

UNITED STATES DEPARTMENT OF LABOR
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CHILDREN'S BUREAU
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MATERNAL DEATHS

A BRIEF REPORT OF A STUDY
MADE IN 15 STATES

Bureau Publication No. 221

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MATERIALS DEPARTMENT
A REPORT ON A STUDY
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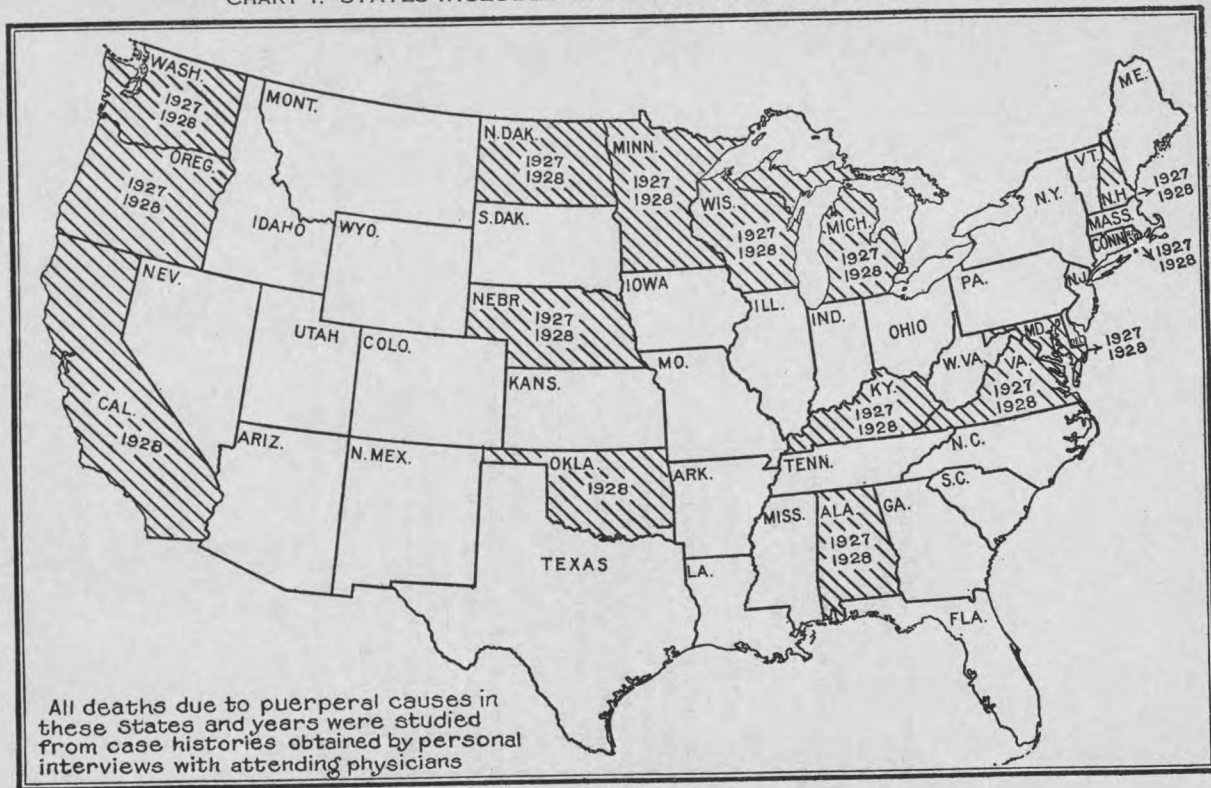
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CONTENTS

	Page
Scope and method of the study.....	1
General considerations.....	4
Comment by advisory committee.....	12
Maternal care.....	14
Comment by advisory committee.....	19
Operations.....	21
Comment by advisory committee.....	27
Cesarean section.....	29
Comment by advisory committee.....	31
Abortions.....	33
Comment by advisory committee.....	35
Puerperal septicemia.....	37
Comment by advisory committee.....	40
Puerperal phlegmasia alba dolens, embolus, sudden death.....	42
Comment by advisory committee.....	43
Toxemias of pregnancy.....	44
Comment by advisory committee.....	47
Puerperal hemorrhage.....	49
Comment by advisory committee.....	51
Other accidents of labor, including rupture of the uterus.....	53
Comment by advisory committee.....	54
Ectopic gestation.....	56
Comment by advisory committee.....	57
Recommendations by advisory committee.....	58
To the medical profession.....	58
To the general public.....	59
Standards of American College of Surgeons for hospitals taking obstetric patients.....	60

CHART 1.—STATES INCLUDED IN MATERNAL-MORTALITY STUDY.



MATERNAL DEATHS

SCOPE AND METHOD OF THE STUDY

The maternal mortality rate in this country is generally recognized as high, and it has shown comparatively slight changes over a period of years. Moreover, information hitherto available concerning maternal deaths consisted only of such limited data with regard to all deaths in a given area as are contained in death and birth certificates and more detailed studies of selected groups. The former were not sufficiently detailed nor the latter sufficiently general to give a picture of the conditions contributing to the 16,000 deaths assigned annually in the United States to causes that are associated with pregnancy and childbirth. At the 1926 conference of State directors in charge of the Maternity and Infancy Act, the chairman of the Children's Bureau obstetric advisory committee¹ presented a plan for a comprehensive study of maternal mortality. It was decided to undertake such a study only in States which were included in the birth-registration area and in which both the State board of health and the State medical society made formal request for it. The United States Children's Bureau undertook to prepare, with the assistance of its obstetric advisory committee, a schedule for use in all the States studied, and to report the findings.² In the preparation of the schedule standards of prenatal care previously set up by the obstetric advisory committee were considered,³ as were hospital standards and standards of obstetric care in hospitals approved by the American College of Surgeons.⁴

The material here presented is an abstract of the full report,⁵ with tables and careful analyses, of the resulting study made by the United States Children's Bureau of all the maternal deaths which occurred in 13 States in 1927 and in these same States and 2 others in 1928. The States in which the study was conducted for both years were Alabama, Kentucky, Maryland, Michigan, Minnesota, Nebraska, New Hampshire, North Dakota, Oregon, Rhode Island,

¹ The members of the obstetric advisory committee are: Dr. Robert L. DeNormandie, instructor in obstetrics, Harvard Medical School, chairman; Dr. Fred L. Adair, professor of obstetrics and gynecology, University of Chicago; Dr. Rudolph W. Holmes, professor of obstetrics, Northwestern University Medical School, Chicago; Dr. Frank W. Lynch, professor of obstetrics and gynecology, University of California Medical School; Dr. James R. McCord, professor of obstetrics and gynecology, Emory University School of Medicine, Atlanta; Dr. C. Jeff Miller, professor of gynecology, Tulane University of Louisiana School of Medicine, New Orleans; Dr. Otto H. Schwarz, professor of obstetrics and gynecology, Washington University School of Medicine, St. Louis; Dr. Alice N. Pickett, assistant professor of obstetrics, University of Louisville School of Medicine, Louisville.

² The study was made under the supervision of Dr. Blanche M. Haines, formerly director of the maternity and infant hygiene division of the Children's Bureau. The taking of the schedules in the different States was coordinated by Dr. Frances C. Rothert, of the Children's Bureau, who also analyzed the material and wrote the complete report, with the cooperation of members of the obstetric advisory committee.

³ Standards of Prenatal Care; an outline for the use of physicians. U.S. Children's Bureau Publication No. 153. Washington, 1925.

⁴ American College of Surgeons, Fourteenth Year Book, 1927, p. 71.

⁵ Maternal Mortality in Fifteen States. U.S. Children's Bureau Publication No. 223. Washington, 1933.

Virginia, Washington, and Wisconsin. California and Oklahoma were included in the 1928 study only. In Michigan, Wisconsin, Minnesota, North Dakota, California, and Oklahoma all or most of the schedules and in Alabama some of them were taken by physicians on the staffs of the State departments of health. In the remaining States the schedules were taken by physicians on the staff of the Children's Bureau.⁶

The States of the study are fairly well distributed geographically and fairly typical of the sections in which they are located. The composition of the population for the group of States conforms very closely to that of the entire United States according to the census of 1920.

In these 15 States, during the years of the study, the deaths of 7,537 women were assigned to puerperal causes by the United States Bureau of the Census in accordance with the International List of Causes of Death. This number of deaths was 26 percent of the 29,298 deaths from puerperal causes in the entire United States birth-registration area for these 2 years. In the States of the study 3,546 (47 percent) of the maternal deaths were urban and 3,991 (53 percent) rural; in the birth-registration area for these 2 years 54 percent were urban and 46 percent rural (rural including towns of less than 10,000). Eighteen percent of the deaths in this study and 19 percent of the maternal deaths in the birth-registration area were of colored women. Colored women, according to the definition used by the Census Bureau, include Negroes, Japanese, Indians, and Chinese.

As there were 1,176,603 live births in the States during the years of the study, these 7,537 deaths gave a maternal mortality rate of 64 per 10,000 live births; in the birth-registration area for 1927 and 1928 together the maternal mortality rate was 67. Conditions as regards maternal mortality were evidently better in the States studied. The four States admitted to the birth-registration area in 1928 all had higher rates than the area as a whole for that year; if they had been in the area in both years of the maternal-mortality study the rate for the area for the 2 years would probably have been higher.

The regions studied, then, are probably fairly representative of the United States as a whole, with some overemphasis on the Pacific Coast and North Central States, and some underemphasis on the Rocky Mountain regions, the far South, and the eastern industrial centers. Conditions as regards maternal mortality were apparently better in the regions studied—they were certainly not worse—than those obtaining in the United States as a whole.

The collection of data was begun in February 1927, and most of the schedules were completed before July 1, 1929. All the finished

⁶The following persons made the interviews in the different States: Alabama—Dr. Wade H. Garner, Dr. Charles M. Lacy, Dr. Robert A. Berry, Dr. William H. Abernathy, and Margaret Murphy, R. N.; Kentucky—Dr. Frances C. Rothert, Dr. Frances M. Hennessy, and Dr. Janice Rafuse; Maryland—Dr. Margaret Swigart; Michigan—Dr. Joseph H. Curhan, Dr. Dorothy L. Green, and Dr. Florence Knowlton; Minnesota—Dr. William H. Rumpf and Dr. Ruth G. Nystrom; Nebraska—Dr. Herman M. Jahr and Dr. MaBelle True; New Hampshire and Rhode Island—Dr. Hennessy; North Dakota—Dr. Maysil M. Williams, Dr. M. May Allen, and Dr. Iva Stevens Merritt; Oregon—Dr. Mildred McBride; Virginia—Dr. Swigart, Dr. Rothert, Dr. Hennessy, and Dr. Rafuse; Washington—Dr. Harold L. Kennedy, Dr. Harvey J. Felch, and Dr. Paul W. Spickard; Wisconsin—Dr. Charlotte J. Calvert; California—staff physicians of the State department of health under the supervision of Dr. Ellen S. Stadtmuller and Dr. Swigart; Oklahoma—Dr. True, Dr. David M. Cowgill, Dr. Margaret Dubois, and Dr. Louise Smith King.

schedules were sent to the Children's Bureau for statistical examination, and tabulations were made there. A very close contact between the interviewers and the Bureau was maintained in order to keep the interpretation of the schedules uniform.

The routine used was as follows: All certificates of deaths assigned to puerperal causes as reported to the State departments of health were copied. Birth certificates were matched when possible. The physicians or other persons signing the death certificates were then interviewed. The families were not visited, except where there were no physicians. The hospitals and clinics in which the patients had received care were visited, and the case records were studied with the consent of the attending physician. In some cases in which the interview was delayed the physician had forgotten many of the details of the case. Very few of the physicians kept case histories, and usually no laboratory work other than a urinalysis and a blood-pressure examination had been done. However, most of them remembered the cases vividly. The physicians interviewed cooperated most heartily, giving freely of their time and helping in every possible way.

GENERAL CONSIDERATIONS

CAUSE OF DEATH

Classification of deaths according to international list

The International List of Causes of Death (edition of 1920)⁷ was used as the general basis for the analysis of these deaths. The titles included in the group "the Puerperal State" are as follows:

143. Accidents of pregnancy. This includes (a) abortion, (b) ectopic gestation, and (c) others under this title. ("Abortion" will be referred to throughout this report as "abortion or premature labor." The word "abortion" as generally used in this report does not have the same meaning as it does in the international classification, but is defined as the termination of a uterine pregnancy before the period of viability, i.e., in the first two trimesters.)
144. Puerperal hemorrhage, which includes (a) placenta previa, (b) others under this title—postpartum hemorrhage, accidental hemorrhage, etc.
145. Other accidents of labor.
 - (a) Cesarean section.
 - (b) Other surgical operations and instrumental delivery.
 - (c) Others under this title.
146. Puerperal septicemia.
147. Puerperal phlegmasia alba dolens, embolus, sudden death.
148. Puerperal albuminuria and convulsions. This title also includes pyelitis, nephritis, tetanus, and uremia.
149. Following childbirth (not otherwise defined).
150. Puerperal diseases of the breast.

When more than one puerperal cause appears on a death certificate, the death is assigned to one of them in accordance with definite rules published in the Manual of Joint Causes of Death,⁸ which the Children's Bureau has followed literally in all cases. It is well to realize what the general rules of the classification are. If one of the more serious acute infectious diseases, such as typhoid fever, small-pox, diphtheria, or if cancer or syphilis, or if an external cause such as an accident or homicide, appears on a woman's death certificate with a puerperal cause, her death is assigned to that cause and not to the puerperal cause. (Influenza, however, takes precedence over no puerperal cause except "other accidents of pregnancy", "following childbirth (not otherwise defined)", and "puerperal diseases of the breast.") Puerperal septicemia takes precedence over all puerperal and nonpuerperal causes except the ones mentioned. Tuberculosis in most forms takes precedence over all puerperal causes except puerperal septicemia. Other serious chronic diseases, such as cardiac valvular disease and chronic nephritis, take precedence over all puerperal causes except the most severe complications of childbirth. The term "pregnancy" on a death certificate causes a death

⁷ Manual of the International List of Causes of Death, 1920. U.S. Bureau of the Census. Washington, 1924.

⁸ Manual of Joint Causes of Death Showing Assignment to the Preferred Title of the International List of Causes of Death When Two Causes Are Simultaneously Reported. U.S. Bureau of the Census. Washington, 1925.

to be classified as puerperal only when it appears alone or with a term denoting a mild disorder or with a cause implying a complication of pregnancy.

Comparison of causes originally assigned and those found through interviews

The 7,537 deaths classified by the United States Bureau of the Census as due to puerperal causes include not only those originally so certified by the physician but those added as a result of the answers to queries by the Bureau of the Census and by State bureaus of vital statistics. Of this total 7,380 were found, by means of the interviews in connection with the study, to have been actually puerperal in the meaning of the international classification, and 157 were found to have been nonpuerperal. The detailed tabulations and the analyses that are in the complete report are based on these 7,380 puerperal deaths.

TABLE 1.—Cause of death¹ as given on the death certificate and as shown by interview, and mortality rate among women whose deaths were assigned to puerperal causes

Cause of death ¹	Deaths from causes as given on death certificate			Deaths from causes as shown by interview		
	Number	Percent distribution	Rate per 10,000 live births	Number	Percent distribution	Rate per 10,000 live births
All causes.....	7,537			7,537		
Puerperal.....	7,537	100	64.1	7,380	100	62.7
Accidents of pregnancy.....	770	10	6.5	719	10	6.1
Abortion, premature labor.....	368	5	3.1	353	5	3.0
Ectopic gestation.....	264	4	2.2	248	3	2.1
Others.....	138	2	1.2	118	2	1.0
Puerperal hemorrhage.....	758	10	6.4	791	11	6.7
Other accidents of labor.....	812	11	6.9	652	9	5.5
Cesarean section.....	155	2	1.3	136	2	1.2
Other surgical operations and instrumental delivery.....	76	1	.6	109	1	.9
Others.....	581	8	4.9	407	6	3.5
Puerperal septicemia.....	2,827	38	24.0	2,948	40	25.1
Puerperal phlegmasia alba dolens, embolus, sudden death.....	337	4	2.9	344	5	2.9
Puerperal albuminuria and convulsions.....	2,006	27	17.0	1,900	26	16.1
Following childbirth (not otherwise defined).....	24	(²)	.2	23	(²)	.2
Puerperal diseases of the breast.....	3	(²)	(³)	3	(²)	(³)
Nonpuerperal.....				157		

¹ According to the Manual of the International List of Causes of Death, 1920.

² Less than 1 percent.

³ Less than one tenth per 10,000.

The causes of death of the cases excluded from this study because they were found to be nonpuerperal were: Chronic nephritis, 32; lobar pneumonia, 18; tuberculosis, 17; other infectious disease, 8; appendicitis, hernia, intestinal obstruction, 12; chronic cardiac valvular disease, 13; salpingitis and pelvic abscess, 21; other diseases of the female genital organs, 17; and all other diseases, 19. Sixty-eight of these 157 women had not been recently pregnant.

Changes in classification within the puerperal group

As a result of the interviews changes in classification were made in many of the 7,380 cases (table 1). Clerical errors had led to erroneous classification. Lack of knowledge of the International List of Causes of Death had led to the omission of statements which, if present, would have caused a different classification. Moreover, some of the 558 autopsies in the group of 7,380 deaths were performed after the death certificates had been signed.

Deaths will be spoken of throughout the report as having been "assigned" or "attributed" to the individual causes of death. The term "assigned" is used of the official classification by the Bureau of the Census, as in the first three columns of table 1; the term "attributed" is used as referring to the classification after interview, for purposes of this study, as in the last three columns of table 1.

The International List of Causes of Death was revised by the international commission late in 1929. The chief changes are: (1) Puerperal septicemia (no. 146) is divided into Abortions with septic conditions (no. 140), Ectopic gestation with septic conditions specified (no. 142a), and Puerperal septicemia not specified as due to abortion (no. 145); (2) Puerperal albuminuria and convulsions (no. 148) is divided into Puerperal albuminuria and eclampsia (no. 146) and Other toxemias of pregnancy (no. 147), which also includes chorea and pernicious vomiting of pregnancy from the old subtitle 143c; (3) the title numbers of 143a, b, and c are changed to 141, 142b, and 143, respectively; title 147 becomes 148, and 145 becomes 149, without change of name or content; (4) Following childbirth not otherwise defined (no. 149) and Puerperal diseases of the breast (no. 150) are combined into Other and unspecified conditions of the puerperal state (no. 150). Although analysis in this report was based largely on the 1920 list, which was in use at the time these deaths were classified, the subdivisions of the topics follow very closely the subdivisions in the 1929 list.

AUTOPSIES

Autopsies were known to have been performed in 571 of the 7,537 deaths certified as puerperal. They were performed in 130 (36 percent) of the 362 cases in which the coroner signed the death certificate and in 441 (6 percent) of the 7,046 cases in which a physician other than the coroner signed the death certificate. Thirteen of the autopsies were included in the 157 cases in which the death was certified as puerperal but was found at the interview with the attending physician to have been nonpuerperal. The remaining 558 constituted only 8 percent of the 7,380 cases found on interview to have been puerperal.

SIGNATURE ON DEATH CERTIFICATE

Death certificates were signed in 7,046 cases by physicians, in 362 cases by coroners, in 62 cases by others (a few by irregular practitioners not listed in the medical directory and some by husbands or parents), and 67 certificates were not signed. Of the 188 cases of women who had no medical attention, the death certificate was signed in 65 cases by physicians, in 47 cases by coroners, and in 76 cases it was signed by some other person or was unsigned.

RACE AND NATIVITY

Deaths of colored women made up 18 percent of those included in the study. *The maternal mortality rate of colored women in the years of the study was nearly twice that of the white women* (table 2). The maternal mortality rates were significantly higher among colored women for every main cause of death except puerperal phlegmasia

alba dolens, embolus, sudden death. For Cesarean section, other surgical operations and instrumental delivery, and "others" under the title "accidents of pregnancy" the differences were insignificant. The greatest difference was in the deaths from puerperal albuminuria and convulsions, which caused more than twice as many deaths per 10,000 live births among the colored women as among the white women.

TABLE 2.—Cause of death¹ as shown by interview, and mortality rate among white and colored women dying from puerperal causes

Cause of death ¹ as shown by interview	Women dying from puerperal causes						
	Total	White			Colored		
		Number	Percent distribution	Rate per 10,000 live births	Number	Percent distribution	Rate per 10,000 live births
All causes.....	7,380	6,072	100	57.5	1,308	100	108.5
Accidents of pregnancy.....	719	613	10	5.8	106	8	8.8
Abortion, premature labor.....	353	301	5	2.9	52	4	4.3
Ectopic gestation.....	248	210	3	2.0	38	3	3.2
Others.....	118	102	2	1.0	16	1	1.3
Puerperal hemorrhage.....	791	670	11	6.3	121	9	10.0
Other accidents of labor.....	652	525	9	5.0	127	10	10.5
Cesarean section.....	136	123	2	1.2	13	1	1.1
Other surgical operations and instrumental delivery.....	109	97	2	.9	12	1	1.0
Others.....	407	305	5	2.9	102	8	8.5
Puerperal septicemia.....	2,948	2,437	40	23.1	511	39	42.4
Puerperal phlegmasia alba dolens, embolus, sudden death.....	344	314	5	3.0	30	2	2.5
Puerperal albuminuria and convulsions.....	1,900	1,493	25	14.1	407	31	33.8
Following childbirth (not otherwise defined).....	23	17	(2)	.2	6	(2)	.5
Puerperal diseases of the breast.....	3	3	(2)	(3)	—	—	—

¹ According to the Manual of the International List of Causes of Death, 1920.

² Less than 1 percent.

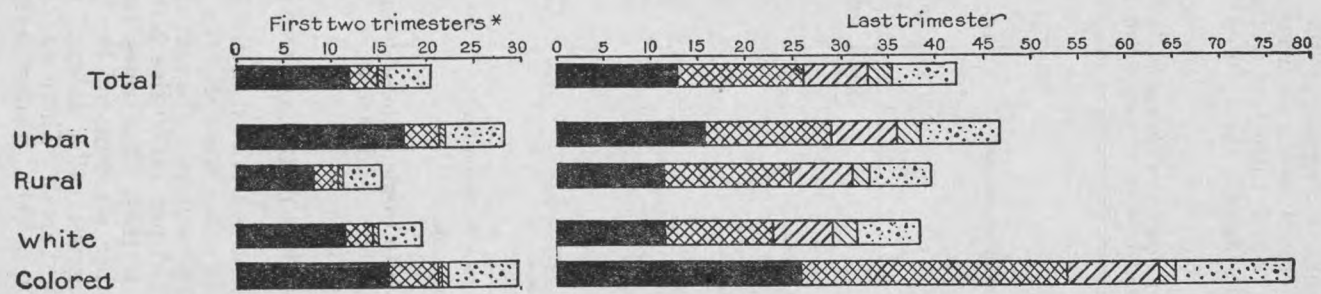
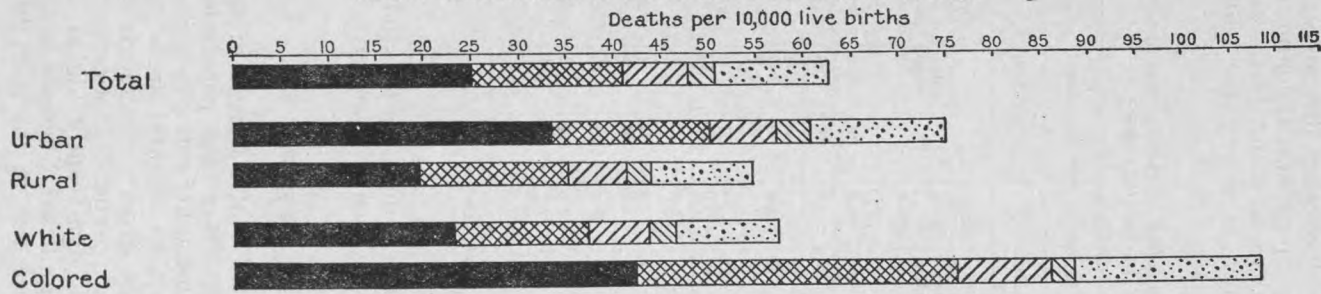
³ Less than one tenth per 10,000.

Of the 6,072 white women whose deaths were included in the study, 5,109 were native born and 805 were foreign born; the nativity of 158 was not reported.

DEATHS IN URBAN AND RURAL AREAS

The Vital Statistics Division of the United States Bureau of the Census includes in urban areas all cities of 10,000 or more population as shown in the 1920 census. The maternal mortality rate was higher in urban areas (75 per 10,000 live births) than in rural areas (55 per 10,000 live births). The rates for the groups "accidents of pregnancy", "other accidents of labor", "puerperal septicemia", "puerperal phlegmasia alba dolens" were significantly higher in urban than in rural areas. There was no significant difference in the other main groups. The greatest difference was in the mortality

CHART II.—MATERNAL MORTALITY RATES, BY CAUSE



Puerperal septicemia
 Puerperal albuminuria and convulsions
 Puerperal hemorrhage

Puerperal phlegmasia alba dolens, embolus, sudden death
 All other puerperal causes

* In the bars showing rates for total, urban, rural, and white, the rate for puerperal hemorrhage (1 tenth per 10,000 live births) is too small to appear.

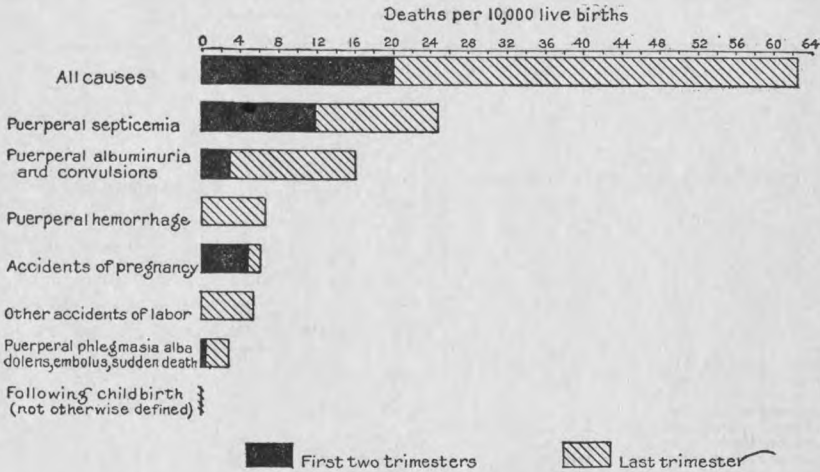
MATERNAL DEATHS

rates from puerperal septicemia, and the difference in this rate was largely due to the higher rates from septic abortion in the cities than in the rural areas. The urban rates are undoubtedly raised by the deaths of nonresidents who are brought to hospitals after delivery and who die there.

LACK OF MEDICAL ATTENTION AND INACCESSIBILITY

Nine percent of all the deaths were of women who had had no medical care or care only when dying. In strictly rural areas the distance from a physician may become an important cause for lack of early and sufficient medical attention, partly because of the actual distance and partly because of the charge for country travel on a mileage basis in addition to the usual medical fees. Lack of medical attention was not always associated with inaccessibility of the

CHART III.—MATERNAL MORTALITY RATES BY CAUSE AND BY TRIMESTER OF PREGNANCY



physician, but it was more frequent when there was no physician living in the vicinity. Yet even in cases of women having a physician nearby, 7 percent of the number for whom medical attention was reported had no care or care only when dying. Poor roads and slow transportation are greater factors in inaccessibility than mere distance, for apparently more patients are really inaccessible in the Kentucky and Virginia mountains than in the western States where the distances are very much greater.

HOSPITALIZATION

Of the 7,380 women included in the study there was a report on hospitalization for all but 14. More than half were hospitalized at some time during their final illness. The deaths of 4,066 occurred in hospitals, but the deliveries or abortions of only 2,629 occurred in hospitals. *Relatively few of these patients who died in hospitals had planned hospitalization.* Of the 4,066 women whose deaths occurred in hospitals, 2,501 had reached the last trimester; 1,558 had not

reached the last trimester; and for 7 the period of gestation was not reported. Of the 2,501 who were known to have reached the last trimester of pregnancy, only 1,893 were in the hospital for delivery, and less than half of these (845) were known to have had planned hospitalization. Hospitalization was less frequent and more of it was of an emergency nature among the colored women than among the white women.

PERIOD OF GESTATION

About one third of the women included in the study died before they reached the last trimester of pregnancy. Puerperal septicemia was the most important cause of death prior to the seventh month and accounted for 59 percent of the deaths in this period. But puerperal albuminuria and convulsions equaled puerperal septicemia in importance in the last trimester, to each being attributed 31 percent of the deaths (table 3). (See charts II and III.)

TABLE 3.—Cause of death as shown by interview, and period of gestation among women dying from puerperal causes

Cause of death as shown by interview	Women dying from puerperal causes					
	Total	Period of gestation				Not reported
		First two trimesters		Last trimester		
		Number	Percent distribution	Number	Percent distribution	
All causes.....	7,380	2,381	100	4,965	100	34
Accidents of pregnancy.....	719	575	24	142	3	2
Puerperal hemorrhage.....	791	11	(1)	779	16	1
Other accidents of labor.....	652	1	(1)	651	13	-----
Puerperal septicemia.....	2,948	1,403	59	1,529	31	16
Puerperal phlegmasia alba dolens, embolus, sudden death.....	344	53	2	291	6	-----
Puerperal albuminuria and convulsions.....	1,900	338	14	1,549	31	13
Following childbirth (not otherwise defined).....	23	-----	-----	22	(1)	1
Puerperal diseases of the breast.....	3	-----	-----	2	(1)	1

¹ Less than 1 percent.

LIVE BIRTHS AND STILL BIRTHS

Only 3,091 (43 percent) of the 7,226 women for whom the type of issue was reported gave birth to living children. Twenty percent were delivered of still-born children (that is, children born dead at 7 or more months' gestation). Twenty-nine percent had nonviable issue (born dead at less than 7 months' gestation), and 8 percent died undelivered. (See chart IV.)

PARITY AND AGE

Primiparæ made up one third and multiparæ two thirds of the 6,854 women in the study for whom the number of pregnancies was reported.

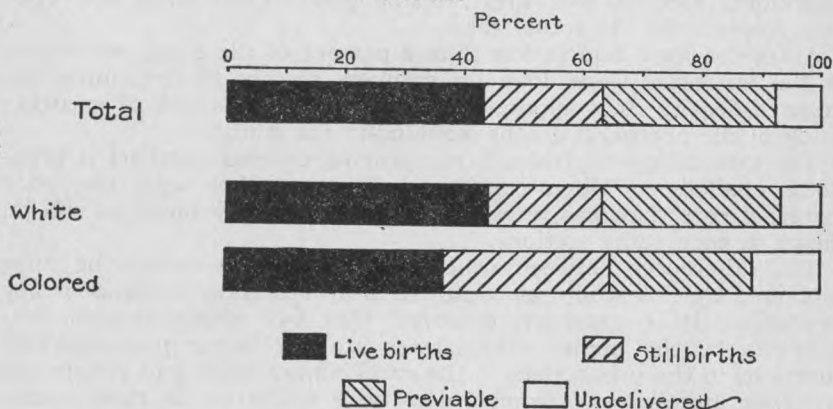
This study shows, as do other published figures, that the risk of childbearing is comparatively great for mothers under 15 years

of age, that the most favorable age is from 20 to 25 years, and that from that age onward the maternal mortality rate increases, reaching a maximum in the age period 45 years and over. This is true both for white and for colored women.

ILLEGITIMACY

The deaths of 509 unmarried women are included in the study. Approximately one half (51 percent) of the deaths, as compared with 39 percent of the deaths of married women, were from puerperal septicemia. Of the deaths from septicemia, almost two thirds occurred before the women reached the third trimester. Puerperal albuminuria and convulsions also caused a larger proportion of deaths of unmarried (32 percent) than of married women (25 percent). The other deaths of unmarried women were due to accidents of pregnancy (7 percent), other accidents of labor (5 percent), puerperal hemorrhage (3 percent), and puerperal phlegmasia alba dolens, embolus, sudden death (2 percent). More than one half of

CHART IV.—TYPE OF ISSUE AMONG WOMEN DYING FROM PUERPERAL CAUSES



the unmarried women were colored, as compared with 18 percent colored in the total group. Of the 506 unmarried women for whom the period of gestation was reported 219 (43 percent) died at less than 7 months' gestation, as compared with 2,152 (32 percent) of the 6,819 married women for whom this was reported. This larger proportion of early terminations of pregnancy among the unmarried women who died was confined, however, to the white women. Among the white women for whom the period of gestation was reported, 60 percent of the unmarried and 32 percent of the married women died before reaching the last trimester of pregnancy.

The maternal mortality rate for unmarried mothers in the States included in the study (except California, where data on legitimacy do not appear on the birth certificate) was 143 per 10,000 illegitimate live births; for married mothers it was 60 per 10,000 legitimate live births.

COMMENT BY ADVISORY COMMITTEE

This study apparently represents a fair sampling of maternal deaths throughout the registration area.

In this study the International List of Causes of Death together with the Manual of Joint Causes in use by the United States Bureau of the Census has been used as the chief basis of classification. While this procedure was not entirely satisfactory from a medical point of view, the inherent disadvantages seemed counterbalanced by the fact that it provides a definite and understandable classification and that its use would assist the comparison of the findings with those of other investigators.

Certain changes in classification resulted after the interviews. These alterations, which were made necessary by various causes, emphasize the dependence of the official statistics on the original death certificate and the apparent unavailability of a small percentage of error. A relatively small number of cases were excluded as nonpuerperal. These cases are easily equaled or exceeded by those that were actually puerperal but that were classed in the vital statistics as nonpuerperal and so were not included in the study. Therefore, maternal mortality rates as given in this study are probably *lower* than the actual rates.

Autopsies were held in less than 8 percent of the cases, and many of the autopsies were done by coroners merely to determine the cause of death. It is apparent that there was gross lack of scientific study of the puerperal deaths included in the study.

The exceedingly high death rate among colored mothers is especially challenging when considered in connection with the poor maternal care that was received by these colored women, as will be shown in succeeding sections.

The differences between urban and rural rates cannot be fully explained by this study, as complete information on residence is not available. It is apparent, however, that two of the factors contributing to the higher urban rates are the larger proportion of abortions in the urban than in the rural communities and the deaths in urban hospitals of women who were delivered in rural areas. The exact value of the second factor cannot be determined from this study for reasons given in the report.

Nine percent of the women had no medical attention whatsoever, or else had attention only when they were actually dying. Only part of this was due to physical inaccessibility. Inaccessibility due to distance and bad roads, however, was a serious problem in certain localities of the States studied. The part played by inaccessibility in the lack of *early*, as distinguished from *any*, medical attention was not measured; but the larger proportion of deaths from hemorrhage and the toxemias in the less accessible groups is suggestive, especially when considered in conjunction with the lack of prenatal care among women who died in the rural areas.

It is impossible to draw conclusions as to the relative safety of deliveries in hospitals and homes from a study of deaths alone. Data regarding the total number of deliveries in hospitals and homes were lacking. Many hospital deaths followed home deliveries, and many of the hospital deliveries were emergency cases. However,

there were too many deaths (899) of women who had planned hospital deliveries in the last trimester.

The figures relative to still births and live births indicate strikingly the appalling loss of fetal life associated with maternal deaths; 37 percent were either undelivered or preivable infants, 20 percent were of viable age but stillborn, and only 43 percent are credited as being live births. The number of these infants who died or were damaged survivors was not possible to determine from this investigation.

One third of all the deaths were of women who had not reached the last trimester of pregnancy. Duration of pregnancy is a most important consideration in the evaluation of any statistics on maternal mortality.

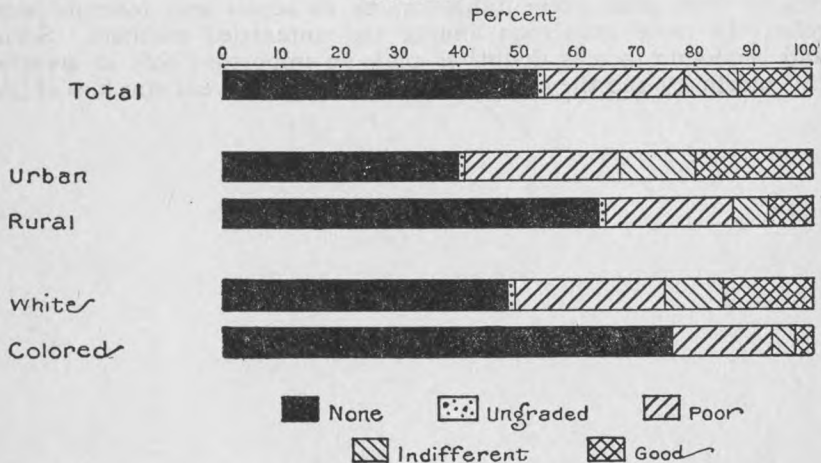
Illegitimacy contributes to maternal mortality, as 7 percent of the deaths in this study were of unmarried women, and the mortality rate is much higher for unmarried than for married mothers. There was a larger proportion of abortions among the unmarried, and the deaths from such preventable causes as sepsis and toxemia were relatively more numerous among the unmarried mothers. Social and economic factors doubtless play an important role in creating this mortality and they should be adjusted to prevent this loss of life.

MATERNAL CARE

Maternal care in the fullest sense includes very many factors—the woman's food, her living conditions, her mental condition, the conditions under which her confinement takes place, how she spends the lying-in period. Of particular importance is the type of medical and nursing care that she obtains. In this study attention was confined largely to the medical aspects of maternal care.

Of the 7,380 women whose deaths are included in this study only 933 were known to have had no complication of pregnancy. Six hundred and sixteen of these women were reported to have had no intercurrent disease. Only 263 of the 616 were known to have had normal spontaneous deliveries in the last trimester, and only 199 of

CHART V.—PRENATAL CARE AMONG WOMEN DYING FROM PUERPERAL CAUSES¹



the 263 were reported to have had a normal third stage of labor and no postpartum hemorrhage. And yet 100 of these 199 women with apparently normal pregnancy and labor died of puerperal sepsis, 55 of puerperal phlegmasia alba dolens, embolus, sudden death, 23 of other accidents of labor, 15 of puerperal albuminuria and convulsions, and the other 6 of other puerperal conditions. It should be borne in mind in connection with these figures that a large number of women who had no prenatal care or about whose care during pregnancy nothing was known were not included in the discussion.

PRENATAL CARE

All pregnant women should receive prenatal care. In practice prenatal care is seldom sought before the third month of pregnancy. Also, it is not sought by women who are sufficiently hostile to their pregnancy to resort to self-induced or criminal abortions. As 1,154

¹ Excludes women for whom pregnancy terminated before the third month and women who had induced abortions.

of the 7,380 women in this mortality group had pregnancies which terminated before the third month, either spontaneously or intentionally, or had later induced abortions other than therapeutic, there were 6,226 to whom it might reasonably be expected that prenatal care would have been given.

A report on prenatal care was obtainable concerning only 5,636 of the 6,226 who might be expected to have had such care. Of these 5,636, 3,025 (54 percent) had had no prenatal examination by a physician. For the most part, physicians had no opportunity to give prenatal care to these women, for they were not consulted.

Prenatal care was much more frequent among the white than among the colored women, and in both groups prenatal care was more frequent in the urban areas than in the rural areas (table 4).

TABLE 4.—Prenatal care received by white and colored women dying in urban and rural areas from puerperal causes

Grade of prenatal care	Women dying from puerperal causes					
	Total		In urban areas		In rural areas	
	Number	Percent distribution	Number	Percent distribution	Number	Percent distribution
Total.....	7,380		3,462		3,918	
Report on prenatal care.....	5,636	100	2,452	100	3,184	100
Grade I.....	725	13	484	20	241	8
Grade II.....	499	9	320	13	179	6
Grade III.....	1,337	24	630	26	707	22
Ungraded.....	50	1	32	1	18	1
None.....	3,025	54	986	40	2,039	64
No report on prenatal care.....	590		313		277	
Inapplicable ¹	1,154		697		457	
WHITE						
Total.....	6,072		2,951		3,121	
Report on prenatal care.....	4,568	100	2,061	100	2,507	100
Grade I.....	694	15	463	22	231	9
Grade II.....	458	10	291	14	167	7
Grade III.....	1,157	25	540	26	617	25
Ungraded.....	45	1	28	1	17	1
None.....	2,214	48	739	36	1,475	59
No report on prenatal care.....	458		246		212	
Inapplicable ¹	1,046		644		402	
COLORED						
Total.....	1,308		511		797	
Report on prenatal care.....	1,068	100	391	100	677	100
Grade I.....	31	3	21	5	10	1
Grade II.....	41	4	29	7	12	2
Grade III.....	180	17	90	23	90	13
Ungraded.....	5	(²)	4	1	1	(²)
None.....	811	76	247	63	564	83
No report on prenatal care.....	132		67		65	
Inapplicable ¹	108		53		55	

¹ Induced abortions and cases in which pregnancy terminated before the third month.

² Less than 1 percent.

Prenatal care in the different States

The quality and amount of prenatal care given varied greatly in the different States included in the study. Of the women who might be expected to have had prenatal care, 71 percent in Oregon and 70 percent in Rhode Island had had some care, but only 22 percent in Alabama and 30 percent in Oklahoma. In every State except one, more of the women who died in cities than of those who died in the rural areas had had prenatal care. In general, the States in which more of the women who died had had grade I care had lower mortality rates from puerperal albuminuria and convulsions.

Grading of the prenatal care received

The prenatal care given was divided into three grades:

Grade I includes (1) a complete physical examination, (2) pelvic measurements, internal and external, except in pregnancies terminating before the eighth month and for multiparæ who had had a previous normal delivery, and (3) regular monthly visits to a physician, beginning with or before the fifth month, with examination of urine and blood pressure at each visit. This care, which is on the whole good, although not up to highest standards, was received by 725 women (13 percent). *Only 42 women (less than 1 percent) had adequate care* as described in Standards of Prenatal Care (Children's Bureau Publication No. 153). This includes chiefly, in addition to the above, a Wassermann test and visits beginning with the second month.

Grade II includes a general physical examination, regular monthly visits to the physician, beginning not later than the seventh month, with examination of the urine and blood pressure; this can be classified only as indifferent care. Four hundred and ninety-nine women (9 percent) had had this care.

Grade III included in some cases only a single visit to the physician; in some cases there were repeated visits, but blood pressure was not taken or other essentials of the better grade of care were omitted. Care of this kind must be classified as poor. There were 1,337 women (24 percent) included in this group. (See chart V.)

More than three fourths had had poor or indifferent care, or none at all. Only 16 percent had had a Wassermann test.

Of the 1,478 women who first consulted the physician before or during the fifth month of pregnancy, 725 (49 percent) received grade I care, 243 (16 percent) received grade II care, and 501 (34 percent) received grade III care; for 9 the grade was not reported.

In the grading of prenatal care no account was taken of the treatment given, for the methods of treatment are not so standardized as are the methods of examination.

Prenatal care and trimester of pregnancy

Fifty-five percent of the women who died before they reached the last trimester died too early in pregnancy to have been expected to have prenatal care, or they had induced abortions, or else information concerning their care was not obtained. But of the remaining 1,064 women 17 percent had had grade I care, 3 percent had had grade II care, 14 percent had had grade III care, 1 percent had had care that was ungraded, and 66 percent had had no care.

Of the 4,570 women who died after reaching the last trimester and for whom a report was obtained concerning prenatal care, 12 percent had had grade I care, 10 percent grade II care, and 26 percent grade III care; 1 percent had had care that was ungraded, and 51 percent had had no care. Twenty-four percent of those who died following grade I care and 34 percent of those who had had no care died of puerperal albuminuria and convulsions.

Prenatal care and number of pregnancies

Of the 2,334 known primiparæ whose deaths were included in this study, a report as to prenatal care is available and applicable for 1,924. Of these 14 percent had had grade I care, 14 percent grade II care, 24 percent had had poor care (grade III), and 46 percent had had no prenatal care whatsoever. Of those in their second pregnancy 22 percent had grade I care, 11 percent grade II care, 27 percent grade III care, and 39 percent no care. After the second pregnancy the percentage of those who had good prenatal care decreased, and the percentage of those who had no prenatal care rose with the number of pregnancies.

Prenatal care in relation to live births and still births

Among the 4,843 cases of women who had reached the last trimester in which there was a report on the character of issue, 70 percent were live births for the mothers who had had grade I and grade II prenatal care, 63 percent for those who had had grade III care, and 58 percent for those who had had no prenatal care.

DELIVERY CARE

The paramount importance of adequate care at the time of delivery is conceded by all. Adequate delivery care requires the careful management of normal labor, the maintenance of aseptic technique, and the proper handling of any abnormalities. These in turn imply an attendant who has not only skill but patience and good judgment, sufficient trained assistants, and clean surroundings with facilities for dealing with emergencies. The actual evaluation of all these factors is obviously difficult. In this study no attempt was made to grade the types of delivery care given. The simplest and most objective of the factors involved were merely studied separately.

Hospitalization at delivery

Of the 4,965 women who reached the last trimester of pregnancy, 1,971 were in hospitals for delivery or at the time of death if they died undelivered. The hospitalization of 899 of these 1,971 women was planned, but for 1,018 it was an emergency measure, and for 54 there was no report as to whether it was planned or not. Two thousand nine hundred and ninety women were delivered or died undelivered outside of hospitals, and for four women the place of delivery was not reported. The hospitalization of white women was much more frequent than of colored women. Maternal mortality rates for hospitals and for homes cannot be given, because data regarding the total number of deliveries in hospitals and in homes are not available; but even if there were such data, the large and varying proportions of complicated cases among those delivered in hospitals invalidate comparisons.

Attendant at confinement

Information on the attendant at delivery or at death if the patient died undelivered was obtained for 4,903 of the 4,965 women who died after reaching the last trimester. Of these 4,903, 4,065 (83 percent) were attended exclusively by physicians, internes, or medical students (3,915 by physicians only, 87 by physicians preceded by internes or medical students, 63 by internes or medical students only). Midwives attended 550 (11 percent) of the 4,903 women, including 193 for whom physicians (in 2 cases internes) were called in before the delivery was completed. Nonmedical attendants such as relatives attended 172 women (4 percent), including 47 for whom a physician was called in before the delivery was completed, and 116 women (2 percent) were said to have been unattended.

Practically all the midwives who cared for these women were untrained, although there were a few foreign-trained midwives. All cases in which the patient was delivered by a midwife and all cases in which a midwife was known to have been in attendance for the purpose of delivering the patient, even if the physician made the actual delivery, were classified as having been attended by midwives. Four hundred and sixty-two of the five hundred and fifty women attended at confinement by midwives died in Alabama, Kentucky, Maryland, and Virginia, and these 4 were the only States of the 15 in the study in which the number of deaths of women attended by midwives constituted 10 percent or more of the total number of deaths of mothers who had reached the last trimester. In 3 of these 4 States (Alabama, Maryland, Virginia) the proportion of midwife-attended confinements among the women who died was very slightly smaller than the proportion of midwife-reported births among the total live births of the State. In these 4 States the midwives were employed rather than physicians because the patients were not accustomed to the services of a physician at childbirth or could not afford a physician's care. The inaccessibility of a physician was also an important factor.

Technique of the principal physician

The technique of the principal physician at confinement was reported in 3,619 of the 4,305 cases in which a physician attended women in the last trimester. In 1,740 cases (48 percent) an aseptic technique was said to have been used. This included shaving, scrubbing, sterile drapes, instruments, and rubber gloves, and adequate assistance at delivery. In 510 cases (14 percent) the technique was not so good and was classed as attempted aseptic. In 1,099 cases (30 percent) the technique was classified as clean but not sterile. This meant only ordinary cleanliness and usually sterilization of any instruments used. In many cases the principal physician whose technique was assigned to 1 of these 3 classes was preceded by someone whose technique was less careful. In 270 cases (7 percent) not even ordinary cleanliness was used. The technique as described may not coincide in some cases with that which was actually used, for the grading was based on the physician's subsequent description of his technique as he remembered it.

The principal physician made vaginal examinations in 2,765 cases and made no vaginal examination in 1,089 cases; in 451 cases there was no report on this matter; and in 660 cases no physician was in

attendance. The principal physician had made 1 vaginal examination in 871 cases, 2 in 565 cases, and 3 or more in 771 cases; in 558 cases the number was not given. Of the 2,765 cases in which the principal physician made vaginal examinations, rubber gloves were reported used in 2,188 cases, not used in 484 cases, and there was no report on their use in 93 cases. Rectal examinations were reported as having been made by the principal physician in 778 cases; in 326 of these he made 1 or more vaginal examinations also.

There was a report on the use of pituitrin in 3,718 of the 4,305 last-trimester cases with a physician in attendance. Pituitrin was said to have been used before the delivery of the child in 711 cases, after the delivery of the child only in 1,004 cases, and at an unreported stage of labor in 24 cases. In 1,979 cases pituitrin was said not to have been used. In the group of cases in which pituitrin had been used before the delivery of the child larger proportions of the deaths were from puerperal septicemia and puerperal hemorrhage and a smaller proportion was from puerperal albuminuria and convulsions than in the group in which no pituitrin had been used.

COMMENT BY ADVISORY COMMITTEE

This section shows clearly what a serious situation exists in regard to the quality of the maternal care that many women receive in this country during their pregnancy. Although this study covered but 15 States, they represent a fair cross section of the country, and therefore it is probably fair to assume that the findings in this section are applicable to the country as a whole.

It is discouraging to find that of the women on whom a report as to prenatal care could be obtained and who could reasonably have been expected to have such care, 54 percent had had no prenatal examination by a physician. In only 1 percent was the care given up to the standard that it is the right of every pregnant patient to have and to demand.

For the deaths of the women who had had no prenatal examination the attending physician could hardly be held responsible, for he was not consulted until an emergency had arisen. Gross ignorance, carelessness, and sociological and economic problems all had a share in this responsibility. However, in those cases in which the physician was consulted he was responsible for providing adequate maternal care; and in many of these cases physicians failed in their responsibility, for half the women who did consult a physician had poor prenatal care.

Although the question of prenatal care was considered for only 45 percent of the women who died before they reached the last trimester of pregnancy, 80 percent of these 1,064 women had no care or poor care. Furthermore, many of the 20 percent who had good or indifferent care already had troublesome symptoms before they consulted a physician. Of those women who died after reaching the last trimester and for whom a report was obtained, 78 percent had poor prenatal care or none.

Evidence of the value of prenatal care may be found in the fact that smaller proportions of the women who died after good pre-

natal care than of those who died after poor prenatal care died of puerperal albuminuria and convulsions. Further evidence may be found in the larger proportion of live births in those cases in which there had been good prenatal care, and in the fact that those States with more good prenatal care, even among the women who died, had lower death rates from albuminuria and convulsions.

Primiparæ and the mothers of many children particularly need prenatal care, but many of these women failed to receive it.

Prenatal care, such as it was, was much more frequent among the white than among the colored women, and in both groups it was more frequent in the urban than in the rural areas. In the rural areas among the colored women there was practically no prenatal care, for 83 percent had none and 13 percent had grade III, which is poor care.

Delivery care, though as important as prenatal care, was more difficult to evaluate, but certain facts were noted. For more than half the women who died in hospitals after reaching the last trimester, hospitalization was an emergency measure. Among the colored women emergency hospitalization was much more frequent than among the white women. Eighty-three percent of the women were attended by physicians, internes, or medical students, 11 percent by midwives, 4 percent by nonmedical attendants; 2 percent of the women had no attendant at the delivery or at the death if the patient died undelivered.

Figures given in the report would indicate that, though the midwives played a part in the mortality, they could not have been responsible for any large proportion of the deaths because they attended a relatively small percentage of the cases.

No study of the qualifications of the individual physicians or midwives was attempted. As it was known, however, that the majority of the midwives were ignorant "grannies", it may safely be assumed that these midwives did not use a satisfactory aseptic technique at delivery. In 48 percent of the cases the physicians described their technique, as they remembered it, in such a way that it was classified as aseptic; but obviously this is not a sure way of determining how good this technique was. The point to be noted is that the physicians themselves admitted it was unsatisfactory in more than 50 percent of the cases. The frequency of vaginal examinations, often times without gloves, is clear, and the relatively small number of rectal examinations must be noted.

Although the data on the use of pituitrin are incomplete, its use is shown to be common and to be associated with serious accidents. Higher percentages of maternal deaths from sepsis and from hemorrhage occurred among those who had it than among those who did not have it. The percentages of ruptured uterus and of stillbirths also were higher.

The almost total lack of adequate prenatal care and the relative infrequency of any prenatal care were outstanding. Besides permitting the unchecked development of unfavorable factors during pregnancy, this situation led to delivery care that was unsatisfactory because given without previous knowledge of the case and frequently in circumstances that necessitated emergency hospitalization.

OPERATIONS

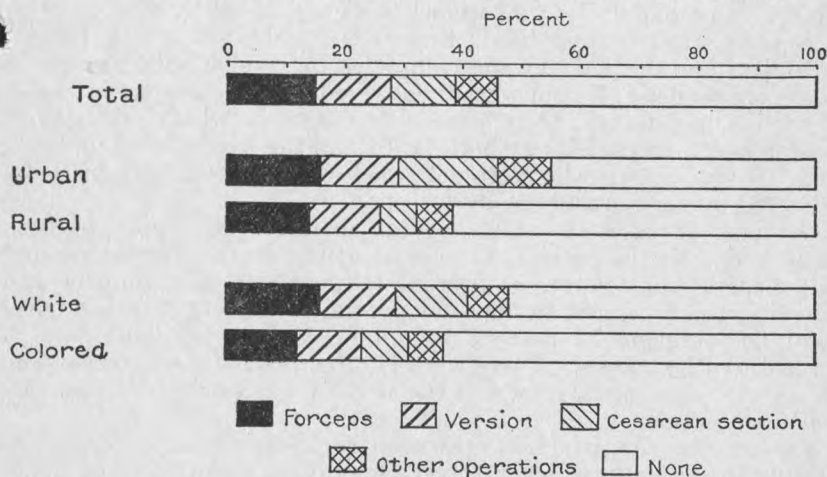
In this study more than half of the women had had some operative procedure before death. Of the 7,234 women concerning whom there was a report on this point, 3,370 (47 percent) had had no operations, while 2,649 (37 percent) had had an operation directed toward delivery and 1,131 (16 percent) had had some operation other than for delivery. By an operative delivery is meant an operation for the purpose of delivering the fetus or for the immediate removal of the placenta. Attempts at these operations, as well as completed operations, are included. Other operations were secondary, usually on account of sequelæ of the delivery.

OPERATIONS IN THE LAST TRIMESTER

OPERATIONS FOR DELIVERY

Of the 4,965 women who reached the last trimester of pregnancy, 2,225 (45 percent) were known to have had an operative delivery or

CHART VI.—OPERATIONS FOR DELIVERY IN THE LAST TRIMESTER OF PREGNANCY AMONG WOMEN DYING FROM PUERPERAL CAUSES



an attempt at operative delivery. Forceps operations were performed 718 times. In addition, there were 98 cases of forceps and version combined. Usually when forceps failed the delivery was completed by version. In 150 of the 718 cases the application of forceps followed induction of labor or artificial dilatation of the cervix.¹ In 24 cases the use of forceps was followed by manual removal of the placenta. In 12 cases all 3 procedures were used. In 14 cases forceps were used in combination with some other opera-

¹ Throughout this report "artificial dilatation of the cervix" includes mechanical induction of labor.

tion. In 162 cases, including 12 with manual removal of the placenta, the use of forceps followed induction of labor or artificial dilatation of the cervix. Of these women 106 were not in labor when the artificial dilatation of the cervix was begun; in 56 cases of women in labor the dilatation of the cervix was done to facilitate delivery. The 718 cases include 2 in which the forceps operation failed and the women delivered themselves spontaneously later, and 13 in which they died undelivered after unsuccessful attempts at delivery by forceps.

The deaths of 35 percent of these 718 women who had forceps operations were attributed, according to the international classification, to puerperal albuminuria and convulsions, 26 percent to puerperal septicemia, 7 percent to embolus and sudden death, 5 percent to placenta previa, 11 percent to other puerperal hemorrhage, 15 percent to other accidents of labor, and 1 percent to other puerperal causes.

Of the 162 cases in which artificial dilatation of the cervix preceded the use of forceps, the deaths were attributed to puerperal albuminuria and convulsions in 62 percent, placenta previa in 10 percent, other puerperal hemorrhage in 9 percent, septicemia in 9 percent, sudden death in 2 percent, and other causes in 8 percent.

In 98 cases attempts at both forceps and version were made, in some cases with dilatation of the cervix or manual removal of the placenta, or both. The delivery in 51 cases was completed by version after forceps had failed; 25 women were delivered by version with forceps on after-coming head; there were 5 cases in which forceps had failed and the delivery was completed by version with forceps on after-coming head; 5 women were delivered by forceps after attempts at version had failed; there were also 5 cases in which attempts at version and forceps delivery both failed and the woman died undelivered. Seven women who were delivered of twins each had one baby delivered by version and one by forceps.

Of these 98 cases in which several operative attempts had been made to deliver the patient, 32 percent of the deaths were attributed to puerperal septicemia, 20 percent to puerperal albuminuria and convulsions, 12 percent to placenta previa, 12 percent to other puerperal hemorrhage, 18 percent to other accidents of labor, and 5 percent to other causes. There were 44 attempts at forceps or version, or both in some cases, in which the woman was finally delivered by Cesarean section.

Version was the principal operation for delivery in 618 cases, including the cases in which a forceps operation was used in conjunction with version—or 520 cases in addition to the 98 already discussed. *In 272 of these 520 cases version followed artificial dilatation of the cervix;* in 48 of these 272 cases it was also followed by manual removal of the placenta. In 26 cases version was followed by manual removal of the placenta, and in 4 cases it was accompanied by some other operation or a combination of operations. In 172 of the 272 cases in which version was preceded by dilatation of the cervix the dilatation was done to induce labor as well as to facilitate delivery. Six of the 520 women died undelivered after attempts at version had failed.

Of these 520 deaths following version, 32 percent were attributed, according to the international classification, to placenta previa, 10 percent to other puerperal hemorrhage, 28 percent to puerperal albuminuria and convulsions, 19 percent to puerperal septicemia, 2 percent to embolus and sudden death, and 9 percent to other causes.

In addition to the cases of dilatation of the cervix performed with some other operation for delivery, the cervix was dilated manually, by bag, or by other artificial means in 112 cases. Eighty-nine women later delivered spontaneously, but 23 women died undelivered without further attempts at delivery. Four of the 89 women who delivered spontaneously after dilatation of the cervix also had manual removal of the placenta. There were also 87 women who had manual removal of the placenta following an absolutely spontaneous labor and delivery.

Sixty-five women were delivered by breech extraction. Eight of these had labor induced, 55 went into labor spontaneously, and for 2 the type of onset was not reported.

Fifty-seven women were delivered by craniotomy or embryotomy. Two of these had labor induced. Eight women with abdominal pregnancy were delivered by laparotomy in the last trimester. Twenty women had had some operation or combination of operations for delivery other than those already mentioned. Nine women had some operation for delivery, but its type was not reported. For 133 women no report could be obtained as to whether or not there had been an operative delivery.

Cesarean section preceded the deaths of 531 women who had reached the last trimester. For 62 of them attempts had been made at some other method of delivery. The Cesarean-section cases are discussed later (p. 29).

The technique of the operating physician as regards asepsis was analyzed. The term "aseptic" is used to indicate the usual good hospital delivery or operating-room technique without reported breaks. This was applicable in 1,328 cases. The term "attempted aseptic" is applicable to 275 cases, indicating that conditions as regards asepsis were not so good. Four hundred and fifty cases were assigned to the classification "clean, not sterile." "Dirty" indicated usually no preparation of the patient and sometimes no preparation even of the physician's hands; 89 cases were so assigned.

Table 5 shows the duration of labor of primiparæ and multiparæ who had reached the last trimester of pregnancy and whose deaths were preceded by various operations for delivery. *Two hundred and eighty-six primiparæ and 1,170 multiparæ were in labor less than 6 hours.* Three hundred and seventy-three primiparæ and 538 multiparæ were in labor 6 but less than 12 hours. Cesarean sections were performed 56 times on primiparæ and 31 times on multiparæ after 36 hours or more of labor. Almost all these operations were of the classical type.

Onset and termination of labor

Artificial onset and artificial termination of labor were more frequent among the white than among the colored women who died. Not only did a larger proportion of colored women die undelivered, but a larger proportion died before the onset of labor.

Of the 1,990 women who died following operative termination of labor in the last trimester of pregnancy, there was a report as to

TABLE 5.—Hours in labor and type of principal operation for delivery performed on primiparæ and multiparæ dying from puerperal causes who had reached the last trimester of pregnancy

Type of principal operation for delivery	Women dying from puerperal causes who had reached last trimester																	
	Total	Hours in labor																Parity not reported
		Primiparæ								Multiparæ								
		Total	None	Less than 6	6, less than 12	12, less than 24	24, less than 36	36 and more	Not reported	Total	None	Less than 6	6, less than 12	12, less than 24	24, less than 36	36 and more	Not reported	
Total.....	4,965	1,746	204	286	373	306	130	184	263	3,041	229	1,170	538	282	90	151	581	178
Forceps (without version).....	718	408		59	93	111	58	53	34	301		93	66	59	23	32	28	9
With dilatation of cervix.....	162	86		35	19	12	6	9	5	76		43	8	10	4	5	6	
Cesarean section.....	531	292	133	15	20	27	19	56	22	234	116	23	14	24	13	31	13	5
Version.....	618	164		49	31	23	19	33	9	445		196	68	56	27	39	59	9
With dilatation of cervix.....	296	74		39	16	5	4	7	3	218		137	24	15	11	9	22	4
Dilatation of cervix only.....	108	37	2	11	14	3	2	3	2	70	5	34	13	6	3	3	6	1
Manual removal of placenta only.....	87	26		3	4	9	4	3	3	60		35	8	2		1	14	1
Craniotomy or embryotomy.....	57	22		1		7	4	8	2	35			7	9	5	11	3	
Breech extraction ¹	65	15		3	4	2	4	2		48		15	12	10	1	4	6	2
Other operation ²	32	7	2					3	1	25	5	9	4	1	1	2	3	
Type not reported.....	9	1							1	4						1	3	4
No operation for delivery.....	2,607	747	67	145	207	123	19	23	163	1,757	103	764	345	114	17	25	389	103
No report on operation for delivery.....	133	27				1			26	62		1	1	1		2	57	44

¹ Includes 17 with dilatation of cervix.

² Includes 9 with dilatation of cervix.

prenatal care for 1,879. Of these, 807 are known to have had no prenatal care; that is, 43 percent of the operative deliveries were on women whom the physician had not seen before labor or before the acute emergency.

Operative deliveries and parity

The percentage of deaths preceded by version and version combinations increased with the number of pregnancies, from 10 percent in the first pregnancy to 16 percent for those with five pregnancies. It decreased slightly for the sixth and seventh pregnancies and rose again to 21 percent of those dying after eight or more pregnancies. Dilatation of the cervix preceding version was also more common in the later than in the earlier pregnancies. The frequency of forceps operations dropped rapidly from 24 percent in the first pregnancies to 11 percent in the second pregnancies, 9 percent in the third, and 8 percent in the fourth pregnancies, after which it rose slightly.

The incidence of operations for delivery increased with age both for primiparæ and for multiparæ. Among primiparæ there was a definite increase with age for Cesarean section. Among multiparæ there was a definite increase with age for forceps, version, and Cesarean section.

Incidence of operative delivery

The deaths of white women were more often preceded by operative deliveries than those of colored women, and the deaths were more often preceded by operative deliveries in the urban than in the rural areas. The proportion of maternal deaths that were preceded by operations for delivery varied in the different States. Some operation for delivery in the last trimester preceded 57 percent of the maternal deaths in California and Wisconsin but only 34 percent in Alabama.

OPERATIONS OTHER THAN FOR DELIVERY

Some operation other than the actual delivery of the child or of the placenta was performed on 636 women who died after reaching the last trimester. Three hundred and one of these women also had an operative delivery. Most of these other operations were done for conditions resulting from the delivery. In 62 cases transfusion was the only operation. In other cases there was a curettage or incision and drainage for infection, packing of the uterus, or enterostomy. Packing of the uterus was recorded in 138 cases. In 73 cases packing followed an operative delivery, and in 65 cases it followed after a normal delivery. A curettage was done in 109 cases, usually on women who died from sepsis. It followed an operative delivery in 22 cases and a normal delivery in 82 cases. In 5 cases the type of delivery was not reported. Some of these women also had a blood transfusion. Incision and drainage of an abscess was reported for 45 cases. In 32 cases a laparotomy for drainage of peritonitis was done. Practically all these secondary operations were performed as a result of sepsis.

Fourteen women had appendectomies, 7 antepartum and 4 postpartum, 2 at Cesarean section, and 1 at laparotomy for abdominal

pregnancy. In some cases the appendectomy had apparently little to do with the death; in other cases it was a factor of greater importance.

Another group of women had enterostomy operations done subsequent to the delivery. Still another group had hysterectomies for one cause or another. A few of these secondary operations were for accidental complications, but most of them were intended to relieve conditions arising from the delivery, and most of the deaths that were preceded by these operations were from sepsis.

OPERATIONS IN THE FIRST TWO TRIMESTERS

Nearly all the operations for delivery performed on women who died before reaching the third trimester were classified either as therapeutic abortions or as laparotomies for ectopic gestation.

Laparotomies for ectopic gestation were performed on 195 women. In 3 cases abdominal pregnancies of 5 or 6 months were found. Various other operations were performed in conjunction with the operation for ectopic gestation or on account of sequelæ of the first operation. In 13 cases the appendix was removed at the time of the operation. Fifteen of the women were curetted before the laparotomy was performed, in some cases for diagnosis and in other cases because of mistaken diagnosis.

The deaths of 52 of these 195 women were attributed to puerperal septicemia. The other deaths in this group were attributed to ectopic gestation; in other words, the women died of hemorrhage and shock.

Only 26 of the 195 women who had had laparotomies for ectopic gestation had blood transfusions.

Of the 205 therapeutic abortions 84 were performed in the first trimester and 117 in the second trimester; the time at which the remaining 4 were performed was not reported. Pernicious vomiting was given as the principal indication for 112 of the 205 therapeutic abortions; other toxemias for 52; hemorrhage, placenta previa, or premature separation for 14; dead fetus for 12; and other causes for 15. Most of the therapeutic abortions were done from below, but in four cases a hysterectomy and in at least seven cases an abdominal hysterotomy was the method used.

Of these 205 women who had had therapeutic abortions, 38 had some other operation besides—a second curettage, a blood transfusion, or packing of the uterus because of hemorrhage. Fourteen of the 38 women had laparotomies subsequent to the therapeutic abortion. Most of the additional operations were for complications, and sepsis caused the death of most of these 38 women.

At least one curettage had been done on 585 women who had had a spontaneous or induced abortion other than a therapeutic abortion, and most of the deaths of these women were attributed to puerperal septicemia. Fifty-three of the women who died in the first two trimesters had had blood transfusions as their only operation. Most of these deaths also were due to sepsis. Another group (82) who had had no operation for delivery, had laparotomies performed for various complications, such as peritonitis or salpingitis, and the majority of these deaths were due to sepsis.

COMMENT BY ADVISORY COMMITTEE

In this series of cases all the women died (and many of the babies), and, therefore, it is a record of failure. One cannot say that the operative procedures followed in many cases caused the deaths, but analysis of these procedures leads to many criticisms of the management of these cases.

The physicians who delivered these cases cannot be blamed in all cases for the results obtained, for in 43 percent of the operative deliveries they had not seen the women before labor or before the acute emergency had occurred. Under these circumstances it is a well-recognized fact that the operation of election is not always possible; the physician many times is forced to do something which he appreciates may not be the best but which, at the time, seems justifiable. This shows, from another point of view, the absolute necessity, if maternal mortality is to be lowered, of insisting upon continuous prenatal and adequate delivery care.

In a study of this type the physician's ability to do well the operation he has chosen can be evaluated only by the results, which show that many of the operations either were badly chosen or were poorly done. In nearly 40 percent of these operative deliveries it was admitted by the physicians that their technique was at least unsatisfactory with regard to asepsis. It is therefore not to be wondered at that 26 percent of the deaths following forceps deliveries and 19 percent of the deaths following versions were due to sepsis. Had those women whose deaths were assigned to eclampsia and placenta previa lived longer, many of them also would probably have died of sepsis. An operative delivery is a surgical procedure and should not be undertaken by physicians untrained in surgical technique. It is evident that many of these physicians did not have such training.

Many of these patients were operated upon after very little or no labor, and this explains the frequency of artificial dilatation of the cervix in both forceps and version deliveries. The number of cases in which manual dilatation of the cervix, forceps or version, and manual removal of the placenta occurred, or forceps failed and version was done, was deplorably large. From this it is evident that accouchement forcé was resorted to many times, and accouchement forcé is not regarded as good obstetrics today; it gives bad results and should not be performed.

That attempts at delivery by vagina were followed by Cesarean section in 62 cases is to be noted and condemned. (For further comment on the Cesarean sections done in this series see p. 31.)

That 57 women died following delivery by craniotomy or embryotomy shows clearly the lack of care these women had.

The frequency with which a curettage was done on women who had developed sepsis is surprising, for such treatment has long been condemned. Secondary operations for various conditions, usually of a septic nature, were much too common.

Most of the operative deliveries in the first two trimesters were classified either as therapeutic abortions or as laparotomies for ectopic pregnancy. The main comment on the deaths occurring from these

two conditions is made in their respective sections, but a few comments may be made here. The removal of the appendix at the time of operation for an ectopic gestation is not good surgery. The fact that of the 195 women who had had a laparotomy for ectopic gestation only 26 had transfusion is to be noted. It must be recognized that preparation to transfuse is almost as essential as operation in ectopic pregnancy. That 52 women died of sepsis shows clearly how perfect one's technique should be if sepsis is to be avoided.

It is to be expected that the operative incidence would be higher in a group of fatal cases such as those included in the present study than among women who survived. Without having all the data for all areas studied it would be difficult to draw too many absolute conclusions. Necessarily the more serious operation would make up a higher percentage in a mortality study than the less dangerous operations.

CESAREAN SECTION

Five hundred and thirty-seven of the maternal deaths included in the study followed Cesarean section. This is 7 percent of the 7,211 deaths for which information concerning operations was secured. Five hundred and thirty-one women whose deaths followed Cesarean section had reached the last trimester of pregnancy. A Cesarean section was done on 11 percent of the 4,832 women who died after reaching the last trimester and for whom there was a report on operation for delivery. Twenty-four percent of all operations for delivery on women who died after reaching the last trimester were Cesarean sections.

The percentages of maternal deaths that were preceded by Cesarean section in the last trimester ranged in the various States from 2 in North Dakota to 24 in California. Deaths following Cesarean section were twice as frequent in the urban as in the rural areas. For 8 percent of the white and 6 percent of the colored women death was preceded by Cesarean section. For those women who died following Cesarean section in the last trimester, the incidence was 17 percent among the urban white, 16 percent among the urban colored, 7 percent among the rural white, and 4 percent among the rural colored.

CAUSE OF DEATH

For these women who died following Cesarean section the number of deaths from each cause, as given on interview by the attendant physicians and classified according to the international list was: Accidents of pregnancy, 3; puerperal hemorrhage, 42; other accidents of labor, 146 (including Cesarean section, 136); puerperal septicemia, 143; puerperal albuminuria and convulsions, 202; and embolus and sudden death, 1.

INDICATIONS

The indications for Cesarean section were very numerous. Combinations of indications were very frequent; in one fourth of the cases more than one indication was given. Eclampsia was given alone or in combination in 165 cases. Contracted pelvis was given in 107 cases, but this probably does not represent the actual number of women with contracted pelvis in the group, as in many cases the principal indication given was a long and difficult labor with no word about contracted pelvis. Preeclamptic toxemia was the indication in 47, uremia in 27, placenta previa in 38 cases. Twenty-five of the 537 women who had a Cesarean section are known to have had a previous Cesarean; but this fact was used as the sole indication for operation in only 6 cases, and as the principal indication in 17.

The following list shows the principal indications for Cesarean section:

Indication for operation as given by attending physician	Women who died following Cesarean section
Total	537
Principal indication reported.....	534
Eclampsia.....	165
Preeclampsia	47
Uremia.....	27
Placenta previa.....	38
Premature separation of placenta.....	15
Ruptured uterus.....	9
Previous Cesarean section.....	17
Contracted pelvis.....	28
Contracted pelvis and other indication.....	55
Abnormal presentation.....	33
Disproportion and long or difficult labor.....	61
Other indication.....	39
Principal indication not reported.....	3

PARITY AND AGE

The deaths of 13 percent of primiparæ, 8 percent of secundiparæ, 5 percent of the women who had had three to five pregnancies, and 4 percent of those who had had six or more pregnancies, followed Cesarean section. When the percentages are based only on those women who died after reaching the last trimester, it appears that the deaths of 17 percent of all primiparæ and 33 percent of primiparæ of 30 years or older were preceded by Cesarean section.

DURATION OF LABOR

The duration of labor was reported for 495 of the 531 women dying from Cesarean section in the last trimester of pregnancy. Two hundred and fifty of these were not in labor, and the cause of death in 59 percent of these cases was puerperal albuminuria, in 12 percent puerperal hemorrhage, and in 11 percent puerperal septicemia. Of the 245 women in labor for whom the number of hours was reported, 38 were in labor less than 6 hours; 35 from 6 to 12 hours; 51 from 12 to 24 hours; 32 from 24 to 36 hours; and 89 more than 36 hours. With increase in the duration of labor, the percentage of deaths that were attributed to puerperal septicemia rose rapidly from 29 percent for those in labor less than 12 hours to 51 percent for those in labor 36 hours or more.

RUPTURE OF THE MEMBRANES

There was a report on rupture of the membranes for 491 of the 531 Cesarean-section cases occurring in the last trimester. In 324 cases the membranes had not ruptured. They were ruptured artificially in 34 cases and had ruptured spontaneously in 109 cases; there was no report on this point in 24 cases. Of the 324 women with unruptured membranes, 15 percent died of puerperal septicemia, 51 percent of albuminuria and convulsions, 10 percent of hemorrhage, and the rest of other causes. Of the 167 women with ruptured

membranes, 49 percent died of puerperal septicemia, 14 percent of albuminuria and convulsions, 4 percent of puerperal hemorrhage, and the rest of other causes.

PLANNED AND EMERGENCY OPERATIONS

Eighty-two of the five hundred and thirty-seven Cesarean sections were planned, 452 were emergency, and in 3 cases there was no report.

ATTEMPTS AT OTHER OPERATIONS

Cesarean section followed attempts at other forms of operative delivery in the cases of 62 women, 42 of whom were primiparæ.

VAGINAL EXAMINATIONS

Vaginal examinations by the operating physician preceded the Cesarean section in 254 cases, or 52 percent of the 485 women dying in the last trimester for whom this information was secured. Of the 231 women who had had no vaginal examination by the operating physician, 20 percent died of sepsis, 43 percent of albuminuria and convulsions, and the rest from other causes; but of the 254 women who had vaginal examinations 34 percent died of sepsis, 30 percent of albuminuria and convulsions, and the rest of other causes.

LIVE BIRTHS AND STILL BIRTHS

Live-born infants resulted from 393 (74 percent) of the 534 Cesareans for which the type of issue was reported. The largest proportion of stillbirths was obtained in those Cesareans for which the indication was premature separation of the placenta or ruptured uterus.

ANESTHESIA

Ether was the most common anesthetic used. It was used alone in 275 of the 480 cases for which this information was obtained. In other cases nitrous oxide, ethylene, chloroform, or local anesthesia was used. Ether was used alone in 90 of the 150 cases in which Cesarean section was done on account of eclampsia and in which a report on the anesthetic used was obtained. Nitrous-oxide oxygen anesthesia was used alone in 56 cases, with ether in 62 cases, and in a few cases with local anesthesia. Ethylene was used in 41 cases, 1 of which was with spinal anesthesia. Chloroform was used in 14 cases, 7 of which were eclamptic. Local anesthesia was used in only 19 cases, in 5 of which it was supplemented by nitrous oxide or ether and in 1 of which it was used with sacral anesthesia. Spinal anesthesia was used in 8 cases.

COMMENT BY ADVISORY COMMITTEE

The very fact that Cesarean section was done on one fourth of all the women who died following operation for delivery suggests that there had been unwise selection of cases for the operation, or of the types of operation, or both, as Cesarean sections constitute only a

small percentage of all operative deliveries in general. Additional evidence to this effect is found in the causes of the deaths following Cesarean section.

According to statements of the physicians upon interview, 27 percent of the women died of sepsis, but careful study of each record indicates that 47 percent were probably septic. The conditions under which the operations were done may account for this high percentage of sepsis. Eighty-five percent of the operations had not been planned. In 34 percent the membranes were ruptured before the operation was done. Fifty-two percent of the women had had one or more vaginal examinations. Twelve percent had had attempted delivery from below. The number of sections done for various types of dystocia after long and exhausting labors is appalling. There was evident lack of recognition of the fact that the mortality from classical Cesarean section increases with the length of time the woman has been in labor and with attempts at delivery from below.

In any discussion of sepsis following Cesarean section it is to be remembered that the operating surgeon often does not have "first chance" with his patients. Yet this should be no reason for unwise selection of the operation to be performed. In many of these cases a Porro or low cervical operation should have been done instead of the classical Cesarean; in others no type of Cesarean operation should have been done.

Probably many of the surgeons could appropriately analyze the selection of their cases and study their operative technique and the surgical technique of their institutions, for death resulted from sepsis in many cases in which it apparently should not have occurred.

The most frequent indication for the Cesarean section was some toxemia—in many cases eclampsia. Although the mortality from eclampsia in Cesarean-section cases is known to be higher than in those treated conservatively, this fact was apparently not appreciated. Women with recognized toxemia were kept under observation for long periods of time and finally developed convulsions and were delivered by emergency Cesarean; women having convulsions were carried long distances to hospitals and operated on immediately upon arrival—both inexcusable procedures.

Many of the cases resulting in death from hemorrhage were equally mismanaged. In many cases the operation was done after great loss of blood when the patient was in shock, and without transfusion or other treatment for shock.

Unwise selection of anesthetic was frequent. In the cases of Cesarean section for eclampsia ether was the most common anesthetic, and even chloroform was occasionally used (7 cases). Ether was also used in the presence of acute respiratory infection. Local anesthesia was used in surprisingly few cases (19).

The tremendous mortality attending Cesarean sections throughout the United States warrants a careful review of the indications in the choice of operation.

ABORTIONS

Abortion as used in this study may be defined as the termination of a previsible uterine pregnancy. Attempted abortions and inevitable abortions are also included, even if the woman died without actual expulsion of the fetus. The term therefore includes all terminations of uterine pregnancy in the first two trimesters except the very few cases already spoken of that resulted in live births. Abortion thus defined is not the same as the title "Abortion" (no. 143a) in the International List of Causes of Death, which includes premature labor and does not necessarily denote previability.

Deaths certified as due to criminal abortion are assigned to homicide in the International List of Causes of Death, and therefore are not included in "maternal mortality." However, abortions not certified as criminal were not excluded from this study, even if the attending physician knew or was convinced that they were criminal.

Of the 2,381 deaths before the seventh month of gestation, 1,825 followed abortion. Five hundred and fifty-four did not follow abortion, and for 2 it could not be ascertained whether they did or did not follow an abortion. The 554 women whose deaths before they reached the last trimester did not follow abortion had had ectopic pregnancies or died without a termination of pregnancy; a few (32) gave birth to living, and probably viable, children.

The type of abortion was reported in 1,588 of these 1,825 cases. Of these, 794 (50 percent) were induced (other than therapeutic), 589 (37 percent) were spontaneous, and 205 (13 percent) were therapeutic; that is, were done for medical indications.

Of the 1,825 deaths following abortion 1,324 were attributed, according to the international classification, to puerperal septicemia, 290 to accidents of pregnancy, 163 to puerperal albuminuria and convulsions, 44 to puerperal phlegmasia alba dolens, embolus, and sudden death, and 4 to puerperal hemorrhage.¹

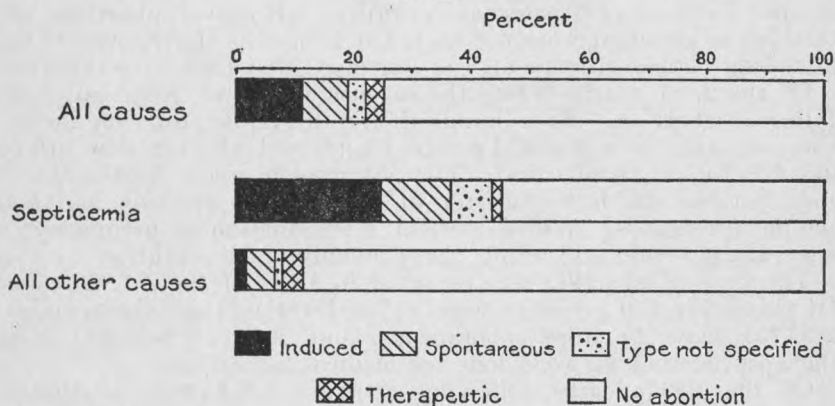
Puerperal septicemia was the cause attributed after interview for deaths of 1,324 (73 percent) of the 1,825 women who died following abortion. These 1,324 deaths from sepsis following abortion constituted 45 percent of the total number of deaths from puerperal septicemia in the study. Ninety-one percent of the deaths following induced abortion, 60 percent of those following spontaneous abortion, and 21 percent of those following therapeutic abortion were due to sepsis. Eighty-six percent of the deaths following abortion for which the type of abortion was not reported were also due to sepsis, this fact suggesting that most of these abortions of unreported type were actually induced abortions.

The period of gestation was reported for 1,461 of the 1,825 cases. In 548 cases it was less than 3 months, in 444 cases 3 months, in 219 cases 4 months, and in 250 cases 5 or 6 months.

¹ According to the 1929 classification 1,324 would be attributed to abortion with septic conditions, about 250 to abortion without mention of septic conditions, and about 200 to other toxemias of pregnancy; the others would remain the same.

A report concerning operations was obtained for 1,777 of the 1,825 cases. Nine hundred and ninety-two (56 percent) had operations of some sort, including 265 of the 583 women who had spontaneous abortions, and 403 of the 778 women who had induced abortions. Of the 205 women who had therapeutic abortions, 38 had other operations as well. The most frequent operation was curettage. Of the women who had spontaneous abortions 212 (36 percent) and of those who had induced abortions 289 (37 percent) had been curetted. Evidently many physicians did not consider fever a contraindication for curettage, for 448 (69 percent) of the 652 women who had had abortions and were curetted were reported to have had fever before the curettage. *Puerperal sepsis caused 94 percent of the deaths of these 448 women*, as compared with 50 percent of the deaths of women who were afebrile before the curettage and 68 percent of the deaths of the women who had no curettage.

CHART VII.—ABORTIONS AMONG WOMEN DYING FROM PUERPERAL CAUSES



Hemorrhage was reported for 328 of the 652 cases in which there had been a curettage. It was absent in 235 cases, and it was not reported on for 89 cases. Of the 1,086 women who died following abortion and who had not been curetted, 430 were reported as having had hemorrhage and 459 as having had no hemorrhage; there was no report for 197.

Pernicious vomiting was given as the principal indication for 112 of the 205 therapeutic abortions. Other toxemias accounted for 52, hemorrhage, placenta previa, or premature separation of placenta for 14, dead fetus for 12, and various other causes for 15.

Married women made up 90 percent of the women whose deaths followed abortion, but abortion was a more frequent cause of death among unmarried than among married mothers, for abortion preceded the deaths of about one fifth of the married mothers and of more than one third of the 509 unmarried mothers included in the study.

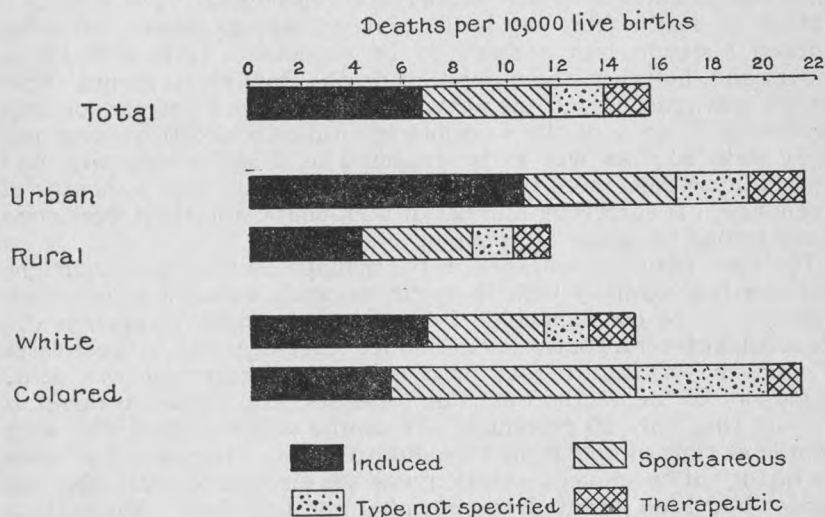
The proportion of maternal deaths that were preceded by abortion increased with the age of the mother up to 30 and then decreased.

The mortality rate for deaths following abortion was higher among the colored than among the white women and among urban

women than among rural women. The difference between urban and rural groups was most marked in induced abortions, for which the mortality rate was 11 per 10,000 live births in urban areas as compared with 4 in rural areas.

The proportion of maternal deaths that followed abortion in the various States ranged from 18 percent in Alabama and Wisconsin to 37 percent in Washington. The variation in the per-

CHART VIII.—MORTALITY RATES FOR DEATH FOLLOWING ABORTION AMONG WOMEN DYING FROM PUERPERAL CAUSES



centage of maternal deaths was greatest for induced abortions, which ranged from 3 percent of all maternal deaths in Alabama to 23 percent in Washington.

Three percent of all the maternal deaths followed therapeutic abortion.

COMMENT BY ADVISORY COMMITTEE

In reading the section on abortion it must be carefully kept in mind that the definition of "abortion" as used in this report is different from that of the international list. In this report the term "abortion" is used to mean the termination of a previable uterine pregnancy.

Undoubtedly among this number of deaths were some due to criminal abortions. If the abortions were known to be criminal and death followed, the deaths were assigned by the Bureau of the Census, according to the International List of Causes of Death, as homicides and were not included in the maternal mortality. It was impossible, however, to separate the known self-induced abortions from possible criminal abortions, and therefore they were included in the figures analyzed.

That one quarter of all the maternal deaths in this study followed some type of abortion is probably the most outstanding finding of the study. The further finding that three quarters of the deaths

following abortion were due to puerperal septicemia is equally significant. As 1,825 deaths followed abortion out of the total of 7,380 deaths in this series, abortion is evidently one of the greatest problems in lowering the maternal mortality of the country.

The large proportion of induced abortions shows a very serious situation. Fifty percent of abortions of known type were induced and 13 percent of all the abortions were of "type not reported", so that many of these may have been induced. The seriousness of this situation is further shown by the fact that 73 percent of the deaths following abortion were due to puerperal septicemia. The high proportion of deaths from sepsis (91 percent) among deaths following induced abortion was perhaps to be expected. It is difficult to understand, however, the number of deaths from sepsis among those having spontaneous and therapeutic abortions, and one cannot help wondering if many of the so-called spontaneous abortions were not really induced. As was to be expected in those women who had induced abortions, more than half were done in the first 2 months of pregnancy. A surprising number of therapeutic abortions were done in the second trimester of pregnancy.

The most frequent operation in the management of these abortions was curettage (usually with sharp instruments, which is a procedure definitely to be condemned). It is clear that many physicians did not consider fever a contra-indication for curettage; yet in those cases in which it was known that fever existed and curettage was done, 94 percent of the deaths were due to sepsis. In marked contrast is the fact that only 50 percent of the deaths of the women who were afebrile at time of operation were due to sepsis. In not a few cases the history of an induced abortion was not discovered until after the patient had been curetted or even after she had died. Evidently a careful history in many of these cases was not obtained.

Hemorrhage was of frequent occurrence in these abortion cases, but the fact that the patient had had a hemorrhage had very little effect on the proportion of deaths from sepsis after curettage in febrile cases.

As pernicious vomiting was the principal indication given for 112 of the therapeutic abortions, it would seem that the physicians had delayed in doing the abortion or had been called in consultation too late to save the patient's life, or else had improper technique.

Analysis of the figures on illegitimacy brings up the whole problem of abortion in unmarried mothers, for abortions accounted for more than one third of the deaths of unmarried mothers in this series.

This study shows very clearly the seriousness of the problem created by the great number of abortions that are induced each year. It also shows that the practice of curetting every patient who has an abortion is common. Physicians must be made to appreciate the seriousness of curetting these potentially septic cases. The management of an abortion calls for the best medical care that can be given, and in many of the cases in this series it is obvious that such care was not given. The abortion problem is a widespread sociological and economic problem, which the medical profession must have help in solving. However, the physician has one great obligation—to teach the public the dangers entailed by abortion, whether spontaneous or induced.

PUERPERAL SEPTICEMIA

Puerperal septicemia, as has been shown (p. 5), was the most important cause of death connected with pregnancy or childbirth. It caused 40 percent of the 7,380 deaths included in the study.

Women who have been weakened by hemorrhage, by eclampsia, or by the exhaustion of a long and difficult labor are an easy prey to infection; and infection is the chief cause of death of women for whom an operative delivery is necessary and who survive the shock of the operation itself. It is also the chief cause of death following abortion from any cause.

From death certificates and subsequent queries of indefinite certificates, 2,827 of the 7,537 deaths studied were assigned by the Bureau of the Census to puerperal septicemia. On interview with the attendant, 110 of these were found to be due actually to other causes; 64 of these 110 were not strictly puerperal and therefore were omitted from the study. Interviews also disclosed that 231 deaths assigned to other puerperal causes were really due to puerperal septicemia, and these deaths were so classified in the study. These changes involve only those cases in which the sepsis, although not mentioned on the death certificate, was diagnosed by the attending physician or in which the history of septic temperature, positive blood culture, or autopsy findings made the change in diagnosis inevitable. This gives a total of 2,948 deaths considered due to puerperal septicemia. *The term "puerperal septicemia" as used in this report means obvious and unmistakable sepsis, and the number of deaths here attributed to this cause is the minimum.*

Of these 2,948 deaths 1,324 (45 percent) were preceded by abortion. Ectopic pregnancy was a factor in 65 cases.¹ Placenta previa was present in 53 cases, and 84 women had other puerperal hemorrhage of such severity that it was considered the principal contributory cause of death. One hundred and sixty-nine women who died of sepsis following delivery were reported to have had postpartum hemorrhage as a contributing factor. Eclampsia or severe toxemia of pregnancy was a principal contributory cause in 168 cases.

Operations aimed at delivery were performed on 573 women who died of sepsis at 7 or more months' gestation. Of these operations, 140 were Cesarean sections. Information as to whether there had been any intrauterine manipulation, such as induction of abortion, operative delivery, or curettage, was obtained for 2,549 of the 2,948 cases of deaths from sepsis. There had been some intrauterine manipulation in 1,546 of these cases, or 61 percent.

The time of this manipulation with reference to the appearance of symptoms of sepsis was reported for 1,526 of these cases. In 748 (49 percent) the intrauterine manipulation had occurred only before

¹ Abortion with septic conditions and ectopic gestation with septic conditions are separate titles in the 1929 revision of the International List of Causes of Death.

the onset of sepsis; in 517 (34 percent) it had occurred after the onset of sepsis; and in 261 (17 percent) it had occurred both before and after. In septic cases of less than 7 months' gestation the intrauterine manipulation before the onset of sepsis was usually the induction of abortion; after the onset it was usually curettage. In the last trimester the manipulation before the onset of sepsis was usually an operative delivery, and the manipulation after the onset of sepsis was usually a curettage.

In the last trimester of pregnancy puerperal septicemia caused the deaths of 1,529 women. Most of these (1,386, or 94 percent, of the women for whom a report as to onset was obtained) had a spontaneous onset of labor. Labor terminated spontaneously in 65 percent of the cases in which information concerning termination was obtained; in 34 percent termination was artificial.

Of the 1,474 deaths of women who had reached the last trimester, for whom there was a report on operations aimed at delivery, 573 (39 percent) had had such an operation. Operations in the last trimester other than those for delivery were far more numerous among women who died of sepsis than among those who died of other causes. Blood transfusion was known to have been performed on 64 women who later died of sepsis and who did not have hemorrhage.

The time between delivery and the appearance of the first symptoms of sepsis was reported in 1,303 of the 1,529 cases of women who died from sepsis after reaching the last trimester. Symptoms of sepsis appeared before the actual delivery in 196 cases (15 percent); within 2 days after delivery in 328 cases (25 percent); between 2 days and a week after delivery in 602 cases (46 percent); and a week or more after delivery in 177 cases (14 percent). The 196 cases in which symptoms of sepsis appeared before the actual delivery were carefully studied for the presumable cause of sepsis. Long labor, early rupture of the membranes, or attempts at delivery were apparently responsible in 53 cases; one or more of these, and some other factor, were responsible in 7 cases. Infectious disease, usually respiratory, at the time of labor was the probable source of sepsis in 38 cases. Macerated fetus was associated with sepsis in 18 cases, pyelitis in 15, gonorrhoea or pelvic inflammatory disease in 11, and some other cause in 22. In 32 cases no probable reason for the development of sepsis was given.

Symptoms of sepsis developed more quickly among the women who had operative deliveries than among those who had spontaneous deliveries. In general, symptoms of sepsis appeared earlier in women who had longer labors. Attendance at birth, technique at delivery, and nursing and aftercare of the patient are of particular interest in these cases of death from sepsis. A larger proportion of the deaths of women who had been attended by midwives were from sepsis than of the deaths of women who had been attended by physicians. Of the 550 women dying at 7 or more months' gestation who had midwife attendance either alone or with a physician or interne, 239 (43 percent) died of sepsis, while of the 4,065 who died after being attended at delivery by physicians, 1,177 (29 percent) died of sepsis.

The delivery technique of the physician in charge was reported in 1,114 cases of women who died of sepsis after reaching the last

trimester. It was said to be aseptic in 445 cases (40 percent). Most of these cases occurred in hospitals. Asepsis was attempted under conditions making its attainment unlikely in 158 cases (14 percent). Ordinary cleanliness was present in 405 cases (36 percent), and in 106 cases (10 percent) ordinary cleanliness was lacking.

More of the women who died of sepsis than of those who died of other puerperal causes had 3 or more vaginal examinations, and a smaller proportion of those who had as many as 3 vaginal examinations had had attendants who used rubber gloves.

Inquiries were made as to the preparation of the patient for operation, and information was obtained as to shaving and scrubbing for 1,348 cases. Of these, 645 (48 percent) had been shaved and scrubbed; 263 (20 percent) were neither shaved nor scrubbed; 428 (32 percent) had been scrubbed only; and 12 (1 percent) had been shaved only. Some antiseptic had been used in 1,094 cases; none had been used in 262 cases. In at least 172 cases women who died of sepsis had been neither scrubbed nor shaved, nor had an antiseptic been used.

Of the 2,948 women who died of puerperal septicemia, 1,950 (66 percent) had had hospital treatment. Only 618 of them, however, were known to have had their delivery or abortion in the hospital. One thousand three hundred and one were known to have had their delivery or abortion outside of the hospital, 25 died undelivered, and for 6 the place of delivery or abortion was not reported. Fatal sepsis developed in the hospital in 420 cases (70 percent) of the 601 women delivered in hospitals for whom the place of development of sepsis was reported, and in 26 cases of women delivered elsewhere. However, at least 69 of these 420 women had had vaginal examinations or other vaginal manipulations before admission to the hospital.

In most cases it was impossible to obtain information whether other septic patients were in the hospital at the same time as were these that died.

There were 898 hospital deaths from sepsis of women who had reached the third trimester; but only 454 of these women were delivered in the hospital, and 105 of the 454 were reported to have had vaginal examinations or attempted operative delivery before admission to the hospital.

The mortality rates from sepsis were higher among the colored than among the white women, and higher in the cities than in the rural areas. This is true of sepsis following delivery as well as of sepsis following abortion.

Deaths from sepsis following abortion make up a large proportion of deaths assigned to puerperal septicemia in the international classification. In the 15 States studied 45 percent of the sepsis deaths followed abortion and 25 percent followed induced abortion. In the separate States the proportion of sepsis deaths following induced abortion varied considerably, being 48 percent in Washington and only 7 percent in Alabama. The mortality rates from septic abortion ranged from 6 deaths per 10,000 live births in New Hampshire to 18 in Washington. The death rates from this condition were low in the New England States of New Hampshire and Rhode Island, and in Wisconsin, Minnesota, and North Dakota, and were highest in Washington, Oregon, and Oklahoma.

COMMENT BY ADVISORY COMMITTEE

That 40 percent of all the deaths in this study were of women who had such obvious and unmistakable signs of sepsis that there could be no question how they should be classified shows clearly the serious condition presented by this cause of maternal death.

The outstanding findings in regard to abortions followed by septicemia have already been commented on in the section on that subject.

No matter how the figures are analyzed, it is clear that the loss of life from sepsis is enormous. That in the last trimester of pregnancy 1,529 women of this series died of sepsis, 94 percent of whom had a spontaneous onset of labor and 65 percent a spontaneous termination of labor, is nothing short of appalling.

In this series of deaths the midwives had a larger percentage of deaths from sepsis than physicians. This fact, however, does not by any means take the onus of this state of affairs from the physicians. Lack of adequate nursing care at home undoubtedly had something to do with these bad results, but the ultimate responsibility for these deaths rests on the delivery technique of the physician. That technique was classed as aseptic in only 40 percent of the cases in which it was reported upon, and these usually occurred in hospitals. The frequency of vaginal examinations without gloves is to be noted, as well as the relative infrequency of rectal examinations. Preparation of the patient in the majority of the cases was inadequate. It is not surprising to find that under these conditions sepsis developed much earlier in operative cases than in spontaneous deliveries. It is also to be noted that in cases of long labor signs of sepsis appeared earlier.

The deaths of 420 women delivered in hospitals from sepsis that developed in the hospital show clearly that the technique in the hospitals was unsatisfactory.

In many of the septic deaths classified as abortions the physician surely cannot be held responsible. It is admitted that many were induced, and there is no way of telling how many of the so-called spontaneous abortions also were induced. Moreover, infection was present in many of these cases when the physician was called. But the frequency with which curettage was done on these septic cases is not justifiable.

In the cases in the last trimester there is no such excuse for the bad results obtained as may be offered in the abortions. Complications were present in many instances in the last trimester, and operative procedures were necessary, but these facts do not excuse the physicians for the poor technique which they themselves admitted.

What is the reason for the existence of this condition? It is due to lack of proper teaching of obstetrics in some of the medical schools, lack of opportunity to deliver a sufficient number of normal cases, and almost total lack of experience in the simplest obstetric operating, or else it is due to the willful disregard by careless physicians of the fundamentals of asepsis.

The large number of fatal cases of puerperal infection are in the majority of instances due to infection that is introduced from

without. Its prevention, therefore, lies in carrying out proper obstetric procedures, consisting chiefly of proper aseptic technique and carrying out only definitely indicated obstetric operations. It must be remembered, however, that there are a certain number of cases of puerperal infection which are endogenous in character; that is, they are due to organisms which the patient harbors chiefly in her birth canal. This type of infection forms another obstetric problem.

PUERPERAL PHLEGMASIA ALBA DOLENS, EMBOLUS, SUDDEN DEATH¹

Three hundred and thirty-seven deaths were assigned to puerperal phlegmasia alba dolens, embolus, sudden death, from information given on death certificates. At the interview with the attending physician 48 of these deaths were attributed to other puerperal causes, most of them to puerperal sepsis or puerperal hemorrhage, and 3 to nonpuerperal causes. But 58 deaths were added to these as a result of additional information or as a result of the physician's change of opinion.

Not all deaths for which this cause is given on the certificates are so assigned in the international classification, for certain other causes take precedence over this classification. There were 242 deaths assigned to puerperal causes for which puerperal phlebitis or embolus was given as the principal contributory cause of death. For 123 of these the primary cause of death was puerperal sepsis. An autopsy was performed in only 25 cases.

Of the 344 deaths attributed after interview to phlegmasia alba dolens, embolus, sudden death, 303 were attributed to embolism, 10 to thrombosis, 10 to phlegmasia alba dolens, and 21 to sudden death. Phlebitis was diagnosed either clinically or at autopsy in 52 of the 303 cases in which death was thought due to embolism. Of these 303 deaths, 10 occurred during delivery. The diagnosis can be questioned particularly in these cases, but in one case embolism was proved by autopsy.

Of the 303 women whose deaths were attributed to embolus, 220 were said to have had respiratory distress, 41 were said not to have had it, and for 42 there was no information on this point. Cyanosis was reported present in 197 cases, 53 were reported as not cyanotic, and for 53 there was no report. That the absence of reported cyanosis or respiratory distress does not rule out embolism is shown by a case in which an autopsy was done, and a large embolus was found in the left pulmonary artery.

Abortions preceded 44 of the 53 deaths at less than 7 months' gestation. The abortion was said to have been spontaneous in 25 cases, induced in 13, therapeutic in 4, and of unknown type in 2 cases.

The deaths of 291 women who died after reaching the last trimester were attributed to phlegmasia alba dolens, embolus, sudden death. Of these women, 12 died undelivered. For 7 the termination of labor was not reported. Of the 272 who were delivered, delivery was spontaneous for 203 (75 percent) and artificial for 69 (25 percent). In 40 cases phlegmasia alba dolens, embolus, sudden death was given as the principal contributory cause where the death was attributed to Cesarean section or other operative delivery.

¹This title, no. 147 in the 1920 revision of the International List, is no. 148 in the 1929 revision, without change of name or content.

Death occurred within the first day after delivery in 33 percent of the 316 cases for which the interval between delivery or abortion and death from phlegmasia alba dolens, embolus, sudden death was reported, and within the first week in 46 percent. Twenty-nine percent of the deaths took place in the second week, 9 percent in the third week, 8 percent in the fourth week, and 9 percent in the fifth week or later.

COMMENT BY ADVISORY COMMITTEE

Little comment on this section is necessary. This number in the international list may cover many deaths of uncertain cause. A death certificate under this heading is oftentimes accepted without proper understanding of the circumstances of the death.

Twenty-five percent of the women who reached the last trimester died following operative delivery. Some had symptoms clearly suggestive of embolism, but in others the history obtained was of ruptured uterus. Many of the spontaneously delivered patients showed the classical symptoms of embolism with no demonstrable phlebitis. Thrombosis and embolism are the results of infection; and so far as infections are preventable, thrombosis and embolism are preventable.

TOXEMIAS OF PREGNANCY

Thirty percent (2,221) of all the deaths in the study were preceded by some presumably toxic condition as the chief cause or the chief contributory cause. Most of these deaths—1,900, or 26 percent of the total—were due to puerperal albuminuria and convulsions (no. 148 in the International List of Causes of Death), and 220 that were attributed to other primary causes had albuminuria and convulsions as the principal contributory cause. Sixty-one deaths were attributed to pernicious vomiting of pregnancy, and 40 more that were attributed to causes other than albuminuria and convulsions had pernicious vomiting as the chief contributory cause.¹

Deaths resulting from the toxemias of pregnancy are assigned in the International List of Causes of Death to various numbers, most of them, as has been noted, to puerperal albuminuria and convulsions. According to the definite rules of classification, some death certificates on which the cause would otherwise be assignable to puerperal albuminuria and convulsions are assigned to puerperal septicemia, puerperal hemorrhage, ectopic gestation, or ruptured uterus, when these conditions accompany the toxemia. For the same reason, because chronic nephritis takes precedence over certain puerperal causes, a number of deaths of pregnant or parturient women from this cause are lost entirely to the puerperal group. Deaths from acute yellow atrophy of the liver are likewise omitted from the puerperal group unless puerperal septicemia appears on the death certificate.

PUERPERAL ALBUMINURIA AND CONVULSIONS

Puerperal albuminuria and convulsions (no. 148 of the international list) was the cause of the death of 1,900 women—26 percent of all those included in the study. As a puerperal cause of death it was exceeded in importance numerically only by puerperal septicemia. In the last trimester of pregnancy it was of equal importance with puerperal septicemia, each accounting for 31 percent of the deaths at or after 7 months' gestation. Among the rural women, both white and colored, after 7 months' gestation, it was a cause of death of numerically greater importance than sepsis.

The 1,900 deaths were finally attributed to the group albuminuria and convulsions, after interview with the physicians in charge of these patients. Physicians had certified 2,006 deaths as due to this cause, but the interviews showed incomplete or incorrect information for 180, which were therefore not included; 74 deaths, however, were added to this group after interview.

No attempt at pathological classification of these deaths was made. Convulsions were known to have preceded the deaths of 1,305 of the 1,900 women. Five hundred and twenty-one had no convulsions, and in 74 cases information as to convulsions was not obtained. In 130 cases the toxemia was a pernicious vomiting of pregnancy.

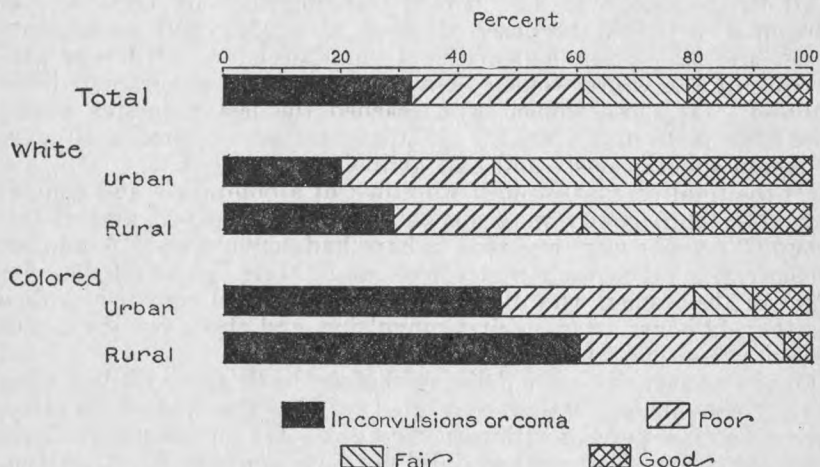
¹ In the 1929 revision of the International List the toxemias are divided into puerperal albuminuria and eclampsia (no. 146) and other toxemias of pregnancy (no. 147), which includes pernicious vomiting.

Death occurred in the first or second trimester in 338 cases, and in the third trimester in 1,549 cases; in 13 cases the duration of pregnancy was not known.

A few of these cases seemed to be true cases of fulminating eclampsia, fatal convulsions developing a few days after a thorough examination at which nothing abnormal was found, but *the great majority of toxemic deaths were of women who lacked some or all of the ordinary safeguards.* Approximately one half of the 1,756 women who died of puerperal albuminuria and convulsions after the second month of pregnancy and for whom a report as to prenatal care was obtained had presented themselves for prenatal care, but only 12 percent of the total had received good care.

After the patient was seen by the physician the cooperation of the patient was said to have been good in a little more than one half of the cases in which a report on this point was obtained. It is of interest to note that *about one third of the women who died of albuminuria and convulsions could not have cooperated, because they were in convulsions or in coma when first seen by a physician, or they were not seen by a physician before death.*

CHART IX.—CONDITION WHEN FIRST SEEN BY PHYSICIAN OF WOMEN WHO DIED FROM PUERPERAL ALBUMINURIA AND CONVULSIONS



In 1,723 cases the condition of the patient when she was first seen by a physician was known. Of these women, 546 (32 percent) were in coma or were having or had had convulsions; 508 (29 percent) were otherwise in poor condition; 313 (18 percent) were in fair condition; and only 356 (21 percent) were in good condition.

Thirty-six percent of the women who died in the rural areas as compared with 25 percent of those in urban areas were in coma or had had convulsions when first seen. Fifty-six percent of the colored women and 25 percent of the white women were in this condition. It must be noted that only 54 percent of the urban white, 39 percent of the rural white, 20 percent of the urban colored, and 11 percent of the rural colored women who died of albuminuria and convulsions were in good or even fair condition when first seen by a physician.

One thousand and twenty-nine (54 percent) of the 1,900 women whose deaths were attributed to albuminuria and convulsions were hospitalized, 869 (46 percent) were not, and for 2 cases this information was not reported. The great majority of the patients who were sent to the hospital did not reach it until they were in a serious condition. One hundred and thirty-eight were sent to a hospital or were already in a hospital on the first appearance of symptoms. Of the 866 women who were not hospitalized until they were in a serious condition, only 157 were reported to have been put to bed at home at the first appearance of symptoms. More of the white women who died than of the colored had had hospitalization and bed treatment. A number of the women who were sent to the hospital early improved under treatment and were allowed to go home and later returned in convulsions.

Operative delivery comprised part or all of the treatment of many of the women. Twenty-six percent of those who died after reaching the last trimester had an artificial onset of labor. This includes 224 women who had labor induced mechanically, 146 who had Cesarean section when not in labor, 10 who had medical induction, and 3 for whom the exact method was not reported. Fourteen percent died before the onset of labor.

Of the women who died before reaching the last trimester, 47 percent died before the onset of labor, 21 percent had spontaneous onset, and 32 percent had artificial onset of labor. A larger proportion of the white women than of the colored women had labor induced. Of those women who reached the last trimester nearly one fifth died undelivered. Of the remainder about half were delivered spontaneously and half artificially.

Of the total of 1,900 women who died of albuminuria and convulsions 437 (23 percent) were not delivered before death, and of this group 69 percent were reported to have had convulsions. A number of patients died in their first convulsion. More than half (56 percent) of the women who died undelivered and had convulsions died less than 12 hours after the first convulsion, and about two thirds (63 percent) less than 24 hours afterward.

Of the women who were delivered before death and who died after having convulsions, 90 percent died within the first week after delivery and 56 percent within the first day. Of the women who were delivered before death and who did not have convulsions, 63 percent died within the first week and 31 percent within the first day.

Of the women who were delivered in the last trimester 807 gave birth to liveborn and 457 to stillborn children. Eighteen mothers had 1 liveborn and 1 stillborn twin. No data were obtained, however, as to the survival of these children.

Puerperal albuminuria and convulsions caused 36 percent of the deaths of primiparæ and 21 to 24 percent of the deaths of women in subsequent pregnancies. Of primiparæ less than 20 years of age it caused 41 percent of the deaths.

Both the percentage of total deaths due to puerperal albuminuria and convulsions and the rate per 10,000 live births were higher among the colored than among the white women. The highest death rates from this cause among the white women were in Alabama and New Hampshire, the lowest in Wisconsin and Minnesota.

Among the colored women in the States having 2,000 or more colored births annually, the highest rates were in Alabama and Oklahoma, the lowest in California and Maryland.

The death rate from this cause was, in general, higher in the urban than in the rural areas.

PERNICIOUS VOMITING

Although pernicious vomiting of pregnancy was the primary cause of death given for only 61 of the 7,380 women included in the study, it was a contributing factor in 191 other cases. Nearly all the women whose deaths were associated with pernicious vomiting died before the seventh month, and most of them died before the fifth month.

The duration of the vomiting before the physician was called was given in 164 of the 252 cases. It had lasted less than a week in 49 cases, from 1 to 2 weeks in 24 cases, from 2 to 4 weeks in 28 cases, and 4 weeks or longer in 63 cases. Ninety-three of these cases were said to have been in poor condition when first seen.

The condition that 227 of these 252 women were in when they were first seen by the physician was noted. Twenty-nine women were said to have been in good condition, 62 in fair condition, 136 in poor condition.

Pregnancy was interrupted artificially for 121 women. Labor or abortion took place spontaneously in 47 cases, and 82 women died without labor or abortion. Operation was known to have been refused by 19 of the 127 women dying without operation whose deaths were associated with pernicious vomiting. A few of these women had a spontaneous abortion. There were also other patients who refused interruption of pregnancy for varying periods, and finally consented to operation only when they were in very poor condition.

Of the 112 women with pernicious vomiting who had therapeutic abortions, 16 died of sepsis.

COMMENT BY ADVISORY COMMITTEE

The chief method of attack against the severe toxemias of pregnancy is conceded to be their early detection and control. For this it is necessary to have continuous intelligent medical supervision of the prospective mother from early in pregnancy, early recognition of untoward symptoms, prompt and judicious treatment of symptoms as they appear during pregnancy as well as during and after actual delivery of the patient, and the cooperation of the patient. It is true that a few patients developed toxemias and died who apparently had all these safeguards. A small number of these seemed to be true cases of fulminating eclampsia—fatal convulsions developing a few days after a thorough examination at which nothing abnormal was found. Evidently, in the present state of medical knowledge, death from toxemia cannot be entirely prevented. But the vast majority of toxemic deaths were of women who lacked some or all of the safeguards mentioned.

For many of the toxic deaths studied the physician was not responsible because he saw the patient for the first time when the condition was already acute or because the patient failed to follow

his advice. Three fifths of the women were in convulsions or coma or otherwise in poor condition when the physician saw them for the first time. Moreover, some of the women were seen early in pregnancy and advised concerning prenatal care—but the advice was not accepted. Others were seen in the preclamptic stage and induction of labor was advised—and the advice was not accepted. Evidently there is great need for the education of patients and families.

On the other hand, the study reveals serious conditions for which the physicians were responsible. Even though the occurrence of toxemia cannot be entirely prevented, many of the deaths from this cause can and should be prevented by the early recognition of symptoms and prompt and judicious treatment by the physician in charge. Some of the women (12 percent) had had what could be considered as good prenatal care, and the symptoms of approaching toxemia were promptly recognized during the latter part of gestation, but treatment was at fault. Induction of labor (as distinguished from accouchement forcé) was done in surprisingly few of these cases. Prenatal care, so far as the toxemias of pregnancy are concerned, will not save lives unless good clinical judgment and treatment are used.

The number of women who died during the first convulsion was rather surprising. Probably many more women die in this way than is realized.

Probably it is now generally conceded that radical treatment in eclampsia is never indicated except in the best environment and with proper anesthetic. The dire results of teaching radical treatment for eclampsia were manifest—almost universal resort to immediate operative interference in all kinds of cases and by all kinds of practitioners. Cesarean section seemed to be too often regarded as proper treatment for eclampsia. Oftentimes the sections were done without regard to the profound shock from which many of the patients were suffering and without due consideration for the proper anesthetic. Operative interference of all sorts was frequent, even in the cases of multiparous women; a majority of the operations were done under general anesthesia, ether being used commonly and even chloroform occasionally. Epigastric pain, which is a prodromal symptom of eclampsia, was occasionally observed, and was almost always treated as acute indigestion. There were more than occasional instances in which rising blood pressure was noted, but its importance evidently was not realized. In many cases treatment other than vague advice as to diet, or the prescription of a diuretic, was far from prompt. In other cases (202) the treatment was an immediate accouchement forcé, which, though prompt, would be called judicious by no leader in obstetric thought today.

Few of these women were treated along the conservative lines now accepted—with fluids, glucose, magnesium sulphate, and morphine or other sedative and induction of labor. There can be no question that failure to institute prompt treatment and the injudicious treatment they did receive contributed to many of the deaths. It is evident, therefore, that some safe, conservative treatment for eclampsia should be agreed upon and that knowledge of it should be widely disseminated.

PUERPERAL HEMORRHAGE

Puerperal hemorrhage accounted for 791 deaths (11 percent) of the total deaths of this study. This includes 347 deaths attributed to placenta previa (no. 144*a* of the International List) and 444 deaths attributed to no. 144*b*, which includes postpartum hemorrhage and accidental hemorrhage.¹ Of these 444 deaths 374 were from postpartum hemorrhage and 70 from premature separation of the placenta, adherent placenta, or undefined puerperal hemorrhage.

Puerperal hemorrhage was definitely related to both parity and age. *Among primiparæ this condition caused 7 percent of all deaths as compared with 13 percent among multiparæ.* It caused 5 percent of the deaths of primiparæ under 20 years of age and 15 percent of the deaths from 35 to 39 years. Among the multiparæ 8 percent died from puerperal hemorrhage in the group under 20 years of age, 16 percent in the group from 35 to 39 years. The percentage of deaths from puerperal hemorrhage rose rapidly from 7 for primiparæ to 10 for women in their second pregnancy and to 13 for women in their third pregnancy, and rose again to 17 percent in the seventh pregnancy, 22 percent in the eighth pregnancy, and 24 percent in the ninth pregnancy. It caused 21 percent of the deaths of women having 10 or more pregnancies.

Puerperal hemorrhage caused a slightly larger proportion of the deaths in rural areas (12 percent) than in urban areas (10 percent). It caused a larger percentage of deaths among the white women than among the colored, but the maternal mortality rate (deaths per 10,000 live births) from puerperal hemorrhage was higher for the colored than for the white women.

PLACENTA PREVIA

For 347 of the 408 women who were known to have had placenta previa, it was given as the primary cause of death. Fifty-three of the 408 deaths were attributed to puerperal septicemia and 8 to other causes. Of these 408 women who were known to have had placenta previa, 327 had some bleeding before the onset of labor, 38 had no bleeding then, and for 43 it was not known whether or not there was hemorrhage before the onset of labor. In 310 cases of bleeding before the onset of labor for which the extent of bleeding was ascertained, it was scanty in 44 cases, moderate in 82 cases, and profuse in 184 cases.

The bleeding was said to have begun before the thirteenth week in 7 cases, from the thirteenth to the twenty-fifth week in 31 cases, from the twenty-sixth to the thirty-ninth in 201 cases, and in the fortieth week in 49 cases; in 39 cases the week in which the bleeding began was not reported.

¹ Puerperal hemorrhage (no. 144) remains the same in the 1929 revision of the International List.

The first hemorrhage—occurring in some cases before the onset of labor and in others at the beginning of labor—was said to have been dangerously profuse in 107 of the 408 cases, *in 236 cases there had been a warning hemorrhage earlier in pregnancy*, and in 65 cases there was no report as to warning hemorrhage. It was reported that the warning hemorrhage resulted in prompt treatment for the placenta previa in 18 cases, but that *in 216 cases treatment was delayed*. Of the 107 who had no warning, it was reported that 87 had prompt treatment, 14 had delayed treatment, and 3 died at once without time for treatment. In all, 239 women were reported to have had delayed treatment. The delay was apparently due to the physician in 129 cases, and to the patient, her family, or circumstances in 110 cases. At least 9 women died without medical attention. In 46 cases the physician did not arrive until the patient was moribund, but in 351 cases there had been earlier medical care.

Of the 408 women who died following placenta previa, a report concerning operations for delivery was obtained for all but 7. Three hundred and twenty-five (81 percent) were known to have had some operation aimed at delivery. About half (207) of the women were reported to have been delivered by some form of version, in 124 cases preceded by artificial dilatation of the cervix. This was nearly always a version with immediate extraction. In only 2 of these 207 cases was there said to have been a Braxton Hicks version without immediate extraction. Cesarean section was the method of delivery in 41 (10 percent) of the cases. It was done upon at least 7 women who had been packed before admission to the hospital. A forceps operation alone or in combination with some operation other than version was used in 33 cases (8 percent), and dilatation of the cervix—usually manual or bag dilatation—was the only operation for delivery in 17 cases (4 percent). Only 27 of the 408 women were known to have had a blood transfusion.

The uterus was reported packed postpartum in 31 cases. It was apparently done as a routine procedure in only 6 cases. In the other 25 cases the packing was done after the onset of a postpartum hemorrhage.

A ruptured uterus was diagnosed by the attending physician after treatment in 3 cases of death associated with placenta previa.

There was a report on postpartum hemorrhage in the cases of 335 women whose deaths were associated with placenta previa and who had been delivered in the third trimester. Of these women, 156 had a postpartum hemorrhage.

Of the 347 women whose deaths were assigned to placenta previa, 50 women died undelivered, and the rest died soon after delivery.

The interval between delivery and death was reported for 290 women. Of these, 88 percent died less than a day after delivery, and 97 percent died within the first week.

OTHER PUERPERAL HEMORRHAGE

Puerperal hemorrhage other than placenta previa caused the deaths of 444 women, 443 of whom were known to have reached the last trimester. Of these 443 women the termination of labor was reported for all but 10. It was spontaneous in 249 cases and artificial in 178 cases; the patient was undelivered in 6 cases.

Of the 444 women 374 died from postpartum hemorrhage and the other 70 from adherent placenta, premature separation of the placenta, or some bleeding during or after labor the exact cause of which was unknown.

Postpartum hemorrhage

In addition to the 374 deaths of which postpartum hemorrhage was the primary cause, it was present as a complication in the deaths of 519 other women, so that 893 women, or 21 percent of the 4,188 who died after reaching the last trimester of pregnancy and for whom a report was made on this condition, had postpartum hemorrhage. Of the 374 women dying of postpartum hemorrhage, 50 had no physician at the time of delivery; in 185 cases the physician did not leave the patient until after her death, and in 94 cases the patient's condition was satisfactory when he left; in 28 cases she was in unsatisfactory condition, and in 17 cases a statement as to her condition or as to attendant was not made.

Of the 893 women who had postpartum hemorrhage (including those whose deaths were assigned to other causes), only 78 were known to have had a blood transfusion.

Premature separation of the placenta

The diagnosis of premature separation of the placenta was made by the attending physician in 106 cases. In 21 cases the delivery was spontaneous; in 31, there was manual dilatation, usually followed by forceps or version; in 24, forceps or version without manual dilatation; and in 17, Cesarean section. In 8 cases there was some other method of delivery, in 2, the method of delivery was not reported, and in 3, the patient died undelivered.

The uterus was known to have been packed after delivery in only nine cases.

The women whose deaths were associated with premature separation of the placenta were, in general, older and had had more pregnancies than the total group included in the study. Eighteen percent of these deaths were among primiparæ; 69 percent were known to have had three or more pregnancies.

Eighty of the one hundred and six women were delivered operatively, but in 21 cases the deliveries were reported as spontaneous; 3 died undelivered; and for 2 there was no report.

COMMENT BY ADVISORY COMMITTEE

If the onset of hemorrhage in placenta previa were accompanied by pain, patients would apply for treatment sooner and would not be content with inactivity on the part of the physician. Of 236 cases in which warning bleeding occurred, it was ignored by the patient or by the physician in 216, and in more than half these cases it was the physician who was responsible for the delay. Even among the 107 cases in which the first hemorrhage was profuse, and it could therefore be said that no warning was given, there were a few cases of delayed treatment, for a small number of which the physician was responsible. Placenta previa is not a condition that can safely be treated expectantly.

A Braxton Hicks version, which is of greatest use to control bleeding, was rarely done, but manual dilatation of the cervix with internal podalic version and immediate extraction was done many times. The frequent occurrence of rupture of the uterus, tears, hemorrhage, shock, and immediate death illustrates the seriousness of these procedures and the fact that they are not proper in the treatment of placenta previa. So many of these women died immediately after delivery that relatively few lived long enough to die of sepsis; as it was, 53 died of sepsis.

Treatment for shock in connection with hemorrhage was rarely mentioned in the histories as given in the schedules. Fluids of any sort were infrequently used. That the buttocks of the child could be used to control hemorrhage and that shock could be treated at this time, the labor being terminated by the patient's own efforts, was apparently seldom thought of.

Many women with placenta previa died of hemorrhage after labor. Only 31 of the women were packed after delivery. This would suggest that if proper packing were at hand it would be used more often, and certainly blankets and sheets would not be used as emergency packing, with later death from sepsis.

Unfortunately rupture of the membranes was seldom done in the appropriate cases of lateral placenta previa.

Long distances and bad roads would seem to have contributed to some of the deaths from placenta previa.

It should be emphasized that Cesarean section is contraindicated in the treatment of placenta previa when the patient is suffering from shock or hemorrhage or potential or actual sepsis. If dirty packing had previously been used or if there had been mismanagement of any sort, the delivery should be by vagina whenever possible. But in this study the Cesarean sections for placenta previa were not limited to cases in which the mother and baby were in good condition. The operation was often done after great loss of blood and without coincident blood transfusion, though transfusion would doubtless have been given more frequently if equipment for blood typing and for giving the transfusion had been at hand. The Cesarean sometimes followed dirty packing done before the women were admitted to the hospital. Naturally many women who did not die at once from shock and hemorrhage died from sepsis.

The treatment of placenta previa is to control bleeding and treat shock and acute anemia; it is not to effect the immediate delivery of the fetus, except as a means to this end in properly selected cases.

In the cases diagnosed as placental separation also, shock, even when severe, did not seem to be sufficiently considered in determining treatment. Only one fifth of the women in this group had spontaneous deliveries. About one half the women in the group were delivered immediately.

The frequent use of pituitrin before delivery in cases of women who later died of puerperal hemorrhage other than placenta previa is worthy of comment.

OTHER ACCIDENTS OF LABOR, INCLUDING RUPTURE OF THE UTERUS

OTHER ACCIDENTS OF LABOR

Of the 7,380 deaths in the study, 652 were attributed after interview to "other accidents of labor" (no. 145 of the international list). Of these 652, 136 deaths were attributed to Cesarean section (no. 145*a*); these deaths have already been discussed. One hundred and nine deaths were attributed to instrumental delivery and other operative procedures (no. 145*b*). These were not deaths resulting from hemorrhage, sepsis, or toxemia but were thought by the attending physician to be due to shock, exhaustion, or embolism.

The remaining 407 deaths were attributed to "others" under the title "other accidents of labor" (no. 145*c*). Sixty-five of these were attributed to no. 145*c1*, which includes rupture of uterus or bladder during delivery. Sixty-three of these were due to ruptured uterus and will be taken up later. Forty-six were attributed to no. 145*c2*, a group including deaths said to be due to difficult or abnormal labor, faulty presentation, inversion of the uterus, or similar causes. The immediate cause of death in these cases was usually thought to be either shock or exhaustion. There was a group of 296 deaths about which so little was known that it was not possible to attribute them to a more definite cause than "others under this title" (no. 145*c3*). This also includes deaths in which influenza, pneumonia, and certain other diseases complicated an otherwise fairly normal childbirth.¹

In this latter group there was a report on intercurrent disease for 203. One hundred and thirty-seven (67 percent) of these had some intercurrent disease, and 66 (33 percent) had none. Not only intercurrent disease during pregnancy but various complications after delivery contributed to some of these deaths. Influenza, various types of pneumonia, cardiac disease, cerebral hemorrhage, intestinal obstruction, and anemia were given as nonpuerperal contributory causes of death in 242 of the 296 cases.

RUPTURE OF THE UTERUS

In addition to the 63 deaths attributed to ruptured uterus (no. 145*c1*) 28 had a diagnosis of ruptured uterus made by the attending physician or at autopsy—a total of 91 out of the 7,380 deaths included in the study. Of these 28 deaths 17 were attributed to puerperal septicemia, 5 to puerperal hemorrhage, and 6 to accidents of pregnancy.

¹ In the 1929 revision of the International List of Causes of Death, other accidents of labor (no. 145) becomes other accidents of childbirth (no. 149), consisting of Cesarean section (no. 149*a*), and others under this title (no. 149*b*). Rupture of uterus or bladder is now no. 149*b1*; the conditions formerly grouped under nos. 145*b*, 145*c2*, and 145*c3* are now included in no 149*b2*.

Ten of these 91 women were primiparæ, and 77 were multiparæ; the parity of 4 was not reported.

Six of these women were not in labor. One had a rupture of a uterine sinus as shown by autopsy; 2 had had previous Cesarean sections; there was no adequate explanation for the other 3. Fifteen of the patients had been in labor less than 6 hours; the others varied to 36 hours or more. In 8 cases a Cesarean section had been done in a previous pregnancy.

The type of presentation was reported for 78 of the 91 cases; it was vertex in 59 cases, face in 6 cases, breech in 6 cases, and transverse in 7 cases.

There was a report as to the use of pituitrin in 75 cases. It was not used in 36 cases and was used for induction in 1 case; in the first stage, in 10 cases; in the second stage, in 13 cases; in the third stage or postpartum only, in 14 cases; and at an unreported stage, in 1 case.

Of the 91 women, 64 had an operation for delivery and 27 did not; 15 of these 27 died undelivered and 12 were delivered spontaneously. As some of the operations were unsuccessful, 6 of the 64 who had operations for delivery died undelivered.

There were many other cases in which the symptoms suggested ruptured uterus, although the attending physician had not made the diagnosis. A careful study of the schedules showed that the history pointed clearly to ruptured uterus in 68 cases and made such a diagnosis probable in 109 other cases.

INVERSION OF THE UTERUS

Twenty cases of inversion of the uterus were reported. In three of these cases the condition was not discovered until necropsy was done. Whether these cases are a true index of the frequency of this complication cannot be stated, for there were many unexplainable deaths that occurred in severe shock, some of which may have been due to this condition.

The causes of death were as follows: Postpartum hemorrhage, 13; accidents of labor, 5; sepsis, 1; embolism, 1.

COMMENT BY ADVISORY COMMITTEE

A satisfactory analysis of the deaths in this miscellaneous group of 652 cases, "other accidents of labor", is difficult. This is true particularly of the largest subgroup of 296 "other" deaths, although here the nonpuerperal contributory causes of death play an important part.

It is a well-recognized fact that the diagnosis of a rupture of the uterus is not always made in spite of the suggestive history that is often obtained. This statement is supported by the relatively small number in this series of cases so diagnosed and the many probable ruptures not so diagnosed by the attending physician which were revealed by careful study of the schedules. Though spontaneous rupture is uncommon, the possibility of its occurrence, especially when a previous Cesarean section has been performed, must be kept in mind. The relative infrequency of this accident in

primiparæ is conclusively shown in this series. Abnormal presentations were common. However, many of the ruptures followed apparently needless, and certainly premature, interference with labor.

Study of the case histories of the women whose deaths were caused by rupture of the uterus emphasizes the need for further education of physicians regarding the danger of pituitrin. The use of pituitary extract during labor is still causing maternal deaths from rupture of the uterus.

Although inversion of the uterus was reported as a cause of death in but 20 cases, some of the unexplainable deaths may have been caused by this condition. For, unless the physician in charge is alert and keen, an inversion may be overlooked.

ECTOPIC GESTATION

Of the 7,380 maternal deaths ectopic gestation was associated with 314 (4 percent). Two hundred and forty-nine of these were attributed to accidents of pregnancy (no. 143 of the International List), 248 to ectopic gestation (no. 143*b*), and 1 (a case of ruptured cornual pregnancy) to "others under this title" (no. 143*c*). The other 65 patients developed sepsis, and their deaths were accordingly attributed to puerperal septicemia.¹

The deaths reported to be associated with ectopic gestation were more frequent in urban than in rural areas of the States, 194 occurring in urban areas and 120 in rural areas. In every State except Nebraska and North Dakota, the mortality rates from deaths associated with ectopic gestation were higher in urban than in rural areas. The mortality rate for white women was less than for colored women. These rates are probably minimum because the differences in the mortality rates from ectopic gestation in the various States are influenced by the opportunity for exact diagnosis.

Of the 314 women whose deaths were known to be associated with ectopic gestation, 4 had no medical care by a physician, and 44 were seen by a physician only when moribund. Two hundred and sixty-three, however, had been under the care of a physician for a time. For 3 medical care was not reported. Of the 314 women, 253 (81 percent) received hospital care.

The parity was reported for 262 of the 314 women. Of these, 93 were primigravidæ and 169 were multigravidæ.

The period of pregnancy at which symptoms began was reported in 239 of the 314 cases. Symptoms were noted by the third month in all instances in which a report was obtained. In 30 cases symptoms began before the fourth week, from the fourth to the sixth week in 39 cases, from the sixth to the ninth week in 116 cases, from the ninth to the thirteenth week in 38, and at 3 months in 16.

Two hundred and four of the 314 women were operated on for this condition, but 109 died without operation. Twenty-six of the 204 operations were described as elective, 175 as emergency, and there was no report on 3.

Sixteen percent of the women operated on for ectopic gestation for whom duration of symptoms was known had had symptoms for less than a day, 43 percent for less than a week, and 35 percent from 1 to 3 weeks. Twenty-three percent had had symptoms for 4 weeks or more. Of the 26 women who died after elective operations, 17 were known to have had symptoms for more than a week. The duration of the symptoms of the other 9 was not reported. Of the 86 women who died without operation and for whom duration of symptoms was reported 34 percent had had symptoms for less than a day and 60 percent for less than a week.

In all but one case the operation performed was a laparotomy, and in this case there was a puncture of the posterior cul-de-sac only.

¹The 314 would all be included in ectopic gestation (no. 142) of the 1929 revision, 65 in no. 142*a* "with septic conditions specified" and 249 in no. 142*b* "without mention of septic conditions."

Six women had a hysterectomy done, and three of the women who had an ectopic pregnancy of 7 or more months' gestation had dilatation of the cervix in an attempt to bring on labor.

Eighty-six of the women who died following ectopic gestation had other operations. Only 36 of the 314 women had blood transfusions. Eight of the women who died following ectopic gestation had had attempts at induced abortion in the present pregnancy, and five of them died of sepsis.

In 12 cases the period of viability of the child was reached, the diagnosis being made either at operation or at autopsy in 6 cases. One living child was delivered. The abdominal pregnancy was discovered in the course of an operation that was intended to be a Cesarean section with appendectomy.

COMMENT BY ADVISORY COMMITTEE

Ectopic gestation is more frequently reported as a cause of death in urban than in rural areas. But when one considers the nature of this complication and the fact that it was given as the cause of death for only four women who died without medical care, it is fair to assume that, especially in the rural areas, some of the deaths from this condition are not recognized and the cause of death is not properly assigned. This assumption is further supported by the fact that in those States where hospitalization was more frequent the diagnosis of ectopic gestation was made more frequently.

Of the 314 women whose deaths were known to be associated with ectopic gestation, 4 had no medical care and the condition was discovered at autopsy, and 44 were moribund when first seen. Eighty-one percent of these cases received hospital care. It is interesting also to note the large percentage of these cases that occurred in multigravidae. It is likewise surprising to find that 109 of these women died without operation. As is to be expected, a very large percentage of the others had emergency operations.

The fact that only 36 of these 314 women had blood transfusions shows that this life-saving procedure was not available in many of these cases, for if it had been it undoubtedly would have been used.

That emergency operating was common and that the deaths of 65 of these patients were classified as due to puerperal septicemia makes it very clear that the operative technique must be as perfect as is possible if deaths from sepsis are to be avoided. The removal of the appendix in cases of ruptured ectopic is a dangerous procedure and adds to the deaths from sepsis. (There were 11 such cases.) It has long been recognized that the opening of the gut when there is much blood in the peritoneal cavity should be avoided.

A review of the duration of symptoms suggestive of ectopic pregnancy before the operation was performed shows that only 16 percent of these cases had symptoms less than a day, while 43 percent had symptoms for a week, 35 percent had symptoms for 1 to 3 weeks, and 23 percent had symptoms for 4 weeks or more. These figures show clearly that in many cases the symptoms of the serious condition of ectopic pregnancy were ignored.

RECOMMENDATIONS BY ADVISORY COMMITTEE

Maternal deaths are due in large part to controllable causes. But how is control of these causes to be established? First, the medical profession and the public must know the facts, and then each group should take appropriate and decisive action. Physicians have the responsibility for leadership in both the medical and the community program for such control. As the facts become more widely known, others will assume this leadership if they do not.

Recommendations for action looking to prevention of maternal deaths are addressed to the medical profession and to the general public.

To the Medical Profession

A. Physicians must assume leadership in the field of maternal care by:

1. Informing the public that the high mortality during pregnancy, delivery, and the postpartum period is due largely to controllable causes.

2. Recognizing that every mother must have adequate prenatal, delivery, and postpartum care. (For definition of adequate see pp. 16, 17.)

3. Instructing the public as to what constitutes adequate maternal care.

4. So organizing the available resources of their communities that every mother can receive adequate maternal care.

5. Warning the public as to the dangers occasioned by abortions, spontaneous or induced.

B. In order that more accurate information may be secured relative to cause and prevention of maternal deaths:

1. Physicians should make a greater effort to study by autopsy and other scientific means every maternal and fetal death, for in many cases this is the only means of ascertaining the true cause of death.

2. Physicians are urged to exercise the greatest possible care in making out maternal and fetal death certificates, so that vital statistics may be more accurate and therefore more valuable.

3. Bureaus of vital statistics are urged to query maternal and fetal death certificates recording an indefinite cause of death; for example, "Cesarean section" alone.

4. Medical societies and departments of health in cooperation should investigate each maternal death within a few weeks of the death.

C. In order that physicians in general may have a better understanding of the fundamentals of obstetric care:

1. There should be larger and better facilities for clinical training in obstetrics.

2. Undergraduate students should have a much wider contact with obstetric patients.

3. The State medical societies, the medical schools, and State departments of health should provide or arrange for postgraduate teaching in the various counties in order to keep the local practitioner in touch with the best obstetric thought and practice.

D. It is recommended that all physicians practicing obstetrics give particular consideration to:

1. The importance of good aseptic technique, including the use of rubber gloves and masks that cover nose and mouth.

2. The danger to mothers from carriers of infection.

3. The dangers of the use of pituitrin during labor.

4. The dangers of multiple, forcible, and radical procedures in obstetrics.

5. The proper indications and contraindications for various obstetric operations, especially (a) the dangers of major operations in the presence of shock and hemorrhage and (b) the dangers of Cesarean section after vaginal manipulations or long labor.

6. The proper selection of anesthetics.

7. The value of blood transfusions.

8. The dangers of intrauterine manipulation in cases of infected abortion.

9. The dangers of abortion or delivery to women suffering from acute diseases, especially infectious diseases.

10. Knowledge of the symptoms of some of the less common but more serious complications of delivery such as rupture of the uterus.

E. It is recommended that State medical societies working in cooperation with the State departments of health consider the development of some plan by which well-trained regional obstetric consultants may be made available.

To the General Public

There should be widespread education of the public as to the following:

1. That the high maternal death rate is due largely to controllable causes.

2. That it is necessary for all women to have adequate supervision and medical care during pregnancy, labor, and the postpartum period, such supervision and care to begin early in pregnancy and to be continuous through the postpartum period—

- a. In order to safeguard the health of both mother and child.

- b. In order especially to control the infections, toxemias, and hemorrhages that this study and others have shown to be real menaces to life.

3. That there is danger of death or serious invalidism following abortions, spontaneous or induced.

4. That the community has a definite responsibility to provide adequate medical and nursing facilities for the care of women during pregnancy, labor, and the postpartum period. This predicates the proper organization of hospitals, outpatient services, and medical and nursing personnel and applies to both home and hospital care. The community should know the standards for hospitals taking obstetric cases that have been drawn up by the American College of Surgeons. (See below.)

5. That judicious selection of the hospital to be used for maternity care is of the greatest importance when hospitalization is planned.

6. That the better education of those caring for women during this period is essential and should have public support. This includes adequate obstetric training for medical students, post-graduate obstetric training for physicians in practice, to keep them abreast of modern developments, the training of nurses in good maternity care, and the training and supervision of midwives in communities where midwives still practice.

7. That it is important to make careful and intelligent selection of the attendant for maternal care.

STANDARDS OF AMERICAN COLLEGE OF SURGEONS
FOR HOSPITALS TAKING OBSTETRIC PATIENTS

[American College of Surgeons; Twentieth Year Book. 1933.
Pp. 68-69. Chicago]

- (1) Segregation of obstetric patients from all others in the institution.
- (2) Special facilities available for immediate segregation and isolation of all cases of infection, temperature, or other conditions inimical to the safety and welfare of patients within the department.
- (3) Adequately trained personnel, the entire nursing staff to be chosen specially for work in this department and not permitted to attend other cases during time on obstetric service.
- (4) Readily available, adequate laboratory and special-treatment facilities under competent supervision.
- (5) Accurate and complete clinical records on all obstetric patients.
- (6) Frequent consultations encouraged on obstetric service, a consultation made obligatory in all cases where major operative procedures may be indicated.
- (7) Thorough analysis and review of the clinical work of the department each month by the medical staff with particular considerations to deaths, infections, complications, or such conditions as are not conducive to the best end results.
- (8) Adequate theoretical instruction and practical experience for student nurses in prenatal, parturient, and postpartum care of the patient, as well as the care of the newborn.