ORIGINAL ARTICLE

Maternal Mortality due to Eclampsia in Khyber Pakhtunkhwa: Identifying Underlying Risk Factors, and Care-seeking Behaviours

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Abstract

Objective: To identify the characteristics of women at risk of death due to eclampsia, and steps to improve maternal outcome.

Methods: This study is a part of a retrospective study conducted in 2016 and included Mansehra, Swabi, Haripur, Nowshera, Kohat, and Dera Ismail Khan districts of the Khyber Pakhtunkhwa province of Pakistan, and used information cited by a 2016 study to estimate the maternal mortality rate in the province based on data pertaining to the 2013-14 period. The Maternal Death from Informants / Maternal Death Follow-on Review method was applied to identify the magnitude, causes and circumstances of maternal deaths in the province. SPSS 21 was used for data analysis.

Results: Of the 958 cases of maternal death identified, 167(17%) were related to eclampsia. The median age of such women was 28 years (interquartile range: 11 years). Of them, 88 (53%) died undelivered, 48 (29%) had a live birth while 31 (18%) had a stillbirth or abortion. Mothers aged 25 years or above ($p<0.01$), primiparous ($p<0.01$) and those with a previous history of stillbirth ($p<0.005$) carried higher risk, while higher socioeconomic status had a protective effect ($p<0.007$).

Conclusions: Eclampsia deaths can be prevented through Continuum of Care approach and by ensuring provision of basic health facilities across the board.

Keywords: Eclampsia, Khyber Pakhtunkhwa, Mothers. (JPMA 69: 934; 2019)

Introduction

Hypertensive disorders of pregnancy, particularly eclampsia, are among the top three causes of maternal mortality in the world.[1-3] Eclampsia also predisposes women to severe morbidity and long-term disability, and causes foetal and neonatal death.[2,4-7] It is estimated that globally about 343,000 maternal deaths occurred between 2003 and 2009 due to hypertensive disorders[1] while 200,000 stillbirths were attributable to pre-eclampsia and eclampsia (PE/E), with the highest burden in sub-Saharan Africa and South Asia.[8] The majority of deaths of mothers and their babies that are caused by severe PE/E are preventable through provision of timely and effective medical care.[9]

The Pakistan Demographic and Health Survey (PDHS) 2006-07[10] estimated the country's maternal mortality ratio (MMR) at 276 deaths per 100,000 live births, with eclampsia accounting for more than 12% of direct maternal deaths. A more recent study conducted to estimate the MMR in the Pakistani province of Punjab found eclampsia to be the second major cause of maternal mortality, accounting for slightly more than a quarter of maternal deaths.[11,12]

The current study was planned to examine the magnitude of maternal mortality due to eclampsia in the Khyber Pakhtunkhwa (KP) province in order to identify shortcomings in the health system that must be addressed to improve outcomes.

Subjects and Methods

The study was conducted in 2016 and covered Mansehra, Swabi, Haripur, Nowshera, Kohat, and Dera Ismail Khan districts of KP, and used information cited by a 2016 Population Council (PC) study to estimate MMR in the province using data related to the 2013-14 period.[13] The PC study had used the University of Aberdeen's Maternal Death from Informants / Maternal Death Follow-on Review (MADE-IN/MADE-FOR) method.[14] The method entails two steps. First, networks of community-level informants identify pregnancy-related deaths (PRDs) in their areas. In the second step, the identified deaths are

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followed up with home visits where verbal autopsies are carried out with relatives of the deceased women to identify the circumstances and cause of death.

To obtain a provincially representative sample, a multi-stage sampling process was adopted. The province was first stratified into three geographical zones. The districts in each zone were stratified as more urbanised and less urbanised, and one district was randomly selected from each of the two strata in each zone. The six districts selected comprised approximately 24% of the total universe of districts in KP and covered 29% of the provincial population.[15]

Districts in Pakistan are composed of Union Councils (UCs), which is the smallest administrative unit in the country, and each UC has a population of 10,000-20,000. The study covered all UCs in the six selected districts.

The community informant networks included Lady Health Workers (LHWs), who are government employees tasked with providing preventive healthcare services to women in their homes; religious leaders, who are well known, respected, and privy to events such as births, deaths, and marriages taking place in their communities; Nikkah registrars, who solemnise marriages; and local Elected Councillors. Two overlapping networks were employed in each UC.

Members of the informant networks were identified and approached with the help of the local administration. They were invited to preparatory meetings where they were tasked with identifying and reporting all deaths that had taken place in their communities in 2013-14 among women of reproductive age, which was set at 12-50 years, during pregnancy, birth, or the 42-day post-birth period. Nearly 15,000 individuals gathered information.

Once the lists of PRDs had been provided by the informants, the capture-recapture technique was applied to adjust for deaths that may have been missed by either network.

The identified cases were followed up with visits to the homes of the deceased women for conducting verbal autopsies with their close relatives. Informed consent was obtained from the respondents. The World Health Organisation (WHO) verbal autopsy questionnaire for adult deaths was used in these interviews.[16]

The data was entered into Inter VA,[17] a computerised algorithm compatible with the WHO questionnaire, which provides probabilities of possible causes of deaths. Final verification, in cases where the diagnosis could not be determined, was carried out by an obstetrics/gynaecology consultant based at the Pakistan Institute of Medical Sciences (PIMS), Islamabad. In the verbal autopsy form questions on socio-demographic characteristics of the deceased and her household were included, also included were questions related to health system utilisation. A verbatim selection was included to obtain details regarding family decision-making and the health-seeking pathway. The socio demographic index was constructed on the basis of possession of household assets. Statistical analysis was carried out using SPSS 21 and, where appropriate, chi-square Yates, Fisher-Exact test and Wilcoxon T test were used. Multivariate analysis looked at the association of independent variables, like age, parity, socio-economic index, and timing of death, with death due to eclampsia. Significance was assessed by confidence intervals (CI) and Wald statistics.

Approval for the 2016 study was obtained from the National Bioethics Committee of Pakistan and the institutional review board of PC, New York.

Results

Of the 958 cases identified, 167(17%) related to hypertensive disorders during pregnancy (eclampsia), which was the second major cause of maternal death in the province, after postpartum haemorrhage, which accounted for 434 (45%). The other major factors were: indirect causes for 118 (12%), sepsis 104 (11%), obstructed labour 51 (5%), and antepartum haemorrhage 15 (2%). The remaining 20 (2%) included abortion-related complications 11 (1%), rupture of uterus 5 (0.5%), ectopic pregnancy 5 (0.5%). Besides, 28 (3%) cases could not be categorised and 21 (2%) were incidental deaths. Among the verbal autopsy respondents, 33 (20%) were parents-in-law, 33 (20%) were siblings-in-law, 23 (14%) were parents, 17 (10%) were siblings, 12 (7%) were husbands, 13 (7%) were either sons or daughters including in-laws, 8 (5%) were cousins, 28 (17%) were others, including neighbours.

The median age of women who died from eclampsia was 28 years (interquartile range [IQR]: 11); 105(63%) were illiterate; and 149(89%) belonged to middle or low socio-economic class (Table 1).

Compared to women who died of other causes, eclamptic women showed well defined signs and symptoms of risk, including being diagnosed as having hypertension

Table-1: Socio-demographic Characteristics of mothers who died due to Eclampsia in KP province.

		n (%)
Age (years)	< 20 years	15 (9.0)
	20-24 years	29 (17.4)
	25-29 years	49 (29.3)
	30-34 years	19 (11.4)
	35/35+ years	55 (32.9)
	Total	167 (100.0)
Literacy	Literate	62 (37.1)
	Illiterate	105 (62.9)
	Total	167 (100.0)
Number of children	0 - 1 (Primiparous)	59 (35.3)
	2 - 5 (Multiparous)	77 (46.1)
	6/6+ (Grand multi)	31 (18.6)
	Total	167 (100.0)
Socio-economic status	Low	70 (41.9)
	Medium	79 (47.3)
	High	18 (47.3)
	Total	167 (100.0)

Table-2: Multiple Regression Model.

	p-value	95% CI
Age		
Less than 25 years	1.000	
25 or more years	0.011	1.5 (1.1 - 2.2)
Parity		
3 or more children	1.000	
No child	0.010	1.8 (1.2 - 2.9)
1 child	0.308	1.2 (0.8 - 1.8)
2 children	0.627	0.9 (0.6 - 1.4)
Socio-economic index		
Low	1.000	
Medium	0.294	0.9 (0.6 - 1.1)
High	0.007	0.3 (0.1 - 0.7)
Risk factors*[1]		
High BP	0.000	3.9 (2.9 - 5.4)
Severe Headache	0.016	1.5 (1.1 - 2.1)
Convulsions	0.000	3.7 (2.4 - 5.6)
Blurred Vision	0.002	2.4 (1.4 - 4.1)
Heart Disease	0.288	1.4 (0.7 - 2.7)
Diabetes	0.823	1.1 (0.4 - 3.3)
Vomiting	0.278	0.8 (0.6 - 1.2)
Timing of maternal deaths		
Died within 42 days after birth	1.000	
Died during pregnancy / undelivered	0.000	5.4 (3.4 - 8.5)
Died within 24 hours after birth	0.067	1.6 (1.0 - 2.5)
Obstetric outcomes		
Live birth	1.000	
Still birth	0.230	1.4 (0.8 - 2.4)
Foetal death	0.000	4.3 (2.9 - 6.3)
Current birth		
Live birth	1.000	
Still birth	0.001	2.1 (1.3 - 3.3)
Foetal death	0.030	2.4 (1.1 - 5.5)

*[1] These variables are dichotomous and 'no' of each one is reference.

Table-3: Place of Death of Women who died due to Eclampsia.

	n (%)
Did not consult and died at home	61 (36.5)
Died on the way to 1st facility	16 (9.6)
Died at 1st facility	37 (22.2)
Died on the way to 2nd facility	10 (6.0)
Died at 2nd facility	25 (15.0)
Died on the way to 3rd facility	2 (1.2)
Died at 3rd facility	16 (9.6)
Total	167 (100.0)

(p<0.000), headaches (p<0.016), blurred vision (p<0.002) and convulsions (p<0.000). Also, 25(15%) of the deceased had had a convulsion in the last three months of pregnancy. Mothers who were primiparous (p<0.01), had a previous history of a stillbirth (p<0.005), or were aged 25 years or above (p<0.01) had a higher risk of developing eclampsia compared to women who died of other causes. Higher socio-economic status was a protective factor (p<0.007) (Table 2).

In terms of care-seeking behaviour, 88(53%) women had visited a service provider three or more times for antenatal care and, among these, 67(76%) had had their blood pressure checked, while 70(79%) had their urine tested.

Of the 167 deaths, 61(37%) took place at home, 90(54%) could reach the first contact facility where 37(22%) expired, 53(32%) reached a second contact facility where they were referred or self-referred, and where 25(15%) lost their lives, 16(9.6%) reached and expired at a third contact facility. The remaining 28(17%) women lost their lives during transit to a first, second, or third contact facility. In 58(35%) cases, the first contact facility was a private hospital or clinic, while the second and third contact facilities were mainly tertiary care government hospitals 50(30%) and teaching hospitals 32(19%) (Table 3).

The outcome of the last pregnancy included 48 (50%) live births, 40 (41%) stillbirths and 9 (9%) abortions. Out of the 48 babies born alive, 14 (29%) did not survive; the survival rate being 34 (71%). In terms of survival, 17 (51%) girls survived compared to 16 (49%) boys. Foetal loss was significantly higher among eclamptic mothers (p<0.000).

Discussion

A high proportion of eclamptic women died undelivered during labour. Delivery is the definitive treatment for pre-eclampsia and eclampsia, therefore most of these women's deaths could have been prevented through prompt assisted vaginal deliveries at appropriate facilities. WHO recommends that Venthouse, or vacuum extraction,

deliveries be made a part of the basic emergency obstetric care offered to eclamptic women at least in all secondary care facilities,[18,19] which are currently unavailable in most facilities in Pakistan. The high proportion of stillbirths could have also been prevented had prompt intrapartum care been provided to women with convulsions when they were brought to a facility.

The fact that a substantial proportion of women who were eclamptic had to travel to multiple health facilities reflects the dire need for a sound and functional referral system.[20] A continuum of care approach should be introduced in which LHWs and community midwives (CMWs), who are currently working discretely, work collaboratively to detect potential obstetric complications and provide timely advice to women to visit a facility where comprehensive emergency obstetric and neonatal care (EmNOC) services are available.

Only half of the deceased women had visited a health facility for 3 or more antenatal care (ANC) visits, and nearly a quarter of the women did not have their blood pressure (BP) measured or urine tested. We found that being a primigravida was a risk factor associated with eclampsia. This is similar to findings from studies conducted in Ethiopia Egypt, Nigeria, Eastern India and Uganda.[21-24]

Improving the quality of antenatal care visits to include BP measurements and routine tests for protein in urine can help greatly in the detection of hypertensive disorders. Therefore, LHWs must be tasked to refer all pregnant women to the CMWs of their area for monitoring BP as part of individual or group ANC of all pregnant women, especially those whose history suggests higher risk. Special attention must be paid to the primigravida as they are at a higher risk of developing eclampsia.

Our results indicate that lower socioeconomic status and lower low educational attainment were significantly associated with higher risk of PE/E. This is similar to earlier findings,[25,26] and could be linked to poor access to services and poor recognition of danger signs of pregnancy. It suggests that suitable information, education, and communication (IEC) materials must be used by LHWs and CMWs to enable women with low literacy levels and poorer backgrounds to recognise the danger signs. Mass media and the growing social media can also be used to inform families, including husbands, about what to do in case of pregnancy-related complications and facilitate decision-making within households.

In the current study, eclampsia was more common in the higher age groups, which is similar to earlier findings in China,[27] Finland[28] and Uganda.[29] It implies that older women must be encouraged to deliver at health facilities offering comprehensive emergency obstetric care (EOC), and not at home. A continuum of care approach needs to be introduced and the scope of community-based healthcare be expanded by recruiting more trained CMWs and linking them to specialised care facilities through a subsidised ambulance system.

Specific interventions such as raising community awareness refresher training of community-based providers on recognising danger signs of pregnancy and an efficient transport of women to appropriate facilities where comprehensive obstetric care is available can markedly reduce deaths due to postpartum haemorrhage and eclampsia, the leading causes of maternal mortality. Despite government efforts, the delivery of quality public-sector obstetric services is hampered, especially in rural areas, by poor implementation, governance issues, human resource constraints, and lack of essential equipment and supplies.[30,31] At the same time, a largely unregulated private sector coexists with the public sector and there is an urgent need to regulate its services by introducing compulsory standards. The plan to register and license private sector facilities to regulate services and ensure uniform quality standards is a step in the right direction. While the KP government has recently introduced a number of public health schemes, it will be some time before their impact becomes discernible, as the issues and problems are intertwined with the socio-cultural milieu as well as weaknesses in the health system.

In terms of limitations, verbal autopsy from relatives of the deceased women has inherent recall bias as it took place two years post-event. Moreover, the respondents were relatives of the deceased, and details on the treatment provided and procedures carried out at the health facility were not available. The scope and mandate of the study did not allow cross-verification of the data at the facilities. The verbal autopsy component has its limitations and actual causes obtained from this method are not perfect.

Conclusions

The study highlighted poor quality of care at both public and private health facilities, a non-functional referral system, and poor continuum of care leading to

preventable maternal deaths due to eclampsia in KP. **Disclaimer:** The research study was conducted by the Population Council. The views expressed and information contained in this document are not necessarily those of or endorsed by GIZ and DFID, which can accept no responsibility or liability for such views, for completeness or accuracy of the information, or any reliance placed on them.

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