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Women's Autonomy and Household Health Factors in Infant Mortality

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ABSTRACT

Introduction: Infant mortality remains a significant concern, spanning from national to global contexts. Despite substantial global progress in reducing infant mortality rates, considerable challenges persist, particularly in specific regions. In 2020, 2.4 million infant deaths occurred within the first month of life, underscoring the need for continued attention to this issue. This study aims to identify the influence and risks of women's autonomy and household health characteristics on infant mortality.

Objective: The objective of this research is to analyze the impact and risks of women's autonomy, household wealth, maternal education, maternal occupation, delivery method, antenatal care, postnatal care, and birth attendant on infant mortality

Method: This study is quantitative in nature, employing a cross-sectional design to examine the influence and risks of sociodemographic factors and household health characteristics on infant mortality. A bivariate and multivariate analysis was conducted on 3,624 respondents. The inclusion criteria were: (a) mothers who were married and living with their husbands, (b) mothers aged 15-49 years, and (c) cases of death of the most recent child from the couple (aged 0-12 months). The exclusion criteria included: (a) divorced mothers, (b) mothers who had never given birth, and (c) mothers younger than 15 years or older than 49 years.

Result: The study found no significant associations between women's autonomy (p=0.499; OR=1.2), household economic status (p=0.09; OR=0.7), delivery method (p=0.856; OR=0.9), quality of antenatal care (p=0.137; OR=1.6), or birth assistance (p=0.277; OR=1.3) and infant mortality. However, significant associations were identified between maternal education (p=0.043; OR=3.1), maternal employment status (p=0.013; OR=0.5), and postnatal care (p=0.0001; OR=5.2) and infant mortality.

Conclusion: The study recommends that the healthcare sector prioritize improving the quality and accessibility of antenatal and postnatal care programs. This includes enhanced training for healthcare workers, promoting regular check-ups, and monitoring infant health post-birth.

Keywords: Women's Autonomy; Infant Mortality; Household Health Factors; Maternal Education; Postnatal Care

INTRODUCTION

Infant mortality is a critical issue that warrants thorough investigation, both in Indonesia and globally. This challenge poses serious obstacles to improving public health and human well-being. Despite progress in healthcare advancements that have reduced infant mortality rates worldwide, several regions continue to struggle with the burden of early loss. Globally, 2.4 million infants died within the first month of life in 2020, illustrating the ongoing severity of this problem. Each day, around 6,700 newborns lose their lives, representing 47% of all deaths of children under five—up from 40% in 1990. Since 1990, however, the world has made remarkable strides in child survival, with neonatal mortality decreasing from 5 million in 1990 to 2.4 million in 2020 (1).

In many developing countries, limited healthcare infrastructure and insufficient antenatal care are substantial contributors to high infant mortality rates. Infant mortality, defined as deaths occurring before a baby reaches one year of age per 1,000 live births in a given year, is a basic measure of public health globally. In the United States, infant mortality rates decreased by 15% over the last decade, dropping from 6.86 per 1,000 live births in 2005 to 5.82 in 2014 (2). The majority of these deaths (75%) occur within the first week of life, with around 1 million newborns dying within 24 hours in 2019. Premature birth, respiratory difficulties at birth, infections, and congenital defects are the leading causes of neonatal mortality. Between the neonatal period and age five, pneumonia, diarrhea, congenital anomalies, and malaria are the main causes of death, with malnutrition being a critical factor that increases children's vulnerability to severe illness (3).

In Indonesia, the 2017 Demographic and Health Survey (DHS) recorded an infant mortality rate of 24 per 1,000 live births. Despite improvements, this figure still falls short of the desired target of 12 per 1,000 live births (4). Infant mortality is closely related to women's autonomy, which plays a pivotal role in human survival. Women are often expected to take full responsibility for raising their children, particularly since childbirth occurs within their own bodies.

Women's autonomy can significantly affect child welfare, including factors influencing infant mortality rates. Women's involvement in decisions related to health, education, and household economics can profoundly impact the living conditions of their children. In the context of infant mortality, women's autonomy may influence access to prenatal and perinatal health services, as well as knowledge and practices regarding family health (5). Women with greater autonomy may be more likely to seek adequate prenatal care, follow medical advice, and manage health risks during pregnancy. Additionally, autonomy can affect decisions around breastfeeding and infant care post-birth, with autonomous women more likely to provide better care for their infants.

Conversely, a lack of women's autonomy can limit their access to necessary healthcare services, increasing maternal and infant health risks, and hindering efforts to prevent infant mortality. Therefore, to reduce infant mortality, it is essential to support women's autonomy through education, access to employment, economic resources, and cultural shifts that promote the well-being of both women and children.

The economic status of the household is also a crucial factor in determining infant mortality. Families facing economic challenges often struggle to access adequate maternal and perinatal healthcare services. Limited budgets may prevent pregnant women from attending regular medical check-ups or receiving essential medical care. Insufficient resources can also affect access to adequate nutrition during pregnancy and postpartum (6). Moreover, economic difficulties may force mothers to return to work shortly after giving birth, limiting the time they can dedicate to infant care, including breastfeeding—an essential factor for infant health. Infants from lower economic backgrounds are also more susceptible to unhealthy environments due to challenges in maintaining safe and hygienic living conditions.

Addressing the negative impact of economic status on infant mortality requires efforts to improve access to affordable, high-quality healthcare for low-income families. Social support programs, economic welfare initiatives, and public health education can play vital roles in reducing health disparities and improving the living conditions of economically disadvantaged families.

METHOD

This study utilized a cross-sectional approach with a quantitative focus to explore the association between women's autonomy, household wealth, maternal education, maternal occupation, delivery method, antenatal care, postnatal care, and birth attendant on infant mortality.

The population studied comprised all Women of Reproductive Age (WRA) between 15-49 years, sampled from the 2017 Indonesia Demographic and Health Survey (IDHS). The sample for this study included Women of Reproductive Age (WRA) who were aged 15-49 years, had a most recent child aged 0-12 months, and were living with their partners. The inclusion criteria were: (a) married mothers living with their husbands, (b) mothers aged 15-49 years, and (c) cases of infant death involving the most recent child from the couple (aged 0-12 months). The exclusion criteria included: (a) divorced mothers, (b) mothers who had never given birth, and (c) mothers younger than 15 years or older than 49 years. The final sample size consisted of 3,624 respondents.

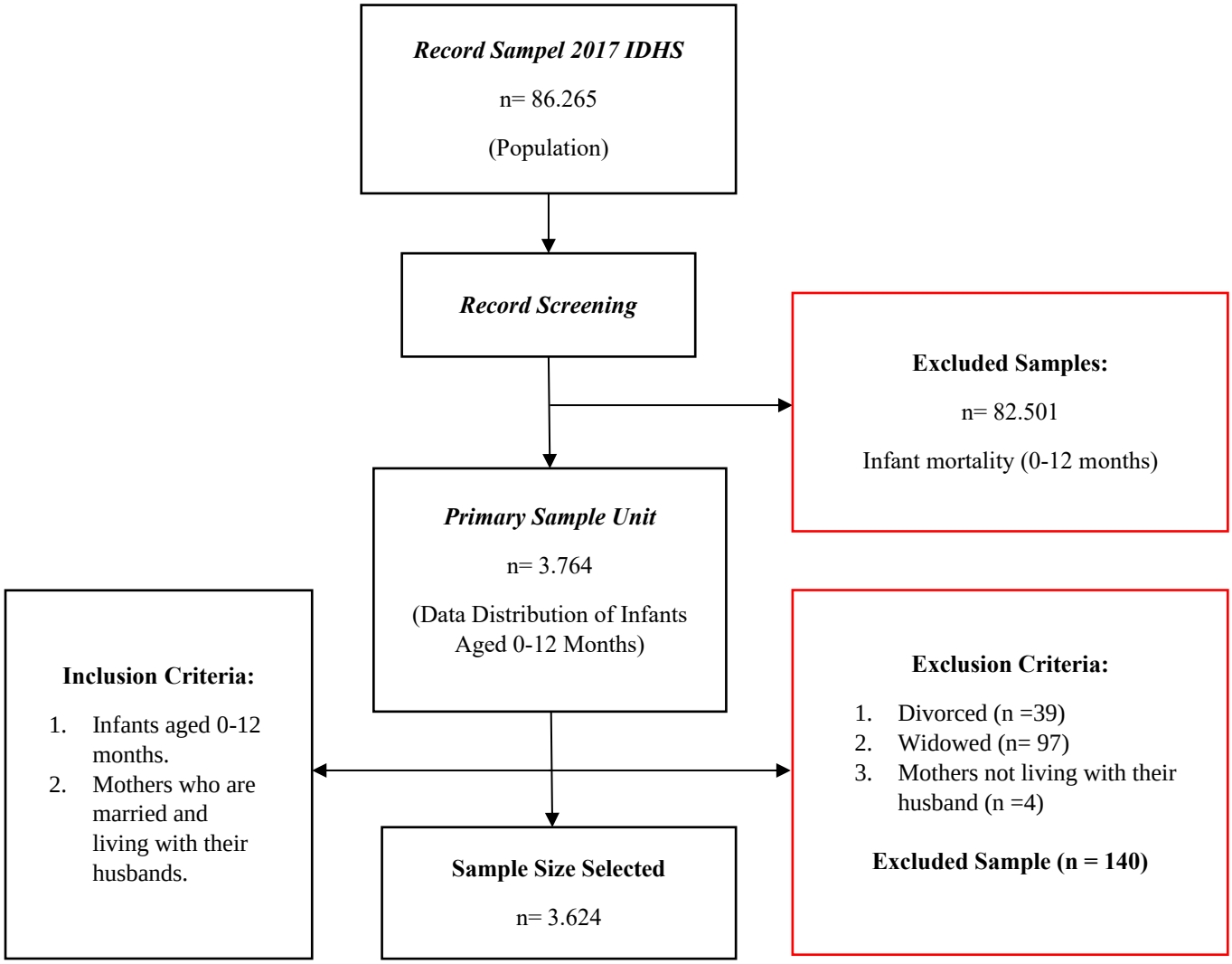

Figure 1. Sample Framework

The initial dataset comprised 3.764 records, representing the distribution of data for infants aged 0-12 months. To align with the research objectives, specific inclusion criteria were applied: Infants aged 0-12 months, and 2. Mothers who are married and living with their husbands were included in the study. Subsequently, 140 records were excluded based on the following criteria: divorced (39 cases), widowed (97 cases), and mothers not living with their husbands (4 cases). After applying these exclusion criteria, the final sample size was refined to 3,624 records, which were used to analyze the factors influencing infant mortality in relation to women's autonomy and household health factors.

Data was collected using questionnaires from the 2017 IDHS, which were administered to the selected respondents. Bivariate and multivariate analyses were performed to investigate the relationships between the independent variables (women's autonomy, household economic status, maternal education, maternal employment, delivery method, antenatal and postnatal care, birth assistance) and the dependent variable (infant mortality). Statistical analyses utilized Odds Ratios (OR) to determine the strength of associations and significance levels (p-values) to evaluate the relationships between the variables.

RESULTS

Based on the research conducted using secondary data from the 2017 Indonesian Demographic and Health Survey (IDHS), an analysis was performed to identify the impact and risks of sociodemographic factors and household health characteristics on infant mortality, with a sample size of 3,624 respondents.

Respondent Characteristics

Tabel 1. Frequency Distribution of Respondent Characteristics Data

Characteristics	Frequency	Percentage
Mother's Age		
<20 Years	202	5.57
20-35 Years	2.652	73.18
>35 Years	770	21.25
Infant Age at Death		
0 Month	120	3.31
1 Month	303	8.36
2 Month	300	8.28
3 Month	317	8.75
4 Month	330	9.11
5 Month	291	8.03
6 Month	268	7.40
7 Month	245	6.76
8 Month	281	7.75
9 Month	313	8.64

The data on respondent characteristics reveal key insights into maternal age and infant mortality. The majority of mothers, 73.18%, are within the age range of 20-35 years, indicating that most pregnancies occur during the prime reproductive years. A smaller proportion of mothers, 21.25%, are over 35 years, which may be associated with higher health risks for both mother and infant. Teenage pregnancies, represented by mothers under 20 years, account for only 5.57% of the sample, indicating a lower prevalence of young mothers in this population.

Regarding infant mortality, deaths are distributed relatively evenly across the first nine months of life. The highest percentage of infant deaths occurs at 4 months, with 9.11% of the total. Mortality is lower at birth (0 months), comprising only 3.31%, and fluctuates slightly from 1 month (8.36%) to 9 months (8.64%). This relatively steady rate of infant deaths throughout the first year suggests that no specific period, except perhaps the 4-month mark, stands out as particularly high-risk.

Univariate Analysis

Table 2. Frequency Distribution of Dependent and Independent Variable Data

Variable	Frequency	Percentage
Infant Mortality		
Not Deceased	3.551	97,99
Deceased	73	2.01
Women's Autonomy		
High Autonomy	602	16.61
Low Autonomy	3.022	83.39
Household Wealth		
Rich	1.686	46.52
Poor	1.938	53.48
Mother's Education		
Attended Formal Education	3.574	98.62
Did Not Attend Formal Education	50	1.38
Mother's Employment Status		
Not Employed	2.007	55.38
Employed	1.617	44.62
Delivery Method		
Caesarean Delivery	675	18.63
Non-Caesarean Delivery	2.949	81.37

Variable	Frequency	Percentage
Quality of Antenatal Care		
Good	2.706	74.67
Poor	918	25.33
Postnatal Care		
Yes	2.323	64.10
No	1.301	35.90
Birth Attendant		
Healthcare Worker	838	23.12
Non-Healthcare Worker	2.786	76.88

The data presented in Table 2 provides a comprehensive overview of various factors related to infant mortality and maternal characteristics. The majority of infants in the study did not experience mortality, with 97.99% not deceased and only 2.01% deceased, highlighting a generally low mortality rate within this sample. Women's autonomy is predominantly low, with 83.39% of women categorized as having low autonomy, which may have implications for their decision-making and health outcomes. Household wealth is fairly evenly distributed, with 46.52% of households classified as rich and 53.48% as poor.

In terms of maternal education, a significant 98.62% of mothers attended formal education, indicating high educational attainment among the participants. Employment status shows a nearly even split, with 55.38% of mothers not employed and 44.62% employed, which may reflect differing socioeconomic roles. Regarding delivery methods, 81.37% of births were non-Caesarean, while 18.63% were Caesarean deliveries.

Quality of antenatal care is generally high, with 74.67% of mothers reporting good care, though 25.33% experienced poor care. Postnatal care was received by 64.10% of mothers, while 35.90% did not have access to it. Lastly, the majority of births were attended by non-healthcare workers (76.88%), with 23.12% attended by healthcare professionals.

Bivariate Analysis

Table 3. Analysis of the Relationship Between Family Characteristics and School-Age Child Mortality

Predictor Variable	Response Variable (Infant Mortality)				Total		OR	CI 95%	P-*value*
	Not Deceased		Deceased						
	n	%	n	%	n	%			
Women's Autonomy									
High Autonomy	5.494	80.81	1.305	19.19	6.799	100			0.07
Low Autonomy	24.882	81.72	5.565	18.28	30.447	100	0.94	0.88-1.00	
Total					37.246	100			
Household Wealth									
Rich	16.170	81.42	3.691	18.58	19.861	100			0.459
Poor	14.206	81.71	3.179	18.29	17.385	100	0.98	0.93-1.03	
Total					37.246	100			
Mother's Education									
Attended Formal Education	15.646	86.76	2.387	13.24	18.033	100			0.001
Did Not Attend Formal Education	14.730	76.67	4.483	23.33	19.213	100	1.9	1.88-2.10	
Total					37.246	100			
Mother's Employment Status									
Not Employed	20.033	81.33	4.598	18.67	24.631	100			0.122
Employed	10.343	81.56	2.722	18.01	12.615	100	0.95	0.90-1.0	
Total					37.246	100			

Predictor Variable	Response Variable (Infant Mortality)				Total		OR	CI 95%	P-*value*
	Not Deceased		Deceased						
	n	%	n	%	n	%			
Delivery Method									
Caesarean Delivery	30.043	81.63	6.761	18.37	36.804	100			0.856
Non-Caesarean Delivery	333	75.34	109	24.66	442	100	1.4	1.1-1.8	
Total					37.246	100			
Quality of Antenatal Care									
Good	2.661	98.26	47	1.74	2.708	100			
Poor	980	97.16	26	2.84	916	100	1.6	1.0-2.6	0.040
Total					3.624	100			
Postnatal Care									
Yes	2.304	99.18	19	0.82	2.323	100			
No	1.247	95.85	54	4.15	1.301	100	5.2	3.0-8.8	0.0001
Total					3.624	100			
Birth Attendant									
Healthcare Worker	825	98.45	13	1.55	838	100			
Non-Healthcare Worker	2.726	97.85	60	2.15	2.786	100	1.3	0.7-2.5	0.277
Total									

The proportion of women with high autonomy, at 98.34%, indicates that infants are less likely to experience death compared to women with low autonomy, who have a proportion of 97.92%. However, for women with low autonomy, the proportion of infant deaths at 2.08% is higher compared to those with high autonomy at 1.66%. Nevertheless, the statistical test results with a P-value of 0.545 and an odds ratio (OR) of 1.26 suggest that there is no significant relationship between women's autonomy and infant mortality.

In the group with "Able" family economic status, the proportion of infant deaths is 1.938%, while the proportion of no infant deaths is 2.22%. In the group with "Unable" family economic status, the proportion of infant deaths is 1.686%, and the proportion of no infant deaths is 1.78%. However, statistical analysis with a P-value of 0.348 and an OR of 0.79 indicates that there is no significant relationship between family economic status and infant mortality.

Based on the analysis of the relationship between the independent variable Mother's Education and the dependent variable Infant Mortality, mothers with higher formal education do not lead to infant mortality (98.04%) compared to mothers without formal education (94.00%). Meanwhile, mothers with lower formal education lead to infant mortality (1.96%) compared to those without formal education (6.0%). Statistical testing with a P-value of 0.013 and an OR of 3.19 shows a significant relationship between mother's education and infant mortality, with mothers without formal education having a 3.19 times higher risk of infant mortality.

In the analysis regarding the relationship between mother's occupation and infant mortality, mothers with lower occupation lead to no infant deaths (97.34%) compared to mothers who do not work (98.51%). Meanwhile, mothers with higher occupation lead to infant mortality (2.66%) compared to mothers who do not work (1.49%). Statistical analysis with a P-value of 0.013 and an OR of 0.5 explains an inverse relationship between mother's occupation and infant mortality. Initially, the risk category was mothers who do not work, but after adjusting the analysis, working mothers become the risk category for infant mortality.

In the analysis of the relationship between delivery method and infant mortality, non-Caesarean delivery methods lead to lower infant mortality (97.97%) compared to Caesarean delivery (98.07%). Meanwhile, Caesarean delivery methods lead to lower infant mortality (1.93%) compared to non-Caesarean delivery methods (2.03%). Statistical analysis with a P-value of 0.856 and an OR of 0.9 indicates no significant relationship between delivery method and infant mortality.

Analysis of the relationship between antenatal care and infant mortality shows that good antenatal care leads to lower infant mortality (98.26%) compared to inadequate antenatal care (97.16%). Meanwhile, good antenatal care

results in lower infant mortality (1.74%) compared to inadequate antenatal care (2.84%). Statistical analysis with a P-value of 0.040 and an OR of 1.6 indicates a significant relationship between antenatal care and infant mortality, with inadequate antenatal care posing a 1.6 times higher risk of infant mortality.

Analysis of the relationship between postnatal care (checked at 2 months after birth) and infant mortality shows that those who receive postnatal care lead to lower infant mortality (99.18%) compared to those who do not (97.16%). Meanwhile, those who receive postnatal care lead to lower infant mortality (0.82%) compared to those who do not (4.15%). Statistical analysis with a very significant P-value of 0.0001 and an OR of 5.2 indicates a strong relationship between postnatal care and infant mortality, with the group not receiving postnatal check-ups having a 5.2 times higher risk of infant mortality.

In the analysis of the relationship between birth attendant and infant mortality, results show that skilled birth attendants (Nakes) lead to fewer infant deaths (98.45%) compared to non-skilled attendants (97.85%). Meanwhile, skilled birth attendants (Nakes) lead to lower infant mortality (1.55%) compared to non-skilled attendants (2.15%). However, statistical analysis with a P-value of 0.277 and an OR of 1.3 indicates no significant relationship between birth attendants and infant mortality, despite the observed risk associated with non-skilled attendants for infant mortality.

Multivariate Analysis

Table 4. Multivariate Analysis of Factors Influencing in Infant Mortality

Infant Mortality	OR	CI (95%) Lower - Upper	P-*value*
Postnatal Care (No Check-Up 2 Months After Birth)	5,4	3,19 – 9,18	0,0001
Mother's Occupation (Employed)	0,5	0,32 – 0,82	0,006
Quality of Antenatal Care Status (Poor)	1,6	0,88 – 2,47	0,040
Mother's Education (No Formal Education)	3,1	0,59 – 7,27	0,043

In the results of the multivariate logistic regression analysis using the stepwise method, several key risk factors for infant mortality were identified. Postnatal care emerged as a critical determinant, with an odds ratio (OR) of 5.4, indicating that infants whose mothers did not receive a postnatal check-up two months after birth are 5.4 times more likely to die compared to those who did receive the check-up (p-value = 0.0001). Additionally, mother's occupation plays a significant role; employed mothers have infants with a 50% lower risk of mortality (OR = 0.5, p-value = 0.006). The quality of antenatal care is also crucial, as poor antenatal care is associated with a 1.6 times higher risk of infant mortality (OR = 1.6, p-value = 0.040). Finally, maternal education is a significant factor, with mothers lacking formal education having a 3.1 times higher risk of their infants dying compared to those with formal education (OR = 3.1, p-value = 0.043).

However, after implementing the stepwise selection method, the variables Women's Autonomy, Household Wealth, Delivery Method, and Birth Attendant were removed from the model due to their lack of significant contribution to infant mortality. Despite showing initial significance in the bivariate analysis, these variables did not retain their relevance in the multivariate context. In contrast, Mother's Employment Status emerged as a significant factor in the final model. Initially displaying a notable relationship in the bivariate analysis, the multivariate analysis with the stepwise approach confirmed that employed mothers have a significantly lower risk of infant mortality (OR = 0.5, p-value = 0.006). This finding underscores the crucial role of maternal employment in reducing the likelihood of infant mortality, emphasizing the importance of supporting mothers in the workforce to improve child health outcomes.

DISCUSSION

The Influence of Women's Autonomy on Infant Mortality

In this study, women's autonomy was measured through three questions that cover aspects of household decision-making related to access to healthcare services, household expenditures, and visits to relatives. The women's autonomy score was determined based on the answers to these three questions, assigning a score of 1 if the respondent or mother stated that she made the decision herself, and a score of 0 if the answer indicated that someone else made the decision. The final scores were summed, and the scores were categorized into two groups: low autonomy with a score of less than 2, and high autonomy with a score of 2 or more.

In the analysis of the relationship between the independent variable "Women's Autonomy" and the dependent variable "Infant Mortality" based on 2017 SDKI data, it was found that in the group with high women's autonomy, 98.34% did not experience infant mortality, while 1.66% experienced infant mortality. Meanwhile, in the group with low women's autonomy, 97.92% did not experience infant mortality, and 2.08% experienced infant mortality. The

analysis results showed an Odds Ratio (OR) of 1.26 with a 95% confidence interval between 0.6 and 2.4. Based on this OR result, it can be explained that low women's autonomy has a 1.2 times higher risk of causing infant mortality. The relationship analysis results with a P-value of 0.499 indicate that there is not enough statistical evidence to reject the null hypothesis, meaning there is no statistically significant relationship between infant mortality and high or low women's autonomy.

Multivariate analysis was conducted using logistic regression tests to examine the effect in-depth and to assess the Odds Ratio (OR) as a risk assessment of the independent variable on the dependent variable. After applying the stepwise approach in multivariate analysis using logistic regression, the results showed that the variable of women's autonomy did not meet the criteria to remain in the model with a P-value=0.51, indicating that there was no relationship between women's autonomy and infant mortality. With an OR=1.2, it can be explained that low women's autonomy carries a 1.2 times higher risk of causing infant mortality.

Based on the study by Stiyaningsih et al. (2017) regarding the impact of women's autonomy on infant mortality, the results of that study align with the findings of this research. The category of low women's autonomy does not have a significant relationship with infant mortality, while high women's autonomy has a significant relationship with infant mortality (P-value=0.000). This creates consistency between this research and previous studies, although there is a difference in the P-value concerning the relationship between high women's autonomy and infant mortality (7).

The Influence of Family Economic Status on Infant Mortality

The analysis of the relationship between the independent variable "Family Economic Status" and the dependent variable "Infant Mortality" was conducted by dividing respondents into two main groups: "Capable" and "Not Capable."

In the "Capable" group, the analysis results showed that 97.78% of respondents did not experience infant mortality, while 2.22% did. The total number of respondents in this group was 97, and the analysis results showed an Odds Ratio (OR) of 0.79 (95% Confidence Interval: 0.4 - 1.2), indicating that the "Capable" family economic status does not have a significant risk for infant mortality (P-value = 0.348).

Meanwhile, in the "Not Capable" group, 98.22% of respondents did not experience infant mortality, while 1.78% did. The total number of respondents in this group was 3,527. The analysis results showed an OR value of 0.79 (95% Confidence Interval: 0.4 - 1.2) with a P-value = 0.348. The interpretation of the results indicates that there is not enough statistical evidence to reject the null hypothesis, which states that there is no significant relationship between infant mortality and family economic status. Furthermore, the bivariate analysis with a stepwise approach showed that the variable "Family Economic Status" did not remain in the model, with a P-value of 0.09.

Previous studies have extensively investigated the relationship between family economic status and infant mortality. According to the study by Aisyan et al. (2013), similar findings showed that families with higher economic status tended to have lower infant mortality rates (8). Other studies, such as Nurwati et al. (2021), found similar results, where the availability of economic resources in the family positively impacted infant well-being (9).

However, it should be noted that contradictory findings have also emerged in the literature. The study by Lestari (2020) indicated that other factors, such as access to healthcare services and maternal knowledge about infant care, may play a more dominant role in determining infant mortality rates, even among families with lower economic status (10).

The research hypothesis identified from the results of this study brings several important considerations for interpreting the findings and provides a basis for further research. Although this study did not find a significant relationship between family economic status and infant mortality, the hypothesis that other factors, such as healthcare accessibility and maternal knowledge, may significantly impact infant mortality rates. Additionally, assumptions were made about the variability of regional or geographical contexts that may influence the relationship between family economic status and infant mortality. With this diversity, future research is expected to consider regional factors that may be key determinants of this phenomenon. Data limitations were also an important assumption, considering that the data used in this study had certain limitations.

Therefore, future research is expected to expand the timeframe or use alternative datasets to gain a more comprehensive understanding of the dynamics of the relationship between family economic status and infant mortality. In addition to these factors, assumptions regarding the role of social and cultural factors in society are acknowledged as important points. The influence of these variables could become the focus of future research to gain deeper insights into the complexity of the relationship between family economic status and infant mortality rates.

Recent studies indicate that the influence of family economic status may not always have a significant risk or relationship with infant mortality. Non-economic factors, such as access to medical care, parental education, and environmental conditions, have been identified as more important factors in determining infant mortality risk than family economic status. For example, a study conducted by Goudar found that despite differences in family economic

status, no significant relationship was found between infant mortality and family economic status in the Southern and Central regions of India. Similar findings were also revealed in a study conducted by An and Hao (2021) in China, showing that although families with higher economic status tend to have lower infant mortality rates, this relationship is not always consistent and may depend on other factors such as healthcare accessibility and maternal knowledge about infant care (11).

The bivariate analysis from these studies also reinforces the complexity of the relationship between family economic status and infant mortality. For example, research conducted by Ekholuenetale in Nigeria showed that the variable "Family Economic Status" did not remain in the analysis model, indicating that other factors may have a greater impact on determining infant mortality. This suggests that the interaction between family economic status and non-economic factors needs to be comprehensively considered when evaluating the risk of infant mortality.

Therefore, future research that takes into account non-economic factors and regional contexts is expected to provide a more holistic understanding of this phenomenon. Studies focused on efforts to improve access to medical care, enhance parental education, and improve environmental conditions are expected to make a significant contribution to reducing global infant mortality rates.

The Influence of Mother's Education on Infant Mortality

The bivariate analysis of the relationship between mother's education and infant mortality yielded a p-value of 0.043, indicating a relationship between mother's education and infant mortality. The Odds Ratio (OR) obtained was 3.19, explaining that mothers without formal education have a 3.19 times higher risk of causing infant mortality. After performing multivariate testing using logistic regression to examine the deeper impact of mother's education, specifically focusing on mothers without formal education, a different result from the bivariate test was found. The multivariate test results showed a p-value of 0.25, indicating no significant relationship between mother's education and infant mortality. Furthermore, the Odds Ratio (OR) was found to be 2.0, explaining that mothers without formal education have a 2 times higher risk of causing infant mortality. After testing with the Stepwise approach based on the Wald test, the variable of mother's education remained in the model with a p-value of 0.043, reaching the specified level of significance.

Previous studies have revealed several relevant findings regarding the relationship between mother's education and infant mortality. One such study is the research conducted by Kiross et al. (2019). This study focused on the impact of mother's education on child health, with a particular emphasis on infant mortality rates (12). The study found that a mother's level of education had a significant correlation with the risk of infant mortality. Mothers with higher levels of formal education tended to have lower infant mortality rates compared to mothers without formal education. This finding supports related studies that show a positive relationship between mother's education and child well-being.

Additionally, the research by Soe et al. (2019) also provided insights into the mechanisms that may explain this relationship (13). Better access to health information, utilization of maternal health services, and the mother's ability to recognize danger signs in infants were identified as potential mediators in the relationship between mother's education and infant mortality.

This research summarizes several critical assumptions guiding the interpretation of the potential impact of a mother's lack of schooling or formal education on child health. First, it is assumed that a lack of maternal education may hinder the family's access to health information, medical services, and the understanding of proper infant care practices. This assumption is based on the idea that mothers without formal education may face limitations in accessing health resources that could improve their understanding of infant care. Second, it is assumed that mothers without formal education may face difficulties in recognizing danger signs in infants or lack knowledge of health practices that could reduce the risk of infant mortality. This assumption arises because maternal education plays a key role in raising awareness of infant health warning signs and helps mothers take preventive action or seek the necessary medical assistance. Third, it is assumed that the lack of maternal education may influence daily infant care practices, such as nutrition, hygiene, and child development stimulation.

The Influence of Mother's Employment on Infant Mortality

This study reveals significant analysis results regarding the relationship between mother's employment and infant mortality based on the 2017 IDHS data. With a p-value of 0.013, the findings show that there is a statistically significant relationship between mother's employment and infant mortality. Furthermore, the Odds Ratio (OR) value of 0.5 indicates that mothers who are not employed have a lower risk of causing infant mortality compared to working mothers.

A multivariate analysis conducted to understand the deeper impact of the mother's employment variable, specifically in the risk category of non-working mothers, showed interesting results. The Stepwise approach with the Wald test indicated that mother's employment remained in the model with a p-value of 0.013. This suggests that,

even after considering other factors that may influence the relationship, the mother's employment still has a significant effect on infant mortality.

This is consistent with the study by Adegbosin et al. (2019), which explained that mothers who do not work are at risk for infant death (14). These findings imply that the employment status of the mother plays an important role in the risk of infant mortality, and continuing this research may provide further insights into the mechanisms and mediating factors involved in this relationship.

Several assumptions underlie the interpretation of the relationship between mother's employment and infant mortality. The initial assumption is that there is a causal relationship between mother's employment and infant mortality. This means that it is assumed that the mother's employment can directly influence factors related to the risk of infant mortality. The second assumption is that the impact of mother's employment on infant mortality is independent, implying that this influence remains significant even when controlling for other variables that might affect the relationship. Therefore, the interpretation can be made by stating that the effect of mother's employment on infant mortality is not solely influenced by additional factors not included in the analysis.

The Influence of Delivery Method on Infant Mortality

In this study, an analysis was conducted to examine the relationship between the independent variable "Delivery Method" and the dependent variable "Infant Mortality" using data from the 2017 IDHS. Two main groups were formed: "Non-Cesarean" and "Cesarean Delivery." In the "Non-Cesarean" group, 97.97% did not experience infant mortality, while 2.03% did. Meanwhile, in the "Cesarean Delivery" group, 98.07% did not experience infant mortality, and 1.93% did. The total number of respondents in this analysis was 3,624. With an Odds Ratio (OR) of 0.9 and a 95% confidence interval between 0.5 and 1.7, the results of the study indicate that the Cesarean delivery method does not have a significant risk in causing infant mortality. A p-value of 0.856 shows that there is not enough statistical evidence to reject the null hypothesis, indicating that there is no significant relationship between the delivery method and infant mortality. The OR of 0.9 implies that Cesarean delivery has a relatively low risk in relation to infant mortality.

A multivariate analysis using logistic regression and the stepwise approach provided further insights. The results show that the "Delivery Method" variable did not remain in the model, with a p-value of 0.919, which exceeds the significance threshold.

A study conducted by Adewale et al. (2023) contributes important insights into understanding the relationship between normal delivery methods and the risk of infant mortality. In this study, researchers explored the impact of normal delivery methods on the incidence of infant mortality, adding a new dimension to the existing knowledge about factors that may affect infant well-being during the birth process (15).

This study supports the conclusion that normal delivery methods are more risk for causing infant mortality compared to Cesarean methods, possibly due to several factors that need to be considered. First, researchers may assume that normal delivery processes involve higher risks due to the possibility of unexpected complications, such as premature birth, umbilical cord issues, or other difficulties that could increase the risk of infant mortality.

The findings suggest that normal delivery may introduce additional risk factors, such as infection or trauma during the birth process, which could contribute to the risk of infant mortality. This assumption may be based on the idea that Cesarean methods, as a procedure carried out through medical intervention, can reduce the likelihood of complications during delivery. Moreover, researchers may assume that the level of expertise and experience of medical professionals during normal delivery may vary, and the lack of intensive medical supervision in normal delivery could increase the risk of infant mortality. Therefore, these factors may create the assumption that normal delivery methods are riskier than Cesarean methods in the context of infant mortality.

The Influence of Antenatal Care on Infant Mortality

This study investigates the impact of antenatal services on infant mortality based on the 2017 IDHS data. Two main groups were formed— "Good" and "Poor"— to analyze the relationship between the independent variable "Antenatal Services" and the dependent variable "Infant Mortality." In the "Good" group, 98.26% did not experience infant mortality, while 1.74% did. On the other hand, in the "Poor" group, 97.16% did not experience infant mortality, and 2.84% did. The total number of respondents in this analysis was 3,624.

The analysis results showed an Odds Ratio (OR) of 1.6, with a 95% confidence interval between 1.0 and 2.6. This indicates that poor antenatal services have a 1.6 times higher risk of causing infant mortality. A p-value of 0.040 implies that there is sufficient statistical evidence to reject the null hypothesis. In other words, there is a significant relationship between infant mortality and the quality of antenatal services.

A multivariate analysis using the stepwise approach revealed that poor antenatal services remained in the model with a p-value of 0.040. The analysis results indicate a significant association between infant mortality and the quality of antenatal services, with the poor service group showing a higher risk.

The Influence of Postnatal Care on Infant Mortality

This study explores the relationship between the independent variable "Postnatal Services" and the dependent variable "Infant Mortality" based on 2017 IDHS data. Two main groups were formed: "Yes" (received postnatal services with a check-up within 2 months after birth) and "No" (did not receive postnatal services). In the "Yes" group, 99.18% did not experience infant mortality, while 0.82% did. In contrast, in the "No" group, 95.85% did not experience infant mortality, but 4.15% did. The total number of respondents included in this analysis was 3,624.

The analysis showed an Odds Ratio (OR) of 5.2, with a 95% confidence interval between 3.0 and 8.8, indicating that the group that did not receive postnatal services had a 5.2 times higher risk of infant mortality compared to the group that did receive postnatal services. The p-value of 0.0001 provides strong statistical evidence to reject the null hypothesis, confirming a significant relationship between infant mortality and receiving postnatal services.

Multivariate analysis using the stepwise approach confirmed that the variable "postnatal check-up 2 months after birth" remained in the model, with a p-value of 0.000, which is well below the significance threshold. This finding suggests that the significant relationship between receiving postnatal services and infant mortality persists even after controlling for other potential influencing factors. These results further support the notion that postnatal services can have a significant impact on reducing the risk of infant mortality. Ongoing research in this area can provide deeper insights into preventive mechanisms and strategies that can be implemented.

A study by Tiruneh et al. (2019) aligns with the findings of this research, showing similar results regarding the impact of receiving postnatal services on reducing infant mortality rates (16). Their study supports the idea that postnatal check-ups within 2 months of delivery can contribute to lowering the incidence of infant mortality.

The assumptions in this research refer to the basic premise that failing to undergo a postnatal check-up within 2 months after birth may increase the potential for infant mortality. This assumption is based on the belief that postnatal services play a critical role in detecting and addressing potential health problems in infants that can develop after birth.

Therefore, if mothers do not receive postnatal care, it is assumed that potential health issues in the baby might not be identified early, leading to delays in necessary medical interventions. This assumption also relies on the idea that regular postnatal care provides more intensive health monitoring, detecting symptoms or risks of infant mortality earlier, thus offering greater opportunities for effective preventive or therapeutic measures. Additionally, it is assumed that the lack of participation in postnatal check-ups may limit the mother and baby's access to health information and care, which could reduce the risk of infant mortality.

The Influence of Birth Attendants on Infant Mortality

In this study, an analysis was conducted to explore the relationship between the independent variable "Birth Attendant" and the dependent variable "Infant Mortality" using data from the 2017 IDHS. Two primary groups were formed: "Health Professional" and "Non-Health Professional." The analysis showed that in the "Health Professional" group, 98.45% did not experience infant mortality, while 1.55% did. In the "Non-Health Professional" group, 97.85% did not experience infant mortality, but 2.15% did. The Odds Ratio (OR) from the analysis was 1.3, with a 95% confidence interval between 0.7 and 2.5. Although the OR suggests that those attended by non-health professionals had a 1.3 times higher risk of infant mortality compared to those attended by health professionals, the p-value of 0.277 indicates insufficient statistical evidence to reject the null hypothesis. This suggests that there is no significant relationship between birth attendants and infant mortality, and the results may be due to random variation.

Additionally, a multivariate analysis using the stepwise approach was performed to determine whether the category of non-health professional birth attendants remained in the model. The results showed a p-value of 0.277, exceeding the predetermined significance threshold. As a result, this variable did not remain in the model, indicating that the category of non-health professional birth attendants does not have a significant impact on infant mortality after considering other variables in the analysis.

The findings, which suggest no significant relationship between birth attendants (health professionals and non-health professionals) and infant mortality, may be influenced by several factors. First, the quality of healthcare services provided by birth attendants might be consistent, whether they are health professionals or not. If the level of care is relatively similar, the impact on infant mortality could be comparable between the two groups. Second, other factors such as the quality of medical equipment, the availability of adequate healthcare facilities, and quick responses to complications may play a crucial role in determining infant mortality outcomes.

CONCLUSION

Based on the research findings regarding the influence and risk of sociodemographic aspects and household health characteristics on infant mortality, it can be concluded that several factors play a crucial role in determining the risk of infant mortality. Although there is an increased risk, low women's autonomy does not show a significant relationship with infant mortality, supported by logistic regression analysis after controlling for other variables. Additionally, family economic status, whether able or unable, does not significantly influence infant mortality, as there is insufficient statistical evidence to reject the null hypothesis. In contrast, maternal education proves to have a significant impact, with mothers who have not received formal education having a 3.1 times higher risk of infant mortality. On the other hand, maternal employment status is found to be a protective factor, where mothers who do not work show a lower risk of infant mortality.

Regarding the method of delivery, both bivariate and multivariate analyses do not indicate a significant relationship between the method of delivery (normal or cesarean) and infant mortality. However, poor quality of antenatal care has been shown to have a significant relationship with infant mortality, with an increased risk of 1.6 times. Postnatal care also shows a very significant relationship, with groups not receiving this care having about 5.2 times higher risk of infant mortality. These findings highlight the importance of postnatal care in efforts to reduce infant mortality. Finally, the analysis of birth attendants shows that the type of attendant, whether healthcare professionals or non-healthcare professionals, does not have a significant influence on infant mortality after considering other variables. Overall, the results of this study emphasize the need for increased attention to maternal education and improved healthcare services to reduce the risk of infant mortality.

SUGGESTION

Based on the research findings and conclusions, several recommendations are proposed to address the issues identified and to inform government programs and future research. To enhance women's autonomy, it is essential to develop programs that empower women both economically and socially. Initiatives could include skills training, financial education, and support for women entrepreneurs, enabling them to take an active role in decision-making regarding family health and to plan their pregnancies wisely.

Improving access to and the quality of education for mothers should be a priority. The government and non-governmental partners can collaborate to provide reproductive health education programs that encompass aspects of infant health. Additionally, community outreach campaigns can raise awareness about best practices for infant health.

The importance of antenatal visits before and after pregnancy must be emphasized through educational campaigns and promotions. Government programs should focus on enhancing the accessibility and quality of antenatal services, ensuring that all pregnant women have adequate healthcare access and receive necessary information to care for themselves and their unborn babies.

Furthermore, the government can improve the quality and reach of antenatal and postnatal programs. This includes intensive training for healthcare providers, promoting regular visits, and monitoring infant health after birth. Resources should be allocated to ensure these services are equitably distributed across regions and accessible to all segments of society.

Future research should focus on understanding the mediating factors that may influence the relationship between women’s autonomy and infant mortality. This research can also explore regional and cultural dynamics that may affect the implementation of health policies and interventions. Involving multiple disciplines such as medicine, sociology, and anthropology can provide holistic insights.

By implementing these recommendations, it is hoped that the health conditions of infants can be improved, women's autonomy can be supported, and contributions can be made to the government’s efforts in achieving sustainable health targets.

REFERENCES

1. WHO (2022) Newborn Mortality, World Health Organization.
2. CDC (2021) Infant Mortality, Centers for Disease Control and Prevention (CDC).
3. Rosa-Mangeret, F. et al. (2022) ‘2.5 Million Annual Deaths-Are Neonates in Low- and Middle-Income Countries Too Small to Be Seen? A Bottom-Up Overview on Neonatal Morbi-Mortality.’, Tropical medicine and infectious disease, 7(5). Available at: https://doi.org/10.3390/tropicalmed7050064.
4. Ministry of Health Indonesia (2018) ‘Indonesia Demographic and Health Survey 2017’, Bps, p. 588.
5. Memiah, P. et al. (2019) ‘Is sexual autonomy a protective factor for neonatal, child, and infant mortality? A multi-country analysis.’, PloS one, 14(2), p. e0212413. Available at: https://doi.org/10.1371/journal.pone.0212413.
6. Suhaeri, F. and Sugiharti, L. (2020) ‘Pengaruh Faktor Sosial Ekonomi Terhadap Angka Kematian Bayi (AKB)

Pada Kabupaten/Kota di Propinsi Jawa Timur', Ekonomikawan: Jurnal Ilmu Ekonomi dan Studi Pembangunan, 20(1), pp. 68–87. Available at: https://doi.org/10.30596/ekonomikawan.v20i1.3843.
7. Stiyaningsih, H. and Wicaksono, F. (2017) 'Impact of women's empowerment on infant mortality in Indonesia', Kesmas, 11(4), pp. 185–191. Available at: https://doi.org/10.21109/kesmas.v11i4.1259.
8. Aisyan, S.D.S., Jannah, S.N. and Wardani, Y. (2013) 'Hubungan Antara Status Sosial Ekonomi Keluarga Dengan Kematian Perinatal Di Wilayah Kerja Puskesmas Baamang Unit Ii Sampit Kalimantan Tengah Januari-April 2010', Jurnal Kesehatan Masyarakat (Journal of Public Health), 5(1), pp. 35–44. Available at: https://doi.org/10.12928/kesmas.v5i1.1085.
9. Nurwati, R.N. and Listari, Z.P. (2021) 'Pengaruh Status Sosial Ekonomi Keluarga Terhadap Pemenuhan Kebutuhan Pendidikan Anak', Share : Social Work Journal, 11(1), p. 74. Available at: https://doi.org/10.24198/share.v11i1.33642.
10. Lestari, T.R.P. (2020) 'Achievement of Mother and Baby Health Status As One of the Successes of Mother and Child Health Programs', Kajian, 25(1), pp. 75–89.
11. Goudar, S.S. et al. (2015) 'Institutional deliveries and perinatal and neonatal mortality in Southern and Central India'. Available at: https://doi.org/10.1186/1742-4755-12-S2-S13.
12. Kiross, G.T. et al. (2019) 'The effect of maternal education on infant mortality in Ethiopia: A systematic review and meta-analysis.', PloS one, 14(7), p. e0220076. Available at: https://doi.org/10.1371/journal.pone.0220076.
13. Soe, K., Holland, P. and Mateus, C. (2019) 'Association Between Maternal Education and Childhood Mortalities in Myanmar', Asia Pacific Journal of Public Health, 31(8), pp. 689–700.
14. Adegbosin, A.E. et al. (2019) 'Systematic review and meta-analysis of the association between dimensions of inequality and a selection of indicators of Reproductive, Maternal, Newborn and Child Health (RMNCH).', Journal of global health, 9(1), p. 10429. Available at: https://doi.org/10.7189/jogh.09.010429.
15. Adewale, V. et al. (2023) 'Planned cesarean delivery vs planned vaginal delivery: a systematic review and meta-analysis of randomized controlled trials', American Journal of Obstetrics & Gynecology MFM, 5(12), p. 101186. Available at: https://doi.org/https://doi.org/10.1016/j.ajogmf.2023.101186.
16. Tiruneh, G.T., Shiferaw, C.B. and Worku, A. (2019) 'Effectiveness and cost-effectiveness of home-based postpartum care on neonatal mortality and exclusive breastfeeding practice in low-and-middle-income countries: A systematic review and meta-analysis', BMC Pregnancy and Childbirth, 19(1), pp. 1–19. Available at: https://doi.org/10.1186/s12884-019-2651-6.