ORIGINAL ARTICLE

Seven Years Analysis of Postpartum Death in Selangor, Malaysia: A Lesson Learnt

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ABSTRAK

Maklumat tentang penentu kematian selepas bersalin meningkatkan pemahaman tentang punca asas kematian. Kajian mengenai kematian selepas bersalin di Malaysia adalah terhad walaupun terdapat peningkatan trend kematian selepas bersalin. Kajian ini bertujuan untuk mengenal pasti faktor penentu kematian selepas bersalin di Selangor, Malaysia. Kawalan kes telah dijalankan menggunakan data dari Rekod Pendaftaran Kematian Ibu, Jabatan Kesihatan Negeri Selangor, Malaysia. Sebanyak 144 kes kematian selepas bersalin dimasukkan untuk analisis selepas mengeluarkan kes kematian yang tidak disengajakan dan tidak diketahui. Kawalan adalah ibu yang terselamat enam minggu selepas bersalin dan dipilih melalui persampelan rawak mudah. Kebarangkalian kematian selepas bersalin di kalangan multipara adalah hampir dua kali ganda lebih tinggi (aOR; 1.76 95% CI 1.10,2.82). Kehadiran masalah perubatan atau pembedahan yang sedia ada dikaitkan dengan peningkatan tiga kali ganda dalam kebarangkalian kematian selepas bersalin (aOR 3.23; 95% CI 1.91,5.47). Kebarangkalian kematian selepas bersalin adalah sepuluh kali lebih tinggi bagi mereka yang bersalin di fasiliti bukan kesihatan (aOR 10.62; 95% CI 2.64,42.74). Wanita yang menjalani pembedahan caesar mempunyai kebarangkalian hampir tiga kali ganda (aOR 2.50; 95% CI 1.60,3.91) untuk kematian. Wanita yang menerima penjagaan antenatal di fasiliti kesihatan kerajaan mempunyai kebarangkalian rendah (aOR 0.34; 95% CI 0.19,0.60) untuk kematian selepas bersalin. Faktor penentu menunjukkan perkaitan yang signifikan dengan kematian selepas bersalin di Selangor, Malaysia, termasuk kehadiran penyakit perubatan atau pembedahan yang sedia ada, tempat bersalin, cara kelahiran, tempat penjagaan antenatal dan status kewarganegaraan Malaysia. Program kesihatan masa depan sepatutnya bukan hanya bertujuan untuk

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mengurangkan kematian selepas kematian melalui pendidikan dan pemerkasaan, tetapi juga mempertingkatkan jagaan pra-kehamilan, menyediakan latihan untuk kemahiran kecemasan obstetrik kepada kakitangan perubatan, bekerjasama dengan beberapa agensi dan manaja jamin yuran perubatan maternal bagi migran.

Kata kunci: faktor berkaitan, kematian ibu, kematian selepas bersalin

ABSTRACT

Information on determinants of postpartum death enhances understanding of the fundamental causes of mortality. Studies on postpartum death in Malaysia are limited despite increasing trends of postpartum mortality. This study aimed to ascertain the determinants of postpartum death in Selangor, Malaysia. A case control was conducted using data from the Maternal Death Registry, Selangor State Health Department, Malaysia. A total of 144 postpartum death cases were included for analysis after the removal of fortuitous and unknown death. Controls were mothers who survived six weeks after childbirth and were selected via simple random sampling. The odds of postpartum death among multiparous was almost two times higher (aOR; 1.76 95% CI 1.10,2.82). The presence of pre-existing medical or surgical problems were associated with a three-folds increase in the odds of postpartum death (aOR 3.23; 95% CI 1.91,5.47). The odds of postpartum death were ten times higher for those who gave birth in non-health facilities (aOR 10.62; 95% CI 2.64,42.74). Women who underwent caesarean section had almost three times more odds (aOR 2.50; 95% CI 1.60,3.91) for death. Women who received antenatal care in government health facilities had low odds (aOR 0.34; 95% CI 0.19,0.60) for postpartum death. The determinants showed significant association with postpartum death in Selangor, Malaysia which included the presence of pre-existing medical or surgical illness, place of birth, mode of birth, place of antenatal care and Malaysian ethnicity-citizenship. In the future, health programmes should not only aim to reduce postpartum deaths by emphasising maternal education and empowerment, but should also enhance pre-pregnancy care, provide continual obstetric emergency skill training to healthcare providers, collaborate with several agencies and underwrite migrants' maternal healthcare fees.

Keywords: associated factors, maternal mortality, postpartum death

INTRODUCTION

The postnatal stage is crucial for optimising maternal health (World Health Organisation 2010). Home visits are an intervention for assessing maternal and child wellbeing, to deliver instruction and assistance, to support breastfeeding and to deliver useful support (Naohero et al. 2017).

All countries including Malaysia have post-birth customs and philosophies (Mun et al. 2019). Education is important so that the community does not substitute taboos and traditions for medical care (Mun et al. 2019). Maternal morbidity and mortality can result from delayed or failed seeking of postpartum medical care.

In 2017, there were approximately 810 maternal deaths due to pregnancy and childbirth-associated avoidable causes globally (World Health Organisation 2019). In Malaysia, the Maternal Mortality Ratio (MMR) was able to be reduced from 533/100,000 live births in 1950 to 24.4/100,000 in 2000 (Department of Statistic Malaysia 2016). Nevertheless, from 2000 to 2014, the MMR remained static from 24.4 to 22.3/100,000 live births (Ministry of Health Malaysia 2019). Selangor state had the highest MMR in 1995 in the country and was reported as 22 per 100,000 live births in 2014 (Department of Statistic Malaysia 2016). Additionally, ASEAN countries such as Myanmar (282 per 100,000 live births in 2014) and Indonesia (East Java Province; 89.6 per 100,000 livebirths in 2015) showed higher MMRs compared to Malaysia (Department of Statistic Malaysia 2016; Ei Ei et al. 2018; Prasetyo et al. 2018).

Even though the global MMR was reduced with 38% in 2017 as compared to 2000 (Prasetyo et al. 2018), in achieving United Nations Sustainable Development Goals (SDGs) requires much work, which aims to decrease by 2030 global MMR to <70/100,000 live births (United Nation 2018). Understanding maternal death timing is crucial to decrease maternal mortality as it aids health programme planning, priority establishment, and resource allocation. In South Africa, the trend for intrapartum and postpartum mortality increased while antepartum and intrapartum mortality increased in West Africa (Merdad & Ali 2018). More than 50% of postpartum death occurred in Malaysia. Malaysian postpartum death has increased from 59.1% in 2009 to 64.6% in 2011 (Ministry of Health Malaysia 2015). Meanwhile, postnatal death was recorded at 52.9% between 2012 and 2014 in Malaysia (Ministry of Health Malaysia 2019). This was in accordance with the results of a 2019 Nigerian study (55.6%) (Sageer et al. 2019) and a study in Bangladesh (78.8%) of maternal deaths postnatally (Halim et al. 2014). These aforementioned results indicated that additional information is needed to enable detailed analyses of postpartum death. In Selangor, studies on postpartum death are limited. Accordingly, we aimed to identify socio-demographic, characteristics and determinants of postpartum deaths in Selangor.

MATERIALS AND METHODS

Study Site

Selangor is located on the peninsular Malaysia west coast (Prasetyo et al. 2018) and comprises nine districts. The central district of Selangor is Petaling, which is an urban district (Selangor Town and Country Planning Department 2020). The Selangor population was an estimated 6.53

million in 2019, making it a high-density population (Department of Statistic Malaysia 2019).

Design

We performed a case–control study (case:control ratio = 1:3). The case and the control are matched based on the postpartum period at 42 days of pregnancy termination. All 184 cases of MMR from the MMR registry were obtained. A total of 40 fortuitous deaths (such as death due to motor vehicle accident) and unknown causes were excluded from the analysis.

Case Selection

According to the International Classification of Disease of the World Health Organisation (WHO), the Selangor Technical Committee of Maternal Death defines maternal death as the death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and site of the pregnancy, any cause related to or aggravated by the pregnancy or management but from intentional or non-incidental causes (Prasetyo et al. 2018; World Health Organisation 2019). In Selangor, all maternal deaths were determined via compulsory reporting to the State Health Department. The District Health Officer is required to report deaths in any pregnancy phase (antenatal, intrapartum, puerperium) to the Technical Committee of the state and then to the Ministry of Health Development Division of Family Health within 24 hours from the certified death time. All such cases require thorough district-level investigation and subsequent review by state committee experts. The experts are expected to describe the cause and classification of death and the required corrective action.

In the present study, we used the secondary data of deaths following birth that occurred between 2013 and 2019 and recorded in a database (the Maternal Death Registry) composed by the State Health Department Maternal Death Technical Committee. A death postpartum occurs when a woman dies within the puerperium (within 42 days following birth). The study population involved all women who died within six weeks after birth who had been permanent residents of a Selangor district for six months prior to their passing, irrespective of where they had died. The MMR death was triangulated with the National Registry Department which confirmed all cases of death in the state. Maternal deaths included women who were Malaysian citizens, the Peninsular Malaysia, Sarawak and Sabah indigenous groups, documented migrants (including refugees with valid passports under the United Nation High Commissioner for Refugees) and undocumented migrants without valid passports. The Maternal Death Registry only included cases with complete information/data.

In Selangor, 184 postpartum maternal deaths occurred between 2013 and 2019. All postpartum maternal death in the MMR registry were obtained. A total of 40 cases of fortuitous death and unknown causes were excluded from the analysis.

Selection of Controls

Controls were defined as women who survived after birth for up to six weeks. The controls were selected from among the women who had attended Petaling postnatal care health clinics in 2019. These postpartum mothers were permanent Selangor residents for at least six months including all different ethnic group and legal or illegal immigrants as mentioned for cases. Control women with incomplete information were excluded.

Out of 2,641 women who were alive in puerperium in 2019, 432 controls were selected by using random sampling using SPSS version 25.0 (Armonk, NY, US). The list of possible controls was retrieved from Postnatal Treatment Records (PNN102). Detailed information for each sample was obtained from records on tele-primary care, PNN102, and antenatal care [KIK/1(b)/96 (Revision 2012)].

Study Instrument

We used the Maternal Death Registry that are kept confidential by the State Health Department Family Health Unit. Each notification of maternal death was documented in the Registry and the details were discussed and confirmed by the Secretariat Maternal Death Meeting. The inclusive sampling of postpartum maternal death was then extracted from this registry.

Variables

The dependent variable was Selangor maternal deaths postpartum. The independent variables were divided into: (i) Section A: sociodemographic status, including ethnicity, citizenship, parity, and maternal age; (ii) Section B: obstetrics and clinical characteristics which included pre-existing medical illness, place of birth, mode of birth, place of antenatal care (ANC), and family planning practice.

Statistical Analysis

Descriptive analyses were expressed as frequencies (n) and percentages (%). The crude and adjusted odds ratios (OR) and the related 95% confidence intervals (CI) were respectively obtained with simple and multiple logistic regression analyses. Statistical significance was indicated when $P<0.05$.

RESULTS

Sociodemography

Table 1 depicted the participants' characteristics. There were 184 cases of postpartum maternal death in Selangor from 2013-2019. Fortuitous and unknown reasons for death accounted for 40 cases, thus they were excluded from the study analysis. Therefore, the total number of cases included for the analysis were 144 cases and 432 controls. Most of the respondents among the cases (73.6%) and controls (94%) were of Malaysian citizenship. However, postpartum death among non-Malaysians were higher among cases compared to control (26.4% vs 6%, respectively). Up to 52.1% of the cases and 64.1% of the controls

Table 1: Factor associated with postpartum death in Selangor, 2013 to 2019.

Characteristic	Case (Postpartum Death) (n=144), n (%)	Control (Postpartum Alive) (n=432), n (%)	cOR (95% CI)	aOR* (95% CI)
Socio-demographic				
Citizenship				
Malaysian	106 (73.6)	406 (94.0)	1	
Non-Malaysian	38 (26.4)	26 (6.0)	5.60 (3.25,9.63)	-
Ethnic				
Others (immigrants)**	38(26.4)	26 (6.0)	1	
Malay	75 (52.1)	277 (64.1)	0.19 (0.11,0.33)	**0.35 (0.18,0.69)**
Chinese	15 (10.4)	90 (20.8)	0.11 (0.05,0.23)	**0.21 (0.09,0.49)**
Indian	11 (7.6)	39 (9.0)	0.19 (0.08,0.43)	**0.26 (0.10,0.67)**
Indigenous	5 (3.5)	10 (2.3)	0.27 (0.08,0.94)	0.63 (0.16,2.45)
Age (years)				
35	7 (4.9)	17 (3.9)	1	
20-34	85 (59.0)	314 (72.7)	0.53(0.35,0.79)	-
19	52 (36.1)	101 (23.4)	0.80(0.31,2.05)	
Parity				
Primiparous	46 (31.9)	208 (48.1)	1	1
Multiparous	86 (59.7)	204 (47.2)	1.91 (1.27,2.86)	**1.76 (1.10,2.82)**
Grand-multiparous (para ≥5)	12 (8.3)	20 (4.6)	2.71 (1.24,5.94)	1.73 (0.67,4.47)
Obstetrics and clinical				
Pre-existing Medical/ Surgical Illness				
No	102 (70.8)	382 (88.4)	1	1
Yes	42 (29.2)	50 (11.6)	3.15 (1.98,5.01)	**3.23 (1.91,5.47)**
Place of birth				
Health facilities (government/privates)	128 (88.9)	429 (99.3)	1	1
Non-health facilities (homes/en-routes)	16 (11.1)	3 (0.7)	17.88 (5.13,62.32)	**10.62 (2.64,42.74)**
Mode of birth				
Vaginal birth	73 (50.7)	305 (70.6)	1	1
Caesarean birth	71 (49.3)	127 (29.4)	2.34 (1.59,3.44)	**2.50 (1.60,3.91)**
Place of antenatal care				
Private health facilities	37 (25.7)	48 (11.1)	1	
No antenatal care/ Un-booked	20 (13.9)	7 (1.6)	3.71 (1.42,9.70)	1.70 (0.54,5.36)
Government health facilities	87(60.4)	377 (87.3)	0.30 (0.18,0.49)	**0.34 (0.19,0.60)**
Practice of family planning before last child birth				
Non-acceptor family planning	112 (82.6)	383 (88.7)	1	-
Acceptor family planning	25 (17.4)	49 (11.3)	1.64 (0.97,2.77)	

*Backward stepwise multiple logistic regression ** both legal and illegal immigrants were grouped as "other" ethnicity. Bold: significant at p<0.05

were of Malay ethnicity. In total, 85 cases (59%) of cases and 314 controls (72.7%) were aged 20-34 years. Most cases and control were multiparous women, followed by primiparous and grand-multiparous.

Most of the women did not have pre-existing medical or surgical illnesses. However, almost one third of the death cases had pre-existing medical or surgical illnesses (29.2%) compared to control (11.6%). Similar finding was seen whereby 11.1% of the death cases gave birth in non-health facilities in comparison to the controls (0.7%). Up to 49.3% of death cases had undergone a caesarean section, only 29.4% of the control had undergone this procedure. Majority of the women received their ANC at government health facilities. However, among the 13.9% of the death cases and 1.6% of the control did not have any ANC. Most of the women also did not practice any family planning prior to last childbirth.

Table 1 showed the crude OR (cOR) and adjusted OR (aOR) of factors associated with postpartum death among these women. Simple logistic regression indicated that all socio-demographic and obstetrics/clinical characteristics except for family practice were significantly associated with postpartum death.

From this univariable analysis, it showed that socio-demographic characteristics played a role in influencing the postpartum death. Non-Malaysian had almost six times higher odds (cOR 5.60, 95% CI: 3.25, 9.63) for postpartum death compared to Malaysian. Compared to "other"

ethnicity which comprised of both legal and illegal immigrants, Malay, Chinese, Indian and indigenous groups of ethnicities had low odds for postpartum death [(cOR 0.19; 95% CI 0.11, 0.33), (cOR 0.11; 95% CI 0.53, 0.23), (cOR 0.19; 95% CI 0.08, 0.43) and (cOR 0.27; 95% CI 0.08, 0.94), respectively]. Women aged 20-34 years also had low odds (cOR 0.53; 95% CI 0.35,0.79) for postpartum death compared to those aged 35 years. Multiparous women had a two times and grand-multiparous women faced three times more odds for postpartum death compared to primiparous women [(cOR 1.91; 95% CI: 1.27, 2.86) and (cOR 2.71; 95% CI: 1.24, 5.94), respectively.

For obstetrics and clinical characteristics, women with pre-existing medical/surgical illnesses also had three-folds higher odd (cOR 3.15; 95% CI: 1.98, 5.01) for postpartum death compared to women with no pre-existing medical/surgical illnesses. Women who did not give birth at health facilities faced 18 times greater risk of death after birth (cOR 17.88; 95% CI 5.13,62.32) than those who gave birth in government/private health facilities. Mothers who delivered through caesarean section had two-folds greater odd (cOR 2.34; 95% CI: 1.59-3.44) for postpartum death compared to per-vaginal delivery. Women with no antenatal check-up had four times more odds (cOR 3.71, 95% CI: 1.42, 9.70) and women who received antenatal examinations at public-sector health facilities had low odds (cOR 0.30, 95% CI: 0.18-0.49) for postpartum death compared to women

who received antenatal examinations at private clinics or hospitals.

Further adjusted analysis using multiple logistic regression indicated that for socio-demographic characteristics, only ethnicity and parity remained significantly linked with postpartum death. Malay, Chinese and Indian women still significantly had low odds for postpartum death compared to "other" ethnicity [(aOR 0.35; 95% CI 0.18, 0.69), (aOR 0.21; 95% CI 0.09, 0.49) and (aOR 0.26; 95% CI 0.10, 0.67) respectively]. Multiparous women had approximately two times greater postpartum death odds (aOR; 1.76; 95% CI 1.10, 2.82) in comparison to primiparous women.

For obstetric and clinical characteristics, history of prior medical or surgical illnesses, location of birth, delivery mode and place of ANC remained significantly associated with postpartum death. A history of prior medical or surgical issues was linked with three-folds greater postpartum death odd (aOR 3.23; 95% CI: 1.91, 5.47). Women who did not give birth at health facilities faced 10-folds greater postpartum death odd (aOR 10.62; 95% CI 2.64, 42.74) than those gave birth at health facilities. Women who underwent caesarean section had approximate three-folds greater odd (aOR 2.50; 95% CI 1.60, 3.91) for postpartum death compared to women who delivered per-vaginally. Meanwhile, women who received ANC at public health facilities had low odds (aOR 0.34; 95% CI 0.19, 0.60) for postpartum death in comparison to women who underwent antenatal examinations at private clinics or hospitals.

DISCUSSION

In this present study, the three major ethnicity in Malaysia, namely the Malay, Chinese and Indian had less likelihood of experiencing postpartum death in comparison to "other" ethnicity group (whom were migrants). Malaysian women have fast accessibility toward effective maternal and child health service in government facilities especially in Selangor in view of short distance between health clinic and community residential (Selangor State Health Department 2022). The health care system of Malaysia includes tax-funded and government-operated universal services and provides ANC service for free of charge for the Malaysian (Safurah et al. 2013). In comparison, migrant women in Selangor hold strong beliefs regarding traditional birth attendants (TBAs) based on cultural values and issues regarding logistics, such as financial and transportation constraints. It is consistent that the migrant women's belief that TBAs provide reliable encouragement and advice for childbirth and birth physiology (Miller & Smith 2017; Sialubanje et al. 2015). The TBAs take into consideration the cultural values and tradition of the women and the community at large, thereby wining the confidence of the labouring women and their family (Adatara et al. 2018).

Malaysian policies on immigration prohibit migrant workers from pregnancy (Loganathan et al. 2020); nevertheless, births among migrant

women take place assisted by TBAs. Furthermore, TBAs' adaptable payment approach is typically an influencing factor in numerous home births in rural areas in developing nations (Adatara et al. 2018; Dodzo & Mhloyi 2017; Pfeiffer & Mwaipopo 2013). Our findings proved that migrants were prone to postpartum death, which agreed with a Spanish study that showed that migrant women had higher maternal death risk (cOR 2.19; 95% CI 1.68-2.85) (Blagoeva Atanasova et al. 2018). This may be attributed to the lack of antenatal booking or late booking when mothers presented to health facilities in labour. Therefore, the Ministry of Health Malaysia strongly advises employers to bear the responsibility of assisting in the provision of health services, such as extending health insurance to the employee's wife and family and providing transportation during emergencies. Proper antenatal care for migrant women should be identified, encouraged and aided by collaboration and consistent contact between employers and public health services (Ministry of Health Malaysia 2019). Furthermore, it is expected that healthcare providers provide in-depth information to migrant women regarding the significance of antenatal and postnatal care and maternal health. Nevertheless, language might be a barrier to comprehension, although the presence of a translator may aid the facilitation of communication.

Our findings revealed that postpartum death is three times higher in cases with underlying medical or surgical illness. Similarly, a case report by Shrestha et al. (2020) reported the first postpartum death caused by Coronavirus 2019 (COVID-19) in Nepal. The WHO have shown in the preliminary report, severe disease was present in approximately 8% of COVID-19-infected women who were postpartum or pregnant and critical illness was present in approximately 1% of such women (World Health Organisation 2020). In Gambia, 73% postpartum deaths were reported, where the most frequent cause was consistently postpartum haemorrhage (Idoko et al. 2017).

Though the finding in this study showed higher odds of pre-existing medical or surgical illness in postpartum death, it was however showing consistency with the finding in maternal death. This was similar to the results of a study in United Kingdom maternal deaths, where maternal mortality odds were seven-folds greater in cases with prior health conditions in comparison to controls (Mccall et al. 2017). In Northern Ethiopia, women with a prior history of other diseases also faced a higher maternal death risk (aOR 5.58, 95% CI 2.17-14.30) (Godefay et al. 2015) and women in the United Kingdom with prior comorbidity had eight times higher maternal death odds (aOR 8.65; 95% CI 6.29-11.9) (Nair et al. 2016). Among mothers in Malaysia, related medical conditions remain the most common cause of death (Ministry of Health Malaysia 2019), which is an indicator of the gaps in services regarding family planning and pre-pregnancy care for people with pre-existent morbidities. Therefore, the study outcome demonstrated that pre-

existent surgical and medical illnesses indicated the importance of enhancing care provided before pregnancy, where people with pre-existent surgical and medical illnesses should be targeted to improve their health and medical conditions prior to pregnancy (Ministry of Health Malaysia 2019). In Malaysia, reproductive-age people receive interventions and healthcare prior to conception termed pre-pregnancy care (PPC). The PPC involves family planning, medical condition and risk factor screening, management, and optimisation, and supplementation and nutrition (Ministry of Health Malaysia 2019).

In the present study, caesarean birth was linked to three-folds higher postpartum death risk in comparison to vaginal birth. It is consistent with previous study conducted in Brazil in 2016 whereby the postpartum maternal death risk was approximately three times greater with caesarean delivery as compared with vaginal delivery (aOR 2.87, 95% CI 1.63-5.06), which largely stemmed from deaths following postpartum haemorrhage and anaesthesia problems (Esteves-Pereira et al. 2016). Meanwhile, a study conducted by Deneux-Tharaux et al. (2006) also reported that the risk for death postpartum was 3.6 times greater following caesarean rather than vaginal birthing (aOR 3.64; 95% CI 2.15-6.19) and this is attributed to anaesthesia complications, venous thromboembolism, and puerperal infection. Given the high risk of postpartum death from caesarean birth in Selangor specifically, the combined care concept involving the obstetrician,

physician and healthcare providers aims at enhancing maternal health care management, which includes the antenatal, intrapartum and postpartum phases (Ministry of Health Malaysia 2019). To decrease caesarean section-related complications, the Ministry of Health Malaysia has established guidelines to reduce segment caesarean section (Ministry of Health Malaysia 2020).

The WHO foresees a future where all pregnant people and new-borns receive excellent care during pregnancy, birth and postnatally. In the reproductive health care continuum, ANC platforms functions of critical health-care, which include the promotion of health, disease prevention, diagnosis and screening (World Health Organisation 2016). A study of low-income countries reported a significant negative association between MMR and ANC utilisation and skilled birth attendants (Girum & Wasie 2017). Correspondingly, the death risk in the United Kingdom was 23-folds greater for women with insufficient ANC use (Mccall et al. 2017). There was a 68% lower probability of death in Nigeria among mothers who booked for ANC (Ntoimo et al. 2018) while such odds in Zambia were 94% lower among women who attended their ANC appointments (Moyo et al. 2018).

Women who practiced family planning were found not significant to postpartum death in this study. Although contraceptive services are available in all Selangor clinics (community or health), high-risk reproductive-age women tended to reject the use of contraceptives for

various reasons. In Northern Ethiopia, women without family planning prior to their previous pregnancy faced three-folds greater odd of maternal death than those who had (Godefay et al. 2015). Contraceptive use could avert 44.3% of maternal deaths globally (Ahmed et al. 2012). A vital approach under the Safe Motherhood Initiative is a universal access to family planning that is of high quality. Accordingly, in Selangor, all Malaysian women receive free access to safe and efficacious contraceptive methods at government maternal and child health clinics. Additionally, postnatal women at high risk warded in Selangor government hospitals receive long-term contraceptives after delivery before they are discharged. This initiative enables sufficient spacing between deliveries to enhance the status of maternal health.

The Selangor State Health Department has planned and executed several approaches to decrease maternal mortality, which includes postpartum death. The Ministry of Health Malaysia launched the programme GenerasiKu Sayang to support and empower maternal health care among adolescent mothers. The programme involves establishing care centres to protect unmarried pregnant people and their offspring. Under the programme, non-governmental and government agencies engage holistically with the main aim of reducing maternal mortality among adolescents (Ministry of Health Malaysia 2022). Furthermore, the Selangor Health Department implemented the Obstetric Lives

Saving Skills course in all healthcare worker categories in all Selangor districts following the increased maternal mortality ratio in the state. The course involves cooperation between Selangor government hospital departments of gynaecology and obstetrics to train healthcare workers in applying emergency obstetrics skills in the primary care setting. Additionally, the Department of Health Department strongly underscored non-governmental organisation (NGO) and United Nations High Commissioner for Refugees involvement in obtaining subsidised fees at governmental and NGO clinics to address the financial constraints among legal migrant for early and sufficient access to maternal health care.

This is the first analysis of postpartum mortality data in Selangor as well as the first analysis of postpartum death in Malaysia. Our findings are a baseline for subsequent policies and planning for reducing overall maternal deaths in the state, in particular the reduction of postpartum death. Nevertheless, our study has limitations. The few deaths postpartum might have affected the analysis outcome. Moreover, the controls were selected from only one district. Therefore, the analysis could be improved by obtaining data from all Selangor districts. In addition, the study also excluded antepartum as well as intrapartum death. Nevertheless, our results might still be broadly relevant as it identifies the relevant factors in preventing postpartum deaths.

CONCLUSION

Determinants that are significantly related to postpartum death in Malaysia include, the presence of prior surgical or medical illness, location of birth, birth mode, ANC location and Malaysian ethnicity or citizenship. Identifying determinants for post-birth mortality constitutes a basis for developing an effective plan to prevent maternal mortality. Therefore, enhancing maternal education and empowerment in maternal health care service in Malaysia is vital. An inclusive pre-pregnancy health promotion initiative that encompasses the antenatal stage would decrease postpartum deaths and maternal deaths as a whole.

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