Maternal complications and risk factors for mortality

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Abstract

Background: Maternal mortality could be prevented through early detection, including the period preceding pregnancy. Women of childbearing age are faced with extreme uncertainties, hence the purpose of this study was to analyse maternal complications and the possible high-risk factors connected to maternal mortality.

Design and methods: A case-control study was used to study the causes of maternal mortalities amongst pregnant, delivering, and postpartum mothers between 2017 and 2018. A total sample size of 48 samples was selected through simple random sampling.

Results: The result of logistic regression analysis showed nutritional status, prominence of anemia, history of illness, age, antenatal care ANC examination, method of delivery, late referral, occupational status, as well as postpartum complications, as the most influencing risk factors. This very high significance for maternal mortality was based on the chi-square value of 109.431 (p equal to 0.000), and R square (0.897).

Conclusions: In conclusion, the potential risk factors of maternal mortality include nutritional status, state of anemia, history of illness, age, ANC examination, delivery method, late referral, occupational status, and pregnancy complications, which is specifically the most dominant factor.

Introduction

Every year, an estimate of 358,000 maternal mortalities is recorded worldwide, with about 99% cases occurring in poor developing countries, and 67% reported in a group of eleven countries, which include Indonesia. Moreover there has been an upsurge in the Maternal Mortality Rate (MMR) of East Java from 91.00 to 91.92 per 100,000 live births in 2017 and 2018, respectively. Laksono and Rachmawati reported on 10 preventable cases out of 19, if recognized prior to the onset of pregnancy. These include women of childbearing age with high risk of being in the unmet need group, consisting of heart disease, breast cancer, HIV/hepatitis, etc.14

Higher risks of maternal mortality were influenced by factors include low education, lack of prenatal visits, caesarean delivery, haemorrhage, and hypertension. Early screening is expected to reduce maternal mortality rates.5 The purpose of this research, therefore, was to analyze the high-risk factors and complications associated with maternal mortality, and to also identify fit/final models with the capacity to predict maternal complications.

Results and Discussions

The result from Table 1 suggested anemia as the leading cause of complications, which was diagnosed in 14 women (14.3%). This was followed by labor issues resulting from late referral, reported in 13 (13.3%) cases, and the most significant determinant was that a majority were working mothers, consisting of 71 women (72.4%). The results of the Mantel–Haenszel test indicated the characteristics of nutritional status, state of anemia, history of illness, age, ANC examination, delivery method, late referral and working status as risk factors in maternal mortality (Table 2).10,11 Table 3 showed complication in pregnancy as the most dominant factor influencing maternal mortality. This was based on the fact that affected mothers had a 0.3% higher risk of death than others.12–14 The logistic regression analysis (Table 4) attributed a high significance to the model incorporating the influence of

Significance for public health

An upsurge in the maternal mortality rate of East Java indicates maternal health status in this particular area. Reducing maternal mortality is challenging due to the fact that 99% of maternal mortality occur in low-middle income countries. However, maternal mortality is preventable through early detection of complications and adequate treatment. This study highlights the potential risk factors of maternal mortality, which include nutritional status, state of anemia, history of illness, age, antenatal care (ANC) examination, delivery method, late referral, occupational status, and pregnancy complications.
Table 1. Risk factors for maternal mortality.

| Risk factors          | Criteria                      | N=98 | Percentage (%) |
|----------------------|-------------------------------|------|----------------|
| Nutritional status   | Good nutrition                | 73   | 74.5           |
|                      | Chronic energy deficiency     | 25   | 25.5           |
| Anemia status        | No anemia                     | 84   | 85.7           |
|                      | Anemia                        | 14   | 14.3           |
| History of illness   | No history of illness         | 68   | 69.4           |
|                      | With history of illness       | 30   | 30.6           |
| Age                  | Normal (20–35 years old)      | 68   | 77.6           |
|                      | Risky (<20 years and >35 years old) | 22 | 22.4           |
| Parity               | Not risky (2–4)               | 77   | 78.6           |
|                      | Risky                         | 21   | 21.4           |
| Pregnancy distance   | Not risky (>2 years)          | 79   | 80.6           |
|                      | Risky (<2 years)              | 19   | 19.4           |
| ANC examination      | Good (>4 times)               | 68   | 69.4           |
|                      | Not good (<4 times)           | 30   | 30.6           |
| Childbirth helper    | Health workers                | 98   | 100.0          |
|                      | Non–health workers            | 0    | 0.0            |
| How to give birth    | Spontaneous                   | 86   | 87.8           |
|                      | With action                   | 12   | 12.2           |
| Late referrals       | Not late                      | 85   | 86.7           |
|                      | Late                          | 13   | 13.3           |
| Mother’s education   | High school and college       | 86   | 87.8           |
|                      | Below middle school           | 12   | 12.2           |
| Occupational status  | Working                       | 71   | 72.4           |
|                      | Does not work                 | 27   | 27.6           |
| Place of incident    | House                         | 56   | 57.1           |
|                      | Public Health Center          | 0    | 0.0            |
|                      | Hospital                      | 42   | 42.9           |

Table 2. Relationship between risk factors and maternal mortality.

| Maternal risk factors | Criteria                      | Maternal mortality | Odds ratio (95% CI) | R value |
|-----------------------|-------------------------------|--------------------|---------------------|---------|
|                      |                               | Yes (%)            | No (%)              |         |
| Nutritional status   | Good nutrition                | 47 (94.0%)         | 26 (54.2%)          | 13.256 ** (3.620-48.540) | 0.545   |
|                      | Chronic energy deficiency     | 3 (6.0%)           | 22 (45.8%)          |         |         |
| Anemia status        | No anemia                     | 48 (96.0%)         | 36 (75.0%)          | 8.000 ** (1.684-37.997) | 0.300   |
|                      | Anemia                        | 2 (4.0%)           | 12 (25.0%)          |         |         |
| History of illness   | No history of illness         | 47 (94.0%)         | 21 (43.8%)          | 20.143 ** (5.495-73.337) | 0.545   |
|                      | With history of illness       | 3 (6.0%)           | 27 (56.2%)          |         |         |
| Age                  | Normal (20–35 years old)      | 43 (86.0%)         | 33 (68.8%)          | 2.792 * (1.022-7.630) | 0.307   |
|                      | Risky (<20 years and >35 years old) | 7 (14.0%)    | 15 (31.2%)          |         |         |
| Parity               | Not risky (2–4)               | 42 (84.0%)         | 35 (72.9%)          | 1.950 (0.726-5.239) | 0.135   |
|                      | Risky                         | 8 (16.0%)          | 13 (27.1%)          |         |         |
| Pregnancy distance   | Not risky (>2 years old)      | 43 (86.0%)         | 36 (75.0%)          | 2.048 (0.730-5.747) | 0.139   |
|                      | Risky (<2 years)              | 7 (14.0%)          | 12 (25.0%)          |         |         |
| ANC examination      | Good (>4 times)               | 48 (96.0%)         | 20 (41.7%)          | 33.600 ** (7.302-154.620) | 0.589   |
|                      | Not good (<4 times)           | 2 (4.0%)           | 28 (58.3%)          |         |         |
| Childbirth helper    | Health workers                | 50 (101.0%)        | 48 (48.0%)          | 0       | 0       |
|                      | Non–health workers            | 0 (0%)             | 0 (0%)              |         |         |
| How to give birth    | Spontaneous                   | 48 (96.0%)         | 38 (79.2%)          | 6.316 ** (1.305-30.562) | 0.257   |
|                      | With action                   | 2 (4.0%)           | 10 (20.8%)          |         |         |
| Late referrals        | Not late                      | 48 (96.0%)         | 37 (77.1%)          | 7.135 ** (1.490-34.175) | 0.279   |
|                      | Late                          | 2 (4.0%)           | 11 (22.9%)          |         |         |
| Mother’s education   | High school and college       | 45 (90%)           | 41 (85.4%)          | 1.537 (0.452-5.221) | 0.070   |
|                      | Junior high school            | 5 (10%)            | 7 (14.6%)           |         |         |
| Working status       | Working                       | 45 (90%)           | 26 (54.2%)          | 7.615 ** (2.575-22.525) | 0.401   |
|                      | Not working                   | 5 (10%)            | 22 (45.8%)          |         |         |
Table 3. Maternal complications and mortality.

| Types of maternal complications | Maternal mortality | Odds ratio (95% CI) | R value |
|---------------------------------|--------------------|---------------------|---------|
|                                 | Yes (%)            | No (%)              |         |
| No complications                 | 48 (96.0%)         | 0 (0.0%)            | 540.5 ** (58.195-5020.006) | 0.900 |
| Pregnancy complications          | 2 (4.0%)           | 8 (16.7%)           |         |
| Labor complications              | 0 (0.0%)           | 12 (25.0%)          |         |
| Postpartum complications         | 0 (0.0%)           | 28 (58.3%)          |         |

Table 4. Partial Test Results in Logistic Regression.

| Risk factors          | B      | P value | Exp (B) | 95% CI      |
|-----------------------|--------|---------|---------|-------------|
| Nutritional status (1)| -2.704 | 0.119   | 0.067   | 0.002 - 2.010 |
| State_of_anemia (1)   | -1.152 | 0.646   | 0.316   | 0.002 - 43.382 |
| History of illness (1)| -2.485 | 0.132   | 0.083   | 0.003 - 2.111 |
| Age (1)               | -0.615 | 0.628   | 0.541   | 0.045 - 6.478 |
| Anc examination (1)   | -0.644 | 0.657   | 0.525   | 0.031 - 8.968 |
| Delivery method (1)   | -1.807 | 0.536   | 0.164   | 0.001 - 49.991 |
| Late_referral (1)     | -1.748 | 0.453   | 0.174   | 0.002 - 16.726 |
| Complications         |         |         | 0.002   |             |
| Complications (1)     | -5.797 | 0.001   | 0.003 **| 0.000 - 0.089 |
| Complications (2)     | -0.282 | 0.877   | 0.754   | 0.021 - 26.612 |
| Complications (3)     | -0.735 | 0.644   | 0.479   | 0.021 - 10.827 |
| Constant              | 11.826 | 0.020   | 136814.258 |             |

Conclusions

In conclusion, the potential risk factors of maternal mortality include nutritional status, state of anemia, history of illness, age, ANC examination, delivery method, late referral, occupational status, and pregnancy complications, which is specifically the most dominant factor.
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