Report on confidential enquiries into maternal deaths in England and Wales 1961-1963 / by Arnold L. Walker [and others].

MINISTRY OF HEALTH

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Report on confidential enquiries into maternal deaths in England and Wales 1961 - 1963

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1966

PREFACE

This is the fourth in a series of reports each covering three years of the confidential enquiry into maternal deaths It covers the period 1961–63 inclusive and for convenience of comparison with the results of the earlier enquiries the basic tables from each of the earlier reports have been included as an Appendix to it. The form of the enquiry will be known from earlier reports but is briefly described in the first chapter.

This enquiry is an unique exercise in medicine in this country. It is a careful review of each maternal death in an attempt to ascertain whether additional or different action in accordance with the best current practice in obstetrics might have given the patient a better prospect of survival. The avoidable factors are of course assessed with the benefit of hindsight but the standard is not unreasonable and the purpose is not to apportion blame but to derive lessons if possible for future preventive action. Two hundred and sixty-two true maternal deaths and thirty-four associated deaths are assessed as having had avoidable factors. The proportion in true maternal deaths is lower than in any of the three previous series, although a comparison with reports in the first year of the enquiry, 1952, has shown that the information now being provided is so much more comprehensive that avoidable factors if present are certainly more likely to be identified now. This explains why the incidence of deaths judged to be without avoidable factors has diminished almost as rapidly as those which are judged to have avoidable factors.

It is important that the significance of the findings should be properly appreciated. There were 2,550,252 births in the years 1961–63 compared with 2,034,755 births in the years 1928–30 when an earlier enquiry was undertaken. Eight hundred and sixteen deaths directly due to pregnancy and child birth occurred, compared with 8,561 in the earlier three year period. If the rates obtaining in 1928–30 had applied in the years 1961–63 the number of deaths would have been 10,730, more than thirteen times the number recorded. Even in the years 1952–54, the first three year period of the present enquiry, the rates were more than double those in the present series.

The object of this enquiry by obstetricians, general practitioners, Medical Officers of Health and midwives, co-ordinated by the Ministry, is to seek the opportunities that remain for further advance, not to apportion blame to individuals or to particular parts of the service. There will always be opportunity for improvement in medical care and its organization. This report seeks to show where that improvement can best be effected in the maternity services. Superficial or sensational use of any of the material in this report would be a disservice to the mothers of the future.

Individual chapters deal with the principal causes and show that toxaemia and haemorrhage which were formerly most common among them have now been so reduced that abortion and pulmonary embolism have taken their place. Procured abortion, a special largely social problem, is now the commonest cause of avoidable maternal death; but there are still lives to be saved through no

more than the adoption of best current practice in each of the groups examined in individual chapters. The avoidable factors are examined in detail in each chapter and in summary in section 12. Section 11 is a new feature of these reports devoted to the booking arrangements because it is here that the greatest opportunity for improvement remains.

Maternal deaths are now so rare that the individual general practitioner is unlikely to encounter one in a full professional career. He can therefore only appreciate the comparative risks from the experience of others. Even for the obstetrician a maternal death is an infrequent experience. The criteria set out on page 57–8 for booking for home confinement should therefore be considered most seriously by any doctor with responsibility for advising where a confinement shall take place. This is not a matter for general practitioner or obstetrician alone, but essentially one upon which an agreed policy reached by a local maternity liaison committee in the light of these recommendations should be applied. If this is done it would not be unreasonable to hope that the maternal death rate which is already in England and Wales one of the lowest in the world should be reduced by another two-fifths in the next decade. If some reduction could be achieved in deaths from abortion the figure might be lower still. Here we are dealing with a group of deaths largely brought about by the women themselves. It may be that the risks of self induced abortion are still not fully appreciated but even so the number of deaths from this cause must reflect the pressures to which some women are subjected by a pregnancy they feel unable to face. Too often these fatalities occur to women who already have families, with a result no less distressing than the death of a young girl from this cause. There is here a social problem which will be reflected in the mortality figures unless and until some acceptable alternative is seen by the women concerned. Therapeutic abortion is not wholly free from risk but it must carry far less risk from infection or haemorrhage than illegally procured abortion.

In many cases the patient herself is shown to have been responsible for the avoidable factor associated with her death. This means that correct professional advice has not prevailed on her or her family. This is a matter in the relationship between health professions and patient which is deserving of closer study. Better public education in this aspect of health must clearly be the answer.

One other small group calls for comment. In the years 1961–63 3,211 girls aged 15 or less had babies and four of them died. The variation in mortality with increasing age of the mother is well known. It is less appreciated that pregnancy at this early age is not only undesirable, but may also be associated with a greater risk to both mother and baby.

Sir Arnold Walker and Mr. A. J. Wrigley have been the principal authors in this and in each of the three preceding reports. They have now retired from their posts as Consultant Advisers to the Ministry and I record with gratitude our indebtedness to them for this among many other services. Only those who have worked closely with them can appreciate the immense volume of work they have undertaken in the scrutiny of more than 3,500 detailed reports on individual deaths and the compilation of the bulk of this and the preceding reports. They have had the assistance of a group of Regional assessors which

has changed over the years, though seven of the original number remain. Medical Officers of Health of Counties and County Boroughs have initiated the compilation of reports and consultant obstetricians, general practitioners and midwives throughout the country have freely made their own contributions. Throughout, the enquiry has had the steady support of successive Presidents of the Royal College of Obstetricians and Gynaecologists, some of whom have acted as assessors. In the actual writing of this report, Dr. Organe, the Ministry's Consultant Adviser in Anaesthetics, and Dr. Heasman, formerly the Ministry's Medical Statistician, have each contributed their part and the main co-ordinating role has been played by Dr. Kuck. To all I express the gratitude of the Ministry for the part they have played.

G. E. GODBER,

Chief Medical Officer.

Ministry of Health,
London.
January 1966.

CONTENTS

1. HISTORY AND METHOD

This report is the fourth in a series on the Confidential Enquiry into Maternal Deaths in England and Wales. The first was for the years 1952-54, the second for 1955-57, the third for 1958-60. This report covers the years 1961-63.

The Method of Confidential Enquiry

The enquiry is initiated by the medical officer of health of the local health authority who usually learns of the death through local hospitals or local health authority staff or through the death certification, either from the local registrar or the General Register Office. He obtains as much information as he can, where possible by personal discussion, from those in the domiciliary service concerned with the care of the patient including general practitioners, midwives, health visitors and local authority medical staff. He then forwards the form to the consultant obstetrician of the hospital who provides full clinical details including where possible a post-mortem report of any care which the patient has received. The consultant also adds any extra information himself which may be of value in assessing the death. The form is then returned to the medical officer of health for his final summing up before he sends it to the regional assessor who is a senior obstetrician in the area of each Regional Hospital Board. The regional assessor records his views as to the cause of death and as to whether there was any avoidable factor in the clinical care or administrative management of the case. Should the information be insufficient he may refer back to the reporting consultant obstetrician or the medical officer of health for further details. The regional assessor then sends the complete report with his comments to the Chief Medical Officer of the Ministry of Health. The final assessment and classification of the reports rest with the Ministry's Consultant Advisers on Obstetrics and, in appropriate cases, Anaesthetics.

The enquiries cover deaths directly due to pregnancy and childbirth, and deaths due to other causes though occurring in association with pregnancy and childbirth (referred to in each of the reports as "associated deaths"). The purpose of the enquiry is to discover facts together with the considered comment of experienced obstetricians, and it is the pooled information obtained over a three-year period which forms the basis for each report. At every stage the reports are regarded as strictly confidential and are scrutinized and analysed only by the regional assessors, the consultant advisers and a medical officer of the Ministry of Health.

Assessment of Avoidable Factors

One of the chief features of the investigation is the assessment of the presence of an "avoidable factor" or "factors" in the circumstances of the maternal death, that is, some departure from the accepted standards of satisfactory care, which may have played a part in the ensuing death. It is not suggested that in all cases in which avoidable factors are considered present, death could certainly have been prevented, but the presence of an avoidable factor is regarded as an indication that the risk of death could have been, at least, materially lessened.

In no case has a patient's refusal to accept termination of pregnancy or to practise contraception been regarded as an avoidable factor.

The final assessment made by the consultant advisers, takes into account the views of the regional assessors, and reflects the most generally accepted standards of good antenatal and obstetric care which are attainable under average practice conditions.

Definition of Parity

As in previous reports on the Confidential Enquiry into Maternal Deaths, parity is defined as the number of previous pregnancies of more than twenty-eight weeks duration no matter what the outcome, plus the fatal pregnancy whatever its duration. Previous pregnancies of less than twenty-eight weeks gestation are ignored. Thus a woman with one previous child who dies from an ectopic pregnancy when pregnant for the second time would be listed as para 2, and a woman who had been pregnant three times, each pregnancy ending in an abortion, and subsequently died as a result of her fourth pregnancy whatever its duration would be listed as para 1. In the tables, the Enquiry parity figures are compared with the Registrar General's figures which refer to registered legitimate live births to women married once only, because no other figures are available.

The 1961–63 Enquiry Series

For the three years 1961–63 confidential reports were received on 692 deaths due to pregnancy or childbirth and 244 deaths due to associated causes. For the same period the Registrar General recorded 816 deaths certified as due to pregnancy or childbirth, and 215 due to associated causes. Neither the Enquiry series nor the Registrar General's figures include deaths occurring more than one year after the last pregnancy or delivery. As in previous reports, the present Enquiry series includes deaths associated with pregnancy which were not recorded as "associated" maternal deaths by the Registrar General. Usually this is because pregnancy was not mentioned on the death certificate, but occasionally because reappraisal of the clinical history has resulted in deaths in the enquiry series being reclassified and transferred from deaths directly due to pregnancy and childbirth to deaths associated therewith.

In Appendix I will be found (tables 1 and 2), both for the enquiry series and for registered maternal deaths, an analysis of the causes of death classified in accordance with the International Statistical Classification. For purposes of comparison tables are given for each three-year period covered by this series of reports.

The four major causes of maternal death have remained the same as in previous years namely, toxaemia, haemorrhage, abortion and pulmonary embolism. The classification of maternal deaths, as has been pointed out in previous reports, is always difficult since the mother may suffer from multiple conditions, for example, toxaemia of pregnancy and accidental antepartum haemorrhage. It is frequently a matter of opinion in these cases which is the principal cause of death. In the first report for the years 1952–54 deaths from toxaemia included those who died from toxaemia where accidental haemorrhage was the secondary cause, and those who died from haemorrhage but also had signs of toxaemia. The allocation of these deaths in the previous reports has

been reviewed and an attempt made to assign them to single cause and this is shown in table I. It has not been possible to include the 1952–54 figures because sufficient information is not available. It must be understood, however, that some of the patients whose primary cause of death was toxaemia also had haemorrhage and some of those assigned to haemorrhage also had toxaemia. These figures show that there has been a steady decline in deaths from both these causes so that abortion and pulmonary embolism are now the two most important causes of maternal deaths. In consequence, the proportion of deaths

Table I. Major causes of maternal death

	1955–1957	1958–1960	1961–1963
Toxaemia	171	118	104
Haemorrhage	138	130	92
Abortion	141	135	139
Pulmonary embolism	147	132	129

which occur in the early months is increasing and, in the 692 deaths directly due to pregnancy, nearly one-third died before viability. While the majority of these early deaths were the result of procured abortion and ectopic pregnancy, there were many which might have been prevented by better supervision in the early months. To these may be added deaths from toxaemia and antepartum haemorrhage which occurred shortly after viability had been reached. This stresses the importance of early booking and close supervision of the patient throughout her pregnancy.

Special Enquiry concerning Pulmonary Embolism and Venous Thrombosis

An additional and more detailed clinical enquiry is now being made whenever a maternal death is ascribed to pulmonary embolism or venous thrombosis. The purpose is to try to discover predisposing causes and the value of treatment in what at present is an intractable cause of maternal mortality. The special enquiry was introduced towards the end of the present series and concerned only thirteen of the deaths due to pulmonary embolism.

Table II. Number of births and related death rates for the years 1952–63.

Year	Total births in England and Wales	Maternal mortality (excluding abortion) per 1000 total births	Maternal mortality from abortion per 1000 total births	Neonatal mortality (under 4 weeks) per 1000 live births	Early neonatal mortality (under 1 week) per 1000 live births	Perinatal mortality (still-births plus infants under 1 week) per 1000 total births	Stillbirths (foetal deaths at or over 28 weeks gestation) per 1000 total births
1952	689,371	0·54	0·13	18·3	15·2	37·5	22·7
1953	700,053	0·60	0·11	17·7	14·8	36·9	22·4
1954	689,851	0·54	0·11	17·7	14·9	38·1	23·5
1955	683,640	0·50	0·10	17·3	14·6	37·4	23·2
1956	716,740	0·42	0·10	16·8	14·2	36·7	22·9
1957	739,996	0·37	0·08	16·5	14·1	36·2	22·5
1958	757,003	0·35	0·08	16·2	13·8	35·0	21·5
1959	764,402	0·32	0·06	15·9	13·6	34·1	20·8
1960	800,824	0·31	0·08	15·5	13·3	32·8	19·8
1961	827,008	0·27	0·07	15·3	13·3	32·0	19·0
1962	854,200	0·28	0·07	15·1	13·0	30·8	18·1
1963	869,044	0·22	0·06	14·3	12·3	29·3	17·2

Table II shows the number of births each year and the death rates related to those births. The number of births showed little change between 1952 and 1955, but then began to rise so that by the end of the twelve-year period there had been an increase of over one-sixth. Despite this, the maternal mortality has steadily decreased over the entire period. Neonatal and perinatal mortality rates which remained fairly stationary from 1952 to 1957 have since presented a picture of increasing safety for the babies as well as their mothers.

2. TOXAEMIA OF PREGNANCY

The 106 deaths considered in this section are included in Appendix table 1 under the following categories of the International Statistical Classification of Diseases.

I.S.C.D. No.	Cause of Death	Number
642.0	Hypertensive disease arising during pregnancy ...	1
642.1	Renal disease arising during pregnancy... ...	6
642.2	Pre-eclampsia of pregnancy. (This includes 5 deaths in which accidential haemorrhage occurred as a complication but was not regarded as the cause of death).	44
642.3	Eclampsia of pregnancy. (This includes 1 death in which accidental haemorrhage occurred as a complication but was not regarded as the cause of death).	37
642.4	Hyperemesis gravidarum	1
642.5	Other toxaemias of pregnancy (including acute yellow atrophy of liver and necrosis of liver).	14
685	Puerperal eclampsia	3
	Total ...	106

The clinical discussion is based on 104 deaths, as two deaths assigned to I.S.C.D. No. 642.2 have been excluded because the actual causes of death were not pre-eclamptic toxaemia, but they are included in the tables showing age and parity distribution. In one case the patient was known to have labile hypertension and when thirty-six weeks pregnant was prescribed phenobarbitone because there was a trace of albuminuria and her blood pressure reading was 130/90. She developed a spreading erythema and urticaria and died from exfoliative dermatitis due to allergy to phenobarbitone. A subsidiary coding E953 (therapeutic misadventure in administration of drugs) was given. In the second case the patient was pregnant for the first time and known to have mitral stenosis and aortic incompetence. She developed pre-eclamptic toxaemia which necessitated induction. When induction of labour failed she was delivered by Caesarean section. There was cyanosis before the operation began and she died without recovering from the anaesthetic. A subsidiary coding E954 (therapeutic misadventure in anaesthesia) was given.

Avoidable factors were thought to be present in 51 of the 104 cases or 49 per cent which is a fall in the proportion of deaths with an avoidable factor compared with previous reports. There were 52 per cent in the first series, 55 in the second and 56 in the third.

Among the 104 women who died from toxaemia, seventeen died undelivered and three aborted. In the remaining eighty-four, thirty-two had stillbirths, fifty had livebirths and in two cases the information was not recorded. Four of the women had twin pregnancies. In three cases both infants survived and in the remaining case both were stillborn.

Duration of Pregnancy

The duration of pregnancy in the seventeen women who died undelivered was as follows:—

At term	2	30 weeks	1
38 weeks	4	29 weeks	2
35 weeks	1	28 weeks	1
33 weeks	1	26 weeks	2
32 weeks	2	10 weeks*	1

The duration of pregnancy at delivery in the remaining eighty-seven women was as follows:—

At term	33	32 weeks	2
39 weeks	1	31 weeks	2
38 weeks	11	30 weeks	2
37 weeks	7	28 weeks	4
36 weeks	8	26 weeks	1
35 weeks	4	24 weeks	1
34 weeks	7	20 weeks	1
33 weeks	3		

It will be seen from these tables that six women (whether they died delivered or undelivered) died before the baby was viable, and in over one-quarter death occurred before the thirty-fifth week of pregnancy. These facts and those given in previous reports emphasize that careful antenatal care at an early stage in pregnancy is essential if these deaths are to be avoided.

Actual Cause of Death

Deaths assigned to toxaemia under the categories of the International Statistical Classification of Diseases may in fact be due to a complication of toxaemia such as anuria, or as a complication of treatment made necessary by the disease such as in the case of a Caesarean section performed because of

*Death from hyperemesis gravidarum.

toxaemia which was followed by death from paralytic ileus. The actual cause of death in the 104 assigned to toxaemia was as follows:—

Eclampsia		40
Complicated by cerebral haemorrhage	13	
,, ,, anuria	3	
,, ,, accidental haemorrhage	1	
No additional complications recorded	23	
Pre-eclamptic toxaemia		39
Complicated by cerebral haemorrhage	10	
,, ,, anuria	15	
,, ,, accidental haemorrhage	5	
No additional complications recorded	9	
Liver necrosis (acute yellow atrophy)		19
Complicated by cerebral haemorrhage	2	
No additional complications recorded	17	
Renal failure		3
Haemorrhage from liver		1
Hyperemesis		1
Ileus after Caesarean section		1
		104

Age and Parity

The age and parity distribution of the women who died from toxaemia of pregnancy is shown in tables III and IV.

Table III. Age distribution of deaths from toxaemia of pregnancy compared with the distribution among all registered births in England and Wales 1961–63.

Age	Eclampsia		All other toxaemia		All toxaemia		Total registered births
	No.	Per cent.	No.	Per cent.	No.	Per cent.	Per cent.
15 and under	—	—	—	—	—	—	0·1
16—19	1	2·5	4	6·1	5	4·7	7·8
20—24	13	32·5	15	22·7	28	26·4	31·0
25—29	10	25·0	13	19·7	23	21·7	30·6
30—34	8	20·0	13	19·7	21	19·8	18·4
35—39	7	17·5	11	16·7	18	17·0	9·2
40—44	1	2·5	9	13·6	10	9·4	2·7
45+	—	—	1	1·5	1	0·9	0·2
Not stated	—	—	—	—	—	—	—
Total ..	40	100·0	66	100·0	106	99·9	100·0

*Table IV. *Parity distribution of deaths from toxaemia of pregnancy compared with the distribution among all registered legitimate live births in England and Wales 1961–63.*

Parity	Eclampsia		All other toxaemia		All toxaemia		Registered Legitimate Live births
	No.	Per cent.	No.	Per cent.	No.	Per cent.	Per cent.
1	22	55·0	30	45·5	52	49·1	36·8
2	6	15·0	10	15·2	16	15·1	30·7
3	5	12·5	7	10·6	12	11·3	16·4
4	2	5·0	7	10·6	9	8·5	7·9
5	1	2·5	3	4·5	4	3·8	3·8
6 or more	1	2·5	6	9·1	7	6·6	4·4
Not stated	3	7·5	3	4·5	6	5·7	—
Total ..	40	100·0	66	100·0	106	100·1	100·0

*For definition of parity see page 2.

Avoidable Factors

In this series of 104 deaths from toxaemia, avoidable factors were found in fifty-one and no avoidable factors were found in fifty-three. Among the fifty-one deaths where there were avoidable factors, all these factors were present during the antenatal period, with the exception of two cases in which there was an error in management during labour in hospital. Nineteen of the fifty-one women whose deaths had avoidable factors had been booked for hospital confinements, fifteen had arranged to be confined at home, nine were booked for general practitioner maternity homes and eight had made no arrangements for the confinement. The major avoidable factors were similar to those described in previous reports. They were:—

(*a*) Lack of co-operation from the patient.

In thirteen of the fifty-one deaths with avoidable factors the patient was solely responsible, and she was partially responsible in five others. Responsibility was not placed solely on the patient unless there was evidence that all possible pressure had been brought to bear on her by her professional attendants to persuade her to accept advice. It is difficult to see what can be done for women who conceal the fact that they are pregnant, or fail to seek professional advice, who refuse to enter hospital, or discharge themselves from hospital against advice. Among the eighteen women who were either solely or partially responsible for the avoidable factor the parity of one is unknown, eight were primigravidae, and the parity of the remainder was 3 (four deaths), 4 (one death), 5 (two deaths), 8 (one death) and 12 (one death).

(*b*) Inadequate antenatal care.

A feature of the present series of deaths from toxaemia is the number of instances (eighteen) in which lapses occurred in the standard of antenatal care provided by members of hospital staffs and two instances in which the clinical care in hospital fell short of accepted standards. For these the consultant must be held responsible. In one instance arrangements were made by a local health

authority medical officer for a patient with hypertension, oedema and albuminuria to be seen at the maternity hospital. The hospital staff told the patient to rest at home. She received no skilled supervision until admitted to hospital in labour four days later and she died, undelivered, from eclampsia. Another patient was known by the consultant obstetrician to have a multiple pregnancy and albuminuria but she was not admitted to hospital for over a month, by which time she was gravely ill. A third patient who had pre-eclamptic toxaemia in her previous pregnancy and in whom there was evidence of a recurrence by the eighteenth week was given monthly appointments to attend the antenatal clinic. A cerebral catastrophe occurred at the twenty-fourth week when hypertension was severe. It would surely have been more prudent to have examined this patient more frequently.

Apart from the thirteen instances in which the patient herself failed to provide an opportunity for antenatal care there were thirty-eight patients who received inadequate antenatal care. Hospital staff, general practitioners, local authority clinic medical officers and domiciliary midwives may all be concerned with the care of one woman and errors may be made by more than one of them. The hospital staff were responsible for eighteen avoidable factors, general practitioners for twenty-nine, and local health authority staff for two.

(c) Confusion of responsibility.

Confusion of responsibility and poor liaison are no more than instances of poor antenatal care. This occurred in three instances in all of which a local health authority medical officer and a general practitioner were involved. A midwife was also involved in two of them and hospital staff in one.

(d) Wrong booking.

Wrong booking was an avoidable factor in eight cases, and of these the general practitioner was responsible for four and the patient herself for four.

Avoidable factors have been allotted to individual groups as follows:—

General practitioner	29
Consultant obstetrician	20
Clinic medical officer	3
Midwife	2
Patient	18
	72

More than one avoidable factor may occur in an individual case and the seventy-two factors occurred in fifty-one women who died. The two main avoidable factors attributed to general practitioners were the acceptance for home confinement of patients who should have been booked for hospital, and failure to make use of the consultant service when abnormalities occurred. These are errors which cannot be made by the consultant obstetrician, but he must accept

responsibility for the errors made by those under his control if they could have been prevented by clearer instruction or better administration.

Summary and Conclusions

1. There were 104 deaths from toxaemia from 1961–63 compared with 118 from 1958–60, and 171 from 1955–57.

2. Avoidable factors were found in 49 per cent which is a fall compared with previous reports.

3. The chief avoidable factors were lack of co-operation by the patient, inadequate antenatal care, confusion of responsibility and wrong booking.

3. HAEMORRHAGE

The 96 deaths discussed in this section are those shown in Appendix table 1 under the following categories of the International Statistical Classification of Diseases.

I.S.C.D. No.	Cause of Death	Number
	(1) Accidental haemorrhage	
644	Other haemorrhage of pregnancy	9
Part of 670	Delivery complicated by placenta praevia or antepartum haemorrhage	17
648.3	Other complications arising from pregnancy	1
		27
	(2) Placenta praevia	
643	Placenta praevia	5
Part of 670	Delivery complicated by placenta praevia or antepartum haemorrhage	19
		24
	(3) Postpartum haemorrhage	
671	Delivery complicated by retained placenta	11
672	Delivery complicated by postpartum haemorrhage	34
		45
	Total ...	96

The clinical discussion and tables in this section are based on 92 deaths from haemorrhage which is comparable with the 130 deaths in the 1958–60 report and 138 in the 1955–57 report. There were 188 deaths from haemorrhage in 1952–54 but this figure is not comparable with those for subsequent years as it excluded deaths due to accidental haemorrhage if toxaemia was also present. Four deaths have been excluded. Two were certified as due to accidental haemorrhage (I.S.C.D. No. 644) but there was so little relevant information in the records and none to support the diagnosis that from the point of view of the enquiry the diagnosis must remain a matter of doubt. A third death assigned to placenta praevia (I.S.C.D. No. 670) and a fourth due to placenta accreta (I.S.C.D. No. 671) have also been excluded because at no time was there significant haemorrhage.

As in previous reports, unless the operation was done for antepartum haemorrhage, deaths from haemorrhage after Caesarean section (17 deaths) have not been included as the haemorrhage was regarded as a post-operative complication rather than as postpartum haemorrhage in the usually accepted sense.

Table V shows the number of deaths in each clinical group:—

Table V. Number of deaths in each clinical group and the number in which avoidable factors were considered to be present.

	Number of deaths	Deaths with avoidable factors	
		Number	Per cent.
Accidental haemorrhage, toxaemic and non-toxaemic	25	13	52·0
Placenta praevia	23	8	34·8
Postpartum haemorrhage*	44	24	54·5
Total	92	45	48·9

Age and Parity

The age and parity distribution of the women who died from haemorrhage is shown in tables VI and VII.

Table VI. Age distribution of deaths from haemorrhage compared with the distribution among all registered births in England and Wales 1961–63.

Age	Accidental Haemorrhage		Placenta Praevia		P.P.H.		All cases		Total registered births
	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.	Per cent.
15 and under	—	—	—	—	—	—	—	—	0·1
16—19 ..	—	—	—	—	1	2·3	1	1·1	7·8
20—24 ..	5	20·0	2	8·7	9	20·5	16	17·4	31·0
25—29 ..	5	20·0	3	13·0	8	18·2	16	17·4	30·6
30—34 ..	9	36·0	6	26·1	7	15·9	22	23·9	18·4
35—39 ..	4	16·0	8	34·8	10	22·7	22	23·9	9·2
40—44 ..	2	8·0	4	17·4	8	18·2	14	15·2	2·7
45+.. ..	—	—	—	—	1	2·3	1	1·1	0·2
Total ..	25	100·0	23	100·0	44	100·1	92	100·0	100·0

Table VI shows that the risk of death from haemorrhage in the 30-year and over age group is greater than in younger women. In the case of placenta praevia three-quarters of the deaths occurred in women aged 30 or more.

* In previous reports deaths from postpartum haemorrhage with retained placenta, and deaths from other postpartum haemorrhage have been separated. This has been discontinued because there was only one death in which delay in removing the placenta was regarded as an avoidable factor. This patient was transferred to hospital with the retained placenta in utero.

*Table VII. *Parity distribution of all deaths due to haemorrhage compared with the distribution among all registered legitimate live births in England and Wales 1961–63.*

Parity	Accidental Haemorrhage		Placenta Praevia		P.P.H.		All cases		Registered legitimate live births
	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.	Per cent.
1	4	16·0	4	17·4	17	38·6	25	27·2	36·8
2	4	16·0	2	8·7	6	13·6	12	13·0	30·7
3	3	12·0	6	26·1	6	13·6	15	16·3	16·4
4	4	16·0	3	13·0	6	13·6	13	14·1	7·9
5	1	4·0	2	8·7	3	6·8	6	6·5	3·8
6 or more ..	9	36·0	5	21·7	6	13·6	20	21·7	4·4
Not stated ..	—	—	1	4·3	—	—	1	1·1	—
Total ..	25	100·0	23	99·9	44	99·8	92	99·9	100·0

*For definition of parity see page 2.

Table VII shows the parity distribution among the women who died from haemorrhage compared with all registered legitimate live births. This table demonstrates the increased risk of death from all types of haemorrhage in the higher parities. The lowest risk is in women having their second baby.

Pre-existing Anaemia

The number of women dying from haemorrhage in whom the haemoglobin content was not estimated and recorded during pregnancy has diminished. In this series the haemoglobin was recorded in 64 out of the 92 (70 per cent.) women who died from haemorrhage compared with 62 out of 130 (48 per cent.) in 1958-60 and 39 out of 138 (28 per cent.) in the 1955-57 series. There was only one death in which failure to treat anaemia was regarded as an avoidable factor.

Blood Coagulation Failure

This was reported in seventeen women who died from haemorrhage. In seven of these accidental haemorrhage occurred, two had placenta praevia, and in the remaining eight death was due to postpartum haemorrhage without antecedent antepartum haemorrhage.

Accidental Haemorrhage

There were six cases of toxaemia in which accidental haemorrhage also occurred but the cause of death was considered to be eclampsia or other complication of toxaemia. These deaths were included in the discussion and tables in the previous section on toxaemia, and not included in either the discussion or tables in this section.

One death listed in Appendix table 1 under "other complications of pregnancy" has been included in this section. The patient was pregnant for the

second time and there was a history of prolonged labour and difficult delivery and the size of the pelvis was below average. Because of this history surgical induction was attempted at term. Rupture of the hindwaters was immediately followed by profuse bleeding. No uterine lacerations were found at post-mortem examination.

Amongst the twenty-five deaths from accidental haemorrhage five occurred in women who also exhibited signs of toxaemia. Avoidable factors were present in all these five cases. One woman was booked for hospital, but her family doctor who had undertaken the antenatal care failed to take action when the blood pressure rose. The second woman who was also booked for hospital had anaemia which was diagnosed at the hospital clinic, but no action was taken and a missed antenatal appointment was not followed up. The third death occurred in a woman aged 40 who was unwisely booked for a general practitioner maternity home*. When antepartum haemorrhage occurred she was transferred to hospital where the house surgeon failed to notify the consultant of her admission until too late. A fourth woman, booked for a general practitioner maternity home was unco-operative and the standard of antenatal care was poor. The last death occurred in a woman booked for home confinement. The standard of antenatal care was poor and consultant help was not requested until too late. To summarize, two of these women were booked for hospital, two for general practitioner maternity homes and one for confinement at home. All were between the ages of thirty and forty years. One was having her second child, two their fourth, one her fifth and one her seventh.

In the remaining twenty deaths from accidental haemorrhage the women had no signs of toxaemia. Avoidable factors were present in eight. In four of these the patient failed to seek antenatal care and in one the doctor called in emergency, did not request the flying squad. The patient died at home without transfusion. A fifth patient booked for hospital was so unco-operative that she had little antenatal care but the hospital shared the responsibility by not taking adequate steps to follow up her failures to attend. Another woman booked for hospital had a severe haemorrhage at home but instead of the flying squad being called the patient was sent to hospital and died in the ambulance. A similar case was transferred from a general practitioner maternity home to hospital where she arrived in a state of irreversible shock. The last patient was correctly transferred to hospital from a general practitioner maternity home on account of anaemia. This was inadequately dealt with in hospital and when haemorrhage occurred transfusion was unduly delayed. To summarize, eight of these patients were booked for hospital, five for home confinement, two for a maternity home and five had made no arrangements. Four were primigravidae, three were having their second child, three their third, two their fourth, three their sixth and the remaining five the seventh to the eleventh. Ten were under thirty years of age and ten over thirty.

Placenta Praevia

There were twenty-three deaths from haemorrhage due to placenta praevia

*For definition of a general practitioner maternity home see page 57

and avoidable factors were present in eight (35 per cent). This proportion is lower than in the previous reports. The figures are as follows:—

	1952-54	1955-57	1958-60	1961-63
Deaths from placenta praevia	29	28	25	23
Number with avoidable factors	16	12	19	8
Percentage with avoidable factors	55	43	76	35

Of the eight deaths with avoidable factors, three of the women were booked for hospital, three for a general practitioner maternity home, one for home confinement and one had made no arrangements. In two of the women booked for hospital, severe haemorrhage occurred at home; in one the husband delayed sending for the doctor and in the other the patient had refused to stay in hospital after a warning haemorrhage. Both patients were sent to hospital without transfusion at home and both died soon after admission. The third woman was in hospital on account of recurrent malpresentation. External version was repeatedly performed without any attempt being made to discover the cause of the trouble. The final version was performed under anaesthesia. Severe haemorrhage occurred followed by Caesarean section during the course of which she died.

The three deaths in patients booked for a general practitioner maternity home are of particular interest. The first occurred in a patient who lived in a rural area a long way from a well equipped hospital. When bleeding occurred she was sent into the local general practitioner maternity home which had no facilities for immediate blood transfusion. She arrived in a very poor condition and died shortly after admission. It was probably unwise to move this patient without assistance from the flying squad in the first place, but had the parent hospital been warned, the flying squad could have arrived at the maternity home by the time the patient was admitted. The second patient was booked for a well equipped general practitioner maternity home but should have been booked for hospital on account of previous abnormal labours. She was admitted with a warning haemorrhage and seen at once by a consultant who decided that the original booking could stand. The third patient was an elderly multigravida with a bad obstetric history including toxaemia and a Caesarean section for transverse lie. At a fairly early stage in pregnancy she developed severe hypertension, oedema and albuminuria and was admitted to the general maternity home for a few days and was then allowed to go home. No consultant advice was sought. Six weeks later she was re-admitted with antepartum haemorrhage and was transferred to hospital. In the period between the two admissions she had reported a "show" on three occasions but no action was taken. In hospital, the bleeding stopped but hypertension persisted and after three weeks it was decided to perform Caesarean section. This was done by a registrar who was unable to control the bleeding. The consultant was not available for two hours. He reopened the abdomen but the patient died five hours later.

Another patient booked for home confinement had a severe haemorrhage and was transferred to hospital without a transfusion at home. She arrived very

shocked and was found to have blood coagulation failure. Fibrinogen was not available and death occurred in spite of massive blood transfusion. The last patient had made no arrangements for her confinement. She had small warning haemorrhages and was eventually admitted to hospital in a severe state of shock. Information is not available to explain why she was not admitted earlier.

Postpartum Haemorrhage

Again deaths from postpartum haemorrhage show a substantial reduction. In this series the number is 44, compared with 61, 70 and 113 in the three previous triennial reports. In the first report attention was drawn to the fact that no less than twenty-one women died as the result of transfer to hospital with retained placenta. In the present series there is only one such death. This may be due to a greater readiness to remove the placenta manually before the occurrence of serious bleeding and shock.

Blood coagulation failure was reported in eight patients who died from postpartum haemorrhage.

Avoidable factors were present in 24 of the 44 deaths (54 per cent). The most important single avoidable factor was wrong booking which occurred in twelve cases. Eight out of eleven women booked for home confinement were 35 years of age or over and the average parity was 5, whereas six out of nineteen women booked for hospital were 35 or over and the average parity was 2·6. Comparable figures for general practitioner maternity homes were five out of thirteen with an average parity of 2. The commonest reason for wrong booking was the refusal of older women to leave their families, but in some instances it appears that more might have been done by doctors and midwives to persuade these women to change their minds.

Two women were removed to hospital in a collapsed state and in one of these the doctor failed to visit the patient when called by the midwife. Instead he telephoned the hospital and asked for an ambulance. The house surgeon offered to send the flying squad but the doctor refused. The patient arrived at the hospital moribund. It would have been better and quite proper if, on the arrival of the ambulance, the midwife had not allowed the patient to be moved without prior assessment by a doctor or insisted that the flying squad be called. There were four deaths in which the flying squad was not called or called too late and two in which transfusion was unduly delayed in hospital. In three, junior medical staff in hospital failed to notify the consultant until too late. In two instances the patient was entirely to blame. In one, pregnancy was concealed and when a doctor was finally called the patient was found to have severe toxaemia. She was admitted to hospital at once but died from post-partum haemorrhage. In the second case the patient was completely unco-operative and failed to notify the doctor or midwife when labour started. No attendant was present at delivery and the midwife was informed after the baby had been born. She found the patient dying on the floor.

The age distribution of the women who died from postpartum haemorrhage was as follows:—eighteen were under 30 years, seventeen between 30 and 39, and nine were 40 years old or more. Seventeen were primigravidae, twelve were

having their second or third babies, six their fourth, three their fifth, two their seventh, one her eighth and three their ninth.

The Avoidable Factors in all deaths from haemorrhage

Fifty-eight avoidable factors occurred in the forty-five deaths, in which avoidable factors were found. These have been allotted as before to the groups concerned but it must be stressed again that different factors involve the four groups. The general practitioner may be at fault because he accepted a case unwisely for home confinement or he may have failed to call out a consultant or the flying squad. The consultant must accept responsibility for the errors of those under his control unless they disobeyed his instructions, but the midwife is absolved if she has referred a problem to a doctor. The fifty-eight avoidable factors are distributed as follows:—

General Practitioner	27
Consultant	15
Midwife	2
Patient and her relatives	14

Summary and Conclusions

1. Despite the rising birth rate, deaths from haemorrhage show a fall from 130 to 92. The "avoidability rate" has, for the first time, fallen below half with 45 (48·9 per cent) with avoidable factors.

2. While deaths from placenta praevia show little change there has been a marked fall in deaths from accidental haemorrhage, from 44 to 30 and, from postpartum haemorrhage, from 61 to 44.

3. Haemoglobin estimations during pregnancy were recorded in 70 per cent of the deaths from haemorrhage and probably carried out in others in whom it was not recorded.

4. PULMONARY EMBOLISM

There were 129 deaths from pulmonary embolism which are included in Appendix table I under category 648·3 (other complications arising in pregnancy) of the International Statistical Classification of Diseases where the embolism occurred during pregnancy (36 deaths), No. 684 where the embolism occurred during labour or the puerperium (91 deaths), and No. 465 where the embolism was associated with but not due to pregnancy or childbirth (2 deaths). These 129 deaths are comparable with 138 in 1952-54, 157 in 1955-57 and 132 in 1958-60.

In the clinical discussion one of the maternal deaths from pulmonary embolism associated with but not considered due to pregnancy (I.S.C.D. No. 465) has been excluded; an upper abdominal tumour was found after delivery; Gastrectomy was performed for a large fibroma of the stomach and death occurred from pulmonary embolism after the operation. With this exception the clinical report concerns all deaths in this enquiry series which were due to pulmonary embolism whatever the underlying cause, and is based on the following 140 deaths:—

I.S.C.D. No.	Cause of Death	Number
648.3	Embolism due to pregnancy which occurred during pregnancy	36
684	Embolism due to pregnancy or childbirth which occurred during the puerperium	91
465	Embolism associated with but not due to pregnancy or childbirth	1
651.0	Abortion spontaneous or unspecified in which patient died from embolism	8
651.1	Abortions induced for medical or legal reasons in which patient died from embolism	2
648.1	Hydatidiform mole in which patient died from embolism	1
410	Disease of the mitral valve in which patient died from embolism	1
	Total	140

As there is no comparable figure to these 140 deaths in previous reports, in the subsequent tables the figures relating to it are shown in brackets alongside figures relating to the 129 deaths which can be compared with those for previous years.

The distribution and comparison with the three previous triennial reports are as follows:—

	1952-54	1955-57	1958-60	1961-63
Deaths during pregnancy ...	4	17	30	36 (39)
Deaths after vaginal delivery ...	104	114	80	66 (72)
Deaths after Caesarean section	30	26	22	27 (27)
Deaths after termination of pregnancy by hysterotomy ...	—	—	—	— (2)
Total ...	138	157	132	129 (140)

It will be noticed that although more women were at risk, the number of deaths after vaginal delivery has fallen. The rise in the number of deaths during pregnancy and after Caesarean Section is slightly but not significantly more than would be expected with the greater number of women at risk.

Deaths during Pregnancy

Thirty-nine deaths occurred during pregnancy. In ten of these thrombosis was diagnosed before embolism and in five of the ten cases thrombosis had occurred in connection with a previous pregnancy. One woman with a previous history of thrombosis showed no sign of thrombosis before the fatal embolism. In ten women embolism occurred without previous illness or symptoms and three further women died suddenly without medical care. In the remaining patients who were under treatment for various reasons it is interesting to note that nine were complaining of breathlessness. A post-mortem examination was carried out in thirty-eight of the thirty-nine women and the source of the embolism was found in thirty-four.

The duration of pregnancy varied between eight weeks and term:—

12 during the first trimester.
10 during the second trimester.
15 during the third trimester.
2 in which the duration of pregnancy is not stated.

Ages ranged from 18 to 47 with an average age of 30. Parity ranged from 1 to 7. Thirteen deaths occurred in the first pregnancy, eight in the second, four in the third, five in the fourth, and seven in the fifth or more pregnancy. In two cases parity was not reported.

Seven patients had probably been confined to bed for at least a week before the embolism occurred. A haemoglobin estimation was recorded on the enquiry form in only thirteen cases, and in only one was anaemia mentioned and this patient was receiving treatment in hospital when death occurred. Anticoagulants had been used in three patients. In only three of these deaths during pregnancy had the special embolism enquiry form* been completed and little information was available concerning some of the deaths. All the deaths from pulmonary embolism which occurred during pregnancy were regarded as "unavoidable".

*See page 3

Deaths occurring after Delivery

Deaths after vaginal delivery

There were seventy-two women who died in this group. In twenty-nine there was no clinical reason to expect embolism. In thirty thrombosis was diagnosed before the fatal embolism occurred and six had a history of thrombosis in a previous pregnancy. One patient had had thrombosis in a previous pregnancy but no evidence of thrombosis was found before embolism occurred. In the remaining thirteen patients various complications of the puerperium were present including three instances of anaemia. One woman with severe mitral stenosis, safely delivered after prolonged bed-rest, died from pulmonary embolism on the tenth day. A case of special interest was that of a healthy young woman who had a small pulmonary embolism on the fourth day followed by a small cerebral thrombosis a few days later. She developed pulmonary hypertension possibly as a result of repeated or progressive thrombosis of small pulmonary vessels and died about ten months after delivery from heart failure.

Information about ambulation is incomplete but it would appear that thirty-one women who died were ambulant early, nineteen were confined to bed because of illness or other reason and in the remaining twenty-two no information on this matter was available. In no instance did it appear that a patient was kept in bed after delivery without a specific indication. In eight cases anticoagulants were administered.

The time of onset of the fatal embolism is shown in table VIII.

Table VIII. Onset of fatal embolism in the puerperium after vaginal delivery.

Day after delivery	Cases with no warning	Cases with warning signs*
Under 24 hours	2 (2)†	4 (4)†
2—7 days	11 (11)	6 (5)
8—14 days	13 (13)	13 (11)
15—28 days	2 (2)	9 (7)
Over 28 days	0	11 (8)
Unstated	1 (1)	0
Total	29 (29)	43 (35)

*Tachycardia, traumatic delivery and previous thrombosis were regarded as warning signs. It is possible that dyspnoea and respiratory infections such as pneumonia and influenza should also be regarded as warning signs because the diagnosis may be incorrect and a non-fatal embolism may have occurred.

†The figures in brackets are the number of cases in which the diagnosis was confirmed by post-mortem examination.

Deaths after Caesarean section

Twenty-seven deaths from pulmonary embolism occurred after Caesarean section and two after termination of early pregnancy by hysterotomy. In only one of these cases were anti-coagulants administered. In this patient pyrexia and thrombophlebitis were present on the fourth day. The signs and symptoms cleared up rapidly and the patient was discharged on the nineteenth day. She died suddenly when up and about on the thirty-third day. No post-operative complications were reported in sixteen of the twenty-nine patients. Thrombosis in the lower limbs occurred in three women and in a congenital cerebral aneurysm in another. Warning pulmonary infarcts occurred in three women and other chest complications in two. Ileus occurred in one woman, and pyrexia of unknown origin was mentioned in three.

Death occurred at the time of operation in one case and the next day in another, within two to seven days in thirteen, between eight and fourteen days in six, between fifteen and eighteen days in seven and in one case on the thirty-third day.

There was no case in which the patient appeared to have been kept in bed unnecessarily. In twenty-four the patient had been out of bed early or had died within seven days of operation, and the other five patients had been kept in bed for good reasons. The only patient in this group who received anticoagulants was the one mentioned above.

Anticoagulant Therapy

The use of anticoagulants has changed little since the last report. The number of cases in which they were reported as being used was twelve out of 140. In the previous report the number was nine out of 132. It is possible that when the more detailed new enquiry forms* for investigating deaths from embolism and venous thrombosis are available for analysis, it will be found that these figures do not present a true picture. Throughout the present enquiry series the use of anticoagulant therapy has been considered a matter of clinical judgement and in no case has failure to use it been regarded as an avoidable factor.

Anaemia

In seventy-five of the 140 cases there was a record of haemoglobin estimations during pregnancy. When evidence of anaemia had been present steps had been taken to correct it and there was no case in which it appeared that thrombosis or embolism was the result of neglected anaemia.

Avoidable Factors

Avoidable factors were present in sixteen of the 140 women who died. As in previous reports, these figures are of little significance and mainly relate to the management of pre-disposing conditions and have little or no bearing on the prevention of pulmonary embolism.

The Age and Parity

The age and parity distribution of the women who died from pulmonary embolism is shown in tables IX and X.

*See page 3

Table IX. Age distribution of deaths from pulmonary embolism compared with the distribution among all registered births in England and Wales 1961–63.

Age	Deaths from Pulmonary Embolism				Total Registered Births
	No.		Per cent.		Per cent.
15 and under	1	(1)†	0·8	(0·7)†	0·1
16—19	5	(6)	3·9	(4·3)	7·8
20—24	24	(24)	18·6	(17·1)	31·0
25—29	27	(33)	20·9	(23·6)	30·6
30—34	27	(28)	20·9	(20·0)	18·4
35—39	23	(26)	17·8	(18·6)	9·2
40—44	20	(20)	15·5	(14·3)	2·7
45+	1	(1)	0·8	(0·7)	0·2
Not stated	1	(1)	0·8	(0·7)	—
Total... ...	129	(140)	100·0	(100·0)	100·0

*Table X. *Parity distribution of deaths from pulmonary embolism compared with the distribution among all registered legitimate live births in England and Wales 1961–63.*

Parity	Deaths from Pulmonary Embolism				Registered Legitimate Live births
	No.		Per cent.		Per cent.
1	42	(48)†	32·6	(34·3)†	36·8
2	26	(27)	20·2	(19·3)	30·7
3	20	(21)	15·5	(15·0)	16·4
4	12	(14)	9·3	(10·0)	7·9
5	8	(10)	6·2	(7·1)	3·8
6 or more	16	(15)	12·4	(10·7)	4·4
Not stated	5	(5)	3·9	(3·6)	—
Total ...	129	(140)	100·1	(100·0)	100·0

*For definition of parity, see page 2.

†The figures in brackets relate to the clinical discussion and are not comparable with any in previous reports.

Summary and Conclusions

1. Death from pulmonary embolism occurred during pregnancy or the puerperium in 129 cases compared with 132, 157 and 138 in previous reports. In addition it was the cause of death in ten cases of abortion, one of hydatidiform mole and one of disease of the mitral valve.

2. Although more women were at risk there was a slight fall in the number of deaths from pulmonary embolism due entirely to a drop in the number of deaths after vaginal delivery.

3. In the future it is hoped that the special enquiry form for the investigation of deaths from pulmonary embolism will be completed in all cases. In this series only thirteen forms were returned.

5. ABORTION

The 139 deaths considered in this section are shown in Appendix table 1 under categories of the International Statistical Classification of Diseases No. 650 (abortion without mention of sepsis or toxaemia) sixty-four deaths, No. 651 (abortion with sepsis) seventy-four deaths, and No. 652 (abortion with toxaemia without mention of sepsis) one death.

In the three previous reports the number of maternal deaths considered to be due to abortion were 153, 141 and 135. In this report the number is 139. As stated in a previous report the number of women who had abortions and survived is not known and therefore it is not possible to state whether there has been any change in the actual death rate; nevertheless, during the years 1961–63 there was a considerable rise in the number of births and if the number of abortions increased in proportion then it is probable that the case fatality rate from abortion has not risen.

There was evidence that in seventy-seven of the 139 deaths, i.e. in 55·4 per cent, the abortion was procured either by the patient herself or by some other person. All such cases were considered to have avoidable factors but they constitute a social rather than a medical problem.

Age and Parity

Table XI. Age distribution of deaths from abortion and the age distribution of all registered births in England and Wales 1961–63.

Age	Procured Abortion		Other* Abortions		Total Abortions		Total Registered Births
	No.	Per cent.	No.	Per cent.	No.	Per cent.	Per cent.
15 and under	1	1·3	—	—	1	0·7	0·1
16—19 ..	7	9·1	2	3·2	9	6·5	7·8
20—24 ..	21	27·3	11	17·7	32	23·0	31·0
25—29 ..	13	16·9	18	29·0	31	22·3	30·6
30—34 ..	18	23·4	13	21·0	31	22·3	18·4
35—39 ..	13	16·9	13	21·0	26	18·7	9·2
40—44 ..	4	5·2	5	8·1	9	6·5	2·7
45+ ..	—	—	—	—	—	—	0·2
Total ..	77	100·1	62	100·0	139	100·0	100·0

*Includes five cases of therapeutic abortion.

*Table XII. *Parity distribution of deaths from abortion and the parity distribution of all registered legitimate live births in England and Wales 1961–63.*

Parity	Procured Abortion		Other† Abortions		Total Abortions		Registered Legitimate Live Births
	No.	Per cent.	No.	Per cent.	No.	Per cent.	Per cent.
1	18	23·4	7	11·3	25	18·0	36·8
2	12	15·6	10	16·1	22	15·8	30·7
3	10	13·0	14	22·6	24	17·3	16·4
4	8	10·4	6	9·7	14	10·1	7·9
5	3	3·9	10	16·1	13	9·4	3·8
6 or more ..	9	11·7	11	17·7	20	14·4	4·4
Not stated	17	22·1	4	6·5	21	15·1	—
Total ..	77	100·1	62	100·0	139	100·1	100·0

†Includes five cases of therapeutic abortion.

Marital status

Table XIII. Marital status of the patients who died from abortion.

	Procured Abortions	*Other Abortions*	*Total*
Married	21	29	50
Unmarried ...	25	7	32
Not stated ...	31	26	57
	77	62	139

Table XIII shows the marital status of the patients who died from abortion. In almost half this information was not supplied on the enquiry form.

Methods used to procure abortion

It is not known by which method abortion was procured in women who survived and therefore the relative danger attached to the varying procedures cannot be ascertained. Of the women who died the methods used to procure abortion and the accompanying causes of death were as follows:—

1. *Uterine injection* via the vagina—usually of some soapy fluid 42 deaths

Cause of death (a) *Air embolism* 29

(b) *Shock and haemorrhage* ... 4

(c) *Infection*—Cl. *Welchii* ... 3

E. Coli 2

Not known 3

(d) *Inhaled vomit* 1

*For definition of parity, see page 2.

2. *Instrumental interference*				27 deaths
Cause of death (a) *Infection*	*Cl. Welchii*	13		
	Streptococci ...	5		
	E. Coli	1		
	Not known ...	6		
(b) *Shock and haemorrhage* ...		2		
3. *Vaginal Insertion of potassium permanganate*				
Cause of death—*Haemorrhage*				1 death
4. *Vaginal insertion of slippery elm*				2 deaths
Cause of death—Tetanus		1		
Cl Welchii infection ...		1		
5. *Poisoning—Quinine*				2 deaths
6. *Method not known*				3 deaths
Cause of death *Cl Welchii* infection ...		1		
E. Coli infection		1		
Shock		1		
				77

The Avoidable Factors

As in previous reports when it was certain that abortion had been procured this was assessed as an avoidable factor. In addition to the seventy-seven deaths in this category there were six instances of spontaneous abortion in which avoidable factors were found. There were seven classified as not having an avoidable factor in which the probability that abortion had been procured was very great, but proof was absent. Five of these seven women died from septicaemia and two from haemorrhage.

A brief account is given of the six deaths following spontaneous abortion in which an avoidable factor appeared to be present, as from each a lesson is to be learnt. One woman died of asphyxia following inhalation of the stomach contents, during anaesthesia given for evacuation of the uterus; the second, a woman who was known to have valvular disease of the heart, has been reported in the section dealing with deaths from cardiac disease. In the third case the patient was to blame as she concealed her pregnancy and illness until the last moment. In the remaining three, in all of which the abortion was incomplete, responsibility for the avoidable factor must rest with the family doctor. One woman was watched at home and when finally she reached hospital the haemoglobin level was estimated at 27 per cent. Another woman was sent to hospital by ambulance by her doctor who had never seen her; she arrived moribund. The last patient saw her doctor on the eighth day of the month. Relatives called him on the tenth and eleventh to say that her condition was worse. The eventual visit of the doctor on the twelfth preceded death from septicaemia due to *Cl. Welchii* by only a few hours.

In fifty-six deaths no avoidable factor was ascertained. The causes of death in these cases were as follows:—

Septicaemia		25
Cl. Welchii infection	5	
Streptococcal or staphylococcal infection	3	
E. Coli infection	1	
Bacteriology not recorded... ...	16	
Pulmonary embolism		10
Concealed haemorrhage and shock ...		4
Haemorrhage from placenta praevia ...		3
Haemorrhage—exact cause not known		6
Anuria		4
Spontaneous rupture of uterus ...		1
,, ,, of Caesarean scar		1
Post-anaesthetic pulmonary oedema ...		1
Cerebral infarction		1
		56

In all the above cases there was evidence that the patient received every possible attention and that in the light of present day knowledge no obvious and beneficial measure was omitted.

Deaths from haemorrhage

Twenty-one of the women whose death was due to abortion died from haemorrhage and shock. In none of these cases was it mentioned on the enquiry form that the flying squad had been called. For these and other seriously ill women suffering from abortion who are transferred to hospital and arrive moribund, it is not always realized that the flying squad is available and with its help patients might be better able to survive the ambulance journey to hospital.

Therapeutic Abortion

Death occurred in five women after the operation of therapeutic abortion. In one case the indication was that the patient had developed a rapidly growing carcinoma of the breast. A second case, that of a woman in her early thirties who was Rhesus negative and was pregnant for the ninth time, presented what can only be described as a hopeless obstetric past history. Her first child was alive and well, her next two pregnancies each produced a stillborn baby and the next five ended in miscarriage. Abdominal hysterotomy and sterilization was followed by sudden death from massive pulmonary embolism. In the remaining three women the indications for termination of the pregnancy were

psychiatric and one died from shock at the time of the operation, the second from post-operative pulmonary embolism, and the third from *C*1. *Welchii* septicaemia.

Hydatidiform Mole

Four deaths were associated with a hydatidiform mole, and two of the women were pregnant for the first time. The first, aged 31 years, "fell down dead" as a result of a massive pulmonary embolus. The second developed severe pre-eclamptic toxaemia at the estimated twelfth week of pregnancy (the uterus was twenty-six weeks by size) and died from uncontrollable haemorrhage while in hospital. The third aged 40 years, who was pregnant for the ninth time, died under similar circumstances at about the estimated sixteenth week of pregnancy. The fourth death assessed as having an avoidable factor, was that of a woman, aged 43 years who was having her eighth baby and who obstinately refused to accept advice that she should attend hospital. When finally a severe loss of blood occurred, she was sent to hospital by ambulance and arrived there moribund.

Summary and Conclusions

1. One hundred and thirty-nine deaths were due to abortion. There was evidence that abortion was procured in seventy-seven and all these deaths were considered to have an avoidable factor.
2. Sixty-two deaths followed spontaneous or therapeutic abortion and in six of these an avoidable factor was present.
3. Termination of pregnancy for therapeutic reasons has once more been shown not to be without risk in itself. The number performed each year is not known and the relative safety of the operation cannot therefore be estimated.
4. The circumstances of death in four cases of hydatidiform mole have been described.

6. CARDIAC DISEASE ASSOCIATED WITH PREGNANCY

The eighty-one deaths considered in this section are those included in Appendix I table 2 under the following categories of the International Statistical Classification of Diseases.

I.S.C.D. No.	Cause of Death	Number
410	Diseases of mitral valve	49
412	Diseases of tricuspid valve	1
415	Other myocarditis specified as rheumatic	1
420	Arteriosclerotic heart disease, including coronary disease	6
422	Other myocardial degeneration	2
430	Acute and subacute endocarditis	5
431	Acute myocarditis not specified as rheumatic ...	2
434	Other and unspecified diseases of heart	1
440	Essential benign hypertensive heart disease ...	1
754	Congenital malformation of the circulatory system ...	13
	Total ...	81

In previous reports congenital cardiac disease associated with pregnancy has not been discussed nor has it been included in the tables in the section on cardiac disease. The tables in this section are therefore based on sixty-eight deaths to make possible comparison with those in previous reports and figures which include deaths from congenital cardiac disease associated with pregnancy are shown in brackets in each of the tables. In comparison with sixty-eight deaths from acquired heart disease in this series, there were 66 in 1958-60, 102 in 1955-57 and 121 in the 1952-54 enquiry.

Table XIV. Age distribution of deaths from Cardiac Disease compared with the distribution among all registered births in England and Wales 1961–63.

Age	Deaths from Cardiac Disease		Total Registered Births
	Number	Percentage	Percentage
15 and under	— (—)	— (—)	0·1
16—19	1 (3)	1·5 (3·7)	7·8
20—24	10 (14)	14·7 (17·3)	31·0
25—29	18 (24)	26·5 (29·6)	30·6
30—34	13 (14)	19·1 (17·3)	18·4
35—39	17 (17)	25·0 (21·0)	9·2
40—44	7 (7)	10·3 (8·6)	2·7
45+	2 (2)	2·9 (2·4)	0·2
Not stated	—	—	—
Total	68 (81)	100·0 (99·9)	100·0

N.B.—The figures in brackets include deaths from congenital heart disease and are not comparable with any in previous reports.

Table XIV analyses the age distribution of deaths due to heart disease in comparison with the distribution among all registered births. The findings confirm those in the three previous reports and once more emphasize the added danger in the older women. As would be expected, deaths associated with congenital malformations of the circulatory system occurred in much younger women (average age 23) compared with that (average age 32) of the remaining sixty-eight women who died.

*Table XV. *Parity distribution of deaths due to Cardiac Disease compared with the distribution among all registered legitimate live births in England and Wales 1961–63.*

Parity	Deaths due to Cardiac Disease		Registered Legitimate Live Births
	Number	Percentage	Percentage
1	20 (32)	29·4 (39·5)	36·8
2	12 (13)	17·6 (16·1)	30·7
3	17 (17)	25·0 (21·0)	16·4
4	5 (5)	7·4 (6·2)	7·9
5	2 (2)	2·9 (2·5)	3·8
6 or more	9 (9)	13·2 (11·1)	4·4
Not stated	3 (3)	4·4 (3·7)	—
Total	68 (81)	99·9 (100·1)	100·0

N.B.—The figures in brackets include deaths from congenital heart disease and are not comparable with any in previous reports.

The parity distribution of women dying from cardiac disease is shown in table XV and is compared with the distribution among all registered legitimate live births. The percentage of deaths from acquired cardiac disease in first pregnancies in the three previous enquiries was 50·4, 38·2 and 24·2 per cent and the hope was expressed as a result of this fall, that it might be taken to reflect the decline in the incidence of rheumatic fever in the last two decades. In this, the latest report, the figure will be seen to have risen slightly to 29·4 per cent. The figures in brackets which include deaths from congenital malformation of the circulatory system show that twelve of the women whose death was associated with pregnancy were pregnant for the first time, and the remaining woman was the mother of one child. This small group merits separate consideration.

*For definition of parity, see page 2.

Table XVI. Time of Death in relation to Confinement

	Number	Percentage
Died in pregnancy*	40	58·8
Died in labour	4	5·9
Died within 24 hours of completion of labour ...	5	7·3
Died in puerperium (excluding first 24 hours) ...	18	26·5
Died at operation of Caesaraen section	1	1·5
Total	68	100

*Including 6 deaths after the operation of valvotomy. The duration of pregnancy at the time of the operation of valvotomy was as follows:—

Duration of pregnancy when valvotomy performed	Duration of pregnancy when death occurred
14 weeks	14 weeks
15 ,,	20 ,,
18 ,,	22 ,,
22 ,,	28 ,,
33 ,,	33 ,,
Not stated	33 ,,

The time at which death occurred corresponds with the findings in the previous reports but more deaths in pregnancy (i.e. before labour) occurred amongst the younger primigravidae.

Table XVII. Duration of pregnancy when death occurred.

Duration of pregnancy when death occurred	Previous 3 Reports	Present Report	Total
6—19 weeks	15	7	22
20—23 ,, ...	20	6	26
24—27 ,, ...	22	2	24
28—31 ,, ...	25	7	32
32—35 ,, ...	19	9	28
36—39 ,, ...	19	9	28
Total	120	40	160

The analysis in table XVII is interesting because whereas the cardiac output and thus the work to be performed by the heart is believed to be greatest at about the thirtieth week of pregnancy, only thirty-two of the 160 deaths occurred between the twenty-eighth and thirty-second week.

In the present series six deaths occurred during or soon after the operation of valvotomy, and one death during Caesarean section, undertaken for the sudden onset of acute heart failure during labour.

The Avoidable Factors

At least one avoidable factor was present in eighteen of the sixty-eight deaths, approximately one quarter of the total. In addition, a few cases, classed as "doubtful" only because of the omission of some vital piece of information, were included under the heading "no avoidable factor present". The avoidable factors were of the same pattern as those noted in previous reports. They are described below in the hope that this may result in their elimination in the future.

(a) Unwise arrangements for the confinement.

Unwise arrangement for the confinement to take place in the patient's home or in a maternity home had been made in six instances. In the case of one woman the patient's doctor had grave doubts and quite correctly obtained the opinion of a consultant physician, who, whilst recognizing that the patient suffered from mitral and aortic valve disease, decided that there was no reason for hospital care. A second patient, a grand multipara, over 40 years of age, who had a history of pre-eclampsia and was known to suffer from chronic hypertension and exhibited symptoms and signs of cardiac embarrassment was described as unco-operative and her attendants accepted the risk of delivering her thirteenth baby at home. The third case, a woman embarking on her first pregnancy late in life, with known cardiac disease, was booked for delivery in a general practitioner maternity home. Labour was difficult and further hazards appeared when the doctor working single-handed, attempted a forceps delivery under chloroform anaesthesia. The fourth patient, known to suffer from severe mitral disease was delivered at home; she died immediately after what was described as an easy labour. No doctor was present at any time. Both the next two women had had valvotomy performed for mitral valve disease before the pregnancy commenced and in both responsibility for a home confinement was accepted. One woman was noted to be difficult. Both had shown symptoms and signs of cardiac embarrassment, if not of cardiac failure, in previous pregnancies. The doctor in one case wrote "why should all heart cases be delivered in hospital?" With the exception of the case of the first patient mentioned above there was no evidence that a consultant's opinion or advice had been sought at any time in the pregnancy of any of these women.

(b) Poor antenatal care.

Inevitably an overlap occurs in the matters of poor antenatal care and the making of unwise arrangements for the place of confinement but in three instances poor antenatal care appeared to constitute the major avoidable factor. In each of these antenatal supervision was in the hands of the family doctor and at no time had a specialist opinion been sought. Two of the confinements had been arranged to take place in a general practitioner maternity home and one in the patient's home. All three women were under 30 years of age, but in all three the diagnosis of valvular disease of the heart had been correctly made. It appeared that in only one case had the need for extra rest

been mentioned to the patient. One of these women died in labour and the other two in the later weeks of pregnancy.

(c) Lack of co-operation from the patient.

On six occasions at least, the patient herself provided a main or contributory avoidable factor. In four of these cases it was clear that both doctor and midwife fully realized the necessity for specialist care and hospital responsibility, but the patients, abetted by relatives and friends, persistently refused to take advice. All these women were relatively old, and all were mothers of large families. While their reluctance to accept hospital care and to leave home is easy to understand, the hope can only be expressed that with wider and better education, this unnecessary loss of life will diminish. Another elderly woman, pregnant for the thirteenth time, deliberately concealed her pregnancy. A doctor saw her for the first time in labour at home and suffering from acute heart failure. She died four hours after the birth of the baby.

(d) Confusion of responsibility.

In four deaths it appeared that confusion of responsibility constituted the major avoidable factor. All the women concerned were booked for delivery in hospital. In two cases valvotomy was performed during pregnancy and after recovery from the operation the patients were discharged from hospital. In both these the hospital staff assumed that the general practitioner would watch the woman's progress. One doctor appears not to have been informed that his patient had returned home; the second received this information but did not realize that he, rather than the hospital, was expected to continue antenatal supervision. A third woman had been correctly sent to hospital from a local authority antenatal clinic for a specialist opinion. The opinion was obtained and good advice given, but neither her doctor, clinic staff, nor hospital thereafter assumed responsibility for the woman's welfare and for the supervision of her pregnancy. The fourth patient succumbed to acute heart failure while an in-patient in a psychiatric hospital. Attention there seemed to be directed to the patient's state of mental depression rather than to her physical wellbeing.

(e) Failure to follow up the defaulting patient.

In only one case did failure to take immediate steps to find out the reason why a patient failed to attend at an antenatal clinic on her scheduled date appear to constitute a clearly avoidable factor. The woman concerned was over the age of 35 and known to suffer from mitral valve disease which had been complicated by heart failure in previous pregnancies and she had been correctly booked for care in hospital. When she did not attend at the clinic "letters were sent" and "she was written to". When she was eventually visited she was "at death's door". If the hospital staff is unable to arrange for the defaulting patient to be visited by its own medical or nursing staff there should be no difficulty in arranging for her to be seen either by her own doctor or by a health visitor.

Post-Mortem Examination

Post-mortem examinations were made in all except eleven of these sixty-eight deaths. Such examinations confirmed in general the diagnosis that had been

made in life, but once more demonstrated that disease of the aortic valve was present far more often than it it had been suspected before death.

At the beginning of the section fifty-one deaths were ascribed to rheumatic heart disease, six to arteriosclerotic (coronary) heart disease, and five to endocarditis. In the remaining six death had been sudden and necessitated a post-mortem examination; in three instances this was made by the coroner's pathologist. In five the detailed findings revealed good reason for concluding that there was some abnormality in the heart or its valves. The reports submitted as the cause of death are not without interest and read "Natural Causes", "Heart failure" (2 cases), "Cardiac Myopathy", "Fidler's Myocarditis", and "Isolated Myocarditis". In one of the deaths from "heart failure" a detailed copy of the post-mortem report was not obtained for the confidential enquiry.

Deaths due to Congenital Malformations of the Circulatory System associated with pregnancy

Congenital malformations of the circulatory system were responsible for thirteen deaths. These present certain features different from the sixty-eight cases of what may be termed "acquired cardiac disease". Attention has been drawn already to the fact that death in these thirteen occurred in much younger women (average age 23) and that with one exception all these women were pregnant for the first time. A post-mortem examination was made in all but two cases; in these permission was refused.

The congenital defects can be tabulated as follows:—

Eisenmenger's complex	7
Fallot's tetralogy	2
Patent ductus arteriosus	2
Rupture of aortic aneurysm	1
Rupture of aorta (coarctation) ...	1

One woman who suffered from Fallot's tetralogy, was also a deaf mute; it was reported that her mother had contracted rubella in the early weeks of the pregnancy which resulted in her birth.

Hospital confinement had been arranged for all but two patients and always upon the advice of the patient's doctor after the making of a correct diagnosis. One woman, who died at the twentieth week of pregnancy had made no arrangements for delivery. A second, whose death occurred suddenly on the eighth day of the puerperium as the result of rupture of an unsuspected aortic aneurysm, had had a normal labour and delivery in a general practitioner home.

An avoidable factor was present in only two cases. One patient was described as being perfectly hopeless. Abetted by friends and relatives she refused all medical advice. Death of the second patient occurred when she aborted about the nineteenth week of pregnancy. The loss of blood was considerable and she was sent to hospital by ambulance and arrived moribund. It would have been

wiser to have asked help from the flying squad. Despite energetic treatment in hospital the patient died seven hours later. The consultant had not been informed by the hospital staff.

The time of death in relation to the confinement was as follows:—

	Number
Died in pregnancy (at 20, 26, 32 and 35 weeks).	4
Died in labour	0
Died within 24 hours of completion of labour	2
Died in puerperium (excluding first 24 hours)	7

Summary and Conclusions

1. Of the sixty-eight deaths assigned to cardiac disease complicating pregnancy, in at least eighteen (or 26 per cent) an avoidable factor was considered to be present.

2. An account of the avoidable factors has been given. In sixteen cases of known cardiac disease, the responsibility for the care of the woman in her own home or in a general practitioner maternity home had been accepted by the patient's own doctor, sometimes perforce as a result of the patient refusing to accept advice that she should be booked for hospital. In the majority of these cases a specialist opinion and advice had been obtained.

3. A separate section has been included on congenital malformations of the circulatory system. Deaths occurring from this cause appear to take place in younger women who are pregnant for the first time.

7. CAESAREAN SECTION

The number of deaths associated with, but not necessarily due to Caesarean section was 143 (The comparable figures for the three preceding reports were 183, 184 and 130). The estimated percentage of Caesarean section operations for all births is shown in table XVIII which lists the estimated number of Caesarean sections performed in the country and the estimated rate.

Table XVIII. Estimated number of Caesarean sections and the death rate.

	1957	1958	1959	1960	1961	1962	1963
Total births in N.H.S. hospitals	448,176	457,206	464,293	490,622	515,274	536,495	566,068
Total births in non-N.H.S. hospitals ..	27,620	26,765	26,384	27,186	27,168	26,653	26,644
	475,796	483,971	490,677	517,808	542,442	563,148	592,712
Percentage of Caesarean sections in N.H.S. hospitals (In patient sample)	3·8	3·9	4·4	4·5	4·5	4·8	4·7
Estimated no. of Caesarean sections in all hospital deliveries ..	17,950	18,680	22,630	23,300	24,570	26,770	27,860*
Total births in England and Wales	739,996	757,003	764,402	800,824	827,008	854,200	869,044
Percentage of Caesarean sections for all births ..	2·4	2·5	3·0	2·9	3·0	3·1	3·2
Deaths after Caesarean section (true maternal and associated deaths)	60	46	46	48	40	61	42
Estimated no. of deaths per 1,000 Caesarean sections	3·3	2·5	2·0	2·1	1·6	2·3	1·5

*1963 figures for estimated Caesarean sections are provisional.

An estimate can be made of the number of Caesarean section operations per 1,000 confinements from the Hospital In-patient Enquiry conducted by the Ministry of Health and the General Register Office. It is from this figure that we have made the estimate of the number of Caesarean sections performed in England and Wales, and of the death rate which has been calculated to be 1·8 per 1,000 Caesarean sections during the years 1961–63.

Immediate Cause of Death

Table XIX gives a list of the immediate causes of death in the present series. Attention is again drawn to the fact that the list of causes does not correspond with those given in the Appendix tables 1 and 2 in which many deaths are classed to the conditions for which the operation was undertaken.

Table XIX. Avoidable factor distribution according to immediate cause of death.

Immediate Cause of Death 1961–63	Deaths with no avoidable factor		Deaths with avoidable factor		All Deaths	
	No.	Per cent. distribution	No.	Per cent. distribution	No.	Per cent. distribution
Haemorrhage	25	22·5	9	28·1	34	23·8
Pulmonary Embolism ..	24*	21·6	5	15·6	29*	20·3
Sepsis	16	14·4	3	9·4	19	13·3
Toxaemia of Pregnancy ..	11	9·9	3	9·4	14	9·8
Cardiac failure (during or immediately after operation)	11	9·9	2	6·3	13	9·1
Anaesthesia	11	9·9	8	25·0	19	13·3
Other causes	13	11·7	2	6·3	15	10·5
Total	111*	99·9	32	100·1	143*	100·1

*This includes 2 deaths after hysterotomy.

Table XX. Proportion of deaths according to immediate cause.

	Percentage distribution of all deaths				Percentage of deaths with avoidable factors			
	1952–54	1955–57	1958–60	1961–63	1952–54	1955–57	1958–60	1961–63
	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
Haemorrhage	37·1	24·4	43·8	23·8	33·8	34·1	56·2	26·5
Pulmonary embolism	18·3	18·3	20·9	20·3	12·5	30·3	7·4	17·2
Sepsis	14·9	16·7	17·7	13·3	38·5	36·7	26·1	15·8
Cardiac failure (during or immediately after operation)	3·4	8·3	2·3	9·1	— A	26·7	—	21·4
Toxaemia of pregnancy	— B	6·1	6·9	9·8	— B	63·6	—	15·3
Anaesthesia	6·9	6·1	3·8	13·3	41·7	36·4	20·0	42·1
Other causes	19·4	20·0	4·6	10·5	27·5	5·6	—	13·3
Total	100·0	99·9	100·0	100·0	29·7	29·4	31·5	22·4

A Figures are not available for the 1952–54 report.
B These figures are included with " Other causes " for 1952–54.

If the figures given in table XX are compared with those published in the three preceding reports several points of interest appear. The proportion of deaths caused by pulmonary embolism 20·3 per cent (18·3 in 1952–54, 18·3 in 1955–57 and 20·9 in 1958–60) and by sepsis 13·3 per cent (14·9, 16·7 and 17·7) remain for practical purposes much the same throughout the years. Anaesthetic deaths, most of which resulted directly from the inhalation of regurgitated stomach contents, accounted for 13·3 per cent of deaths (6·9, 6·1 and 3·8) which in a very considerable rise. The proportion of deaths from loss of blood, 23·8 per cent (37·1, 24·4 and 43·8) would appear to show a satisfactory decrease. However, the picture is somewhat confused by 9·1 per cent certified as due to "cardiac failure" (3·4, 8·3, 2·1). From the evidence furnished on the forms for this report the operation in some of these cases was accompanied by a severe loss of blood. As death occurred at the time of or immediately after the operation the post-mortem examination was usually made by a coroner's pathologist who certified the cause of death as "cardiac failure". In the past this happened to a much less extent; even though cases of sudden death were always previously reported to the coroner, the autopsy was usually carried out by the hospital pathologist.

Avoidable Factors

In thirty-two cases or 22·4 per cent (29·7 in 1952–54, 29·4 in 1955–57 and 31·5 in 1958–60) of the total number of fatalities at least one avoidable factor was noted. The incidence of an avoidable factor therefore shows a drop compared with the figures of the three preceding reports. However, a further ten cases were assessed as "doubtful" and therefore included with those in which no avoidable factor was found. In eight cases death followed inhalation of the regurgitated stomach contents and was certified as having been due to Mendelson's syndrome. These are considered in the section dealing with anaesthetic deaths.

Unwise arrangements for the confinement and inadequate antenatal care are almost inseparable and together were responsible for at least half of the deaths in this section. A brief summary is given of some of these cases in the hope that similar complications may be avoided in the future. Thus the following patients were booked for confinement in general practitioner maternity homes:— (1) A woman aged 41, pregnant for the sixth time with a history of previous pregnancies complicated by pre-eclamptic toxaemia and previous delivery by Caesarean section, died from loss of blood. (2) A primigravida aged 34, was suffering from what was described as massive fibroids. (3) A woman having her tenth baby, aged 35, who had suffered in previous pregnancies from pre-eclamptic toxaemia died of a severe concealed antepartum haemorrhage. (4) A woman pregnant for the eighth time aged 38, had labour induced for post-maturity by rupture of the membranes. This was done in a nursing home where she remained undelivered for the next two weeks. When labour eventually started a foetal arm prolapsed. (5) Two further women both in their third pregnancies were suffering from toxaemia, They had had similar complications in both preceding pregnancies but when complications which should have been anticipated occurred, neither blood transfusion nor adequate facilities for Caesarean section were immediately available. In one patient an emergency operation was performed under less than ideal conditions and in the other there was delay while the patient was moved to the parent hospital. Apart from

the making of unwise arrangements for delivery in these cases, antenatal care fell far short of the accepted standards and consultant advice was not sought until too late.

Examples of patients who were wrongly booked for home confinement are as follows:— (1) A woman pregnant for the fourth time and aged 42, who had previously been delivered by Caesarean section. No notice appeared to have been taken of recurrent small losses of blood which eventually were found to be due to a carcinoma of the cervix. (2) A primigravida who was described as grossly fat. Labour was inert. (3) Three other multiparous women had suffered from pre-eclamptic toxaemia in previous pregnancies. This condition recurred and in two cases the patients were watched at home far too long a time before other advice was sought. (4) Two other women were eventually admitted to hospital in a grossly anaemic state with no evidence that they had been given any treatment, or even that the condition had been diagnosed.

Lack of expert advice or assistance certainly contributed to the deaths of four other women. Three deaths occurred when the operation was performed in a poorly equipped nursing home, two from loss of blood and one as the result of suffocation from inhalation of regurgitated stomach contents. All these operations were elective and in the absence of the facilities of a fully equipped hospital it would surely have been wiser for the operations to have been undertaken where facilities existed and expert assistance was immediately available to deal with unforseeable but unfortunately not uncommon complications. In at least three instances the patient suffered from losses of blood in the last three months of pregnancy. No action seems to have been taken, other than to instruct the women to rest at home, expert advice was not sought nor was the flying squad summoned. Failure to summon the flying squad or other help contributed to a fatal issue in the cases of three women, confined at home, in whom labour was obstructed. Prolonged efforts by the patients' own doctors to deliver the babies failed and all three women were transferred to hospital without prior consultation. Their condition on arrival was poor. While help from the obstetric flying squad is being more and more widely sought in cases of haemorrhage or eclampsia, it would seem that there is a lack of appreciation of the assistance this service is able to render in other cases of abnormal labour; in these it is sometimes possible to improve the patient's general condition so that she is better able to withstand the journey to hospital and subsequent operative procedures in hospital.

We conclude this section with the observation that of the thirty-two deaths after Caesarean section in which an avoidable factor was present, in only nine had arrangements been made in the first place for the responsibility for the confinement to be that of a hospital. Amongst the remaining twenty-three cases in most of which there developed some complication in pregnancy or labour which certainly demanded urgent, if not immediate advice and help, there was no record of any prior consultation and/or help being sought from the flying squad; indeed, in only two of these cases was a consultant summoned.

Indications for operation

The following analysis is presented giving the indication for operation and the cause of death under each heading:—

Indication for Operation		*Cause of Death*	
Toxaemia (including 8 cases of eclampsia)	30 cases	Toxaemia	12
		Pulmonary embolism ...	6
		Haemorrhage	4
		"Cardiac failure" ...	4
		Intracranial haemorrhage	2
		Sepsis	2
Placenta Praevia	28 cases	Haemorrhage	15
		Pulmonary embolism ...	9
		Sepsis	3
		Anaesthesia	1
Uterine Inertia	13 cases	Anaesthesia	4
		Haemorrhage	4
		"Cardiac failure" ...	3
		Sepsis	2
Foetal Distress	10 cases	Haemorrhage	4
		Pulmonary embolism ...	4
		Sepsis	2
Diabetes	7 cases	Diabetes	5
		Cardiac failure	2
Transverse lie	7 cases	Haemorrhage	3
		Anaesthesia	2
		Peritonitis	1
		Pulmonary embolism ...	1

Other indications for Caesarean section were contracted pelvis (6); prolapse of the cord, fibroids and carcinoma (5 each); obstructed labour and previous Caesarean section (4 each); breech presentation and a subarachnoid haemorrhage (3 each); poor past obstetric history, the age of the patient, concealed accidental haemorrhage, acute heart failure and encephalitis (2 each); and brow presentation, mesenteric thrombosis and Hodgkin's disease (1 each).

The picture is much the same as in previous reports but it should be noted that in the present series Caesarean section seems to have been performed on a number of occasions on women who could only be described as being in the terminal stages of a fatal illness. Such cases include three women in whom a correct diagnosis had been made of subarachnoid haemorrhage, two suffering from acute heart failure from mitral valve disease, one who had developed a massive mesenteric thrombosis and five suffering from malignant growths.

Toxaemia of Pregnancy

The cause of death in the majority of the women suffering from this illness was described as diffuse toxic necrosis, with changes found on post-mortem examination especially in the liver and kidneys, and noticed also in the heart and uterine muscle. Cardiac failure was certified as the cause of death at operations performed in four eclamptic patients. More deaths were recorded from eclampsia treated by Caesarean section than in any preceding report which probably reflects the increasing tendency to deliver patients suffering from eclampsia by Caesarean section.

Placenta Praevia

Once more excessive loss of blood was considered to be the most important cause of death in women with placenta praevia who were treated by Caesarean section. These deaths are considered in the third section of this report but it has to be observed that the same avoidable factors appear in this as in the previous report. Thus there was failure to take appropriate action after one or more small or moderate losses of blood in the last three months of pregnancy, failure to summon the flying squad, prior to the transfer of the patient to hospital, failure to correct anaemia caused by blood loss, and failure to make preparations for immediate blood transfusion before the commencement of Caesarean section.

Uterine Inertia

To the thirteen cases included under the heading of uterine inertia as an indication for Caesarean section could be added seven others in which the indication was stated to be foetal distress. In all but three of these twenty cases labour had been induced by artificial rupture of the membranes. On seven occasions an oxytocin infusion had been given and either labour failed to start, or having started, was characterized by ineffectual albeit painful contractions. Six of the women in this group died from intractable haemorrhage at the time of or after the operation.

The Surgeon

No record of the status of the medical officer who performed the operation was made in fifty-four out of the total of 143 women who died who were delivered by Caesarean section. The figures for the operating surgeon were:—

	Consultant	Below consultant level	Unknown
Placenta Praevia ...	15	5	8
Other causes ...	36	33	46
All causes	51	38	54

Caesarean section performed by medical officers below consultant level was an elective procedure in seven instances. The indication for the other thirty-one was:—

Before onset of labour	
Pre-eclamptic toxaemia or eclampsia	7
Placenta praevia	5
During labour	
Foetal distress	6
Obstructed labour	6
Prolapse of cord	4
Uterine inertia	3
	31

Summary and Conclusions

1. This survey covers 143 deaths after Caesarean section. The calculated mortality for the operation for England and Wales in 1961-63 was probably 1·8 per 1,000 Caesarean sections. This compares with 2·0 per 1,000 in 1959 and 3·5 per 1,000 in 1955.

2. Maternal deaths due to or associated with pregnancy or childbirth (excluding deaths before the onset of labour or due to abortion, hydatidiform mole or ectopic pregnancy) for the years covered by this enquiry numbered 402 and the estimated number of deaths per 1,000 births which occurred per vaginam was 0·16 whereas the estimated number of deaths per 1,000 women delivered by Caesarean section was 1·8.

3. In approximately one quarter of the cases in this series one or more avoidable factors were present.

4. The pattern of avoidable factors remained much the same as that found in preceding reports with the exception that on only three occasions was the operation performed in an unsuitable place.

   (a) Mistakes were made in initial arrangements for the confinement.

   (b) Antenatal care was deficient. Signs of toxaemia or repeated losses of blood were ignored or expert help was not obtained or was requested too late. Transfer to hospital was delayed, and in some cases when bleeding was continuing should not have been made until restorative measures had been applied.

   (c) The significance of delay in labour was not appreciated especially when the delay occurred in the second stage. In both hospital and domiciliary practice expert advice was sought too late or not at all. Exactly the same conclusions were reached in Section 9 in the survey of deaths due to rupture of the uterus.

5. The operation of Caesarean section is one that demands an experienced surgeon or at least supervision by such a person. Although there is evidence that this is happening rather more than in the past, there still would appear to be a number of fatal cases in which the decision that the operation is indicated and its actual performance have been the responsibility of a junior medical officer.

8. DEATHS DUE TO COMPLICATIONS OF ANAESTHESIA

Twenty-eight deaths due to complications of anaesthesia are considered in this section. In appendix tables 1 and 2 the deaths appear under the conditions for which the obstetric operation was undertaken and for which the anaesthetic was administered. They are listed under the following categories of the International Statistical Classification of Diseases:—

I.S.C.D. No.	Cause of death	Number
260	Diabetes mellitus	4
410	Diseases of mitral valve	1
642.2	Pre-eclampsia of pregnancy	2
650.0	Abortion without mention of sepsis or toxaemia (Spontaneous or unspecified)	1
670	Delivery complicated by placenta praevia ...	1
674	Delivery complicated by disproportion or malposition of foetus	14
675	Delivery complicated by prolonged labour of other origin	3
678	Delivery with other complications of childbirth (foetal distress)	2
	Total ...	28

In the three previous reports the number of maternal deaths considered due to the complications of anaesthesia were 49 in 1952-54, 31 in 1955-57 and 30 in 1958-60 compared with 28 deaths in the present enquiry series. The figures, and the number with avoidable factors were as follows:—

Deaths due to complications of anaesthesia

	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963
Avoidable	—	—	—	11	8	5	12	7	5	3	6	5
Doubtful	—	—	—	—	—	—	—	—	—	1	1	—
Unavoidable	—	—	—	1	3	3	1	2	3	4	6	2
Total ..	15	15	19	12	11	8	13	9	8	8	13	7

Inhalation of stomach contents

This complication accounted for twelve of the fourteen deaths with avoidable factors, was a contributory factor in the two doubtful cases and was the probable cause in two of the twelve classed as unavoidable. Failure to intubate the trachea seemed to be the commonest fault, though this procedure, alone, is not an absolute safeguard. Sellick's manoeuvre (cricoid pressure) might have prevented regurgitation which occurred before intubation could be performed. Amongst the sixteen women whose death was either certainly or probably due

to inhalation of stomach contents, in only five was it recorded that tracheal intubation was a planned procedure during the induction of anaesthesia. In six the trachea was intubated after anaesthetic complications occurred, and in the remaining five insufficient information was recorded to determine whether the procedure was a planned or an emergency measure. The number of deaths in patients whose tracheas were intubated but who died from inhalation of stomach contents were distributed as follows:—

	Planned procedure	Emergency procedure	Not known
Avoidable factor(s) present	2	5	5
Doubtful	1	1	—
No avoidable factor present	2	—	—

Two patients died of asphyxia from inhaled vomit although one was known to have eaten nothing for twenty-four hours and in neither instance was tracheal intubation planned. The remainder seem to have developed Mendelson's syndrome. This was often not treated energetically enough. In particular, the injection of hydrocortisone was often delayed until symptoms had appeared, by which time it appeared to be ineffective.

Massive Lung Collapse

Three patients appear to have died from massive collapse of the lungs, two during anaesthesia and one after recovery of consciousness, when being transferred from the trolley to bed. All three had Caesarean sections. There was no other common factor and the cause of lung collapse in these cases is unknown.

Pudendal Nerve Block

In the last report pudendal nerve block was commended as a means of avoiding the dangers of general anaesthesia for forceps delivery. This is a good technique but too much should not be expected of it. In two patients, difficult forceps delivery proved too uncomfortable and general anaesthesia was induced in a hurry. Both women died of asphyxia from inhalation of vomit.

Spinal Anaesthesia

The need for constant supervision during anaesthesia is shown by the death of a patient during a spinal anaesthetic for Caesarean section. Anaesthesia initially appeared satisfactory but respiratory difficulties occurred before the operation was completed. By this time the anaesthetist was busy elsewhere and not immediately available.

Anaesthetic agents

A wide variety of general anaesthetic agents and muscle relaxants was employed. From the limited information in the enquiry forms and the small number of deaths involved, there was nothing to incriminate any particular one of them.

The Status of the Administrator of the Anaesthetics

The person who performed the anaesthetic was as follows:—

	Deaths with avoidable factors present	Deaths with no avoidable factors	Total
Consultant anaesthetist ...	3	2	5
Registrar anaesthetist ...	3	2	5
Anaesthetic houseman ...	6	4	10
General practitioner	1	—	1
Unknown	3	4	7
			28

The consultant anaesthetist must be held responsible not only for the avoidable factors present in deaths from anaesthesia in which he is directly concerned, but also in part at least for errors made by junior members of his team unless they disobeyed his instructions, for he is responsible for the administrative arrangements within his department and he must make certain his juniors know when to request help and that help is immediately available when it is needed. He cannot, of course, be held responsible for staff shortages.

Summary and Conclusions

1. A survey is made of twenty-eight deaths due to complications of anaesthesia. Avoidable factors were present in fourteen.
2. Inhalation of stomach contents was the main cause of death associated with anaesthesia.
3. Failure to intubate the trachea as a planned procedure was the principal avoidable factor.
4. There is still room for improvement in the prevention of inhalation of stomach contents and its treatment.

9. RUPTURE OF THE UTERUS

There were thirty-eight deaths from rupture of the uterus and they are included in Appendix table I under category No. 648.3 (other complications arising in pregnancy) of the International Statistical Classification of Diseases where rupture occurred before the onset of labour (3 deaths), and No. 677 (delivery with other trauma) where rupture occurred during labour (35 deaths). In all thirty-eight deaths the diagnosis was confirmed or discovered at laparotomy or post-mortem examination. The figure of 38 deaths during the period 1961–63 compares with 33 in 1955–57.

Age and Parity

The age and parity distribution of the women who died from rupture of the uterus is shown in tables XX and XXI.

Table XX. Age distribution of deaths from Rupture of the Uterus compared with the distribution among all registered births in England and Wales 1961–63.

Age	Deaths from rupture of the uterus		Total registered births
	No.	Per cent.	Per cent.
15 and under	—	—	0·1
16—19	1	2·6	7·8
20—24	2	5·3	31·0
25—29	4	10·5	30·6
30—34	7	18·4	18·4
35—39	17	44·7	9·2
44—44	7	18·4	2·7
45+	—	—	0·2
Not stated	—	—	—
Total	38	99·9	100·0

Table XXI. Parity distribution of deaths from Rupture of the uterus compared with the distribution among all registered legitimate live births in England and Wales 1961–63.*

Parity	Deaths from rupture of the uterus		Total registered legitimate live births
	No.	Per cent.	Per cent.
1	1	2·6	36·8
2	6	15·8	30·7
3	8	21·1	16·4
4	3	7·9	7·9
5	5	13·2	3·8
6 or more	15	39·5	4·4
Not stated	—	—	—
Total	38	100·1	100·0

Although the numbers are small the figures in tables XX and XXI suggest that the chance of a pregnancy ending in death from ruptured uterus is much greater in the high age and parity groups.

Previous uterine surgery or exploration

Amongst the thirty-eight women who died as a result of ruptured uterus, one had had a previous classical Caesarean section, four lower segment Caesarean section, and one hysterotomy. In two women the placenta had been removed manually in the penultimate pregnancy, and six had had uterine curettage between the previous delivery and the fatal pregnancy.

Avoidable factors

In fifteen of the thirty-eight deaths following rupture of the uterus no avoidable factor was judged to be present, though in four of these the assessment was that of 'doubtful' for the reason that it was not absolutely certain that a possible avoidable factor had been directly responsible for the fatality. That this judgement was lenient is suggested by the fact that the average age of these four women was over 40 (viz. 38, 41, 42 and 43) whereas the average age of the remaining eleven was under 30. While the records provided information that everything possible, in the light of present day knowledge, had been available and had been done to save the lives of these patients it might be that insufficient attention had been given to the importance of age, especially in two women whose confinements had been arranged to take place in a general practitioner maternity home. An analysis of the remaining eleven deaths in which no avoidable factor appeared to be present shows that all had been booked for confinement under consultant care. In three women, one aged 25, para. 2; the second aged 38, para. 11; and the third aged 36, para. 17, spontaneous

*For definition of parity, see page 2.

rupture occurred unexpectedly in the later weeks of pregnancy; in one case it happened when the woman was asleep. Rupture of the scar of a Caesarean section (lower segment operation) occurred on two occasions both during labour. In two others spontaneous rupture occurred during the first stage of labour. One case was that of a primigravida age 18, and the other was a woman age 40 having her seventh labour. In three women collapse (i.e. rupture) was noted with the birth of the baby, and in two of these shortly after routine administration of ergometrine. In one of these patients the actual confinement had been under the direct supervision of the consultant. The last patient in this group had previously had a Shirodkar operation (although the suture had been removed and the patient had had a vaginal delivery before the commencement of the fatal pregnancy), and rupture occurred during a subsequent lengthy labour.

In twenty-three cases (60·5 per cent of the total) one or more avoidable factors were certainly present. These women will be considered according to arrangements that had been made for the confinements. In the first group eleven women had been booked for confinement in hospital and were under the care of a consultant obstetrician, in the second group eight had been booked for confinement in their own homes and in the third group four for confinement in a maternity home under the care of the general practitioner.

The first group present the following features. These eleven women had been booked correctly for hospital confinement for reasons such as a previous abnormal obstetric history, ill health, or because of their age and parity. Indeed it would appear from the records that their antenatal care left little or nothing to be desired and that it was only after the onset of labour that trouble developed. In five of these women the lie of the foetus was transverse at the onset of labour and in no case had the consultant been informed of this state of affairs; in fact some hours elapsed after uterine rupture before the consultant was notified, and in two cases not until death had occurred. The responsible medical officer was variously described as a junior registrar, an inexperienced registrar, a junior R.M.O. (twice) and lastly as a house-surgeon. Moreover it was noted in two records that a considerable delay (up to three-quarters of an hour) was experienced in obtaining the help of the resident medical officer concerned and in a third case of an anaesthetist. In one patient rupture occurred during attempts at the performance of internal podalic version. In another a potentially dangerous situation must surely have been made more hazardous when a persistent transverse lie, was treated for no less than twelve hours with a pitocin drip given to restore the normal shape of the uterus. The circumstances of these happenings speak for themselves and suggest a lack of satisfactory organization in the obstetric departments concerned. Uterine rupture in five cases was associated with the administration of oxytocic drugs. Pitocin administered either as a drip infusion, or by repeated injections, or both, preceded rupture in three instances. In two others rupture occurred immediately after the injection of routine syntometrine, at the time of the birth of the shoulders in one patient, and at the crowning of the foetal head in the other. Unfortunately both babies were large, the shoulders became impacted and rupture occurred. Again in the last of these cases the note was made that great delay was experienced in obtaining any medical assistance.

In five of the eight women confined in their own home, collapse, that is to say uterine rupture, occurred at the time of the birth of the baby. A brief account of these deaths reveals the presence of many avoidable factors. The first was a parous woman in her thirties whose previous confinements had been normal, and labour was induced (method not recorded) in her own home. Collapse occurred at the time of the baby's birth. Neither the flying squad nor consultant help was summoned before the death of the woman four hours later. The next three cases of rupture of the uterus occurring in the patient's own home presented many similar features. Two women were over the age of 35 and the other over the age of 40. All were grand multiparae. All previous confinements had been described as normal. The last case was that of a relatively young woman who had already given birth to seven babies and her general physical condition was definitely abnormal for she weighed nineteen stone. The next two cases in this group were similar in that in each the foetus presented by the shoulder and an arm prolapsed. One was a multipara in her late thirties who in previous pregnancies had had toxaemia and postpartum haemorrhage and in the last pregnancy had a shoulder presentation with prolapsed arm. The fatal labour was complicated by transverse lie with prolapsed arm, and uterine rupture occurred during attempts to effect delivery. Expert advice or assistance was not sought at any stage. The other case was that of a woman over 40 years of age and also a grand multipara who was described as a chronic hypertensive. Prolapse of the arm occurred during labour at home. No expert help was summoned before this patient was moved and she was transferred a considerable distance to a hospital and collapsed on the journey. The eighth case in this group, a woman who previously had had abdominal hysterotomy performed, was booked for home delivery and the scar ruptured during labour.

The records of the four deaths from uterine rupture that occurred in women who had been booked for confinement in general practitioner maternity homes show similar pictures. The first patient was over 40 years of age and a grand multipara. While previous confinements were described as having been normal the patient was noted to be grossly obese and also to suffer from mitral valve disease. She was estimated to have been six weeks post-mature and collapse occurred after labour had been in progress for twenty-six hours. At no time was any expert advice sought. The second patient was 40 years of age. Previous confinements had been normal but she suffered from severe hypertension for which artificial rupture of the membranes was performed. Again after more than twenty-four hours in labour the patient collapsed. At no time was expert advice sought. The third patient was a multipara over 35 years of age. All previous confinements had been complicated by severe postpartum haemorrhage. Collapse occurred immediately when the routine administration of ergometrine with the birth of the foetal head was followed by impaction of the shoulders. A dead baby weighing nearly 11 lbs. was eventually delivered after prolonged manipulations. In the fourth case the woman's previous delivery had been by Caesarean section and the scar ruptured during labour in the general practitioner maternity home.

Summary and Conclusions

1. Thirty-eight women died following uterine rupture. Although the number

was not large and forms only a small proportion of the 816 under review, nevertheless in well over one-half definite avoidable factors were present and to these attention has been drawn.

2. A few deaths were associated with the administration of oxytocic drugs but these happenings need to be considered in relation to the large but unknown number of women who receive these substances some time during pregnancy or labour.

3. This small group forcibly endorses recommendations that have previously and repeatedly been made in the earlier published reports in this series. These were to the effect that, although the risks of pregnancy and childbirth are so slight, disasters still occur and the responsibility for the confinement to take place in a patient's home or in a maternity home should never be taken unless certain generally accepted criteria are present. The woman should have had an uneventful past medical and obstetrical history, her general state of health should be good, and she should fall into the recognized age and parity groups. Even when all these points are observed any deviation from the normal either in pregnancy or labour will nearly always indicate the necessity of seeking help and advice from either a consultant obstetrician or from the flying squad.

10. AMNIOTIC FLUID EMBOLISM

The deaths in this section include those shown in Appendix table 1 under category 648·3 (other complications arising in pregnancy) of the International Statistical Classification of Diseases where the embolism occurred during pregnancy (one death), and No. 678 (delivery with other complications of pregnancy) (26 deaths). These twenty-seven deaths were considered to be the result of the entry of amniotic fluid into the maternal circulation. In thirteen histological examination of the lungs demonstrated the presence of amniotic debris. In the remaining fourteen no histological examinations of the lungs were reported and the diagnoses are therefore open to doubt.

Among the thirteen proved cases, embolism was associated with labour in twelve. In the thirteenth, a para 7, who was twenty-two weeks pregnant, the patient visited her doctor at his evening surgery to have her ears syringed. Later the same evening she became cyanosed, and collapsed and died before the doctor could reach her. At post-mortem examination a twin pregnancy was found with one amniotic sac ruptured and one intact. In three cases the membranes were ruptured artificially; collapse occurred a few minutes later in two and five-and-a-half hours later in the third. In eight cases the membranes ruptured spontaneously; in two of these collapse occurred within a few minutes of the rupture of the fore-waters, in the others the intervals were stated to be one hour, two hours (two cases) and "several hours". The interval was not recorded in the remaining two. In none of these did proved embolism occur while the membranes were intact. In the remaining case, collapse followed shortly after Caesarean section. Survival of the patient after initial collapse was noted as follows. Five women died in less than one hour, four between one and two hours, one within four hours and one at forty-eight hours (her condition having deteriorated gradually during that period). In two women blood coagulation failure was noted to occur after the onset of acute pulmonary symptoms. In two of the thirteen proved cases, oxytocins were given. In one Syntocinon 2·5 units per litre was given at the rate of 16 drops a minute for an unspecified period. In the other case six injections of 2·5 units of Pitocin were given at half-hourly intervals. Twenty minutes after the last injection the membranes ruptured spontaneously and the patient collapsed and died.

In the group of fourteen women who died but whose deaths from amniotic fluid embolism were not proved histologically, the diagnosis rested on the clinical picture of sudden collapse accompanied by cyanosis and dyspnoea, followed by evidence of blood coagulation failure in five. Amongst the fourteen deaths from presumed amniotic fluid embolism no autopsy was carried out in one. In the others the lungs were not examined histologically, and death was ascribed to amniotic fluid infusion because no other cause was discovered. In five of the fourteen the membranes had been ruptured artificially. In these collapse occurred one hour, five-and-a-half hours, one day and two days (two cases) later. In another woman whose pregnancy was complicated by hydramnios, the amniotic cavity had been tapped twice per abdomen and collapse occurred some time later during the first stage of labour. Spontaneous rupture of the membranes occurred in seven of the fourteen women; one woman

collapsed immediately but in the other six information about the occurrence and time of escape of liquor was not supplied. The fourteenth patient collapsed and died at the end of an elective Caesarean section. Survival of the patients after their initial collapse was for the following periods of time:—less than one hour, seven women; one to two hours, three women; four to nine hours, four women. In one of the fourteen deaths in which the diagnosis was not proved histologically, oxytocin was given to induce labour. The membranes were ruptured artificially followed later by an intravenous 'drip' of Pitocin, two units per litre.

Since the number of maternal deaths ascribed to amniotic fluid embolism is increasing, the criteria for the diagnosis of this condition deserves consideration. In more than half of the cases described above the diagnosis was presumed and rested on clinical history, not on pathological findings. There were other maternal deaths originally certified as being caused by amniotic fluid embolism in which further enquiry by the assessors resulted in altered diagnoses. It is all too easy to ascribe an otherwise unexplained death to amniotic fluid embolism. If the importance of this condition as a cause of maternal death is to be assessed accurately, it is essential that care be taken by the obstetrician and the pathologist to produce reasonably certain evidence that embolism has occurred.

The following criteria require emphasis:—

An absolute diagnosis depends on demonstrating by histological examination of the maternal lungs that the capillaries contain a significant amount of particulate matter of foetal origin. This may consist of:—

(i) *Foetal squames.* These can be confused with endothelial cells shed from the maternal vessels themselves. Moreover epithelial cells from the foetal skin may stain weakly with haematoxylin-eosin mixtures and can be missed. They are best identified by the alcian green-phloxin stain which colours the squames red and mucin greenish-blue.

(ii) *Fat.* Globules of fat representing vernix caseosa are best demonstrated by a stain specific for fat.

(iii) *Meconium.* The presence of meconium in the maternal vessels can be best recognized by using a stain for mucin.

In case of amniotic fluid embolism, the maternal vessels may also contain fibrin emboli, recognized by using the acid picro-mallory stain. The presence of these is a manifestation of the blood coagulation disorder which commonly complicates amniotic fluid embolism.

A presumptive diagnosis of amniotic fluid embolism can be justified by the following clinical observations:—

(i) A sudden collapse of the patient at some time after a break in continuity of the membranes, usually during labour. This collapse is characterized by dyspnoea and cyanosis.

(ii) If the patient does not die immediately from shock, blood coagulation failure generally supervenes and should be looked for particularly

(either before or after death) in all cases in which amniotic fluid embolism is suspected. In only seven of the twenty-seven cases reported above was coagulation failure recorded; it may well have occurred in others unrecognized.

(iii) Blood coagulation failure may be the first evidence that an infusion of liquor amnii has occurred, for there may be no dramatic clinical effects at the time of the infusion. In these cases the coagulation failure is unlikely to become manifest until the delivery is complete.

Age and Parity

The age and parity distribution of the women who died from amniotic fluid embolism (all cases) is shown in tables XXII and XXIII. The figures in brackets are the number in which the diagnosis was proved by histological examination of the lungs.

Table XXII. Age distribution of deaths from Amniotic Fluid Embolism compared with the distribution among all registered births in England and Wales 1961–63.

Age	Deaths from Amniotic Fluid Embolism		Total Registered Births
	Number	Per cent.	Per cent.
15 and under	—	—	0·1
16—19	—	—	7·8
20—24	3 (0)	11·1 (—)	31·0
25—29	6 (3)	22·2 (23·1)	30·6
30—34	6 (5)	22·2 (38·5)	18·4
35—39	7 (4)	25·9 (30·8)	9·2
40—44	5 (1)	18·5 (7·7)	2·7
45+	—	—	0·2
Total	27 (13)	99·9 (100·1)	100·0

Table XXIII. Parity distribution of deaths from Amniotic Fluid Embolism compared with all registered legitimate live births in England and Wales 1961–63.*

Parity	Deaths due to Amniotic Fluid Embolism		Total Registered Legitimate Live Births
	Number	Per cent.	Per cent.
1	5 (2)	18·5 (15·4)	36·8
2	4 (2)	14·8 (15·4)	30·7
3	8 (3)	29·6 (23·1)	16·4
4	4 (3)	14·8 (23·1)	7·9
5	—	—	3·8
6 or more	6 (3)	22·2 (23·1)	4·4
Total	27 (13)	99·9 (100·1)	100·0

Although the numbers in tables XXII and XXIII are too small to be of statistical significance, they suggest that the chance of a pregnancy resulting in death from amniotic fluid embolism is greater in the older woman and in the higher parities.

Summary and Conclusions

1. An account is given of twenty-seven deaths considered to be due to amniotic fluid embolism. In only thirteen had the diagnosis been confirmed by histological examination of the lungs. None of the twenty-seven deaths were considered to have avoidable factors.

2. In order to permit in subsequent reports, a realistic assessment of the frequency and aetiological factors associated with the condition, criteria necessary for a presumptive diagnosis and histological confirmation are suggested.

*For definition of parity, see page 2.

11. THE BOOKING ARRANGEMENTS FOR ALL PATIENTS IN THE ENQUIRY SERIES

An analysis has been made of the deaths of patients according to the original booking arrangements for the place of confinement. Amongst the 936 deaths included in the enquiry series 428 occurred amongst women originally booked for delivery in a consultant maternity hospital, 96 for delivery in a general practitioner maternity home*, and 194 were booked for a domiciliary confinement. The remaining 218 women had no arrangements made for their confinement.

Patients for whom no booking arrangements had been made.

There were 218 women in this group and 182 of them received no antenatal care. In all except eighteen, the maternal death occurred before the foetus became viable. One hundred and thirty-four of the deaths followed abortion, fourteen ruptured ectopic pregnancy, and twenty-five were directly due to complications of pregnancy and childbirth. The remaining nine women died from causes associated with but not directly due to pregnancy and childbirth.

Thirty-six deaths occurred amongst women who were receiving antenatal care but for whom arrangements had not yet been made for the confinement. Fifteen of these deaths followed abortion and seven ruptured ectopic pregnancy. Ten other women died early in pregnancy, and three from causes associated therewith. There were four women who sought antenatal care throughout pregnancy, three from their family doctor and one from a local health authority clinic, but for whom no arrangements were made for their confinement and for whom consultant help or advice was not sought until far too late.

Patients booked for a domiciliary confinement.

There were 194 deaths amongst women booked for a domiciliary confinement. Thirty-two women died in their homes before the onset of labour and sixty-seven during or after labour. One woman was transferred as an emergency to a poorly equipped general practitioner maternity home where she died undelivered. Eleven women had their booking changed to a consultant maternity hospital during the antenatal period and eighty-three were transferred as emergencies, five of whom died before labour commenced.

Avoidable factors were present in seventy-one of the 194 deaths amongst women booked for domiciliary delivery, and in many of these cases more than one avoidable factor occurred. It is now generally agreed that the criteria for a confinement to take place at home or in a general practitioner maternity unit should be normality and at the time of booking:—

(1) As far as can be ascertained the woman's general physical state is unimpaired.

*For the purpose of this enquiry a general practitioner maternity home is defined as a place equipped for normal obstetrics where the patient remains under the care of a general practitioner and there is no resident doctor.

(2) She is pregnant for the second, third or fourth time, the previous pregnancies, labour and puerperia have been normal and she is under 35 years of age.

(3) If a primgravida she is under 30 years of age.

(4) She is known to have no Rhesus antibodies.

(5) The home conditions are suitable.

There were fifty-three women in which these criteria were not present at the time of booking and the unwise arrangement for the place of confinement was considered the avoidable factor in the chain of events which ended in death. Of these fifty-three women, there were twenty-five whose obstetric history had not been normal, and one whose general physical state was known to be impaired. Thirty of the fifty-three women were elderly and seventeen were grand multiparae. In nineteen cases, the patient herself was partially or solely responsible for the unsuitable booking arrangement, in thirteen a midwife and general practitioner shared the responsibility and in the remainder, the general practitioner alone was considered responsible. In some cases it appeared that doctors and midwives too readily acceded to the patient's wish to be confined at home and discovered too late that it was mistaken kindness to accept responsibility for the confinement of a 'priority group' woman in a place lacking the facilities of a consultant maternity hospital unless it was clear that the patient would otherwise remain unattended. One of these women was referred to a consultant physician because she was known to have mitral stenosis. When he advised that the patient could expect a normal delivery the family doctor arranged for her to be confined at home. At no time was an obstetrician consulted. Seven of the women in whom there were indications for a hospital confinement at the time of booking might not have died had consultant help been obtained as soon as signs of complications occurred. Five women who prevailed on their doctors to arrange for their confinements at home still might have lived had they not disregarded advice concerning their antenatal care.

Nineteen women who had no indications for hospital confinement at the time of their initial antenatal examination and for whom domiciliary confinements were quite correctly arranged, developed complications during the ante-natal period but consultant help was not sought or sought far too late. In another instance, the family doctor referred a patient suffering from pre-eclamptic toxaemia to a hospital clinic but the obstetrician failed to accept responsibility for her subsequent care. Sixteen women died whose general practitioners provided antenatal care which was so deficient that it was regarded as an avoidable factor and another woman received inadequate antenatal care because she did not seek it until late in pregnancy by which time she had already developed severe toxaemia.

Eight women died from haemorrhage whose lives might have been saved had the assistance of the flying squad been requested. One suffered from hydatidiform mole, two from placenta praevia, two from accidental haemorrhage, one from rupture of the uterus during labour, and two from postpartum haemorrhage.

Table XXV. Age distribution of deaths amongst women booked for delivery in their own home compared with the distribution among all registered births in England and Wales 1961–63.

Age	All cases		No avoidable factor present		Avoidable factor present		Total registered births Per cent.
	Number	Per cent.	Number	Per cent.	Number	Per cent.	
15 and under	—	—	—	—	—	—	0·1
16—19	4	2·1	3	2·4	1	1·4	7·8
20—24	43	22·2	30	24·4	13	18·3	31·0
25—29	51	26·3	38	30·9	13	18·3	30·6
30—34	38	19·6	23	18·7	15	21·1	18·4
35—39	36	18·6	21	17·1	15	21·1	9·2
40—44	21	10·8	8	6·5	13	18·3	2·7
45+	1	0·5	—	—	1	1·4	0·2
Total	194	100·1	123	100·0	71	99·9	100·0

*Table XXVI. *Parity distribution of deaths amongst women booked for delivery in their own home compared with the distribution among all registered legitimate live births in England and Wales 1961–63.*

Parity	All cases		No avoidable factor present		Avoidable factor present		Registered legitimate live births Per cent.
	Number	Per cent.	Number	Per cent.	Number	Per cent.	
1 ..	40	20·6	27	21·9	13	18·3	36·8
2 ..	44	22·7	33	26·8	11	15·5	30·7
3 ..	37	19·1	22	17·9	15	21·1	16·4
4 ..	32	16·5	19	15·4	13	18·3	7·9
5 ..	15	7·7	11	8·9	4	5·6	3·8
6 or more	22	11·3	9	7·3	13	18·3	4·4
Not stated	4	2·1	2	1·6	2	2·8	—
Total	194	100·0	123	99·8	71	99·9	100·0

The age and parity distribution of the 194 women who died is shown in tables XXV and XXVI. The figures demonstrate the increased chance of pregnancy resulting in death in the older woman and the higher parities. It will be noted from the figures that not all the deaths listed under the heading 'no avoidable factor present' were of women wisely booked for domiciliary delivery. Indeed, fifty-five of these women were in the priority groups at the time of booking. Twenty-seven of them were known to have adverse previous obstetric histories and another was known to suffer from mitral stenosis. Among these fifty-five women, twenty-nine were 35 years of age or more, and twenty were pregnant for the fifth or more time. Nevertheless, however unsuitable the booking arrangement, it was not regarded as an avoidable factor unless there was evidence that it had some bearing on the subsequent death. Thus one

*For definition of parity—see page 2.

woman booked to have her ninth child at home died from puerperal cerebral thrombosis. Another, who was booked for a home confinement, had a history of pre-eclamptic toxaemia in all her previous pregnancies but died from a pulmonary embolism when thirty-three weeks pregnant. Although in both these instances the assessors considered the arrangements for the confinement most unwise, they felt that the deaths would have occurred regardless of the booking arrangements and did not list it as an 'avoidable factor' in the chain of events leading to death.

The causes of death of the 194 women booked for a home confinement are of interest. They were as follows:—

Cause of Death		*Number*
Pulmonary embolism		37
(a) Existing venous thrombosis noted ...	29	
(b) No existing venous thrombosis noted	8	
Puerperal cerebral thrombosis		4
Mesenteric thrombosis		2
Toxaemia (including 10 cases of eclampsia) ...		24
Postpartum haemorrhage and shock		21
Antepartum haemorrhage		19
Valvular disease of the heart		13
Amniotic fluid embolism		11
Ruptured uterus		7
Cerebral haemorrhage		7
Broncho-pneumonia		6
Malignant disease		6
Puerperal sepsis		5
Anaemia of pregnancy		5
Influenzal pneumonia...		5
Anaesthesia		4
Infective hepatitis		4
Air embolism		3
Appendicitis		2
Peritonitis, acute enteritis, perforated duodenal ulcer, empyema, tuberculous meningitis, encephalitis, epilepsy, moniliasis, pancreatitis	1 each	9
		194

The importance of death from pulmonary embolism and venous thrombosis is immediately apparent, and in the majority of cases a note had been made that the woman was suffering from thrombophlebitis in the legs.

Where an avoidable factor was found to be present, the three major causes of death were toxaemia, postpartum haemorrhage and rupture of the uterus. The nature of the avoidable factor ran true to a general pattern, thus when death was due to toxaemia antenatal care was at fault and often by sending the patient home to rest without taking any steps to discover whether the home conditions made this possible, and without any visit from the doctor or midwife until one week had elapsed or until the doctor was summoned urgently because the patient's condition had rapidly worsened. All cases of toxaemia call for expert advice at an early date and usually for admission to hospital. When death followed severe postpartum haemorrhage and an avoidable factor was considered to be present, not once had help been sought from the flying squad and in several instances a severely ill woman had been despatched to hospital in an ambulance. Unwise arrangements for the confinement was the avoidable factor in all the deaths from rupture of the uterus. In one instance, the woman had previously been delivered by Caesarean section, and in others the age of the patient, together with a history of several extremely difficult confinements, gave clear warning of the need for hospital confinement. In some of these cases, inappropriately booked in the first instance, prolonged and forcible efforts to complete delivery were made without the doctor seeking help from either a consultant or the flying squad.

Patients booked for delivery in general practitioner maternity homes

In the series at present under review ninety-six women who died were booked to have their babies in general practitioner maternity homes. Two of these women died after abortion, one after hydatidiform mole, and fourteen others before the onset of labour. Forty-seven were confined in their booked maternity home but died during or after labour. Seven women had the booking changed to a consultant maternity hospital during the antenatal period and twenty-five were transferred as emergencies. Amongst the thirty-two women transferred to a hospital eight died before the onset of labour.

Avoidable factors were present in thirty-eight of the ninety-six deaths amongst women booked for delivery in general practitioner maternity homes, and in many of these cases more than one avoidable factor occurred. Fifteen of these women who died were potentially obstetric or medical 'bad risks' at the time the booking was made. Amongst them, ten were elderly, five having their fifth or more child, five whose previous obstetric and five whose medical history clearly indicated the need for a hospital booking. Three of the women unwisely booked for care in general practitioner homes might have survived had they been transferred to the care of a consultant obstetrician as soon as complications occurred. A further thirteen were quite correctly booked for a maternity home confinement but consultant help was not obtained nor was the booking changed when abnormalities appeared in the antenatal period or during labour. Three lives might have been saved had the help of the flying squad been requested for women suffering from haemorrhage. There were seven instances where clinical mis-management was not regarded as a genuine error of judgment but as an

avoidable factor. Four of these were considered the responsibility of the family doctor, for example, instances of what could only be described as neglect of women with toxaemia or antepartum haemorrhage. The other three were the responsibility of the hospital service. In one instance an inexperienced junior hospital doctor was sent to the maternity home when the family doctor had requested skilled help for a primigravida suffering from a retained placenta and bleeding. Another woman was quite correctly transferred to hospital when it became apparent she would not have a normal delivery, but in hospital no preparations were made to deal with blood loss before Caesarean section was commenced.

Table XXVII. Age distribution of deaths amongst women booked for delivery in a general practitioner maternity home compared with the distribution among all registered births in England and Wales 1961-63.

Age	All cases		No avoidable factor present		Avoidable factor present		Total registered births Per cent.
	Number	Per cent.	Number	Per cent.	Number	Per cent.	
15 and under	1	1·0	—	—	1	2·6	0·1
16—19 ..	5	5·2	5	8·6	—	—	7·8
20—24 ..	22	22·9	16	27·6	6	15·8	31·0
25—29 ..	26	27·1	17	29·3	9	23·7	30·6
30—34 ..	15	15·6	9	15·5	6	15·8	18·4
35—39 ..	19	19·8	8	13·8	11	28·9	9·2
40—44 ..	7	7·3	3	5·2	4	10·5	2·7
45+ ..	1	1·0	—	—	1	2·6	0·2
Total	96	99·9	58	100·0	38	99·9	100·0

*Table XXVIII. *Parity distribution of deaths amongst women booked for delivery in a general practitioner maternity home compared with the distribution among all registered legitimate live births in England and Wales 1961-63.*

Parity	All cases		No avoidable factor present		Avoidable factor present		Registered legitimate live births Per cent.
	Number	Per cent.	Number	Per cent.	Number	Per cent.	
1	51	53·1	34	58·6	17	44·7	36·8
2	16	16·7	8	13·8	8	21·1	30·7
3	11	11·4	7	12·1	4	10·5	16·4
4	6	6·3	2	3·4	4	10·5	7·9
5	3	3·1	2	3·4	1	2·6	3·8
6 or more	7	7·3	4	6·9	3	7·9	4·4
Not stated	2	2·1	1	1·7	1	2·6	—
Total	96	100·0	58	99·9	38	99·9	100·0

*For definition of Parity—see page 2.

The age and parity distribution of the ninety-six women who died is shown in tables XXVII and XXVIII. It will be noted that over half the women who died were primigravidae. The number and age and parity distribution of women booked for confinement in general practitioner maternity home is unknown, therefore it is not known whether the distribution of those who died is proportional to the distribution of all women originally booked for delivery in general practitioner homes.

Tables XXVII and XXVIII also show that, as in the previous section dealing with deaths amongst women booked for domiciliary confinement, not all the deaths listed under the heading 'no avoidable factor present' were of women wisely booked for delivery in general practitioner maternity homes. Indeed, eighteen of these women were in the priority groups at the time of booking and three developed obstetric complications during the antenatal period. There were eleven instances when the age was 35 years or more and six of parity greater than four. Five of these women were both elderly and grandmultiparae. Two women were known to have adverse obstetric histories and four were abnormal medically. But however unsuitable the booking arrangement, it was not regarded as an avoidable factor unless there was evidence that it had some bearing on the subsequent death. Thus one woman with no living children and a history of three stillbirths was booked for delivery in a general practitioner home but died from rupture of the uterus when she was thirty weeks pregnant. Every assessor considered this a most unwise booking arrangement, but felt that the death would have occurred regardless of the arrangements made for the confinement. Another woman developed severe pre-eclamptic toxaemia in the last month of pregnancy and was admitted to and subsequently delivered in her booked general practitioner home. At no time was help or advice sought from a consultant obstetrician. Despite her pre-eclamptic toxaemia the patient was safely delivered but died from septicaemia during the puerperium. The assessors did not consider an avoidable factor was present because, though feeling very strongly that all patients with severe toxaemia should have consultant care, in this particular death there was no evidence to associate the care or treatment of toxaemia with the cause of death. Similarly, there were five instances when the patient sought antenatal care and a booking arrangement so late in pregnancy that this might have been judged an avoidable factor which contributed to the patient's own death, but in all these five cases the absence of care throughout most of the antenatal period appeared unrelated to the death of the women and was, therefore, not recorded as an avoidable factor.

The causes of death and those with avoidable factors amongst the ninety-six women booked for delivery in general practitioner maternity homes were as follows:—

Cause of death	*Number*	*Number with avoidable factors*
Pulmonary embolism	18	5
Puerperal cerebral thrombosis ...	1	
Mesenteric thrombosis	1	
Toxaemia (eclampsia 9; renal failure 5; liver failure 1; associated with hydatidiform mole 1)	16	7
Postpartum haemorrhage and shock	17	10
Antepartum haemorrhage (placenta praevia 3, accidental haemorrhage 2)	5	5
Valvular disease of the heart ...	7	3
Aminiotic fluid embolism	1	
Ruptured uterus	7	4
Cerebral haemorrhage	5	
Pneumonia	2	
Puerperal sepsis	2	
Anaemia of pregnancy	2	2
Anaesthesia	2	2
Asthma	2	
Paralytic ileus after Caesarean section; Infective hepatitis; Air embolism; Appendicitis; Epilepsy; Ruptured aortic aneurysm; Heart failure of unknown cause, Ruptured ovarian cyst. — 1 each	8	
	96	38

There is probably no better way to demonstrate the avoidable factors present in these thirty-eight deaths than to give a brief summary of the records in each of these groups.

(*a*) *Death from haemorrhage* (*15 deaths*)

Amongst these fifteen women booked for delivery in a general practitioner home, four were over the age of 40 and six others over 35. One was having her fifth baby. Six women gave a history of complications occurring in previous pregnancies and/or labours. Poor health was noted in three and pre-eclamptic toxaemia in four. Surgical induction was performed twice. Obstructed labour requiring operative delivery occurred in five women and two others who suffered from antepartum haemorrhage at home were transferred into their booked general practitioner maternity homes

for eventual delivery by Caesarean section. In ten of the deaths from haemorrhage expert help or advice was not sought from either a consultant obstetrician or the flying squad. In three cases of antepartum haemorrhage a consultant permitted the patient to remain in a poorly equipped maternity home and in one of these sent an inexperienced junior hospital doctor to assist the general practitioner when bleeding occurred. The remaining woman who died had a retained placenta and was transferred by ambulance to the consultant hospital. On arrival, manual removal was immediately undertaken by a house surgeon who made no arrangements for intravenous transfusion.

(*b*) *Death from toxaemia* (*7 deaths*)

These women were all in the younger (under 35) age group and all were pregnant for the first time. In every case marked hypertension had been noted on more than one occasion. All had been watched, usually for more than three weeks. Two women had been transferred from their own homes to a general practitioner maternity home where they were examined by consultant obstetricians who did not change the arrangements for the place of confinement. In one case the pregnancy was ended as a matter of urgency by Caesarean section. In none of the other five cases was any note made that expert advice had been sought.

(*c*) *Death from pulmonary embolism* (*5 deaths*).

Three of these women were known to have suffered from severe thrombophlebitis in their previous pregnancies and a fourth was delivered in a general practitioner maternity home despite deep vein thrombosis during the antenatal period. The fifth woman was never referred to a consultant obstetrician but was treated for severe toxaemia by bed rest, induction of labour and forceps delivery by her family doctor. Three of these women were over 35 and two of them were also grandmultiparae.

(*d*) *Death from rupture of the uterus* (*4 deaths*)

One woman was in her early thirties and three were between 35 and 39 years of age. All were multiparae though only one had more than five previous pregnancies. Three gave histories of most difficult and prolonged labours and another had previously been delivered by Caesarean section. In one woman shoulder presentation and prolapse of the arm occurred and in two others rupture of the uterus followed injection of oxytocic drugs, in one case given to induce labour and in the other given with the crowning of the foetal head. In three of these cases no note was made that any expert advice or help had been sought from either a consultant or from the flying squad. The fourth was booked for delivery in a general practitioner home by a consultant despite a request from the general practitioner that the patient should be accepted for consultant hospital care.

(*e*) *Death from anaesthesia* (*2 deaths*)

One woman, described as very obese, had a prolonged and difficult labour and was delivered with assistance under a prolonged and difficult anaesthetic. The second woman died during chloroform anaesthesia administered by the family doctor who was working single handed.

(*f*) *Death from heart failure* (*5 deaths*)

All these women were cared for in general practitioner maternity homes although three were known to have mitral stenosis at the time the booking arrangement was made and two developed severe anaemia during pregnancy. In none of the cases was it recorded that any expert advice or help had been sought.

Patients booked for delivery in consultant obstetric hospitals

There were 428 deaths amongst women originally booked for confinement in consultant obstetric hospitals. Two hundred and eighty-two of these deaths were directly due to pregnancy and childbirth and 146 from causes associated therewith. The age and parity distribution are shown in tables XXIX and XXX.

Table XXIX. Age Distribution of deaths amongst women booked for delivery in hospital compared with the distribution amongst all registered births in England and Wales 1961–63.

Age	All cases		Total registered births Per cent.
	Number	Per cent.	
15 and under	2	0·5	0·1
16—19	19	4·4	7·8
20—24	67	15·7	31·0
25—29	85	20·0	30·6
30—34	99	23·1	18·4
35—39	91	21·3	9·2
40—44	62	14·5	2·7
45 +	3	0·7	0·2
Total	428	100·2	100·0

*Table XXX. *Parity distribution of deaths amongst women booked for delivery in hospital compared with the distribution among all registered legitimate live births in England and Wales 1961–63.*

Parity	All cases		Registered legitimate live births
	Number	Per cent.	Per cent.
1	162	37·9	36·8
2	64	15·0	30·7
3	66	15·4	16·4
4	38	8·9	7·9
5	28	6·5	3·8
6 or more	63	14·7	4·4
Not stated	7	1·6	—
Total	428	100·0	100·0

* For definition of parity — see page 2.

Tables XXIX and XXX illustrate the increased chance of pregnancy resulting in death in the older woman, the higher parities and amongst primigravidae.

An avoidable factor or factors was identified in eighty of the 428 deaths and their nature is discussed in Section 12. These factors necessarily bear no relation to the arrangements made for the confinement or failure to obtain help or advice from the flying squad or hospital team and are, therefore, not relevant in this discussion of booking arrangements. Their very irrelevance serves to emphasize that comparisons should not be made concerning avoidable factors attributed to the different spheres of maternity care because factors occur outside the hospital service which are quite impossible once a patient is under hospital care and, likewise, opportunities exist for errors of administration and clinical management in hospital which cannot occur except in consultant obstetric hospitals.

Summary and Conclusions

(1) A survey has been given of the arrangements made for the confinement of the 936 women whose deaths are analysed in this enquiry series. Four hundred and twenty-six were originally booked for a hospital confinement, 96 for delivery in general practitioner homes, 194 for a domiciliary confinement, and in 218 cases no arrangements had been made.

(2) When deaths occurred amongst women booked for maternity homes or domiciliary confinement, much attention was given to the records of each case to discover whether unwise booking arrangements for women in the priority groups had contributed to the deaths, but in some cases the circumstances were such as to lead the assessors to conclude that an avoidable factor was not present. The assessors were also at pains to discover whether expert opinion had been obtained prior to death, whether the doctor had sought but failed to

secure help from a consultant or flying squad, whether the patient had been refused admission to hospital and whether her transfer was too late or unwise. The details in the reports permitted firm conclusions in these respects in the majority of cases.

(3) Throughout the series example after example occurred of unwise bookings for confinement in places lacking the equipment and staff to deal with emergencies and abnormal obstetrics. Such bookings were made despite advanced age, high parity and history of complications such as postpartum haemorrhage or Caesarean section in a previous pregnancy. There were many cases in which help from the flying squad would have been appropriate but none was sought or it was sought far too late. Several women should have had, but did not have, expert advice from a consultant physician or obstetrician either in pregnancy or in labour. The significance of deep venous thrombosis or antepartum haemorrhage seems not to have been appreciated and patients with these disorders were transferred from their homes to inadequately equipped and staffed units whereas their illness or its complications indicated the full resources of a consultant unit.

12. AVOIDABLE FACTORS IN THE WHOLE SERIES

The number of deaths in which avoidable factors were considered to be present is shown, for each cause of death and in the whole series in tables 1 and 2 in Appendix I. They have been discussed in relation to the principal deaths in the preceding sections. Reports of 692 deaths directly due to pregnancy and childbirth were received for this Enquiry for the years 1961–63. Of the 692 reported deaths 262 or 37·9 per cent had avoidable factors. Reports were also received for 244 deaths associated with, although not directly due to pregnancy and childbirth of which 34 or 13·9 per cent had avoidable factors. The presence of an avoidable factor does not mean that death would have been averted, or that a factor identified as avoidable was the cause of the mother's death. It does mean that there is reason to believe that if the avoidable factor or factors had been recognized or anticipated or handled differently a fatal issue might have been avoided.

The proportion of deaths with avoidable factors among all the deaths in each enquiry series is shown in the following table.

Table XXXI. Deaths with avoidable factors as a percentage of deaths in the enquiry series.

	1952–54	1955–57	1958–60	1961–63
All deaths due to pregnancy and childbirth.	43·1	41·0	42·5	37·9
Deaths due to pregnancy and childbirth excluding abortion and ectopic pregnancy.	40·0	37·3	38·9	34·4
Deaths associated with pregnancy and childbirth.	16·8	16·8	17·7	13·9

The total number of deaths and the number with avoidable factors have fallen considerably during the years of the enquiry series but the percentage with avoidable factors has fallen only by an eighth suggesting either stricter criteria in assessing avoidability, or that some deaths are no longer occurring among those groups formerly considered not to present avoidable factors.

When a comparative study was made of the forms received in 1952 and those received for the third report it was found that criteria have not changed but there was a difference in the amount of information supplied on the forms. Whereas in 1952 a number of deaths were considered unavoidable for lack of information, most of the forms received for the later reports enable a much more accurate assessment to be made.

Of the 296 deaths in this series in which avoidable factors were considered to be present, the factor(s) occurred solely in the antenatal period in 208, during labour in thirty-seven and during the puerperium in five. In thirty-seven

women avoidable factors were present in both the antenatal period and during labour, and in a further seven during the antenatal period, labour and puerperium. In one woman avoidable factors occurred during the antenatal period, and puerperium, and in the remaining woman during labour and the puerperium. Thus one or more avoidable factor(s) were present in each case in the antenatal period of 252, during labour in eighty-two and during the puerperium in fourteen women who died.

An attempt has been made to assign the responsibility for avoidable factors from the information in the enquiry forms and it is tabulated in table XXXII. It must be emphasized that this is not assigning responsibility for a death. In one column are listed deaths with avoidable factors in which it was considered that one person was wholly responsible for the avoidable factor(s). The other column indicates those in which responsibility was shared, or there was more than one avoidable factor with differing responsibility. General practitioners have far more opportunities to make mistakes. They are at some stage of the pregnancy, responsible for almost all pregnant women whereas local health authority and hospital services are responsible for a smaller proportion and only for part of the time. The general practitioner has to decide which of his patients require a hospital confinement, or a change in their booking arrangements, and at what stage help and advice or the services of the flying squad are necessary. The hospital service can only be responsible for such errors by failing to agree to the referring doctors request. This table therefore must not be taken as reflecting discredit on the part of the general practitioner in maternity care, since his is the exposed position. It is an indication only of the points at which remedial action may best be taken.

TABLE XXXII. The apportionment of responsibility for avoidable factors in the 296 deaths with avoidable factors.

	Entirely responsible	Partially responsible
Hospital		
Consultant obstetrician	25	20
Obstetric registrar or house surgeon ...	13	18
Midwife	1	1
Anaesthetist	6	2
Consultants in other specialties ...	2	1
General practitioner maternity homes or nursing home		
Consultant obstetrician	2	2
General practitioner	21	5
Midwife	—	2
Domiciliary service		
Consultant	1	1
General practitioner	32	55
Local health authority medical officer ...	—	5
Midwife	—	21
Patient or her relatives	121	33

Avoidable factors which occurred during the antenatal period.

1. *Avoidable factors attributed to the hospitals*

Consultant obstetricians, obstetric registrars, house officers and midwives who comprise the hospital obstetric team were considered solely responsible for the avoidable factor(s) in twenty-five patients who died and shared responsibility in a further four. The principal factors were long intervals between antenatal clinic appointments for women known to have pre-eclamptic toxaemia and delay in admission of these women to hospital. There were five deaths in women who were not followed up when they failed to keep their clinic appointment and two in women for whom no arrangements were made for their continued supervision following periods of rest in hospital for pre-eclamptic toxaemia. In two women referred by their family doctor because of toxaemia, the consultant failed to undertake responsibility for antenatal care. There was inadequate care of four women under the supervision of other specialists. In one a chest physician and in another a psychiatrist failed to refer the patient to his obstetric colleague. In a third case the patient was discharged from hospital after a valvotomy during pregnancy with no arrangements made for antenatal supervision. The fourth was in a hospital for infectious diseases where she received inadequate supervision from an obstetrician. There were three instances when junior officers failed to inform the consultant of emergency admissions, and two when they sent an ambulance to bring a patient who was bleeding, from her home, when the flying squad would have been more appropriate.

The consultant obstetrician should be held responsible for the work of his team unless they disobey his instructions. It is his responsibility to ensure that consultant help and advice are always available, and that his staff know when to call for it. He is responsible for the administrative arrangements within his department and must make certain that patients who fail to attend for antenatal clinic care are visited, that patients referred to other specialist departments continue to receive obstetric supervision, and when antenatal care is shared there is a clear understanding of the division of responsibility. He cannot, of course, be held responsible for lack of staff, but only for deployment of the staff he has.

2. *Avoidable factors attributed to general practitioner maternity homes*

There were twenty-four deaths in which the avoidable factor occurred during the antenatal period in general practitioner maternity homes which are discussed in Section 11. In eighteen cases the general practitioner was solely responsible for the avoidable factor, in two cases he shared it with a consultant, in one case with the midwife and in another with the patient. In two instances a consultant was entirely responsible. Eight women had clear indications for confinement in a consultant unit but were wrongly booked, in six instances by their general practitioner and in two by a consultant obstetrician to whom they had been referred. Eleven women were initially correctly booked for care by their own doctor in a general practitioner home but there was failure to refer them to a consultant obstetrician and change the place of booking as soon as complications occurred. Symptoms of severe toxaemia and antepartum haemorrhages were treated by antenatal rest in bed in these small units where there were no

facilities to deal with complications. In some the seriousness of the patient's condition was not appreciated, and in deaths from antepartum haemorrhage the flying squad was summoned too late or not at all.

3. *Avoidable factors attributed to the domiciliary service*

There were eighty deaths in which avoidable factors occurred during the antenatal period in women booked for domiciliary confinement. These are discussed in Section 11. In one death a consultant obstetrician was held responsible for the avoidable factor. In thirty-one a general practitioner was solely responsible, in another nine he was responsible for an avoidable factor, but more than one factor occurred and responsibility was divided. In sixteen deaths responsibility was shared between the midwife and general practitioner. Of these in two a local health authority medical officer was also partially responsible and in eight responsibility was also shared with the patient. There were twenty-two other deaths in which responsibility was divided between the general practitioner and patient and one in which a midwife shared responsibility with the patient.

The principal avoidable factors were wrong booking, failure to seek consultant advice and failure to change the booking when complications occurred during the antenatal period. Thirty-four women were wrongly booked for home confinements. These included four with known valvular disease of the heart, two with a history of previous Caesarean section and one with a history of hysterotomy. Eight women had suffered from pre-eclamptic toxaemia in previous pregnancies. Seventeen women qualified for hospital delivery because of age alone. Several had histories of prolonged labours, difficult deliveries and postpartum haemorrhage. Twenty-nine deaths occurred in women in whom there was failure to obtain consultant advice or change the booking as soon as complications were discovered. Toxaemia, antepartum haemorrhage and heart failure were either ignored or treated by rest in bed at home, and women with malpresentations were allowed to go into labour at home.

There were twenty-two deaths in women who received inadequate antenatal care many of whom were amongst those described in the previous paragraph who should have been transferred to consultant care. The main faults were infrequent and inadequate antenatal examinations and the failure to recognize abnormalities when they occurred. It is worth recording that of the eighty women booked for home delivery in whom avoidable factors occurred during the antenatal period, there was no record in thirty-four cases that an estimation had been made of their haemoglobin level during pregnancy. Two women received inadequate antenatal care because there was failure of liaison between the local health authority clinic and family doctor.

Seven deaths from antepartum haemorrhage might have been averted had the flying squad been summoned. Six women died at home and the seventh in an ambulance on the way to hospital.

One death from puerperal sepsis occurred in a woman whose membranes were artificially ruptured at home by a consultant obstetrician.

Avoidable factors which occurred during labour

1. *Avoidable factors attributed to the hospitals*

There were thirty-one deaths in which an avoidable factor(s) in labour was attributed to the hospital team. The consultant was solely responsible in five, and in seven, in which more than one avoidable factor was present, responsibility was divided between the consultant and his junior obstetric staff. In twelve deaths the junior obstetric staff were responsible for the avoidable factor, and in another responsibility was divided between junior obstetric staff and junior anaesthetist. Six deaths occurred in which responsibility for the avoidable factor was attributed to the consultant anaesthetist.

There were five deaths in which inexperienced junior hospital staff undertook operative deliveries without consulting their senior colleagues and four in which they failed to request help and advice when difficulties were encountered during operative deliveries. They failed to realize the seriousness of a patient's condition and did not seek expert help in four deaths from ruptured uterus, two of which they treated with syntocinon and two with ergometrine. Haemorrhage from retained fragments of placenta was treated with repeated injections of ergometrine in one, and inversion of the uterus remained untreated in another. Manual removal of the placenta was twice undertaken and a Caesarean section performed without prior arrangements for blood transfusion. In two deaths from haemorrhage blood transfusion was given too late.

In one death from ruptured uterus there was one and a half hours delay before the arrival of the house officer who had been requested to see the patient. In another case the junior staff were unable to obtain consultant help when they got into difficulties performing an operative delivery.

2. *Avoidable factors attributed to general practitioner maternity homes*

There were twenty-one deaths in which avoidable factors occurred during labour in general practitioner maternity homes. Eighteen were the responsibility of general practitioners, in another the responsibility was shared with a consultant and in another with a midwife. In one the consultant was entirely responsible. The avoidable factors mainly occurred because patients were either wrongly booked or should have had their booking changed during the antenatal period. Two of the patients known to have mitral stenosis developed heart failure during labour. Two with a previous history of Caesarean section suffered from rupture of the uterus during labour, and three with a history of difficult deliveries failed to deliver spontaneously. Eight women died who had pre-eclamptic toxaemia 'watched' antenatally. For all these consultant help was either requested too late or not at all.

Consultant help was either not requested or sought too late for five women who had prolonged labours, and one with a transverse lie. The flying squad was not called to two women who died from haemorrhage.

3. *Avoidable factors attributed to the domiciliary service*

Amongst deaths occurring in women booked for delivery at home there were thirty in which an avoidable factor arose during labour. A general practitioner was solely responsible for the avoidable factor(s) in eighteen of these

cases and he shared the responsibility with a consultant obstetrician in one, with a midwife in three, and a midwife and the patient in another two women.

Women who should never have been booked for home confinement or who should have been transferred to consultant care during the antenatal period were allowed to go into labour at home. Help was not sought until four women developed uterine rupture, until heart failure occurred in another, until pre-eclamptic toxaemia became severe in four patients and until eclampsia occurred in a fifth.

There was failure to call the flying squad in four fatal cases of postpartum haemorrhage and in one of ruptured uterus.

Avoidable factors which occurred during the puerperium

1. *Avoidable factors attributed to the hospitals*

Two deaths occurred in which the avoidable factor was attributed to the hospital staff. Both patients had anaemia which was neglected, both developed infection, and subsequently died from pulmonary embolism.

2. *Avoidable factors attributed to general practitioner homes*

Three deaths occurred in which there was an avoidable factor during the puerperium all of which were considered the responsibility of general practitioners In one, consultant help was not sought for a woman with severe postpartum toxaemia. The remaining deaths resulting from pulmonary embolism occurred in women with a known history of venous thrombosis, neither of whom was ever referred to a consultant.

3. *Avoidable factors attributed to the domiciliary service*

There were none.

Avoidable factors attributed to the patient

There were 121 deaths with avoidable factors for which the patient was considered responsible; seventy-seven of these were accounted for by procured abortion. There remain forty-four deaths for which the patient was solely responsible for the avoidable factor(s) and she was partially responsible for another thirty-three. In twenty-two of these deaths the patient shared the responsibility for the avoidable factor(s) with a general practitioner, in two with a midwife, and in six with a general practitioner and midwife. In three instances where there was more than one factor, responsibility was shared with a consultant obstetrician who failed to arrange follow-up when she failed to keep her appointment at an antenatal clinic.

There were twenty-five instances of wrong booking in six of which the patient was entirely responsible, but in the remaining nineteen she prevailed on the general practitioner or midwife to agree to her confinement at home. Deaths in this group occurred from accidental haemorrhage, severe toxaemia, ruptured uterus, haemorrhage, and heart failure.

Thirty patients failed to seek or obtain antenatal care of any description. Seven of these died from pre-eclamptic toxaemia or eclampsia, seven from accidental haemorrhage, two from heart failure, one from placenta praevia, six from postpartum shock and haemorrhage, two from abortion and the remainder

from causes associated with pregnancy. Three women who delayed seeking antenatal care until the last three months in pregnancy died, one from heart failure and two from pre-eclamptic toxaemia.

Three women failed to keep their antenatal clinic appointments, and seventeen either refused antenatal admission to hospital until it was far too late or discharged themselves from hospital against medical advice. Three of these women died from accidental haemorrhage, two from eclampsia, five from toxaemia, five from heart failure, one from ruptured uterus, two from pulmonary embolism and one from hydatidiform mole.

Summary and Conclusions

1. Two hundred and ninety-six maternal deaths with avoidable factors occurred in a period of three years during which there were 2,550,252 total births.

2. The risk of death in pregnancy is now small but there is no doubt it could be further reduced. It has been shown that avoidable factors were considered to be present in 34·4 per cent of the deaths directly due to pregnancy and childbirth (excluding abortion and ectopic pregnancy) and in 13·9 per cent of deaths due to other causes but associated with pregnancy and childbirth.

3. Details are given of the avoidable factors attributed to each branch of the obstetric service. Most avoidable factors arose in the antenatal period.

4. Approximately one maternal death in four with avoidable factors (excluding abortion) was due to the patient's refusal to follow medical advice or refusal to be booked for the safest place for her confinement. The persuasiveness with which advice was offered by doctors and midwives is not always entirely clear from the records, but it is evident there is a need for better and more vigorous health education. Women might more readily follow medical advice and consent to hospital confinement if they were certain their homes and other children would be cared for in their absence, and they would be allowed home as soon as the period of genuine danger was over.

APPENDIX I

Table 1(a) Deaths due to Pregnancy and Childbirth 1961–63.

International List No.	Cause of Death	1961			1962			1963			1961–1963			
		R.G.	Enquiry Series		R.G.	Enquiry Series		R.G.	Enquiry Series		R.G.	Enquiry Series		
			Total	Avoidable		Total	Avoidable		Total	Avoidable		Total	Avoidable Number	Avoidable Percentage
640	Pyelitis and Pyelonephritis	—	—	—	3	—	—	3	1	—	6	1	—	—
641	Other infections of genito-urinary tract during pregnancy	2	—	—	—	—	—	—	—	—	2	—	—	—
642	Toxaemia of pregnancy	46	38	20	50	31	11	43	34	21	139	103	52	50·5
643	Placenta praevia	—	3	1	—	—	—	—	2	1	—	5	2	40·0
644	Other haemorrhage of pregnancy	2	5	2	4	3	—	6	1	—	12	9	2	22·2
646	Anaemia of pregnancy	1	3	3	—	1	1	2	1	1	3	5	5	100·0
648	Other complications arising from pregnancy	19	11	2	26	21	—	23	14	—	68	46	2	4·3
645	Ectopic pregnancy	12	7	—	22	20	—	16	15	—	50	42	—	—
650	Abortion without mention of sepsis or toxaemia	18	19	9	28	25	19	14	20	14	60	64	42	65·6
651	Abortion with sepsis	32	25	16	28	26	16	32	23	12	92	74	44	59·5
652	Abortion with toxaemia without mention of sepsis	4	—	—	1	—	—	3	1	—	8	1	—	—
660	Delivery without complication	7	—	—	4	—	—	6	—	—	17	—	—	—
670	Delivery complicated by placenta praevia or A.P.H.	18	9	4	19	10	6	11	17	7	48	36	17	47·2
671	Delivery complicated by retained placenta	8	4	3	3	2	2	6	5	2	17	11	7	63·6
672	Delivery complicated by other postpartum haemorrhage	15	10	4	17	14	6	15	10	7	47	34	17	50·0
673	Delivery complicated by abnormality of bony pelvis	—	1	—	2	—	—	—	—	—	2	1	—	—
674	Delivery complicated by disproportion or malposition of the foetus	8	10	4	8	10	4	3	9	5	19	29	13	44·8
675	Delivery complicated by prolonged labour of other origin	7	3	—	10	2	—	6	1	1	23	6	1	16·7
677	Delivery with other trauma	12	17	11	8	16	8	7	10	7	27	43	26	60·5
678	Delivery with other complications of childbirth	20	21	2	15	21	6	11	12	2	46	54	10	18·5
681	Sepsis of childbirth and the puerperium	4	4	—	9	8	2	5	2	—	18	14	2	14·3
682	Peurperal phlebitis and thrombosis	23	—	—	25	2	—	15	—	—	63	2	—	—
684	Puerperal pulmonary embolism	1	32	9	9	36	6	5	23	4	15	91	19	20·9
685	Puerperal eclampsia	8	1	—	3	—	—	2	2	—	13	3	—	—
686	Other forms of puerperal toxaemia	1	—	—	—	—	—	1	—	—	2	—	—	—
687	Cerebral haemorrhage in the puerperium	5	2	—	2	6	1	4	4	—	11	12	1	8·3
688	Other and unspecified complications of the puerperium	—	2	—	2	1	—	4	2	—	6	5	—	—
689	Mastitis and other disorders of lactation	1	1	—	1	—	—	—	—	—	2	1	—	—
	Maternal deaths omitting those due to ectopic pregnancy and abortion	208	177	65	220	184	53	178	150	58	606	511	176	34·4
	Maternal deaths due to ectopic pregnancy and abortion	66	51	25	79	71	35	65	59	26	210	181	86	47·5
	Total maternal deaths	274	228	90	299	255	88	243	209	84	816	692	262	37·9

Table 1(b) Deaths due to Pregnancy and Childbirth 1952–54.

International List No.	Cause of Death	1952			1953			1954			1952–54			
		R.G.*	Enquiry Series		R.G.*	Enquiry Series		R.G.*	Enquiry Series		R.G.*	Enquiry Series		
			Total	With Avoidable Factors		Total	With Avoidable Factors		Total	With Avoidable Factors		Total	With Avoidable Factors	
													Number	Percentage
640	Pyelitis and pyelonephritis of pregnancy	3	—	—	3	4	4	2	1	—	8	5	4	80·0
641	Other infections of genito-urinary tract during pregnancy	3	—	—	—	—	—	—	1	—	3	1	—	—
642	Toxaemia of pregnancy	107	64	39	132	72	37	90	45	19	329	181	95	52·5
643	Placenta praevia	1	2	2	—	2	—	2	2	2	3	6	4	66·7
644	Other haemorrhage of pregnancy	4	5	2	6	8	5	1	1	—	11	14	7	50·0
646	Anaemia of pregnancy	4	2	1	4	3	3	3	5	1	11	10	5	50·0
647	Pregnancy with malposition of foetus in uterus	—	1	1	—	—	—	—	—	—	—	1	1	100·0
648	Other complications arising from pregnancy	13	4	4	6	7	2	18	8	1	37	19	7	36·8
645	Ectopic pregnancy	19	14	—	35	29	1	24	16	3	78	59	4	6·8
650	Abortion without mention of sepsis or toxaemia	31	17	9	30	23	18	33	19	18	94	59	45	76·3
651	Abortion with sepsis	47	34	23	39	30	24	32	27	22	118	91	69	75·8
652	Abortion with toxaemia without mention of sepsis	12	2	1	7	—	—	11	1	—	30	3	1	33·3
660	Delivery without complication	5	2	—	3	—	—	5	1	—	13	3	—	—
670	Delivery complicated by Placenta praevia or A.P.H.	14	22	10	33	37	16	29	28	14	76	87	40	46·0
671	Delivery complicated by retained placenta	15	18	16	27	17	14	19	18	16	61	53	46	86·8
672	Delivery complicated by other post-partum haemorrhage	24	27	20	24	25	10	25	22	9	73	74	39	52·7
673	Delivery complicated by abnormality of bony pelvis	4	2	—	3	3	1	2	—	—	9	5	1	20·0

* Omitting deaths which occurred 12 months or more after the pregnancy or delivery.

Table 1(b) Deaths due to Pregnancy and Childbirth 1952–54—continued.

International List No.	Cause of Death	1952			1953			1954			1952–54			
		R.G.*	Enquiry Series		R.G.*	Enquiry Series		R.G.*	Enquiry Series		R.G.*	Enquiry Series		
			Total	With Avoidable Factors		Total	With Avoidable Factors		Total	With Avoidable Factors		Total	With Avoidable Factors	
													Number	Percentage
674	Delivery complicated by disproportion or malposition of foetus	8	7	1	6	8	5	9	7	2	23	22	8	36·4
675	Delivery complicated by prolonged labour of other origin	20	14	4	22	14	7	21	14	2	63	42	13	31·0
676	Delivery with laceration of perineum, without mention of other laceration	—	—	—	—	—	—	—	—	—	—	—	—	—
677	Delivery with other trauma	17	21	12	13	15	10	15	19	8	45	55	30	54·5
678	Delivery with other complications of childbirth	26	21	8	21	26	8	26	19	4	73	66	20	30·3
680	Puerperal urinary infection without other sepsis	—	1	—	—	—	—	—	—	—	—	1	—	—
681	Sepsis of childbirth and the puerperium	4	11	2	14	13	3	11	18	6	29	42	11	26·2
682	Puerperal phlebitis and thrombosis	27	—	—	27	—	—	38	—	—	92	—	—	—
683	Pyrexia of unknown origin during the puerperium	—	—	—	1	—	—	—	—	—	1	—	—	—
684	Puerperal pulmonary embolism	24	42	4	22	49	2	13	47	3	59	138	9	6·5
685	Puerperal eclampsia	12	12	7	7	1	—	10	3	1	29	16	8	50·0
686	Other forms of puerperal toxaemia	3	2	1	4	—	—	4	1	—	11	3	1	33·3
687	Cerebral haemorrhage in the puerperium	8	6	1	4	2	—	—	—	—	12	8	1	12·5
688	Other and unspecified complications of the puerperium	2	12	1	2	9	1	1	4	—	5	25	2	8·0
689	Mastitis and other disorders of lactation	5	3	1	—	1	—	2	1	—	7	5	1	20·0
		462	368	170	495	398	171	446	328	131	1,403	1,094	472	43·1

*Omitting deaths which occurred 12 months or more after the pregnancy or delivery.

Table 1(c). Deaths Due to Pregnancy and Childbirth 1955—57

International List No.	Cause of Death	1955			1956			1957			1955–1957			
		R.G.	Enquiry Series		R.G.	Enquiry Series		R.G.	Enquiry Series		R.G.	Enquiry Series		
			Total	Avoidable		Total	Avoidable		Total	Avoidable		Total	Avoidable Number	Avoidable Percentage
640	Pyelitis and pyelonephritis	2	3	2	5	3	1	—	—	—	7	6	3	50·0
641	Other infections of genito-urinary tract during pregnancy	2	—	—	—	—	—	2	—	—	4	—	—	0·0
642	Toxaemia of pregnancy	82	55	29	82	61	34	72	51	27	236	167	90	53·9
643	Placenta praevia	1	5	3	—	3	2	—	6	1	1	14	6	42·9
644	Other haemorrhage of pregnancy	2	2	—	10	12	9	7	9	5	19	23	14	60·9
646	Anaemia of pregnancy	3	4	3	3	2	2	3	3	3	9	9	8	88·9
647	Pregnancy with malposition of foetus in uterus	—	1	—	—	—	—	—	—	—	—	1	—	0·0
648	Other complications arising from pregnancy	23	6	—	23	4	—	9	2	1	55	12	1	8·3
645	Ectopic pregnancy	20	15	1	21	17	—	21	10	—	62	42	1	2·4
650	Abortion without mention of sepsis or toxaemia	27	17	13	24	23	13	24	15	14	75	55	40	72·7
651	Abortion with sepsis	36	28	21	40	28	19	33	26	18	109	82	58	70·7
652	Abortion with toxaemia without mention of sepsis	3	2	1	8	1	—	4	1	—	15	4	1	25·0
660	Delivery without complication	1	1	—	1	1	—	7	—	—	9	2	—	0·0
670	Delivery complicated by placenta praevia or A.P.H.	21	13	7	23	11	4	20	7	4	64	31	15	48·4
671	Delivery complicated by retained placenta	16	11	6	10	5	3	5	8	5	31	24	14	58·3
672	Delivery complicated by other postpartum haemorrhage	25	26	13	14	10	6	17	13	4	56	49	23	46·9
673	Delivery complicated by abnormality of bony pelvis	3	—	—	1	1	—	1	2	1	5	3	1	33·3
674	Delivery complicated by disproportion or malposition of the foetus	10	7	5	15	13	5	10	10	6	35	30	16	53·3
675	Delivery complicated by prolonged labour of other origin	18	8	4	18	5	—	16	3	1	52	16	5	31·3
676	Delivery with laceration of perineum, without mention of other laceration	—	—	—	—	—	—	—	—	—	—	—	—	0·0
677	Delivery with other trauma	12	14	5	10	12	4	14	14	11	36	40	20	50·0
678	Delivery with other complications of childbirth	11	18	2	5	12	4	9	12	3	25	42	9	21·4
680	Puerperal urinary infection without other sepsis	—	—	—	—	1	—	—	—	—	—	1	—	0·0
681	Sepsis of childbirth and the puerperium	13	18	3	8	14	3	16	14	6	37	46	12	26·1
682	Puerperal phlebitis and thrombosis	32	—	—	27	—	—	24	—	—	83	—	—	0·0
683	Pyrexia of unknown origin during the puerperium	—	—	—	—	—	—	—	—	—	—	—	—	0·0
684	Puerperal pulmonary embolism	23	57	5	5	56	6	8	34	3	36	147	14	9·5
685	Puerperal eclampsia	8	3	—	8	—	—	5	1	—	21	4	—	0·0
686	Other forms of puerperal toxaemia	1	—	—	3	—	—	—	—	—	4	—	—	0·0
687	Cerebral haemorrhage in the puerperium	6	3	—	5	—	—	4	3	1	15	6	1	16·7
688	Other and unspecified complications of the puerperium	3	2	—	1	2	—	2	1	1	6	5	1	20·0
689	Mastitis and other disorders of lactation	1	—	—	4	—	—	—	—	—	5	—	—	0·0
	Maternal deaths omitting those due to ectopic pregnancy and abortion	319	257	87	281	228	83	251	193	83	851	678	253	37·3
	Maternal deaths due to ectopic pregnancy and abortion	86	62	36	93	69	32	82	52	32	261	183	100	54·6
	Total Maternal Deaths	405	319	123	374	297	115	333	245	115	1,112	861	353	41·0

Table 1(d). Deaths due to Pregnancy and Childbirth 1958–60.

International List No.	Cause of Death	1958			1959			1960			1958–1960			
		R.G.	Enquiry Series		R.G.	Enquiry Series		R.G.	Enquiry Series		R.G.	Enquiry Series		
			Total	Avoidable		Total	Avoidable		Total	Avoidable		Total	Avoidable Number	Avoidable Percentage
640	Pyelitis and pyelonephritis	4	1	—	2	—	—	1	1	—	7	2	—	0·0
641	Other infections of genito-urinary tract during pregnancy	—	—	—	1	—	—	—	—	—	1	—	—	0·0
642	Toxaemia of pregnancy	58	38	21	50	32	21	60	38	23	168	108	65	60·2
643	Placenta praevia	—	6	5	—	3	2	—	8	7	—	17	14	82·4
644	Other haemorrhage of pregnancy	9	10	2	3	15	10	1	5	2	13	30	14	46·7
646	Anaemia of pregnancy	2	1	1	1	1	1	2	2	—	5	4	2	50·0
647	Pregnancy with malposition of foetus in uterus	—	1	1	—	—	—	—	—	—	—	1	1	100·0
648	Other complications arising from pregnancy	19	9	1	27	17	1	18	9	1	64	35	3	8·6
645	Ectopic pregnancy	13	7	—	12	10	—	17	11	—	42	28	—	0·0
650	Abortion without mention of sepsis or toxaemia	25	21	16	16	16	11	23	19	12	64	56	39	69·6
651	Abortion with sepsis	35	31	18	29	19	14	33	27	18	97	77	50	64·9
652	Abortion with toxaemia without mention of sepsis	3	1	—	2	—	—	6	1	1	11	2	1	50·0
660	Delivery without complication	6	2	—	4	—	—	3	—	—	13	2	—	0·0
670	Delivery complicated by placenta praevia or A.P.H.	16	5	3	18	7	2	24	10	5	58	22	10	45·5
671	Delivery complicated by retained placenta	8	10	5	3	2	2	7	3	1	18	15	8	53·3
672	Delivery complicated by other postpartum haemorrhage	25	22	11	20	15	5	12	18	9	57	55	25	45·5
673	Delivery complicated by abnormality of bony pelvis	—	—	—	1	1	—	2	—	—	3	1	—	0·0
674	Delivery complicated by disproportion or malposition of the foetus	11	8	5	7	12	5	10	10	3	28	30	13	43·3
675	Delivery complicated by prolonged labour of other origin	10	4	2	10	7	1	14	7	—	34	18	3	16·7
676	Delivery with laceration of perineum, without mention of other laceration	—	—	—	—	1	—	—	—	—	—	1	—	0·0
677	Delivery with other trauma	10	17	11	7	15	8	16	13	5	33	45	24	53·3
678	Delivery with other complications of childbirth	10	15	4	19	14	1	20	15	2	49	44	7	15·9
680	Puerperal urinary infection without other sepsis	—	1	—	—	1	1	1	—	—	1	2	1	50·0
681	Sepsis of childbirth and the puerperium	9	8	3	14	11	3	7	7	3	30	24	9	37·5
682	Puerperal phlebitis and thrombosis	23	2	—	19	—	—	19	—	—	61	2	—	0·0
683	Pyrexia of unknown origin during the puerperium	—	—	—	—	—	—	—	—	—	—	—	—	0·0
684	Puerperal pulmonary embolism	17	33	5	11	35	9	8	33	6	36	101	20	19·8
685	Puerperal eclampsia	6	5	1	6	3	1	2	2	1	14	10	3	30·0
686	Other forms of puerperal toxaemia	2	—	—	1	—	—	1	—	—	4	—	—	0·0
687	Cerebral haemorrhage in the puerperium	5	2	1	3	2	1	2	4	1	10	8	3	37·5
688	Other and unspecified complications of the puerperium	2	1	—	4	—	—	1	1	—	7	2	—	0·0
689	Mastitis and other disorders of lactation	—	—	—	—	—	—	—	—	—	—	—	—	0·0
	Maternal deaths omitting those due to ectopic pregnancy and abortion	252	201	82	231	191	74	231	187	69	714	579	225	38·9
	Maternal deaths due to ectopic pregnancy and abortion	76	60	34	59	45	25	79	58	31	214	163	90	55·2
	Total Maternal Deaths	328	261	116	290	236	99	310	245	100	928	742	315	42·5

Table 2(a). Deaths not classed to Pregnancy or Childbirth but associated therewith 1961–63.

Cause of Death	1961			1962			1963			1961—63			
	R.G.	Enquiry Series		R.G.	Enquiry Series		R.G.	Enquiry Series		R.G.	Enquiry Series		
		Total	Avoidable		Total	Avoidable		Total	Avoidable		Total	Avoidable	
												Number	Percentage
I. *Infective and parasitic diseases* ... ... Total	2	5	—	3	4	—	2	7	1	7	16	1	6·3
010 Tuberculosis of meninges and central nervous system	—	—	—	—	1	—	—	—	—	—	1	—	—
092 Infectious hepatitis	—	4	—	—	1	—	—	2	1	—	7	1	—
Other	—	1	—	2	2	—	—	5	—	—	8	—	—
II. *Neoplasms* ... ... Total	5	6	—	11	9	1	12	12	1	28	27	2	7·4
Malignant ...													
170 Breast	—	—	—	—	1	—	—	4	—	—	5	—	—
171 Cervix uteri	—	—	—	—	—	—	—	1	1	—	1	1	—
173 Other parts of uterus including Chorionepithelioma	—	—	—	—	—	—	—	1	—	—	1	—	—
175 Ovary, Fallopian tube and broad ligament	—	1	—	—	—	—	—	—	—	—	1	—	—
Other	—	5	—	—	5	—	—	4	—	—	14	—	—
Benign													
216 Ovary	—	—	—	—	1	—	—	—	—	—	1	—	—
224 Endocrine Glands	—	—	—	—	2	1	—	2	—	—	4	1	—
III. *Allergic, Endocrine system, metabolic and Nutritional diseases* ... Total	1	6	—	6	6	2	2	6	—	9	18	2	11·1
241 Asthma	—	3	—	—	1	—	—	4	—	—	8	—	—
260 Diabetes mellitus	—	3	—	—	5	2	—	2	—	—	10	2	—
IV. *Diseases of the blood and blood forming organs*	2	1	—	4	5	—	1	2	—	7	8	—	—
V. *Mental, psychoneurotic and personality disorders*	—	—	—	—	—	—	—	1	—	—	1	—	—
VI. *Diseases of the nervous and sense organs* ... ... Total	5	6	1	4	14	—	4	9	—	13	29	1	3·4
330 Subarachnoid haemorrhage	—	3	—	—	6	—	—	1	—	—	10	—	—
331 Cerebral haemorrhage	—	2	1	—	3	—	—	4	—	—	9	1	—
332 Cerebral embolism and thrombosis	—	—	—	—	1	—	—	—	—	—	1	—	—
353 Epilepsy	—	1	—	—	3	—	—	1	—	—	5	—	—
Other	—	—	—	—	1	—	—	3	—	—	4	—	—

Table 2(a). Deaths not classed to Pregnancy or Childbirth but associated therewith 1961–63—continued.

	Cause of Death	1961			1962			1963			1961—63			
		R.G.	Enquiry Series		R.G.	Enquiry Series		R.G.	Enquiry Series		R.G.	Enquiry Series		
			Total	Avoidable		Total	Avoidable		Total	Avoidable		Total	Avoidable Number	Avoidable Percentage
VII.	*Diseases of the Circulatory System* ... ... Total	24	27	7	22	24	6	25	26	8	71	77	21	27·3
	410–415 Chronic rheumatic heart disease	19	21	3	16	16	5	17	14	4	52	51	12	—
	420–434 Arterio-sclerotic degenerative and other diseases of the heart	4	3	2	4	4	1	6	9	3	14	16	6	—
	440–445 Hypertensive heart disease and other hypertensive disease ...	1	2	2	—	2	—	—	2	1	1	6	3	—
	456 Other disease of arteries	} —	1	—	} 2	1	—	} 2	—	—	} 4	2	—	—
	465 Pulmonary embolism and infarction		—	—		1	—		1	—		2	—	—
VIII.	*Diseases of the Respiratory system* ... ... Total	16	14	1	8	7	2	5	4	1	29	25	4	16·0
	480 Influenza with pneumonia	—	6	—	—	2	—	—	—	—	—	8	—	—
	490–493 Pneumonia	—	6	1	—	2	1	—	3	—	—	11	2	—
	500–502 Bronchitis	—	—	—	—	1	—	—	1	1	—	2	1	—
	Other	—	2	—	—	2	1	—	—	—	—	4	1	—
IX.	*Diseases of the Digestive system* ... ... Total	6	5	—	4	8	—	6	7	1	16	20	1	5·0
	550 Acute appendicitis	—	2	—	—	3	—	—	2	1	—	7	1	—
	570 Intestinal obstruction without mention of hernia	—	2	—	—	3	—	—	2	—	—	7	—	—
	Other	—	1	—	—	2	—	—	3	—	—	6	—	—
X.	*Diseases of the Genito-Urinary system* ... ... Total	—	2	—	6	3	—	—	2	—	6	7	—	—
	592 Chronic nephritis	—	—	—	—	2	—	—	—	—	—	2	—	—
	600 Infections of kidney	—	1	—	—	1	—	—	2	—	—	4	—	—
	603 Other diseases of kidney and ureter	—	1	—	—	—	—	—	—	—	—	1	—	—
XIII.	*Diseases of the Bone and Organs of Movement*	1	—	—	—	—	—	—	—	—	1	—	—	—
XIV.	*Congenital Malformation* ... ... Total	1	2	1	6	8	—	4	4	1	11	14	2	14·3
	754 Congenital malformations of circulatory system	—	2	1	—	7	—	—	4	1	—	13	2	—
	757 Congenital malformations of genito-urinary system	—	—	—	—	1	—	—	—	—	—	1	—	—
XVI.	*Symptoms, Senility and Ill-defined conditions*	—	—	—	—	—	—	—	1	—	—	1	—	—
XVII.	*Accidents, Poisoning and Violence*	8	1	—	3	—	—	6	—	—	17	1	—	—
	Total	71	75	10	77	88	11	67	81	13	215	244	34	13·9

Table 2(b). Deaths not classed to Pregnancy or Childbirth but associated therewith 1952–54.

Cause of Death	1952			1953			1954			1952–54			
	R.G.	Enquiry Series		R.G.	Enquiry Series		R.G.	Enquiry Series		R.G.	Enquiry Series		
		Total	With Avoidable Factors		Total	With Avoidable Factors		Total	With Avoidable Factors		Total	With Avoidable Factors	
												Number	Percentage
I. *Infective and Parasitic Diseases*													
A. Tuberculosis	6	6	2	8	5	2	1	1	—	15	12	4	33·3
B. Septicaemia (non-puerperal)	1	1	—	—	3	—	—	—	—	1	4	—	
C. Acute poliomyelitis	5	1	—	1	1	—	—	1	—	6	3	—	
D. Infectious hepatitis	2	6	—	1	4	—	2	4	—	5	14	—	
E. Other	3	—	—	1	—	—	—	1	—	4	1	—	
II. *Neoplasms*	14	4	—	15	7	—	10	7	—	39	18	—	
III. *Allergic and Metabolic Diseases*	7	2	—	7	8	1	7	3	—	21	13	1	7·7
IV. *Diseases of Blood and Blood-forming Organs*	2	—	—	2	—	—	7	3	—	11	3	—	
V. *Mental, Pyscho-neurotic and Personality disorders*	—	—	—	1	—	—	1	1	—	2	1	—	
VI. *Diseases of Nervous System*	8	9	1	7	12	—	6	8	—	21	29	1	3·4
VII. *Diseases of Circulatory System*													
A. Mitral Valve	41	26	9	19	31	14	30	26	5	90	83	28	33·7
B. Other cardiac disease	20	17	6	21	9	3	20	12	3	61	38	12	31·6
C. Hypertensive disease	4	8	1	2	—	—	3	5	1	9	13	2	15·4
D. Other circulatory disease	—	—	—	3	3	—	—	3	—	3	6	—	
VIII. *Diseases of Respiratory System*	18	5	—	12	8	1	10	6	1	40	19	2	10·5
IX. *Diseases of Digestive System*													
A. Ulcer of Duodenum	1	—	—	—	1	—	—	—	—	1	1	—	
B. Acute appendicitis	3	1	—	5	3	—	2	1	—	10	5	—	
C. Hernia of abdominal cavity without mention of obstruction	1	1	—	—	1	—	1	—	—	2	2	—	
D. Intestinal obstruction without mention of hernia	3	4	—	—	1	—	3	4	—	6	9	—	
E. Chronic enteritis and ulcerative colitis	1	—	—	1	—	—	2	2	—	4	2	—	
F. Other diseases of intestines and peritoneum	3	1	—	2	—	—	1	—	—	6	1	—	
G. Acute and subacute yellow atrophy of liver	—	1	—	—	—	—	—	—	—	—	1	—	
H. Cirrhosis of liver	—	1	—	—	—	—	1	—	—	1	1	—	
X. *Diseases of Genito-urinary System*	8	5	1	8	3	1	7	6	—	23	14	2	14·3
XIII. *Diseases of Bones and Organs of movement*	2	1	—	—	1	—	1	1	—	3	3	—	
XIV. *Congenital Malformations*	3	7	—	7	2	—	3	5	—	13	14	—	
XVI. *Symptoms, senility, and ill-defined conditions*	—	—	—	—	3	—	—	1	—	—	4	—	
XVII. *Accidents, poisoning and violence*	4	1	1	5	—	—	3	1	—	12	2	1	50·0
	160	108	21	128	106	22	121	102	10	409	316	53	16·8

Table 2(c). Deaths not classed to Pregnancy or Childbirth but associated therewith 1955–57.

Causes of Death	1955			1956			1957			1955–1957			
	R.G.	Enquiry Series		R.G.	Enquiry Series		R.G.	Enquiry Series		R.G.	Enquiry Series		
		Total	Avoidable		Total	Avoidable		Total	Avoidable		Total	Avoidable Number	Avoidable Percentage
I. Ineffective and Parasitic Diseases	12	10	1	9	5	1	7	7	—	28	22	2	9·1
Tuberculosis	6	3	1	6	3	1	3	2	—	15	8	2	25·0
Cardio-vascular syphilis	—	—	—	—	—	—	1	—	—	1	—	—	0·0
Septicaemia and pyaemia	—	—	—	—	—	—	—	1	—	—	1	—	0·0
Meningococcal infections	1	2	—	1	—	—	—	—	—	2	2	—	0·0
Tetanus	—	—	—	—	1	—	—	—	—	—	1	—	0·0
Acute poliomyelitis	2	2	—	1	—	—	1	3	—	4	5	—	0·0
Acute infectious encephalitis	—	1	—	—	—	—	—	—	—	—	1	—	0·0
Infectious hepatitis	3	2	—	1	1	—	2	1	—	6	4	—	0·0
II. Neoplasms	6	7	—	15	12	1	11	13	1	32	32	2	6·3
III. Allergic Endocrine System and Metabolic Diseases	7	3	1	5	2	—	5	1	—	17	6	1	16·7
IV. Diseases of the Blood and Blood-forming Organs	2	2	1	1	2	—	3	2	—	6	6	1	16·7
VI. Diseases of the Nervous System	10	12	—	7	9	—	5	8	—	22	29	—	0·0
VII. Diseases of the Circulatory System	33	35	9	50	54	22	45	43	12	128	132	43	32·6
Rheumatic fever	3	2	1	1	2	—	1	1	—	5	5	1	20·0
Diseases of mitral valve	20	20	5	34	37	19	25	22	9	79	79	33	41·8
Other diseases of heart	4	5	2	7	5	2	13	8	2	24	18	6	33·3
Hypertensive disease	1	3	1	1	3	1	1	5	1	3	11	3	27·3
Other circulatory disease	5	5	—	7	7	—	5	7	—	17	19	—	0·0
VIII. Diseases of the Respiratory System	15	14	1	14	15	3	32	28	1	61	57	5	8·9

Table 2(c). Deaths not classed to Pregnancy or Childbirth but associated therewith 1955–57—continued.

Causes of Death	1955			1956			1957			1955–1957			
	R.G.	Enquiry Series		R.G.	Enquiry Series		R.G.	Enquiry Series		R.G.	Enquiry Series		
		Total	Avoidable		Total	Avoidable		Total	Avoidable		Total	Avoidable Number	Avoidable Percentage
Influenza	2	2	—	—	1	—	18	21	—	20	24	—	0·0
Pneumonia	7	7	1	8	6	—	9	5	1	24	18	2	11·1
Bronchitis	4	1	—	4	3	2	2	1	—	10	5	2	40·0
Other diseases of respiratory system	2	4	—	2	5	1	3	1	—	7	10	1	10·0
IX. Diseases of the Digestive System	8	14	—	10	9	—	5	4	—	23	27	—	0·0
Diseases of oesophagus	—	—	—	2	2	—	—	—	—	2	2	—	0·0
Ulcer of stomach	1	1	—	—	—	—	1	—	—	2	1	—	0·0
Acute appendicitis	2	3	—	1	1	—	—	1	—	3	5	—	0·0
Hernia of abdominal cavity	—	—	—	1	—	—	2	1	—	3	1	—	0·0
Other diseases of intestines and peritoneum	5	8	—	3	4	—	1	1	—	9	13	—	0·0
Diseases of liver and pancreas	—	2	—	3	2	—	1	1	—	4	5	—	0·0
X. Diseases of Genito-Urinary System	11	4	—	3	3	—	5	1	—	19	8	—	0·0
XII. Diseases of the Skin and Cellular Tissue	1	—	—	1	1	—	1	1	—	3	2	—	0·0
XIII. Diseases of the Bones and Organs of Movement	—	—	—	2	2	—	—	—	—	2	2	—	0·0
XIV. Congenital Malformation	6	7	1	1	2	—	1	1	—	8	10	1	10·0
XVI. Symptoms and Ill-defined Conditions	—	1	—	—	2	—	—	—	—	—	3	—	0·0
XVII. Accidents, Poisoning and Violence	4	1	—	7	—	—	8	2	2	19	3	2	66·6
Accidental falls	—	1	—	—	—	—	—	—	—	—	1	—	0·0
Therapeutic misadventure	—	—	—	—	—	—	—	2	2	—	2	2	100·0
Total	115	110	14	125	118	27	128	111	16	368	339	57	16·8

Table 2(d). Deaths not classed to Pregnancy or Childbirth but associated therewith 1958–60.

Cause of Death	1958			1959			1960			1958–1960			
	R.G.	Enquiry Series		R.G.*	Enquiry Series		R.G.*	Enquiry Series		R.G.*	Enquiry Series		
		Total	Avoidable		Total	Avoidable		Total	Avoidable		Total	Avoidable No.	Avoidable Percentage
I. Infective and Parasitic Diseases	8	9	—	4	12	2	2	2	—	14	23	2	8·7
Tuberculosis	1	—	—	—	5	1	—	—	—	—	5	1	20·0
Amoebiasis	—	—	—	—	1	—	—	—	—	—	1	—	0·0
Meningococcal Infection	—	1	—	—	—	—	—	—	—	—	1	—	0·0
Tetanus	—	—	—	—	1	—	—	—	—	—	1	—	0·0
Acute poliomyelitis and late effects	6	4	—	—	1	—	—	—	—	—	5	—	0·0
Chickenpox	—	—	—	—	—	—	—	1	—	—	1	—	0·0
Herpes Zoster	—	1	—	—	—	—	—	—	—	—	1	—	0·0
Infectious Hepatitis	—	2	—	—	4	1	—	1	—	—	7	1	14·3
Other infective and parasitic diseases	1	1	—	—	—	—	—	—	—	—	1	—	0·0
II. Neoplasms	15	12	—	9	9	1	16	8	—	40	29	1	3·4
III. Allergic, Endocrine System, Metabolic and Nutritional Diseases	5	2	1	3	3	1	2	2	1	10	7	3	42·9
IV. Diseases of Blood and Blood-forming organs	1	4	2	—	1	1	—	1	—	1	6	3	50·0
V. Mental, Psychoneurotic and Personality Disorders	—	—	—	—	—	—	1	—	—	1	—	—	0·0
VI. Diseases of Nervous System and sense organs	6	8	1	5	9	—	3	7	—	14	24	1	4·2
VII. Diseases of Circulatory System	38	33	10	25	29	9	25	16	6	88	78	25	32·1
Rheumatic Fever	1	—	—	} 15	1	—	} 15	—	—	} 57	1	—	0·0
Chronic Rheumatic Heart Disease	26	26	8		15	5		10	6		51	19	37·3
Other diseases of heart	5	4	—	3	7	1	6	3	—	14	14	1	7·1
Hypertensive heart disease	2	2	2	3	4	3	1	—	—	6	6	5	83·3
Other diseases of circulatory system	4	1	—	4	2	—	3	3	—	11	6	—	0·0

*The R.G.'s figures are not available in detail for 1959 and 1960; therefore only the total number of deaths in some disease groups are given.

Table 2(d). Deaths not classed to Pregnancy or Childbirth but associated therewith 1958–60—continued.

Cause of Death	1958			1959			1960			1958–1960			
	R.G.	Enquiry Series		R.G.*	Enquiry Series		R.G.*	Enquiry Series		R.G.*	Enquiry Series		
		Total	Avoidable		Total	Avoidable		Total	Avoidable		Total	Avoidable No.	Avoidable Percentage
VIII. Diseases of Respiratory System	7	8	2	17	18	1	6	9	2	30	35	5	14·3
Acute upper respiratory infection	—	—	—	—	1	—	—	—	—	—	1	—	0·0
Influenza	2	3	—	—	6	—	—	2	—	—	11	—	0·0
Pneumonia	4	5	2	—	6	1	—	4	1	—	15	4	26·7
Bronchitis	1	—	—	—	—	—	—	1	—	—	1	—	0·0
Other diseases of Respiratory System	—	—	—	—	5	—	—	2	1	—	7	1	14·3
IX. Diseases of digestive system	11	10	—	7	7	1	10	10	1	28	27	2	7·4
Diseases of buccal cavity and oesophagus	1	—	—	—	—	—	—	—	—	—	—	—	0·0
Diseases of stomach and duodenum	1	1	—	—	—	—	—	1	—	—	2	—	0·0
Appendicitis	3	2	—	—	1	—	—	1	—	—	4	—	0·0
Hernia of abdominal cavity	—	1	—	—	1	—	—	1	—	—	3	—	0·0
Other diseases of intestines and peritoneum	5	4	—	—	3	—	—	6	—	—	13	—	0·0
Diseases of liver, gallbladder and pancreas	1	2	—	—	2	1	—	1	1	—	5	2	40·0
X. Diseases of Genito-urinary System	1	1	—	3	2	1	—	2	—	4	5	1	20·0
XIII. Diseases of Bones and organs of Movement	2	3	—	1	—	—	3	3	—	6	6	—	0·0
XIV. Congenital Malformation	2	3	—	4	1	—	5	5	1	11	9	1	11·1
XVI. Symptoms and ill-defined conditions	—	—	—	—	1	—	—	1	—	—	2	—	0·0
XVII. Accidents, poisoning and violence	2	1	—	4	—	—	2	2	1	8	3	1	33·3
TOTAL	98	94	16	82	92	17	75	68	12	255	254	45	17·7

* The R.G.'s figures are not available in detail for 1959 and 1960; therefore only the total number of deaths in some disease groups are given.

Age and Parity of the Mother in the Series.

As in previous reports, this report has again shown that age and parity are important factors when considering the relative safety of women who are pregnant.

Table 3. Age of mother, 1961–63.

Age	Numbers		Percentage Distribution		Total registered Births
	"True" maternal	Associated	"True" maternal	Associated	
15 and under	3	1	0·4	0·4	0·1
16—19 ...	27	10	3·9	4·1	7·8
20—24 ...	134	49	19·4	20·1	31·0
25—29 ...	137	65	19·8	26·6	30·6
30—34 ...	161	48	23·3	19·7	18·4
35—39 ...	141	45	20·3	18·4	9·2
40—44 ...	83	24	12·0	9·8	2·7
45 + ...	6	2	0·9	0·8	0·2
Not stated	—	—	—	—	—
Total ...	692	244	100·0	99·9	100·0

Table 3 shows the age distribution of the mothers in the enquiry compared with the age distribution of all mothers in England and Wales for the same period. It shows, as in previous reports, that there is a higher proportion of fatalities among women over the age of 30 years. In the '15 years' age group numbers are too small to be of statistical significance but suggest that pregnancy in this age group may also be associated with a higher proportion of fatalities.

Table 4. Parity 1961–63.

Parity	Numbers		Percentage Distribution		Total registered legitimate births
	"True" maternal	Associated	"True" maternal	Associated	
1 ...	206	94	29·8	38·5	36·8
2 ...	116	35	16·8	14·3	30·7
3 ...	104	48	15·0	19·7	16·4
4 ...	73	23	10·5	9·4	7·9
5 ...	48	13	6·9	5·3	3·8
6 or more	100	24	14·5	9·8	4·4
Not stated	45	7	6·5	2·9	—
Total ...	692	244	100·0	99·9	100·0

Table 4 shows the parity distribution of mothers in the enquiry compared with the mothers of registered legitimate live births. It shows that the lowest proportion of fatalities occurred in the second pregnancy and the greater risk as parity increased.

Table 5. "True" Maternal Deaths: Age and Parity of the 647 women whose age and parity was known.

Age	1		2		3		4		5		6 or more	
	No.	Per cent.	No.	Per cent	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.
15 and under ...	3	0·5	—	—	—	—	—	—	—	—	—	—
16—19	17	2·6 (5·7)	3	0·5 (1·1)	—	(0·1)	—	— (0·0)	—	—	—	—
20—24	82	12·7 (17·0)	27	4·2 (10·1)	12	1·9 (3·3)	4	0·6 (0·9)	—	— (0·2)	—	—
25—29	43	6·6 (9·5)	38	5·9 (11·7)	23	3·6 (6·1)	15	2·3 (2·6)	4	0·6 (1·1)	6	0·9 (0·7)
30—34	34	5·3 (3·3)	29	4·5 (5·6)	28	4·3 (4·4)	15	2·3 (2·5)	14	2·2 (1·3)	31	4·8 (1·5)
35—39 ...	17	2·6 (1·1)	14	2·2 (1·9)	22	3·4 (2·0)	24	3·7 (1·5)	20	3·1 (0·9)	34	5·3 (1·4)
40—44	9	1·4 (0·2)	5	0·8 (0·3)	17	2·6 (0·5)	13	2·0 (0·4)	10	1·5 (0·3)	28	4·3 (0·7)
45+...	1	0·2 (0·0)	—	—	2	0·3 (0·0)	2	0·3 (0·0)	—	—	1	0·2 (0·1)

Table 5 gives a more detailed analysis of the age and parity of the mothers. It shows that the proportion of deaths among primigravidae is lower than the proportion of primigravidae who had legitimate live births where the mother is over 16 and under 30 years of age. Primigravidae over the age of 35, and women at any age having their sixth or more pregnancy are at higher risk.

The figures shown in brackets are the percentages in each age and parity group among all legitimate births in England and Wales.

Table 6. Death rates per 100,000 live births and stillbirths from maternal causes for England and Wales by hospital regions

Hospital Regions	Years				
	1952–54	1955–57	1958–60	1961–63	
				Rate	Number
Newcastle	75·8	62·7	40·8	28·3	49
Leeds	66·9	53·2	43·8	30·8	52
Sheffield	73·8	51·9	39·3	30·7	76
East Anglian	53·3	49·8	29·4	36·2	29
North West Metropolitan ..	68·7	49·3	38·5	36·1	85
North East Metropolitan ..	73·3	51·1	38·4	42·3	74
South East Metropolitan ..	69·0	42·0	39·2	30·9	53
South West Metropolitan ..					
(*a*) South West Metropolitan	76·9*	55·6*	43·8* 38·9†	28·5	46
(*b*) Wessex			52·0‡	23·3	22
Oxford	62·3	35·9	21·2	21·3	21
South Western	80·9	50·8	43·1	22·4	33
Birmingham	70·1	58·5	36·0	35·9	100
Manchester	80·9	62·8	44·4	34·6	84
Liverpool	53·2	62·4	37·2	30·1	41
Wales including Monmouthshire)	88·5	79·3	51·4	36·3	51
England and Wales	72·4	55·5	40·4	32·0	816

* South West Metropolitan Region as constituted prior to 1959.

† South West Metropolitan Region as constituted since 1959.

‡ Wessex Region as constituted since 1959.

Table 6 shows the death rates for 100,000 total births from causes directly due to pregnancy and childbirth by hospital region. The table was compiled by the Registrar General from the national returns, and the figures for the previous years for which reports have been published are included for comparison. The table shows the wide variation from region to region.

APPENDIX II:

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