EUROPEAN JOURNAL OF BIOMEDICAL AND PHARMACEUTICAL SCIENCES
http://www.ejbps.com

ISSN 2349-8870
Volume: 9
Issue: 2
124-133
Year: 2022

SOCIAL DETERMINANTS AND CONTRIBUTORS OF MATERNAL DEATHS IN PRAKASAM DISTRICT OF ANDHRA PRADESH, INDIA: AN ASSESSMENT OF HEALTH CARE PATTERN AND USE OF THREE DELAY MODEL

A. Sridevi*[1], B. T. Rao[2], Pratistha Sharma[3], KLS Keerthi[3], R. Yaswanth Chowdary[3] and D. Prem Kumar[3]

[1]Assistant Professor, Department of Obstetrics and Gynecology, Government General Hospital, Ongole.
[2]Assistant Professor, Department of Community Medicine, Government Medical College, Ongole.
[3]Interns, Government Medical College and General Hospital, Ongole.

***Corresponding Author: A. Sridevi**
Assistant Professor, Department of Obstetrics and Gynecology, Government General Hospital, Ongole.

Article Received on 29/11/2021 **Article Revised on 19/12/2021** **Article Accepted on 09/01/2022**

ABSTRACT

Introduction: The standards of Obstetric services in a country are assessed by Maternal and perinatal death rates. The three delays model proposes that maternal mortality is associated with delays in deciding to seek care; reaching the healthcare facility and receiving care. The socio-cultural conditions contribute for delays need to be understood for prevention of maternal Deaths. **Objectives:** To ascertain the social determinants and specific contributors of maternal deaths, health care seeking pattern and analyze about three delays pertaining to emergency obstetric care practices. **Methodology:** Retrospective study conducted on maternal deaths case records occurred from January 2017 to March 2019 in Parkasam District**.** Demographic characteristics, Antenatal Care, booking, delivery details, postnatal visits, causes of death, admission to maternal death time interval and distance from residence to health care facility, and various levels of delay with the reasons were assessed. Data analysis carried out by using latest SPSS Version. **Results:** Among 64 maternal deaths 50% were illiterate, 29.7% were labourers and 62.4% were SC&ST families. About 52 % were high risk and 31.2% deliveries occurred in Government Tertiary Care hospital and 23% in Private Hospitals and 79.7% were intranatal and postnatal deaths. Only 31% deaths had postnatal visits and 72% postnatal complications. 53% maternal deaths were occurred in Government hospitals, 20.3% in transit, 19% in private hospitals and 8% at houses. PIH and Eclampsia (32.9%) followed by hemorrhage (20.3%) were main causes of maternal deaths and 62.5% were had admission and death duration of more than one day. 45.3% travelled more than 3 hours to reach hospital. Type 1 an 2 delays were most common in comparison with 3rd delay. **Conclusions:** Early referral, continued skill based training of ANMS and doctors, monitoring of health services can reduce maternal mortality. Special teams of doctors need to be trained to manage complications at periphery level and household level. Maternal deaths can prevent by improving establishment of proper obstetrics services including proper postnatal visits for all.

KEYWORDS: Maternal Death, Social Determinants, Three delay model, Antenatal Care, Birth Planning.

INTRODUCTION

Maternal mortality is a global health problem and as per United Nations estimates, 1 in 190 women in India face the risk of maternal mortality compared with 1 in 1400 in Sri Lanka.[1] UNICEF has estimated that approximately 80% of maternal deaths could be averted if women had access to essential maternity and basic health care services.[2] Every day, approximately 830 women die from preventable causes related to pregnancy and childbirth.[3,4] Even today 20% global maternal deaths occur in India.[5] MMR for India was 301 per 100,000 live births by Sample Registration Survey (SRS) 2003 estimate and came down to 167 by SRS 2013 survey.[6]

The Kerala has the least MMR with 46 per 1 lakh live births for the year 2016. Andhra Pradesh has reduced MMR from 92 per one lakh live births in year 2013 to 74 per one lakh live births in year 2016. Among all the states Assam has highest MMR of 237 per one lakh live births in the year 2016. WHO commends India for its groundbreaking progress in recent years in reducing the maternal mortality ratio (MMR) by 77%, from 556 per 100 000 live births in 1990 to 130 per 100 000 live births in 2016.[7] The fifth millennium development goal (MDG) target was to reduce maternal mortality ratio (MMR) by three quarters by 2015.

Low status of the women in the society coupled with low literacy rates also leads to underutilization of available

health services.[8] Cultural values and norms are closely related to maternal deaths, geographic distance, poverty are some of the risk factors for maternal death.[9] High maternal mortality rate is an indication of poorly structured and functioning health care systems and limited control over resources, poor decision-making and restriction on access to social support. Social determinants among African countries include, health care provider attitude, financial inequity, transportation problems, insecurity, marital status, age, education, gender equity, material and human resources, socio-cultural factors and health care system delivery.[10]

In many societies health seeking behavior is interlinked to ethnicity, religion socio-economic position, residence and access of transportation.[11,12] Male involvement is also one of the strategies that should be enforced in programs related maternal health. Government policies on the reduction of inequalities, social protection of disadvantaged people can help can help in reducing maternal mortality and morbidity. Social inferiority and discrimination usually lead to poor attitude and treatment by health-care providers.[13,14]

In developed areas of world with high socio economic standards, maternal mortality has been reduced to very negligible proportions.[15] Even though India has made a great stride in reducing maternal deaths, the differentials in the states are huge ranging from 46 to 237 maternal deaths per 1 lakh live births.[16] India's present MMR is below the Millennium Development Goal (MDG) target and puts the country on track to achieve the Sustainable Development Goal (SDG) target of an MMR below 70 by 2030. India has put significant emphasis on mitigating the social determinants of maternal health.[17]

The direct causes of maternal mortality, that is, hemorrhage, unsafe abortion, eclampsia, obstructed labor, and others account for about three-fourths of maternal deaths. The remaining one-fourth are indirect causes such as anemia, hepatitis, heart disease, malaria, and human immunodeficiency virus (HIV)/ acquired immunodeficiency syndrome (AIDS). The other contributory causes are early marriage, adolescent pregnancy, poverty, malnutrition, harmful traditional practices, illiteracy/ignorance, etc.[18] and these are mostly preventable through regular antenatal checkup, proper diagnosis, and management of labor complications.[19]

Efficient antenatal, and intranatal care, availability of such care to vast majority if not to all pregnant women, highly specialized care being made available to all who require it. In developing countries with providing of antenatal care, ignorance and unwillingness on the part of pregnant mother to attend hospitals early.[20] Many interventions have been initiated and strengthened to prevent maternal deaths in India directly and indirectly.[21] The three delay model can be applied to understand the causes of delays in emergency obstetric care which may lead to maternal deaths, eventually calling for interventions to avoid those delays.[22]

This study was done to ascertain the social determinants and specific contributors of Maternal deaths, identify various leading causes of maternal deaths and assess the health care pattern of families of maternal deaths and also to analyze critically about three delays pertaining to emergency obstetric care practices during pregnancy in these maternal deaths.

METHODOLOGY

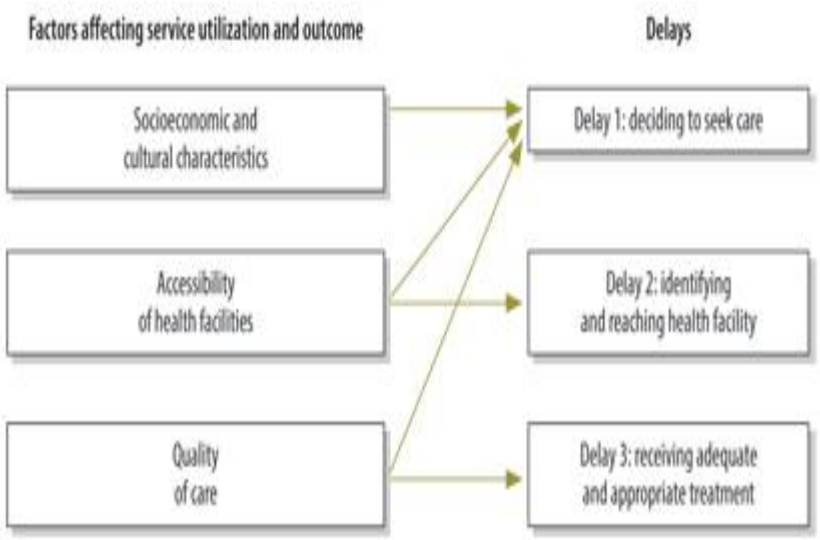
District Medical and Health office, Prakasam district has a separate wing, where all maternal deaths records are filed and these were regularly discussed at the end of every month by team of experts. This was a retrospective study carried out at Department of obstetrics & Gynecology Department Government Medical College and General Hospital, Ongole, Prakasam District, Andhra Pradesh, India which is a tertiary care hospital located at district headquarters catering to many sub district area hospital, Community health centres and Primary health centers for health services.

We have one more big old tertiary care hospital- Guntur Medical College and government general hospital located in neighboring district, the pregnant women from nearer and bordering villages with Guntur, directly visit this hospital to avail the services. Institutional ethical approval obtained for conduction of the study and permission has been taken from the DM and HO office for analyzing maternal death files.

Standard maternal death definition used to find out the maternal mortality and its causes. All these Case records obtained from January 2017 to March 2019 were reviewed by the principal investigator of this study. Total number of live births was also calculated for the same time period. All the deaths pertaining to maternal death were included in this study whereas; the cases left against medical advice were excluded. The information regarding demographic characteristics, causes and places of death, and time interval from admission to maternal death, age, parity, booking and distance from residence to health care facility, Level of ANC care, and referral time noted along with duration of care received at this hospital and time of death.

Various levels of delay with the reasons for delay were assessed and we used the three-delay model in which maternal death were classified into three delays, delay relating to the emergency obstetric care. Type 1 delay is delay in decision making to seek help Type 2 delay is delay in identifying and reaching health facility by transport due to poor roads and unavailability of vehicles and Type 3 delay is delay at institutional level in receiving adequate and appropriate treatment. The three delay model can be applied to understand the causes of delays in emergency obstetric care which may lead to

maternal deaths, eventually calling for interventions to avoid those delays.[23]



DATA ANALYSIS

Permission of the institutional ethical committee was obtained before recording data on proforma with the assurance of its confidentiality. Data was collected on a proforma and entered into Microsoft Excel 2000 and SPSS latest version used for analysis and results were analyzed in terms of percentage and proportion. Descriptive analysis which includes frequency distribution showing number and percent- ages were generated for each identified variable.

RESULTS

Maternal deaths of Prakasam district during study period was 67 and wit 97227 live births the calalculated maternal mortality is around 69.2 per 1 lakh live births. Among total 64 maternal deaths, maximum numbers were occurred between 20-30 years of age group and 12.5% below 20 years. Illiterates were most common (50%) in these deaths, 31.2% completed secondary school and only 3% studied graduation or post-graduation degrees. Most of the maternal deaths (96.8%) were from rural areas, 81.3% were Hindus, 70.3% were house wives and 29.7% were involved in daily labour work.

Table 1: Socio Demographic factors of Maternal Deaths.

S.No	Variable	Number N=64	Percentage
1	**Age**		
	<20	8	12.5%
	20-30	52	81.3%
	>30	4	6%
2	**Education**		
	Illiterate	32	50%
	Primary School	2	3.1%
	Secondary School	20	31.2%
	Intermediate	8	12.5%
	Graduate	1	1.5%
	Post Graduate	1	1.5%
3	**Residency**		
	Rural	62	96.8%
	Urban	2	3.2%
4	**Religion**		
	HIndu	52	81.3%
	Christian	7	10.9%
	Muslim	5	7.8%
	Others	0	
5	**Occupation**		

	House wife	45	70.3%
	Daily labour	19	29.7%
6	**Socio Economic Status**		
	Upper	5	7.8%
	Upper Middle	10	15.6%
	Middle	12	18.7%
	Lower Middle	20	31.2%
	Lower	17	26.2%
7	**Caste**		
	OC	7	10.9%
	OBC/BC	17	26.6%
	SC	31	48.4%
	ST	9	14%

It was noticed that 57.4% families were lower middle and lower socio economic status and only .7% were belong to upper socio economic status families. Very astonish to see that the highest number of (62.4%) maternal deaths occurred in SC and ST families, 26.6% were OBC families and 10.9% were open category families (Table-1).

Ninety seven percent maternal deaths received antenatal care, 75% visited sub Centre-ANMs, 68.7% to Primary Health centers 35.9% to private hospitals 12.5% to community Health centers and only 3.2% availed services from tertiary care hospitals. More than 98% of these deaths were booked during pregnancies and 96.5% undergone for more than 4 antenatal visits. It was noticed that 51.5% deaths were labeled as high risk pregnancies, 48.5% were no high risk pregnancies. Forty seven percentages of deaths suffered with complications during pregnancies and 57% were without complications (Table-2).

Table 2: Status of antenatal care seeking pattern among maternal Deaths.

S.No	Variable	Number (N=64)	Percentage
1	**Received Antenatal Care** (Yes)	62	96.5%
2	**Health Care Providers**		
	Sub centre (ANM)	48	75%
	Primary Health Centre (PHC)	44	68.7%
	Community Health Centre (CHC)	8	12.5%
	Tertiary Care Hospital	2	3.2%
	Private Hospital	23	35.9%
	Not visited any health Care provider	1	1.5%
3	**Number of Antenatal Check-ups**		
	>4	62	96.5%
	<4	2	3.5%
4	**Booked during Pregnancy**		
	Yes	63	98.5%
	No	1	1.5%
5	**High Risk Pregnancy**		
	Yes	33	51.5%
	No	31	48.5%
5	**Complications occurred during Pregnancy**		
	Yes	30	46.8%
	No	34	53.2%
6	**Birth Planning (Y)**	54	84.4%

Out of total maternal deaths 20.3% were antenatal deaths and 79.7% were post natal deaths. Thirty one percentage delivered in district hospital, 23.4% at private hospital 12.5% at area hospital, 6.2% at Community health centre, 3.2% at home, 1.5% at primary health center and 1.5% during transit period. 42.1% delivered by LSCS, 37.5% by Normal vaginal delivery and 59.3% encountered complications during delivery. Only 31.2% received postnatal visits, 71.8% suffered with post natal complications and 28.1% received blood transfusions at the time of delivery (Table-3).

Table 3: Natal and postnatal care seeking pattern among maternal deaths.

S.No	Variable	Number (N=64)	Percentage
1	**Place of Delivery**		
	Home	2	3.2%
	Primary Health Centre (PHC)	1	1.5%
	Community Health Centres (CHC)	4	6.2%
	Area Hospital (AH)	8	12.5%
	District Hospital (DH)	20	31.2%
	Private Hospital (PVT)	15	23.4%
	TRANSIT (During Travel)	1	1.5%
	Not Delivered	13	20.3%
2	**Mode of Delivery**		
	Normal vaginal delivery	24	37.5%
	LSCS	27	42.1%
	Not Delivered (Antenatal Deaths)	13	20.3%
3	**Complications during Delivery**		
	Yes	38	59.3%
	No	26	40.6%
4	**Post natal visits**		
	Yes	20	31.2%
	No	24	37.5%
	DNK	20	31.2%
5	**Post natal complications**		
	Yes	46	71.8%
	No	5	7.8%
	Not Delivered (Antenatal Deaths)	13	20.3%
6	**Blood transfusion**		
	Yes	18	28.1%
	N0	43	67.1%
	DNK	3	4.6%

It was noticed that direct causes contributed to 70.1% maternal deaths and indirect causes contributed to 29.9% maternal deaths. Out of total maternal deaths Direct causes of deaths are very common, Pregnancy induced hypertension, ante partum eclampsia and Post-partum eclampsia together contribute 32.9% of maternal deaths, followed by antepartum hemorrhage and post-partum hemorrhage together contributes to 21.3%, then sepsis causing 7.8% of maternal deaths. Among indirect causes thrombotic embolism (9.4%) played a great role in causing maternal death then severe anemia (3.2%) and cancer (3.2%) (Table-4).

Table 4: Causes of maternal deaths.

S.NO	Causes of Death	Number	Percentage (%)
	Direct Causes		
1	Antepartum Haemorrhage	**5**	7.8%
2	Postpartum Haemorrhage	**8**	12.5%
3	PIH and antepartum eclampsia	**15**	23.5%
4	Postpartum eclampsia	**6**	9.4%
5	Sepsis	**5**	7.8%
6	Septic Abortion	**2**	3.2%
7	Amniotic Fluid embolism	**1**	1.6%
8	Uterine inversion	**1**	1.6%
9	ARDS	**2**	3.2%
	Indirect Causes		
1	Thrombotic embolism	**6**	9.4%
2	Severe Anaemia	**2**	3.2%
3	Cancer	**2**	3.2%
4	Chronic Liver Diseases	**1**	1.6%
5	AIDS	**1**	1.6%
6	PP Cardiomyopathy	**1**	1.6%
7	TB	**1**	1.6%

8	Pulmonary Hypertension	**1**	1.6%
9	Head injury	**1**	1.6%
10	Diabetic Ketoacidosis	**1**	1.6%
11	Haemorrhagic fever	**1**	1.6%
12	Opioid Poisoning	**1**	1.6%

Maximum number of maternal deaths were occurred in Government General Hospital Guntur (26%), During transit period (20%), followed by Private hospitals (19%), then Government General Hospital Ongole (16%). It was observed that deaths were occurred in home (8%), 5% in Community Health Centre and 3% in maternal child health hospital, Ongole (Fig-1)

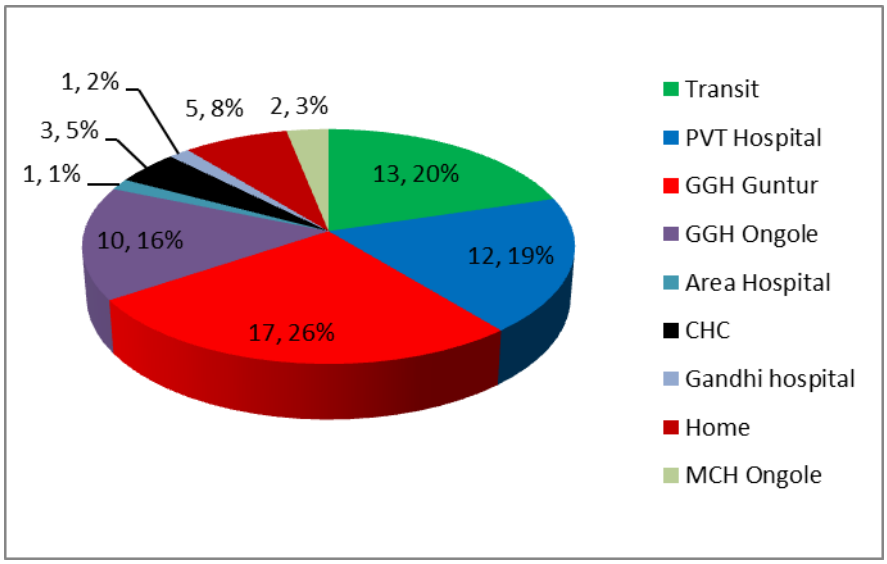


Fig-1: Place of maternal deaths in Prakasam District.

It was observed that 80% of maternal deaths were occurred in postnatal period followed by 20% in antenatal period and only 3% of deaths in intranatal period (Fig-2)

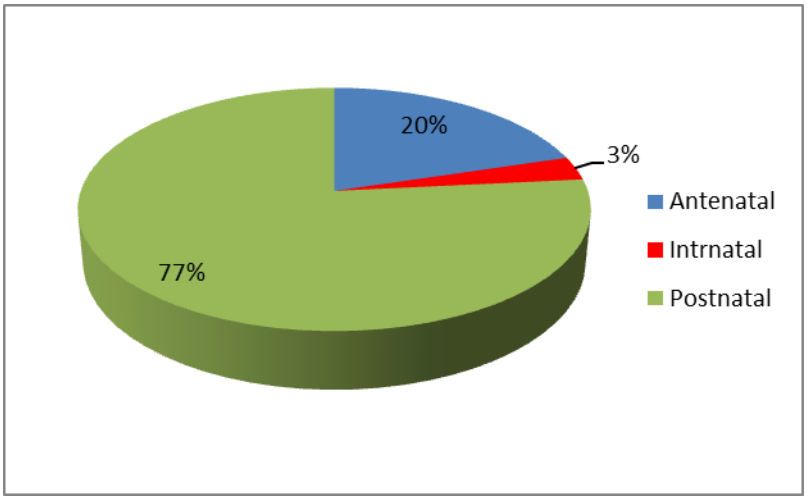


Fig-2: Time of Maternal Deaths in Prakasam District.

Three types of delays were assessed and Type-2 delay (reaching care) was found to be most common (70.3%) followed by type-1 delay (Seeking care). Type-3 delay (24%) also exists with problems in infrastructure quality of services and decision making at health care facility level. Type 2 delay is mostly due to long distance travel and poor road conditions. Type-1 Delay is due to lack of awareness and poor socio economic status and Type-3 delay is due to shortage of infrastructure and equipment for emergency obstetric care and ICU setup. (Fig-3).

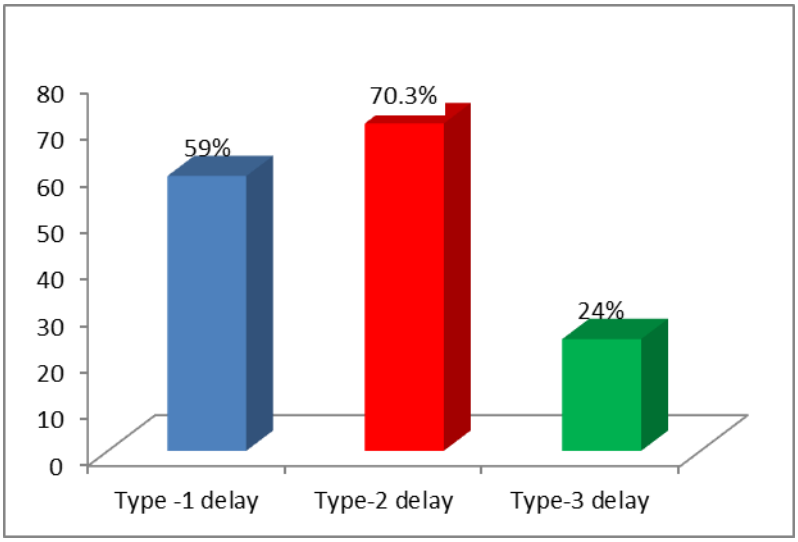


Fig-3: Three delays in Emergency obstetric services.

It was noticed that 62.5% were had admission and death duration of more than one day and 45.3% travelled more than 3 hours to reach hospital. (Table-5)

Table 5: Admission to Death Duration and Travel details in Prakasam District.

S.NO	Variable	Number (N=64)	Percentage
	Admission to Death Duration		
1	< 1day	24	37.5%
2	>1 day	40	62.5%
	Travel details		
1	< 3 Hrs	34	55.7%
2	>3 Hrs	30	45.3%

DISCUSSION

The people staying in the rural areas have poor availability, accessibility, affordability of health services when compared to their urban which is evident[24,25] among maternal health services. Poor, illiterate, unbooked women coming from remote rural areas were more vulnerable to morbidity and mortality.[26] Maternal deaths of Prakasam district were 67 and wit 97227 live births the calculated maternal mortality is around 69.2 per 1 lakh live births.

Maternal mortality is an index to judge the health care and reflects the educational and socio-economic state of a country as well as public health consciousness All the maternal deaths that occurred were of women who belonged to the low socio-economic group.[27,28] Since 1990, a sharp maternal mortality decline of 43% were reported globally. During the same period, many countries in Sub-saharan Africa recorded 50% reduction in maternal mortality.[29]

Among total 64 maternal deaths in our study 81.3% were between 20-30 years of age, 50% were illiterates and 31.2% completed secondary school. This finding is similar to study conducted in western Maharashtra semi-urban area tertiary care hospital.[30] Oladapo et al reported a higher maternal mortality in elderly women.[31] It was noticed that 96.8% were from rural areas in our study, in contrast Jadhav et al. in their study on maternal mortality observed that 64.55% maternal deaths was from urban residence and only 35.45% were from rural residence.[32]

Our study revealed that 70.3% were house wives and 57.4% families belong to poor socio economic status and 62.4% maternal deaths occurred in SC and ST families. As per Bedi etal study most of the maternal deaths were among women belonging to poor class (76.4%).[33] Literacy, parity and socioeconomic status are some of the determinants of maternal mortality and can act as risk factors. As per Ratan das eat al study, majority of patients belong to low socio-economic group and were illiterate and due to lack of awareness, people do not seek medical advice at an early stage.[34]

In our study, 97% maternal deaths received antenatal care, 75% visited sub Centre-ANMs, 68.7% to Primary Health centers and only 3.2% availed services from tertiary care hospitals during antenatal period. A study by Awasthi etal found that 76.0% of respondents had attended antepartum visit during their last pregnancy, whereas 24.0% of respondents did not attend any antepartum clinic Among them who had done their ANC visit, all of the respondent had visited a government hospital.[35] A study by Misra etal observed that They were registered at different level of health services, i.e.,

1.8% in sub health posts, 28.0% in PHCs, 34.3% in a Zonal hospital, and 35.9% in private nursing homes.[36]

It was observed in our study that 80% of maternal deaths were occurred in postnatal period followed by 20% in antenatal period and only 3% of deaths in intranatal period. As study conducted in Maharastra found that Majority of deaths (54.40%) occurred in the postnatal period, followed by antenatal (27.90%) and intranatal period (17.70%).[37] Similar to our study findings Bhosale et al. in their study revealed that 66.70% maternal deaths happened in the postpartum period followed by antepartum period (29.20%).[38] It was noticed in our study that 62.5% were had admission and death duration of more than one day and 45.3% travelled more than 3 hours to reach hospital. In contrast, 47.20% maternal deaths were within 1-7 days and 27.07% were beyond 7 days of hospital admission in the study by Bhosale et al.[38]

It was noticed that direct causes contributed to 70.1% maternal deaths and indirect causes contributed to 29.9% maternal deaths. A study by Paul B et al who reported 76.7% direct causes of maternal mortality in 2006-07.[39] In our study out of total maternal deaths, direct causes of deaths are very common, Pregnancy induced hypertension, ante partum Eclampsia and Post-partum Eclampsia together contribute 32.9% of maternal deaths, followed by antepartum hemorrhage and post-partum hemorrhage together contributes to 21.3%, then sepsis causing 7.8% of maternal deaths. Eclampsia accounted for 43.35% of total maternal deaths, Hypertensive disorders of pregnancy are a major cause of maternal and fetal morbidity and mortality all over the world.[40] Our findings were consistent with studies by Jadhav, and Pal.[41,42]

Three types of delays were assessed and Type-2 delay (reaching care) was found to be most common (70.3%) followed by type-1 delay (Seeking care). Type-3 delay (24%) also exists with problems in infrastructure quality of services and decision making at health care facility level. Type 2 delay is mostly due to long distance travel and poor road conditions. Type-1 Delay is due to lack of awareness and poor socio economic status and Type-3 delay is due to shortage of infrastructure and equipment for emergency obstetric care and ICU setup. A study in Tirupati noticed that type 1, 2 and 3 delays had role in 4.8%, 57.1% and 38.1% maternal deaths respectively.[43] Paul B et al where type 1 and 2 contributed to 58% maternal deaths and type 3 contributed 46.5% maternal deaths.[39]

CONCLUSIONS

Early referral, continued skill based training of ANMS and doctors, monitoring of health services can reduce maternal mortality. Special teams of doctors need to be trained to manage complications at periphery level and household level. Maternal deaths can prevent by improving establishment of proper obstetrics services including proper postnatal visits for all. The socio-economic and cultural conditions that often contribute to delays need to be understood and explained to prevent these untimely maternal deaths. Regular monitoring of blood pressure and detection of albuminuria at primary health care centres with early detection of hypertensive disorders of pregnancy can prevent maternal deaths at facility level. Early referral must be done to tertiary care centers where blood transfusion, ventilator facilities and dialysis units are available. The role of a well-equipped health facility with a good referral network plays an important role in preventing the maternal deaths.

ACKNOWLDGEMENTS

We gratefully acknowledge and sincerely thank our District Medical Health Officer (DM&HO) granting permission to review maternal death cases of Prakasam District allow us for planning and conduction of this research study.

REFERENCES

1. WHO Trends in maternal mortality, 1990-2013. WHO, UNICEF, UNFPA. The World Bank and The United Nations Population Division Estimates, 2014. Available at http://apps.who.int/iris/bitstream/10665/112682/2/9789 241507226_eng.pdf.
2. UNICEF. The state of the world's children 2009: maternal and newborn health. In: UNICEF, eds. Sales No. E 0.
3. Global, regional, and national levels and trends in maternal mortality between 1990 and 2015, with scenario-based projections to 2030: a systematic analysis by the UN Maternal Mortality Estimation Inter-Agency Group.
4. Alkema L, Chou D, Hogan D, Zhang S, Moller AB, Gemmill A, et al. Lancet, 2016; 387(10017): 462-74.
5. Yerpude PN, Keerti S Jogdand. A 5 year retrospective study of pattern of maternal mortality in a tertiary care hospital in South India. Int J Recent Trends Sci Technol, 2014; 11(3): 310-2.
6. mmr_bulletin_2011-13 census (SRS) 2011. [Online]. Available at http://www.censusindia.gov.in/vital_statistics/mmr_bulletin_2011-13. pdf. [Cited 2015 Nov 22]
7. special bulletin on maternal mortality in India 2014-16, sample registration system, May 2018.
8. Abdella A. Maternal mortality trend in Ethiopia. Ethiop J Health Dev, 2010; 24(1): 115-22.
9. UNFPA. The Social Determinants of Maternal Death and Disability. 2012.
10. Adgoy ET. Key social determinants of maternal health among African countries: a documentary review. MOJ Public Health, 2018; 7(3): 140–144.
11. Gabrysch S, Campbell OM. Still too far to walk: Literature review of the determinants of delivery service use. BMC Pregnancy and Childbirth, 2009; 9: 34.

12. Say L, Raine R. A systematic review of inequalities in the use of maternal health care in developing countries: examining the scale of the problem and the importance of context. Bull World Health Organ, 2007; 85(10): 812–819.
13. Coovadia H, Jewkes R, Barron P, et al. The health and health system of South Africa: historical roots of current public health challenges. The Lancet, 2009; 374(9692): 817–834.
14. Mumtaz Z, Salway S, Bhatti A, et al. Addressing invisibility, inferiority, and powerlessness to achieve gains in maternal health for ultra-poor women. Lancet, 383(9922): 1095–1097.
15. Andrea Nove, Zoë Matthews, Sarah Neal, Alma Virginia Camacho Articles Maternal mortality in adolescents compared with women of other ages: evidence from 144 countries Lancet Glob Health, 2014; 2: e155–164.
16. Special bulletin on maternal mortality in India 2014-16. Sample Registration System. Registrar General of India, 2018.
17. India has achieved groundbreaking success in reducing maternal mortality By Dr Poonam Khetrapal Singh, WHO Regional Director for South-East Asia.
18. Wadhwa L, Gupta S, Jain A. Demography and aetiological profile of maternal mortality cases at a tertiary care centre of India – five and a half years retrospective analysis 2013 July-Dec. Indian J Med Specialities, 2013; 4(2): 238-42.
19. Zaman S, Begum AA. Maternal mortality at a rural medical college of Assam: a retrospective study. J Obstet Gynaecol Barpeta, 2014; 1(1): 46-51.
20. Chi PC, Bulage P, Urdal H. A qualitative study exploring the determinants of maternal health service uptake in post-conflict Burundi and Northern Uganda. BMC Pregnancy and Childbirth, 2015; 15: 18.
21. Millennium development goals. India country report 2015. Available at http://mospi. nic.in/sites/default/files/publication_reports/mdg_2j u ly15_1.pdf.
22. Thaddeus S., Maine D. Too far to walk: Maternal mortality in context. Soc Sci Med., 1994; 38(8): 1091- 110.
23. Thaddeus S., Maine D. Too far to walk: Maternal mortality in context. Soc Sci Med., 1994; 38(8): 1091- 1100.
24. Kumar, C., Singh, P.K., & Rai, R.K. (2013). Coverage gap in maternal and child health services in India: Assessing trends and regional deprivation during 1992–2006. Journal of Public Health, 35(4): 598–606.
25. Montgomery, A.L., Ram, U., Kumar, R., & Jha, P. (2014). For the million deaths study collaborators, Maternal mortality in India: Causes and healthcare services use based on a nationally representative survey. PLoS, 9(1): e83331.
26. Gupta, M., Angeli, F., Bosma, H., Rana, M., Prinja, S., Kumar, R., & Van schayck, O.C.P. (2016). Effectiveness of multiple-strategy community intervention in reducing geographical, socioeconomic and gender based inequalities in maternal and child health outcomes in Haryana, India. PLoS ONE, 11(3): e0150537. doi: 10.1371/journal.pone.0150537.
27. Sowjanya Kumari1,*, V Revathi2, K Sharmista Reddy3. A study of maternal mortality in Government Maternity Hospital, Sri Venkateswara Medical College, Tirupati. Indian Journal of Obstetrics and Gynecology Research, October-December, 2018; 5(4): 525:529.
28. 5Bangal VB, Giri PA, Garg R. Maternal Mortality at a Tertiary Care Teaching Hospital of Rural India: A Retrospective Study. Int J Biol Med Res., 2011; 2(4): 1043–1046. [Google Scholar]
29. Mullick SS, Serle E. Achieving millennium development goals 4 and 5: a snapshot of life in rural India. BJOG, 2011; 118(Suppl. 2): 104–107. [PubMed] [Google Scholar]
30. Murthy BK, Murthy MB, PM, P. Maternal mortality in a tertiary care hospital: A 10-year review. Int J Preventive Med., 2013; 4(1): 105-9.
31. Oladapo OT, Lamina MA, Fakoya TA. Maternal deaths in Sagamu in the new millennium: a facility based retrospective analysis. BMC Pregnancy and child birth, 2006; 6: 6.
32. Jadhav CA, Prabhakar G, Shinde MA, Tirankar VR. Maternal mortality: five year experience in tertiary care centre. Indian J Basic Appl Med Res., 2013; 7(2): 702-9.
33. Bedi N, Kambo I, Dhillon BS, Saxena BN, Singh P. Maternal deaths in India: Preventable Tragedies (An ICMR Task Force Study). J Obstet Gynecol Ind., 2001; 51: 86-92.
34. Ratan Das and Saumya Biswas. Eclapmsia: The Major Cause of Maternal Mortality in Eastern India. Ethiop J Health Sci., 2015 Apr; 25(2): 111–116.
35. Mamata Sherpa Awasthi, Kiran Raj Awasthi, Harish Singh Thapa, Bhuvan Saud, Sarita Pradhan, and Roshani Agrawal Khatry, "Utilization of Antenatal Care Services in Dalit Communities in Gorkha, Nepal: A Cross-Sectional Study," Journal of Pregnancy, vol. 2018, Article ID 3467308, 8 pages, 2018.
36. R. Misra and N. Chaurasia, "Utilization of Safe Motherhood Services in Jhorahat PHC Area of Morang District, Nepal," American Journal of Public Health Research, 2015; 3: 123–129.
37. Abhilasha Nair1, Mohan K Doibale2, Venkatesh V Gujrathi1, Ismail F Inamdar1, Amol D Shingare1, Pinkesh S Rajput1. Study of maternal mortality in a tertiary care hospital in a district of Maharashtra. International Journal of Medical Science and Public Health | 2016 | Vol 5 | Issue 09 1851-1854.
38. Bhosale A, Qureshi S, Nandanwar YS. Maternal mortality at a tertiary institute: a five year study. Bombay Hospital J., 2011; 53(2): 189-92.
39. Biswajit Paul, Bijeeyani Mohapatra, Krishna Kar. Maternal Deaths in a Tertiary Health Care Centre of

Odisha: An In-depth Study Supplemented by Verbal Autopsy. Indian J Community Med., 2011; 36(3): 213–216.

40. Ratan Das[1] and Saumya Biswas[2]Eclapmsia: The Major Cause of Maternal Mortality in Eastern India. Ethiop J Health Sci., 2015 Apr; 25(2): 111–116.
41. Jadhav AJ, Rote PG. Maternal mortality-changing trends. J Obstet Gynaecol India, 2007; 57: 398-400. 7.
42. Pal A, Ray P, Hazra S, Mondal TK. Review of changing trends in maternal mortality in a rural medical college in west Bangal. J Obstet Gynecol India, 2005; 55: 521-4.
43. Kumar S, Revathi V, Reddy K S. A study of maternal mortality in Government Maternity Hospital, Sri Venkateswara Medical College, Tirupati. Indian Journal of Obstetrics and Gynecology Research, October-December, 2018; 5(4): 525-529.