



## Original Research Article

## Retrospective analysis of causes of death in severe PIH, Preeclampsia &amp; Eclampsia cases in a tertiary medical care centre from January 2015 to December 2016

Malabika Misra<sup>1,\*</sup>, Chaitali Sarkar<sup>2</sup>, Ranita Roychowdhury<sup>2</sup><sup>1</sup>Dept. of Obs & Gyn, Jagannath Gupta Institute of Medical Science and Hospital, Kolkata, West Bengal, India<sup>2</sup>Dept. of Gyn & Obs, College of Medicine and JNM Hospital | WBUHS, Kolkata, West Bengal, India

## ARTICLE INFO

## Article history:

Received 31-05-2021

Accepted 12-12-2021

Available online 07-04-2023

## Keywords:

Maternal mortality

PIH

Pulmonary oedema in pregnancy

Hypertensive disorders in pregnancy

## ABSTRACT

**Background:** PIH, preeclampsia and eclampsia cases are one of the leading cause of maternal death especially in underdeveloped countries. Substandard maternity care is thought to be the reason behind it. Hypertensive disorders in pregnancy is a multi-organ involving disease of unknown etiology. Early detection, timely intervention, strict vigilance and intensive monitoring is needed to prevent maternal mortality and morbidity.

**Aims & Objectives:** Our aim was to detect the cause of death among pregnant women admitted with hypertensive disorders so that measures can be taken to improve the maternity service.

**Materials and Methods:** It was a Retrospective analytical study of causes of maternal death among hypertensive disorders in pregnancy cases admitted in our institution from 1<sup>st</sup> January 2015 to 31<sup>st</sup> December 2016.

Data were collected from case sheets, death certificates and review report on maternal death cases and were analysed and presented.

**Result & Analysis:** It was found that pulmonary oedema was the most common (75%) cause of maternal death in PIH cases. Improper antepartum care and delay in seeking medical help, moreover, lack of proper utilization of maternity services was the main cause behind the high maternal mortality in PIH cases (89.6%).

**Conclusion:** Substandard maternity care was found to be responsible for so high maternal death in PIH cases. This result was similar to the other studies in this context. These deaths are preventable to a large extent.

This is an Open Access (OA) journal, and articles are distributed under the terms of the [Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License](https://creativecommons.org/licenses/by-nc-sa/4.0/), which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

For reprints contact: [reprint@ipinnovative.com](mailto:reprint@ipinnovative.com)

## 1. Introduction

Severe PIH, Preeclampsia, Eclampsia cases are life threatening obstetric complications of same pathophysiological background. It is one of the leading causes of maternal death in developing countries.

Maternal deaths in these conditions usually occur in the underprivileged sector of the community.

Pathophysiology of PIH cases are capillary endothelial damage of almost all organs of our body by the varying unknown etiological agents. As a result there is accumulation of fluid in extra vascular compartment, intravascular volume contraction, increased haematocrit leading to tissue hypoxia and damage.<sup>1</sup>

Because of unknown etiological origin, prediction of PIH in a previously normotensive woman is not possible till date. Although maternal and perinatal mortality and morbidity can be reduced significantly by early detection, treatment and correction of anaemia, hypertension and other

\* Corresponding author.

E-mail address: [misra\\_malabika@rediffmail.com](mailto:misra_malabika@rediffmail.com) (M. Misra).

comorbid conditions by proper antenatal care, counselling, antihypertensive therapy, prophylactic magnesium sulphate therapy and timely delivery in uncontrolled situation.

Not only proper antepartum and intrapartum care, strict vigilance on maternal haemodynamic status for first 48-72 hours following delivery is equally important to reduce the maternal mortality in PIH cases. This is particularly needed for mothers with no or few antenatal check-up.

Frequent haemoglobin estimation is essential from mid-trimester onwards for early detection and treatment of anaemia. These women with pre-existing anaemia will easily develop features of shock with normal amount of blood loss following delivery.

Vigorous attempt to correct this shock by intravenous fluid infusion without close monitoring and sometimes improper intravenous fluid infusion in some centres will lead to pulmonary oedema. This kind of substandard care will cause fluid accumulation in the in the third space as there is already damaged capillaries in PIH cases.

Every day, approximately 810 women died from preventable causes related to pregnancy and childbirth. 94% of all deaths are occurring in low and lower-middle income countries. Major complications that account for nearly 75% of all maternal deaths are the following: severe bleeding, infection, high blood pressure (PIH) and unsafe abortion.<sup>1</sup>

## 2. Materials and Methods

Maternal death cases occurred during pregnancy and within 42 days of delivery in PIH, Preeclampsia, Eclampsia cases and also in pregnancy aggravated chronic hypertensive cases from 1<sup>st</sup> January 2015 to 31<sup>st</sup> December 2016 were analysed.

Following Data were collected from the case sheet, death certificate and maternal death review reports at our institution

1. Causes of death in these cases.
2. Some demographic variables.
3. Delay in managing these high risk cases both at facility and before admission to any hospital were taken into account and analysed to find out how far it could be preventable.

### 2.1. Inclusion criteria

All cases of maternal death where there was PIH, Preeclampsia, Eclampsia or superimposed PIH on chronic hypertension were taken for analysis.

### 2.2. Exclusion criteria

All other causes of maternal death cases not with PIH and cases with pre-existing heart disease, renal disease or any other medical conditions were not taken in our study.

It is a Retrospective analytical study to find out the cause of death among the pregnant women with PIH and chronic hypertension.

## 3. Result & Analysis

Data were collected from the individual case sheet of each maternal death occurred in our hospital due to pregnancy induced or aggravated hypertension. Maternal death review report was also taken into account while analysing the cause of death or in finding out the point of entry of irreversible phase deterioration of maternal condition.

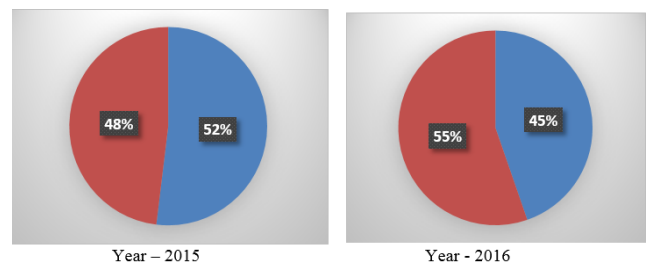
From the case history some demographic data were also taken for analysis these are age, parity, and educational status & number of antenatal check-up.

Cause of death was taken from the death certificate & point of delay in taking care was taken from death review report and case history.

Result shows in the year 2015 total number of maternal death is 52 out of this 27 cases were due hypertension and its complications. In 2016 there were 47 total maternal death and death due to hypertension were 21.

**Table 1:** -Shows major cause of maternal death in this institute is hypertension related complications in pregnancy

| Year | Total number of maternal death | Maternal death in PIH cases |
|------|--------------------------------|-----------------------------|
| 2015 | 52                             | 27                          |
| 2016 | 47                             | 21                          |

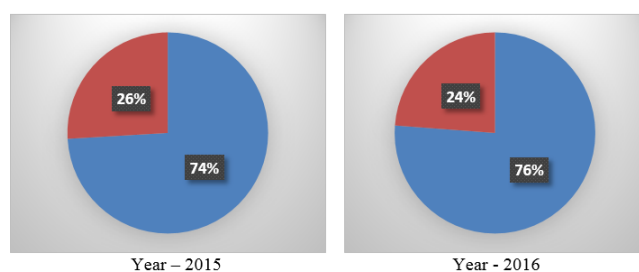


Graph 1: Hypertension in pregnancy was a major cause of maternal death in our centre in that study period; Year 2015 – maternal death with hypertension was 52% of the total maternal death; Year 2016 – maternal death with hypertension was 45% of the total maternal death.

**Table 2:** Cases referred from other hospital was compared with cases directly admitted in our institution

| Year | Referred cases | Cases directly admitted |
|------|----------------|-------------------------|
| 2015 | 20             | 07                      |
| 2016 | 16             | 05                      |

Majority of cases were admitted in our institution neither for timely management of complications nor for



**Fig. 1:** 2015 - 74% cases were referred from other hospitals, 2016 – 76% cases were referred from other hospitals.

timely delivery. They were referred from other hospital in critical condition with or without initiating proper medical management.

**Table 3:** Different age group distribution of maternal death cases due to hypertension

| Age         | Number (n=48) | Percentage % |
|-------------|---------------|--------------|
| <20 years   | 11            | 22.9         |
| 20-30 years | 24            | 50           |
| >30 years   | 13            | 27.08        |

Majority of our cases (50%) were in 20-30 years age group as majority of pregnant women were in this group.

**Table 4:** - distribution of maternal death among primi or multiparous

| Parity      | Number (n=48) | Percentage |
|-------------|---------------|------------|
| Primiparous | 17            | 35.4       |
| Multiparous | 31            | 64.58      |

Number of death among the multiparous is slightly higher than the primiparous women.

**Table 5:** Minimum number of ANC done or not

| ANC     | Number (n=48) | %     |
|---------|---------------|-------|
| <04     | 43            | 89.6  |
| 04 />04 | 05            | 10.42 |

Unbooked cases or cases without proper antenatal check-up were much higher than the mother with proper antenatal check-up among those dead women.

Pulmonary oedema was the significant cause of maternal death (75 %) among those mothers with hypertension. According to our review report as majority of the cases were unbooked there might be coexisting anaemia, underlying heart disease or overenthusiastic, improper & unmonitored intravenous fluid therapy. These are preventable in majority of the cases by timely detection and management. Here socioeconomic and cultural background has a significant role to play in reducing mortality. If these background can be improved people will be more adherent to the preventive aspect of healthcare system and burden of healthcare

**Table 6:** Distribution of number of maternal death cases as per causes of death in pregnancy associated hypertension cases

| Causes of death                  | Number (n=48) | %    |
|----------------------------------|---------------|------|
| Pulmonary oedema with LVF        | 36            | 75   |
| PPH                              | 02            | 4.2  |
| CVA                              | 01            | 2.08 |
| HELLP                            | 03            | 6.25 |
| Renal failure                    | 01            | 2.08 |
| Hypoxic ischaemic encephalopathy | 05            | 10.4 |

delivery to reduce maternal mortality will automatically be reduced as a result of it.

**Table 7:** -distribution of maternal death cases as per delay in reaching at different phases of health care delivery

| Delay         | Number (N=48) | %    |
|---------------|---------------|------|
| No delay      | 00            | 00   |
| Phase 1 delay | 41            | 85.4 |
| Phase 2 delay | 05            | 10.4 |
| Phase 3 delay | 12            | 25   |

Phase 1 delay indicates delay in seeking care.

Phase 2 delay – delay in transportation to the tertiary centre.

Phase 3 delay – delay in initiating proper management in tertiary care.

Most of the delay here in these cases happened due to delay in seeking care. Ignorance, lack of education and women's empowerment, traditional and cultural practices and poor socioeconomic background are the reason behind it. It clearly proves that higher rate (94% of all maternal death) of maternal mortality in lower income countries.

In this centre there were 25% delay in phase 3 which was mainly due to lack availability of adequate blood or blood products and delay in getting proper intensive care due to over burden at facility.

Therefore, phase 1 delay can be reduced significantly by improving preventive aspect of healthcare system which will eventually reduce the burden of healthcare facility at tertiary centre level thus phase 3 delay can be reduced.

In our institution all these cases were managed by WHO standardised protocol that is control of blood pressure, prophylactic and therapeutic magnesium sulphate therapy, early delivery of baby irrespective of attainment of viability, continuous antihypertensive therapy and blood pressure monitoring in postpartum phase and intensive monitoring at critical phase.

In spite of that there were significant maternal death in hypertensive cases. It had been found out that majority of the cases were transferred from other centre in critical condition without proper record of treatment in there centre and sometimes with inadequate and improper treatment without any investigation report. That was another reason

for delay in initiating management at our institution that is phase 3 delay.

#### 4. Discussion

According to WHO report September 2019, every day 810 women died from preventable causes related to pregnancy and childbirth in 2017. about 295000 women died during and following childbirth in 2017. 94% of all maternal deaths occur in low and lower middle-income countries. Skilled care before during and after childbirth can save the lives of women and newborns. Sub-Saharan Africa and Southern Asia accounted for approximately 86% of the estimated global maternal death.<sup>1</sup>

In this present study nearly 50% of the maternal death occurred in hypertensive cases at our centre. And majority of these cases were referred from other hospitals that is around 75% where there was a lack of facility for managing a critically ill patient and high risk obstetric cases and also for blood transfusion. These cases were referred without proper record of previous management and sometimes with inadequate and improper management.

It has also been found that most of the cases did not have adequate antenatal check-up, so associated anaemia might had been there as majority were from poor socioeconomic background (poor men's diet rich in carbohydrate deficit in protein, vitamins and minerals) and due to inadequate intake of iron supplementation.

Because of improper ANC high risk cases (heart disease & other chronic illness) were not identified prior to admission. Even hypertension were also detected after admission in critical condition in many cases.

In this present study 50% of the mothers died with hypertension was in 20-30 years age group this was due to the fact that maximum number of pregnant women in our society were in this age group.

Death of the mothers were more common among multipara than primipara in our study may be due to the fact that they are more reluctant to proper ANC as the fear of first pregnancy is over.

While analysing the causes of maternal death it was found that significant number of cases were died of pulmonary oedema (75%). And around 10.4% of cases died of hypoxic ischaemic encephalopathy as per MRI report in 5 unconscious patients.

In pulmonary oedema cases although heart disease could not be ruled out by the autopsy. Previous record of heart diseases were not found in these cases. Therefore, in this study, considering the significant number of cases died of pulmonary oedema it can be concluded that these are not related to major pre-existing cardiac illness. These are mostly preventable by proper antenatal care, detection of high risk cases and timely critical intervention.

In a case control study to find out the risk factors for death in patients with severe preeclampsia and eclampsia

by Melania Maria Ramos de Amorim et.al. it was found that principal factors are: age >30 years, multiparity, gestational age < 32 weeks, diastolic blood pressure > 110 mmhg, convulsion, chronic systemic hypertension, HELLP syndrome, acute pulmonary oedema, acute renal failure, DIC and abruptio placenta. This study also showed that HELLP syndrome, acute pulmonary oedema, eclampsia, chronic hypertension and lack of prenatal care were the persistently related variables to maternal death.<sup>2</sup>

In a retrospective analytical study on Eclampsia : the major cause of maternal mortality in eastern india by Das R and Biswas S, it was found that majority of the cases were < 24 years of age (76.5%), 61.26% were primigravida and were in late 3<sup>rd</sup> trimester and 90.09% were unbooked cases. In this study it has been found that severe preeclampsia and eclampsia contributed 43.57% of maternal death and pulmonary oedema is the commonest cause of maternal death in eclampsia.<sup>3</sup>

Another study on maternal deaths from hypertensive disorders: lessons learnt published in 2018 by Lill T. Nyflot, Liv Ellingsen et al. showed hypertensive disorders of pregnancy were the most frequent underlying of maternal death in Norway during 1996-2014. They identified substandard care was responsible for majority of the deaths and the audit group concluded that improvements to care could have made a difference of 87% to the outcome.<sup>4</sup>

That Norwegian study has got similarity to a Dutch study on maternal death during 1993 – 2002 where 90% of women died of hypertensive disorders received substandard care.<sup>5</sup>

In a nation-based study on Maternal mortality due to hypertensive disorders in pregnancy, childbirth, and the puerperium between 2012 and 2015 in Turkey it was found that Hypertensive disorders accounted for 15.5% (n=126) out of all maternal mortality. They were the 2<sup>nd</sup> among direct causes of maternal deaths. 48.4% cases were in severe preeclampsia or pre-existing hypertensive disorder with increased/superimposed proteinuria, 30.1% were in eclampsia, 9.5% cases were diagnosed as HELLP syndrome, and 11.1% in pre-existing hypertension complicating pregnancy without increased or superimposed proteinuria. Intracranial hemorrhage was the major final cause of death with a rate of 41.3%. In most of the patients with intracranial hemorrhage, emergency antihypertensive agents were not implemented in optimal dose and/or duration.<sup>6</sup>

In another study on Causes and contributory factors of maternal mortality by Rabiātu Sageer et.al. Leading contributory factors of maternal deaths was found to be inadequate human resource for health, delay in seeking care, inadequate equipment, lack of ambulance transportation, and delay in referrals services. Same is true for other studies from developing countries.<sup>7,8</sup>

“Hypertensive disorders in pregnancy and maternal and neonatal outcomes in Haiti: the importance of surveillance

and data collection” by Matthew Bridwell et al. showed eclampsia is associated with 12 times as likely to be associated with maternal death.<sup>9</sup>

A secondary analysis of a stepped-wedge cluster randomised controlled trial undertaken in sub-Saharan Africa, India, and Haiti. There were 2,692 women with eclampsia (0.5%). In total 6.9% of women with eclampsia died, and a further 51 died from other complications of hypertensive disorders of pregnancy (0.95/10,000). They concluded that large variation in eclampsia and maternal death from hypertensive disorders of pregnancy between developed and developing countries were due to inequality and inequity persist in healthcare for women with hypertensive disorders of pregnancy.<sup>10</sup>

Various other epidemiological studies on maternal mortality from developing countries showed that PIH and eclampsia are the leading cause of maternal mortality. Improper antenatal care, substandard care, lack of standard protocol based treatment at each level of healthcare facility and delayed referral to higher centre are held responsible for this.<sup>11–14</sup>

A similar study showing contrast data on maternal death in severe PIH / eclampsia - ‘Analysis of maternal morbidity and mortality among patients admitted to Obstetric Intensive Care with severe preeclampsia, eclampsia or HELLP syndrome’ by E. Curiel-Balsera et al.- is a study in a developed country. It shows a total of 78% of the patients with severe preeclampsia, 16% with HELLP syndrome, and 6% with eclampsia, occurring in gestational week 31.85±4.45. Maternal mortality was 1.5% (4 patients). Though the complications rate is considerable (14%).<sup>15</sup>

Similar survey on maternal death in developing countries are showing teenage pregnancy, lack of education, poor socioeconomic condition are commonly found among the rural population. Lack of awareness and poor accessibility to proper antenatal care and facility based care are the most important reason behind high maternal death from preventable causes.<sup>16–20</sup>

## 5. Conclusion

Substandard maternity care, poor accessibility to standard facility based care, lack of awareness, ignorance, illiteracy and poor socioeconomic condition were found to be responsible for so high maternal death in PIH cases. This result is similar to the other studies in this context. These deaths are preventable to a large extent as it is showing in similar studies from developed countries.

## 6. Conflict of Interest

None.

## 7. Source of Funding

None.

## References

1. Geneva: World Health Organization. Trends in maternal mortality: 2000 to 2017: estimates by WHO, UNICEF, UNFPA, World Bank Group and the United Nations Population Division; 2017.
2. de Amorim M, Santos LC, Porto AF, Martins LKD. Risk factors for maternal death in patients with severe preeclampsia and eclampsia. *Bras Saude Mater Infant*. 0200;1(3). doi:10.1590/S1519-38292001000300004.
3. Das1 R, Biswas2 S. Eclampsia: The Major Cause of Maternal Mortality in Eastern India. *Ethiop J Health Sci*. 2015;25(2):111–6. doi:10.4314/ejhs.v25i2.2.
4. Nyfløt LT, Ellingsen L, Yli BM, Øian P, Vangen S, Øian P, et al. Maternal deaths from hypertensive disorders: lessons learnt. *Acta Obstet Gynecol Scand*. 2018;97(8):976–87. doi:10.1111/aogs.13357.
5. Schutte JM, Steegers EA, Schuitemaker NW, Santema JG, De Boer K, Pel M, et al. Rise in maternal mortality in the Netherlands. *BJOG*. 2010;117(4):399–406. doi:10.1111/j.1471-0528.2009.02382.x.
6. Keskinilç B, Engin-Üstün Y, Sanisoğlu S, Uygur D, Keskin HL, Karaahmetoğlu S, et al. Maternal mortality due to hypertensive disorders in pregnancy, childbirth, and the puerperium between 2012 and 2015 in Turkey: A nation-based study. *J Turk Ger Gynecol Assoc*. 2017;18(1):20–5. doi:10.4274/jtgga.2016.0244.
7. Sageer R, Kongnyuy E, Adebimpe WO, Omosehin O, Ogunsola EA, Sanni B, et al. Elijah Ayowole Ogunsola & Bola Sanni Causes and contributory factors of maternal mortality: evidence from maternal and perinatal death surveillance and response in Ogun state, Southwest Nigeria. *BMC Pregnancy Childbirth*. 2019;19(1):63. doi:10.1186/s12884-019-2202-1.
8. Ghulmiyyah L, Sibai B. Maternal Mortality From Preeclampsia/Eclampsia. *Semin Perinatol*. 2012;36(1):56–9. doi:10.1053/j.semperi.2011.09.011.
9. Bridwell M, Handzel E, Hynes M, Jean-Louis R, Fitter D, Hogue C, et al. Hypertensive disorders in pregnancy and maternal and neonatal outcomes in Haiti: the importance of surveillance and data collection. *BMC Pregnancy Childbirth*. 2019;19(1):208. doi:10.1186/s12884-019-2361-0.
10. Vousden N, Lawley E, Seed PT, Gidiri MF, Goudar S, Sandall J, et al. Incidence of eclampsia and related complications across 10 low- and middle-resource geographical regions: Secondary analysis of a cluster randomised controlled trial. *PLoS Med*. 2019;16(3):e1002775. doi:10.1371/journal.pmed.1002775.
11. Singla A, Rajaram S, Mehta S, Radhakrishnan G. A Ten Year Audit of Maternal Mortality: Millennium Development Still a Distant Goal. *Indian J Community Med*. 2017;42(2):102–6. doi:10.4103/ijcm.IJCM\_30\_16.
12. Bhadra B, Choudhury RR, Sarkar D, Sarkar S. An epidemiological study of mortality among mothers admitted in a rural tertiary hospital of West Bengal. *J Family Med Prim Care*. 2017;6(2):270–3. doi:10.4103/2249-4863.220004.
13. Rabi KA, Adewunmi AA, Ottun TA, Akinlusi FM, Adebajo AA, Alausa TG, et al. Risk factors for maternal mortality associated with eclampsia presenting at a Nigerian tertiary hospital. *Int J Womens Health*. 2018;10:715–21. doi:10.2147/IJWH.S178729.
14. Mersha A, Abegaz TM, Seid MA. Tadesse Melaku Abegaz & Mohammed Assen Seid Maternal and perinatal outcomes of hypertensive disorders of pregnancy in Ethiopia: systematic review and meta-analysis BMC Pregnancy and Childbirth. *BMC Pregnancy Childbirth*. 2019;19(1):458. doi:10.1186/s12884-019-2617-8.
15. Curiel-Balsera?? E, Prieto-Palomino M, Muñoz-Bono J, De Elvira MR, Galeas JL, García GQ, et al. Analysis of maternal morbidity and mortality among patients admitted to Obstetric Intensive Care with severe preeclampsia, eclampsia or HELLP syndrome. *Med Intensiva*. 2011;35(8):478–83. doi:10.1016/j.medint.2011.05.011.
16. Ranea TM, Mahanta TG, Baruah M, DeviBaruah S. Epidemiological study of maternal death in Assam. *Clin Epidemiol Global Health*. 2019;7(4):634–40. doi:10.1016/j.cegh.2019.02.007.

17. Ashok MV, Santosh S, Anupa. A study on Maternal Mortality. *J Obstet Gynecol India*. 2008;58(3).
18. Sinha M, Sinha SK. Perinatal and Maternal outcomes of Eclampsia in Darbhanga District, Bihar, India. *Int J Contemp Med Res*. 2018;5(1):B1–4.
19. Moodley J, Ngene NC. Maternal deaths due to eclampsia in teenagers: Lessons from assessment of maternal deaths in South Africa. *Afr J Prim Health Care Fam Med*. 2020;12(1):e1–6. doi:10.4102/phcfm.v12i1.2305.
20. Panda S, Das R, Sharma N, Das A, Deb P, Singh K, et al. Kaushiki Singh Maternal and Perinatal Outcomes in Hypertensive Disorders of Pregnancy and Factors Influencing It: A Prospective Hospital-Based Study in Northeast India. *Cureus*. 2021;13(3):e13982. doi:10.7759/cureus.13982.

## Author biography

**Malabika Misra**, Associate Professor

**Chaitali Sarkar**, Assistant Professor

**Ranita Roychowdhury**, Associate Professor

**Cite this article:** Misra M, Sarkar C, Roychowdhury R. Retrospective analysis of causes of death in severe PIH, Preeclampsia & Eclampsia cases in a tertiary medical care centre from January 2015 to December 2016. *Panacea J Med Sci* 2023;13(1):9-14.