

INDIAN RESEARCH FUND ASSOCIATION.

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FINDINGS OF INVESTIGATION
INTO THE CAUSES
OF
MATERNAL MORTALITY IN INDIA.

by

Dr. S. PANDIT, W.M.S.

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Dr. S. PANDIT, W.M.S.,

Director, Maternity & Child Welfare Bureau,
Indian Red Cross Society, New Delhi.



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SUMMARY OF FINDINGS OF INVESTIGATION INTO THE CAUSES OF MATERNAL MORTALITY IN INDIA.

1. Maternal welfare is of immense public health importance. In planning for the improvement of maternal health, it is necessary that we should determine the underlying factors responsible for the deterioration of maternal health, and detailed investigations into the causes of maternal deaths are, therefore, of great value. Such investigations provide the information necessary to formulate measures for the improvement of maternal health and the reduction of maternal deaths. In the western countries, various investigations have from time to time been undertaken into the causes of maternal mortality. Based on the information derived from such investigations several helpful recommendations have been made for the improvement of the maternal welfare services.

2. In India the subject of maternal mortality has received the attention of workers during the past 15 years and several investigations into the causes of maternal deaths in urban areas have been carried out. No investigations, however, have so far been made in typically rural areas.

3. The following is a list of investigations carried out on the causes of maternal mortality in India :

1. In Madras under Dr. A. L. Mudaliar, (Published in Government Press, Madras, 1933).
2. In Calcutta under Dr. M. I. Neal-Edwards, 1936-37, (Published in Health Bulletin No. 27).
3. In Bombay under Dr. J. Jhirad, 1937-38, (Published in Health Bulletin No. 29).
4. In Delhi under Dr. M. I. Neal-Edwards, 1939-40, (Summary on part of the report published in the report of the Scientific Advisory Board for the year 1939).
5. (a) Maternal mortality surveys made in a few large Municipalities in Madras Presidency during 1927-28.
(b) Investigation on mortality among coolie women in certain tea gardens in Assam during 1932 by the late Dr. Margaret Balfour, (Published in the Journal of Association of Medical Women in India).

The investigations mentioned above have shown that the data published in the reports of Public Health Departments in India in regard to maternal mortality are unreliable and do not give an accurate picture of the real situation. The maternal mortality rates recorded during the special investigations were considerably in excess of the rates furnished in the Public Health Reports of the respective areas dealt with. For example, according to the reports of the Executive Health Officer of Bombay, the maternal mortality rate for the year 1937, was 4.4 per 1,000 live births, whereas the rate as determined during the special investigation by Dr. Jhirad for the same period was 13.5 per 1,000 live births. In regard to Madras and Calcutta as well, the maternal mortality rates recorded during the special investigations were very much higher than those recorded in the annual statistics. The maternal mortality rates determined during these enquiries in respect to Madras, Calcutta and Bombay are furnished below :

1. Madras City, (1933)	16.6 per 1,000 live births.
2. Calcutta, (1936-37)	24.4 " " " "
3. Bombay, (1937-38)	13.5 " " " "

In the absence of accurate registration of births and deaths in the areas where these enquiries were conducted, even the rates arrived at by these investigators could not be absolutely correct though they are much more reliable than the data furnished in the Public Health Reports. A clearer picture of the incidence of maternal mortality and of the causes responsible for it will be obtained only when a better system of recording all vital occurrences and of certification of the causes of death becomes established. In order to obtain more reliable information on the incidence of maternal deaths, Public Health Departments should adopt the procedure detailed below :

1. All deaths of mothers occurring either during pregnancy, at labour or within four weeks after the termination of pregnancy, should be included under the heading "maternal deaths". This simple definition of maternal deaths has been suggested only because the agency for bringing to notice vital statistics in rural areas is the village chowkidar who is generally illiterate.
2. The registration of maternal deaths should as far as practicable be accurate and should include disposals at appropriate burial grounds. The death certificate should give the cause of death under classification of primary or secondary cause of death when medical certification of deaths becomes more widely practised.
3. The registration of births, both live and still, should be accurate.
4. The registration of births should also include information in regard to age and parity of the mother, place of delivery and attendant at confinement.
5. The annual reports of Public Health Departments should include not only accurate maternal mortality rates, but should also furnish a classification of the maternal deaths by causes according to the international list with an added heading for "anaemia".

The investigations have shown that the cause of death as registered by the Municipal Health Departments does not often correspond to the probable cause of death as ascertained after local enquiry. In the Calcutta investigation, the disparity between the ascertained cause of death and the registered cause of death occurred among as much as 26% of the maternal deaths investigated. This is due to the defective system of certification and registration which occurs even in urban areas.

In the analysis, during these investigations, of the observed data, the recommendations of the Departmental Committee on Maternal Mortality and Morbidity, (1928), have been followed as far as possible. The deaths have been classified in accordance with the International List of the Causes of Death. An additional heading, "Anaemia", has been added to the list since this is an important cause of death in India.

To ascertain the deviation from normal standards, the primary avoidable factor was determined as recommended by the Departmental Committee on Maternal Mortality and Morbidity. The information collected would serve to indicate the lines on which efforts to reduce maternal mortality could best be directed.

Owing to the fact that facilities for pre-natal and intra-natal care were limited, the criteria laid down by the Departmental Committee had to be modified and the standards for judging the responsible factors were modified.

The findings of the investigations may be classified under the following four groups :

1. Cases showing avoidable factors :
 - (a) Omission or inadequacy of antenatal examination,
 - (b) Error of judgment in management of the case,
 - (c) Lack of reasonable facilities,
 - (d) Negligence of the patient or of the relatives.
2. Cases in which no departure from established practice has been found having a casual relationship to the death.
3. Cases not strictly relevant to this part of the investigation, e.g., abortion and extra-uterine gestation.
4. Cases in which information was insufficient.

An analysis of the figures for Calcutta and Bombay would indicate the relative proportions of the four groupings :

	Calcutta	Bombay
1. Cases showing avoidable factor	414	234
2. Cases in which no departure was found from established practice having casual relationship to the death	16	69
3. Cases not relevant to this part of the investigation e.g., abortion	84	20
4. Cases in which information was insufficient	187	17
Total	701	340

According to the findings of the enquiries at Madras, Calcutta and Bombay, avoidable factor was present in 53.4, 80.5 and 77.2 per cent, respectively, of the maternal deaths. The presence of avoidable factor in such large proportion of the cases indicates that if efforts are made to provide prenatal care, and adequate intra-natal and post-natal care, the incidence of maternal deaths could be appreciably reduced.

SUGGESTIONS FOR MATERNAL CARE.

I. *Prenatal Care :*

The reports state that the provision of prenatal care is one of the important items in the efforts for the reduction of maternal deaths. It has been recommended that facilities should be provided for (i) the health supervision of every pregnant mother at properly conducted prenatal clinics ; (ii) health education for her and her relatives ; (iii) special requirements during pregnancy regarding diet, hygiene and medical care, and (iv) arrangements for confinement. Such prenatal services are best provided at welfare centres which have a staff competent to conduct such services.

In addition to the provision of the above mentioned prenatal services, which aim at the maintenance of health in normal cases, and the detection of abnormal conditions the reports recommended that adequate hospital facilities for the investigation and treatment of abnormal conditions should be provided, as for example, hospital consultant clinics, and beds in maternity hospitals for the treatment of prenatal cases requiring medical care.

The reports further emphasise on the need for the education of the woman and the raising of the family income in order that she could afford the necessary diet and treatment, or supplementing of her diet with milk and other articles of diet from welfare centres.

The preventability of certain conditions during pregnancy, at labour and during the puerperium would depend largely on the type of antenatal care provided. Consequently, any effort to reduce the incidence of deaths under these groups should be directed to the provision of proper prenatal services. The enquiries have shown that conditions such as eclampsia and anaemia could be prevented or detected and treated effectively by proper prenatal care. A large number of deaths due to accidents of labour and antepartum haemorrhage could be reduced if the woman had maintained good health during pregnancy. The preventability of sepsis would also depend on the maintenance of good health.

It is difficult to define a uniform standard of prenatal care, as it would vary with every case, to ensure for her a healthy child and normal health. The standard for judging cases adopted in the enquiries conducted in India was that 'a mother paid two or more regular visits and carried out the instructions'. The Scottish Report suggested as the standard, three or more periodic examinations, the first at six months, the second a month before term and a third two weeks before delivery.

The reports recommended that the aim of prenatal care should be to get 100% of the pregnant women in the area under the health supervision of the welfare centre staff, in order that such cases will receive medical care including examination of urine and determination of blood pressure, and also get advice on diet, hygiene, arrangements and preparation for delivery. The medical care should include constant health supervision by qualified health visitor to see that advice given had been followed, that the mother resides under good hygienic conditions and that she gets the necessary diet of proper quality in sufficient quantity. If a family is not able to afford such diet, arrangements should be made at welfare centres for the issue of milk, extra nourishment and tonics to such cases.

For cases requiring detailed investigation and expert medical advice hospital prenatal clinics and antenatal beds in maternity hospitals are recommended.

II. *Intranatal Care :*

Although emphasis is laid on prenatal care, one should not minimise the importance of intranatal care. The findings of the various investigations point to the need for a better organisation of the maternity services and the co-ordination of services rendered by different maternity institutions in the locality. Over a third of the maternal deaths is due to puerperal sepsis and this reflects adversely on the intranatal services and the aseptic and anti-septic technique. Over a half of the number of deaths due to puerperal sepsis were among cases of spontaneous labour that were attended by untrained persons. There was also a preponderance of sepsis in hospital deliveries of cases which had been examined by untrained attendants prior to admission to the hospital. Deaths due to sepsis were frequent amongst cases confined at home in small overcrowded and insanitary dwellings.

The reports make the following recommendations for the provision of adequate intranatal care :

1. Confinement of normal multiparous cases could be conducted at home by trained staff provided that they have had adequate prenatal care and the confinement is expected to be normal and the family could afford the minimum requirements for delivery at home.

2. Domiciliary midwifery services should be linked up with institutional services and the available beds should be utilised for primiparous cases and such normal multiparous cases whose home conditions do not permit proper arrangements at home.
3. The number of beds in hospitals should be increased so as to provide one bed for every 100 births, with a view to provide for the confinement at hospitals of, (a) complicated cases requiring institutional care, (b) primiparous cases, (c) multiparous normal cases whose home conditions are not satisfactory and, (d) cases of puerperal sepsis.
4. For providing adequate care for all types of cases, normal cases requiring confinement in institutions because of unsatisfactory home conditions, should be delivered in maternity homes so as to relieve pressure on larger hospitals which could be utilised to a larger measure for complicated cases. Maternity homes should be well conducted and under proper technical control. Services rendered by domiciliary staff, private or municipal maternity homes and maternity hospitals should be well co-ordinated.
5. The work of trained midwives should be adequately supervised and the number of cases conducted by one midwife should not exceed the number that she could efficiently attend to.
6. A consultation service from hospitals should be made available to midwives for assistance in cases of difficulty.
7. Enactment of legislation for the prevention of practice by untrained *dais*, and their gradual replacement by trained personnel in urban as well as in rural areas.

III. *Postnatal Care* :

Careful and intelligent nursing is helpful in preventing postnatal infection and particularly in preventing the spread of infection. Since sepsis is an important factor, being responsible for more than a third of the total maternal deaths, the main reasons for its high incidence are : (i) untrained attendant at confinement ; (ii) inadequate arrangements for treatment and isolation of septic cases in institutions, the reports recommend that the administrative authorities should take steps to compel institutions to provide separate units for cases of puerperal sepsis.

Cases of complicated pregnancy or labour usually require prolonged rest and nursing during the postnatal period, such cases require early detection, adequate treatment and follow-up after confinement. In proportion to the high incidence of mortality due to sepsis, there is a high incidence of morbidity through sepsis. In order to detect and treat all morbid conditions following normal and abnormal confinements, it is necessary that the woman should have regular postnatal examinations and receive advice and treatment during the first few months following confinement.

CAUSES OF MATERNAL DEATHS.

The causes of maternal deaths investigated by these enquiries classified according to the international list of causes of deaths are given below :

Causes of death.	Madras (Mudaliar, 1933)		Calcutta (Neal-Edwards, 1936-37)		Bombay (Jhirad, 1937-38)	
	No. of deaths.	Percent- age.	No. of deaths.	Percent- age.	No. of deaths.	Percent- age.
1. Septic abortion ..	14	3.8	33	4.7	10	2.9
2. Abortion, (non-septic)	22	5.9	4	0.6	4	1.2
3. Ectopic gestation ..	2	0.6	6	0.9	6	1.8
4. Other accidents of pregnancy	..	..	7	1.0	1	0.3
5. Puerperal haemorrhage	55	14.8	74	10.6	32	9.4
6. Puerperal sepsis ..	115	30.9	224	32.0	133	39.1
7. Puerperal albuminuria with convulsions ..	42	11.3	126	18.0	36	10.6
8. Other toxæmias of pregnancy ..	38	10.2	15	2.1	6	1.8
9. Embolism and sudden death ..	8	2.2	11	1.6	23	6.8
10. Other accidents of child birth ..	25	6.7	26	3.7	18	5.3
11. Other or unspecified conditions of puerperal state ..	..	..	10	1.4	3	0.9
12. Anaemia ..	50	13.4	165	23.5	58	17.1
13. Acute yellow atrophy	1	0.3	..	..	10	2.9
Total ..	372	100.1	701	100.1	340	100.1

DETAILED ANALYSIS OF MATERNAL DEATHS FROM CHILD-BEARING CAUSES.

I. Puerperal Sepsis :

In the grouping of maternal deaths due to child-bearing causes, puerperal sepsis is the most important single factor that contributes to a large number of deaths. In cases of deaths due to multiple cause associated with sepsis they were classified under this head. According to the reports of the enquiries, puerperal sepsis was responsible for a large proportion of maternal deaths as shown below :

Locality.	Percentage incidence of deaths due to puerperal sepsis.
Madras	30.9
Calcutta	32.0
Bombay	39.1
Delhi	25.9

The deaths followed sepsis (i) after spontaneous labour at home, (ii) after spontaneous labour in the hospital, or, (iii) after abnormal delivery. Of the three groups, a large proportion consisted of cases of spontaneous delivery attended at home by untrained attendant, (54% of the Calcutta puerperal sepsis figures, and 44.4% of the Bombay figures). A large number of such cases consisted of indigent persons living in dirty and overcrowded habitations.

Cases of puerperal sepsis following normal delivery in hospitals consisted of persons that were poor in health at admission and were admitted into

hospital with signs of antepartum infection. Fifty per cent of cases were anaemic. Healthy cases delivered in hospitals that died of sepsis included largely primigravidae who had perineal tear or cases that had some interference.

Dr. Neal-Edwards noted in the Calcutta cases that the onset of fever occurred earlier in the hospital group of cases and the duration of illness was on the whole shorter as compared with septic cases among home deliveries. She, therefore, remarks that, "It seems probable that different and perhaps more virulent organism was causative agent in the hospital cases and that autogenous and droplet infections in healthy women having spontaneous labour is a rare cause of maternal death from sepsis in Calcutta".

Among deaths due to puerperal sepsis following abnormal labour, approximately 40% of the cases had either anaemia or toxæmia. About 60% of the cases had been examined by indigenous *dais* before the cases were admitted into hospital. Among the abnormal cases, deaths due to sepsis predominated in those that had been infected through examination by *dais* prior to admission into hospitals and required interference e.g., cases of postpartum haemorrhage, manual removal of placenta, placenta prævia, caesarian section, craniotomy, forceps, transverse and breech deliveries. Sepsis deaths were also very common among cases of abnormal labour, e.g., manual removal of placenta, that were attended at home by an untrained attendant.

A large number of deaths from sepsis were among cases delivered in places where antiseptic measures were not adequate and treatment of sepsis was not carried out on modern lines.

These findings indicate that as in other countries, sepsis is the most important contributory factor to the cause of maternal deaths. It is recommended that measures to prevent and reduce sepsis should be adopted as follows:

1. Provision for maintenance of health of the mother during pregnancy.
2. Proper selection of cases for home and for institutional confinement.
3. Provision of trained attendant for domiciliary and well-conducted maternity homes and hospitals.
4. Avoiding examinations of cases under unhygienic conditions with a view to reduce chances of infection especially of abnormal cases that may require interference.
5. Provision of arrangements for isolation and treatment of septic cases.

II. Anaemia:

In India, anaemia is the second biggest cause of maternal mortality, and in some areas, may be responsible for as much as 25% of the total number of maternal deaths. Anaemia is responsible for 23.5% of maternal deaths in Bombay, 17% in Madras and 15% in Calcutta. Anaemia may indirectly be responsible for a much larger proportion of maternal deaths than the above figures would indicate. Conditions such as toxæmia, and sepsis often have an underlying factor of anaemia and deaths that have been classed under these heads would at least partly be due to this underlying cause.

The incidence of anaemia is higher among multiparous women than among the primiparas. The findings in Calcutta show that it occurs at all ages during the child-bearing period and is more in evidence during the third pregnancy than at other times.

In the majority of cases that failed to seek treatment at an early stage, or commenced treatment at a late stage of pregnancy, the condition deteriorated

rapidly often with disastrous effects both on the mother and on the foetus. The effect of the labour on anaemic mothers was severe. Fifty per cent of deaths among the delivered cases occurred within three days of labour in spite of the fact that the delivery in a large majority of cases was spontaneous and the duration of labour was short. Foetal mortality was also very high, (51% in the Calcutta cases). The anaemic conditions progress rapidly during the last three months of pregnancy with the result that 15% died undelivered.

Hospital reports of these cases indicate that a large number of them sought hospital treatment at a time when the condition was greatly advanced. More than half the number had not received prenatal care which might have served to prevent the onset, or facilitate early detection and timely treatment.

The reports recommend that as anaemia is a serious condition, it should be prevented by adequate prenatal care and that early detection of the condition and proper treatment are essential. Proper diet and iron treatment are effective in most cases of anaemia not complicated by other conditions, provided that it is diagnosed at an early stage and treated properly.

III. *Toxaemia* :

(a) *Eclampsia* : Eclampsia ranks third in frequency as the cause of maternal deaths. Deaths due to Eclampsia formed 18% of the total maternal deaths in Calcutta, 11.3% in Madras and 10.6% in Bombay. The incidence of deaths from eclampsia was greater among primipara and women under 20 years of age than among multipara and among older women. In Calcutta findings, it was observed that 69% of deaths due to eclampsia were of primigravida women and a large majority of them were under 20 years of age. The condition is apparent in the last three months of pregnancy and is very marked during the last few weeks. The severity of the condition could be determined by the number of fits and the depth of coma which generally occur during late pregnancy and labour. The condition is more common among the better nourished and less active women of the middle classes than among the less nourished women of the poorer classes who are engaged in household work and lead a comparatively active life. The condition runs a rapid course and unless immediate treatment is resorted to, it terminates in the death of the mother and the foetus. Foetal mortality is usually very high, (58% in the Calcutta cases).

The findings of the enquiries at Calcutta, Bombay and other places show that the onset of fits is usually preceded by warning symptoms such as oedema, headache and vomiting which start a few weeks before the actual eclamptic fits (90% of the cases of Calcutta deaths from eclampsia exhibited warning symptoms). Albumin was present in the urine in almost all the cases and blood pressure was raised in 88% of the cases. If proper prenatal care is provided during pregnancy, especially during the last three months of pregnancy the condition could be detected during the periodic examinations and treated in time. The mothers should be asked to report the presence of any warning symptoms forthwith. From the hospital statistics it was found that the incidence of the disease was much higher among cases that did not attend the prenatal clinics but were admitted for confinement, than among booked cases that had regular prenatal examinations and advice before admission into the hospital for confinement.

The reports recommend that in view of the high maternal and foetal mortality caused by eclampsia, the condition should be prevented through adequate antenatal care.

(b) *Albuminuria* : Among the series of deaths investigated were a number of cases of albuminuria associated with a rise in the blood pressure, anaemia,

uraemia or pyclo nephritis. These cases did not develop eclampsia though they showed albumin in the urine.

(c) *Other forms of toxaemias*: Included cases of hyperemesis gravidum. The condition generally occurred early in pregnancy and was associated with anaemia and the presence of albumin in the urine. Recurrence of this condition in the later months of pregnancy is considered serious.

(d) *Acute yellow atrophy*: Although deaths due to acute yellow atrophy have been classified separately, it is a condition of pregnancy almost invariably due to toxaemia, and in few cases due to sepsis. This condition is responsible for 2.9% of the maternal deaths in Bombay.

IV. *Puerperal haemorrhage*:

Next in importance to the eclampsia and toxaemia group is puerperal haemorrhage which accounts for about 12% of total maternal deaths. Deaths due to puerperal haemorrhage were 14.8% in Madras, 10.6% in Calcutta and 9.4% in Bombay. The incidence of this condition was higher in the multiparous women and among women over 30 years of age. The deaths included under this heading include cases of antepartum haemorrhages, (placenta previa, and accidental haemorrhages), and postpartum haemorrhage.

(a) Among the antepartum haemorrhages, haemorrhage due to placenta previa was much more common than accidental haemorrhage and was responsible for a third of the deaths under the haemorrhage group. Investigations show that liability to placenta previa increases with age. Warning haemorrhages occur during the last few weeks of pregnancy. The investigations showed that in a large majority of cases, medical help and hospitalization were arranged and the deaths occurred during pregnancy or soon after delivery. In spite of the condition being serious, barely 50% of such cases were hospitalized at some stage or other and the rest of the cases were treated at home or in small maternity homes where facilities did not exist to meet such emergencies. Among the placenta previa cases admitted into hospitals, nearly all of them had some interference or treatment at home prior to admission in hospital. Foetal mortality in placenta previa cases is exceedingly high.

Accidental haemorrhage was usually associated with signs of toxaemia such as the occurrence of oedema, presence of albumin in the urine and rise of blood pressure. The bleeding starts suddenly accompanied by shock. Foetal mortality among these cases was 100%.

(b) *Postpartum haemorrhage*: This condition formed the largest group among deaths due to haemorrhage. In a majority of cases, haemorrhage started prior to the delivery of the placenta. The condition was common among cases of spontaneous labour that were attended at home by unskilled attendants. In a majority of cases there was the avoidable factor, namely, mismanagement of labour and delay in obtaining skilled assistance for treatment for loss of blood and the subsequent shock.

Investigations of deaths due to puerperal haemorrhages show that the condition is a serious one and requires immediate skilled medical care. Prenatal care could to a certain extent help in reducing the number of deaths by detection of the condition in cases of antepartum haemorrhage early enough to arrange for hospitalization. Proper management of labour is most important especially in the third stage of labour in cases of the postpartum group. As the condition is more common among multiparous women of the later child-bearing age, it is recommended that such women should deliver in hospital.

V. *Accidents of labour :*

Accidents of labour account for 5% of the total maternal deaths, (Madras 6.7%, Bombay 5.3% and Calcutta 3.7%). Cases of difficult labour were contracted pelvis, abnormal presentation, hydrocephalus, uterine inertia and carcinoma of cervix. They required operative treatment such as caesarian section, craniotomy, forceps, internal version treatment of ruptured uterus and manual removal of placenta. Among cases of spontaneous delivery, the women were generally in poor health during pregnancy and some of them showed signs and symptoms of anaemia. The findings of the reports show that the majority of the deaths were due to misjudgment of the part of medical attendant especially in cases of minor disproportions.

VI. *Sudden death :* (including death due to thrombosis and embolism).

This group formed only a small proportion of deaths, Madras 2.2%, Calcutta 1.6% and Bombay 6.8%.

VII. *Septic abortions :*

Septic abortions were responsible for 2.9% of maternal deaths in Bombay, 3.8% in Madras and 4.7% in Calcutta. This condition is more common among multipara cases than among primiparous women. The abortions in most cases took place at home and the women were admitted into hospital for sepsis.

VIII. *Associated diseases :*

Maternal deaths from associated diseases were approximately as much as 25% of the maternal deaths. Among deaths due to associated diseases, tuberculosis was the most frequent cause. The condition is exaggerated during pregnancy or within the last few weeks of confinement. Foetal and neonatal mortality in such cases is as high as 72%.

Pneumonia is the next in importance among associated diseases. Pneumonia usually developed after delivery and was associated with sepsis or had tuberculous origin. Dysentery and diarrhoea are common during pregnancy and are associated with or followed by anaemia. Pregnancy associated with small-pox is fatal to the foetus. Among maternal deaths associated with small-pox investigated under these enquiries, the foetal mortality rate was very high, the foetus was either still-born or the child died within a few days of birth.

Other associated conditions were cardiac and renal diseases, epidemic dropsy, asthma, influenza, enteric, malarial cerebrospinal meningitis, cholera, etc.

FACTORS AFFECTING MORTALITY.

Age of mother : Of the total maternal deaths almost half the deaths were of mothers aged 21-30 years, whereas, deaths in the younger and in the age group of over 30 years the maternal deaths were proportionately less.

In the younger age group sepsis and eclampsia were more frequent causes of deaths as compared to sepsis and anaemia in the group aged 20 years and over, and haemorrhage and accident of labour in the older groups.

Gravidity : Of the maternal death 22.9% were among primigravidae and the incidents of puerperal sepsis and eclampsia were higher among the primipara, whereas, deaths due to haemorrhages and accidents of child-birth are relatively of higher incidence among multigravidae and grow in importance after the age of 20 years. Anaemia is less common during the first pregnancy than in the

subsequent pregnancies while haemorrhage is important from the fifth pregnancy onwards.

The above facts stress the importance of advising primigravidae and multigravidae to seek admission to hospitals, whereas, the second, third and fourth gravidae with a past history of normal labours may be safely delivered at maternity homes or at their own residence by trained midwives.

Term : The incidence of premature births was high among cases of anaemia, toxæmia and antipartum haemorrhage, and under eclampsia 50% of the births were premature. Early and adequate prenatal care which can reduce the incidence of anaemia and eclampsia can appreciably help to reduce the high incidence of premature births due to these underlying causes.

Overcrowding and insanitary environment : The findings of the enquiries show that the incidence of sepsis was highest among women living in overcrowded and insanitary dwellings. The incidence of anaemia was also higher among cases residing under such conditions than those living under better environment. These facts stress the importance of better housing and environment in reducing maternal mortality under the group, sepsis and anaemia.

Income per head : Anaemia and sepsis deaths were higher among cases with poverty, which emphasises the need to raise the economical status of people so that they could provide the minimum requirements for healthful living.

SUMMARY OF RECOMMENDATIONS.

1. Statistical enquiries conducted on maternal mortality show that in spite of the presence of greater facilities in larger towns for midwifery services, the untrained *dais* continue to practise and are responsible for a large proportion of maternal deaths though sepsis. The reports recommend that the practice by the hereditary *dai* should be eliminated by proper legislation and efficient midwifery services provided under the Health Department.
2. In view of the high incidence of deaths due to sepsis among deliveries conducted in some of the maternity homes, the reports recommend that maternity homes and hospitals should be compelled, under legislation, to register and to maintain minimum standards with regard to building, equipment, staff, technique and management. They further recommend close co-operation between the maternity homes and hospitals.
3. The presence of an avoidable factor in a large majority of cases point to the need for intensification and expansion of prenatal services at maternity and child welfare centres, maternity centres, hospitals and by private medical practitioners. The services should be educative and planned as to provide health supervision for *all* mothers, promote good health during pregnancy and help in the detection and treatment of abnormal conditions during pregnancy.
4. In view of the overcrowding frequently observed in maternity hospitals, there is need for better co-ordination of services rendered by different organizations under the maternity hospitals, maternity homes, domiciliary midwifery services offered by midwives in private practice and the staff of maternity centres. Such co-ordination would facilitate better distribution of work to relieve the hospitals of undue overcrowding through admissions of normal cases which could conveniently be delivered at home or in maternity homes. This would make room in the hospitals for the more appropriate cases referred to by different maternity homes and domiciliary staff.
5. In view of the importance of early detection and treatment of ill-health and abnormal conditions resulting from pregnancy and labour, the

reports emphasise the establishment of postnatal clinics along with prenatal clinics and linking them up with contraceptive centres for persons for whom pregnancy is contra-indicated.

6. Considering that the success of maternal welfare services would depend largely on the co-operation of the mother and her family, it is essential that the education of the mother and the family should form an important part of the programme. Such facilities as are considered necessary to provide extra nourishment for prenatal and postnatal mothers should also be offered. They should be educated on the need for continuous health supervision and medical care throughout the period of pregnancy, balanced diet requirements of the mother during the periods of pregnancy and nursing personal hygiene, prevention of infection and abnormalities associated with pregnancy and labour, advantages of looking and need for proper arrangements for confinement.

7. In view of the importance of maternity services, the attendant should be well equipped to diagnose and treat any abnormal conditions that may arise, and the reports recommend that medical personnel and staff of domiciliary midwifery services should receive more intensive training and that provision should be made for refresher courses for them.

8. In order that local bodies and authorities could adopt proper measures for the improvement of the services and reduce maternal mortality, it was suggested that facilities for research work and scientific studies in the fields of maternal and child health be provided.

9. To meet emergencies more efficiently, the reports emphasise on the need for the organization of "flying squads" and transfusion services at large maternity hospitals.

10. Considering that the environment and housing have an important bearing on the well-being of the mother, and that the results of confinement depend to a certain extent on the hygienic conditions of the home, it is necessary that housing conditions for the indigent and working classes should be improved.

The foregoing review of the statistical enquiries on maternal mortality carried out in Bombay, Calcutta, Delhi and Madras reveal certain points of practical interest. It emphasises the need for developing health services for prenatal care, adequate domiciliary and institutional midwifery services and close co-operation among the different agencies conducting them. The reports recommend provision of facilities for institutional treatment for abnormal midwifery and puerperal sepsis cases. It is suggested that the doctors and midwives employed for maternity services should have knowledge on preventive aspects of maternal care and wherever possible, services of health visitors should be employed for educational and follow-up work. As anaemia forms an important cause of maternal deaths in India, its diagnosis and early treatment during pregnancy is pointed out to be of vital importance and special attention should be paid to this condition. With a view to ascertain from time to time the measures that might be necessary to improve maternal health programme, correct information on maternal deaths should be maintained and research in the field of maternal health should be conducted.

The summary of the reports has been prepared with a view that findings of the enquiries would assist the Health Departments of the Provinces, States and Municipalities to plan maternity services for urban and rural areas.

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