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Indonesian Maternal Mortality: A Systematic Review of Three-Level Determinants 1992–2024

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Abstract

In Indonesia, the occurrence of maternal mortality is significantly elevated, estimated at 94% annually, with a maternal mortality rate of 462 per 100,000 live births. Three factors contribute to the occurrence of maternal death. These factors are categorized as distant determinants, intermediate determinants, and immediate determinants. This study provides a comprehensive analysis of the factors contributing to maternal mortality, categorized into three levels of determinants, ranging from 1992 to 2024. The systematic review examines 25 Scopus and BioMed Central papers on maternal mortality causes. The data suggest that close (43%) maternal mortality causes are mentioned more than intermediate (40%) and distant (17%) causes. Journal topics are mostly medical (62.5%). However, the prevalence of some themes indicates a lack of emphasis on problem-solving. In addition to medical problems, there are other issues that are caused by economic, environmental, and a disorganized health service management system. The prevalence of maternal death in Indonesia is greatly influenced by the associated variables of maternal mortality. Hence, this study aims to propose recommendations for resolving the issue by focusing on three approaches: (1) enhancing socioeconomic conditions; (2) enhancing environmental and maternal health status; (3) promoting the consumption of healthcare services.

Keywords: *Article Review, Maternal Health Status, Socio-economic, Household Incomes, Antenatal Care*

Introduction

The Sustainable Development Goals (SDGs) set an aim for the global maternal death rate to be below 70 per 100,000 live births by 2030. Maternal death refers to the demise of a woman either during pregnancy or in the postpartum period. The postpartum phase refers to the 42-day duration following childbirth (Filippi et al. 2016). Annually, the occurrence of maternal mortality in developing nations is projected to exceed 94%, with a maternal mortality rate of 462 per 100,000 live births. In wealthy countries, maternal mortality is only 11 per 100,000 live births (WHO 2019). The primary factors contributing to maternal mortality are inadequate medical care and complications during pregnancy. Between 11% and 17% of maternal deaths happen during the process of giving birth, while 50% to 71% occur in the period following childbirth (Alvarez et al. 2009). In Indonesia, a range of initiatives have been undertaken to decrease the occurrence of maternal mortality. These include enhancing the provision of fundamental emergency obstetric services, conducting antenatal care examinations, empowering families and communities, and implementing comprehensive emergency obstetric

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neonatal care (Puspitasari, Hastuti, and Murti 2017; Chalid 2016). Community understanding and knowledge are significantly enhanced by community empowerment initiatives (Sukmo, Alhanif Islamudin, and Subha Ari Pamungkas 2014).

In 1992, McCarthy & Maine identified three causes of maternal mortality. These factors are distant, intermediate, and close determinants. Distant determinants refer to non-medical elements that are associated with socio-economic and cultural situations. The availability of health services and the behaviour of using healthcare facilities are two examples of intermediate variables that affect maternal health status. Near determinants refer to elements that have a direct correlation with the mother's state resulting from obstetric illnesses (complications during pregnancy, childbirth, and postpartum period). Maternal mortality rates are simultaneously influenced by a number of interrelated causes of maternal mortality. Through intermediate and immediate determinants, distant determinants indirectly contribute to maternal death (Aeni 2013; Meh, Thind, and Terry 2020).

A modeling approach has been developed to analyze the causes of maternal death, mapping different causal elements and identifying suitable treatments. Furthermore, these analyses are utilized to forecast potential underlying causes that are challenging to identify directly. Detecting complications in pregnancy is more straightforward than identifying socio-economic determinants and evaluating health care. A comprehensive analysis is required to systematically identify and categorize the various factors contributing to maternal mortality depending on their degree of influence (distant, intermediate, immediate). The objective is to determine which primary elements are most and least influential. Certain environmental and cultural factors may turn distant determinants into intermediate or immediate ones (Meh et al., 2020; Aeni, 2013; Ghulmiyyah & Sibai, 2012; McCarthy & Maine, 1992). Consequently, locating the optimal preventive and repressive measures will be facilitated. Therefore, systematic reviews are highly beneficial in identifying the underlying factors contributing to maternal mortality and aiding in the development of policy interventions for policymakers. This study aims to examine the factors contributing to maternal mortality in Indonesia by analyzing the three levels of determinants, based on a comprehensive literature review.

Methods

The literature review reporting technique employs the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. Conducting a literature search using Scopus and BioMed Central. The literature study includes all scholarly articles related to the occurrence of maternal mortality in Indonesia between the years 1992 to 2024. The determination of 1992 is established by referencing the publication year of McCarthy and Maine's journal (1992), which serves as a valuable resource for studying the three levels of determinants that contribute to maternal mortality. Search queries are constructed by combining keywords and Boolean operators (such as "maternal AND mortality AND Indonesia"). The chosen research journals are subsequently inputted into Mendeley to avoid the possibility of duplicate journals.

The inclusion criteria comprise the following: (1) the full-text publications must be written in English; (2) they must examine the correlation between determinants or causes of maternal death and the occurrence of maternal death; (3) the study papers must be completely accessible; (4) the research is located in Indonesia.

The extracted information, organized in a Microsoft Excel spreadsheet, comprises the following categories: (1) names of the authors; (2) title of the paper; (3) year of publishing; (4)

keywords; (5) study objectives. (6) the factors that contribute to maternal mortality can be categorized into immediate determinants, intermediate determinants, and distant determinants; (7) the methodology used for conducting study. publication screening is performed through manual examination of the title, abstract, and overall contents of the publication.

Descriptive analysis was used to classify the study's main causes of maternal death into immediate, intermediate, and distant determinants. The purpose of this is to display the primary factors that contribute to maternal mortality in Indonesia. Subsequently, the title and abstract are analyzed to identify frequently occurring keywords, which are then visualized using a word cloud.

Results

Search Results

A total of 1400 journals were screened, as depicted in Figure 1. The majority of the journals examined the etiology of maternal mortality, however, the substance part (including methods, results, and discussion of conclusions) did not establish a direct correlation with the prevalence of maternal death. Essentially, the publication merely provided the causes and quantity of maternal mortality as supplementary information in the background of the study, without adequately elaborating on their significance. Following a rigorous selection procedure, a total of twenty-five articles were ultimately acquired, focusing on the correlation between the factors contributing to maternal mortality and the occurrence of maternal death in Indonesia. The predominant study design types utilized include retrospective studies (8), followed by cross-sectional studies (6), secondary data analysis (4), root-cause analysis (2), case studies (1), initial primary data source (1), prospective cohort design (1), decomposition approach (1), and ethnographic design (1). The study publication year falls within the period of 2011 to 2023. The majority of authors, over 79%, are from Indonesia. Other contributors include Australia (7.69%), USA (5.59%), UK and Saudi Arabia (1.39% each). The other authors come from Malaysia, Thailand, Nepal, Timor Leste, Belgium, and Pakistan, each accounting for 0.69%.

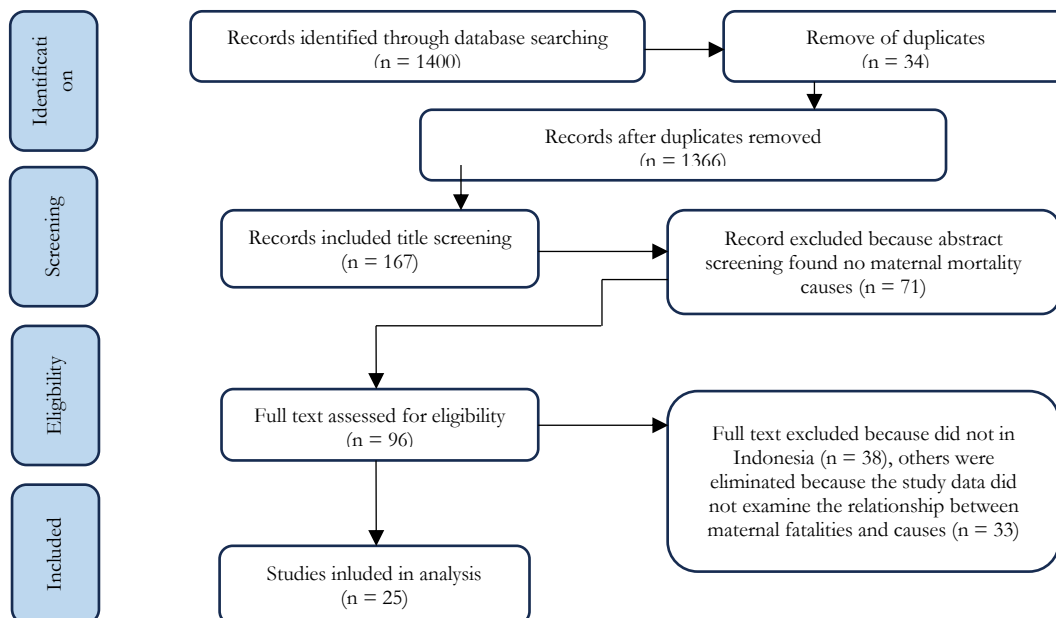


Figure 1: PRISMA Flow Diagram.

Primary Characteristics of Maternal Mortality

Maternal death causes are divided into three determinants to define the problem and inform policy. Figure 2a displays the categorization of each determinant.

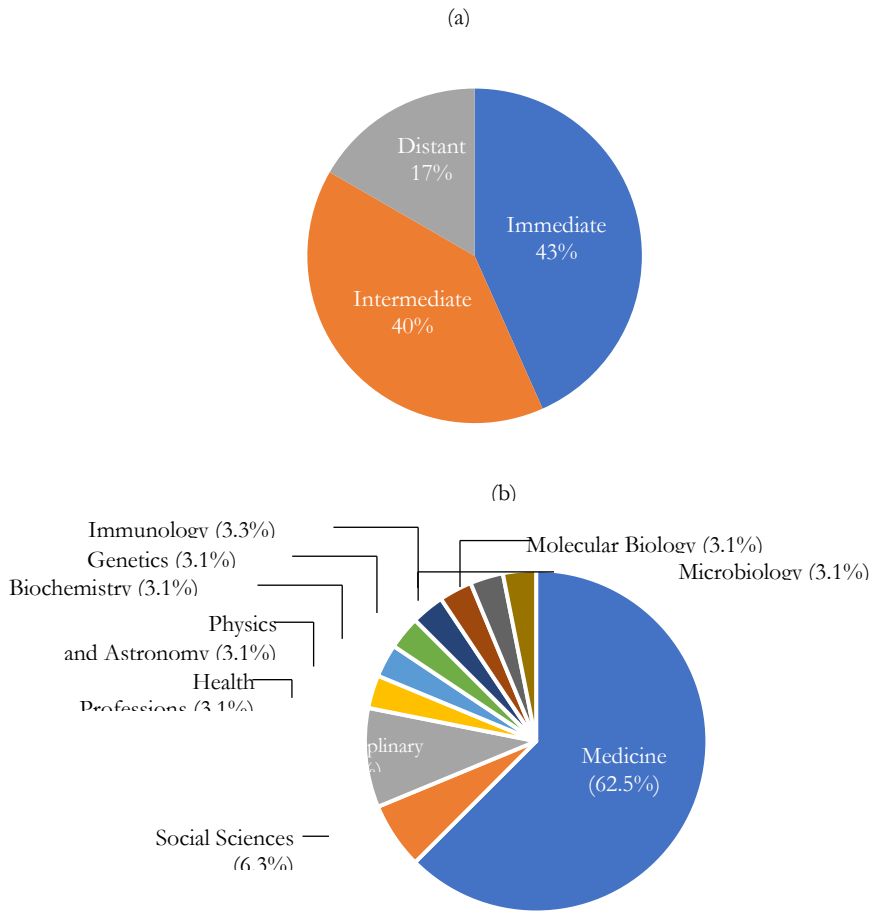


Figure 2: (a) Categories of Determinants of Causes of Maternal Mortality in Indonesia and (B) Proportion of Themes.

Immediate causes cause the most maternal deaths, followed by intermediate and distant. Results suggest immediate determinants increase maternal death rates most. Medicine dominates journal subjects. Merely 9.4% of the themes exhibit multidisciplinary characteristics, while a little 6.3% pertain to the field of social sciences. Figure 2b displays the division of the remaining portion into many other topics. By embracing multidisciplinary, researchers can incorporate extensive analysis and recommendations from several scientific domains. This includes an analysis of hospital administration and the consistent implementation of an effective referral system. The majority of attention is directed only upon medicine, accounting for 62.5%. The data indicates that there is currently a low level of collaboration in the health sciences sector with other scientific fields that are associated. Maternal health problems are influenced not only by individual health variables, but also by several factors such as socio-economic and environmental situations. Furthermore, Sejati et al. (2023) conducted study

(Table 1) indicating that the proportion of obstetrician-gynecology specialists and nutrition professionals had an indirect impact on maternal mortality. The trends in maternal mortality in Indonesia are impacted by the availability of sufficient healthcare personnel, both in terms of their quality and quantity.

Table 1: Characteristics of Systematic Review Publications on Maternal Mortality and Incidence in Indonesia (N= 25).

Authors	Publi sh Year	Aim	Study design/type of study	Summary of maternal mortality findings and causes
Devita Kurniawati et al.	2022	To characterize Indonesian care center Covid-19-related maternal fatalities	Observational-retrospective study	This study reported 15 maternal fatalities from 429 instances. Most maternal deaths are from COVID-19 and pregnancy problems. Acute respiratory distress syndrome (ARDS) caused 53.3% of deaths.
Manggala P. Wardhana et al.	2023	To examine postnatal pregnancies in COVID-19-infected women during pregnancy	Cross-sectional	The study's findings indicate that 73.4% of mothers with a young gestational age experience a more severe (critical) condition compared to other groups. The vital signs, clinical symptoms, and inflammatory markers exhibited a considerable deterioration. Consequently, there was a greater rate of caesarean section ($p= 0.034$), lower birth weight, and a higher incidence of perinatal mortality ($p < 0.001$).
Dandy Candra Satyawan et al.	2023	To examine Eastern Java Province's 2021 COVID-19 pandemic maternal deaths and maternal health service quality	Secondary data, sample calculated using the Solvin formula	Results showed a significant correlation between Covid and maternal death ($p= 0.195$). There is a significant association between maternal mortality and the quality of prenatal treatment. Antenatal care quality is strongly linked to the high frequency of Covid cases in women during the epidemic.
Henry Manik et al.	2021	To identify the main factors that affect mother behavior to lower maternal death rates using existing theories	Analytic observational with cross sectional study design (quantitative and qualitative)	Maternal mortality rates are impacted by the actions and choices of mothers. When mothers actively contribute to the reduction of maternal mortality rates. Effective communication plays a crucial role in shaping maternal behavior.
Trisari Anggondowati et al.	2022	To evaluate pregnancy-related mortality in Jember Regency, East Java, Indonesia, and practical nursing and health insurance searches	Cross-sectional study	There were 103 pregnancy-related deaths. Some 40% occur after 24 hours postpartum, 36% during delivery, and 24% throughout pregnancy. Maternal deaths were caused by hemorrhage (38.8%), hypertension (20.4%), and sepsis (16.5%). The causes of mortality are intricately linked to individuals' patterns of seeking healthcare.
Eka Nur Sejati et al.	2023	To examine Indonesia's health resource-based maternal mortality ratio trends and determinants	An explanatory study employing repeated cross-sectional research	The ratio of obstetrician-gynecology specialists and nutrition professionals has an impact on maternal mortality. The maternal mortality rates in Indonesia is affected by the availability of healthcare personnel.
Sutopo Patria Jati et al.	2023	To assess the attributes and consequences of 95 maternal fatalities attributed to Covid-19	Observational-retrospective study	Most pregnant women (98.8%) died from not getting the Covid-19 vaccination. Pregnant women infected with Covid-19 who did not receive adequate intensive care support experienced fatalities.
Dini Pusianawati et al.	2023	To demonstrate the difficulties of controlling pulmonary hypertension in low-income pregnant women	Case study	Maternal and fetal mortality is caused by mothers with a history of cardiovascular disease. Maternal mortality in poor socioeconomic countries, such as Indonesia, is strongly impacted by heart illness, including tachypnea and dyspnea.
Riznawaty Imma Aryanty et al.	2021	To examine community-level effects of contraceptive use on maternal mortality	First primary data source	Higher maternal mortality is linked to lower contraceptive rates, poorer family conditions, parity four-plus births, lower hospital population density, more birth attendants, and domicile outside Java.
Muhammad Ilham Aldika Akbar et al.	2022	To study clinical symptoms and pregnancy outcomes in pregnant women with Covid-19 in significant Indonesian referral hospitals	Prospective chort design	Maternal mortality with Covid-19 is higher than without Covid-19.
Dimas Ryan Desetyaputra et al.	2021	To identify the root causes of maternal deaths at Dr. Soetomo in 2019	Descriptive retrospective study	Insufficient family understanding of the patient's emergency conditions and medical staff lack of knowledge and abilities when delivering prenatal care cause most maternal deaths.

Authors	Publi sh Year	Aim	Study design/type of study	Summary of maternal mortality findings and causes
Budi Utomo et al.	2021	To assess Indonesia's family planning's historical and potential impact to SDGs 2030 maternal mortality reduction	The decomposition method proposed by Matern Child Health J, 16:456-463, 2012) and regression-based policy modeling	The utilization of contraceptives has resulted in a significant decrease in maternal mortality rates, specifically by 37.5-43.1%, between the years 1970 and 2017. The prevalence of contraception reduces maternal fatalities by 18.9-20%.
Budi Prasetyo et al.	2023	To evaluate how East Java's Human Development Index affects Covid-19-related maternal mortality	A cross-sectional analytic study	The Human Development Index (HDI) and the Covid-19-related maternal mortality rate have a substantial positive correlation.
Adhi Pribadi et al.	2023	To assess the effects of implementing the ZOOM (The Zero Mother Mortality Preeclampsia) initiative between 2015 and 2022	Retrospective observational study	Hypertension, along with preeclampsia/eclampsia, is the underlying cause of maternal mortality. Additional factors contributing to the condition include heart failure problems, hemolysis, elevated liver enzymes, and platelet syndrome. Preeclampsia re-education, early detection, rapid intervention, protocol improvements, and an improved referral system reduced maternal mortality with the ZOOM program.
Dyah Ayu Fatmaningrum et al.	2022	To examine East Java Province's maternal death rates before and during the 2019–2020 COVID-19 pandemic	Retrospective observational study	Gravida status affects maternal mortality.
Eka Diah Kartiningrum et al.	2023	To examine how geographical determinants including prenatal, delivery, and postpartum care affected maternal mortality in East Java Province during the epidemic	A cross-sectional method	Prenatal care, the availability of health services, postpartum care, and services for managing problems all have an impact on maternal mortality.
Febitri Wahyu Rizki Fadilah et al.	2019	To examine the determinants of maternal mortality in the province of Central Jawa	Secondary data analysis	Healthy home habits and community health centers (puskesmas) affect maternal mortality.
Lisa Cameron et al.	2019	To identify the cause of maternal mortality	Secondary data analysis	Access to health care, the number of doctors in the community health center, the village, and the distance to the hospital cause maternal death.
Mohammad Baharuddin et al.	2019	To identify Indonesian hospital-based maternal mortality factors	A retrospective review	Severe preeclampsia and eclampsia are the primary factors contributing to maternal mortality, accounting for 42% of cases.
Mohammad Afzal Mahmood et al.	2021	To examine health service organisation and quality-related maternal mortality	A system approach and root-cause analysis	This analysis reveals that inadequate information flow between health service departments, poor implementation standards, delays in emergency care, and delays in treating worsening patients are the main causes of maternal deaths.
Mohammad Afzal Mahmood et al.	2018	To determine the fundamental factors contributing to maternal mortality	A comprehensive root-cause analysis framework	Poor knowledge, skills, inconsistent protocol application, unavailability of needed services, insufficient risk assessment and management, and inadequate referral systems aggravate maternal mortality caused by poor service quality.
Carine Ronsmans et al.	2011	To examine how HDP prevention and treatment interventions affect maternal mortality rates	Literature review analysis	The use of health interventions has resulted in an 84% reduction in maternal mortality associated with severe preeclampsia or eclampsia.
Yuli Mawarti et al.	2017	To assess the quality of maternity care provided in academic health centres in Indonesia	A retrospective cohort study	This study shows that near-accident mothers received better care than deceased mothers. In detail, maternal deaths are caused by insufficient oxytocin, magnesium sulfate treatment for severe preeclampsia/eclampsia, infrequent prophylactic antibiotics, more vaginal deliveries, and delays in referral to adequate health care facilities.
Asri Adisasmita et al.	2015	To assess demographics, health care characteristics, and obstetric problems and near-miss/death status	A retrospective abstraction	According to this study, postpartum hemorrhage and severe preeclampsia/eclampsia are the primary factors leading to maternal mortality in Indonesia. Poverty and delivering a baby outside of a hospital are considered risk factors.
Suzanne Belton et al.	2014	To assess the incidence of maternal mortality in the eastern region of Indonesia	An ethnographic design	A single or more delays can result in maternal mortality.

An analysis was conducted on the titles and abstracts of all papers to find the most commonly used keywords in research on maternal mortality in Indonesia (Figure 3). The top 5 terms, as shown in Figure 3, are maternal death, maternal mortality, Indonesia, study, and COVID-19.

The subjects of maternal death and mortality are extensively discussed due to their encompassment of numerous sub-topics. COVID-19 is related with pregnancy problems. Subsequently, the study keywords in the article correspond to the enhancement of quality.

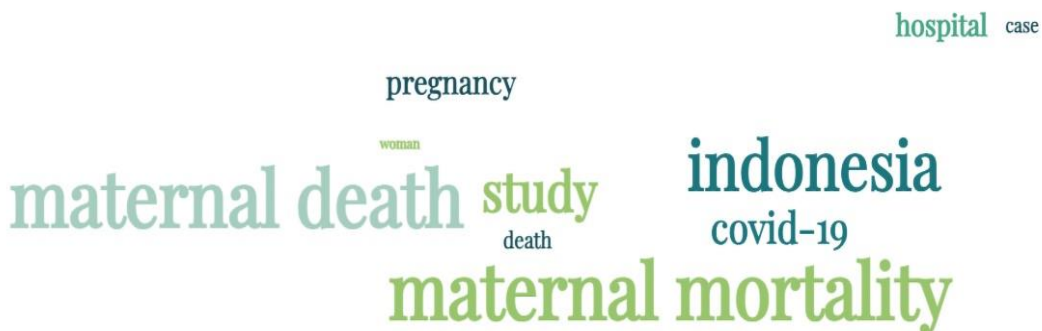


Figure 3: Word Cloud of Indonesian Maternal Mortality Causes.

The Three-Determinant Association

Table 1 presents a concise overview of the journal's findings. Research designs encompass a range of methodologies, including qualitative, quantitative, and mixed-method approaches. Most articles often examine multiple interconnected factors contributing to maternal mortality. The occurrence of Covid-19 significantly worsens maternal mortality resulting from pregnancy problems (immediate). Significantly, Covid-19 contributed to the maternal mortality rate in the 2019-2022 era. Furthermore, intermediate determinants are dominated by poor health services, notably those connected to prenatal care (ANC) and a disorganized hospital referral system (Satyawati et al., 2023; Kurniawati et al., 2022). The correlation between immediate and intermediate determinants is inversely related to distant determinants. Descriptive analysis shows that family members who don't understand pregnant women's emergency conditions (distant determinant) and medical staff who lack knowledge and skills (intermediate determinant) increase pain in pregnant women. In contrast, an inadequate hospital referral system is responsible for a range of pregnancy complications that cause delays in receiving medical care, potentially culminating in catastrophic consequences.

Another paper examined the correlation between near-death experiences of mothers and the quality of health services they received. It found that moms who narrowly avoided accidents received higher quality health services compared to those who encountered death. The lack of awareness and understanding of the patient's family regarding the emergency condition is indicative of their limited knowledge and literacy levels, which can be seen as a distant contributing factor. The risk factor in this scenario is characterised by low economic conditions or poverty. Hence, it is the acquisition of information and economic variables that directly instigate maternal mortality. Pregnant women's dietary choices are influenced by adverse economic conditions. The level of knowledge directly impacts the standard of care provided during pregnancy and the selection of healthcare services (Mahmood et al., 2018; Belton et al., 2014).

Research indicates that the quantity and quality of community health centers are factors that contribute to the management of maternal mortality. In Table 1, Fadilah et al. (2019) found that maternal mortality is spatially influenced by the mother and family's clean and healthy lifestyle, postpartum health services, and the number of health centers and ANC visits in the

first trimester. This research is covered under the physics and astronomy category. Additionally, it explores the utilization of predictive modeling to identify the underlying factors contributing to maternal mortality. There are numerous interconnected aspects (Fadilah et al. 2019). In addition, in terms of health, complications are the primary factor contributing to maternal mortality. The documented pregnancy problems included Covid-19, acute respiratory distress syndrome (ARDS), hemorrhage, hypertension, sepsis, heart disease, preeclampsia/eclampsia, and platelet syndrome. Insufficient local health services are linked to complications that exacerbate the condition of pregnant women in every publication.

Furthermore, maternal mortality is also linked to communication. Thus, medical professionals need good communication skills to complement clinical medical skills. The need for communication is not only limited to the administration of health facilities, in fact communication to patients is significantly more crucial. Communication can help medical staff build trust and offer patients therapeutic options (Manik, Sari, and Wulan 2017).

Discussion

Maternal mortality is a complicated occurrence resulting from a range of reasons, including both direct and indirect factors. The primary factor is an obstetric condition or disease experienced by the mother prior to or during pregnancy (immediate determinant). Indirect causes can be categorized into two groups: medical facilities and related factors (intermediate determinants), and environmental factors (distant determinants). Maternal health status which is influenced by pregnancy difficulties has a severe impact on the risk of maternal death. Liu et al. (2016) found that infections during pregnancy, labor, and the neonatal period affect about 1 million low- and middle-income newborns each year. Untreated, pregnancy problems such as preeclampsia, postpartum hemorrhage, and infection pose a significant risk to the mother's life. Hence, it is crucial to provide significant consideration to the maternal health condition during pregnancy problems to prevent maternal fatalities. Adequate prenatal surveillance, early detection and appropriate treatment of pregnancy problems, and robust care during and after delivery are critical. Through this effort, the chance of maternal death can be decreased. Enhancing the well-being and welfare of expectant mothers can be enhanced (Widoyoko and Septianto 2020). The mother's personal health status influences the risk of mortality. Pregnancy in the presence of pre-existing health issues, such as chronic diseases, Hypertensive disorders in pregnancy (HDP), and hemorrhage might elevate the likelihood of experiencing complications that may result in maternal mortality. Temmerman (2016) study emphasizes the significance of immediately diagnosing and managing pregnancy problems in order to reduce maternal mortality. In addition, according to Lawn et al. (2014), extensive prenatal surveillance, diagnosis of pregnancy problems and effective treatment to decrease maternal mortality are particularly significant. Enhancing general environmental circumstances is vital as it directly impacts the nutritional intake and behavior of pregnant women.

Low-income households also possess low education. Consequently, there is a lack of awareness regarding the health and dietary requirements of pregnant women (Santosa et al., 2022). Education affects maternal mortality, according to Karlsen et al. (2011). According to Bhanbhro et al. (2020), the food budget is strongly related to poverty levels. Low food purchasing power reduces food diversity. Consequently, pregnant women consume less nourishment. Conversely, diet is crucial for preserving the well-being of pregnant women and promoting the development of the fetus. A study conducted in India revealed a higher prevalence of inadequate nutritional status and anemia among women of low socioeconomic

class and those experiencing food insecurity (Mastiholi et al. 2018). Inadequate dietary intake also results in pregnant women having insufficient body weight (BW) and upper arm circumference (UAC). BW and UAC serve as markers for maternal pregnancy health. Hence, it is imperative for pregnant women to augment their food consumption in order to fulfill their nutritional requirements by adopting favorable eating habits, thereby ensuring enough nutrition during pregnancy and mitigating the risk of malnutrition (Jouanne et al. 2021). Consequently, households with limited financial resources frequently struggle to provide for the dietary requirements of mothers on a regular basis. Moreover, economic weakness leads to reduced access to adequate nutrition and adversely affects the mother's overall health. When coupled with challenges in accessing sufficient healthcare services, this combination of factors becomes genuinely lethal. The hospital's delayed arrival and the family's lack of knowledge about emergency conditions resulted in delays in a sequence of medical procedures, ultimately leading to fatal consequences. If the referral system is inconsistent and ineffective, problems will worsen (Mahmood et al., 2018; Belton et al., 2014).

Prasetyo et al. (2023) investigated the association between the human development index (HDI) and maternal mortality. The findings indicate a strong correlation between HDI and maternal death rates. The phrase HDI refers to the affordability of women's access to health, education, and income. As the HDI level increases, maternal mortality decreases. Limited access to healthcare services significantly impacts pregnancy outcomes. Access to health care is the key determinant for mothers selecting delivery assistance facilities. Tshililo et al. (2022) found that education, employment, and income affect household sanitation. According to the findings of Damanik et al. (2023), those with a higher level of education are more likely to effectively utilize latrine sanitation. Moreover, Geere et al. (2018) findings indicate that a plentiful supply of water can foster a propensity among family members to exhibit cleanliness and enhance personal hygiene. Access to uncontaminated water and proper sanitation are crucial factors that promote the well-being of expectant mothers, inhibit the spread of diseases, and have the potential to decrease maternal mortality rates. Similarly, homes lacking proper sanitation can exert a detrimental impact on maternal well-being, perhaps resulting in mortality. The relationship between socioeconomic and environmental factors has a significant impact on the overall health of mothers. A comprehensive approach is required to enhance maternal health, involving strategies such as expanding healthcare accessibility, providing education with appropriate knowledge, and enhancing the quality of living conditions.

Despite the small sample of journals obtained, this systematic review confirms the interdependence of the factors of maternal death and their significant influence on the frequency of maternal death in Indonesia. Despite being invisible, distant determinants have a significant impact and cascade effects. It's a known fact that the environment and the economy have a gradual but significant influence. Thus, action is required to enhance the state of maternal health. The author highlights three key areas where different efforts can be undertaken.

First, employment initiatives can enhance socioeconomic conditions by boosting the local economy, including industry, agriculture, tourism, and other job-creating sectors. Training and mentoring local entrepreneurs to start small and medium enterprises (SMEs). Creating skills training and vocational education programs to boost worker skills and expand employment options. Engage communities in employment program planning and implementation to guarantee local relevance and acceptance. Partner with colleges and training institutes to ensure labor market-relevant skills.

Second, suggestions for stakeholders on environmental health and maternal health. Food diversity intervention is the consumption of a wide range of foods that provide a diverse array of essential nutrients, such as vitamins, minerals, protein, and fiber. This approach is aimed at fulfilling the nutritional requirements of mothers throughout pregnancy and lactation. Given Indonesia's maritime nature, the utilization of marine agriculture products can effectively enhance the supply of nutrients. In addition to that, there are various methods to intervene in food diversity in order to enhance the maternal health status. One such approach is nutritional education, which involves imparting accurate and pertinent information regarding the advantages of different food types for maternal health. This can be achieved through nutrition classes, one-on-one counseling sessions, or the distribution of written educational materials. Enhance access to high-quality and inexpensive food by expanding availability of fresh food markets and food assistance programs. To ensure optimal nutrition for pregnant and breastfeeding mothers, it is essential to conduct regular nutritional monitoring and supervision. Additionally, it is important to administer specific vitamin and mineral supplements, such as folic acid or iron, to mothers who are at a higher risk of experiencing nutritional deficiencies. Another approach could be offering psychosocial assistance to mothers, aiding them in overcoming any barriers they may encounter when attempting to modify their dietary habits. It is crucial to customize these treatments based on the requirements and cultural aspects of local populations to ensure their effectiveness in enhancing maternal health.

Thirdly, the intervention can be implemented by enhancing the accessibility of maternity facilities, specifically in terms of the utilization of health services. To accomplish this, it is vital to guarantee that maternity facilities possess appropriate and comfy infrastructure, encompassing hygienic and well-maintained delivery rooms, ample beds, and excellent sanitation amenities. Ensure that maternity facilities are adequately furnished with important medical apparatus, including fetal monitoring devices, delivery equipment, and vital medications. Facilitating the provision of financial assistance or reasonable access to financing for moms in need of medical care or operations. Enhance the quantity of medical personnel and implement consistent training programs to enhance their expertise and understanding, so ensuring more prompt and efficient services. Engage in cross-sectoral collaboration with education, employment, and infrastructure sectors to enhance the well-being and utilization of maternity facilities, including enhancing the health referral system. An integrated and enduring strategy is essential for attaining improved outcomes in enhancing the utilization of maternal health services.

This study had limitations, primarily because the sample of articles acquired was small (25 articles), and the analysis was limited to the time period of the articles' publication. Therefore, one can use other databases and broaden the search terms to perform research on the same topic. In conclusion, this study can serve as a foundation for developing a new research plan on the prevalence of maternal mortality among scientists. In addition, policymakers in Indonesia might use this work as a reference to enhance the deficient healthcare system.

Conclusion

The systematic review found three primary causes of maternal death in Indonesia. The leading cause of maternal death is immediate, followed by intermediate and distant determinants. These three determinants exert mutual impact on one another. Pregnancy problems are a direct result of inadequate healthcare systems and unfavorable household economic circumstances. Nevertheless, government policies in conjunction with local individuals and communities can

still act to address issues such as improvements in the family economics, inadequate health systems, and pregnancy problems for expectant mothers.

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