was 37.2% (MoH RI 2013). West Java is one of the provinces in Indonesia with a stunting prevalence higher than the national prevalence, which was 31.1% (MoH RI 2013). Several

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factors that influence the nutritional status of children under five include the nutritional status of the mother, clean water sanitation, and hygiene practice.

Personal hygiene and environmental sanitation play essential roles in the issue of malnutrition, including stunting, with regard to frequent infections of children (diarrhea), while the poor habit of failing to wash hands with soap properly can also increase the frequency of diarrhea (Rahman *et al.* 2020). Things that are considered trivial such as open defecation can also have a vast impact on the health, nutritional status, and economy of a nation (Zahtamal *et al.* 2020). Stunting in children is a chronic consequence of the continuous consumption of a low-quality diet, infectious diseases and environmental problems. Poor hygiene practices can cause pregnant mothers to suffer from diarrhea, which in turn can cause fetus losing nutrients that are important for growth. Results of one study stated that most caregivers in the stunting group had poor hygiene practices (75.8%). In contrast, those in the non-stunting group had good hygiene practices (60.6%) (Desyanti & Nindya 2017). This study aims to determine the relationship between hygiene sanitation of pregnant mothers and birth outcomes.

## METHODS

### Design, location, and time

The design of this study was cohort. The study location was chosen purposively, which was Ciampea of Bogor District. The study was conducted in September 2019–January 2020.

### Sampling

The study population were pregnant mothers living in Ciampea, Bogor District, West Java. The inclusion criteria were pregnant mothers with a gestational age of 28–36 weeks, aged 18–35 years, and were willing to be the subject of study. Exclusion criteria were multiple pregnancies or more, suffering from hypertension and diabetes mellitus, and the fetus had congenital abnormalities. Subjects were selected using purposive sampling. Calculation of the minimum sample size was conducted using the formula of Lemeshow *et al.* (1997), resulting in a minimum number of 46 subjects. Ethical clearance for this study was obtained from the Human Research

Ethics Committee of IPB University, with ethical approval letter No. 225/IT3.KEPMSM-IPB/SK/2019.

### Data collection

Subject characteristic data covered the subject's age, gestational age, parity, pregnancy interval, education, occupation, husband's occupation, size of the family, as well as monthly family income. Personal hygiene and household environmental sanitation data were collected through interviews using a structured questionnaire.

Anthropometric data covered data on birth weight and height of the babies. Data on birth weight and length were obtained by measurements using the Serenity SR 7210M digital baby scale with a maximum weight capacity of 25 kg with an accuracy of 0.01 kg and maximum height of 85 cm.

### Data analysis

Data on subject characteristics included age, gestational age, parity, and pregnancy interval. Subjects were categorized into <20 years, 20–35 years, and >35 years. Meanwhile, gestational age was divided into  $\leq 24$  weeks and  $> 24$  weeks, pregnancy interval was categorized into <2 years and  $> 2$  years, and parity was categorized into  $> 3$  times and  $\leq 3$  times.

Family size was divided into three groups based on Aini and Hernawati (2016). The subject's education was grouped based on length of education, which was  $< 12$  years and  $\geq 12$  years. Per capita family income was grouped based on the minimum wage of Bogor District (West Java Governor Decree 2017).

Personal hygiene data in the form of hand washing habits were grouped into two categories, namely good and poor. Good hand washing was defined as washing hands with soap and running water. It is recommended to wash hands at five critical times, namely before eating, after defecating, before breastfeeding (if mother has a baby), after cleaning baby feces (if mother has a baby), and after contact with animals (MoH RI 2013).

There were three variables of household environmental sanitation, namely clean water facilities, sewage disposal facilities (latrines), and waste disposal facilities. Data on clean water facilities were good if the water source was one

or more of these options: branded bottled water, refilled water, tap water from the local water company, drilled water, water from pumps, water from digging out wells, and well maintained water or springs. Meanwhile, clean water facilities were considered not good if the water source is one or more of these options: the wells were not well maintained, unprotected springs, stored rainwater, and surface water (river/lake/irrigation).

Data for sewage disposal facilities (latrines) were good if they were using flush latrines (gooseneck latrines) with shelter/latrines and the septic tank was located >10 m from drinking water sources; and not good if latrines were without shelter/latrines, latrines flush in places where the shelter/location of the septic tank is <10 m from drinking water sources. Data on waste disposal facilities were categorized as good if it consisted of one or more of the following: closed trash cans, garbage was collected and stored in a temporary disposal site, and made into compost; and was not good if the trash can was open, garbage was burned, thrown into rivers or ditches, and dumped anywhere (MoH RI 2018).

Data on pregnancy outcome were birth weight and birth length. Birth weight was categorized into three categories, namely low birth weight if <2,500 g, normal birth weight if 2,500–3,999 g, and over birth weight if >3,999 g. Babies' birth length were categorized as short birth length if <48 cm, normal birth height if 48–52 cm, and over birth height if >52 cm (MoH RI 2013).

The collected data were analyzed using Microsoft Excel 2013 and SPSS Version 16.0. All collected data in this report were presented in descriptive statistics. Further analyses of the association between variables and the birth outcomes were done using the Fisher's exact test with a significance of 0.05.

## RESULTS AND DISCUSSION

### Characteristics of the pregnant mothers

Most of the subjects (89.1%) were in the age range of 20–35 years, which means subjects were in good condition to be pregnant with a mean age of  $27.0 \pm 4.8$  years. In terms of gestational age, all subjects (100%) were in the third trimester with a mean gestational age of  $32.0 \pm 3.7$  weeks. Almost all of the subjects were not in the at risk

parity category. The mean pregnancy interval of the pregnant subjects was  $3.0 \pm 3.1$  years, while 56.5% of subjects had a suitable pregnancy interval. The distribution of subjects based on their characteristics is presented in Table 1.

Table 1 shows that almost all subjects (95.7%) were in the small family category ( $\leq 4$  people). This result was expected because the larger the family, the higher the risk of nutritional problems (Degarege *et al.* 2015). Results show that more than half of the subjects (60.9%) had a length of education <12 years or did not graduate from high school, with a mean length of education of  $9.0 \pm 4.0$  years. Mutisya *et al.* (2016) stated that level of education affects employment and income and is one of determining factors of the quantity and quality of food available in the family.

### Pregnant mothers' hygiene and sanitation

Personal hygiene in this study was the pregnant mothers' habit of washing their hands. Table 2 shows that most of the pregnant mothers washed their hands well with soap and running water (60.9%). The recommended times to wash hands are before preparing food, every time your hands are dirty, after defecating, after using pesticides (if using any), and if they have a baby, after helping the baby to defecate and before breastfeeding the baby (MoH RI 2013).

For environmental sanitation, pregnant mothers with good clean water facilities were more than half (58.7%). As seen from the use of drinking water sources used in households, more than half of them used refilled water and maintained well water. For sewage disposal facilities, most of the pregnant mothers were in the not good category (63.1%). This study found that the pregnant mothers still had a septic tank location <10 m from the source of drinking water/clean water. With regard to waste disposal facilities, most of the pregnant mothers (89.1%) still had poor waste disposal facilities. The common ways were open trash cans, burning trash, and throwing trash into rivers.

### Birth weight and height

Table 3 shows the distribution and mean birth weight and length of babies. Most of the babies (71.7%) had a birth length of the normal category. In line with birth length, most of the babies also had normal birth weight (89.1%). The mean length and weight of the babies were

Table 1. Distribution of pregnant mothers based on characteristics

Characteristics	n	%
Age (years)		
<20	5	10.9
20–35	41	89.1
Mean±SD	27.0 ±4.8	
Gestational age (weeks)		
>24	46	100
Mean±SD	32.0±3.7	
Parity (times)		
>3	2	4.3
≤3	44	95.7
Mean±SD	1.0±1.0	
Pregnancy interval (years)		
<2	20	43.5
≥2	26	56.5
Mean±SD	3.0 ±3.1	
Family size (person)		
Small (≤4)	44	95.7
Moderate (5–6)	1	2.2
Large (≥7)	1	2.2
Mean±SD	3.0±1.0	
Education (years)		
Up to high school	28	60.8
High school graduate	18	39.1
Mean±SD	9.0±4.0	
Occupation		
Housewife/not working	43	93.5
Working	3	6.5
Family income (IDR/month)		
<3,483,667	32	69.6
≥3,483,667	14	30.4
Mean±SD	3,008,000±1,925,650	

classified as normal, which was 48–52 cm and 2,500–3,999 kg, respectively.

#### Relationship between pregnant mothers' characteristics with birth weight and height

Based on Table 4, there was no significant relationship between the characteristics of the pregnant mothers with their babies' birth weight and height ( $p>0.05$ ). This was not in line with

Kominiarek and Rajan's (2016) study, which stated that age was related to pregnancy and psychological conditions, especially readiness to accept pregnancy so that the subject was expected to have better nutritional status to undergo pregnancy and could have a pregnancy outcome with good nutritional status.

Results of this study were also different from Giesta *et al.* (2015), who stated that apart from the subject's age, gestational age was also crucial to note. LBW was found in babies born with immature gestational age (<36 weeks). The relationship between gestational age and baby's birth weight was related to the pregnant mother's weight gain during pregnancy. This means that pregnant mothers with abnormal weight gain tend to deliver babies earlier. Sebayang *et al.* (2012) also argued that a short pregnancy interval (<2 years) resulted in the risk of LBW.

The socio-economic family characteristics observed were family size, subject's education, subject's occupation, and monthly income. Education, occupation, and income are interconnected. The result of this study with regard to family size was not in line with the research of Degarege *et al.* (2015), who revealed that malnutrition was more common among families of more than five people. In households of lower socio-economic conditions, pregnant mothers tend to experience malnutrition and

Table 2. Distribution of subjects based on personal hygiene and household environmental sanitation

Characteristics	n	%
Hand washing habits		
Not good	18	39.1
Good	28	60.9
Clean water facilities		
Not good	19	41.3
Good	27	58.7
Sewage disposal facilities		
Not good	29	63.1
Good	17	36.9
Garbage disposal facility		
Not good	41	89.1
Good	5	10.9

Table 3. Distribution of pregnancy outcomes by birth weight and birth length

Characteristics	n	%
Birth length (cm)		
<48	11	23.9
48–52	33	71.1
>52	2	4.3
Mean±SD	48.6±2.4	
Birth weight (g)		
<2500	4	8.7
2500–3999	41	89.1
>4000	1	2.2
Mean±SD	3207±478	

have an increased risk of anemia, resulting in unfavored birth outcomes (Morsy & Alhady 2014; Dominguez-Salas *et al.* 2016).

The results relating to education was supported by Abuya *et al.* (2012), which stated that education level was related to income. Highly educated women will generally get better jobs with higher incomes so that they can contribute to meet the nutritional needs of their families. The absence of a significant relationship can be caused by many factors other than the pregnant mother's characteristics and the socio-economic characteristics of the family, such as the height of the mother and father (Nasikhah & Margawati 2012).

#### **The relationship between the personal hygiene and sanitation of pregnant mothers with birth weight and height of babies**

According to Marriott *et al.* (2018), personal hygiene is a procedure to maintain cleanliness in the management of safe and healthy food. Good hygiene practices, such as hand washing and safe sewage disposal are essential in maximizing the health benefits of safe water and sanitation facilities. Pregnancy is often thought to be associated with an increased susceptibility to infection. Personal hygiene practices are the main thing in maintaining food safety and reducing diseases caused by consuming food that has been contaminated with pathogenic microbes/germs and is carried out by washing hands before handling food. Good hand washing practice is to wash your hands with soap and water for at least 20 seconds (MoH RI 2014).

Diarrhea, sore throat, and respiratory tract infections are infectious diseases often suffered by children. Diarrheal disease is a water-borne disease. Lack of public access to clean water or drinking water, as well as poor sanitation and hygiene behavior, contribute to the deaths of 1.8 million people per year due to diarrhea (Oloruntoba *et al.* 2014).

Based on Table 5, there was no significant relationship between personal hygiene in the form of hand washing habits and birth weight and height ( $p>0.05$ ). Likewise, there was no significant relationship between household environmental sanitation and birth weight and length ( $p>0.05$ ).

This was not in line with the research of Zairinayati and Purnama (2019), which states that there is a relationship between types of latrines, clean water sources, and the incidence of stunting in children under five. Toilets that do not meet standards have the potential to cause infectious diseases due to poor hygiene and sanitation (e.g. diarrhea and worm infestation), which can interfere with the absorption of nutrients during the digestive process. Rah *et al.* (2015) also explained that improving sanitary conditions and hygiene practices are associated with the reduction in the prevalence of stunting in Indian villages. According to Goudet *et al.* (2011) policies and programs aimed at reducing stunting should include Water, Sanitation, and Hygiene (WASH) practices in order to run sensitive programs in India. Unhealthy water will cause diarrhea and weight loss among pregnant mothers, thus affecting the nutritional status of the mother.

The health and nutritional conditions of the mother during pregnancy can affect the growth and development of the fetus. Mothers with poor nutritional status, experiencing anemia or infectious diseases during pregnancy have an increased risk of LBW and an increased risk of stunting later on in life. Results show that history of disease during pregnancy was a risk factor for the incidence of stunting, which was not statistically significant ( $p=0.562$ ;  $OR=1.4$ ).

According to Medhin *et al.* (2010), the health condition of the mother during pregnancy has more influence on the birth process and the outcome of the baby being born, while the growth of the baby after birth is mostly influenced by environmental factors such as



Table 4. Birth outcomes based on the characteristics of pregnant mothers

Variable	Birth weight		Birth length	
	Low n (%)	Normal n (%)	Short n (%)	Normal n (%)
Age (years)				
<20	0 (0)	5 (10.9)	2 (4.3)	3 (6.5)
20–35	5 (10.9)	36(78.3)	11 (23.9)	30 (65.2)
p	1.000		0.612	
Parity				
>3	0 (0)	2 (4.3)	0(0)	2 (4.3)
≤3	5 (10.9)	39 (84.8)	13 (28.3)	31 (67.4)
p	1.000		1.000	
Pregnancy interval (years)				
<2	2 (4.3)	18 (39.1)	6 (13.0)	14 (30.4)
≥2	3 (6.5)	23 (50.0)	7 (15.2)	19 (41.3)
p	1.000		1.000	
Family size				
Small	5 (10.9)	40 (87)	13 (28.3)	32 (69.6)
Moderate	0 (0)	1 (2.2)	0 (0)	1 (2.2)
p	0.880		0.662	
Education				
Up to high school	4 (8.7)	24 (52.2)	8 (17.4)	20 (43.5)
High school graduate	1 (2.2)	17 (36.9)	5 (10.9)	13 (28.2)
p	0.155		0.971	
Family income (IDR/month)				
<3,483,667	4 (8.7)	28 (60.9)	7 (15.2)	25 (54.3)
≥3,483,667	1 (2.2)	13 (28.3)	6 (13.0)	8 (17.4)
p	1.000		0.171	

nutrient intake, parenting patterns, or infectious diseases. In addition, this study did not determine the timing of the disease where the child is at risk of becoming stunted if the mother's health problems or low nutritional status begins early in pregnancy (Medhin *et al.* 2010).

Pregnancy conditions such as nutritional status before and during pregnancy, as well as maternal weight gain during pregnancy are thought to be associated with the incidence of stunting (Nasikhah & Margawati 2012). This study was not able to address the biological or behavioral basis of these findings.

### CONCLUSION

Most of the subjects (89.1%) were in the age range of 20–35 years with a mean age of 27.0±4.8 years. All subjects (100%) were in

the third trimester with a mean gestational age of 32.0±3.7 weeks. Almost all subjects were not in the at risk parity category and more than half (56.5%) have had a suitable pregnancy interval. The practice of personal hygiene and clean water facilities were mostly in the good category, while the facilities of garbage disposal were still not good. There was no significant relationship between the personal hygiene practices and household sanitation of the pregnant mothers with the birth weight and length of babies in Bogor District.

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Table 5. Birth outcomes based on the hygiene and sanitation of pregnant mothers

Variable	Birth weight		Birth length	
	Low n (%)	Normal n (%)	Short n (%)	Normal n (%)
<b>Handwashing habits</b>				
Not good	2 (4.3)	16 (34.8)	5 (10.9)	13 (28.3)
Good	3 (6.5)	25 (54.3)	8 (17.4)	20 (43.5)
p	1.000		1.000	
<b>Clean water facilities</b>				
Not good	2 (4.3)	17 (37.0)	6 (13.0)	13 (28.3)
Good	3 (6.5)	24 (52.2)	7 (15.2)	20 (43.5)
p	1.000		0.675	
<b>Sewage disposal facilities</b>				
Not good	4 (8.7)	25 (54.3)	9 (19.6)	20 (43.5)
Good	1 (2.2)	16 (34.8)	4 (8.7)	13 (28.3)
p	0.405		0.739	
<b>Garbage disposal facility</b>				
Not good	3 (6.5)	38 (82.6)	12 (26.1)	29 (63.0)
Good	2 (4.3)	3 (6.5)	1 (2.2)	4 (8.7)
p	0.084		1.000	

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#### AUTHOR DISCLOSURES

The authors have no conflict of interest in this study.

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