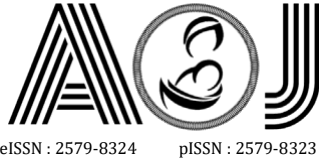


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Address for Correspondence:Editorial Room Andalas Obstetrics and Gynecology Journal, 3rd floor of KSM of Obstetrics and Gynecology, RSUP DR. M. Djamil Padang, Jl. Perintis Kemerdekaan Padang, Sumatera Barat 25127**Website:**<http://jurnalobgin.fk.unand.ac.id/index.php/JOE>**RESEARCH****Determinants of Insecticide-treated Net use among Pregnant Women with Malaria in West Papua, Indonesia.**Madjid TH¹, Romulya AI¹, Mantilidewi KI¹, Susiarno H¹*Affiliations: 1. Department of Obstetrics and Gynecology, Faculty of Medicine, Padjadjaran University, Dr. Hasan Sadikin Hospital, Bandung, Indonesia***Correspondence:** Madjid TH email: titahusnitamadjid@gmail.com**Abstract****Introduction:** *Malaria in pregnancy is still a major cause of neonatal adverse outcome in West Papua, Indonesia. In accordance to the recommendation of the World Health Organization, local government have attempted to prevent malaria in pregnant women by distributing insecticide-treated nets (ITNs).***Objective:** *This study aimed to assess the pattern of malaria infection and the use of ITNs among pregnant women in the city of Manokwari, West Papua, Indonesia.***Methods:** *We recorded all pregnant women who were admitted to the Manokwari District Hospital during May 2017 to April 2018 with malaria. From a total of 335 cases, 125 women agreed to be interviewed on their ITN use at home.***Results :** *Out of a total of 335 cases during the enrolment period, 175 (52%) were found to be infected with Plasmodium falciparum. Chief complaints were fever (28.8%), hyperemesis (25.6%); cephalgia (18.4%); anaemia (15.2%); preterm labor (8.8%) and diarrhoea (3.2%).**Only 23.2% of the 125 samples used ITN at home. Most did not have access government-distributed free nets (43.8%); others did not use it due to the foul smell of the nets (17.7%); the heat experienced when sleeping under nets (29.1%); and fear of insecticide side-effect (9.4%).***Conclusion:** *There is suboptimal use of ITN as a preventive measure against malaria in pregnancy in Manokwari, West Papua. Better distribution and other alternative to physical barriers should be considered by the government***Keywords:** *Malaria, pregnancy, insecticide-treated net***INTRODUCTION**

Malaria in pregnancy is associated to a multitude of adverse pregnancy outcomes, such as severe anaemia, stillbirth and low birth weight.^{1,11} In malaria-endemic Indonesia, the incidence of malaria remains high, particularly in the easternmost provinces of West Papua and Papua. Poespoprodjo (2008) noted 432 cases of malaria in pregnancy in Papua, the majority of which were due to Plasmodium falciparum infection, followed by Plasmodium vivax and mixed malaria.¹ Of these 432 cases, preterm delivery and stillbirth were the most common adverse effects.^{1,12}



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The World Health Organization have recommended the use of insecticide-treated nets (ITNs) to prevent malaria in pregnancy in malaria-endemic regions, along with intermittent preventive treatment in pregnancy (IPTp).^{2,14} There is already a wealth of evidence showing the protective effect of ITN on pregnancy outcomes and anaemia in pregnancy: in a meta-analysis of studies cross-sectional studies conducted in 25 African countries, Eisele et al (2012) concluded that IPTp or ITN was significantly associated with decreased risk of neonatal mortality and increased birthweight.^{3,14} Despite the clear benefit, coverage for ITN use and distribution among pregnant women is suboptimal.^{4,5} In 2010, the pooled rate of ITN use among pregnant women in 24 African countries was noted at 41.6%, far below the target of 80% despite a stark increase from 17.9% in 2007.^{2,6}

In line with the recommendation of the WHO, the Indonesian government's policy to prevent the adverse effects of malaria in pregnancy include rapid diagnostic test and artemisinin combination therapy to quickly diagnose and manage cases; ITNs were distributed to families to prevent new cases. However, the effectiveness of ITN distribution is still unknown in these two most susceptible provinces: in Manokwari, West Papua, the incidence of malaria in pregnancy fluctuated from 2009 to 2012, from 179 cases in 2009 to 187 in 2010, and fell back to 158 cases in 2011; and research on the use of distributed ITNs among pregnant women in West Papua is rare.⁷

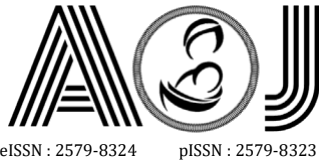
Therefore, this study was undertaken to explore the characteristic of malaria in pregnancy and the pattern of use of ITNs among pregnant women in Manokwari, West Papua

METHODS

This study was conducted in Manokwari District Hospital, Manokwari Regency, West Papua province, Indonesia. The province is inhabited by 850.000 people composed of mainly rural communities, and 30% in urban communities. The city of Manokwari is located in the coastal area, with an average humidity of 73-75%, and a population of 99.488 in 2010. The area is home to the genus Anophelidae and Culicidae, which serve as vectors for the transmission of *P falciparum* and *P vivax* malaria.

This study was approved by the Ethical Committee for Medical Research, Universitas Padjadaran. This was a cross-sectional study conducted in Manokwari District Hospital, West Papua, Indonesia, in May 2017 to April 2018. Data collection were conducted based on a total sampling design from all pregnant women who were admitted to the maternity ward with *Plasmodium falciparum*, *Plasmodium vivax*. Clinical data and antenatal care history were obtained. Mosquito net usage data were collected by interview using a questionnaire. Patients were required to give verbal and written consent to be enrolled in the study

RESULTS



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During the period of the study, a total of 335 pregnant women were admitted with malaria in pregnancy. *P. vivax* malaria slightly dominated the number with 175 (52%) cases recorded during the period. A hundred and fifty cases (45%) were *P. falciparum* malaria and the rest (3%) were mixed malaria. However, among these cases, only 125 agreed to be enrolled to the study.

Chief complaint among the sample was fever (36/125, 28.8%) followed by hyperemesis (32/125, 25.6%); cephalgia (23/125, 18.4%); anaemia (19/125, 15.2%); preterm labor (11/125, 8.8%) and diarrhoea (4/125, 3.2%). Most of the sample did not use ITN (96/125, 76.8%). Reasons given for this were: lack of access to government-issued net (42/96, 43.8%); foul smell (17/96, 17.7%); heat (28/96, 29.1%); and fear of insecticide side-effect (9/96, 9.4%).

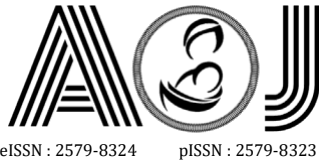
DISCUSSIONS

Fever was cited as the most common complaint among pregnant women who were admitted with malaria, which is in line with well-established knowledge of malaria. Preterm labor was found in 8.8% of our sample; this is in line with the findings of Allen (1998) in Papua New Guinea, who found that *P. falciparum* infection contributed to preterm delivery.^{8,16} It was unknown if hyperemesis, anaemia and diarrhoea were directly the result of malaria infection in our samples, as the records lacked other co-morbidities that could be present in the samples.¹⁷

This study was the first to explore the pattern of use of ITNs among pregnant women in Manokwari, West Papua. While our samples knew of ITNs and the advantage of its use, only 23.2% percent of our sample owned and used ITN, far lower compared to the use of ITN overseas.^{4,9,10} Nearly half of the women who did not use ITN did not even have one, citing a lack of access to free government distributed nets. Fifty-four (54/96, 46.2%) women who owned one but declined to use were deterred by the smell of the net, and the heat they experienced while sleeping underneath it.¹⁸ The least cited reason had to do with fear of side effect of the insecticide laced in the nets – some of our samples cited fear of insecticide fume inhalation by themselves or their infants.¹⁹ Our result is similar to the result obtained by Aluko in Nigeria, where the majority of samples interviewed did not use ITN due to a lack of access to freely distributed ITN.⁵ Heat and odor were similarly high in the list of reasons pregnant women chose not to use ITN.^{5,20}

This study is limited by its very small sample size and lack of access to other data such as gestational age, laboratory values, and maternal and neonatal outcome. Furthermore, a more in-depth interview was unable to be conducted owing to a lack of time and resources on the investigator's part.

CONCLUSIONS



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There is a lack of access to ITN among pregnant women in the city of Manokwari, West Papua. Among women who have obtained ITN, heat, odor and fear of side effects hindered optimal use. Alternatives to physical barrier, better distribution and education should be considered by the local government to reduce the rate of malaria in pregnancy.

REFERENCES

1. Poespoprodjo JR, Fobia W, Kenangalem E, Lampah DA, Warikar N, Seal A, et al. Adverse Pregnancy Outcomes in an Area Where Multidrug-Resistant Plasmodium vivax and Plasmodium falciparum Infections Are Endemic . Clin Infect Dis [Internet]. 2008 May [cited 2020 Jul 5];46(9):1374–81. Available from: <https://pubmed.ncbi.nlm.nih.gov/18419439/>
2. WHO. WHO | Insecticide-treated nets to reduce the risk of malaria in pregnant women [Internet]. WHO. 2019 [cited 2020 Aug 27]. Available from: https://www.who.int/elena/titles/commentary/bednets_malaria_pregnancy/en/
3. Eisele TP, Larsen DA, Anglewicz PA, Keating J, Yukich J, Bennett A, et al. Malaria prevention in pregnancy, birthweight, and neonatal mortality: A meta-analysis of 32 national cross-sectional datasets in Africa. Lancet Infect Dis [Internet]. 2012 Dec [cited 2020 Aug 27];12(12):942–9. Available from: <https://pubmed.ncbi.nlm.nih.gov/22995852/>
4. Manu G, Boamah-Kaali EA, Febir LG, Ayipah E, Owusu-Agyei S, Asante KP. Low Utilization of Insecticide-Treated Bed Net among Pregnant Women in the Middle Belt of Ghana. Malar Res Treat. 2017;2017:1–7.
5. Aluko JO, Oluwatosin AO. Utilization of insecticide treated nets during pregnancy among postpartum women in Ibadan, Nigeria: A cross-sectional study. BMC Pregnancy Childbirth. 2012 Mar 29;12.
6. Gamble CL, Ekwaru JP, ter Kuile FO. Insecticide-treated nets for preventing malaria in pregnancy. Cochrane Database Syst Rev [Internet]. 2006 Apr 19 [cited 2020 Aug 27];(2). Available from: <https://www.cochranelibrary.com/cdsr/doi/10.1002/14651858.CD003755.pub2/full>
7. Rahmawaty. Determinant of Malaria Incidence among Pregnant Women in West Papua. Media Kesehatan Masy Indones [Internet]. 2016;10(3). Available from: <http://journal.unhas.ac.id/index.php/mkmi/article/view/495>
8. Allen SJ, Raiko A, O'Donnell A, Alexander NDE, Clegg JB. Causes of preterm delivery and intrauterine growth retardation in a malaria endemic region of Papua New Guinea. Arch Dis Child Fetal Neonatal Ed [Internet]. 1998 [cited 2020 Aug 31];79(2):F135. Available from: </pmc/articles/PMC1720830/?report=abstract>
9. Ezire O, Adebayo S, Idogho O, Bamgboye E, Nwokolo E. Determinants of use of insecticide-treated nets among pregnant women in Nigeria. Int J Womens Health [Internet]. 2015 Jun 26 [cited 2020 Aug 27];7:655. Available from: <http://www.dovepress.com/determinants-of-use-of-insecticide-treated-nets-among-pregnant-women-i-peer-reviewed-article-IJWH>
10. Van Eijk AM, Hill J, Larsen DA, Webster J, Steketee RW, Eisele TP, et al. Coverage of intermittent preventive treatment and insecticide-treated nets for the control of malaria during pregnancy in sub-Saharan Africa: A synthesis and meta-analysis of national survey data, 2009–11. Lancet Infect Dis [Internet]. 2013 Dec [cited 2020 Aug 27];13(12):1029–42. Available from: <https://pubmed.ncbi.nlm.nih.gov/24054085/>



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11. Ankomah A, Adebayo SB, Arogundade ED, Anyanti J, Nwokolo E, Ladipo O, Meremikwu MM. Determinants of insecticide-treated net ownership and utilization among pregnant women in Nigeria. *BMC Public Health*. 2012 Feb 6;12:105.
12. Kementerian Kesehatan RI. 2019. Situasi terkini perkembangan program pengendalian malaria di Indonesia tahun 2018 (The latest situation in the development of the malaria control program in Indonesia in 2018). Jakarta: Indonesia.
13. Lawford HLS, Lee ACC, Kumar S, Liley HG, Bora S. Establishing a conceptual framework of the impact of placental malaria on infant neurodevelopment. *Int J Infect Dis* 2019; 84(1): 54–65. <https://doi.org/10.1016/j.ijid.-2019.04.019>.
14. Lufele E, Umbers A, Ordi J, Kaius MO, Wangnapi R, Unger H, Tarongka N, Siba P, Mueller I, Robinson L, Rogerson S. Risk factors and pregnancy outcomes associated with placental malaria in a prospective cohort of Papua New Guinean women. *Malar J*. 2017; 16(427):1–10. <https://doi.org/10.1186/s12936-017-2077-4>.
15. Briand V, Saal J, Ghafari C, Huynh B, Fievet N, Schmiegelow C, Massougbo-dji A (2016). Fetal growth restriction is associated with malaria in pregnancy: a prospective longitudinal study in Benin. *J Infect Dis*. 214(3): 417–425. <https://doi.org/10.1093/infdis/jiw158>.
16. Chukwuocha UM, Dozie IN, Onwuliri CO, Ukaga CN, Nwoke BE, Nwankwo BO, Nwoke EA, Nwaokoro JC, Nwoga KS, Udujih OG, Iwuala CC, Ohaji ET, Morakinyo OM, Adindu BC: Perceptions on the use of insecticide treated nets in parts of the Imo River Basin, Nigeria: implications for preventing malaria in pregnancy. *Afr J Reprod Health* 2010, 14(1):117-28.
17. Belay M, Deressa W: Use of insecticide treated nets by pregnant women and associated factors in a pre-dominantly rural population in northern Ethiopia. *Trop Med Int Health* 2008, 13(10):1303-1313.
18. Eisele TP, Keating J, Littrell M, Larsen D, Macintyre K: Assessment of insecticide-treated bednet use among children and pregnant women across 15 countries using standardized national surveys. *Am J Trop Med Hyg* 2009, 80(2):209-14.
19. Afolabi BM, Sofola OT, Fatunmbi BS, Komakech W, Okoh F, Saliu O, Otsemobor P, Oresanya OB, Amajoh CN, Fasiku D, Jalingo I: Household possession, use and non-use of treated or untreated mosquito nets in two ecologically diverse regions of Nigeria-Niger Delta and Sahel Savannah. *Malaria J* 2009, 8:30.
20. Chukwuocha UM, Dozie IN, Onwuliri CO, Ukaga CN, Nwoke BE, Nwankwo BO, Nwoke EA, Nwaokoro JC, Nwoga KS, Udujih OG, Iwuala CC, Ohaji ET, Morakinyo OM, Adindu BC: Perceptions on the use of insecticide treated nets in parts of the Imo River Basin, Nigeria: implications for preventing malaria in pregnancy. *Afr J Reprod Health* 2010, 14(1):117-28.