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### ORIGINAL RESEARCH



## A SCOPING REVIEW: IMPACT OF MALARIA IN PREGNANCY

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ABSTRACT	Keywords
Based on world malaria reports, the most malaria cases are in the African region, followed by the Eastern Mediterranean region and Southeast Asia region. Twentynine countries account for global malaria cases. In the Asia-Pacific region, the rate of malaria transmission is relatively low when compared to sub-Saharan Africa, but it is basically the same as the malaria problem in Africa because the harmful effects of malaria in various regions remain the same. The process of pregnancy can aggravate malaria cases; pregnant women suffering from malaria will affect the process of pregnancy and the fetus and baby born. This Scoping Review aims to synthesize research evidence and categorize research articles on the impact of malaria on pregnant women and their babies in Asia-Pacific countries. Literature search was carried out using the PRISMA flowchart guidelines which were applied to present the article search flow. The synthesis shows 11 articles obtained from the search process. This review raises 6 themes, namely: anemia, low birth weight, premature birth, malaria in infants, placental malaria, and primigravida. The impact of malaria in pregnancy that most often occurs in pregnant women is anemia, low birth weight, premature birth, placental malaria, and malaria in infants.	Pregnant women, Impact, Malaria, Malaria with pregnancy

# **INTRODUCTION**

Malaria is an infectious disease caused by plasmodium parasites that live and reproduce in human red blood cells. Malaria is transmitted by female Anopheles mosquitoes that contain plasmodium. There are four different species of malaria in humans namely plasmodium falciparum, plasmodium vivax, plasmodium malariae and plasmodium ovale, of which plasmodium falciparum and plasmodium vivax are the most common and plasmodium

falciparum the most dangerous and the greatest threat (WHO, 2015).

The World Malaria Report 2020 states that in 2019 an estimated 229 million cases of malaria occurred worldwide. The most malaria cases were in the African region with 215 million or 94%, followed by the East Mediterranean region with 26%, and the Southeast Asia region with 3% of cases. Twenty-nine countries account for 95% of malaria cases globally. Five countries account for more than half of all malaria cases worldwide: Nigeria (27%),

Democratic Republic of Congo (12%), Uganda (5%), and Mozambique (4%), and Niger (3%) (WHO, 2020). In 2019 there were 409,000 deaths from malaria globally. An estimated 33 million pregnancies of which 35% (12 million) were exposed to malaria infection during pregnancy, and gave birth to about 822,000 low birth weight children (16% of all low birth weight children) while Central Africa has the highest prevalence of low birth weight children due to malaria in pregnancy (WHO, 2020). Transmission rates are relatively low in the Asia-Pacific region compared to sub-Saharan Africa. The perception of malaria in the Asia-Pacific region as a problem is not serious enough, but it is basically the same as the malaria problem in Africa because the risk of danger posed by malaria in various regions remains the same (Baird, 2017).

Malaria in pregnancy endangers the health of the mother and places her at a greater risk of death and impacts on the health of the fetus, causing prematurity and low birth weight as major contributors to neonatal and infant mortality (WHO, 2019). The process of pregnancy will exacerbate malaria cases experienced by pregnant women. A pregnant woman who suffers from malaria will affect the process of pregnancy and affect the condition of her fetus and newborn baby. Malaria infection in pregnant women can cause anemia in the mother and fetus, as well as babies with low birth weight. The risk of low birth weight infants (LBW) in mothers with malaria increased two times compared to pregnant women without malaria. This can increase maternal and infant mortality. Complications of malaria infection in pregnancy can include abortion, low birth weight babies, anemia, pulmonary edema (swelling or accumulation of fluid in the lung tissue), impaired kidney function, and congenital malaria (Budiyanto & Wuriastuti, 2017).

In multigravida, pregnancy-specific immunity to disease is usually developed or through self-protection, but is completely absent in primigravida (Aguzie et al., 2017). Primigravida were more frequently infected with a higher density of parasites in the placenta than multigravida. Primigravida are at dangerous risk, and can be complicated by severe maternal anemia, which can cause postpartum hemorrhage and even lead to low birth weight (LBW) babies (Fried & Duffy, 2017).

In the study showed that microscopy infection by P. falciparum and P. vivax was associated with maternal age, decreased levels of hemoglobin in the blood, low birth weight, high risk for low birth weight, gestational age, and preterm birth. In this study, it was observed that pregnant women infected with malaria had a 2-fold higher risk of anemia than women who were not infected (Vásquez et al., 2020). Malaria in pregnant women living in areas of low transmission also found that a high prevalence of antibodies indicated a significant exposure of pregnant women to Plasmodium Malaria. Malaria appears to be benign in the study area because it does not cause symptoms in patients, but pregnant women who are detected to Plasmodium in their blood should be treated immediately, because they can contribute to malaria transmission (Hristov et al., 2014). The results of the study on 1,451 placentas of pregnant women who had a history of malaria, Placental Malaria infection was detected in 269 (18.5%), of which 54 (3.7%) were acute, 55 (3.8%) chronic, and 160 (3.7%) were chronic. 11.0%) is malaria infection during pregnancy. Risk factors for placental malaria included living in a rural area (adjusted odds ratio (AOR) 3.65, 95% CI 1.76–7.51; p 0.001), primigravida (AOR 2.45, 95% CI 1.26 - 4.77; p = 0.008) and had symptoms of malaria during pregnancy (AOR 2.05, 95% CI 1.16-3.62; p = 0.013)

compared with uninfected women, acute infection (AOR 1.97, 95% CI 0, 98-3.95; p = 0.056) was associated with low birth weight infants, whereas chronic infection was associated with preterm delivery (AOR 3.92, 95% CI). 1.64–9.38; p = 0.002) and anemia (AOR 2.22, 95% CI 1.02–4.84; p = 0.045) (Lufele et al., 2017).

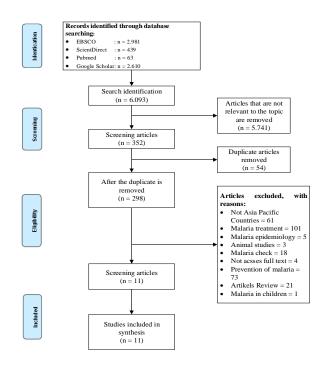
Based on this background, the research question is how the impact of malaria in pregnancy is obtained. The purpose of this scoping review is to synthesize research evidence and categorize or categorize research articles on the impact of malaria on pregnant women and their babies, as well as the impact of malaria on the incidence of anemia, low birth weight, premature birth, placental malaria, and malaria in infants.

#### **METHOD**

This study uses a scoping review method. Scoping review method is used to synthesize research evidence and classify existing research articles. The PEOs method was used to obtain the focus of the review and research questions. The literature search uses a search system on the EBSCO, ScienceDirect, PubMed and Google Scholar databases. The keywords used in the search for articles in the EBSCO database are "Pregnan\* OR Pregnant Wom\* AND Malaria OR Plasmodium Vivax OR Plasmodium Falciparum OR Plasmodium Ovale OR Plasmodium Malariae OR Plasmodium Knowlesi AND Impact OR Effect AND Asia Pacific OR asia-pacific" in the ScientDirect database and PubMed which limits the use of Boolean researchers use the keywords "Pregnancy Associated Malaria AND Asia Pacific OR asia-pacific". Inclusion and exclusion criteria were used in the selection of articles. PRISMA Flowchart is applied to present article search flow. Critical appraisal is carried out to assess the quality of the articles to be used by using

assessment tools from *Hawker*, *S. et al.* 2002 - *Criteria for Quality of the Paper Appraisal.* 

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### **RESULTS**

Based on the results of the synthesis, 11 articles were obtained that matched the research criteria, as shown in the following table:

**Table 1. Data Charting** 

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#### **DISCUSSION**

Based on the 11 articles obtained, as many as 7 articles came from the Southeast Asian region which includes Indonesia, Malaysia, Laos, and Papua New Guinea. In the South Asian region there are 4 articles, all of which are from India. The article uses a quantitative research study, with a cohort study design of 5 articles, a cross-sectional study of 5 articles, and a descriptive study of 1 article. In 2015 there were 4 articles published, in 2016 there were 2 articles, in 2017 there were 2 articles, and in 2019 there were 1 article.

Malaria in pregnancy is a clinical condition in which a pregnant woman is infected with the Plasmodium parasite that causes malaria. Malaria in pregnancy can harm pregnant women and their fetuses (Djabanor et al., 2017). Based on the results of the review of research articles, several themes were found that could answer the objectives and questions of this scoping review, namely: anemia, low birth weight, premature birth, malaria in infants, placental malaria, and primigravida.

#### Anemia

Pregnant women generally will experience mild anemia, especially in primigravida women (Fowkes et al., 2018). Women who did not take iron supplements during pregnancy had a 58% higher risk of anemia than women who took iron supplements (Briand et al., 2016). Women who have had malaria are more likely to experience anemia than women without malaria (Sohail et al., 2015). Women who

detected malaria microscopically significantly lower mean hemoglobins. The likelihood of severe anemia is much higher in women with microscopically detectable malaria infection (Singh et al., 2015). Active cases of malaria in endemic areas are not the cause of most cases of anemia, but contribute to the incidence of severe anemia (Corrêa et al., 2017). In Plasmodium falciparum infection, pregnant women living in areas with unstable malaria transmission are at risk for severe disease complications, including severe anemia (Barber et al., 2015). Low Hb levels and malaria infection during pregnancy and delivery result in reduced birth weight and an increased risk of low birth weight and premature delivery (Stanisic et al., 2015). Anemia can also cause placental malaria infection, a significant decrease in maternal hemoglobin levels results in moderate to severe anemia compared to those without placental malaria infection (Lufele et al., 2017). Malaria anemia during pregnancy can cause lifethreatening conditions for both mother and fetus (Chandrashekar et al., 2019).

# **Low Birth Weight Baby**

Women infected with malaria during pregnancy are at risk of giving birth babies with low birth (Chandrashekar et al., 2019). Malaria infection results in adverse pregnancy outcomes including low birth weight and prenatal death (Barber et al., 2015). Decreased birth weight and increased risk of low birth weight are caused by low maternal Hb levels and malaria infection during pregnancy and childbirth (Stanisic et al., 2015). Malaria infection of the placenta can also cause low birth weight (Lufele et al., 2017). Placental infections that are detected microscopically are more likely to give birth to babies with low birth weight. Submicroscopic placental infection was not associated with an increased risk of LBW

(Singh et al., 2015). LBW is a major risk factor in infant morbidity and mortality. Iron deficiency in the mother can cause the baby to be born with low birth weight. In malaria endemic areas iron deficiency and anemia often occur, resulting in poor birth outcomes (Fowkes et al., 2018), but low birth weight can also be associated with malnutrition in pregnant women (Briand et al., 2016).

# **Premature Birth**

Women infected with malaria during pregnancy are at risk of Intrauterine Growth Restriction (IUGR) and the risk of preterm delivery which is also associated with umbilical cord parasitemia (Chandrashekar et al., 2019) resulting in adverse pregnancy outcomes including low birth weight and prenatal death (Barber et al., 2019). al., 2015). Low Hb levels and malaria infection during pregnancy and delivery result in reduced birth weight and an increased risk of low birth weight and premature delivery (Stanisic et al., 2015). Factors associated with LBW are premature births (Briand et al., 2016). Chronic placental malaria is associated with an increased risk of preterm delivery (Lufele et al., 2017)

# **Malaria In Babies**

Malaria in pregnancy can cause malaria infection in infants at the age of 6 and 12 months. Babies born to malaria-positive mothers during pregnancy are more susceptible to malaria, presumably because placental malaria causes a decrease in maternal antibody transfer, and increases the baby's susceptibility to malaria infection. Malaria in pregnancy in the second trimester and the infant's susceptibility to malaria infection are thought to be related to the length of exposure to malaria in the mother (Indrawanti et al., 2018).

## Placental malaria

The risk factor for placental malaria is in pregnant women who live in rural areas and experience symptomatic malaria infection during pregnancy (Lufele et al.,

2017). Plasmodium falciparum is the main cause of malaria infection in the placenta which is a side effect on mothers and babies worldwide in malaria endemic areas. Placental malaria is detected in more than 40% of pregnancies (Lufele et al., 2017). Acute placental malaria infection is associated with a doubled likelihood of developing low birth weight (Lufele et al., 2017). P. falciparum infection affects the placental weight ratio, especially in the absence of fever or chills during pregnancy (Sukma Oktavianthi et al., 2016).. In African placental women. chronic infection (especially massive chronic intervillositis, accumulation of large numbers of white blood cells in the maternal blood space from the placenta) is specifically associated with growth restriction, whereas acute infection with high parasitaemia is associated with preterm delivery (Stanisic et al., 2015).

# Primigravida

Primigravida women are more susceptible to malaria infection, susceptibility will decrease in subsequent pregnancies. Primigravida are susceptible to malaria infection because malaria immunity in pregnancy has not yet formed a protective antibody response (Lufele et al., 2017) this is due to a decrease in the immune response In pregnant women. subsequent women will experience pregnancies, repeated infections. The lack of antithe antibodies during parasitic pregnancy increases the parasite burden in primigravida compared to multigravida (Chandrashekar et al., 2019). The effects of iron deficiency are greatest for primigravida women, this group is at high risk of being more susceptible to various infectious diseases (Fowkes et al., 2018).

## **CONCLUSIONS**

The impact of malaria in pregnancy that most often occurs in pregnant women is anemia, low birth weight, premature birth, placental malaria, and malaria in infants.

Pregnant women will generally experience mild anemia. In malaria endemic areas, iron deficiency and anemia are common and are exacerbated by the risk of malaria infection. Women infected with malaria during pregnancy are at risk of giving birth to babies with low birth weight. Decreased birth weight and increased risk of LBW are caused by low maternal Hb levels and malaria infection during pregnancy and childbirth. Low Hb levels and malaria infection during pregnancy and delivery result in decreased birth weight, increased risk of low birth weight and premature delivery. Symptomatic malaria infection suffered by the mother in the second trimester of pregnancy can cause placental malaria, malaria in the placenta results in a decrease in the size of the placenta. Malaria infection during pregnancy, especially in the second trimester, makes babies born more susceptible to being infected with malaria at the age of 6 to 12 months. Malaria infection is more common in primigravida because the decreased immune response in pregnant women has not yet formed a protective antibody response.

Researchers recommend that health service agencies should provide health education about the importance of iron supplements or blood boosters in pregnancy. Conduct malaria screening at every Antenatal visit (ANC), especially in each trimester for pregnant women in malaria endemic areas, or pregnant women who come from malaria endemic areas, as well as carry out preventive efforts and provide safe malaria prevention treatment for pregnant anticipate asymptomatic women to infections in those infected with the malaria parasite without symptoms. With this action, it is hoped that it can prevent the transmission of malaria, as well as relieve the burden of anemia caused by the malaria parasite in pregnant women by regularly consuming blood-enhancing tablets.

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