

Relationship of Obstetric Complications to The Event of Maternal Mortality in Indonesia

Nova Eka Wondasari^{1,2*}, Husaini², Mohamad Isa³, Eko Suhartono², Adi Nugroho²

¹Dinas Kesehatan Provinsi Kalimantan Tengah, Palangkaraya

²Master of Public Health Study Program, Faculty of Medicine and Health Science, Lambung Mangkurat University, Banjarbaru, Indonesia

³School of Medicine, Faculty of Medicine and Health Science, Lambung Mangkurat University, South Kalimantan, Indonesia

Correspondence Email: novas8222@gmail.com

ABSTRACT

Maternal mortality in Indonesia is still relatively high compared to neighboring countries in ASEAN, Indonesia's position globally or regionally is the second highest MMR after Laos. Maternal death (direct obstetric death) is a direct death as a result of obstetric complications in pregnancy, childbirth and the puerperium. There were some contradictory researches about obstetric and maternal death. Some studies related, and other did not. The objective of this study was to analyze some articles that discuss the relationship of obstetric complications toward the case of maternal mortality in Indonesia. In this study, an analysis of articles regarding the relationship of obstetric complications to the incidence of maternal death in Indonesia was conducted using the meta-analysis method. Obtained 11 full (full text) research articles published online in 2015-2020, searched using the Google Scholar database, PubMed. Odds Ratio is calculated by table summary of results-model-fixed-effect, using Meta-Analysis Calculator Website Meta-mar program (Free online Meta-Analysis Service). A total of 11 articles were included in the meta-analysis showing the results of maternal deaths caused by obstetric complications OR = 3,14 (95% CI 2,354-.,199). It can be concluded that obstetric complications have a 3,14 times greater risk of maternal death.

Keywords: Obstetrics, death, maternal

INTRODUCTION

Maternal Mortality Rate is one indicator of health development worldwide. Mortality is one component of the demographic process in addition to fertility and morbidity that affects the population structure of an area. Maternal Mortality Rate is a scale used to determine the number of maternal deaths in a country.¹ MMR is an indicator of the good and bad health services of a country, especially those related to maternal and child health problems.² Maternal mortality is one of the indicators to see the quality of health services in a country.³

Maternal mortality is the "tip of the iceberg" from a long-standing maternal condition to a health problem, especially in developing countries. In 2017, it is estimated that 810 mothers in the world die every day and it is recorded that in a year as many as 295,000 mothers die due to complications during pregnancy, childbirth and after delivery.⁴ Maternal mortality in Indonesia is still relatively high compared to neighboring ASEAN

countries, Indonesia's global or regional position is the third highest MMR after Myanmar and Laos, where the MMR is nine times that of Malaysia, five times that of Vietnam and almost twice that of Cambodia.⁵

As for the target reduction in the MMR ratio in the SDGs by 2030 is to reach less than 70 per 100,000 live births.⁶ This is still a health problem that needs attention, because it has a considerable impact on development in the health sector as well as related to the quality of human resources.⁷

Various efforts to reduce MMR have been made by the government, such as the placement of midwives at the village level on a large scale, which aims to bring access to maternal and newborn health services closer to the community. which aims to bring access to maternal and newborn health services closer to the community, so that utilization of health services also increases.⁸

Maternal death according to the limitations of The Tenth Revision of International

Classification of Diseases (ICD-10) is a woman's death that occurs during pregnancy or within 42 days of pregnancy, regardless of the duration and location of pregnancy, caused by pregnancy-related, or aggravated pregnancy or its management, but not death due to accident or chance. The results of the 2015 Inter-Census Population Survey (SUPAS) found that 38 mothers died every day or an MMR of 305/100,000 KH, this figure is still far from the Millennium Development Goals (SDGS) target of 102/100,000 KH and from the 2030 MMR target of 70/100,000 KH.⁹

Impact of maternal death could cause decrease of health status of maternal and child. This condition also effect the life expectancy age. Maternal deaths are divided into two groups, namely direct obstetric death and indirect obstetric death. Direct obstetric death is death directly as a result of obstetric complications in pregnancy, labor and postpartum. Obstetric complications are deviations from normal that occur during pregnancy, childbirth and the postpartum period.

According to the theory of McCanthy and Maine in 1992 for the theory of determinants that affect maternal mortality, there are 3 (three) components in the process of maternal death, namely close determinants that are influenced by intermediate determinants, intermediate determinants influenced by distant determinants and distant determinants. The close determinant is the closest process to maternal death where pregnancy itself and obstetric complications are the direct cause of maternal death.⁴ Most of the threats of maternal death caused by obstetric complications occur due to not getting proper prevention and treatment efforts for obstetric complications of pregnancy.⁸ Nationally, the proportion of obstetric complications experienced by the age of 10-54 years during pregnancy was 28.0%, at delivery 23.2% and during the puerperium 11.4%.⁶

Based on the results of research by Jayanti et al (2016),⁸ Masturoh et al (2017),¹¹ Prihesti et al (2019),¹² Kusnadi et al (2019),¹ Aditya et al (2019).³ It was found that there was a relationship between obstetric complications and maternal mortality. This is also in line with the results of research by Fransiska et al (2017)¹³ that pregnant women who experience pregnancy complications are a direct determinant of maternal death ($p < 0.001$), where mothers who experience complications during pregnancy have 11.24 times the risk of experiencing maternal death compared to mothers who experience complications during pregnancy no complications (OR = 11,24; 95% CI: 4,55 – 27,77).¹³

On the other hand, this is contrary to the research conducted by Sukfitrianty et al (2016), Awang (2017)¹⁴ where it was found that there was no significant relationship between obstetric complications and maternal mortality. This research is supported by the results of Jusuf et al (2019)¹⁴ that the age of less than 20 and more than 35 years has a risk of 3,882 times independently the risk of increasing the number of maternal deaths and education level 9 years has a risk of 3,178 times independently of the risk of increasing the number of maternal deaths.

From the above background, a special study is needed to determine the relationship of obstetric complications to the incidence of maternal mortality by conducting a systematic meta-analysis review from various journals and research articles related to the meta-analysis.

METHOD

This study uses a literature review method. Literature review is a systematic, explicit and reproducible method for identifying, evaluating and synthesizing research results and ideas that have been produced by researchers and practitioners.¹⁴ Researchers use literature review because it is currently not possible to conduct research directly while being social distancing.

This study uses a meta-analysis research design with a correlation meta-analysis research design. As a reference for formulating research questions, you can use the SPIDER method (Sample, Phenomenon of Interest, Design, Evaluation, Result), identification of Research Questions:

1. S (Sample): Maternal death cases
2. P-I (Phenomenon of Interest): The incidence of maternal death is suspected to be due to direct causes such as obstetric complications.
3. D (Design): Cross-Sectional and Case-control study design
4. E (Evaluation): To reduce the incidence of maternal mortality, screening and prevention efforts are needed for direct causes
5. R (Research type): Analytical and quantitative observational research

Research protocols in meta-analysis can use the concept of Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA).

The search strategy is carried out referring to the protocol that has been created and determines the location or source of the database (Google Scholar, PubMed). Data extraction was carried out after the research protocol process using the PRISMA method, data extraction was carried out manually by

creating a form containing: article type, journal or conference name, year, title, keywords, research method and others. Extract the data as follows:

1. Article Type: Fulltext
2. Journal Name: All online journals recorded in PubMed (in English), Google Scholar (in Indonesian). Sinta indexed articles 1-4
3. Year: 2015-2020
4. Title: The relationship of obstetric complications to the incidence of maternal mortality
5. Keyword: Search on Advance Pubmed, Google Scholar using the following
6. keywords, for Advance Pubmed "complicate obstetric and maternal mortality". Advance Google Scholar with keywords "komplikasi obstetri" AND "kematian maternal".
7. Research methods: Cross-sectional Study and Case control
8. Statistical Data: P-Value, Odds ratio by including the value of CI 95%
9. language: Indonesian and English

For the exclusion criteria of this study, among others:

- a. National and international research articles that are not related to the research problem being studied.
- b. Paid Articles.
- c. Article not fulltext full.
- d. Cohort study design, randomized controlled trial, system review, scoping review, literature review.
- e. Not original research, such as thesis, books, web articles and magazines.

The variables that will be used in the research to be carried out are the independent variable, namely obstetric complications, and the dependent variable, namely the incidence of maternal death. Statistical test using effect size and effect summary through Meta-Analysis Calculator Website Meta-mar program (Free online Meta-Analysis Service).

RESULT AND DISCUSSION

Based on the research protocol that has been made previously using the concept of the Flow Diagram Protocols of Systematic Reviews and Meta-Analyses (PRISMA-2015).

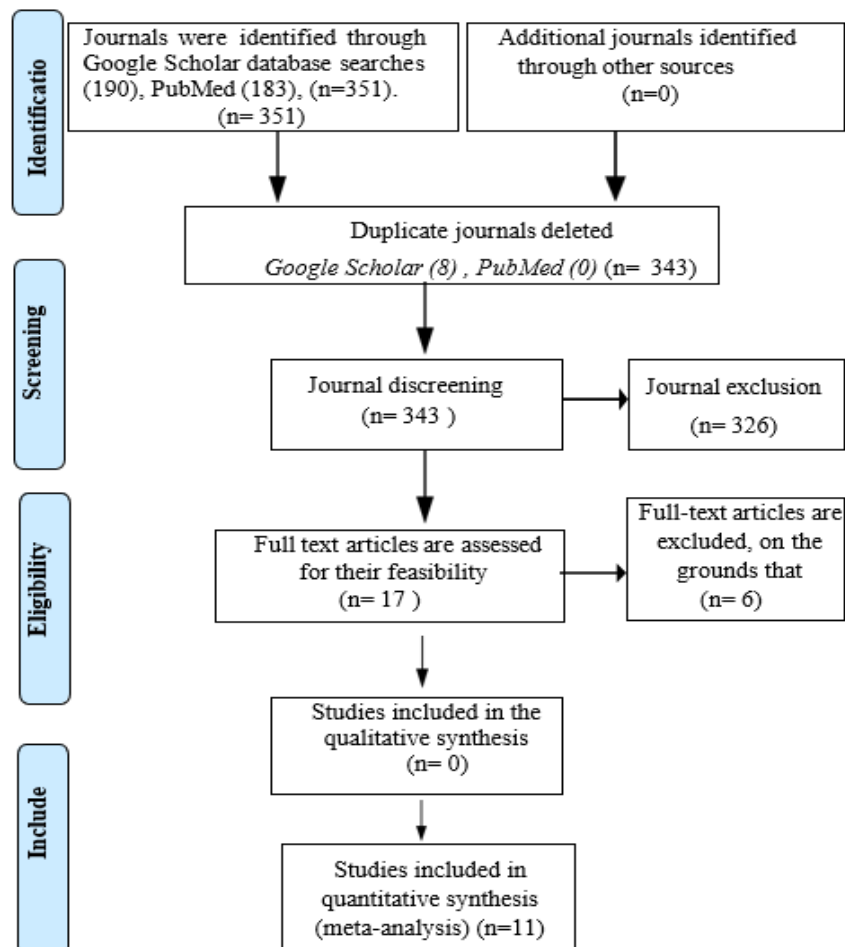


Figure 1. PRISMA-2015 Flow Chart

The first step is identification through searching for articles published online in 2015-2020 using the databased on Advance Pubmed, Google Scholar. For Advance Pubmed using the following keywords: complicated obstetric and maternal mortality (2015:2020 [pdat]), 183 articles were obtained. And to Advance Google Scholar with keywords "komplikasi obstetri" AND "kematian maternal" obtained articles totaling 190 articles.

The results of articles that can be downloaded on this zetero application from the Pubmed database are 183 articles and from the Google Scholar database there are 168 and articles that cannot be downloaded are 22 articles, so the total articles are 351. Case control and cross sectional research.

For full-text articles, 17 articles were assessed for feasibility and complete articles were excluded for reasons such as the articles used as citation material in the introduction and also in the literature review, totaling 6 articles. So that the selected articles

have high quality as studies included in the quantitative synthesis (meta-analysis) totaling 11 articles.

11 (eleven) articles above, the author checks the research journals used as previous research in this study using the Critical Appraisal Skills Program (CASP) and meets these criteria..

Critical Appraisal Skills Program (CASP) which is a bibliography of a number of documents used as citations of a document and each of these documents is contained in a document that specifically examines the author and other works. According to Hartinah (2002: 1) citation analysis is an investigation of citation data from a document, it is also said that bibliometric studies are widely used citation analysis to determine various interests. The Critical Appraisal Skills Program (CASP) method consists of 10 questions to help assess the appropriateness of the article to be analyzed.

Tabel 1. Critical Appraisal Skills Programme (CASP)

No.	Criteria
1.	Is the study type appropriate for the research topic?
2.	Is the research design appropriate to the topic?
3.	Is the study relevant to the search?
4.	Is the review conducted by the researcher sufficient for the inclusion criteria?
5.	Can the study results be combined?
6.	Have the study results been reviewed?
7.	Are the study results appropriate for the criteria?
8.	Can the study results be applied to the local population?
9.	Can all study outcomes be considered?
10.	Are the benefits worth the costs and impacts?

No.	Author	Criteria										Result
												0
1.	Firda Fibrila; 2018	√	√	√	√	√	√	√	√	√	√	10/10
2.	Indah, H Soenamatalina,M; 2015	√	√	√	√	√	√	√	√	√	√	10/10
3.	Krisnita, D.Jayanti, et al; 2016	√	√	√	√	√	√	√	√	√	√	10/10
4.	Masturoh, et al; 2017	√	√	√	√	√	√	√	√	√	√	10/10
5.	Muh. Ikhtiar, Yadi Yasir; 2015	√	√	√	√	√	√	√	√	√	√	10/10
6.	Noferi Kusnadi,et al; 2019	√	√	√	√	√	√	√	√	√	√	10/10
7.	Nova Muhadi, Besral;2015	√	√	√	√	√	√	√	√	√	√	10/10
8.	Renny Aditya,dkk; 2019	√	√	√	√	√	√	√	√	√	√	10/10
9.	Uce, S Prihesti,dkk; 2019	√	√	√	√	√	√	√	√	√	√	10/10
10.	Ratna, D. Fransiska, dkk; 2017	√	√	√	√	√	√	√	√	√	√	10/10
11.	Shely, K. Astuti,dkk; 2017	√	√	√	√	√	√	√	√	√	√	10/10

Source: Primary Data, 2021

Based on the assessment of the feasibility of previous research used in this study, it can be seen that the previous research used meets the criteria needed in a study according to the Critical Appraisal Skills Program (CASP), which means that this research is feasible to continue and there are no problems with the previous research used.

Furthermore, to understand the summary effect size or also known as the effect size of the aggregation, from (11) eleven articles that meet these conditions, a meta-analysis is then carried out using the Meta Analysis Calculator

Website Meta-mar (Free online Meta-Analysis Service) program, meta-analysis: risk/odds ratio model. Based on the calculator results obtained, the summary of studies table and the summary of results table - fixed effect models will come out.

In table 1, it can be seen the summary of studies from each of the (11) eleven articles, so that from these results the Summary of Results – Fixed Effect Models Results Based on Risk Ratio as a combination and the final value of the meta analysis can be drawn in conclusion.

Table 2. Summary of Studies

Study name	Odds Ratio	LnOR	SE_OR	lower_OR	upper_OR	weight(%)_fixed model_OR
Firda Fibrila, 2018	1,92722	0,6560	0,33492	0,9996	3,7155	19,4488
Indah H, Soenamatalina 2015	147,428	4,9933	1,0989	17,104	1270,7	1,80634
Krisnita D Jayanti et al, 2016	8,48484	2,1382	0,53750	2,9587	24,331	7,55144
Masturoh et al, 2017	0,38306	-0,9595	0,40771	0,1722	0,8517	13,1239
Muh. IkhiarYadi Yasir, 2015	1,62820	0,4874	0,56403	0,539	4,9183	6,85776
Noferi Kusnadi dkk,2019	6,98148	1,9432	0,62384	2,0555	23,712	5,60574
Nova Muhadi dan Basran,2015	3,75362	1,3227	0,46183	1,5182	9,2804	10,2287
Renny Aditya dkk, 2019	9	2,1972	0,70972	2,2393	36,171	4,33124
Uce S. Prihesti dkk, 2019	2,53061	0,9284	0,47750	0,9925	6,4519	9,56809
Ratna D Fransiska dkk, 2017	11,237	2,4192	0,4616	4,546	27,77	10,2371
Shely K Astuti dkk, 2017	5,08264	1,6258	0,44055	2,1433	12,053	11,2406

Table 3. Summary of Results – Fixed Effect Models Result based on Odds Ratio

	Ln (Odds Ratio)average	Odds Ratioaverage	SE	95%CI	Z score	P value	Heterogeneity
Fixed Effect Model	1.15	3.14	0.148	[2.354,4.199]	7.755	0.0	$I^2=83,0\%, Chi^2=58.81, df=10$

Based on table 2 Summary of Results – Fixed Effect Models above, the results are Results Based on Odds Ratio with combined result from 11 (eleven) articles such as Ln (Odds Ratio average), Odds Ratio average (OR), SE (Standard Error), CI (Confidence Interval), z score, p value and heterogeneity.

In table 2 the summary of results – fixed effect models is shown in tabular form and the combined effect results from the 11 articles analyzed. Actually, to better provide an overview so that it is easy to understand, the final result of the summary of results is displayed in the form of

a forestplot – fixed effect model graph, this is less than the statistics used. However, the results of the summary of results – fixed effect models in the form of this table will analysis is still carried out on the results displayed.

From the summary of results – fixed effect models in the results based on odds ratio, it is assumed that these 11 articles come from one population, namely the population of research conducted in Indonesia. And the results of the summary of results – fixed effect models show that the variation between the studies analyzed is heterogeneous. This is evidenced by the I² value of more than 50%, namely I² = 83% and Chi² = 58.81, df = 10, which means that this study is highly heterogeneous. The high heterogeneity of the results based on the odds ratio is due to the variation in the variables studied, in addition to the differences in study design in research methods, and also due to variations in the results of the estimated effects (relationships) of the 11 articles analyzed.

Based on table 2 summary of results – fixed effect models in the results based on odds ratio shows that Ln (Odds Ratio average) = 1,15. And the combined effect size (OR) of obstetric complications on maternal mortality is 3.14, which means that obstetric complications have a 3.14 times greater risk of maternal death compared to those without obstetric complications. For the 95% CI value (2.354–4.199) that does not contain a value of 1, the null hypothesis is rejected so that it shows a relationship and is strengthened by a p value <0,05, namely p value = 0,0, which means that there is a relationship between obstetric complications and the incidence of maternal mortality.

The summary of results – fixed effect models in the results based on odds ratio also displays the combined SE (standard error) value of the 11 articles analyzed, namely SE = 0.148, meaning that the smaller the SE value, the better the quality of the study or article being analyzed. Maternal deaths can be divided into maternal deaths that occur during pregnancy, during delivery, and during the puerperium. Based on 11 articles analyzed that maternal deaths that occur in pregnancy are 4 articles (36,4%), the incidence of maternal deaths that occur during childbirth are 2 articles (18,2%) and the incidence of maternal deaths that occur during the puerperium is 5 articles (45,5%). Based on the percentage of the incidence of maternal deaths, most of which occurred during the puerperium. This is in line with the results of the Banten Study II in 2015-2017 that the incidence of maternal death was

34%, occurring after delivery, especially on the 8th–48th day after delivery by 25%. As it is known that About 15% of pregnancies and deliveries have obstetric complications, the problem is that most obstetric complications are unpredictable when they will occur and who will experience which means all pregnancies are at risk.

Based on table 2 Summary of Results – Fixed Effect Models, it is obtained Results Based on Odds Ratio that obstetric complications have a .14 times greater risk of maternal mortality when compared to those who do not experience obstetric complications (OR = 3.14; 95% CI:

2.354-4.199; p value = 0,0), this also shows that there is a significant relationship between obstetric complications and the incidence of maternal mortality. This is in line with the theory of McCanthy and Maine in 1992 that the close determinant is obstetric complications that are the direct cause of maternal death. Based on the research results of Handriani & Melaniani (2015)¹⁶ at the general hospital in Sidoarjo, the results showed that obstetric complications had a risk of maternal death 147,4 times greater than those without obstetric complications. And the results of research by Astuti et al (2017)¹⁷ regarding factors related to maternal mortality in general hospital dr. Hasan Sadikin Bandung in 2009 – 2013, that which contributed to maternal mortality were obstetric complications where obstetric complications had a 5,083 times greater risk of maternal mortality.¹⁸

Most of the threats of maternal death caused by obstetric complications occur due to not getting proper prevention and treatment efforts.¹¹ Based on the Banten Study II in 2015-2017 the incidence of maternal deaths as a result of obstetric complications referred to multiple health care facilities was 63% and 30% of them were never referred or only received one referral. According to the research results of Kusnadi et al (2019)¹ entitled Risk Factors of Maternal Death in Karanganyar, Central Java, Indonesia, concluded that pregnant women

Indonesia, concluded that pregnant women who have obstetric complications related to delays in referral and treatment have a 6,98 times greater risk of maternal death. The increase in cases of obstetric complications caused by health determinants, namely medico-obstetric determinants such as a bad obstetric history, will be greater in incidence by giving an overview or prognosis in subsequent pregnancy, childbirth and postpartum. History of obstetric complications associated with risk in subsequent pregnancies is hyperemesis,

bleeding, abortion, preeclampsia and eclampsia.¹⁹

From the results of this study, most of the studies above can be seen in common that obstetric complications have a significant relationship with the incidence of maternal death. Obstetric complications are deviations from normal conditions that occur in pregnancy, childbirth and the puerperium which directly affect the incidence of maternal death. Cases of maternal death are relatively preventable if a mother gets a faster and better response and quality of health services compared to mothers who experience maternal deaths who get delays and low service quality. Maternal causes are caused by mothers during pregnancy, childbirth and the puerperium who experience obstetric complications that are not detected and are not handled properly.

CONCLUSION

The conclusion of this study is based on 11 journal articles on obstetric complications variables, it is found that there is a relationship between obstetric complications and the incidence of maternal mortality, the results of the effect size (Result based on Odds Ratio) of 3.14 (95% CI (2.354-4.199) with a combined effect value (z score) of 7.755 and p value = 0.0. Statistically, the combined effect is significant if the p value <0.05, which means that in this study there is a significant relationship between the relationship between obstetric complications and the incidence of maternal mortality.

REFERENCES

1. Kusnadi, N, Respati, SH, Sulistyowati S. Risk Factors of Maternal Death in Karanganyar, Central Java, Indonesia. *Journal of Maternal and Child Health* 2019; 4(6): 499-506. <https://doi.org/10.26911/thejmch.2019.04.06>
2. Respati, SH, Sulistyowati S, Nababan R. Analisis Faktor Determinan Kematian Ibu di Kabupaten Sukoharjo, Jawa Tengah, Indonesia. *Jurnal Kesehatan Reproduksi* 2019; 2302-836X. <https://jurnal.ugm.ac.id/jkr.DOI:10.22146/jkr.43463>
3. Adytia, R, Tobing SL, Elyani RAHeriyani, F. Preeclampsia-Eclampsia as Risk Factor of Maternal Mortality in The General Hospital of Ulin Banjarmasin. *Journal of The Indonesia Medical Association*, 2019. DOI: <https://doi.org/10.47830/jinma-vol.69.10-2019-181>
4. WHO. Key facts. Maternal mortality. 16 February 2018; 2018. <https://www.who.int/newsroom/fact.sheets/detail/maternal-mortality>
5. Jayanti, KD, Basuki H, Wibowo A. Faktor yang Memengaruhi Kematian Ibu (Studi Kasus di Kota Surabaya. *Jurnal Wiyata* 2016: 2355-6498.
6. Lidwina A. Angka Kematian Ibu Indonesia Ketiga Tertinggi di Asia Tenggara.; 2021
7. Bappenas. Sustainable Development Goals.
8. Melani, N, Nurwahyuni A. Analisis Faktor Yang Berhubungan dengan Demand atas Pemanfaatan Penolong Persalinan Di Provinsi Banten: Analisis Data Susenas 2019. *J Inov Penelitian* 2022;2(10).
9. Susiana S. Angka Kematian Ibu: Faktor Penyebab dan Faktor Penanganannya. Pus Penelit Badan Keahlian DPR RI. 2019; 9(24).
10. Riset Kesehatan Dasar (Riskesdas) (2018). Badan Penelitian dan Pengembangan. Kesehatan. Kementerian. RI tahun. 2018.
11. Masturoh, Respatih, HS, Murti B. Path Analysis Risk Factors that Influence Maternal Mortality in District of Brebes. *Journal of Maternal and Child Health* 2017: 10-19. <https://doi.org/10.26911/thejmch.2017.02.01.02>
12. Prihasti, US, Nurdianti DS, Ganap. EP. Tren dan Faktor Risiko Kematian Maternal di RSUP Dr. Sardjito Yogyakarta Tahun 2012-2017. *Jurnal Kesehatan Reproduksi* 2019.2302-836X. <https://jurnal.ugm.ac.id/jkr.DOI:10.22146/jkr.46609>
13. Fransiska, RD, Respati SH, Mudigdo A. Analisa Determinan Maternal Mortality di Kabupaten Bondowoso, Jawa Tengah. *Jurnal Kesehatan Ibu dan Anak* 2017. 76-88. <https://doi.org/10.26911/thejmch.2017.02.01.08>
14. Awang, MN. Study of Maternal Mortality based on ANC Category, High Risk Category and High Risk Case Referral in East Sumba District 2011-2015. *Jurnal Info Kesehatan* 2017:110-125. <http://jurnal.poltekeskupang.ac.id/index.php/infokes>
15. Jusuf. EC, Gunawan W, Bangsawan.N. Maternal Death Risk Factors in Wahidin Sudirohusodo Hospital and its Affiliates. *Indonesian Journal of Obstetrics and Gynecology* 2019: 262-6. DOI : <https://doi.org//10.32771/inajog.v7i4.976>
16. Handriani, I, Melaniani S. Pengaruh Proses Rujukan dan Komplikasi Terhadap Kematian Ibu. *Jurnal Berkala Epidemiologi* 2015: 400-11. DOI:10.20473/JBE.V3i3.2015.400-411 Corpus ID: 196474322.
17. Astuti, SK, Aziz MA, Arya DF. Angka Kematian Ibu dan Faktor- Faktor di Dr. Hasan Sadikin General Hospital, Bandung

- di 2009-2013. International Journal of Integrated Health Science 2017: 52-6. <http://doi.org/10.15850/ijhs.v5n2.992>
18. Okoli, C, Schabram K. A Guide to Conducting a Systematic Literature Review of Information Systems Research. Sprouts: Working Papers on Information Systems 2010;10(26).
19. Mappaware, NA. Faktor Determinan Komplikasi dan Rujukan Kasus Obstetri. UMI Medical Journal, 2018. <https://doi.org/10.33096/umj.v3i2.43>