tion of importance because of the different case material available. Application for grants to support such research should be passed upon by a subcommittee of the central cancer committee. The funds may be obtained by legislative appropriation or from voluntary sources. While fundamental research will probably be limited to the larger teaching centers, programs of clinical research should be encouraged throughout all clinics.

COMMENT

There is a logical order of steps to be taken in the establishment of a regional cancer program, which has been demonstrated by experience. Those programs now existing have grown up by trial and error. Delays and frustrations have been suffered in the achievement of their objectives, which are in great part based on the fact that the programs were begun by trying to educate the patient before the physician and before adequate facilities for diagnosis and treatment were provided, thereby creating a popular demand which has been incompletely satisfied. The programs have at last come around to what should have been the beginning.

The responsibility for the development of a regional cancer program or, in fact, a tuberculosis-, diabetes-, or any disease-control program, should remain primarily with the medical profession. This will prevent misunderstanding and misdirected efforts based on emotional rather than objective evaluations of the problem. It is only because the medical profession has often demonstrated lack of initiative in these matters, however, that lay leadership has carried through to establish itself in control.

The extent to which the financial support of this program will come from private or public sources will vary greatly according to the state of development of the region involved. There is no reason why with careful preparation and organization the control of the program should not remain in the hands of the profession, even though the expenditure of public money is involved.

SUMMARY

Seven steps in the organization of a regional cancer program are outlined. They should be carried out through a central cancer committee designated by a responsible medical organization of the region. These steps include the establishment of a cancer record registry, diagnostic cancer clinics, panels of physicians in private practice prepared and willing to perform thorough physical examinations for cancer, cancer treatment centers, programs of professional refresher education, a comprehensive public education program, and research programs.

The initiative for the establishment and maintenance of such programs should be taken by the medical profession to preserve the proper balance and development in cancer control.

147 W. Main St.

MATERNAL DEATH IN THE RURAL SOUTH

A STUDY OF FORTY-SEVEN CONSECUTIVE CASES

James Henry Ferguson, M.D., New Orleans

Maternal deaths under rural conditions in the South have been subjected to relatively little close scrutiny. In this study an attempt is made to assign the fundamental reasons for the South's unenviable maternal death rate by an examination of the causes of maternal deaths and the circumstances surrounding them. I do not believe that exactly such a study had been attempted before.

METHOD AND COMMENT

The period Oct. 1, 1947, to Oct. 1, 1948, was selected for study, and all the maternal deaths that occurred in a group of 30 counties in a Southern rural state in that 12 month period were the subjects of this investigation. The 30 counties will hereafter be referred to as the "project counties" and the state as the "project state" or simply "the state." The project counties are a geographic unit and are a fair sampling of economic, social and medical conditions in the project state. There were 47 maternal deaths, including one abortion and two ectopic pregnancies. I tried to interview personally all the physicians and midwives who had seen the patients in the final stage of pregnancy, who had treated them at any time or who might possess information that would be complementary. Seventy-nine physicians and nine midwives were visited. All the pertinent information that it was possible to obtain on these patients was sought. The public health nurses were consulted for information on the patients' background, home and diet and on behavior of the family and neighbors, as they affected the patients' health.

The interval between the maternal death and my interview with the attending physician ranged from one to 11 months, with a median of five months. The lag was partially necessitated by the length of time needed for processing of death certificates. Hospital charts were consulted whenever possible, but they added little because of their incompleteness. Usually, there was no recording of history, physical examination or progress.

In a state with many similar problems, North Carolina, Lock has succinctly reviewed the circumstances of maternal mortality, relying largely on questionnaires. Much of his assignment of blame for the high maternal mortality is underlined by this study. A monograph by Lapham on maternal care (1931-1936) gives an excellent picture of conditions in a Southern rural area. The picture is essentially the same in 1947-1948. Although there is room for professional improvement, some of the
basic reasons for the relatively high maternal mortality rate lie outside the realm of medicine in the educational and economic poverty in which these persons live.

PRELIMINARY DATA

Table 1 shows the distribution by cause of death in the three major categories of maternal death. Data on maternal death for the project state were obtained from state-wide data for comparison with the deaths in this study. I assigned the causes of death in the two state series from inspection of the death certificates.

The percentages of toxemia, hemorrhage and infection deaths for the state as a whole in the years covered in this study are very close to the distribution in the 47 cases investigated here. Therefore, these cases are representative of the state maternal death pattern, and since they represent 27 and 26% of all maternal deaths in the state for 1947 and 1948 they constitute a good sample. On the death certificates in this study 23 different counties were listed as place of death and 25 counties as place of residence. There were 30 Negro women and 17 white women. The age distribution of these patients is shown in Table 2.

Ten women were primiparas and 37 multiparas. Five women had had over 10 pregnancies; one woman had had 16 pregnancies. In three the parity could not be exactly ascertained. One woman, with toxemia, was reputed to have had 11 pregnancies with no liveborn children. Thirteen women died at home and 34 in the hospital. Two white women and 11 nonwhite died in the home. Twenty-one women were delivered in the hospital, and 11 were delivered at home. There were two tubal pregnancies and one miscarriage. Among the 12 women who died undelivered, two died in the home and 10 in the hospital. Six women were attended by midwives and 24 delivered by physicians. In one case, a neighbor was the attendant. Six patients died without a physician in attendance. Four others were moribund when they first received medical attention. There were nine stillbirths and three neonatal deaths among the 32 infants born.

Residence was predominately rural in this study. Nine women lived in such completely remote districts that no town was claimed as place of residence. Fifteen lived in towns of less than 1,000 population. Only five lived in communities of over 10,000.

The case reports in this study are heavily weighted with women who are poverty stricken. Thirty-seven (79%) of these women can be classified as being in the lowest socioeconomic group. Some quotations from physicians, midwives and public health nurses that will describe the patient and her family (each quotation a different case) follow: "A field worker"; "very poor"; "poor nutrition and ignorant"; "represented the poorest and most ignorant group of white people in the community"; "worked hard like a man in the fields"; "condition confused by beating husband gave her night before death"; "illiterate"; "transferred to hospital in stripped-down pick-up track (48 miles)"; "from the lowest class Negro and had very poor sanitation facilities in the home"; "came home to live with her father because her husband took another woman"; "only complaint was sore head where her husband beat her"; "economic con-

dition is bad as can be seen in that district"; "extremely filthy and dirty—body covered with a greasy scum"; "very poorly nourished and a poor farmer's wife"; "about the lowest status of society we have"; "nomadic chronic beggars"; "very low income and four children to support"; "remarried two weeks after wife died"; "very ignorant—from back woods"; "pathetically ignorant"; "ignorant"; "[neighbor] took pity on her and took her in"; "stupid"; "diet definitely inadequate."

CASE REPORTS

Twenty-one of the fatalities are briefly abstracted in the following case reports. No known detail that would affect the interpretation of the deaths has been omitted.

REPORT OF CASES

Case 1.—The patient was bleeding at term. She had a vaginal examination at home. There was placenta previa totalis. The hospital was too far for her to be transported there. Although 1 cc. of posterior pituitary extract (pituitrin®) was given, contractions were weak. The patient died undelivered eight hours after the onset of bleeding.

Table 1.—Causes of Death, 1947-1948

<table>
<thead>
<tr>
<th>Year</th>
<th>No., Entire State</th>
<th>Percent</th>
<th>No., Entire State</th>
<th>Percent</th>
<th>No., This Study</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Toxemia</td>
<td>1947</td>
<td>1948</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>76</td>
<td>43</td>
<td>67</td>
<td>60</td>
<td>59</td>
<td>43</td>
</tr>
<tr>
<td>Hemorrhage</td>
<td>33</td>
<td>20</td>
<td>44</td>
<td>24</td>
<td>11</td>
<td>28</td>
</tr>
<tr>
<td>Infection</td>
<td>14</td>
<td>8</td>
<td>13</td>
<td>8</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>Other</td>
<td>2</td>
<td>29</td>
<td>1</td>
<td>36</td>
<td>2</td>
<td>14</td>
</tr>
<tr>
<td>Total deaths</td>
<td>196</td>
<td>184</td>
<td>11</td>
<td>47</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 2.—Distribution by Age

<table>
<thead>
<tr>
<th>Age Group</th>
<th>No.</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 20 years</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>20-29 years</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>30-39 years</td>
<td>19</td>
<td></td>
</tr>
<tr>
<td>40 and over</td>
<td>26</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>57</td>
<td></td>
</tr>
</tbody>
</table>

Case 2.—This was a home delivery with a neighbor attending. There were antepartum and postpartum convulsions and bleeding. On the day after delivery, the physician arrived and sent the patient to the hospital. Morphine, phenobarbital sodium, penicillin and magnesium sulfate were given. There was no transfusion or infusion. The patient died eight hours after admission.

Case 3.—Labor progressed poorly at term; the membranes had ruptured two days before onset. Approximately 1 cc. of pituitary extract was given in three doses. An attempt at high forceps delivery in the home failed. The patient was oliguric. She was hospitalized and discharged the same day. Nine days later she was hospitalized in poor labor and again discharged the same day. Three days later she was hospitalized again. She was in hard labor and a state of shock. Her urine was bloody. High forces delivery was again attempted and again failed. Two days later the patient's condition was worse; she was anuric, and there was scalp traction and shock. The next day, cesarean hysterectomy was performed. The patient became jaundiced and died the next day.

Case 4.—Two weeks before death, this patient had severe edema, albuminuria and hypertension. Later, she began to labor and was hospitalized. She had antepartum and postpartum convulsions. Pulmonary edema developed, and the patient died five days later. There were no infections at any time.

Case 5.—The delivery in this case was performed by a midwife. Ten minutes later, there was bleeding. The physician was called immediately, but the patient was moribund on his arrival. Oral medication and massage were given. The patient died one and one-half hours after delivery.
Case 6.—This patient experienced dyspnea suddenly at term. An ambulance was unable to approach her home because of an impassable, muddy road. The patient died from pulmonary edema while being transported to a paved road.

Case 7.—On prenatal visit to the physician when she was six months pregnant, this patient had headache, severe edema and albuminuria. Diet and rest were prescribed. A few days later, while at home, the patient became comatose. She died in the hospital soon afterward without regaining consciousness or delivering.

Case 8.—This patient was 19 years old and had had five children. She had chronic hypertension and disease and had been bedridden for five years with paralysis. She was edematous and dyspneic throughout pregnancy. There was no prenatal care. Delivery was uneventful and was performed by a midwife. Two days post partum, the physician was summoned. The patient had a rapid pulse, an enlarged heart and dyspnea. Hospitalization was advised (this necessitated a 59 mile trip). The patient died at home the next day.

Case 9.—This was a home delivery with a physician attending. Labor seemed to be progressing normally. A small dose of pituitary extract was given. Slight shoulder dystocia was noted. Chloroform was given. The third stage of labor was normal. One and one-fourth hours after delivery, the patient was in shock. Caffeine was the only available drug. The husband was sent to obtain plasma (21 miles). The patient was dead before his return. The body was difficult to embalm, as the fluid ran into the abdominal cavity.

Case 10.—The patient was a primipara and had no prenatal care. She was in labor three days. Attempt at forceps delivery failed. The patient had convulsions. On her admission to the hospital, it was noted that her pelvis was generally contracted, and her temperature was 105.5 F. Craniotomy was performed. The patient died 12 hours later, after another convolution.

Case 11.—This patient, 42 years old, had had 16 children. The physician made a home visit to the patient when she was eight months pregnant. The patient was bleeding slightly and had chest pain. She was given morphine and sent to the hospital; she was not in labor. The blood pressure was 140/120. Examination disclosed total placenta previa; the cervix was one-third dilated. The pulse rate was 140 and respirations 40. Bleeding was slight, and there was a foul discharge. Penicillin was given. On the second hospital day there was vomiting and albuminuria (4+), and the abdomen was distended. An infusion was given. On the third hospital day, 500 cc. transfusion was given. On the fourth hospital day pituitary extract was given, but response was poor. The patient died on the fifth hospital day.

Case 12.—The patient had had severe hypertension in a previous pregnancy. She had no prenatal care in this pregnancy. Near term, she was unconscious for one to three days. Her home was so inaccessible that a truck was necessary to bring her to the hospital. She was not in labor. She was given amobarbital sodium to control extreme restlessness. Vaginal examination was done immediately so that membranes could be ruptured. This procedure was very difficult, because of the extreme obesity of the patient. She died 15 minutes after vaginal examination was begun.

Case 13.—On the first visit of the patient to the office of the physician, two months before her death, pronounced edema was noted and digitalis was prescribed. One month later, another physician visited her home and noted hypertension and edema. Two weeks later, the physician came to the office of this physician. Hypertension and albuminuria (+ +) were noted. Bed rest at home and magnesium sulfate were prescribed. Two weeks later the patient had six convulsions at home. She was brought to the hospital and died 20 hours later, after having had more convulsions.

Case 14.—This patient received no prenatal care. Delivery was at home, with a physician attending. There was slight postpartum bleeding. The patient had convulsions three hours post partum and died a few minutes afterward.

Case 15.—The patient was a 16 year old primipara. She made only one prenatal visit, two weeks before term. She had severe hypertension and was not hospitalized until she was in labor two weeks later. On admission, edema and albuminuria (+ + +) were found. Delivery was uneventful, but the patient had postpartum convulsions; she died 15 hours later.

Case 16.—In this case toxemic signs failed to disappear in six office visits (during last 18 days of life). The patient was hospitalized when toxemic symptoms appeared. Membranes were ruptured artificially at once. The condition of the patient became worse in labor. Version and extraction were done for shoulder presentation. The patient became comatose and died six hours later.

Case 17.—This woman had had 11 pregnancies and 10 miscarriages. She received no prenatal care. She was hospitalized at term because she was "on the verge of convulsions." Sometime later she became moribund and semicomatose. The cervix was completely dilated, and there was pulmonary edema. No medication was given. There were no blood pressure readings or urinalysis. Delivery was with low forceps, and the patient bled slightly. The uterus was packed. The patient died 20 minutes after delivery.

Case 18.—The patient was hospitalized at term for painless bleeding. She was given only a rectal examination. There was spotting for five days while the patient was in hospital. Anesthesia was started for cesarean section. The patient died suddenly. At autopsy, complete separation of a placenta previa marginalis was observed.

Case 19.—This was a cardionic patient, who had one prenatal visit to the physician. There was decomposition when labor began. Five hours later the physician was called. When he arrived, the fetal head was visible and the patient's pulse was fast. She was sent to the hospital. She died before a staff physician arrived.

Case 20.—The patient was jaundiced six weeks before term. Her condition seemed to be improving. She had two convulsions at home. She was reassured and given morphine. She then had more convulsions. She was taken to the hospital, where she had convulsions and became comatose. Cesarean section was performed 12 hours later. She died 10 hours after operation. A total of 500 cc. of fluids had been given.

Case 21.—Delivery of this patient was by a midwife. Bleeding occurred 10 minutes after delivery. The physician was sent for. Pressure and injection produced the placenta. The patient died from hemmorhage six hours post partum.

Case 22.—This patient was insane. When seen one month before term, she had been bleeding for several days. Vaginal examination was done in the hospital, and placenta previa was found. Hospitalization was advised, but the patient refused. She continued to bleed for one to three days, and finally she was taken to the hospital, but she died en route.

**CAUSES OF DEATH: MISCELLANEOUS FACTORS**

A consideration of death certificates is important in that it furnishes an index of the physician's understanding of the causes of disease and his use of modern terminology. Some noteworthy inaccuracies in the death certificates in this study were lobar pneumonia and preeclampsia, used for eclampsia, endocarditis for anesthetic death, pulmonary embolism for nonconvulsive toxemia and hemorrhage from placenta previa, abnormal labor and placenta previa for hemorrhage and heart failure without mention of eclampsia.

Table 3 lists the causes of death as stated in the death certificates and compares them with my reassignment of the causes of death.
This list is not large enough to be statistically significant but may show some tendency on the part of the physician not to recognize toxemia and hemorrhage as the true cause of the patient's difficulties. In several interviews the physician in relating the terminal course gave a different diagnosis from the one he wrote on the death certificate. Autopsy was performed in two cases. Diagnosis was established at operation in two cases.

In Table 1 it is shown that toxemia and hemorrhage are the principal causes of maternal death in this study and in the state. Other causes of death in this study were anesthesia (two deaths), cardiac disease (two deaths), and pulmonary embolism (seven deaths). In three cases the cause of death was unknown.

As a secondary or contributing cause of death hemorrhage figured in five cases, intercurrent infection twice and toxemia once.

There were two anesthetic deaths, one from spinal anesthesia and one from chloroform. No criticism of the technique of administration of chloroform could be found. In the spinal case 150 mg. of piperocaine (metycaine®) hydrochloride was administered, and the level of anesthesia was not tested. Diaphragmatic paralysis followed. There were two cases of ruptured uterus, one a rupture of an old cesarean scar. In Case 9 the location of delivery, the patient's home, which was 21 miles from a source of plasma and 52 miles from a hospital and transfusion, is an undeniable factor in the cause of death.

Table 4 shows the method of delivery used in the cases in which a physician attended.

Several women would have benefited from forceps delivery if it had been done. In some cases the physician failed to use forceps because so many years had elapsed since he had used them that he lacked confidence or failed to recognize the indication for their use. Some did not own the equipment for a forceps operation in the home. A Negro physician (Case 19) had had no training in the use of forceps.

Seven women were delivered by cesarean section. The classic section was preferred by operators in this series and was used in three of the cases. Low cesarean section was done in one case. Cesarean section was combined with hysterectomy in one case and was performed post mortem in one case. The type was unknown in one case.

Most of the indifference on the part of the patient or her family lay in the direction of not seeking prenatal care. It seemed to me that in only three cases was death substantially hastened by indifference or neglect once prenatal care was sought. It is difficult to tabulate the number who fall into this category, because in so many instances neglect was indistinguishably linked with lack of real opportunity for anything better.

No maternal death in this series can be laid at a midwife's door. The one derelict woman attendant was a retired midwife about 80 years old and senile, who was helping out a neighbor (Case 2). An exhausting walk to the homes of the midwife and the deceased and a glance at the map for the town of the nearest practicing physician were convincing evidence of the hopelessness of the situation. The midwives who attended in these cases were not responsible for the deaths, but a society that makes the employment of them necessary is responsible. In many counties all the midwife deliveries could be eliminated if each physician would take a small and equal share of the cases.

The prominence of syphilis has sharply declined in the South but is by no means to be ignored. None of these women were known to have syphilis. However, the data are incomplete because of the large number of women who had no prenatal care and the several patients who did not have a serological test for syphilis performed by their physician.

TOXEMIA

Toxemia is the chief cause of maternal death in the project state, as shown in Table 1. Of the women in this study, 20 (43%) died of this disease. One patient who died of infection also had toxemia of unclassified type. In 1947 and 1948, 41% and 36% of the maternal deaths in the entire state were caused by toxemia. The data were too meager in many cases to permit classification of the toxemias except as convulsive or nonconvulsive. Of the 21 women who had toxemia, 13 had convulsions. At least eight women had chronic hypertensive disease. Six of the women had convulsions in the antepartum period, four post partum and three both before and after delivery.

Of the 20 women who died primarily of toxemia, 13 had no prenatal care, while three had only one to two visits to the physician. Six were primiparas. The attend-

<table>
<thead>
<tr>
<th>Table 4.—Method of Delivery by Physicians</th>
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<tbody>
<tr>
<td>Spontaneous delivery by physician.........</td>
</tr>
<tr>
<td>Forceps ....................................</td>
</tr>
<tr>
<td>Cesarean section ..................................</td>
</tr>
<tr>
<td>Version and extraction ......................</td>
</tr>
<tr>
<td>Craniotomy ..................................</td>
</tr>
</tbody>
</table>

ant at delivery was a physician in 11 cases, a midwife in one, a neighbor in one and a nurse in one. Six of these patients died undelivered. The place of delivery was the hospital in 11 cases and the home in three. Eighteen patients died in the hospital and two at home. There were five stillbirths among the 14 patients who delivered, and there was one neonatal death.

The clinical management of toxemia was in general poor by modern standards. Many patients were not hospitalized until after they had had convulsions. Warnings of severe preeclampsia went unheeded, so that hospitalization of the patient was delayed. Limitation in hospital facilities was often the reason. Twelve of the 18 hospitalized patients did not have an infusion. In only one patient was the urinary output measured with what seemed to be a semblance of accuracy. In most cases there was no effort to measure the intake and output. Of the 18 toxemia patients who were hospitalized, in only one was a hemoglobin or blood cell count of any type done in the prenatal course and in only one was there a count while she was in the hospital.

There were no cases of accouchment forced, but there was a tendency to lack of conservatism in treatment. Intervention was not preceded by a sufficient period of medical treatment. Sedation was not adequate to control convulsions in a number of patients.

HEMORRHAGE

Hemorrhage is the second commonest cause of maternal death in the project state. Hemorrhage figured prominently in 16 (34%) of these 47 deaths. In 11 cases

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(23%) it was the primary cause of death, and it was a contributing cause in five cases. Among the primary hemorrhage cases were postpartum hemorrhage four, placenta previa two, ruptured uterus two, ruptured tubal pregnancy two and premature separation of the placenta one. Six women died in the home and four in the hospital. One died en route to the hospital. Of the nine infants that reached viability, five were delivered in the home and four died undelivered. Two of the hemorrhage patients were attended by midwives, one by a neighbor and the others by physicians. The midwives summoned a physician as soon as the bleeding appeared. With the exception of a patient who died three days post partum of eclampsia, the average length of survival was five hours in the women who experienced postpartum hemorrhage.

The primary causes of death in cases in which bleeding was a contributing factor were eclampsia in two cases, pulmonary embolism in two and unclassified toxemia in one. The treatment of hemorrhage fell pitifully short of modern standards. Thirteen of the 16 patients received no blood. Two had plasma, and three had infusions. Of the six patients with postpartum hemorrhage, only 1 had a satisfactory vaginal-uterine examination that was included in the effort to control bleeding. The five patients with a diagnosis of placenta previa bled for six hours, nine hours, five days and seven days before delivery or before dying undelivered. One bled for an unknown length of time.

The 16 women themselves were unprepared for hemorrhage. Of the six who had had prenatal care from physicians, only one had had a test for anemia. Among the eight women who were hospitalized, only two could be found who had a blood count.

**INFECTION**

There were only two cases in this study in which puerperal infection was the cause of death. Infection appears to be relatively insignificant in this region today as judged by the data in Table 1. In the United States and Canada infection is often considered the chief cause of maternal death. This reversal in the assignment of the causes of death indicates that there are maternal health problems that are peculiar to this region. In the two infection deaths, one was an uncomplicated midwife delivery with sepsis occurring about three weeks later. The other (Case 3) was a grossly mismanaged hospital operative case.

**NEEDS OF A STATE MATERNAL HEALTH PROGRAM**

The requirements for improvement in maternal mortality in the project state and presumably in other Southern states are (1) more and better prenatal care, (2) more blood transfusion facilities and recognition of the uses of whole blood, (3) greater hospital facilities and (4) postgraduate education for the physicians.

**PRENATAL CARE**

In this group of women, excluding the cases of abortion and ectopic pregnancy, 19 patients received no prenatal care. In only six of the 25 women who received prenatal care was this care adequate, on the basis of the number of visits to the physician, with no consideration given to the quality of the care. Nineteen women had what could be called inadequate care, because, although they visited a physician, the visits were far from the accepted standards of prenatal care. Eleven women had one to three visits, and the rest had four to five prenatal visits, which were poorly spaced. Many women deferred visits until the last four to eight weeks of pregnancy. Others neglected to return in the last two months of pregnancy.

The reasons for this poor showing in prenatal care appear to be lack of physicians, education and economic resources. In many sections of the project counties there may not be enough physicians to give maternity care to all pregnant women. The project state has one of the largest percentages in the U. S. of nonwhite live births with no medical attendant. Some of the project counties had a ratio of one licensed physician to 5,057, 5,655, 3,808, 3,171, 3,592, 3,736 and 3,175 inhabitants. However, one who knows how many of these physicians are aged, are limited in activity or treat no maternity patients realizes that the true figures are actually worse. In 14 of the 30 project counties, 50% or more of the physicians were over 60 years of age.

A large part of the blame for neglect of antepartum care must be leveled at ignorance on the part of the people. They do not realize the necessity for medical care throughout a pregnancy. A much larger public education program is needed to present a fact that many communities now accept as self-evident. For longer range planning proposed improvements in the school systems should be carried out. The key word to solution of the South’s maternal death rate could well be education.

Many women in the state, and a number in this study, have been discouraged from completing prenatal care by the distance from their home to a physician or a full-time health department. Lack of transportation and unpaved roads were related factors. All the patients who died following illegitimate pregnancies in this study had inadequate or no prenatal care. There were five such patients, three white and two Negro. In each case the medical care was inadequate because of attempts to conceal the pregnancy. This fact was either admitted to the physician or disclosed by inquiries in the home made by the public health nurse. Improvement in the poor facilities for sheltering these unfortunate girls could have saved them. The extent of the problem is shown by a figure of over 6,000 illegitimate births in the project state in 1948.

**BLOOD REPLACEMENT**

Maternity patients in the project state do not appear to be receiving blood frequently enough or in the quantities that they need. Of the 16 patients in this study in whom hemorrhage was the primary or contributing cause of death, only three received blood. A patient with a ruptured tubal pregnancy received 1,500 cc, and the estimated blood loss was 3,000 cc. Another patient with a ruptured tubal pregnancy received multiple transfusions that were apparently sufficient in quantity. The patient with placenta previa and toxemia (Case 11) was not given more because the 500 cc. that were administered did not seem to improve her condition! Two patients received plasma, and three received infusions. In the six cases in which antemortem cesarean section was done, only one woman received blood.

The data drawn from hemorrhage cases do not completely uncover the need for more liberal use of blood. Many of the patients with toxemia or infection would
certainly have been improved by transfusions of whole blood. Opportunity to estimate the number who needed blood is hampered by the rarity of hemoglobin determinations.

HOSPITALS

There is an increasing use of hospitals for childbirth in the South. In the project state in 1940 only about 14% of all deliveries occurred in hospitals. By 1948 it had reached over 40%, a great improvement but far from ideal. A number of the patients described here could have been saved in a hospital. Either an emergency arose or there existed a complication that suddenly became a desperate illness requiring services usually only obtainable in a hospital.

Lack of hospital facilities was a contributing cause of death in the nine patients in whom hemorrhage was the primary or secondary cause of death and who died outside of hospitals, the three patients with toxemia who delivered or died in the home, and the two cases of infection in which home delivery was accomplished or attempted. It can be judged by the case histories that there were other cases in which a more favorable outcome might have been possible if hospital care had been received earlier. The ability of the patient to pay for hospital care deserves its share of attention. Voluntary prepayment plans must have reached few or none of the women who make up this study.

POSTGRADUATE EDUCATION

It is evident from the case histories that more training in modern methods of obstetrical management would be beneficial for many of the physicians in the region under consideration, and presumably in other rural Southern areas. This might be accomplished by attendance at postgraduate courses but it is unlikely that this will come about. Most of the physicians interviewed have never attended a formal postgraduate course and are not likely to in the future. Explanations offered have been prohibitive cost, fear of loss of contact with patients and simple lack of interest. Some of these objections can be overcome by the opportunity and stimulus provided by movements to bring the medical school to the practitioner, such as those in which Tulane University is at present energetically engaged. A more promising solution than postgraduate courses would be everyday contact in hospitals with a good grade of medical care. This could be achieved by the use of temporarily assigned residents and by visits of consultants from medical centers. Encouraging reports of extension programs have come from Michigan, Pennsylvania, New York and Virginia.

Some definite defects in obstetrical management can be seen in this report as common factors in several deaths. They should be the targets in a program of instruction.

SUMMARY

Forty-seven consecutive maternal deaths are investigated. These deaths occurred in a typical Southern rural area. Seventy-nine physicians and nine midwives, all associated with these cases, were interviewed. Supplemental information was obtained from hospital charts and by home visits of public health nurses.

Toxemia is the decidely the commonest cause of maternal death in the region studied. Hemorrhage is second, and puerperal infection is a relatively unimportant cause and seems less important than pulmonary embolism. The reasons for a poor prenatal care record are lack of physicians, low educational standards and poverty. For lowering of the maternal death rate in this area the basic needs are improved prenatal care, increased hospital and transfusion facilities and more postgraduate medical education.

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MATERNAL DEATHS IN NEW YORK CITY DURING 1948 AND 1949

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Maternal and infant deaths have often been regarded as an index of the maturity of a civilization. The implication of this attitude is that concern for the well-being of mothers and infants is a vital function of an enlightened society. From this point of view, the United States compared rather unfavorably with the rest of the civilized world until as recently as 1930, when the maternal mortality rate for this country was 6.8 deaths per 1,000 live births. This high mortality rate has been remarkably reduced during succeeding years, and the latest national figure recorded was 1.3 (1947). The rate for New York City has shown the same satisfactory downward trend, and the rate for 1949, based on tentative figures, is 0.9, the first ever to be recorded below 1.0. Knowing that these rates are based on the inclusion of many deaths that had other factors added to the state of pregnancy, the medical profession may begin to wonder at what stage the so-called irreducible minimum will be achieved. No attempt is made in this paper to give the final answer to that question, but rather the study will attempt to present special problems in the prevention of maternal mortality as they occur in New York City, together with some suggestions for their solutions.

This study was based originally on the maternal deaths in the city of New York during 1948. The infor-