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OBSTETRIC CARE SURVEILLANCE IN ABIDJAN

Final Report

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CAUTION: All findings in this report are based on data that have been adjusted and/or weighted. Before interpreting these results, see the discussion in Chapter II on sampling and underreporting.

Please note that in each table of Chapters III-VIII, distributions and percentages represent adjusted and/or weighted data; the number of cases reported is not adjusted or weighted.

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◆ Abobogare

Abidjan, Cote d'Ivoire

Foret du Banco

● = Centre Hospitalier Universitaire
◆ = Centre de Maternité

• Yopougon

◆ 220 Logements
◆ Adjame

● CHU Cocody

• Cocody Nord

• Locodjoro

Lagune Ebrie

• Abobodoume

• Libanaise

◆ Marcory

● CHU Treichville

• Koumassi

Lagune Ebrie

• Port-Bouet

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I. INTRODUCTION

Background. Among the stated population policy goals of the Cote d'Ivoire is the improvement of maternal and child health through the reduction of maternal and child morbidity and mortality. Mortality levels are high. According to current estimates, the infant mortality rate is 103 per thousand live births.¹ No community-based studies of maternal mortality have been conducted, but the World Health Organization estimates that up to 530 women in West African countries die as a result of pregnancy or childbirth for every 100,000 live births.²

While recognizing the need to reduce mortality, another important policy goal is to increase population in order to keep up with the expanding economy, considered one of the most dynamic in Africa. With a population of approximately 10.5 million, a total fertility rate of 6.4 and a large number of immigrants, the population doubling time is estimated at less than 23 years.³ The effect of this rapid increase in population on maternal and child health is not known.

Health professionals regard child spacing as an important factor in reducing morbidity and mortality among women and children. The impact of high fertility and current birthspacing practices on the health and well-being of mothers and infants has not been well documented in Cote d'Ivoire since information on pregnancy-related care and outcomes is not uniformly collected and analyzed by health service providers. Likewise, resource distribution and obstetric management capabilities at the different levels of care have not been examined in detail.

From February 1982 through March 1983, two teaching hospitals in Abidjan, Centre Hospitalier Universitaire de Cocody (CHU Cocody) and Centre Hospitalier Universitaire de Treichville (CHU Treichville), participated in an FHI-sponsored maternity care study to examine the risk factors associated with maternal and perinatal mortality and morbidity.⁴ Although the data collected were not a representative sample of women hospitalized for pregnancy-related care in Abidjan, the study did provide some insight into the population receiving services at the two CHUs. It also stimulated interest in enlarging the study to include a more representative sample covering the entire city of Abidjan.

The Obstetric Care Monitoring Study, designed to address a wide range of issues confronting providers of pregnancy-related care, was an outgrowth of that investigation. The goal was to identify risk factors associated with maternal and perinatal morbidity and mortality through the collection and analysis of data for a representative sample of women hospitalized for pregnancy-related care in the public maternity centers and hospital maternity services in Abidjan. Related areas of interest included women's opinions about ideal family size and the desire for and utilization of contraceptive methods. The study was designed to provide policy relevant information on factors associated with unfavorable pregnancy outcome and to establish a permanent pregnancy care monitoring system so that improved reproductive care could be achieved.

The Setting. The study was carried out in Abidjan, the economic capital and largest city in Cote d'Ivoire. With a population of nearly two million, or about 20% of the country's total population, Abidjan is the country's fastest growing urban area, increasing at a rate of 11% per year. Data from a recent

demographic survey⁵ reported that there are approximately 100,000 births annually in the city.

Recent surveys characterize Abidjan as having lower fertility and infant mortality rates than the Cote d'Ivoire as a whole. The total fertility rate in Abidjan is 5.3 children, 1.5 less than the average 6.8 children for the country as a whole. Infant mortality for Abidjan is estimated to be 70 per 1000 live births in comparison with 121/1000 for rural areas.⁶ Better access to health facilities and better sanitation facilities are two probable reasons for lower mortality rates in Abidjan. However, population growth is most rapid in the poorest peripheral sections of the city, leading to increased difficulties in providing adequate health and public services in these areas.

Most obstetric care in Abidjan is provided by 11 government maternity centers and the maternity services of the two major referral hospitals (see map). Maternity centers handle most of the normal deliveries and refer complicated cases to the designated referral hospital. A small but unknown number of private clinics provide care to women able to pay for services.

Although the majority of deliveries are institutional, some women deliver at home. (An estimate of the proportion of women delivered at home is discussed in a separate section of this report, "A Note on Estimated Number of Deliveries," Chapter II.) Babies delivered at home are usually registered at a maternity center or hospital within hours following birth so that the birth

Note: "Cocody maternity centers" are those centers that refer patients to CHU Cocody and "Treichville maternity centers" are those centers that refer patients to CHU Treichville.

certificate required for eligibility to social services can be obtained. It is not known what proportion of home deliveries are not registered although it is likely that most home deliveries resulting in stillbirth or early postpartum death are not registered.

Maternity Centers. Maternity centers are located in neighborhood health complexes together with a dispensary and a Centre de Protection Maternelle et Infantile (PMI) where women receive prenatal care through the first eight months of pregnancy. Each maternity center is staffed by approximately ten midwives who rotate in shifts of two or three and by nurses' aides. Many of the maternity centers also receive student nurses and midwives for their practical training.

The physical facilities usually consist of a labor room and a large delivery room with three or four delivery tables. A small area from which the personnel can observe the women and where the midwife records the progress of the delivery connects with the delivery room. Multi-bed recovery rooms are used to hospitalize women after delivery. Each maternity center has approximately 25 beds. Depending on the center and conditions of delivery, women are hospitalized between six hours and three days. Each maternity center has a small supply of surgical gloves, needles, suture, and medications; however, such items are often depleted and standard practices may be modified depending on the availability of materials. Although the case loads vary greatly among the maternity centers, physical facilities, materials and number of staff are often similar. As a result, some maternity centers are particularly overcrowded and have an overburdened staff and insufficient materials.

Deliveries at maternity centers are attended by staff midwives. Most births are spontaneous and without anesthesia or episiotomy. If there is a malpresentation, or if the woman is having some difficulty, she is referred to the designated referral hospital.

Hospital Maternity Services. The maternity services at the CHUs are staffed by midwives, student midwives and physicians*. For normal deliveries, midwives monitor the progress of the labor and attend the delivery, but more often, a physician or medical student delivers the child. As university hospitals, both CHU Cocody and CHU Treichville receive many referrals and the most complicated cases from maternity centers in Abidjan as well as from outlying areas. (Referrals are discussed in more detail in Chapter IV.) Because of crowded conditions, women with normal deliveries are usually hospitalized for less than a day, while those with complications or a cesarean section are hospitalized longer. As at maternity centers, there is a chronic lack of materials and equipment at the hospital maternity services. Operating facilities are limited and elective surgery is sometimes postponed due to lack of operating space. If there are two or three emergency cases at one time, cases may be sent to the hospital's main operating theater. Funding to provide for adequate services has not kept up with the tremendous increase in patient load.

*This category includes medical students, interns, general physicians and ob/gyn specialists.

Prenatal Care. Prenatal care is provided at all of the PMIs as well as at the hospitals. Women are encouraged to make at least four prenatal visits and to initiate care during their first trimester. Prenatal clinics are crowded; often 40-60 women are seen at a center in one morning.

At the PMIs, prenatal consultations are held by staff midwives. In principle, the initial visit consists of a complete obstetric history, testing urine for albumin and sugar, weighing, a blood pressure check and a pelvic exam. The uterine fundal height is measured and, depending on the length of the pregnancy, the midwife determines the position of the fetus and listens for fetal heartbeat. Patients are also asked to have additional lab work done at the hospital or other public health institution. Often, women do not have this suggested work done. Women who receive prenatal care at a PMI and who are expected to deliver in a maternity center have their last prenatal visit at that maternity center. This visit permits maternity staff to examine the woman, become familiar with the progress of her pregnancy, and detect any complication that may require her to deliver at the referral hospital. At any time during pregnancy, if a patient is determined to be at risk, she may be referred to the CHU for more extensive prenatal care or for delivery. Most often, women with a history of medical problems or with a previous cesarean section are considered to be at risk.

At the CHUs, physicians see prenatal patients. As at the PMIs, most women are encouraged to make four prenatal visits; women at high risk are followed more closely. Because of higher level staff and better facilities, the examinations at the CHUs are more thorough and are often more costly for the patient depending on the laboratory work required and prescriptions given.

Cost of Services. Although services at the maternity centers and hospitals are nominally free of charge, there is some cost to the patient involved. Patients must buy a health booklet "carnet de sante" in which obstetric history and information about each prenatal visit is written. These booklets cost 155 CFA (approximately \$0.50). The patient brings the booklet with her at the time of delivery so that information about the delivery and its outcome can be recorded in it. Women who do not make any prenatal visits buy the booklet just before delivery. Prenatal lab examinations and delivery-related medication (if needed) are paid for by the patient. If the patient needs to be referred from a maternity center to a hospital at the time of delivery, it is the family's responsibility to hire a taxi or pay for the gas for an ambulance.

II. METHODS

Data Collection

Data collection for this study took place at the two university hospitals and 11 government maternity centers over a 15-month period from October 1, 1984, to December 31, 1985. The number of forms obtained by month for each center is given in Appendix B. These data represent a sample of the total number of deliveries in Abidjan during this period of time. Data were collected for 16,174 cases using the standardized Obstetric Surveillance Form 950 developed by Family Health International (Appendix A). This form is designed to record information on the patient's sociodemographic characteristics, referral status, obstetric and family planning history, prenatal care, delivery status, complications and treatment, birth outcome, and postpartum family planning intentions. Information on prenatal care, obstetric history and sociodemographic characteristics was taken from the health booklet kept by the patient. Those patients without health booklets were interviewed to obtain the information. Events pertaining to the delivery itself were recorded as the delivery progressed. After delivery, patients were interviewed about family planning intentions. In the event of a maternal death, information was collected on a Maternal Death Report (Appendix A), which supplements the Obstetric Surveillance Form and provides more complete information about events leading to and treatment before death.

For this report, the 12 consecutive months (November 1, 1984–October 31, 1985) with the most complete data were used for analysis. Data for the months of October, 1984 and November and December, 1985, were excluded from analysis for all 13 participating centers. Data collection in the maternity centers for

October, 1984 was incomplete due to late study initiation and, in November and December, 1985, data collection dropped off in both hospitals due to lack of motivation and insufficient supervisory effort. (Underreporting during the study period is discussed in the section on sampling.)

Data were collected for a total of 13,500 women admitted to the 13 centers between November, 1984 and October, 1985 (Table 2.1). Of these, 1,895 were reported to have been admitted postpartum and 45 had unknown admission status (Table 2.2). Because this report focuses on institutional deliveries, data on postpartum admissions have been excluded from most analyses. Thus, data on a total of 11,560 women (6,013 who delivered in hospitals and 5,547 who delivered in maternity centers) are analyzed. (Appendix C contains a description of women admitted postpartum and the number of postpartum admissions by center.)

Caution: The number of cases shown in Tables 2.1 and 2.2 represent the reported number and have not been weighted or adjusted for sampling or underreporting. See the discussion at the end of this chapter on weighting and adjusting of data.

**Table 2.1 Number of Reported Cases by Center, 12-Month Study Period
(November 1, 1984–October 31, 1985)**

Center	Number of cases*
Centre Hospitalier Universitaire de Cocody (CHU Cocody)	3,233
Abobodoume	99
Locodjoro	142
Adjame	242
220 Logements	1,268
Cocody Nord	249
Yopougon	1,277
Abobogare	<u>1,651</u>
Total Cocody Maternity Centers	4,928
Centre Hospitalier Universitaire de Treichville (CHU Treichville)	2,938
Libanaise	268
Marcory	478
Port-Bouet	593
Koumassi	<u>1,062</u>
Total Treichville Maternity Centers	2,401
Total All Centers	<u>13,500</u>

*Includes postpartum admissions and women with unknown admission status.

**Table 2.2 Comparison of Total Reported Number of Cases,
15-Month Study Period and 12-Month Sample**

	15-Month Study Period	12-Month Sample	
		Total	Excluding postpartum admissions ¹
Maternity centers	8,925	7,329	5,547
Hospitals	<u>7,249</u>	<u>6,171</u>	<u>6,013</u>
Total	16,174	13,500	11,560

¹Also excludes 45 women with unknown admission status: 22 in the hospitals and 23 in the maternity centers.

Training and Supervision. At the maternity centers, data were collected by staff midwives. Medical interns were responsible for completing study forms at CHU Cocody, while at CHU Treichville, medical students were given this task. A three-month pretest (July-September 1984) was carried out in each of the CHUs and one of their designated maternity centers in order to correct coding errors and resolve sampling problems. Project staff reviewed the objectives of the study and its implementation. Training for the remaining maternities took place in October 1984. A visit was made to each maternity center by the Chief of the respective referral hospitals' maternity service to explain the importance of the study to the midwives. A training session was organized at each participating center during which the study instruments were reviewed question by question to insure correct interpretation and to answer specific questions. The same procedure was also followed at the hospitals with the interns and medical students.

Each hospital had a team of two to three obstetricians/clinical assistants who were responsible for the smooth functioning of the study at their hospital and associated maternity centers. CHU Cocody also employed a data collection coordinator. In principle, the physicians visited the maternity centers for which they were responsible once a week to collect and verify forms and to review the sampling procedure. They also verified forms at the hospital. After the forms were checked, they were sent to Family Health International for data entry and analysis. Regular monitoring visits were made by FHI staff to discuss the progress of the study and resolve data collection problems.

Sample Design and Implementation

In both maternity centers and hospitals, a standard delivery room register is used to record information on each woman delivering at that center as well as those presenting during the hours immediately following delivery to register the birth. In this study, the registers were used as the sampling frame in maternity centers. Because the maternity centers handle such a large number of deliveries, a representative one-in-ten sample was planned. To ensure adherence to the one-in-ten sampling protocol, study monitors at each maternity center noted every tenth entry in the birth register in red pen. A form was completed for these patients. Service statistics indicated that there was little or no underreporting of cases in the maternity centers. These service statistics are taken from the birth registries and include monthly totals of numbers of events such as total deliveries, cesarean sections, number of babies born, number of home deliveries, etc.

All entries in the hospital birth registers (women delivering in the hospitals or admitted postpartum) were to be included in the study to assure that complete information would be collected on referrals, transfers and complicated cases. Because a 100% sample was planned for the hospitals, registers were not monitored as at the maternity centers. However, data reporting checks indicated that forms were not in fact completed for every woman registered. Maternal Death Reports also were not completed for every woman who died at the hospitals during the study as had been specified in the protocol. Following is a description of the level and nature of underreporting at the two hospitals. (Underreporting of maternal deaths is described in Chapter VII).

CHU Cocody. At CHU Cocody, data were collected on 3,870 deliveries over the 15-month study period, comprising 75% of the 5,193 deliveries during this time (Appendix B). Comparing the sample to service statistics, coverage varied considerably, from 97% in October, 1984, to 41% in November, 1985.

Underreporting increased during the latter months of the study. Data were collected during the first ten months (November 1984-August 1985) on 84% or more of all deliveries, but for the last two months of the study (November and December, 1985), fewer than 50% of deliveries were reported. The number of reported deliveries per day also varied, from zero to 18.

Service statistics show that the cesarean section rate at CHU Cocody averaged 28% of all admissions, ranging from 23% to 32% per month during the 15-month study period (Appendix B). For data reported, cesarean sections varied from 29% of reported admissions in November and December, 1984, to 15% in November and December, 1985, representing an average cesarean section rate of 24%.

This suggests that cesarean deliveries at CHU Cocody were slightly underrepresented in our sample.

CHU Treichville. During the 15-month study period, data were obtained for 3,379 cases at CHU Treichville, or 57% of the 5,910 deliveries, according to service statistics. The monthly reporting rate varied greatly, from a high of 77% in November, 1984, to 28% in November, 1985. Underreporting was greatest during the last three months of the study period (October-December, 1985) when data were collected on only 27% of all deliveries. The number of reported deliveries per day varied greatly, from zero to 19.

During a retrospective study in June, 1986, it was found that service statistics for CHU Treichville were not reliable due to numbering errors in the registers. Individual entries are not consecutively numbered and, because each entry was not counted separately for service statistics totals, the number of deliveries reported was inaccurate by as few as eight to as many as 125 cases per month. Therefore, these statistics were not used to estimate underreporting as for CHU Cocody. Instead, underreporting was estimated based on findings from the retrospective study discussed below.

Retrospective Study of Missing Cases. As described above, hospital service statistics indicated underreporting of deliveries registered at both CHUs. To ascertain the nature of underreporting at the two hospitals, data from hospital birth registers for all missing cases were recorded retrospectively on Obstetric Surveillance Forms for three consecutive months at CHU Cocody (August-October, 1985) and for five consecutive months at CHU Treichville (April-August, 1985). These supplementary forms for missing cases, combined

with the original sample data, represent 100% of all deliveries registered in the hospitals during the time periods stated above.

Forms were completed for 357 missing cases (34% of all admissions for August thru October, 1985) at CHU Cocody, and 676 missing cases (33% of all admissions for April thru August, 1985) at CHU Treichville. To assess the nature of underreporting for each hospital, two data sets were created and compared. For each center, the supplementary data combined with the original sample data, together representing the complete data set for the time period, were compared with the original sample data. Frequency distributions for key variables were compared and the significance of any differences was tested using the chi-square statistic. Differences with $p < .001$ were considered significant.

Table 2.3 shows a comparison of type of delivery and fetal-neonatal survival for the two CHUs. There was significant underreporting of cesarean section deliveries* at both hospitals. At CHU Treichville, the cesarean section rate in the complete data set was 21.4%, compared with the rate of 16.7% in the original sample data. The respective cesarean section rates for CHU Cocody were 30.3% and 22.7%. Fetal deaths, including antepartum and intrapartum deaths, were also underreported at both CHUs, but the differences were not statistically significant.

*Includes women with laparotomy for repair of ruptured uterus.

Other variables examined included maternal age, referral status and complications of labor and delivery. The lack of significant differences in these variables between the original sample and the combined data is noteworthy. This is probably because the recording of this information in the birth registries was not complete. For certain variables such as prolonged labor and premature rupture of the membranes, the complete data had a smaller percentage of problems recorded, indicating that this information was not rigorously noted in the register.

Table 2.3 Difference Between Original Sample Data and Complete Data (Original Sample Data Plus Supplementary Data), CHU Cocody and CHU Treichville¹

Variable	CHU Cocody				CHU Treichville			
	Original Sample Data		Complete Data		Original Sample Data		Complete Data	
	%	(n)	%	(n)	%	(n)	%	(n)
Total	100.0	(673)	100.0	(1,010)	100.0	(1,326)	100.0	(1,958)
Type of Delivery								
abdominal	22.7	(153)	30.3	(306)	16.7	(222)	21.4	(419)
vaginal	77.2	(520)	69.7	(704)	83.3	(1,104)	78.6	(1,539)
Fetal Status								
anteartum death	5.6	(38)	7.1	(72)	4.2	(56)	3.5	(69)
intrapartum death	6.1	(41)	6.1	(62)	4.6	(61)	6.1	(119)
other ²	88.3	(594)	86.7	(876)	91.2	(1,209)	90.4	(1,770)

¹Excluding women admitted postpartum and those with unknown admission status.

²Includes infants discharged alive and postpartum deaths before mother's discharge from the hospital.

Note: P-values were calculated from chi-square tests of association. There was a significant difference in both hospitals between the cesarean section rate in the original reported data and the rate in the complete data ($p < .001$). There was no significant difference in fetal status in either hospital ($p = .36$ CHU Cocody; $p = .45$ CHU Treichville). In the testing for fetal status, anteartum and intrapartum fetal deaths were collapsed into one category.

Adjusting for Underreporting and Weighting for Sampling

Internal adjustment factor for the hospitals. Data for both CHUs were adjusted to compensate for underreporting of cesarean section deliveries. Because the quality of service statistics varied between the two hospitals, adjustment factors were calculated differently. For CHU Cocody, the adjustment factor was based on service statistics, whereas for CHU Treichville, it was based on data collected retrospectively.

The adjustment factor for cesarean section cases of 1.14 for CHU Cocody was calculated by dividing the percentage of cesarean sections listed in service statistics by the same percentage in original reported data for the 12-month study period (Appendix B):

$$\frac{\% \text{ cesareans (service statistics)}}{\% \text{ cesareans (original reported data)}} = \frac{1,152/4,100}{799/3,233} = \frac{28.1}{24.7} = 1.14$$

The adjustment factor of 1.28 for CHU Treichville was based on findings from the retrospective study. It was based on the percentage of abdominal deliveries in the combined data set (April - August, 1985) over the same percentage in the original data set (Table 2.3):

$$\frac{\% \text{ cesareans (combined data)}}{\% \text{ cesareans (original reported data)}} = \frac{419/1,958}{222/1,326} = \frac{21.4}{16.7} = 1.28$$

Aggregated data. In this report, certain analyses combine hospital data with data from maternity centers. To aggregate data, hospital data were adjusted to account for underreporting of all deliveries. For CHU Cocody data, the adjustment factor was calculated based on the number of deliveries from

service statistics for the 12-month period over the number for the original reported data (Appendix B):

$$\frac{\# \text{ deliveries (service statistics)}}{\# \text{ deliveries (original reported data)}} = \text{adjustment factor to aggregate data}$$

$$\frac{4,100}{3,233} = 1.27$$

For CHU Treichville, the adjustment factor was based on the number of deliveries in the combined data set divided by the original reported data (Table 2.3):

$$\frac{\# \text{ deliveries (combined data)}}{\# \text{ deliveries (original reported data)}} = \text{adjustment factor to aggregate data}$$

$$\frac{1,958}{1,326} = 1.48$$

If the delivery was a cesarean section delivery, this adjustment factor was then multiplied by the internal adjustment factor for underreporting of cesarean sections. For CHU Cocody, the factor was calculated by multiplying $1.14 \times 1.27 = 1.45$. For CHU Treichville, the factor was calculated by multiplying $1.48 \times 1.28 = 1.89$.

Weighting for sampling. Since a representative one-in-ten sample was obtained from the maternity centers, all maternity data were weighted by a factor of ten in those analyses where data from maternity centers are aggregated with hospital data.

A Note on Estimated Number of Deliveries

Table 2.4 shows the reported number of cases for the 12-month study period (November 1, 1984 to October 31, 1985) by place of delivery. Table 2.5 shows the estimated total number of cases by place of delivery, weighted and adjusted for sampling and underreporting. These tables serve two purposes: 1) to inform the reader about the effect of weighting and adjusting of data; and 2) to provide estimates of the actual number of deliveries in Abidjan. It is strongly recommended that the reader consult Chapter II on sampling and underreporting before attempting to interpret these tables.

Note that Table 2.5 is the only place in this report in which weighted and adjusted data for all cases are aggregated. This is because it is not possible to determine the number of women represented by those reported as having been referred from centers outside of Abidjan or from private or "other" clinics in the city. In other analyses in this report involving aggregated data, these cases were therefore excluded. Despite the limitations of presenting data as shown in Table 2.5, estimates based on these data represent the best information available on the number and status of deliveries in Abidjan.

Estimated number of deliveries in Abidjan. There were an estimated 82,142 admissions to maternity centers and hospitals in Abidjan during the 12-month study period. Eighty-nine percent of these were admissions to maternity centers; the remaining 11% were hospital admissions. Among women admitted to maternity centers, approximately 24% delivered at home and were admitted postpartum to register the birth. Less than 3% of women admitted to the hospitals were admitted postpartum. The majority were admitted for maternal-

related complications of delivery, not for the purposes of registering home births.

Over 80,000 deliveries are represented by data collected during the study period. Because it can be assumed that some home deliveries were not registered, and because some women delivered in private clinics not included in this study, this figure represents an underestimate of the actual number of births in Abidjan.

**Table 2.4 Reported Number of Cases by Place of Delivery,
November 1, 1984 to October 31, 1985**

Place of Delivery	Reported Number of Cases		
	Cocody Area	Treichville Area	Total City of Abidjan
<u>Maternity Centers</u>			
Delivering in maternity centers	3,512	2,035	5,547
Postpartum admissions or unknown admission status	<u>1,417</u>	<u>365</u>	<u>1,782</u>
	4,929	2,400	7,329
<u>Hospitals</u>			
Not referred (walk-ins)	1,271	1,838	3,109
Referred from centers in Abidjan	1,410	860	2,270
Referred from centers outside of Abidjan	462	127	589
Other ¹	20	25	45
Postpartum admissions or unknown admission status ²	<u>70</u>	<u>88</u>	<u>158</u>
	3,233	2,938	<u>6,171</u>
			13,500

¹Includes women with unknown referral status and those referred from private or "other" clinics in Abidjan.

²Includes six women with unknown admission status at CHU Cocody and 16 women with unknown status at CHU Treichville.

**Table 2.5 Number by Place of Delivery,
Weighted and Adjusted for Sampling and Underreporting,
November 1, 1984 to October 31, 1985¹**

Place of Delivery	Number of Weighted and Adjusted Cases		
	Cocody Area	Treichville Area	Total City of Abidjan
Maternity Centers			
Delivering in maternity centers	35,120	20,350	55,470
Postpartum admissions or unknown admission status	<u>14,170</u>	<u>3,650</u>	<u>17,820</u>
	49,290	24,000	73,290
Hospitals²			
Not referred (walk-ins)	1,642	2,825	4,467
Referred from centers in Abidjan	1,864	1,395	3,259
Referred from centers outside of Abidjan	628	209	837
Other ³	26	39	65
Postpartum admissions or unknown admission status	<u>90</u>	<u>134</u>	<u>224</u>
	4,250	4,602	<u>8,852</u>
			82,142

¹See earlier discussion in this chapter for a detailed discussion about weighting and adjusting of data.

²Adjusted for underreporting of cesarean sections and underreporting of all deliveries.

³Includes women with unknown referral status and those referred from private or "other" clinics in Abidjan.

III. DISCUSSION OF STUDY POPULATION

This chapter presents an overview of data for the 12-month study period November, 1984–October, 1985. It includes information on characteristics of the study population, complications and management of deliveries and resources used, and perinatal outcomes. Tables 3.1–3.10 provide data on women delivering in the two hospitals and their respective maternity centers, excluding women admitted postpartum. It is important to note that hospital data (distributions and percentages) are adjusted for underreporting of abdominal deliveries, but the numbers of cases given in the tables are the actual reported numbers and are not adjusted. (See Chapter II for a discussion of adjusting and weighting of data.)

Characteristics of the Study Population

Maternal Characteristics. Table 3.1 shows a comparison of maternal characteristics by place of delivery. The mean age of women delivering in participating centers was 25 years. About 10% were under 18 years of age and another 10% were 35 or over. Women in these age groups are considered to be at elevated risk of unfavorable pregnancy outcomes. Also, nearly 5% of the women in this study were at risk due to height less than 150 centimeters; the mean height was 160 cm.

In all centers, the majority of women had no formal education, ranging from slightly over one-half at the two CHUs to almost three-quarters at Treichville maternity centers. Women delivering in hospitals were better educated than those delivering in maternity centers with a mean of 4.2 years of education, compared with 2.0 years in the maternity centers. Nearly half of those

delivering in hospitals had some education, and 10% had completed 13 or more years. Women delivering in Cocody maternity centers were more likely to have some education than those delivering in Treichville maternity centers (33% and 26%, respectively).

CHU Treichville and Treichville maternity centers had a larger population of non-Ivoirien patients than CHU Cocody and Cocody maternity centers. Forty percent of women delivering in CHU Treichville and 60% in its maternity centers and 40% were non-Ivoirien, compared with nearly 30% and 40%, respectively, in CHU Cocody and its maternity centers.

Obstetric History. Women having their first pregnancy, those with more than five previous pregnancies and those with previous stillbirths or abortions are considered to be at elevated risk of unfavorable pregnancy outcomes. Women who delivered in hospitals were more likely than those delivering in maternity centers to have one or more of these risk factors.

Overall, between 21% and 25% of the women in each center were primigravidas; 20% to 27% had five or more previous pregnancies (Table 3.2). Women delivering in hospitals had a mean of 2.9 previous pregnancies, compared with 2.5 in maternity centers. Women delivering in hospitals were less likely to report a previous live birth and substantially more likely to report a previous induced or spontaneous abortion or stillbirth than those delivering in maternity centers.

Type of center was also associated with previous cesarean delivery and outcome of last pregnancy. Among women with at least one previous delivery, those delivering in hospitals were eight to 12 times more likely to have had a

previous cesarean section than those delivering in maternity centers. Of women ever pregnant, those who delivered in hospitals were more likely to report an unfavorable outcome of their last pregnancy than those delivering in maternity centers. The proportion who reported that their last pregnancy ended in a live born infant still surviving was higher in maternity centers than in hospitals (84% vs. 68%, respectively). This is to be expected, since the hospitals are referral centers and receive a higher proportion of high risk cases. Nine percent of women with at least one live birth reported that their last live birth was not surviving. Nearly 10% of women delivering in hospitals reported that their last pregnancy ended in an induced abortion, compared with 2% of women delivering in maternity centers.

Complications and Management of Delivery and Resource Use

This section provides basic statistics on complications, management of delivery and resource use according to place of delivery. In Abidjan, women presenting at maternity centers with indications of a difficult delivery, such as malpresentation or complications of labor, are generally referred for delivery. One would thus expect to see a relatively low rate of complications among those delivering in maternity centers. Hospitals, on the other hand, handle the most complicated cases, including women referred from within and outside the city of Abidjan.

Prenatal conditions and complications of labor and delivery. In this study, data were collected on 23 specific prenatal conditions and complications of labor and delivery. An additional code was available for "other" problems. Prenatal conditions included chronic problems such as deficiency anemia, sickle cell anemia, hypertensive disorders, bilharzia and diabetes. Data were

collected on 15 delivery-related complications affecting both the mother and baby, including but not limited to labor-related problems (prolonged or obstructed labor or hypo/hypertonic uterine contractions), antepartum and postpartum hemorrhage and fetal-related problems. Data on malaria were also collected.

Despite the high prevalence of prenatal care (97% of all women in this study made at least one prenatal visit) and the opportunity afforded to detect and record information on prenatal conditions, the level of reported prenatal problems in this study population was low. The most frequently reported prenatal conditions were deficiency anemia and hypertensive disorders, including preeclampsia and eclampsia (Table 3.3). A very small percentage of the population was diagnosed as having other prenatal problems such as sickle cell anemia, diabetes and bilharzia. It is likely that few women are tested for these other problems.)

Anemia was reported for one-eighth of women delivering in maternities but for less than 5% of women in hospitals. Because the most complicated cases were delivered in the hospitals, it is surprising that the anemia rates were lowest for these patients. The difference in rates might be due to differences in the patient populations or to diagnostic problems* or coding errors, but the hospital rates most likely represent an underestimate. Six percent of patients at CHU Cocody, 3% at CHU Treichville and less than 1% in the maternities were diagnosed with hypertensive disorders. These figures also appear to be low: other studies indicate that the expected proportion of

*Anemia is typically diagnosed using clinical assessment techniques but is not confirmed with lab tests.

women with hypertensive disorders in any given population is about 5%.

Reporting of malaria varied widely by center.

The reported rate of complications was three times higher in the hospitals than in the maternity centers. Fifteen percent of patients delivering in maternities were diagnosed with one or more complications (including "other"), compared with about one-half of those in the hospitals. Labor-related and fetal-related problems were the most commonly reported complications in the hospitals (Table 3.3). Thirty percent of patients at CHU Cocody and 21% at CHU Treichville were diagnosed as having prolonged or obstructed labor or hypotonic/hypertonic uterine contractions. Nearly one-fourth of patients at both hospitals were diagnosed as having fetal problems such as cord prolapse and fetal distress.

Management of delivery and resource use. Table 3.4 shows selected characteristics of delivery by place of delivery. Ninety-eight percent of women who delivered in maternity centers had vertex presentations and 98% had spontaneous deliveries. Eighty-five percent of all deliveries in maternity centers were attended by midwives. At Treichville maternity centers, less than 1% were attended by health auxiliaries and 13% were attended by student midwives. This compares with 12% and 2%, respectively, at Cocody maternity centers. One explanation for this difference is that student midwives are trained at CHU Treichville and are more likely to be assigned to that hospital's maternity centers for their internships.

Women delivering in the two hospitals were more than five times as likely to have malpresentations (13% of all deliveries at CHU Cocody and 10% at CHU

Treichville) than those delivering in maternity centers. Two-thirds of deliveries at the hospitals were spontaneous; abdominal deliveries were predominant among interventions. Women delivering in CHU Cocody were more likely to be delivered abdominally than those delivering in CHU Treichville. They were also more likely to be attended by a physician.*

Table 3.5 shows the percent of patients having an episiotomy by number of previous deliveries. Forty-three percent of patients at CHU Cocody and 36% at CHU Treichville had an episiotomy for the current delivery, compared with 9% and 16% at the respective maternity centers. At both CHUs, women having their first delivery were more than three times more likely to have an episiotomy than those with at least one previous delivery.

Availability of resources such as blood, anesthesia and oxytocics varied widely (Table 3.6). Blood was reported to be necessary, but not available, for 1% of cases in the maternity centers, 8% in CHU Cocody and 3% in CHU Treichville. Availability of anesthesia and oxytocics was not reported to be a problem in the hospitals. However, both of these items were reported lacking to varying degrees in the maternity centers. Anesthesia was reported as necessary but not available for 11% of patients at Cocody maternity centers and 6% at Treichville maternity centers; oxytocics were necessary but not available for 16% of patients at Cocody maternity centers and 4% at Treichville maternity centers.

*This category includes medical students, interns, general physicians and ob/gyn specialists.

Perinatal Outcome

A total of 11,926 infants were delivered, including 716 sets of twins and 33 sets of triplets (Table 3.7). The ratio of males to females varied from 1.24 in Cocody maternity centers to 1.08 in Treichville maternity centers.

Table 3.8 shows the distribution of gestational age, Apgar score at five minutes and perinatal death for singleton deliveries. The proportion of infants with gestational age less than 37 weeks and Apgar score less than seven was highest in the hospitals. Eleven to twelve percent of infants born in hospitals were 36 weeks or less, compared with 4% and 10%, respectively, in Cocody and Treichville maternity centers. Twenty-five percent of infants born in CHU Cocody and 17% in CHU Treichville had an Apgar score of less than seven at five minutes. Less than 5% of infants born in maternity centers had Apgar scores of seven or less.

The perinatal mortality rate* among singleton deliveries ranged from 2% in the maternity centers to 16% at CHU Cocody (Table 3.8). At CHU Treichville 9% did not survive until mother's discharge from the hospital.

Birthweight is a major factor associated with perinatal and infant mortality. Infants born weighing less than 2,500 grams, or low birthweight infants, are at much higher risk than those weighing 2,500 grams or more. As birthweight decreases below 2,500 grams, the risk of mortality increases. Tables 3.9-3.10 show distribution of birthweight and perinatal mortality rates by birthweight for singleton deliveries. Overall, the percent of low birthweight (<2,500

*Perinatal mortality includes fetal loss and postpartum deaths until the time of mother's discharge from the hospital or maternity center.

grams) varied from one-sixth in hospitals to about one-tenth in maternity centers. Less than 7% of women delivering in hospitals and less than 3% delivering in maternity centers delivered very low birthweight infants (<2,000 grams).

The mortality rate was highest among the very low birthweight infants (<2,000 grams). The survival rate of these infants was 50% in CHU Cocody and 65% in CHU Treichville. Babies 2,500 grams and over had the lowest mortality rates. At the hospitals, between 6% and 12% of babies 2,500 grams and over did not survive, compared with less than 2% at the maternity centers.

Table 3.1 Selected Characteristics of Women Admitted for Delivery

Characteristic	CHU Cocody	CHU Treichville	Cocody Maternity Centers	Treichville Maternity Centers
<u>Total</u>	100.0	100.0	100.0	100.0
<u>Maternal age</u>				
<15	0.7	0.4	0.4	0.4
15-17	9.5	7.6	7.8	8.5
18-19	10.5	9.2	10.9	11.7
20-29	51.6	53.8	58.3	55.3
30-34	17.3	16.7	13.9	15.1
35-39	8.1	8.9	6.7	6.8
>40	2.5	3.4	1.9	2.2
Mean	25.5	26.1	25.0	25.0
<u>Education (years)</u>				
0	54.0	53.9	67.2	73.5
1-6	16.7	16.4	20.4	14.5
7-12	18.7	21.0	11.6	11.1
>13	10.6	8.7	0.8	0.8
Mean	4.3	4.1	2.2	1.8
<u>Marital status</u>				
never married	8.2	11.0	10.2	11.7
married or in union	91.5	88.9	89.7	88.2
divorced/separated/ widowed	0.2	0.1	0.1	0.1
<u>Height</u>				
<150 cm	5.2	4.4	3.0	4.1
>150 cm	94.8	95.6	97.0	95.9
<u>Ethnic group¹</u>				
1) Akans	23.7	22.5	21.0	16.9
2) Krou	20.0	15.0	23.3	10.4
3) Lagunaires	9.4	11.9	6.0	8.1
4) Malenke	16.1	10.3	12.8	6.0
5) Bourkinabe	14.1	15.8	17.6	28.5
6) Other non-Ivoirien	16.5	24.4	19.4	29.7
Reported no. of cases	3,163	2,850	3,512	2,035

¹ The various ethnic groups comprising each category are listed in Appendix B.

Note: For this table and all other tables in this chapter, distributions and percentages for hospitals are adjusted for both underreporting of cesarean sections and underreporting of deliveries and are weighted for maternity center deliveries. Reported number of cases are not adjusted or weighted. For maternity centers, reported numbers of cases represent a one-in-ten sample. (See Chapter II for a discussion of adjusting and weighting of data.) All tables in Chapter III exclude postpartum admissions and women with unknown admission status.

Table 3.2 Selected Obstetric History Characteristics of Women Admitted for Delivery

Characteristic	CHU Cocody	CHU Treichville	Cocody Maternity Centers	Treichville Maternity Centers
<u>Total</u>	100.0	100.0	100.0	100.0
<u>Previous pregnancies</u>				
0	24.5	21.7	21.3	22.9
1-2	31.3	29.6	34.6	35.4
3-4	21.0	22.1	23.2	21.7
>5	23.7	26.6	21.0	19.9
Mean	2.8	3.0	2.6	2.5
<u>Previous deliveries</u>				
0	32.0	28.9	24.3	24.9
1+	68.0	71.1	75.7	75.1
Mean	2.4	2.5	2.5	2.4
<u>Previous live births</u>				
0	34.3	30.3	25.0	25.7
1+	65.7	69.7	75.0	74.3
Mean	2.4	2.4	2.4	2.3
<u>Previous induced abortion¹</u>				
0	82.9	80.6	94.4	96.8
1+	17.1	19.4	5.6	3.2
<u>Previous spontaneous abortion¹</u>				
0	79.6	77.9	87.3	87.3
1+	20.4	22.1	12.7	12.7
<u>Previous stillbirth²</u>				
0	86.3	87.5	90.8	90.1
1+	13.7	12.5	9.2	9.9
<u>Previous cesarean section²</u>				
0	83.0	83.5	98.6	97.8
1+	17.0	16.5	1.4	2.2
<u>Outcome of last pregnancy¹</u>				
Live birth-surviving	66.3	71.0	81.9	86.7
Live birth deceased	10.4	8.2	9.2	8.3
Stillbirth	5.8	4.9	2.1	1.6
Spontaneous abortion	7.5	6.2	4.2	2.4
Induced abortion	9.6	9.5	2.4	1.0
Reported no. of cases	3,163	2,850	3,512	2,035

¹ Excluding women with no previous pregnancies.

² Excluding women with no previous deliveries.

Table 3.3 Percent of Patients Diagnosed with Prenatal Conditions and Complications of Labor and Delivery, by Place of Delivery

	CHU Cocody %	CHU Treichville %	Cocody Maternity Centers %	Treichville Maternity Centers %
<u>Prenatal condition</u>				
Anemia	3.2	4.9	12.0	14.5
Preeclampsia, eclampsia or other hypertension	6.2	2.8	0.3	0.1
Other ¹	1.8	0.8	0.1	0.3
<u>Malaria</u>	3.7	7.8	17.1	13.2
<u>Complication</u>				
No complication	46.7	55.5	84.9	85.2
1+ complication	53.3	44.5	15.1	14.8
<u>Type of complication</u>				
Labor-related ²	30.2	20.7	3.9	4.8
Placenta previa, abruptio placenta	5.8	3.7	0.1	0.2
Uterine rupture	1.4	1.0	0.0	0.0
Other hemorrhage ³	4.4	1.4	3.0	2.5
Postpartum hemorrhage	3.3	2.3	3.4	2.1
Premature rupture of membranes	8.9	6.8	1.7	0.9
Fetal-related problem ⁴	24.3	22.5	1.8	6.9
Retained products	1.0	1.5	0.3	0.5
Maternal trauma	1.6	1.5	2.6	1.1
"Other" ⁵	6.1	5.4	3.0	0.3
Reported no. of cases	3,163	2,850	3,512	2,035

¹Includes sickle cell anemia, diabetes and bilharzia.

²Includes prolonged and obstructed labor and hyper/hypotonic uterine contractions.

³Other hemorrhage refers to antepartum and intrapartum hemorrhage and does not include hemorrhage due to placenta previa, abruptio placenta or uterine rupture.

⁴Includes fetal distress, meconium staining and cord prolapse.

⁵May include prenatal or chronic problems as well as acute labor-related problems.

Table 3.4 Distribution of Cases by Type of Labor, Presentation, Delivery, and Attendant at Delivery, by Place of Delivery

	CHU Cocody	CHII Treichville	Cocody Maternity Centers	Treichville Maternity Centers
<u>Total</u>	100.0	100.0	100.0	100.0
<u>Type of labor</u>				
No labor	1.7	1.1	0.0	0.0
Spontaneous	71.2	83.3	85.8	94.0
Augmented	24.2	12.7	14.0	5.5
Induced	3.0	2.8	0.2	0.3
<u>Type of presentation</u>				
Vertex	86.6	90.3	98.3	98.0
Face, brow	1.9	1.4	0.4	0.2
Breech	7.8	6.7	1.2	1.8
Transverse	3.1	1.4	0.0	0.0
Other	0.6	0.2	0.0	0.0
<u>Type of delivery</u>				
Spontaneous	63.5	71.8	98.1	97.5
Forceps	3.5	2.1	1.7	1.9
Suction	1.7	3.0	0.0	0.0
Breech extraction	2.2	2.7	0.1	0.6
Abdominal ¹	27.8	20.1	0.0	0.0
Other	1.4	0.3	0.0	0.0
<u>Attendant at delivery</u>				
Auxiliary	0.0	0.2	12.0	0.1
Student nurse/midwife	4.7	15.0	2.3	13.1
Nurse/midwife	42.2	52.8	84.1	85.3
Physician ²	52.7	31.5	0.0	0.1
Other	0.4	0.6	1.6	1.4
Reported no. of cases	3,163	2,850	3,512	2,035

¹ Includes cesarean section deliveries and laparotomies.

² Includes medical students, general physicians and Ob/gyn specialists.

Table 3.5 Percent of Patients with Episiotomy by Number of Previous Deliveries and Place of Delivery, All Women with Vaginal Deliveries

	CHU Cocody	CHU Treichville	Cocody Maternity Centers	Treichville Maternity Centers
<u>Number of previous deliveries</u>				
0	80.8	77.9	27.8	46.5
1+	25.0	20.7	2.5	5.4
Total all women	42.9	36.4	8.6	15.7
Reported no. of cases	2,368	2,374	3,509	2,033

Table 3.6 Distribution of Cases by Treatment Given, by Place of Delivery

	CHU Cocody	CHU Treichville	Cocody Maternity Centers	Treichville Maternity Centers
<u>Total</u>	100.0	100.0	100.0	100.0
<u>Blood transfusion</u>				
Not necessary	78.1	89.2	98.7	98.8
Necessary, not available	7.6	2.5	1.2	1.0
Blood given	14.3	8.3	0.0	0.2
<u>Anesthesia</u>				
Not necessary	43.2	59.5	88.5	90.8
Necessary, not available	0.1	1.2	11.3	6.0
Local	26.3	13.6	0.1	3.2
General	30.1	25.3	0.0	0.0
Other	0.2	0.3	0.1	0.0
<u>Oxytocics</u>				
Not necessary	31.6	85.8	36.0	93.3
Necessary, not available	0.3	0.6	16.3	3.6
Oxytocics given	68.1	13.6	47.7	3.1
Reported no. of cases	3,163	2,850	3,512	2,035

**Table 3.7 Number of Mothers
Delivered, Number of Infants Born by Birth
Status and Sex, and Sex Ratio, by Place of Delivery**

	CHU Cocody ¹	CHU Treichville ²	Cocody Maternity Centers ³	Treichville Maternity Centers ³
<u>Number of mothers</u>	3163	2850	3512	2035
<u>Number of infants born</u>				
singletons	2996	2724	3460	1997
twins	308	248	92	68
triplets	18	3	9	3
	<u>3322</u>	<u>2975</u>	<u>3561</u>	<u>2068</u>
<u>Sex</u>				
boys	1837	1583	1856	1073
girls	1485	1392	1705	995
	<u>3322</u>	<u>2975</u>	<u>3561</u>	<u>2068</u>
<u>M:F ratio</u>	1.24*	1.15*	1.09	1.08
<u>Multiple birth rate per 1,000 deliveries</u>	50.8*	44.3*	14.0	17.2

* Based on adjusted data.

¹ Excludes information on infants for seven missing cases.

² Excludes information on infants for two missing cases.

³ Excludes information on infants for three missing cases.

Table 3.8 Percent Distribution of Gestational Age, Apgar Score and Perinatal Death (singleton deliveries)

	CHU Cocody	CHU Treichville	Cocody Maternity Centers	Treichville Maternity Centers
<u>Gestational age (weeks)</u>				
<34	5.3	4.9	1.6	1.2
34-36	6.1	7.5	8.5	3.2
>37	<u>88.6</u>	<u>87.6</u>	<u>89.9</u>	<u>95.6</u>
Reported no. of cases	2,995	2,717	3,456	1,986
Total	100.0	100.0	100.0	100.0
<u>Apgar score</u>				
0	14.2	8.5	2.2	1.5
1-6	11.2	8.8	1.7	2.6
7-10	<u>74.6</u>	<u>82.7</u>	<u>96.0</u>	<u>95.9</u>
Reported no. of cases	2,975	2,694	3,442	1,947
Total	100.0	100.0	100.0	100.0
<u>Perinatal death</u>				
No death	84.2	90.8	97.8	98.3
Antepartum	5.1	3.9	1.0	1.0
Intrapartum	8.6	4.1	0.9	0.4
Postpartum ¹	<u>2.1</u>	<u>1.1</u>	<u>0.3</u>	<u>0.3</u>
Reported no. of cases	2,996	2,724	3,460	1,997
Total	100.0	100.0	100.0	100.0

¹Includes postpartum deaths until the time of mother's discharge from hospital.

Table 3.9 Percent Distribution of Birthweight and Percent Not Surviving at Discharge,* CHU Cocody and CHU Treichville (singleton deliveries)

	CHU Cocody		CHU Treichville	
	Percent of total	Percent not surviving	Percent of total	Percent not surviving
<u>Birthweight (grams)</u>				
<2000	6.7	50.0	6.1	34.5
2000-2499	9.6	22.0	8.6	18.9
2500-3499	63.9	12.4	65.9	6.3
>3500	19.9	12.0	19.5	6.6
Total	100.0	15.8	100.0	9.2
Reported no. of cases	2,996		2,724	

*Includes fetal loss and postpartum deaths until the time of mother's discharge from hospital. There were 469 perinatal deaths at CHU Cocody and 239 deaths at CHU Treichville.

Table 3.10 Percent Distribution of Birthweight and Percent Not Surviving at Discharge,* Cocody and Treichville Maternity Centers (singleton deliveries)

	Cocody Maternity Centers		Treichville Maternity Centers	
	Percent of total	Percent not surviving	Percent of total	Percent not surviving
<u>Birthweight (grams)</u>				
<2000	2.0	17.4	2.2	16.7
2000-2499	6.7	5.6	8.6	2.3
2500-3499	73.2	1.7	77.1	1.3
>3500	18.0	1.3	12.2	1.2
Total	100.0	2.2	100.0	1.7
Reported no. of cases	3,460		1,997	

*Includes fetal loss and postpartum deaths until the time of mother's discharge from the maternity center. There were 78 perinatal deaths at Cocody maternity centers and 34 deaths at Treichville maternity centers.

IV. THE REFERRAL SYSTEM

This chapter describes the referral system in Abidjan. It addresses the following questions:

1. What proportion of admissions at the hospitals is referred? Where do these referrals come from?
2. What is the pattern of referrals between the maternity centers in Abidjan and their respective referral hospitals? What factors affect decisions to refer women presenting for delivery at maternity centers?
3. How do complications of referrals compare with non-referrals (walk-ins) and how do these different rates of complications affect resource use? What differences are there between women referred from centers within Abidjan and those referred from outside the city?

Distribution of Referrals. Referrals constitute a major proportion of admissions at both CHUs in Abidjan. In this study, 60% of women admitted to CHU Cocody and 36% at CHU Treichville were referred, either from centers within Abidjan or from centers outside of the city (Table 4.1).^{*} Referred women were most likely to come from maternity centers within the catchment area of each hospital, although one-fourth of referred women at CHU Cocody and one-eighth at CHU Treichville were referred from centers outside of Abidjan.

Determinants of Referral Status. Although the great majority of women presenting for delivery at each of the 11 maternity centers were delivered in those centers, a small proportion were referred for hospital delivery.

^{*}Includes 136 women admitted postpartum and 22 women with unknown admission status.

Table 4.2 shows the number of patients presenting at maternity centers and the percentage of these referred for delivery.* The total referral rate varied from 3% to 10%. Overall, 5% of women who presented at Cocody maternity centers were referred, compared with 6% of women presenting at Treichville maternity centers.

Within each CHU's catchment area, proximity of the maternity center to its referral hospital was associated with referral rates. Women were more likely to be referred the closer the maternity center was to the referral hospital (see map at beginning of report). Among maternity centers in the CHU Cocody catchment area, Cocody Nord and Adjame, two of the centers closest to CHU Cocody, had the highest referral rates to that hospital (8.5% and 8.9%, respectively). Likewise, Libanaise Maternity Center had the highest referral rate (9.3%) among centers in the CHU Treichville catchment area.

Although most referred women delivered in their respective referral hospitals, a small percentage were not admitted to the hospital associated with the referring maternity center. For example, although Yopougon and Abobodoume are within the CHU Cocody catchment area, 10% and 30%, respectively, of all women referred from these centers were admitted to CHU Treichville. These "cross-referrals" represented a small proportion of the total group of women referred (4% of referrals from Cocody maternity centers and 2% from Treichville centers).

*Eighteen women presenting at maternity centers were referred to a hospital for delivery but were admitted postpartum. Ten referred women had unknown admission status. These women have been included in the total column of women presenting at maternity centers in Tables 4.2-4.4.

Table 4.3 shows the percentage of women presenting at Cocody and Treichville maternity centers who were referred according to selected determinants of referral. Age less than 18 or 35 years or over, height less than 150 cm., parity status (no previous deliveries) and previous cesarean section were all associated with high referral rates in both catchment areas. Outcome of the last pregnancy was also associated with referral rates. Women whose last pregnancy resulted in a stillbirth, spontaneous abortion or induced abortion were most likely to be referred, while women with a surviving last birth were least likely to be referred.

Although women with no prenatal visits were more likely to be referred than women with any care, the referral rate was higher for women with five or more visits than for women with one to four visits. This may be because women who have more problems make more visits to deal with these problems. Trimester of initiation of care was associated with referral rates at Cocody centers and, to a lesser degree, at Treichville centers. Among women with one or more prenatal visits, those who initiated care in their first trimester were least likely to be referred while those who waited until their third trimester were most likely to be referred.

As expected, multiple birth status and presentation were strongly associated with referral rates. Women with multiple births were four times more likely to be referred than women with singleton births. Women with malpresentations, especially breech or transverse presentations, were more than seven times more likely to be referred than those with normal vertex presentations.

Table 4.4 shows the complication rate for selected complications among women presenting at maternity centers. In general, the rates were low and there was

little variation between Cocody maternity centers and Treichville maternity centers. However, referral rates for these complications differed.

Fetal distress was among the most frequently diagnosed complications. In two percent of the cases presenting at Cocody maternity centers and 6% at Treichville maternity centers, fetal distress was diagnosed. However, the referral rate for these cases was 1.3 times higher at Cocody maternity centers.

Among women presenting at Cocody maternity centers, over 80% of cases diagnosed as having obstructed labor, abruptio placenta and cord prolapse were referred to a hospital for delivery. All cases diagnosed with placenta previa and uterine rupture were referred. In comparison, only for patients with uterine rupture were all women referred from Treichville maternity centers. Eighty-one percent of cases with placenta previa and 66% of those with abruptio placenta were referred, but for each of the remaining complications, less than half of all women were referred for delivery.

Complications, Management and Outcome by Referral Status. Tables 4.5-4.8 show distributions of women delivering at the hospitals according to referral status. Referrals are divided into the following groups: women referred by a center in Abidjan, those referred from outside the city, and women not referred (walk-ins). As expected, referred women were the most likely to have complications at both hospitals. Referred women also had the most unfavorable birth outcomes. Because referrals had more problems, they were more likely to need an operative delivery and to require the care of a physician. Such patients were three times more likely to be delivered abdominally.

At both hospitals, women referred from outside the city had higher complication rates than those referred from centers in Abidjan. They were more likely to be reported as having labor-related complications including prolonged or obstructed labor or hypertonic or hypotonic uterine contractions. At both hospitals, placenta previa was more likely among the group referred from outside of the city, as were other antepartum or intrapartum hemorrhage and fetal problems. Among women delivering at CHU Cocody, those referred from outside of Abidjan were nearly four times more likely to report uterine rupture than those referred from within the city. At CHU Treichville, there was only a minor difference between the two groups in the reported rate of uterine rupture. Because referrals from outside the city had higher complication rates than those referred by centers in Abidjan, they were more likely to be delivered abdominally and to have required a physician's attendance at delivery.

Infants born to women who were not referred had the lowest rates of stillbirth and postpartum death, while those born to women referred from outside the city had the highest rates (Tables 4.7-4.8). At both hospitals, the perinatal death rate* for all cases referred from outside the city was approximately 1.5 times higher than for those referred from within the city and over five times higher than for walk-ins. It should be noted that although CHU Cocody had a higher overall perinatal death rate than CHU Treichville, it also had a higher percentage of referrals (60% vs. 36%). Nonetheless, the perinatal death rate

*Includes fetal loss and postpartum deaths until the time of mother's discharge from the hospital.

at CHU Cocody was higher for each group, even when controlled for referral status.*

*When directly standardizing CHU Cocody's perinatal death rate to CHU Treichville's distribution of referrals, the rate decreased from 158 to 112. This rate is still higher than for CHU Treichville (91).

Table 4.1 Distribution of Women Admitted to CHU Cocody and CHU Treichville by Referral Status¹

	CHU Cocody	CHU Treichville
Place of presentation ²		
<u>Not referred</u>	40.3	63.8
<u>Referred by centers in Abidjan</u>	44.8	31.6
Cocody Nord	4.8	0.1
220 Logements	13.0	0.1
Adjame	4.5	0.1
Abobogare	9.1	0.3
Yopougon	11.5	1.2
Locodjoro	0.8	0.1
Abobodoume	0.5	0.2
Libanaise	0.2	5.4
Marcory	0.1	5.8
Koumassi	0.1	10.3
Port-Bouet	0.1	7.3
Other centers in Abidjan ³	0.2	0.7
<u>Referred by centers outside of Abidjan</u>	14.9	4.6
<u>Total</u>	100.0	100.0
Reported no. of cases	3,220	2,934

¹Includes 136 postpartum admissions to the hospitals. Some women admitted to the hospital postpartum were referred. These women delivered en route to the hospital.

²Excludes 17 women referred with unknown place of referral.

³Includes private clinics and "other" clinics not specified.

Note: For this table and all other tables in this chapter, distributions for aggregated data are adjusted for both underreporting of cesarean sections and underreporting of deliveries in the hospitals and are weighted for maternity center deliveries. Reported numbers of cases are not adjusted or weighted. For maternity center data, reported numbers of cases represent a one-in-ten sample. (See Chapter II for a discussion of weighting and adjusting.)

Table 4.2 Number of Patients Presenting at Eleven Maternity Centers in Abidjan and Percent Referred to a Hospital for Delivery¹

	Presenting at maternity centers Number	% referred to CHU Cocody	% referred to CHU Treichville	Total % referred
<u>Cocody maternity centers</u>				
Cocody Nord	375	8.4	0.1	8.5
220 Logements	1,410	5.3	0.1	5.4
Adjame	337	8.9	0.2	9.1
Abobogare	1,203	4.1	0.1	4.2
Yopougon	1,386	4.7	0.5	5.2
Locodjoro	163	2.4	0.2	2.6
Abobodoume	<u>105</u>	<u>2.4</u>	<u>1.0</u>	<u>3.4</u>
Total	4,979	5.0	0.2	5.2
<u>Treichville maternity centers</u>				
Libanaise	400	0.3	9.3	9.6
Marcory	567	0.1	6.2	6.3
Koumassi	1,183	0.1	5.1	5.2
Port-Bouet	<u>716</u>	<u>0.1</u>	<u>6.2</u>	<u>6.3</u>
Total	2,866	0.1	6.1	6.1

¹Eighteen women referred from a maternity center were admitted to a hospital postpartum. Ten referred women had unknown admission status. These cases have been included.

Table 4.3 Distribution of Patients Presenting at Cocody and Treichville Maternity Centers and Percent Referred to Hospital for Delivery, by Selected Determinants of Referral¹

Determinant	Patients presenting at Cocody maternity centers		Patients presenting at Treichville maternity centers	
	Percent of total	Percent referred	Percent of total	Percent referred
<u>Total</u>	100.0	5.2	100.0	6.2
<u>Age (years)</u>				
<18	8.3	8.7	8.9	8.5
18-19	10.9	5.9	11.7	7.4
20-34	71.7	4.6	69.9	5.6
>35	8.7	6.7	9.1	7.1
<u>Education (years)</u>				
No education	67.3	5.4	73.3	5.9
1-6	20.2	4.4	14.7	7.2
7 or more	12.6	6.1	12.0	6.8
<u>Height (cm)</u>				
<150	3.1	8.8	4.3	11.2
>150	96.9	5.1	95.7	6.1
<u>Number of previous deliveries</u>				
0	25.0	7.7	25.8	9.3
1-4	56.6	4.2	56.1	4.9
>5	18.5	5.4	18.1	5.7
<u>Outcome of last pregnancy</u>				
Never pregnant	21.8	7.5	23.6	8.9
Live birth-surviving	63.5	3.8	65.5	4.3
Live birth-not surviving	7.3	6.4	6.4	7.4
Stillbirth	1.7	11.8	1.4	17.2
Spontaneous abortion	3.4	8.5	2.0	14.4
Induced abortion	2.0	10.9	1.0	24.5
Other	0.3	*	0.1	0.0
Reported no. of cases	4,979	1,467	2,866	831

*Number of cases less than 10.

¹Eighteen women referred from a maternity center were admitted to a hospital postpartum. Ten referred women had unknown admission status. These cases have been included in all categories.

Table 4.3 (cont.)

Determinant	Patients presenting at Cocody maternity centers		Patients presenting at Treichville maternity centers	
	Percent of total	Percent referred	Percent of total	Percent referred
<u>Total</u>	100.0	5.2	100.0	6.2
<u>Previous cesarean section²</u>				
No	97.6	3.8	96.8	4.1
Yes	2.1	35.0	3.2	33.9
<u>Number of prenatal visits</u>				
0	2.1	9.0	4.1	10.2
1-2	42.8	5.4	37.3	5.6
3-4	45.1	4.7	48.1	5.7
>5	10.0	6.6	10.5	9.0
<u>Trimester of first visit³</u>				
First	31.8	3.6	26.2	5.2
Second	53.6	5.7	57.3	6.2
Third	14.7	6.9	16.5	6.4
<u>Malpresentation</u>				
No	97.4	4.4	97.1	5.3
Yes ⁴	2.6	39.6	2.9	35.3
<u>Multiple birth status</u>				
Singleton	98.3	5.0	97.9	5.9
Multiple birth	1.7	20.7	2.1	21.5
Reported no. of cases	4,979	1,467	2,866	831

²Excluding women with no previous deliveries.

³For women having one or more prenatal visits.

⁴Includes brow/face, breech, transverse and combination presentations.

Table 4.4 Distribution of Patients Presenting at Cocody and Treichville Maternity Centers and Percent Referred to Hospitals for Delivery, by Selected Complications of Labor¹

Complication	Patients presenting at Cocody maternity centers		Patients presenting at Treichville maternity centers	
	Total 100.0%	Percent referred	Total 100.0%	Percent referred
<u>Obstructed labor</u>	1.0	89.5	3.1	38.2
<u>Hyper/hypotonic uterine contractions</u>	0.6	71.0	0.6	41.8
<u>Placenta previa</u>	0.2	100.0	0.2	81.4
<u>Abruptio placenta</u>	0.3	81.9	0.4	65.9
<u>Ruptured uterus</u>	0.1	100.0	0.1	100.0*
<u>Premature rupture of membranes</u>	2.2	23.5	1.4	35.7
<u>Fetal distress²</u>	2.3	41.8	5.8	33.1
<u>Cord prolapse</u>	0.3	82.9	0.5	59.8
Reported no. of cases	4,979	1,467	2,866	833

*Based on number of cases less than 20.

¹Eighteen women referred from a maternity center were admitted to a hospital postpartum. Ten referred women had unknown admission status. These cases have been included in all categories.

²Excluding cord prolapse.

Table 4.5 Distribution of Patients Delivering at CHU Cocody According to Referral Status, by Type of Delivery, Attendant at Delivery and Selected Complications, by Place of Presentation¹

	Referred by any center in Abidjan ²	Referred by a center outside of Abidjan	Not referred (walk-ins)	All Patients
<u>Total</u>	100.0	100.0	100.0	100.0
<u>Complication</u>				
labor-related ⁴				
yes	38.8	57.9	9.8	30.2
no	61.2	42.1	90.2	69.8
placenta previa				
yes	4.1	7.0	1.5	3.5
no	95.9	93.0	98.5	96.5
abruptio placenta				
yes	4.4	3.0	0.5	2.7
no	95.6	97.0	99.5	97.3
uterine rupture				
yes	1.4	5.1	0.1	1.4
no	98.6	94.9	99.9	98.6
other hemorrhage ⁵				
yes	5.3	6.7	2.7	4.4
no	94.7	93.3	97.3	95.6
fetal problem ⁶				
yes	31.0	41.5	9.2	23.8
no	69.0	58.5	90.8	76.2
<u>Type of delivery</u>				
vaginal	68.4	47.2	86.1	72.3
abdominal	31.6	52.8	13.9	27.7
<u>Attendant at delivery</u>				
midwife	39.6	24.0	64.0	46.9
physician ³	60.0	75.6	35.6	52.6
other	0.3	0.4	0.5	0.4
Reported no. of cases	1,417	462	1,271	3,150

¹Excludes postpartum admissions and patients with unknown admission status.

²Includes private clinics and "other" centers.

³Includes medical students, general physicians and Ob/gyn specialists.

⁴Includes prolonged or obstructed labor and hypertonic/hypotonic uterine contractions.

⁵Refers to other antepartum or intrapartum hemorrhage. Excludes hemorrhage due to placenta previa, abruptio placenta and uterine rupture.

⁶Includes fetal distress, meconium staining and cord prolapse.

**Table 4.6 Distribution of Patients Delivering at CHU Treichville
According to Referral Status by Type of Delivery, Attendant at
Delivery and Selected Complications, by Place of Presentation¹**

	Referred by any center in Abidjan ²	Referred by a center outside of Abidjan	Not referred (walk-ins)	All Patients
<u>Total</u>	100.0	100.0	100.0	100.0
<u>Complication</u>				
labor-related ⁴				
yes	37.3	50.2	10.2	20.7
no	62.7	49.8	89.8	79.3
placenta previa				
yes	3.1	11.5	0.7	1.9
no	96.9	88.5	99.3	98.1
abruptio placenta				
yes	4.7	0.9	0.5	1.9
no	95.3	99.1	99.5	98.1
uterine rupture				
yes	2.2	2.6	0.2	1.0
no	97.8	97.4	99.8	99.0
other hemorrhage ⁵				
yes	2.4	1.7	0.9	1.4
no	97.6	98.3	99.1	98.6
fetal problem ⁶				
yes	37.5	37.1	13.2	22.0
no	62.5	62.9	86.8	78.0
<u>Type of delivery</u>				
vaginal	65.4	58.4	88.9	80.0
abdominal	34.6	41.6	11.1	20.0
<u>Attendant at delivery</u>				
midwife	49.2	36.2	79.6	67.9
physician ³	49.9	61.6	19.8	31.4
other	0.8	2.2	0.6	0.8
Reported no. of cases	881	127	1,838	2,846

¹Excludes postpartum admissions and patients with unknown admission status.

²Includes private clinics and "other" centers.

³Includes medical students, general physicians and Ob/gyn specialists.

⁴Includes prolonged or obstructed labor and hypertonic/hypotonic uterine contractions.

⁵Refers to other antepartum or intrapartum hemorrhage. Excludes hemorrhage due to placenta previa, abruptio placenta and uterine rupture.

⁶Includes fetal distress, meconium staining and cord prolapse.

Table 4.7 Perinatal Death Rates by Referral Status and Place of Referral, CHU Cocody (singleton deliveries)¹

	Referred by any center in Abidjan ²	Referred by a center outside of Abidjan	Not referred (walk-ins)	All Patients
<u>Perinatal death rate per 1,000 births</u>	208	297	51	158
stillbirth	182	267	39	136
postpartum death	26	30	12	21
Reported no. of cases	1,319	432	1,232	2,932

¹Excludes postpartum admissions and patients with unknown admission status. Perinatal death includes fetal and postpartum deaths until time of mother's discharge from hospital.

²Includes maternity centers, private clinics and "other" clinics in Abidjan.

Table 4.8 Perinatal Death Rates by Referral Status and Place of Referral, CHU Treichville (singleton deliveries)¹

	Referred by any center in Abidjan ²	Referred by a center outside of Abidjan	Not referred (walk-ins)	All Patients
<u>Perinatal death rate per 1,000 births</u>	181	278	35	91
stillbirth	155	268	31	80
postpartum death	25	10	4	11
Reported no. of cases	814	117	1,783	2,714

¹Excludes postpartum admissions and patients with unknown admission status. Perinatal death includes fetal and postpartum deaths until time of mother's discharge from hospital.

²Includes maternity centers, private clinics and "other" clinics in Abidjan.

V. PRENATAL CARE

Prenatal care is generally recognized to be an important factor contributing to a healthy pregnancy outcome for both the mother and baby. Although the content of prenatal care may vary depending on where care is obtained, it generally includes screening to identify risk status. Prenatal care affords the medical community an opportunity to identify women who may be at risk of unfavorable outcomes and to monitor these women during the prenatal period. If a woman is classified as high risk, she will be encouraged to continue making regular visits and may be referred to a hospital for prenatal care and/or delivery.

This chapter focuses on women presenting for delivery at maternity centers or hospitals in Abidjan and provides information on women receiving prenatal care through the city's public health system. Women referred from centers outside the city were excluded from these analyses, as were women referred from private or "other" clinics in Abidjan. Although these data do not cover the content of prenatal care, they do provide information on the number and timing of visits. The data are then used to examine associations between prenatal care and perinatal outcomes.

Level of Prenatal Care

This section describes the number of prenatal visits and timing of initiation of care for women delivering in participating centers. It focuses on selected sociodemographic determinants of care such as maternal age, level of education, ethnic group and obstetric history.

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Although there is no active city-wide health education program promoting prenatal care, women in Abidjan are encouraged to make at least four visits and to initiate care in their first trimester. Table 5.1 shows the number of prenatal visits according to place of presentation for delivery. The majority of women in this study received some prenatal care: over 97% reported making one or more prenatal visits. Sixty-eight percent made between one and three visits, while only 30% made four or more visits. The mean number of visits was 2.8.

Place of presentation for delivery was associated with both the number of prenatal visits and timing of initiation of those visits. Patients presenting at a hospital (not referred) made more prenatal visits than those presenting at maternity centers, including patients referred for delivery. Over 30% of patients presenting at hospitals made more than four visits, compared with about 10% of those presenting at maternity centers. Patients presenting at hospitals also had a higher mean number of visits than those presenting at maternity centers (3.7 and 2.7, respectively). Women who presented at a maternity center but were later referred to a hospital had nearly the same mean number of visits as those delivering at maternity centers (2.8 and 2.7, respectively).

Overall, about one-third of women who had some prenatal care initiated visits in their first trimester, while 15% waited until their third trimester. Timing of initiation was associated with place of presentation and referral status. Patients presenting at a hospital were most likely to initiate care in their first trimester, while patients presenting at a maternity center but referred to a hospital were least likely to initiate care early.

Table 5.2 shows the distribution of prenatal visits by selected maternal and obstetric history characteristics. Education and ethnic group were strongly associated with number of prenatal visits. As level of education increased, women were likely to make more visits. Women with one to six years of education were twice as likely as those with no education to make more than four visits; those with more than six years education were four times as likely. Ivoiriens were twice as likely as non-Ivoiriens to make five or more visits. However, this may be partly a result of other factors such as education. Ivoiriens were more likely to have had some education than were non-Ivoiriens.

Outcome of last pregnancy was also associated with number of prenatal visits. Never-pregnant women and those whose last pregnancy resulted in a delivery, regardless of the survival status of that birth, were least likely to have made five or more visits. Women whose last pregnancy was terminated by an induced abortion were most likely to make five or more visits. However, as with ethnic grouping, level of education is closely associated with induced abortion and may explain the difference in visits. Over two-thirds of women who terminated their last pregnancy with an induced abortion had seven or more years of education, compared with only 13% of all other women.

Timing of initiation of care was also closely associated with education, ethnic group and outcome of last pregnancy (Table 5.3). As level of education increased, women were more likely to initiate prenatal care in their first trimester. Women with seven or more years of education were 1.7 times more likely than those with no education and 1.4 times more likely than those with one to six years to begin care before their second trimester. Ivoiriens were more likely to initiate care early than were non-Ivoiriens. Also, over 50% of

women with an induced abortion initiated care in their first trimester, compared with one-third of all other women.

Prenatal Care and Perinatal Outcome

This section examines the relationship between prenatal care and selected perinatal outcome indicators, including birthweight and survival status of the baby until mother's discharge from the hospital or maternity center. It focuses on the effect of whether any prenatal visits were made and, if so, the effect of number and timing of those visits on birthweight and survival.

In examining the association of number of prenatal visits with outcome, there are methodological problems in determining causation. Women who deliver pre-term generally have smaller babies and less time in which to make visits; women with longer gestations (and therefore larger babies) could potentially make more visits. Consequently, we did not examine the relationship between birthweight and the actual number of prenatal visits.

Because the likelihood of survival is closely associated with birthweight, birthweight was controlled for in all analyses of survival status. Also, because primiparas were significantly more likely to have low birthweight (<2,500 grams) babies than were multiparas (18% vs. 8%, respectively), parity was controlled for in analyses of the relationship between prenatal care and birthweight.

Table 5.4 shows both birthweight and survival status by prenatal care status. The differences between the no care groups and the groups with care were significant ($p < .001$). Babies of women with no prenatal visits were twice as

likely to be low birthweight and three times as likely to die as babies of women with one or more visits.

Figure 5.1 shows the percentage of low birthweight babies by trimester of first visit and parity status. There was no association between birthweight and timing of initiation of care for all women but, when controlled for parity status, primiparas who initiated care early were less likely than those who initiated care late to have low birthweight babies. This was not true for multiparas.

Figure 5.2 shows the percent of infants not surviving until the mother's discharge according to birthweight and number of prenatal visits. For both low birthweight babies and those over 2,500 grams, chances of survival were better for babies whose mothers made at least one prenatal visit than for those whose mothers had no care. There was a positive relationship between number of visits and survival for low birthweight babies ($p < .05$), and for those weighing 2,500 grams or more, the relationship was significant at $p < .10$. (Table 5.5).

As shown in Figure 5.3, early initiation of prenatal care was positively associated with survival for babies in both birthweight categories. This association was not statistically significant, however (Table 5.5).

In these analyses, it was shown that prenatal care was associated with both birthweight and perinatal survival. Babies of mothers with any prenatal care were more likely to weigh 2,500 or more grams and to survive until mother's discharge than those whose mothers had no prenatal care. In addition, although the relationships were not always statistically significant, both an

increase in the number of visits and early initiation of care were associated with improved survival for all babies, but especially for those weighing less than 2,500 grams.

Table 5.1 Distribution of Prenatal Visits, Mean Number of Visits and Trimester of Initiation of First Visit by Place of Presentation, 13 Centers in Abidjan¹

	Patients presenting at a maternity center in Abidjan		Patients presenting at a hospital (not referred)	Total ²
	Patients delivering at maternity centers	Patients referred to a hospital for delivery ²		
<u>Number of prenatal visits</u>				
0	2.7	4.8	2.5	2.8
1	18.4	18.1	7.8	17.7
2	22.4	21.5	11.8	21.6
3	29.3	24.4	23.0	28.6
4	17.2	17.6	23.6	17.7
5	7.7	9.6	17.8	8.5
6	2.0	3.2	8.9	2.6
>7	0.3	0.9	4.7	0.7
Total	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>
Mean number of visits	2.7	2.8	3.7	2.8
Reported no. of cases	5,542	2,295	3,104	10,941
<u>Trimester of first visit³</u>				
First	30.2	22.1	44.6	30.8
Second	54.7	59.1	45.5	54.3
Third	<u>15.1</u>	<u>18.8</u>	<u>10.0</u>	<u>15.0</u>
Total	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>
Reported no. of cases	5,385	2,182	3,016	10,583

¹Excludes women referred to a hospital from centers outside of Abidjan. Also excludes women presenting at private clinics and "other" centers in Abidjan.

²Includes 18 referred patients admitted to the hospital postpartum and 10 referred patients with unknown admission status.

³For patients having one or more prenatal visit(s).

Note: For this table and all other tables in this chapter, distributions and percentages for hospitals are adjusted for both underreporting of cesarean sections and underreporting of deliveries and are weighted for maternity center deliveries. Reported number of cases are not adjusted or weighted. For maternity center data, reported numbers of cases represent a one-in-ten sample. (See Chapter II for a discussion of weighting and adjusting.)

Table 5.2 Number of Prenatal Visits by Selected Characteristics of Women Admitted for Delivery to 13 Participating Centers¹

	Number of Prenatal Visits				Total	(n)
	0	1-2	3-4	≥5		
<u>Total</u>	2.8	39.2	46.3	11.7	100.0	(10,941)
<u>Age (years)</u>						
<18	4.3	45.2	43.5	7.0	100.0	(945)
18-34	2.6	38.8	46.0	12.6	100.0	(8,884)
≥35	2.1	38.6	50.9	8.4	100.0	(1,080)
<u>Education (years)</u>						
0	3.4	45.4	44.2	7.0	100.0	(6,593)
1-6	1.4	32.9	51.0	14.7	100.0	(1,915)
≥7	1.6	18.9	49.8	29.6	100.0	(2,409)
<u>Ethnic Group</u>						
Ivoirien	1.7	33.6	49.5	15.2	100.0	(6,419)
Non-Ivoirien	4.2	46.7	42.0	7.1	100.0	(4,205)
<u>Number of previous deliveries</u>						
0	4.1	38.4	43.9	13.6	100.0	(2,972)
1-4	2.5	39.2	46.1	12.3	100.0	(5,879)
≥5	2.0	40.6	50.0	7.4	100.0	(2,089)
<u>Outcome of last pregnancy</u>						
Never pregnant	4.5	40.3	43.7	11.6	100.0	(2,406)
Live birth ²	2.4	40.1	46.8	10.7	100.0	(7,241)
Stillbirth	0.5	39.6	49.0	10.8	100.0	(294)
Spontaneous abortion	2.4	26.6	53.5	17.5	100.0	(453)
Induced abortion	0.5	20.0	44.8	34.8	100.0	(502)

¹Excludes women referred to a hospital from centers outside of Abidjan. Also excludes women presenting at private clinics and "other" centers in Abidjan.

²Includes live birth-surviving and live birth-not surviving.

Table 5.3 Trimester of First Visit by Selected Characteristics of Women Admitted for Delivery to 13 Participating Centers¹

	Trimester of First Visit ²			Total	(n)
	First	Second	Third		
<u>Total</u>	30.8	54.3	15.0	100.0	(10,583)
<u>Age (years)</u>					
<18	27.1	58.7	14.2	100.0	(896)
18-34	31.0	54.4	14.6	100.0	(8,614)
>35	31.7	49.1	19.3	100.0	(1,047)
<u>Education (years)</u>					
0	26.8	55.5	17.7	100.0	(6,322)
1-6	33.1	55.3	11.6	100.0	(1,870)
>7	45.8	47.4	6.7	100.0	(2,367)
<u>Ethnic group</u>					
Ivoirien	35.4	53.0	11.6	100.0	(6,291)
Non-Ivoirien	24.8	55.5	19.7	100.0	(3,987)
<u>Number of previous deliveries</u>					
0	32.1	56.1	11.8	100.0	(2,839)
1-4	30.4	55.0	14.6	100.0	(5,708)
>5	30.3	49.5	20.2	100.0	(2,035)
<u>Outcome of last pregnancy</u>					
Never pregnant	30.5	57.1	12.5	100.0	(2,286)
Live birth ³	30.0	53.8	16.3	100.0	(7,031)
Stillbirth	36.6	46.3	17.1	100.0	(286)
Spontaneous abortion	32.5	59.7	7.8	100.0	(441)
Induced abortion	53.4	41.5	5.1	100.0	(494)

¹Excludes women referred to a hospital from centers outside of Abidjan. Also excludes women presenting at private clinics and "other" centers in Abidjan.

²For patients having one or more prenatal visits.

³Includes live birth-surviving and live birth-not surviving.

Table 5.4 Distribution of Birthweight and Perinatal Survival Status, by Prenatal Care Status (singleton deliveries only)

	No prenatal visits	One or more prenatal visits	Total
Total	2.8	97.2	100.0
Birthweight (grams)			
< 2500	21.7	9.8	10.1
> 2500	78.3	90.2	89.9
Total	100.0	100.0	100.0
Survival status			
Death ¹	8.7	2.9	3.1
No death	91.3	97.1	96.9
Total	100.0	100.0	100.0
Reported no. of cases	316	10,250	10,566

¹Includes antepartum and intrapartum fetal loss and postpartum deaths until mothers' discharge from hospital.

**Table 5.5 Association Between Perinatal Survival
and Prenatal Care Controlled for Birthweight**

	Birthweight	
	<2500	<u>≥</u> 2500
No care/any care	p<.01	p=.05
Number of visits (1-2, 3-4, 5+)	p=.04	p=.08
Trimester (1, 2, 3)	p=.70	p=.29

Note: P-values were calculated from chi-square tests of association and are significant if p<.05.

Figure 5.1
Percent Low Birthweight by Trimester of First Prenatal Visit
and Parity Status, Singleton Deliveries

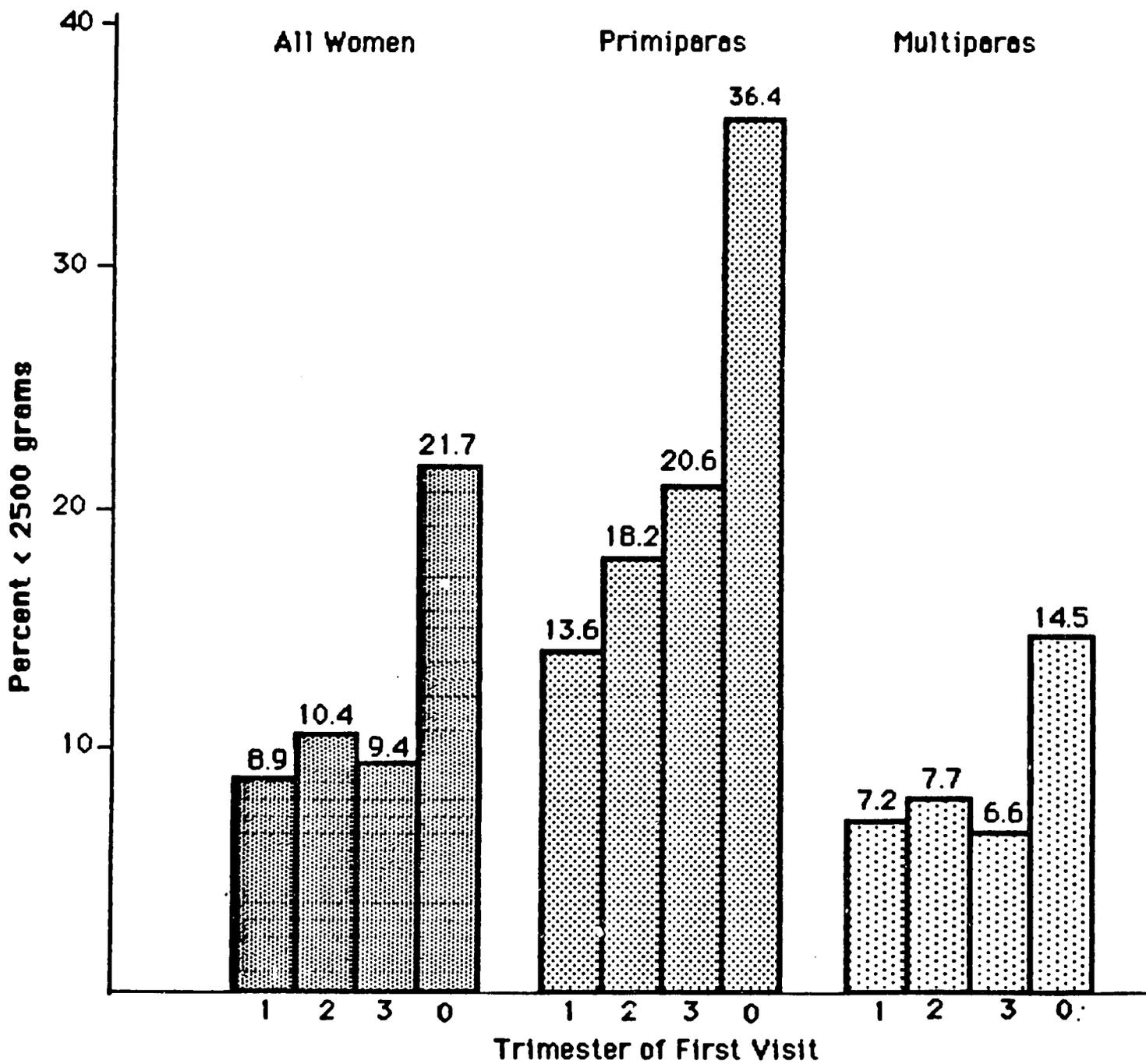


Figure 5.2
Percent Perinatal Death by Birthweight
and Number of Prenatal Visits, Singleton Deliveries

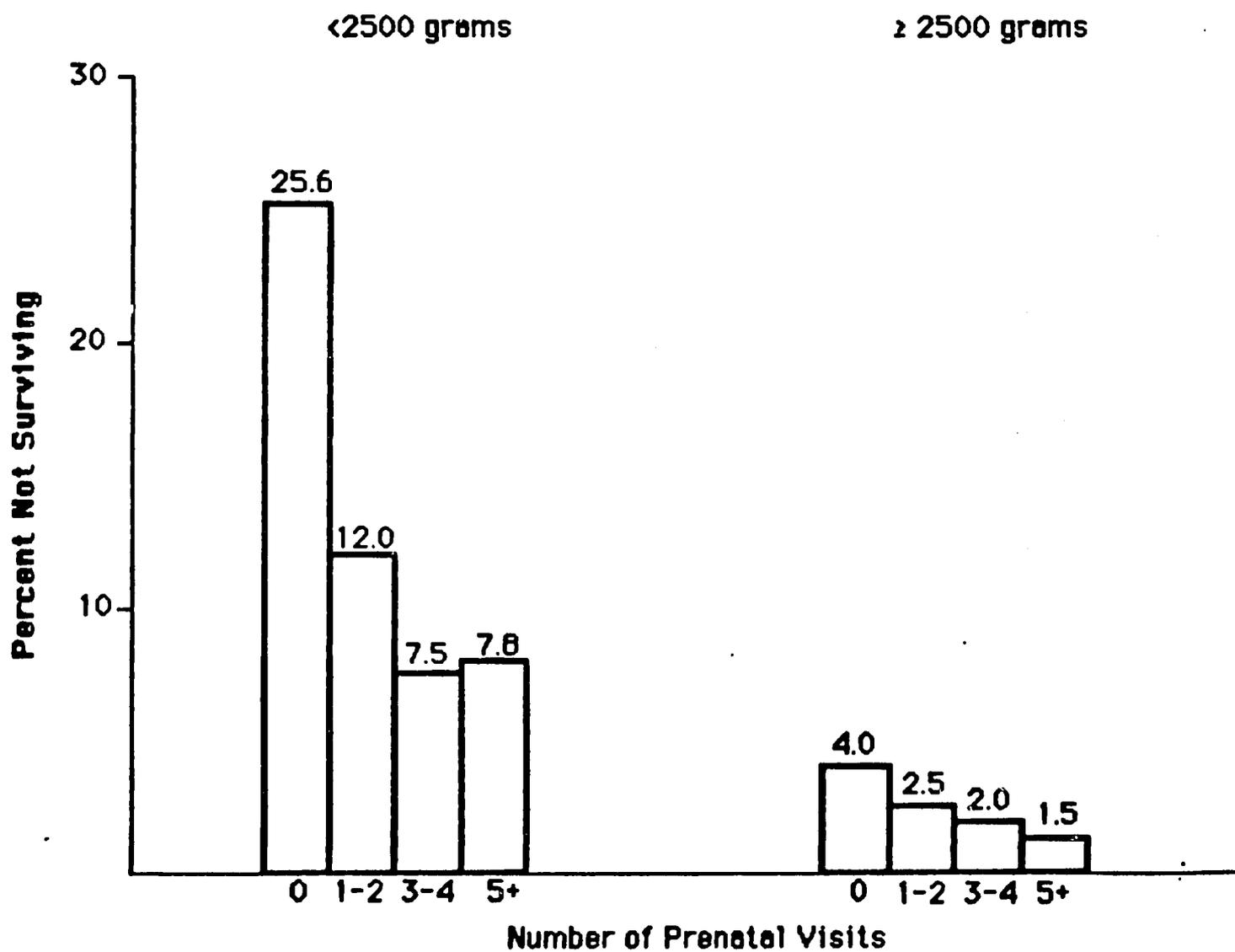
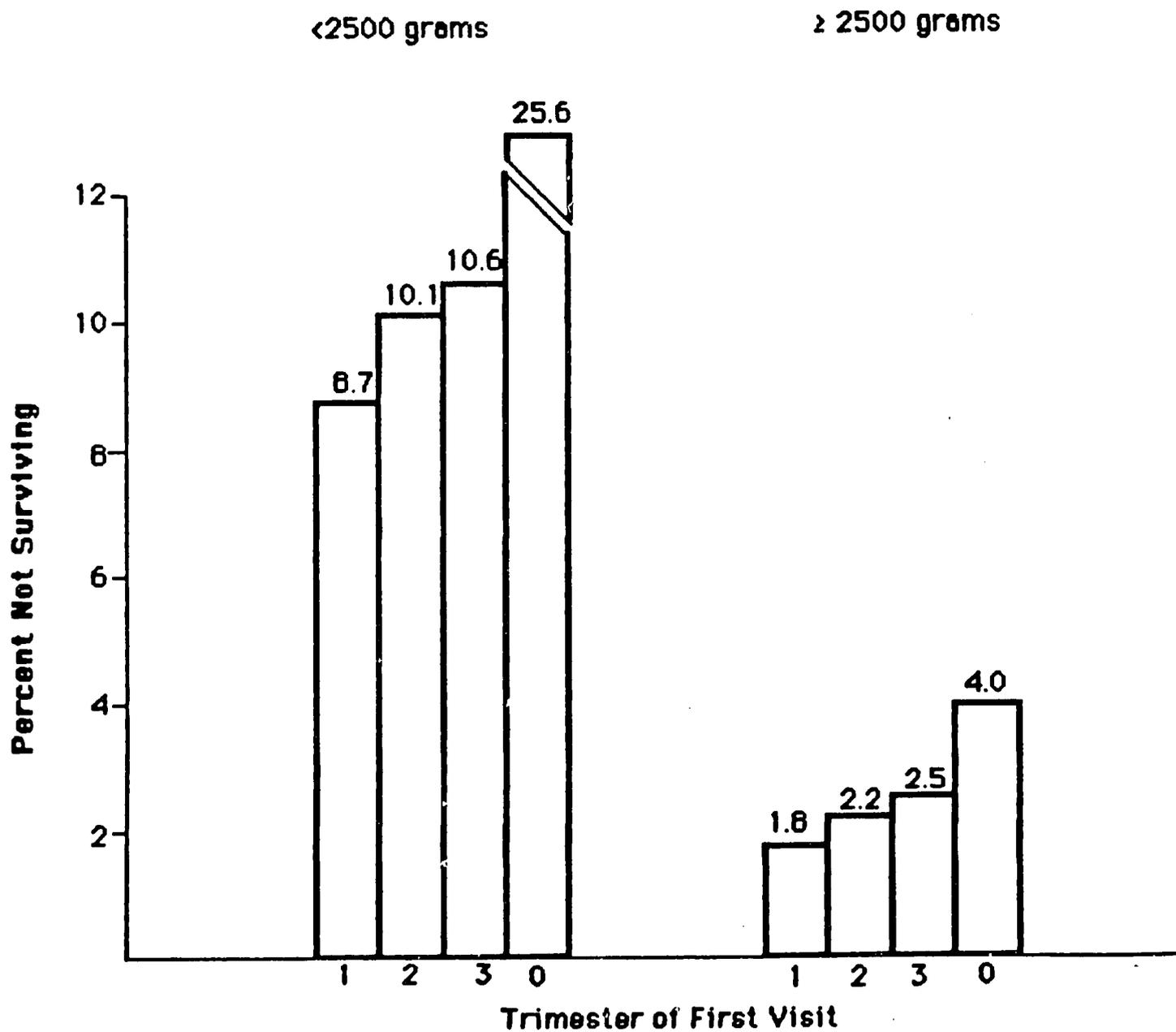


Figure 5.3
Percent Perinatal Death by Birthweight
and Trimester of First Prenatal Visit, Singleton Deliveries



VI. MANAGEMENT AND PERINATAL OUTCOME FOR WOMEN WITH A CESAREAN SECTION FOR THEIR LAST DELIVERY

In the CHUs in Abidjan, women are not routinely resectioned. Several factors restrict the use of cesarean sections except when necessary to preserve the mother's or baby's life. First, the vast majority of women deliver in maternity centers where cesarean sections are not performed; these women must be transferred to a hospital if abdominal intervention is required. In the hospitals, availability of medical supplies such as blood products, anesthesia and drugs is sometimes limited, and patient case loads are high relative to the number of beds and medical personnel. Finally, the risk of post-operative infection remains a major concern.

Given the limitations of the medical care system, identification of those women for whom intervention can be appropriately avoided is a primary objective. In this chapter, data are analyzed to determine whether women with a cesarean section for their last delivery can have safe vaginal deliveries for the current pregnancy. The subjects of analysis are women who had a cesarean section for their last delivery, some of which had a subsequent cesarean and some of which had a subsequent vaginal delivery. A control group of parous women having their first cesarean delivery is also included in the analysis. The following questions are addressed:

1. For women with a cesarean section for their last delivery, what are the primary differences between those with a repeat cesarean section and those with a vaginal delivery? How do women with repeat cesareans compare with the control group having their first cesarean delivery?
2. Do women who had a cesarean section for their last delivery have significantly different perinatal outcomes if they deliver vaginally than if they deliver by cesarean section? How do the outcomes of those with repeat cesareans compare with those of the control group?

3. How does the level of resource use compare for these three groups of women?

Thirteen percent of women at CHU Cocody reported having a cesarean section for their last delivery and of these, 42% had a vaginal delivery for the current pregnancy. This compares with 11% and 56%, respectively, at CHU Treichville. Ninety-eight percent at CHU Cocody and 97% at CHU Treichville made one or more prenatal visits. This high percentage of women with at least one visit afforded opportunities for care providers to diagnose existing problems and refer those with a cesarean section at last delivery.

No data were collected on the booking status of women admitted for delivery; it is not known what proportion was scheduled in advance for hospital delivery. Data were collected on timing of admission, however. Fourteen percent of all parous women delivered in a hospital were admitted before labor. There was a significant difference in the timing of admission by current type of delivery for women with a cesarean section for their last delivery. Women with a repeat cesarean section were over twice as likely to be admitted before labor as those delivered vaginally (18% vs. 8% at CHU Cocody; 20% vs. 8% at CHU Treichville). While women admitted before labor may have been scheduled in advance for hospital delivery, it is possible that some proportion of women who were initially scheduled delivered vaginally because they arrived too late to deliver by cesarean section.

Indications for Cesarean Section

Data on indications for cesarean section according to current type of delivery and history of cesarean section are shown in Tables 6.1-6.2. Data for the two hospitals are shown separately to provide information about intervention

patterns. In this section, women with a cesarean section for their last delivery are compared according to indication and current type of delivery. Next, women with repeat cesarean sections are compared with the control group.

Indications for women with a cesarean section last delivery. There were significant differences in referral status: in both hospitals, women delivered abdominally were more likely than those delivered vaginally to have been referred. Maternal height of less than 150 cms., birthweight of 3,500 grams or more, and malpresentation were all associated with abdominal delivery, but the difference between the two groups was statistically significant only for women with malpresentations at CHU Treichville.

Obstructed labor, fetal distress and pre-delivery bleeding* were all significantly associated with type of delivery. At CHU Cocody, women with current abdominal deliveries were more than four times as likely to have obstructed labor as those delivered vaginally; at CHU Treichville, they were eight times more likely to have obstructed labor. In both hospitals, fetal distress and pre-delivery bleeding were more common among women who were delivered abdominally. Duration of labor was not significantly associated with type of delivery.

Indications for women having repeat cesareans compared with those having their first abdominal delivery. When women with repeat cesarean sections are compared with the control group, significant differences emerge. The control group was more likely to have been referred than those with repeat cesareans (86% vs. 63% at CHU Cocody and 68% vs. 52% at CHU Treichville). In both

*Includes uterine rupture, placenta previa, abruptio placenta and unspecified antepartum or intrapartum hemorrhage.

hospitals, the control group was less likely than women with repeat cesareans to be under 150 cms. in height or to have obstructed labor, but they were significantly more likely to have pre-delivery bleeding. There were few other significant differences between these two groups in CHU Treichville, but in CHU Cocody, the control group was significantly more likely to have fetal distress, malpresentations and durations of labor of more than 12 hours than those with repeat cesareans. They were also more likely to have babies weighing 3,500 grams or more.

Perinatal Outcome

The first panels of Tables 6.3-6.4 show perinatal outcome for babies of women with an abdominal delivery for their last delivery compared with the control group. In CHU Cocody, women delivered vaginally had a higher rate of perinatal mortality than those who were resectioned, although the difference between the two groups was not statistically significant. In CHU Treichville the reverse was true: women delivered vaginally had lower rates of perinatal mortality than those with repeat cesareans.

Women having their first cesarean section (controls) were significantly more likely than those with a cesarean for their last delivery to have a non-surviving birth. For this control group, 33% of deliveries at CHU Cocody and 25% at CHU Treichville resulted in non-surviving births. This high rate reflects the emergency nature of these deliveries.

Resource Use

The second and third panels of Tables 6.3-6.4 show resource use by current type of delivery and history of cesarean section. The variables examined were blood transfusion and number of nights hospitalized after delivery.

Women delivered vaginally. Of the three groups of women examined in this analysis, women who were delivered vaginally required the least amount of resources. They rarely required blood transfusions: for 97% of women at CHU Cocody and 96% at CHU Treichville, blood transfusion was not necessary. They were also unlikely to be hospitalized longer than one night after delivery. Eighty-nine percent of women at CHU Cocody and 95% at CHU Treichville were discharged from the hospital within two days of delivery.

Women delivered by cesarean section. At CHU Cocody, women having repeat cesareans were less likely to require blood transfusions than the control group (34% vs. 50%, respectively). For about one-fourth of each group, blood transfusion was reported to be necessary but not available. At CHU Treichville, about one-third of women having an abdominal delivery were given blood transfusions. Only a small percentage of women having a repeat cesarean and those having their first abdominal delivery were reported to need blood that was not available (6% and 7%, respectively).

In both hospitals, women delivered abdominally were hospitalized an average of seven to eight nights following delivery. There was little difference in the length of hospitalization following cesarean section for the repeat cesarean group and the control group in CHU Cocody. In CHU Treichville, however, women having a repeat cesarean were less likely to be hospitalized for nine nights

or longer than were those having their first abdominal delivery (27% vs. 49%, respectively).

Summary

In this chapter, significant differences were found between three groups of women compared for selected indications for cesarean section. Women who delivered vaginally following a cesarean section last delivery were the least likely of the three groups to have indications of chronic dystocia such as short stature and obstructed labor. They were also the least likely to have acute problems such as fetal distress and pre-delivery bleeding. Regardless of history of cesarean section, women currently delivered by cesarean consisted of two groups: those with chronic indications and those with acute problems at this delivery. Women who were resectioned had the highest rates of chronic problems, while those having their first cesarean section had the highest rates of acute labor-related complications.

A significant proportion of patients with a cesarean section for their last delivery had uncomplicated vaginal deliveries for their current pregnancy. However, perinatal mortality for this group differed between the two hospitals. The need for blood transfusion was negligible and length of hospitalization was significantly shorter than for women delivered by cesarean.

Table 6.1 Distribution of Indications for Cesarean Section by Type of Current Delivery and Previous Cesarean Section, CHU Cocody (singleton deliveries)

	Women with a Cesarean Section for their Last Delivery		Controls
	Delivered Vaginally	Delivered Abdominally	
Total	100.0	100.0	100.0
Referral Status			
Referred	48.6	63.4	86.2
Not referred	51.4	36.6	13.8
Height (cms)			
<150	6.4	10.7	7.8
<u>>150</u>	93.6	89.3	92.2
Birthweight (grams)			
<2500	12.0	8.4	15.0
2500-3499	75.0	69.5	54.4
<u>>3500</u>	13.0	22.1	30.6
Malpresentation			
Yes	5.5	10.7	24.2
No	94.5	89.3	75.8
Obstructed labor			
Yes	9.2	42.0	32.7
No	90.8	58.0	67.3
Duration of labor (hours)			
0	0.0	8.5	6.0
1-11	79.8	72.9	63.6
<u>>12</u>	20.2	18.6	30.4
Fetal distress			
Yes	10.1	20.6	34.2
No	89.9	79.4	65.9
Pre-delivery bleeding			
Yes	0.0	16.8	36.8
No	100.0	83.2	63.2
Reported no. of cases	109	131	334

Note: Women were selected as controls if they had at least one previous delivery, if they had no previous cesarean sections and if their current delivery was abdominal.

Note: For this table and all other tables in this chapter, distributions for aggregated data are adjusted for both underreporting of deliveries and underreporting of cesarean sections in the hospitals and are weighted for maternity center deliveries. Reported numbers of cases are not adjusted or weighted. For maternity center data, reported numbers of cases represent a one-in-ten sample. (See Chapter II for a discussion of weighting and adjusting.)

Table 6.2 Distribution of Indications for Cesarean Section by Type of Current Delivery and Previous Cesarean Section, CHU Treichville (singleton deliveries)

	Women with a Cesarean Section for their Last Delivery		Controls
	Delivered Vaginally	Delivered Abdominally	
Total	100.0	100.0	100.0
Referral Status			
Referred	37.5	52.2	68.0
Not referred	62.5	47.8	32.0
Height (cms)			
<150	8.9	14.5	6.1
<u>>150</u>	91.1	85.5	93.9
Birthweight (grams)			
<2500	9.8	10.1	12.4
2500-3499	70.5	63.8	56.7
<u>>3500</u>	19.7	26.0	30.9
Malpresentation			
Yes	4.5	15.9	19.6
No	95.5	84.1	80.4
Obstructed labor			
Yes	6.2	50.7	24.3
No	93.8	49.3	75.8
Duration of labor (hours)			
0	0.0	5.8	8.2
1-11	86.6	73.9	70.1
<u>>12</u>	13.4	20.3	21.6
Fetal distress			
Yes	15.2	47.8	56.2
No	84.8	52.2	43.8
Pre-delivery bleeding			
Yes	2.7	11.6	27.8
No	97.3	88.4	72.2
Reported no. of cases	112	69	194

Note: Women were selected as controls if they had at least one previous delivery, if they had no previous cesarean sections and if their current delivery was abdominal.

Table 6.3 Distribution of Perinatal Outcome and Resource Use by Type of Current Delivery and Previous Cesarean Section, CHU Cocody (singleton deliveries)

	Women with a Cesarean Section for their Last Delivery		Controls
	Delivered vaginally	Delivered abdominally	
Total	100.0	100.0	100.0
<u>Outcome</u>			
Fetal/neonatal death ¹			
Death	14.7	7.6	32.9
No death	85.3	92.4	67.1
<u>Resource Use</u>			
Blood transfusion			
Transfusion given	1.8	33.6	50.2
Not necessary	97.2	39.7	27.0
Necessary, not available	0.9	26.7	22.8
Reported no. of cases	109	131	334
Nights hospitalized after delivery ²			
0-1	89.0	0.8	2.8
2-6	7.3	13.9	13.4
7-8	0.9	45.8	41.7
9-13	2.7	38.9	38.0
>14	0.0	0.8	3.9
Reported no. of cases	109	131	326

Note: Women were selected as controls if they had at least one previous delivery, if they had no previous cesarean sections and if their current delivery was abdominal.

¹Includes fetal loss and postpartum deaths until mother's discharge from hospital.

²Excludes maternal deaths.

**Table 6.4 Distribution of Perinatal Outcome and Resource Use by
Type of Current Delivery and Previous Cesarean Section,
CHU Treichville (singleton deliveries)**

	Women with a Cesarean Section for their Last Delivery		Controls
	Delivered vaginally	Delivered abdominally	
Total	100.0	100.0	100.0
<u>Outcome</u>			
Fetal/neonatal death ¹			
Death	8.0	13.0	25.1
No death	92.0	87.0	74.9
<u>Resource Use</u>			
Blood transfusion			
Transfusion given	3.6	33.3	35.2
Not necessary	96.4	60.9	57.5
Necessary, not available	0.0	5.8	7.3
Reported no. of cases	112	69	194
Nights hospitalized after delivery ²			
0-1	94.6	2.9	2.1
2-6	0.9	11.8	7.3
7-8	3.6	58.8	51.8
9-13	0.9	16.2	20.0
>14	0.0	10.3	18.8
Reported no. of cases	112	68	189

Note: Women were selected as controls if they had at least one previous delivery, if they had no previous cesarean sections and if their current delivery was abdominal.

¹Includes fetal loss and postpartum deaths until mother's discharge from hospital.

²Excludes maternal deaths.

VII. MATERNAL MORTALITY

Although estimates vary widely, complications of pregnancy and childbirth may be responsible for as many as one-fourth of all deaths to women of reproductive age in many parts of the developing world. According to the World Health Organization, between 84 and 530 women in West African countries die as a result of pregnancy or childbirth for every 100,000 live births.⁷ In studies of subnational areas of West Africa, the rates were even higher, ranging from 700 in Sine Saloum, Senegal to 2,420 in Juli, Gambia. In comparison, pregnancy-related death in developed countries is a very rare event; the rate in the United States has been estimated at between 9.6 and 12.1 per 100,000 live births.⁸

Comparing international data on mortality is complicated by the fact that there is no single, universally accepted definition of maternal death. In this report we use the definition of the World Health Organization: "A maternal death is the death of a woman known to be pregnant or within 42 days* of delivery or termination of pregnancy, irrespective of the duration or site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management but not from accidental or incidental causes."⁸ Obstetric deaths are further categorized as "direct" and "indirect". Direct obstetric deaths include "those resulting from obstetric complications of the pregnant state, from interventions, omissions, incorrect treatment or from a chain of events resulting from any of the above."⁸ Indirect obstetric deaths

*It has been estimated that 16% of pregnancy-related deaths occur more than 42 days after delivery.⁷ There were no reported maternal deaths in the study after 42 days.

includes "those resulting from previous existing disease that developed during pregnancy which was not due to direct obstetric causes but which was aggravated by physiological effects of pregnancy."⁸

The factors underlying maternal mortality vary in different regions and societies. In many areas of West Africa, transportation is poor and health services are limited. Patients with pregnancy complications often travel long distances and many arrive at health centers in a moribund state. Abortion-related death is among the most common causes but is likely to be underreported due to legal and social constraints. Classification systems vary and make comparisons difficult, but excluding deaths due to ectopic and molar pregnancy and pregnancies with abortive outcomes, the primary direct obstetric causes of maternal mortality include hemorrhage, ruptured uterus, obstructed labor,* infection and eclampsia. Infectious hepatitis has been identified as a common indirect cause of death in some countries.⁹

Population-based data on maternal mortality are seriously lacking and, for the city of Abidjan, no such data are available. Although some data on maternal deaths were collected during an earlier FHI-sponsored Maternity Care Monitoring Study at CHU Cocody, these data were not representative of deaths among either all women in Abidjan or among women hospitalized at the CHU.

*Obstructed labor is not a cause of death per se but is often cited separately in cause of death classifications.

Among the objectives of the Obstetric Surveillance Study was to collect data on maternal mortality in Abidjan. The first section of this chapter describes methodological problems in collection of data on maternal mortality in the hospitals. The next section catalogues the number of reports of death and provides a discussion of causes of death and characteristics of women who died. In the third section, selected case histories for two of the most common causes of death are presented. A final section discusses the problem of uterine rupture in general.

Methodological Problems in Data Collection

Between October, 1984 and December, 1985, data were collected on 19 maternal deaths at CHU Treichville and 27 such deaths at CHU Cocody. Because severely compromised patients are evacuated from the maternity centers to the hospitals for treatment, it was expected that the majority of reported deaths in this study would be among women admitted to the two hospitals. In fact, there were no reported deaths in the maternity centers, and there is no reason to believe that there was underreporting in these centers.

However, during the course of the study, it was determined that there was substantial underreporting of maternal deaths at the hospitals. This was verified by a retrospective study of hospital records and by interviews at both CHUs during a site visit in June, 1986. At that time, death reports were completed for some missing cases. In addition, every attempt was made to verify original death reports.

One objective of this study was to collect data on women dying of pregnancy-related causes in the hospitals and maternity centers, including those who

died before delivery or in the postpartum period and those who died outside of the maternity services of the hospitals. To ensure that a Maternal Death Report would be completed for all deaths to women at the hospitals, an attempt was made to collect data for women who died in other parts of the hospital including other wards and emergency rooms. However, this did not prove feasible for two reasons. First, it was found that neither CHU maintains centralized statistics on death for the entire hospital. Each service is responsible for its own mortality statistics. In services where mortality data are collected, the methods for recording and maintaining those statistics vary. Often, detailed and complete information is not recorded. Second, there was no system in place during the study whereby study investigators could be notified of maternal deaths in other services and alerted to the need to complete a death report. Thus only women admitted to the maternity services were included in this study.

Sources of information. As described above, each hospital service is responsible for its own statistics. At CHU Cocody, the Maternity Service maintains a death register which lists basic information about patients who die. Although there are seven columns in the register for specific items of information, the completeness of individual entries varies. At CHU Treichville, information is recorded in small notebooks located in the delivery room, in the intensive care room and in the Service's nursing station. At both hospitals, all information is recorded for some entries while for others, only the patient's name and date of death are recorded.

At both hospitals, an additional source of information about deaths is the birth register, which includes information about home deliveries as well as births at the hospital. Not all entries in the death register have a

coinciding entry in the birth register. The entry in the latter is typically made at the time of delivery and thus provides little follow up information about complicated cases, particularly women who are hospitalized for any length of time following delivery. Women who die undelivered are not routinely entered into the birth register; likewise, women who deliver in maternity centers or at home and die shortly after admission to the hospital may not be entered in either register.

Summary Information from Reports of Maternal Death

A total of 94 reports of death during the 15-month study period were collected, including both original reports and missing cases collected retrospectively (Table 7.1). During the prospective study, there were three ways in which deaths were reported. Ideally, an Obstetric Surveillance Form and a Maternal Death Report were both completed. The death report not only provided additional information on the circumstances and causes of death; it confirmed the death as noted on the Obstetric Surveillance Form. In some instances, only one form or the other was completed. However, only data for those cases with an Obstetric Surveillance Form could be loaded onto the computer for analysis; therefore, only those cases are included in the data set for the Obstetric Surveillance Study.

Data collected retrospectively in June, 1986, varied in completeness and quality. Information was not available in the registers to answer each question on the death report. In some cases, enough information was available to complete an Obstetric Surveillance Form in addition to the death report, albeit with a good deal of missing information.

CHU Cocody. A total of 55 deaths were reported for women admitted to the Ob/Gyn Service of CHU Cocody. Twenty-seven deaths were reported during the original 15-month period. Two of these were not accompanied by death reports; both were subsequently confirmed as deaths. An additional 28 death reports were obtained as a result of the retrospective study.

CHU Treichville. Including both original reports and missing cases, there were a total of 39 deaths reported for women admitted to CHU Treichville during the period October, 1984 through December, 1985. Nineteen deaths were reported during the 15 months of data collection. Of these, three had no death reports and were not listed in the death register; no confirmation of these deaths could be made. Three death reports had no Obstetric Surveillance Forms and although these deaths were confirmed, the death reports lack basic information about the women such as age, parity status, prenatal care and referral status. Twenty additional death reports were obtained during the retrospective study of missing cases.

Characteristics. Most of the 94 women for whom death reports were received were admitted to the hospitals under emergency conditions. The majority were referred from centers lacking facilities and equipment to deliver complicated cases. Although the exact timing of death is not known for most women, the majority died shortly after admission to the hospitals.

Table 7.2 shows selected characteristics of the 94 women for whom reports of death were received. Information on referral status was available for 89% of the patients dying in hospitals. Of these, over four-fifths were referred: 45 from centers in Abidjan and 26 from centers outside of the city. Data on previous pregnancies were not available for 20 (one-fifth) of the women who

died. Of the remaining 74 women, over one-fourth had never been pregnant and nearly one-third had five or more previous pregnancies. Data on prenatal visits were not available for 20 women, but one-fourth of those for whom data were available had no prenatal visits reported.

The majority of reported deaths occurred in the hospitals, although four women died en route from home or from a maternity center (Table 7.3). Of the 81 women for whom data on time of death are available, five died antepartum and 18 died intrapartum. Twenty-four women were delivered spontaneously, without surgical intervention; 12 of these delivered in settings where no such intervention was feasible (home, maternity center, en route). Of the 55 women who delivered in the hospitals for whom data on type of delivery are available, 37 delivered abdominally, two by craniotomy, three by forceps, and two by vacuum extraction. Data on blood transfusion were available for 62 women, over one-fourth of whom reportedly required blood that was not available.

Cause of Death.* Table 7.4 shows a cause of death classification by specific problem or complication for the 94 women for whom reports of death were

*No data were collected during this study for women dying of complications of abortion or ectopic or molar pregnancy. According to information reported in the death register of CHU Cocody for the period October 1984-December 1985, there were 136 deaths of which 14 were reported to be abortion-related and four were due to ectopic pregnancy. At CHU Treichville, there were a total of 109 deaths during the same period, according to information reported in the notebooks located in the delivery room, intensive care room and nurses' station. Of these, 19 deaths were reported to be abortion-related, 11 others were likely to be abortion-related, three were due to ectopic pregnancy and one was the result of molar pregnancy.

available. A cause of death was reported for only 92 women. Seventy-eight of these were direct maternal deaths. Uterine rupture and antepartum hemorrhage due to placenta previa, placenta accreta or placenta abruptio were responsible for one-fourth (23) of the 94 deaths. Another 23 women died due to other unspecified hemorrhage. Nine women died of hypertensive disorders; all nine were eclamptic at death. Generalized infections were reported for five women, and pelvic infections including endometritis and chorioamnionitis were diagnosed in three other cases. Five anesthesia accidents occurred among women who delivered in the hospital; four were cesarean section deliveries and the fifth was delivered by craniotomy.

There were 14 deaths attributable to indirect causes. Ten women died of hepatic disorders of which five were reported due to hepatitis. One death was attributed to typhoid fever, one to meningitis, one to encephalitis and one to poisoning.

Case Histories

Summaries of selected reports of death from the two hospitals are given below. These reports provide valuable information about why the women died and, to the extent that enough information was recorded, what might be done to prevent such deaths in the future. Two groups of women are discussed, those with deaths attributed to uterine rupture and those with eclampsia. Selected case histories are then presented for each cause of death.

Uterine rupture.* Among the 94 women for whom reports of death were received, 17 died of hemorrhage or infection following uterine rupture. All but one of the 17 were referred, seven from centers in Abidjan and the remainder from centers outside of the city. These women ranged in age from 20 to 41 years. Many were admitted to the hospital in serious condition and died shortly after admission. Four were delivered post-mortem by cesarean section or laparotomy.

Eight of the 17 reports had information about what might have been done to prevent death. Lack of adequate facilities and equipment were frequently cited, for both the referring centers and the hospitals. Four of these women were referred from centers outside of Abidjan, one from a distance of 120 kilometers. None of these centers have surgical facilities. In every case, the attendant at the hospital felt that the death could have been prevented if such facilities had been available at the place of referral. For two of the remaining four women referred from centers in Abidjan, lack of blood products or other supplies at the hospital were cited. The attending physician cited late referral and the failure of the referring center to diagnose the severity of the patient's condition as factors in the death of a third woman. No information was available for the fourth patient.

One 31 year old woman with obstructed labor and blood loss was admitted to the CHU with prolonged labor and signs of fetal distress. She had made one prenatal visit in her third trimester. She was estimated to be full term and was delivered of a 3,270 gram stillborn baby by cesarean section. Her death was characterized as preventable if blood had been available.

*See "A Note on Uterine Rupture" at the end of this chapter.

A 25 year old woman with two previous deliveries had made six prenatal visits, beginning in the first trimester. She was referred by a center in Abidjan with signs of fetal distress and was delivered vaginally at the hospital. She died of severe hemorrhage and irreversible shock following a ruptured uterus.

A woman of 34 years with nine previous pregnancies and at least one previous cesarean section was admitted during labor. She delivered by vacuum extraction and died shortly afterward of hemorrhagic shock. Her stillborn infant weighed 3,600 grams. No information was available on prenatal care status or complications, and it is not known whether hospital staff regarded this death as avoidable.

A 20 year old woman with no previous deliveries was referred from a nearby maternity center because she "refused to push". She was diagnosed at the hospital as having a ruptured uterus and a laparotomy was performed to repair the rupture. It was not stated how she delivered. She died in the hospital of septicemia more than two weeks after admission.

In summary, women who died of complications associated with uterine rupture were usually admitted to the hospital in serious condition. Most of these women had been transferred from another center lacking the facilities or medical supplies to provide adequate treatment; the majority died shortly after admission to the hospital.

Eclampsia. Nine women, or 10% of those for whom death reports were available, died of eclampsia. Information on maternal characteristics, prenatal care status or referral status was not available for one of these women. The other eight ranged in age from 16 to 36. Two had six or more previous pregnancies,

five had never been pregnant and one had one previous pregnancy. Six of these women were referred: five from centers in Abidjan and one from a center 70 kilometers from the city. In one case, the woman had no prenatal visits and the attending physician felt that, with care, the death might have been preventable. In two of the three cases in which the women had some prenatal care, the deaths were regarded by the attending physician as preventable had more adequate diagnoses been made during prenatal visits.

A 36 year old grandmultipara who made five prenatal visits was referred with eclamptic convulsions from a maternity center. She was anemic and there were signs of fetal distress. A cesarean section was performed during which she went into cardiac arrest. Although her death was reported by the attendant to be unavoidable, complications associated with the blood transfusion were reported. The nature of these complications, however, was unclear.

After a normal delivery at a maternity center on the outskirts of Abidjan, a 16 year old woman with no previous deliveries was referred to the hospital with severe eclampsia. She died five days after admission of respiratory failure resulting from an eclamptic coma. Although she reportedly had two prenatal visits, it was noted by the attending physician that her death was linked to the lack of prenatal visits.

A Note on Uterine Rupture

Rupture of the uterus, a serious complication of pregnancy and labor, severely threatens the life of both mother and fetus. It occurs in about one of every 1,500 deliveries in the United States but is believed to be many times more frequent in developing countries. This increased incidence may be due partly

to higher levels of cephalo-pelvic disproportion.¹⁰ In the absence of adequate prenatal care, disproportion and malpresentations may go undetected until the rupture is imminent or has already occurred.

Uterine rupture is among the leading causes of maternal mortality in many developing countries. In Abidjan, nearly one-fourth of all reported deaths that occurred during the 15-month period October 1985-December 1986 were due to complications of uterine rupture.

Uterine rupture is commonly associated with previous uterine scarring from such interventions as previous cesarean section, curettage or myomectomy. However, a significant proportion of cases occur during labor and are not associated with a previous uterine scar. Spontaneous rupture of an unscarred uterus may be caused by cephalo-pelvic disproportion, malposition or malpresentation, or abnormality of placentation. Traumatic rupture may occur during obstetric intervention, either manipulatory, instrumental or pharmacological. Version and extraction, forceps delivery, and injudicious use of oxytocics have been linked to traumatic rupture.

A total of 70 cases of uterine rupture were reported during the 12-month study period. Sixty-six of these women were admitted to one of the two hospitals for delivery; three were admitted postpartum and one had unknown admission status. Of the 66 women admitted for delivery, 61 were referred, 35 from maternity centers in Abidjan and 26 from centers outside the city.

This section is divided into two parts. The first focuses on identifying risk characteristics of women in the city; therefore, the 26 women referred from outside of Abidjan were excluded from analysis. The second section examines

management of women with uterine rupture. The subjects of analysis were women admitted to the hospitals, including those referred from centers outside of the city, but excluding three women admitted postpartum and one with unknown admission status.

Risk characteristics of women with uterine-rupture. In this analysis, the rate of uterine rupture among women presenting at a maternity center or hospital in Abidjan is examined according to selected maternal and obstetric history characteristics and complications of the current labor and delivery (Table 7.5). The variables examined include maternal age and height, number of previous deliveries and history of cesarean section, birthweight, presentation and presence of labor-related complications.

The rate of uterine rupture for women admitted to maternity centers and hospitals for delivery was 1 per 1,000 deliveries, or 50% higher than the rate for the United States. Maternal age and height and number of previous pregnancies were not associated with uterine rupture. However, history of cesarean section was significantly associated with uterine rupture. Women with one previous cesarean were seven times more likely to have a rupture than those with no previous cesarean, while women with two or more previous cesareans were 14 times more likely to have a uterine rupture.

Although no information on cephalo-pelvic disproportion are available, data were collected on presentation, presence of obstructed labor and duration of labor. Not surprisingly, uterine rupture was significantly associated with malpresentation and prolonged or obstructed labor.

Management of women with uterine rupture. In this section, 66 women with a uterine rupture who were admitted to a hospital before delivery are examined. It is important to note that the timing of the rupture is not known. Therefore, no conclusion can be drawn about the effect of intervention.

Table 7.6 shows the distribution of type of delivery, blood transfusion and perinatal and maternal outcome among women with uterine rupture. Eighty-two percent of women with uterine rupture were delivered by cesarean section. Fifteen percent were delivered vaginally: 11% were spontaneous, 1% was by manual rotation and 3% by vacuum extraction. Three percent of women died undelivered, and type of delivery was unknown for 1% of women. Of the women delivered spontaneously, 1% were delivered by manual rotation and 3% by vacuum extraction. Forty-nine percent of women with uterine rupture had hysterectomies; these women accounted for 70% of all hysterectomies performed at the two hospitals.

Blood transfusions were given to 68% of women with uterine rupture. Eleven percent were reported to need a blood transfusion, but blood was not available for these women. The remaining 20% did not require a blood transfusion.

Perinatal and maternal mortality. Among singleton deliveries, 77% of infants born to mothers with uterine rupture did not survive until mother's discharge from the hospital. Seven of the 66 women in this analysis women died as a result of complications of uterine rupture. Of these seven women, five were referred from maternity centers in Abidjan, one was referred from a center outside of the city and one was not referred. Four were grand multiparas with five or more previous deliveries, and two had no previous deliveries. None of the women who died had a previous cesarean section. All seven women had normal

vertex presentations. Four were delivered by cesarean section, and one was delivered vaginally. Two women died undelivered.

Table 7.1 Number of Reports of Maternal Death Received and Number of Forms Loaded onto the Computer, by Type of Study and Hospital

	CHU Cocody		CHU Treichville	
	received	loaded	received	loaded
<u>15-month study period¹</u>				
Maternal Death Report only	0	0	3	0
Obstetric Surveillance Form only	2	2	3	3
Both	25	25	13	13
<u>Retrospective study of missing cases²</u>				
Maternal Death Report	<u>28</u>	<u>0</u>	<u>20</u>	<u>0</u>
Total	55	27	39	17

¹October 1, 1984 - December 31, 1985.

²June, 1986.

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**Table 7.2 Distribution of Characteristics of 94 Women
for Whom Reports of Death Were Received
(October 1, 1984 - December 31, 1985)**

	CHU Cocody Number	CHU Treichville Number	Total Number
<u>Referral status</u>			
Referred	44	28	72
Not referred	6	6	12
Total	50	34	84
Unknown	5	5	10
All women	55	39	94
<u>Age</u>			
10-14	1	0	1
15-17	4	2	6
18-19	4	3	7
20-29	23	19	42
30-34	17	0	17
35-39	2	5	7
40-44	3	1	4
45-59	0	1	1
Total	54	31	85
Unknown	1	8	9
All women	55	39	94
<u>Previous pregnancies</u>			
0	8	11	19
1-4	21	10	31
5 or more	15	9	24
Total	44	30	74
Unknown	11	9	20
All women	55	39	94
<u>Prenatal visits</u>			
None	9	9	18
Any	40	16	56
Total	49	24	73
Unknown	6	14	20
All women	55	39	94

Table 7.3 Distribution of Place of Delivery, Place of Death and Blood Transfusion for 94 Women for Whom Reports of Death Were Received (October 1, 1984 - December 31, 1985)

	CHU Cocody Number	CHU Treichville Number	Total Number
<u>Place of delivery</u>			
no delivery	6	3	9
hospital	36	23	59
maternity center	4	7	11
home	6	0	6
en route to hospital	1	0	1
Total	<u>53</u>	<u>33</u>	<u>86</u>
Unknown	2	6	8
All women	<u>55</u>	<u>39</u>	<u>94</u>
<u>Place of death</u>			
hospital	50	33	83
en route	3	1	4
Total	<u>53</u>	<u>34</u>	<u>87</u>
Unknown	2	5	7
All women	<u>55</u>	<u>39</u>	<u>94</u>
<u>Blood transfusion</u>			
not necessary	9	14	23
necessary, not available	14	3	17
blood given	14	8	22
Total	<u>37</u>	<u>25</u>	<u>62</u>
Unknown	18	14	32
All women	<u>55</u>	<u>39</u>	<u>94</u>

**Table 7.4 Cause of Death of 94 Women
for Whom Reports of Death Were Received**

Cause	Number
Hemorrhage	
uterine rupture	17
abruptio placenta	4
placenta accreta	1
placenta previa	1
other hemorrhage	23
Hypertensive disorder	
eclampsia	9
Generalized infections	
peritonitis	5
Pelvic infections	
endometritis	2
chorioamnionitis	1
Hepatic disorders	
hepatitis	5
jaundice (not specified)	5
Encephalitis	1
Meningitis	1
Poisoning	1
Anesthesia accidents	5
Typhoid fever	1
Other	<u>10</u>
Total	92
Unknown	<u>2</u>
All women	94

Table 7.5 Distribution of Selected Risk Factors; and Percent of Women with Uterine Rupture by Risk Factor, Abidjan

	Percent distribution	Percent with uterine rupture	p-value
Total	100%	0.1	
Age			
<30	76.3	0.1	*
≥30	23.7	0.2	
Height (cms)			
<150	3.5	0.1	*
≥150	96.5	0.1	
Number of previous deliveries			
0-4	71.4	0.1	p=.059
≥5	18.6	0.2	
Number of previous cesareans ¹			
0	96.6	0.1	p=.003
1	2.9	0.7	
≥2	0.5	1.4	
Malpresentation			
Yes	2.9	0.8	p<.001
No	97.1	0.1	
Birthweight (grams) ¹			
<2500	10.9	0.1	
2500-3499	72.9	0.1	*
≥3500	16.2	0.2	
Prolonged labor			
Yes	5.0	0.8	p<.001
No	95.0	0.1	
Obstructed labor			
Yes	1.9	1.4	p<.001
No	98.1	0.1	
Reported no. of cases	10,926	40	

*Not significant (p>.05).

¹Includes multiple births.

**Table 7.6 Management and Outcome of Women with a Uterine Rupture,
Women Admitted to a Hospital for Delivery¹**

	Percent distribution
	100%
Type of delivery	
Vaginal	15
Abdominal	81
Unknown	1
Died undelivered	3
Hysterectomy	
Yes	49
No	51
Blood transfusion	
Not given	20
Blood given	68
Necessary, not available	10
Unknown	2
Perinatal death²	
Yes	77
No	22
Unknown	1
Maternal death	
Yes	11
No	89
Reported no. of cases	66

¹Excludes three women admitted postpartum and one with unknown admission status.

²Excludes multiple births.

VIII. BIRTH SPACING AND FAMILY PLANNING

This chapter examines factors associated with the spacing of births and the use of family planning among women delivering in maternity centers and hospitals in Abidjan, specifically:

1. current family size and the desire for additional children;
2. birth intervals, breast-feeding and previous use of family planning;
3. the factors associated with abortion experience; and
4. the family planning intentions of women who have just given birth.

In the first two sections, data are analyzed according to patient's place of presentation for delivery and referral status. The objective is to determine whether there are differences between women who intend to deliver in a maternity center and those intending to deliver in a hospital. In the third section, all data are aggregated for the city of Abidjan. Women referred from centers outside the city and those referred from private or "other" centers in Abidjan are excluded from the first three analyses. In the final section, data are shown separately for the two hospitals and their associated maternity centers. All referred women are included in the final analysis.

Current Family Size and Desire for Additional Children

Family Size. The average number of living children by maternal age is presented in Table 8.1. Women delivering in hospitals and maternity centers in Abidjan have high fertility. The mean number of living children including the current delivery was 3.0, ranging from 2.5 for referred women to 3.1 for

women delivering at maternity centers and those presenting at a hospital for delivery.

Women under 20 years of age were having their first child; those in their twenties were having a second or third child; those in their early thirties were having their fourth or fifth child; and women approaching the end of their reproductive cycle were having, on average, a sixth or higher order birth.

Desire for additional children. This section examines factors associated with future childbearing intentions as related to family size, including the current birth. About half of the women responded that they were uncertain about whether they desired additional children or about the number of additional children they desired.* Women with uncertain fertility desires had a family size distribution similar to those wanting additional children; therefore, the two groups were categorized together.

The desire for large families in Abidjan is reflected in the responses to the question on the desire for additional children. Figures 8.1-8.2 show the proportion of women who desire no additional children by number of living children. Overall, 8% of women wanted no additional children. Only a small minority of women with two to three children wanted to cease childbearing, and it was only after women had as many as eight surviving children that nearly half (46%) did not want any more children. The relationship between desire

*It has been observed that in general, women in Abidjan do not perceive that they have a choice about additional children. This may account for the high percentage of "uncertain" responses to this question.

for additional children and current family size was consistent when controlled for maternal age and education (Figures 8.3-8.4).

Birth Intervals, Breast-feeding and Use of Family Planning Before This Pregnancy

The importance of adequate spacing of births has long been recognized in most African cultures. Awareness of the negative effect of short birth intervals on the infant displaced by a new pregnancy is evidenced by the term 'kwashiorkor', which means in the Ga language of Ghana 'child who is taken from the breast too soon'. Many traditional cultures have established practices that serve to delay a new pregnancy at least until the child is weaned; the practice of prolonged breast-feeding is often accompanied by sexual abstinence.¹¹

In many urban areas of West Africa, these traditional restraints on fertility are being abandoned. The decline in breast-feeding concerns health authorities because infant nutrition may be impaired. In addition to compromising child health, the shorter intervals between births associated with shorter breastfeeding leads to higher fertility and poor maternal health.¹² Modern contraceptives may not be substituted quickly enough to make up for the decline in contraceptive effects of prolonged breast-feeding.

This section examines the relative roles of breast-feeding and use of family planning on the length of the last birth interval. The birth interval is defined as the period in months from the end of the last pregnancy to the date of the current delivery. This analysis is restricted to women whose last pregnancy resulted in a surviving live birth in order to control for the

differential effects of mortality on both the length of the birth interval and the duration of breast-feeding. We recognize nonetheless that women with non-surviving outcomes, including abortions, stillbirths and early child deaths, will have shorter intervals both because the period of postpartum amenorrhea will be shorter and because the motivation to have an additional child will be stronger (except for women with an induced abortion).^{13,14} In order to gain an insight into the effects of modernization on child spacing practices, we examined the effects of education (the best indicator of socioeconomic status on the Obstetric Surveillance Form) on birth intervals, duration of breast-feeding and use of family planning before this pregnancy.

Birth interval. The first panel of Table 8.2 shows the distribution of women with a surviving last birth by birth interval. Ten percent reported a birth interval of less than two years. There was some difference by place of presentation and referral status. Fifteen percent of patients presenting at a hospital had intervals of less than two years, compared with 9% of those delivering at maternity centers and 11% of those referred for delivery. Women with intervals of four or more years comprised 25% of those presenting at a hospital, compared with only 15% of those delivering at a maternity center and 21% of those referred for delivery. The majority of women had birth intervals of two years or more: 52% had an interval of between two and three years, 23% had an interval of three to four years, and 15% had an interval of four or more years.

Table 8.3 shows the mean birth interval in months for women whose last pregnancy resulted in a surviving birth, controlled for maternal age and education. The average birth interval for women with a surviving last birth was 34.7 months, ranging from 34.3 for women who delivered in maternity

centers to 38.2 for those presenting at a hospital for delivery. In every center, the mean interval increased with age and education. Women under 20 years of age had an average interval of 29.0 months, nearly 11 months shorter than women aged 35 years and older. Women with no education had shorter intervals than those with seven or more years (34.0 and 38.7, respectively).

Breast-feeding of surviving last birth. Breast-feeding of the surviving last birth was almost universal. Over 98% of women in all centers reported that they breast-fed, and 39% breast-fed for 18 months or longer (second panel of Table 8.2). Table 8.4 shows the mean duration of breast-feeding, controlled for place of presentation and referral status, age and education. On the average, women breast-fed last child for 15.4 months. Women presenting at a hospital had a shorter mean duration of breast-feeding than those delivering in a maternity center and those referred for delivery (11.8 vs. 15.7 and 13.9, respectively). In every center, mean length of breast-feeding increased with age: women under 20 years of age breast-fed an average of three months less than those 35 and older (13.8 vs. 16.9, respectively).

Education was strongly associated with length of breast-feeding (Table 8.4). As the level of education increased, the mean duration of breast-feeding decreased: women with no education breast-fed more than four months longer than those with seven or more years of education (16.2 vs. 11.9, respectively). Figure 8.5 shows the distribution of breast-feeding by education. The proportion of women who did not breast-feed increased as level of education increased: women with 13 or more years of education were nine times more likely not to breast-feed than those with no education. The mean duration of breast-feeding also varied by place of delivery and referral

status even after controlling for education. This would suggest that other socioeconomic factors in addition to education affect breast-feeding.

Previous use of family planning. The data on contraceptive use have some important limitations. Women were asked only whether or not a method was used before this pregnancy and, if so, which method. No information is available about the length and regularity of use, the reasons for discontinuation or the practice of more than one method. Thus, it cannot be determined if the woman became pregnant while using the method or stopped using the method in order to become pregnant.

The third panel of Table 8.2 shows the percentage of women who used family planning in the interval between the last birth and the current delivery. Family planning use, in general, was low: fewer than 7% of women used a method. Five percent of women reported that they used a clinical method; the majority of these used the pill. Place of presentation was strongly associated with previous use. Women intending to deliver in a hospital were more than three times as likely as those intending to deliver in a maternity center to report previous use of both clinical and non-clinical methods.

Previous use of contraception was associated with age: women under 20 and those 35 years and older were least likely to report previous use, while those between the ages of 20 and 34 were most likely to have used a method (Table 8.5). Previous use was significantly associated with level of education. As education increased, the proportion of women who reported previous use of a method also increased. Overall, women with seven or more years of education were more than 10 times as likely to have used a method as those with no education. Place of presentation was also strongly associated with the use of

contraception which may indicate that other socioeconomic factors in addition to education also affect contraceptive use.

Breast-feeding, previous use of family planning and birth intervals. Figure 8.6 shows the relationship between the length of the birth interval and both use of family planning and the duration of breast-feeding. Controlling for the duration of breast-feeding, women who used any family planning method had longer birth intervals than those who did not use a method. Among those women who breast-fed for less than 12 months, the birth interval was 20 months longer for those who used a family planning method than for non-users.

Both contraceptive use and prolonged breast-feeding can lengthen the birth interval. If family planning is not practiced, breast-feeding has an important role in lengthening the birth interval. The contraceptive effects of breast-feeding are less clear for women who used family planning.

As educational levels continue to increase, it is likely that the duration of breast-feeding will decline as more and more women adopt the breast-feeding practices of more educated women. Consequently, over the next several years, unless efforts are made to make family planning more widely available to women who are not breast-feeding, birth intervals may decrease.

Abortion Experience

In contrast to some other developing regions where abortion is used by older, married women to limit family size, abortion in Africa is most common among younger and nulliparous women who seek to delay their first birth. Hospital studies in Zaire, Nigeria and Mali have shown that many women who seek

abortion are young and unmarried with no children and have limited or no access to family planning services.^{15,16,17,18}

Although the present study did not collect data on women with abortion complications, the Obstetric Surveillance Form does include questions on the number of previous pregnancies, including spontaneous and induced abortions. In addition, the outcome of the last pregnancy was specified. This section assesses the prevalence of previous abortion among women delivering in centers in Abidjan and examines the factors that affect the likelihood of a woman having had an induced abortion. Aggregated data for the city of Abidjan, excluding women referred from outside of the city and those referred from private clinics, are used for this analysis.

Table 8.6 shows the percentage of women who reported at least one previous abortion. Among all women with one or more previous pregnancies, 6% reported that they had had an induced abortion, 13% reported a spontaneous abortion and less than 1% reported both. It is known from other studies that induced abortion is usually underreported, even where it is legal. Therefore, this 6% figure very likely represents an underestimate of the true proportion. It is also possible that reluctance to report an induced abortion resulted in some misreporting of induced abortions as spontaneous abortions.

An important issue is whether induced abortion is used to delay a first pregnancy, to space later births or to limit family size. Table 8.7 shows the outcome of the last pregnancy by the number of previous pregnancies for women with one, two and three or more pregnancies. The outcome of the last pregnancy includes the following five categories: surviving live birth, live birth not surviving, stillbirth, spontaneous abortion, and induced abortion.

For each gravidity level, the percentage of women whose last pregnancy resulted in a live birth not surviving or a stillbirth remained fairly constant. However, the percentage of women whose last pregnancy resulted in a surviving live birth increased with each gravidity level, while the percentage reporting an induced or spontaneous abortion decreased. Of women with one previous pregnancy, 5% reported an induced abortion, compared with 4% of those with two previous pregnancies and less than 2% of those with three or more previous pregnancies. These results imply that abortion may more often be used to delay the first birth rather than to space later births or to limit family size. It should be noted that the percentage of women whose last pregnancy resulted in a spontaneous abortion decreased significantly with each gravidity level. Seven percent of women with one previous pregnancy reported a spontaneous abortion, compared with 3% of those with three or more previous pregnancies.

Women with exactly one previous pregnancy. In order to examine the characteristics of women who reported a prior induced or spontaneous abortion, we examined the pregnancy outcome of women with exactly one previous pregnancy by age and education. We selected this group because women currently completing their second pregnancy were most likely to report a previous abortion.

Table 8.8 shows the outcome of the last pregnancy by age. The percentage of women whose last pregnancy resulted in an induced or spontaneous abortion decreased with increasing age, whereas the percentage with a surviving child increased. Women currently under 20 years of age were the least likely to report a surviving child and the most likely to report an induced abortion. Nine percent of these women reported that their last pregnancy ended in an

induced abortion, compared with 4% of women 20-24 years old and 5% of women 25-29 years old. It is surprising that the rate of spontaneous abortion also decreased, since the risk of spontaneous abortion would be expected to increase with age.¹⁹ This may reflect misreporting of induced abortions as spontaneous abortions, particularly among younger women.

Table 8.9 shows the outcome of the last pregnancy by level of education for women with one previous pregnancy. As education increased, the proportion of women reporting an induced abortion increased. Less than 1% of women with no education reported an induced abortion, compared with 32% of women with 13 or more years. There was a similar relationship between spontaneous abortion and education. Although the proportion of women with stillbirths and non-surviving live births decreased with increasing education, the proportion with spontaneous abortions increased. This increase is surprising since one would expect all unfavorable outcomes (except induced abortion) to decrease as education increased. It provides further evidence that induced abortion is misreported, i.e. reported as spontaneous abortion.

When further controlled for age, the relationship between education and induced abortion persisted (Figure 8.7). The association was most pronounced for younger women: among women with one or more years of education, 22% of those under 20 reported an induced abortion, compared with 11% of those 20 years and older.

Previous family planning use was strongly associated with outcome of first pregnancy (Figure 8.8). Women whose first pregnancy resulted in induced abortion were five times more likely than those with spontaneous abortion and more than six times as likely as women with other outcomes to report previous

use of a family planning method. The relationship between previous use of family planning and outcome of the first pregnancy remained after controlling for education. Women who had some education and who reported a spontaneous abortion were more likely to report use of family planning than were women with a non-surviving birth or stillbirth. This suggests that there was some misreporting of induced as spontaneous abortions.

Summary. In this study women currently completing their second pregnancy were more likely than women with higher gravidity to report an induced abortion for their last pregnancy. Induced abortion experience was very high among women with the highest levels of education: nearly one-fifth of women with a secondary education and one-third of those with a university education reported an induced abortion for the last pregnancy.

Family Planning Intentions

In this section, the family planning intentions of women who have just given birth are examined. Table 8.10 shows, by method, family planning intentions after the current delivery. Twenty-five percent of women planned to use a clinical method, and 7% planned to use a non-clinical method. The percent planning to use a clinical method varied from a high of 51% (CHU Cocody) to a low of 12% (Treichville maternity centers). Planned use of non-clinical methods also varied, from 11% in Cocody maternity centers to 2% in Treichville maternity centers. Overall, women were three times more likely to report planned use of a clinical method than a non-clinical method.

Among women planning to use a clinical method, oral contraceptives were the most commonly indicated method, accounting for at least 40% in each center

(Table 8.11). Planned use of oral contraceptives varied from 42% of women planning to use a clinical method in CHU Cocody to 83% in Treichville maternity centers. In CHU Cocody and its maternity centers, more respondents said they planned to use injectables than oral contraceptives, although oral contraception was the second most prevalent choice overall. Together, oral contraceptives and injectables accounted for over 90% of planned use of clinical family planning methods. Among the other three methods, more women planned to use IUDs than barrier methods and female sterilization combined.

Table 8.12 shows planned use of clinical methods by age, education, survival status of the current birth and current family size. Planned use increased with age, education and number of living children, but there was little difference in planned use according to survival status of the current birth. Women 30 years of age and over were 1.5 times more likely than those under 25 to report planned use of a method. Education was strongly associated with planned use: women with seven or more years of education were nearly three times more likely than those with no education to report that they planned to use a clinical method after this delivery. The number of living children after this delivery was also associated with planned use. Only one-fourth of women with one or two children planned to contracept, compared with over 40% of those with six or more children.

Table 8.13 shows the percent of women who planned to use a clinical method of family planning method after the current delivery and the percent who used a clinical method before the current pregnancy. The percentage planning to contracept, even among those women who wanted more children, was much higher than the percentage who contracepted before the current pregnancy. (For a discussion of previous use of family planning for women with a surviving last

birth, see the earlier section in this chapter on pregnancy intervals, breastfeeding and use of family planning before this pregnancy.)

Planned contraceptive use was related to desire for additional children (Table 8.13). Among women who wanted more children, 20% reported that they planned to contracept. Women who did not want any more children were significantly more likely to report that they planned to contracept: four-fifths of these women planned to use a method after this delivery. Planned use varied widely according to the center where the delivery occurred. Of women who did not desire additional children, 90% in CHU Cocody and its maternity centers planned to contracept, compared with 67% in CHU Treichville and 40% in Treichville maternity centers.

**Table 8.1 Mean Number of Living Children After
the Current Delivery by Maternal Age (singleton deliveries)**

	Patients presenting at a maternity center in Abidjan		Patients presenting at a hospital (not referred)	Total
	Patients delivering at maternity centers	Patients referred to a hospital for delivery		
Total	3.1	2.5	3.1	3.0
Maternal age				
<20	1.3	1.0	1.2	1.2
20-29	2.8	2.1	2.5	2.7
30-34	4.9	4.3	4.3	4.8
35 or more	6.3	5.9	6.5	6.3
Reported no. of cases	5,421	2,127	3,007	10,555

Note: This table and all other tables in this chapter (Tables 8.1- 8.13) exclude women referred from a center outside of the city of Abidjan and those referred from private or "other" centers in the city. The tables include 18 women admitted postpartum to a hospital and ten women with unknown admission status who were referred from centers in Abidjan.

Note: For this table and all other tables in this chapter, distributions for aggregated data are adjusted for both underreporting of cesarean sections and underreporting of deliveries in the hospitals and are weighted for maternity center deliveries. Reported numbers of cases are not adjusted or weighted. For maternity center data, reported numbers of cases represent a one-in-ten sample. (See Chapter II for a discussion of weighting and adjusting.)

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Table 8.2 Distribution of Women by Birth Interval, Duration of Breast-feeding and Previous Use of Any Method of Family Planning, All Women with a Surviving Last Birth

	Patients presenting at a maternity center in Abidjan		Patients presenting at a hospital (not referred)	Total
	Patients delivering at maternity centers	Patients referred to a hospital for delivery		
Birth intervals (months)				
< 18	3.0	3.3	5.2	3.1
18-23	6.1	7.4	9.4	6.4
24-35	53.3	44.7	39.4	52.1
36-47	23.1	24.0	21.3	23.0
48+	14.5	20.5	24.6	15.4
Total	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>
Reported no. of cases	3,599	1,042	1,806	6,447
Breast-feeding (months)				
0	1.3	1.8	3.4	1.5
1-11	13.0	22.3	39.8	15.1
12-17	45.3	46.9	36.7	44.8
18+	40.4	28.9	20.1	38.6
Total	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>
Reported no. of cases	3,606	1,048	1,812	6,466
Previous use of family planning				
None	94.7	92.7	77.9	93.5
Clinical method ¹	3.9	6.0	18.0	4.9
Non-clinical method ²	1.4	1.2	4.1	1.6
Total	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>
Reported no. of cases	3,616	1,049	1,811	6,476

¹Includes the pill, injectables, IUD and barrier methods.

²Includes rhythm/withdrawal, postpartum abstinence and "other".

Table 8.3 Mean Birth Interval (Months) by Age and Education, All Women with a Surviving Last Birth

	Patients presenting at a maternity center in Abidjan		Patients presenting at a hospital (not referred)	Total
	Patients delivering at maternity centers	Patients referred to a hospital for delivery		
Total	34.3	36.9	38.2	34.7
Age				
<20	28.9	32.1	29.1	29.0
20-29	33.8	35.9	37.2	34.0
30-34	34.6	38.3	39.5	35.2
35 or more	39.6	40.1	42.0	39.8
Education (years)				
0	33.9	35.9	35.4	34.0
1-6	34.3	38.1	39.3	34.7
7 or more	37.9	41.1	40.7	38.7
Reported no. of cases	3,590	1,041	1,804	6,435

Table 8.4 Mean Duration of Breast-feeding (Months) by Age and Education, All Women with a Surviving Last Birth

	Patients presenting at a maternity center in Abidjan		Patients presenting at a hospital (not referred)	Total
	Patients delivering at maternity centers	Patients referred to a hospital for delivery		
Total	15.7	13.9	11.8	15.4
Age				
<20	14.0	12.6	10.6	13.8
20-29	15.6	13.7	11.8	15.3
30-34	15.8	13.7	11.7	15.4
35 or more	17.4	15.1	12.5	16.9
Education (years)				
0	16.4	14.2	13.8	16.2
1-6	14.7	13.9	12.5	14.6
7 or more	12.7	11.8	9.5	11.9
Reported no. of cases	3,591	1,046	1,809	6,446

Table 8.5 Percent of Women Who Used Any Method of Family Planning Before This Pregnancy, All Women with a Surviving Last Birth

	Patients presenting at a maternity center in Abidjan		Patients presenting at a hospital (not referred)	Total
	Patients delivering at maternity centers	Patients referred to a hospital for delivery		
Total	5.3	7.3	22.1	6.5
Maternal Age				
<20	4.8	2.8	8.9	4.9
20-29	5.6	7.7	21.6	6.6
30-34	6.0	8.9	25.2	7.8
35 or more	3.5	5.0	22.0	5.2
Education (years)				
0	1.8	3.1	6.3	2.0
1-6	8.9	12.1	17.3	9.5
7 or more	24.9	24.8	40.4	28.3
Reported no. of cases	3,607	1,048	1,809	6,464

Table 8.6 Distribution of Women by Previous Abortion Experience, Women Ever Pregnant

	Patients presenting at a maternity center in Abidjan		Patients presenting at a hospital (not referred)	Total
	Patients delivering at maternity centers	Patients referred to a hospital for delivery		
Previous abortion experience				
Induced abortion only	4.4	8.8	21.8	5.9
Spontaneous abortion only	12.4	18.6	19.5	13.2
Induced and spontaneous	0.3	1.4	3.2	0.6
No previous abortion	<u>82.9</u>	<u>71.2</u>	<u>55.5</u>	<u>80.3</u>
Total	100.0	100.0	100.0	100.0
Reported no. of cases	4,333	1,560	2,650	8,543

Table 8.7 Outcome of Last Pregnancy by Number of Previous Pregnancies, Women Ever Pregnant

	Total	Number of Previous Pregnancies		
		1	2	3+
Outcome of last pregnancy				
Live birth-surviving	81.8	74.5	80.5	85.3
Live birth-not surviving	8.9	10.0	10.2	7.9
Stillbirth	2.3	3.4	2.1	1.9
Spontaneous abortion	4.0	6.7	3.4	3.1
Induced abortion	2.9	5.3	3.7	1.6
Other	0.1	0.0	0.1	0.2
Total	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>
Reported no. of cases	8,515	1,898	1,711	4,906

**Table 8.3 Outcome of Last Pregnancy by Age,
Women with One Previous Pregnancy**

	Maternal Age			
	<20	20-24	25-29	30+
Outcome of last pregnancy				
Live birth-surviving	63.4	76.8	79.2	87.6
Live birth-not surviving	14.6	8.9	8.3	5.7
Stillbirth	4.2	3.2	3.2	0.8
Spontaneous abortion	8.5	6.9	4.6	3.9
Induced abortion	9.3	4.1	4.7	2.0
Total	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>
Reported no. of cases	456	949	382	107

**Table 8.9 Outcome of Last Pregnancy by Education,
Women with One Previous Pregnancy**

	Level of Education			
	None 0	Primary 1-6	Secondary 7-12	University 13+
Outcome of last pregnancy				
Live birth-surviving	78.6	73.8	61.6	51.1
Live birth-not surviving	10.6	9.0	9.6	5.4
Stillbirth	3.8	3.2	2.5	1.0
Spontaneous abortion	6.2	6.8	8.1	10.3
Induced abortion	0.8	7.1	18.2	32.2
Total	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>
Reported no. of cases	1,083	321	354	134

**Table 8.10 Family Planning Intentions After This Delivery
(Percent Distribution)**

	CHU Cocody	CHU Treichville	Cocody Maternity Centers	Treichville Maternity Centers	Total
% of Women Who Planned to Contracept					
Clinical methods ¹	51.4	29.2	29.3	11.7	24.9
Non-clinical methods ²	6.8	5.8	10.7	1.8	7.3
% of Women Not Planning to Contracept					
	<u>41.8</u>	<u>65.1</u>	<u>60.0</u>	<u>86.4</u>	<u>67.8</u>
Total	100.0	100.0	100.0	100.0	100.0
Reported no. of cases	2,675	2,687	3,503	2,026	10,891

¹Includes the pill, injectables, IUD, barrier methods and female sterilization.

²Includes rhythm/withdrawal, postpartum abstinence and "other" non-clinical methods.

Table 8.11 Percent Distribution of Women Who Planned to Use a Clinical Method of Family Planning After This Delivery

	CHU Cocody	CHU Treichville	Cocody Maternity Centers	Treichville Maternity Centers	Total
Method					
Pills	42.3	74.6	48.5	83.2	55.1
Injectables	46.0	12.1	50.0	11.8	40.9
IUD	7.1	7.7	0.3	3.8	2.2
Barrier methods	0.4	2.1	0.9	0.8	0.9
Female sterilization	3.6	3.5	0.3	0.4	0.9
Total	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>
Reported no. of cases	1,356	779	1,027	238	3,400

Table 8.12 Percent of Women Who Planned to Use a Clinical Method After This Delivery, by Age, Education, Current Number of Living Children and Survival Status of This Birth¹

	CHU Cocody %	CHU Treichville %	Cocody Maternity Centers %	Treichville Maternity Centers %	Total %
Age (years)					
<25	41.5	23.6	25.3	10.2	21.0
25-29	56.5	35.1	28.9	11.9	25.8
30 or more	63.5	32.2	39.3	15.3	32.5
Education (years)					
0	42.5	13.8	21.7	6.3	16.8
1-6	50.5	34.4	42.0	20.2	36.3
7 or more	65.6	52.1	50.1	35.7	48.6
Fetal-neonatal status					
Surviving	53.0	29.6	29.6	11.8	24.9
Not surviving	41.6	24.1	19.3	*	23.3
Reported no. of cases	2,675	2,687	3,503	2,026	10,891
Current no. of living children²					
1-2	47.1	27.9	21.8	9.3	19.7
3-5	54.3	31.0	30.8	12.2	25.9
6 or more	73.9	33.6	52.8	20.4	41.5
Reported no. of cases	2,542	2,572	3,452	1,988	10,554
Total	51.4	29.2	29.3	11.7	24.9

*This cell is not shown due to number of cases less than 50.

¹Includes the pill, injectables, IUD, barrier methods and female sterilization.

²Singleton deliveries only for the current delivery.

Table 8.13 Percent of Women Who Contracepted Before the Current Pregnancy; and Percent Who Planned to Contracept After the Current Delivery, by Desire for Additional Children, Clinical Methods Only

	Before Current Delivery		After Current Delivery	
	Total Who Contracepted %	Desired Additional Children and Planned to Contracept %	Did Not Desire Additional Children and Planned to Contracept %	Total Who Planned to Contracept %
CHU Cocody	13.7	44.3	89.4	51.4
CHU Treichville	12.3	23.3	67.0	29.2
Cocody Maternity Centers	3.9	23.4	90.7	29.3
Treichville Maternity Centers	3.4	10.6	39.3	11.7
Total	4.9	20.2	79.1	24.9
Reported no. of cases	10,939	9,699	1,168	10,891

Figure 8.1
Percent of Women Wanting No Additional Children,
by Current Number of Living Children
(including the current delivery, singleton deliveries only)

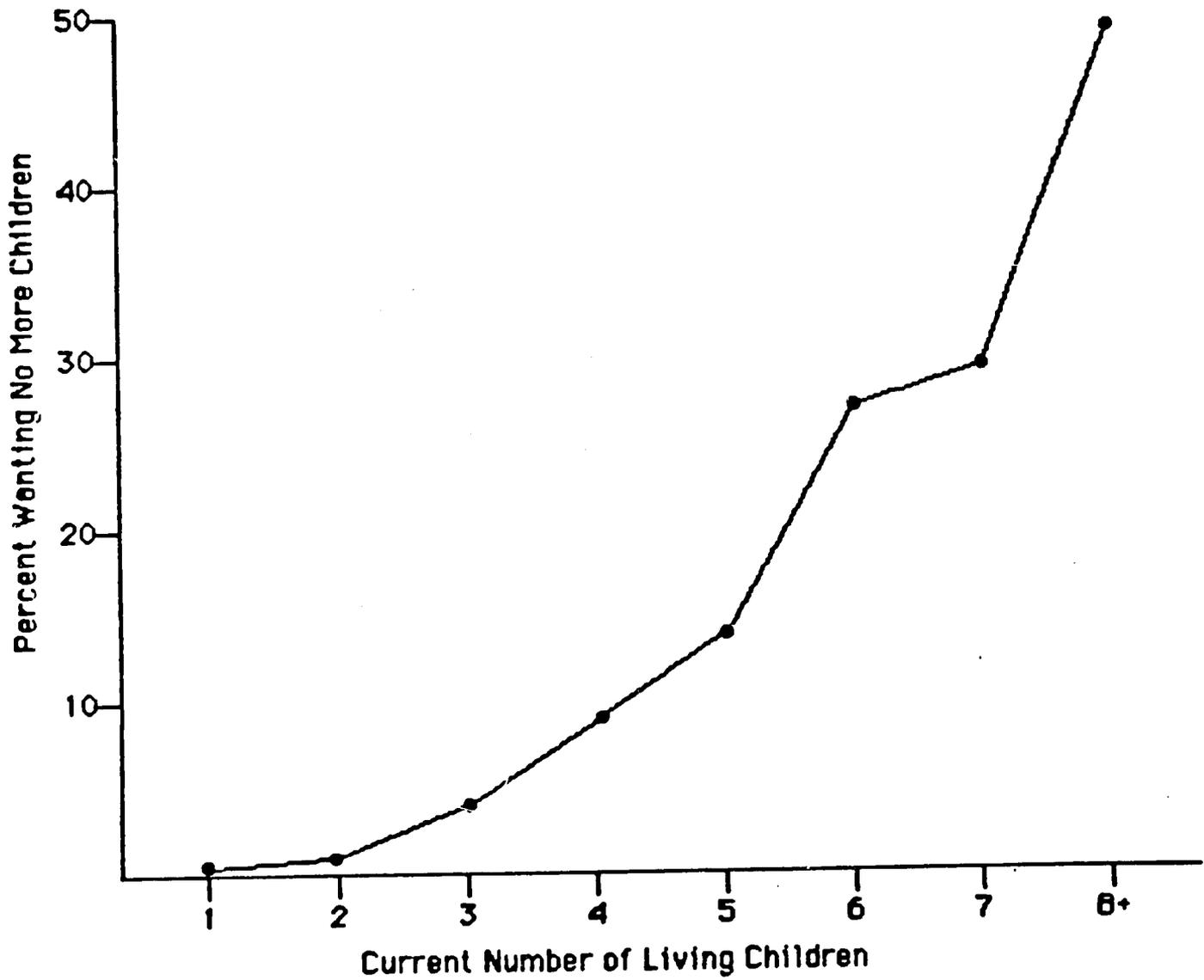


Figure 8.2
Percent of Women Wanting No Additional Children,
by Current Number of Living Children
(including the current delivery, singleton deliveries only)

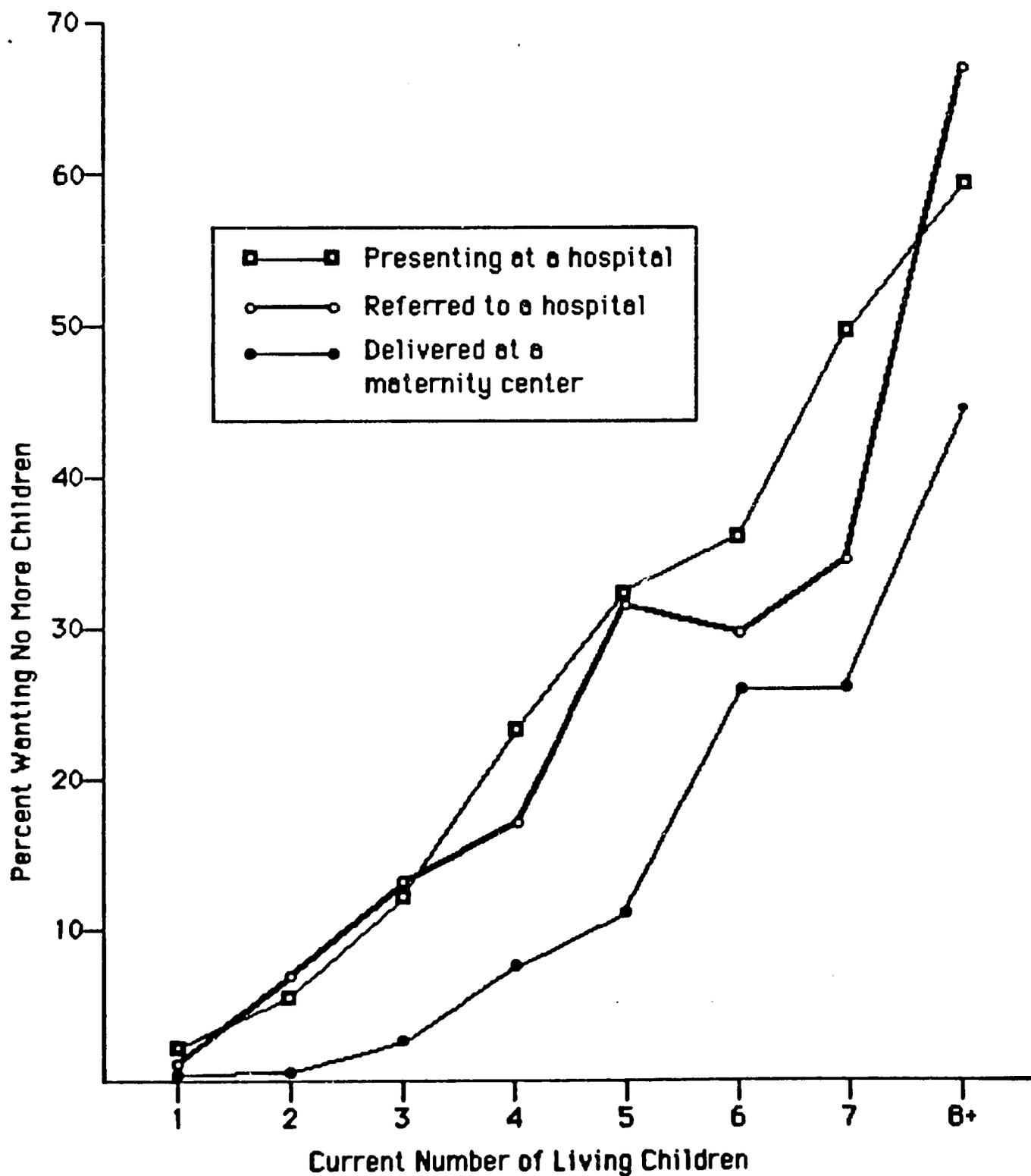


Figure 8.3
 Percent of Women Wanting No Additional Children,
 by Current Number of Living Children and Maternal Age
 (including the current delivery, singleton deliveries only)

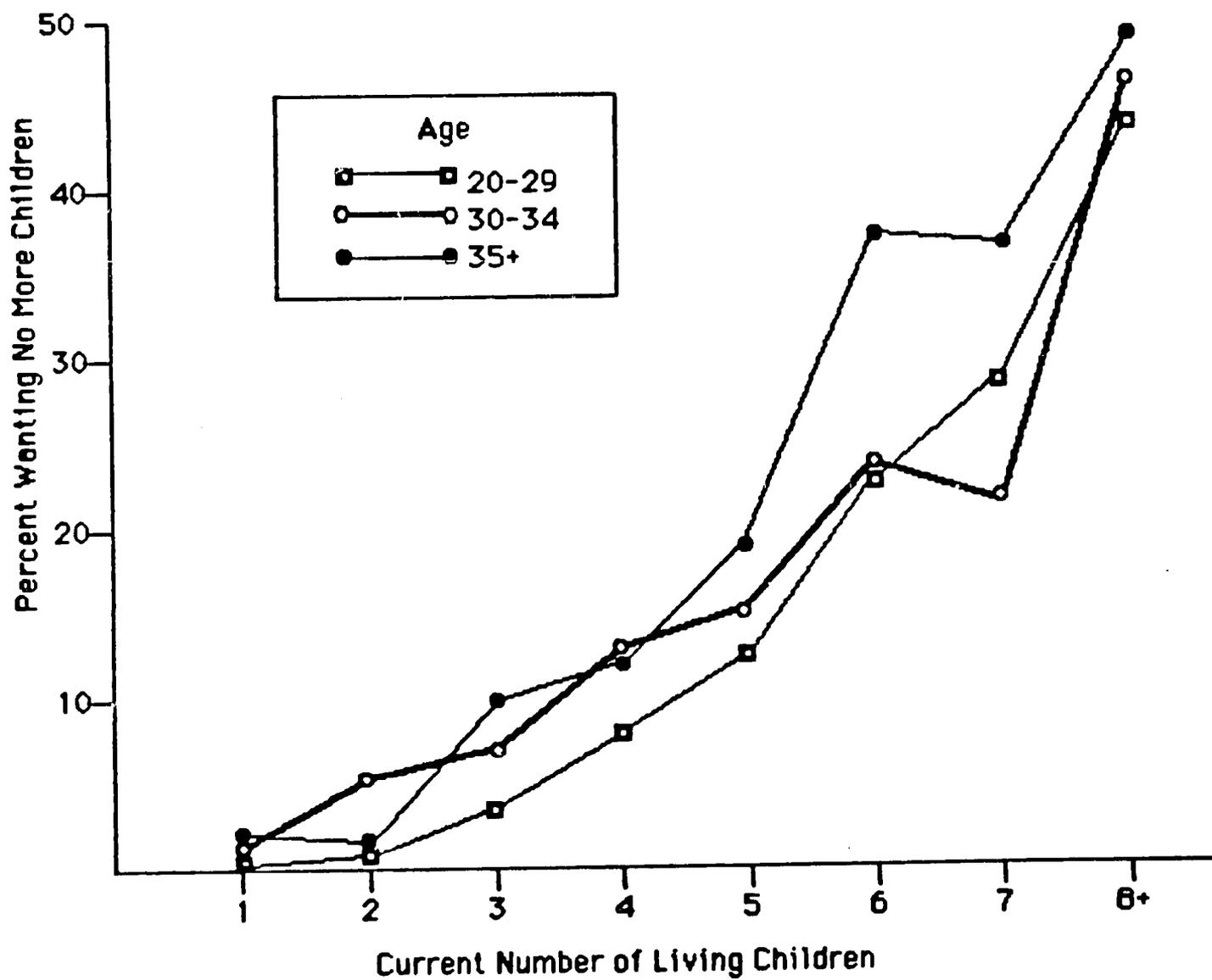


Figure B.4
Percent of Women Wanting No Additional Children,
by Current Number of Living Children and by Education
(including the current delivery, singleton deliveries only)

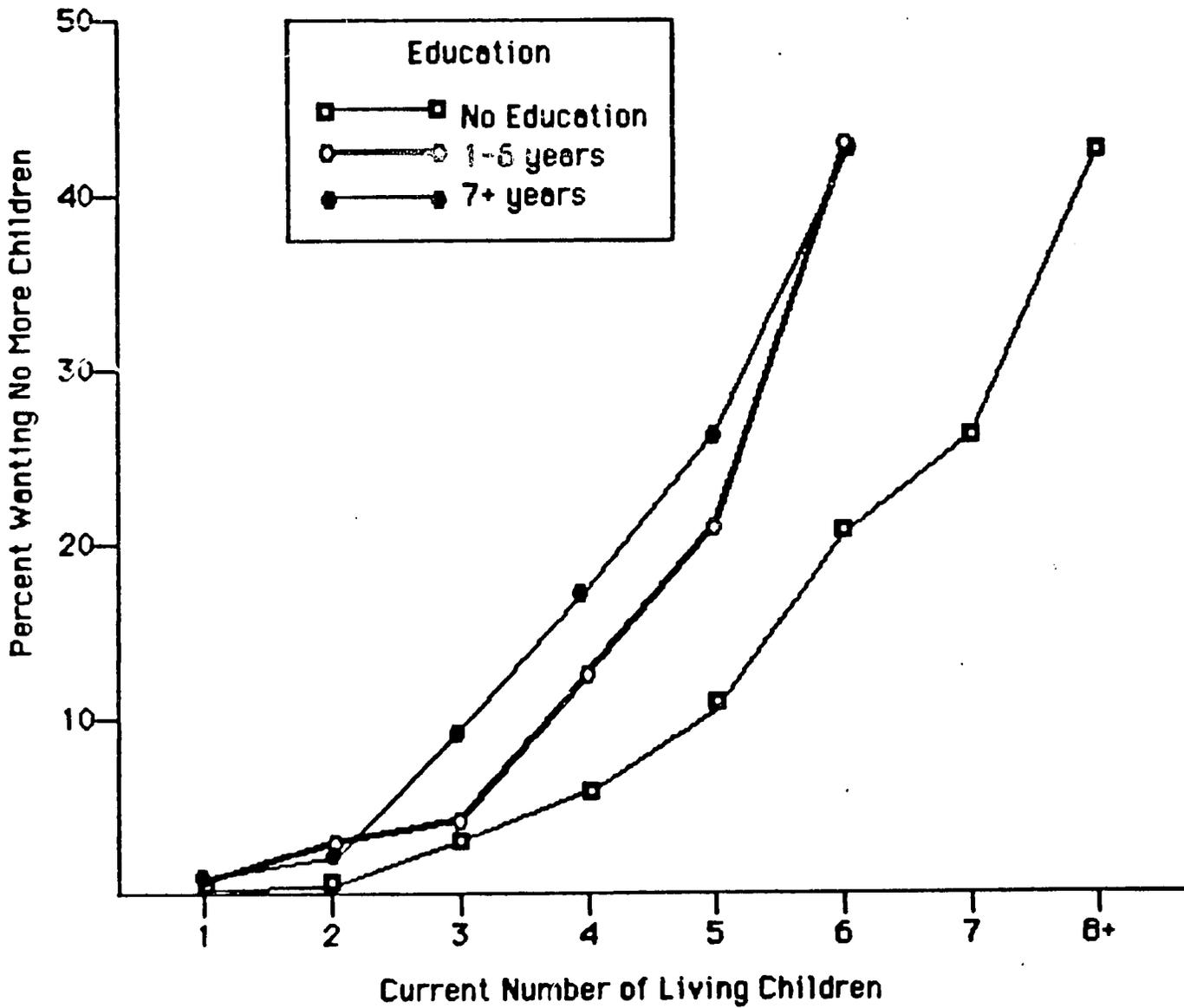


Figure B.5
Duration of Breast-feeding by Education,
All Women with a Surviving Last Birth

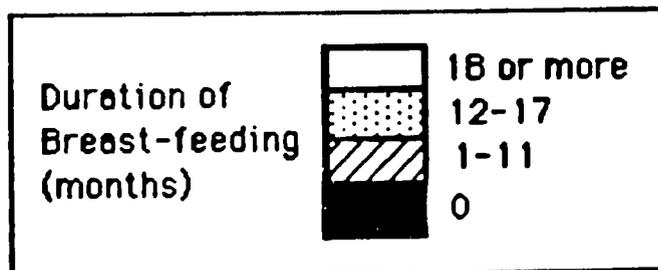
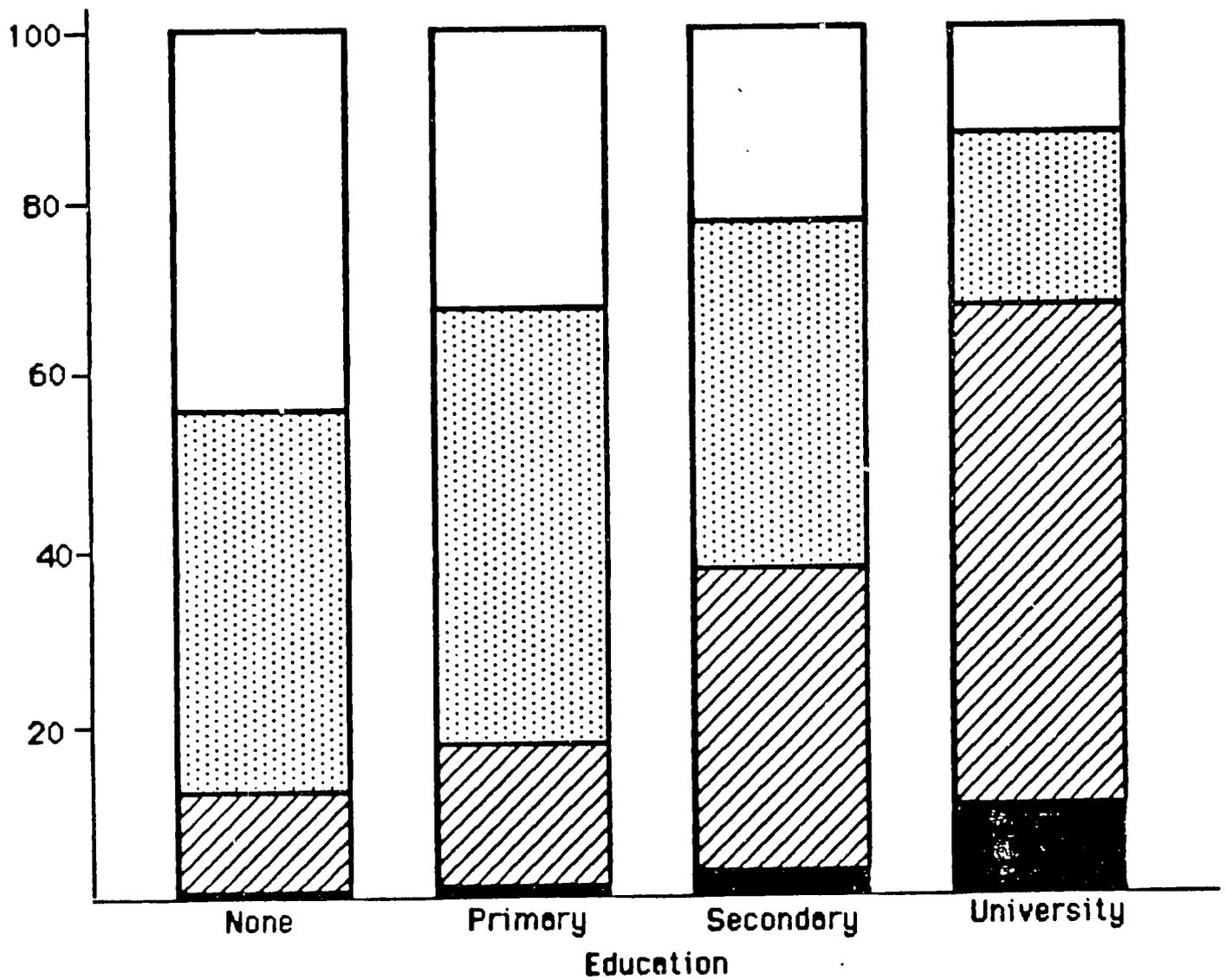


Figure B.6
Mean Birth Interval (months) by Duration of Breast-feeding and Previous Use of Family Planning, All Women with a Surviving Last Birth

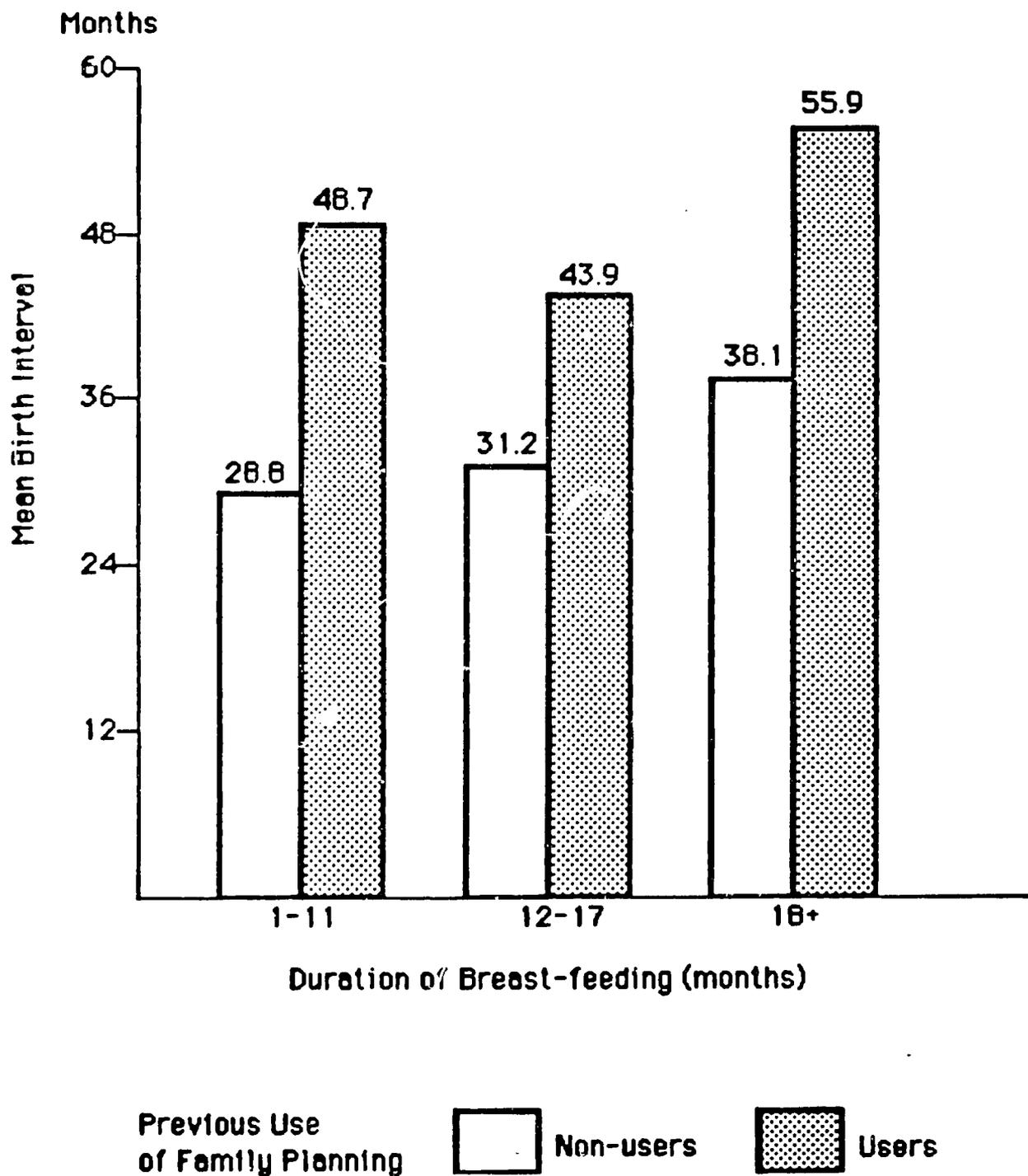


Figure 8.7
Outcome of Last Pregnancy by
Number of Years of Education and Maternal Age,
Women with One Previous Pregnancy

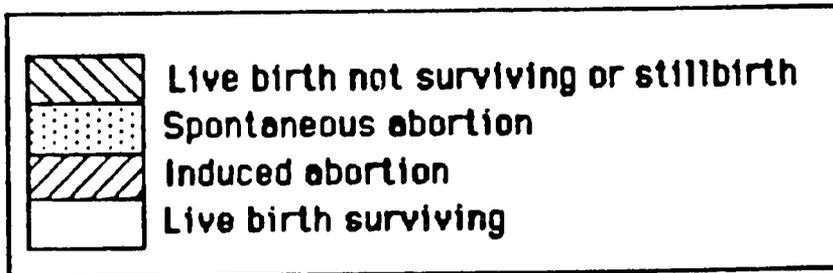
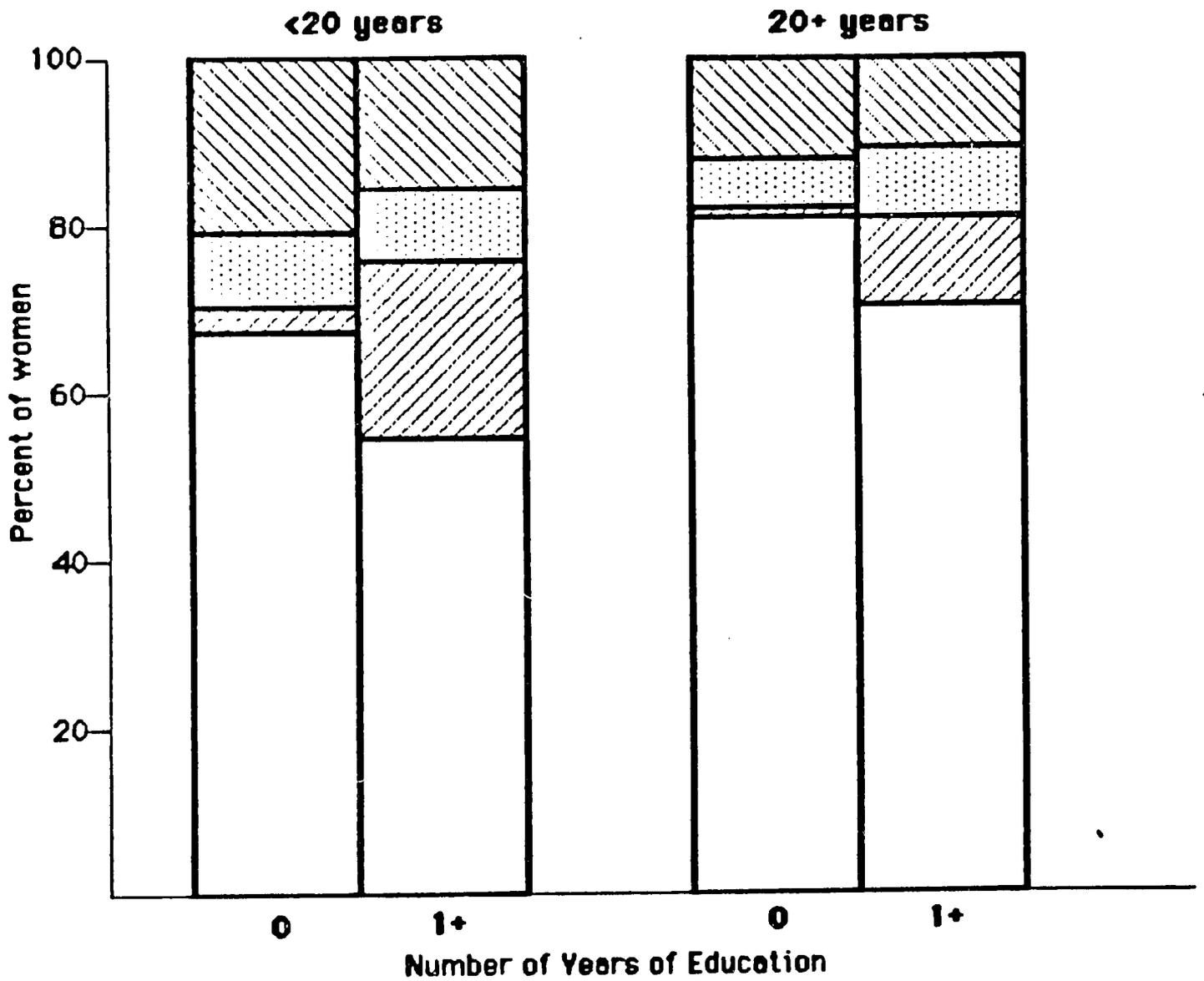
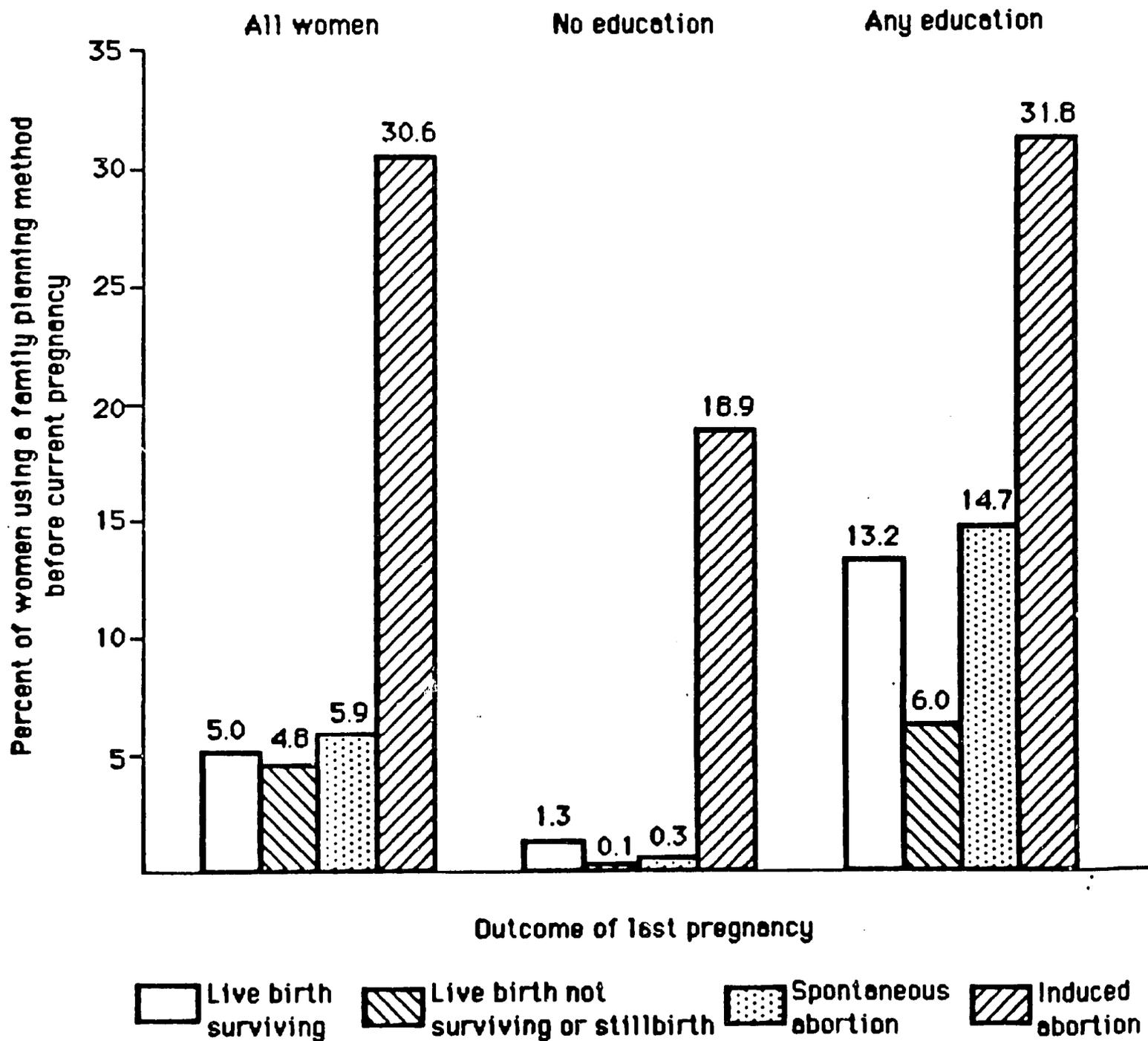


Figure 8.6
Percent of Women Using a Family Planning Method
Before the Current Pregnancy, by Outcome of
Last Pregnancy and Level of Education,
Women with One Previous Pregnancy



IX. SUMMARY AND RECOMMENDATIONS**SUMMARY**

From November 1, 1984 to October 31, 1985, an Obstetric Care Monitoring Study was conducted in the eleven public maternity centers and maternity services of the two referral hospitals in Abidjan. The goal of the study was to identify risk factors associated with maternal and perinatal morbidity and mortality for a representative sample of women receiving pregnancy-related care. The major findings of this study are summarized below.

Data were collected on 11,560 women admitted for delivery to the 13 centers. In the analysis, maternity center data were weighted one-in-ten for sampling, and hospital data were adjusted for underreporting of deliveries and underreporting of cesarean sections. These data are representative of all deliveries in the 13 centers during a one-year period.

Data were analyzed 1) for each hospital and/or its referring maternity centers (grouped), and 2) aggregated for all 13 centers (but excluding women referred to a hospital from outside the city). The first method was used to compare women delivering in hospitals with those delivering in maternity centers. It was also used in comparing women delivering in the two hospitals. The second method was used to examine city-wide patterns of prenatal care, referral and birth spacing. In analyses using aggregated data, cases were divided according to place of presentation for delivery rather than actual place of delivery.

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The majority (89%) of women who delivered in the public maternity system delivered in a maternity center. The remaining 11% delivered in one of the two hospitals, Centre Hospitalier Universitaire de Cocody (CHU Cocody) or Centre Hospitalier Universitaire de Treichville (CHU Treichville). The population of women at risk of unfavorable pregnancy outcome due to age, height, education or gravidity status differed among centers. Overall, about 10% were under 18 years of age; another 10% were aged 35 or older. The majority of women delivering in any center had no education, ranging from slightly over 50% at the two hospitals to 75% at one group of maternity centers. A small percentage of women (about 5%) were under 150 cms in height. Between 21% and 25% of women were primigravidas; 20% to 27% had had five or more previous pregnancies.

Because the hospitals are referral centers, they have a higher proportion of high risk cases than the maternity centers. Women who delivered in hospitals were substantially more likely to report a previous induced or spontaneous abortion or stillbirth than those delivering in maternity centers. They were also eight to 12 times more likely to have had a previous delivery by cesarean section. Women who delivered in hospitals were substantially more likely to have malpresentations, multiple births, and prolonged or obstructed labor than those who delivered in maternity centers.

There were significant differences between the two hospitals: 28% of women in CHU Cocody delivered by cesarean section, compared with 20% in CHU Treichville. Women delivering in CHU Cocody were also more likely to be given blood transfusions, anesthesia and oxytocics. Among women delivering in CHU Cocody, 8% required blood that was not available, compared with 3% of those delivering in CHU Treichville.

Between 9% and 11% of singleton deliveries in the maternity centers resulted in low birthweight (<2,500 gm.) babies. This compares with a low birthweight rate of 15% to 16% in the hospitals. At the hospitals, between 9% and 15% of singleton deliveries resulted in stillbirth or early neonatal death. The death rate was highest among the very low birthweight (<2,000 gm.) babies.

Between 6% and 7% of all babies delivered in hospitals were very low birthweight; of these, 35% to 50% did not survive until their mother's discharge from the hospital.

The Referral System Referrals constitute a large proportion of admissions at both CHUs. Sixty percent of women admitted to CHU Cocody and 36% at CHU Treichville were referred, either from maternity centers in Abidjan or from centers outside the city. One-fourth of referred women at CHU Cocody and one-eighth at CHU Treichville were referred from centers outside of Abidjan. At both hospitals, women referred from outside the city had higher complication rates than those referred from centers in Abidjan. They were most likely to deliver by cesarean section; they also had the highest perinatal mortality rates.

Because there are no facilities for surgical intervention in any of the maternity centers, complicated cases must be referred to a hospital. Between 5% and 6% of patients who went to a maternity center were referred at the time of delivery. The closer the maternity center was to a hospital, the more likely were its patients to be referred there.

Among women who went to a maternity center for delivery, less than 1% had serious complications such as placenta previa, abruptio placenta and uterine

rupture. These women were consistently referred to a hospital for delivery. Referral rates were lower for more common types of complications such as obstructed labor, fetal distress and premature rupture of the membranes.

Prenatal Care Prenatal care, which is recognized to be an important factor contributing to a health pregnancy outcome for both the mother and baby, is available through the Centres de Protection Maternelle et Infantile (PMIs) and hospitals. The medical community in Abidjan encourages women to make at least four visits and to initiate care in their first trimester. Most women did make at least one prenatal visit. Ninety-seven percent of those who went to maternity centers or hospitals for delivery made one or more prenatal visits, although only 31% initiated visits in their first trimester. Few women made the recommended number of visits. Less than one-third made four or more visits; only 12% made more than four visits.

The number of prenatal visits a woman made and when she started making those visits was associated with her level of education, her ethnic group and the outcome of her last pregnancy. Among those least likely to make more than four visits or to initiate care in their first trimester were women with no education, women having their first pregnancy, and women whose last pregnancy resulted in a live birth, regardless of the survival status of that birth.

Perinatal outcome was associated with prenatal care. Babies of women with no prenatal visits were two times more likely to be low birthweight and three times more likely to die than babies of women with one or more visits. When controlled for parity status, primiparas who initiated care early were less likely than those who initiated care late to have low birthweight babies.

Maternal Mortality: While the maternal mortality rate in Abidjan is believed to be as high as 500 per 100,000 live births, no actual population-based studies have been conducted. Data on maternal deaths were collected in this study, but due to underreporting of deaths, no rates can be calculated. These data provide insights into the causes and circumstances of death for 94 women who died during a 15-month period, October 1, 1984 and December 31, 1985. These women died in the CHUs or in transit from maternity centers to hospitals. Four-fifths of these women were referred, 45 from centers in Abidjan and 26 from outside the city.

The most common cause of death was hemorrhage. One-fourth of the women died of uterine rupture or antepartum hemorrhage due to placenta previa, placenta accreta or placenta abruptio. Another one-fourth died due to unspecified hemorrhage. Hypertensive disorders resulting in eclampsia, infection, and anesthesia accidents related to intervention procedures were other frequently cited causes of death.

Many of the deaths were characterized as preventable by those in attendance at the time of death. They cited serious inadequacies of facilities, equipment and supplies at all levels of the health care system. Lack of necessary blood products at the hospitals was cited as a contributing factor in one-fourth of the deaths. In addition, one-fourth of women for whom data were available had no prenatal care reported. This fraction is six times higher than for the general population of women delivering in maternity centers and hospitals.

Uterine rupture, which was responsible for a significant number of deaths, was reported for less than 1% of women presenting for delivery at a maternity center or hospital in Abidjan. A total of 70 cases of uterine rupture were

reported during the 12-month study period. Of the 66 women with uterine rupture admitted to a hospital before delivery, 35 women were referred from maternity centers in Abidjan and 26 were referred from centers outside the city. Seven of the 66 (11%) died.

Birth Spacing Among women with a surviving last birth, 10% had a birth interval of less than two years. The average birth interval was 34.7 months. Women under 20 years of age had an average interval 11 months shorter than women aged 35 years and older; women with no education had shorter intervals than those with seven or more years of schooling.

Both contraceptive use and prolonged breast-feeding can lengthen the interval between births. Over 98% of women breast-fed their last surviving birth, and 39% breast-fed for 18 months or longer. On average, women breast-fed for 15.4 months. Women with no education breast-fed longer than those with some education, and, as level of education increases, women were less likely to breast-feed at all.

Use of family planning prior to this pregnancy was low: less than 7% of women used a method. Five percent reported that they used a clinical method; the majority of these used the pill. Educated women and those between the ages of 20 and 34 were most likely to report previous use of a method.

Abortion Experience Among all women with one or more previous pregnancies, 6% reported that they had had an induced abortion, 13% reported a spontaneous abortion and less than 1% reported both. Because induced abortion is usually underreported, this 6% figure likely represents an underestimate of the true proportion. Women with exactly one previous pregnancy were more likely than

those with higher gravidity to report an induced abortion for that pregnancy. Among women completing their second pregnancy, those currently under 20 years of age were the most likely to report an induced abortion; educated women were more likely than those with no education to report an induced abortion. Women whose last pregnancy resulted in an induced abortion were most likely to report previous use of a family planning method, even when controlling for education.

Family Planning Intentions Twenty-five percent of the women reported that they planned to use a clinical method of family planning, and 7% planned to use a non-clinical method. There were wide variations in the percent of women planning to use a clinical method, from 51% (CHU Cocody) to 12% (Treichville maternity centers). Planned use increased with age, education and number of living children. Oral contraceptives were the most commonly indicated method among those planning to use a clinical method.

Planned contraceptive use was related to desire for additional children. Among women who wanted more children, 20% reported that they planned to contracept. Only, 8% of women wanted no additional children after the current delivery. Among women who did not want any more children, 80% planned to use a method after this delivery.

RECOMMENDATIONS

GOAL: To reduce maternal and perinatal mortality and morbidity.

The Obstetrical Care Study in Abidjan identified risk factors associated with maternal and perinatal morbidity and mortality. This section makes recommendations, based on study findings and other information gathered during monitoring visits, to strengthen and improve the maternity care system with the objective of improving maternal and child health. The first five recommendations address the maternity care system, including prenatal care and the referral system. The remaining recommendations pertain to the need for family planning services.

The Maternity Care System

1. The importance of regular prenatal care cannot be over-emphasized. Early initiation of care and regular prenatal visits help to assure that health personnel monitor the progress of the pregnancy and make appropriate referrals of women at risk.

This report examined the level of prenatal care for women obtaining services in Abidjan. The great majority of women make at least one prenatal visit. However, fewer than 30% make the recommended four or more visits. Only 30% of women begin prenatal care during their first trimester.

Objective: To increase the percentage of women 1) getting an adequate number of prenatal visits; and 2) beginning visits early in pregnancy.

Recommendation: Establish an IE&C campaign emphasizing the importance of starting prenatal care early and making regular visits.

2. Besides the number and regularity of prenatal visits, quality of care is an important issue. Although no data were collected to address the issue of quality specifically, it is known that prenatal clinics are often crowded and understaffed. Women are seen briefly, and the screening process may be compromised as a result. There are no standardized criteria to identify those women who should deliver in a hospital.

The prenatal booklet, which is the only record available for maternity patients, is often incompletely filled out by clinic staff. On the Obstetric Surveillance Form, prenatal conditions such as deficiency anemia and hypertension were underreported, reflecting both the probable lack of screening and incompleteness in the recording of information in prenatal booklets.

Objective: To improve the quality of prenatal care by encouraging thorough screening of patients using standard criteria for referral; and by improving the recording of information in prenatal booklets.

Recommendation: Standardize the screening process so that women who should deliver in a hospital are uniformly identified at prenatal clinic. Evaluate the prenatal booklet for a) inclusion of important information, and b) ease of recording of information.

To achieve the first objective, a simple checklist of risk factors should be developed to help staff at prenatal clinics identify women who should deliver in a hospital. This checklist should be included in the prenatal booklet. Below is a prototype of a checklist to be used at the first prenatal visit. Some or all of the following criteria might be included on the checklist:

- women at extremes of the reproductive age span (under 18, 35 and over)
- high parity status (5 or above)
- height less than 150 cm.
- unfavorable outcome of last pregnancy (abortion or stillbirth)
- last delivery a cesarean section
- previous cephalo-pelvic disproportion or labor prolonged more than 12 hours
- chronic medical problems such as hypertension, diabetes, TB, sickle cell anemia, parasitic infections

The following list would be checked for women receiving care during their third trimester:

- developing hypertensive disease, i.e. two or three signs of toxemia (oedema ≥ 1 , albuminuria - more than a trace, elevated blood pressure - systolic ≥ 140 , diastolic ≥ 90)
- primipara with non-vertex presentation
- severe anemia (under 9.5 gm, 29 Hct)
- multiple birth this pregnancy
- antepartum bleeding

3. The primary objective of the referral system is to assure that women with pregnancy complications deliver in a hospital. The timely referral of these women is essential and requires that maternity center staff appropriately evaluate patients. Lack of timely referral compromises the health of mother and fetus. Recognizing that some women do not arrive at a maternity center in time to be referred before delivery, when possible, those who present with complications or indications of potential complications should be immediately referred.

In Abidjan, some women with indications for referral deliver in maternity centers. For example, over half of the women who present at maternity centers with malpresentations deliver in those centers; only 35-40% are referred. Some women with cord prolapse are not referred: 17% of women at Cocody maternity centers and 40% at Treichville maternity centers deliver in those centers.

Women with acute problems such as uterine rupture or placenta previa are nearly always referred, but some do not arrive at the hospital in time to prevent serious sequelae. Among the women who died, the majority had been referred. These women often arrived at the hospital moribund, too late to implement treatment.

Objective: 1) To facilitate the identification of women who should be referred for hospital delivery; and 2) to refer them in a timely manner.

Recommendation: Develop a checklist providing guidelines to aid maternity center personnel in identifying women who should be immediately referred.

The checklist would be used by maternity center staff when a woman presents at the center for delivery. The following is a suggested list only; it does not include all possible indications:

- multiple pregnancy
- membranes ruptured 24 hours or longer
- prolonged or obstructed labor
- prolonged abdominal pain
- palpable abdominal or vaginal masses (other than pregnant uterus)
- prolapsed cord
- meconium per vaginum
- fetal heart beats below 110 per minute
- intrapartum bleeding
- floating, unengaged vertex in primigravida
- evidence of infection (purulent discharge or temperature 38°C or higher)
- malpresentation or malposition (other than vertex)
- intrapartum development of hypertension, or proteinuria or convulsion

4. Several Ivoirien health care providers have voiced the concern that the maternity services in Abidjan are underbudgeted, understaffed and overextended. Excluding the two maternity centers which serve the less populated areas of the city (Loçodjoro and Abobodoume), most centers are comparable in physical structure, number of staff and number of beds. Each center has between 12 and 17 midwives on staff, and between 30 and 48 beds. Patient loads differ considerably, however. At one maternity center there are fewer than 2,000 deliveries per year, compared with 10,000 at another center.

(See Appendix D for a complete breakdown of staff, beds and deliveries per center.)

Objective: To assure that MCH and maternity centers have an appropriate quantity and distribution of staff.

Recommendation: Implement an evaluation of staffing patterns.

Redistribute personnel between the centers, if possible, so that midwives can spend an adequate amount of time with each client. Increase the number of staff so that each center has a similar ratio of staff per population served.

5. In the maternity centers, basic resources essential for a safe and healthy delivery (gloves, alcohol, cotton and gauze) are often unavailable. Because the maternity centers cannot provide all necessary delivery-related material, clients are asked to buy some supplies, such as umbilical dressings and antibiotics.

In the hospitals, where surgical intervention is performed, other supplies such as blood products and anesthesia are often in short supply. Among women in this study, 8% at CHU Cocody and 3% at CHU Treichville needed blood products for transfusion, but the blood was not available. In addition, blood products were cited as necessary but not available for 17 women who died at the hospitals. Hemorrhage was reported to be the principal cause of death for ten of these women.

Objective: To maximize the availability and distribution of resources. To correct supply availability problems for women delivering the maternity centers and hospitals.

Recommendation: Evaluate supply availability at each center. Explore the possibility of charging a fixed fee for delivery to cover the cost of these supplies.

Family Planning

Contraception is not widely available in Abidjan. Although some methods may be obtained through pharmacies, they require the written prescription of a physician. To get a prescription for oral contraceptives or injectables, the patient must undergo a medical examination plus laboratory work. This involves costs that likely deter many potential acceptors. Equally important, most women deliver in maternity centers where they are attended by midwives or health auxiliaries and never see a physician. Since family planning services are not available through the maternity centers, women are not routinely informed about or offered contraceptive options. Those not informed of nor referred for family planning at the time of delivery are less likely, than those who are, to return for services later.

Pharmacies are the main source of contraceptive supplies. The hospitals have limited supplies, which are given primarily to women at high risk, i.e. patients delivered by cesarean section or those with chronic medical problems such as diabetes or sickle cell anemia. In addition to pharmacies and hospitals, women can obtain contraceptives (primarily barrier methods) and

counseling through a recently opened family planning center. Services and supplies are free at this center. Its location, however, is not accessible to many potential clients.

The results of this study show that there is a strong need for improved family planning services in Abidjan. There is a need to encourage contraceptive use among women who wish to adequately space their future pregnancies or to limit childbearing. In addition, efforts should be made to provide all women who want to contracept with an appropriate method. Until contraceptive services are more widely available, the great majority of women in Abidjan will find it difficult to space their pregnancies to maximize favorable pregnancy outcomes.

6. There is an expressed demand for family planning. One-fourth of the women report that they want to use a clinical method of family planning following delivery. Given that women are probably not well-informed about their family planning options, and given the difficulty in obtaining a method, this percentage is surprisingly high. Despite the high rate of intended use, only 7% of women report having used a family planning method prior to delivery. Most women do not have easy access to services. This presents a barrier to family planning acceptance.

Objective: To increase availability of family planning services.

Recommendation: Programs to inform women about the family planning center and to refer those in need of services should be established in the MCH centers. The Ministry of Health (MOH) should consider providing contraceptive services in the MCH centers to make services more accessible to women unable or unwilling to go to the family planning center.

7. A substantial percentage of women in Abidjan have births which are too closely spaced. Ten percent of women with a surviving last birth reported birth intervals of less than two years. For these women, both the new baby and the older sibling are at increased risk of morbidity and mortality. The older sibling is twice as likely to die if the birth interval is less than two years than if the interval is between two and six years.²⁰ The new baby is also at increased risk of low birthweight and perinatal mortality.²¹

Objective: To improve awareness of the health and spacing reasons for family planning.

Recommendation: Implement an IE&C program on the benefits of adequate birth spacing.

8. Many women and their babies are at elevated risk of mortality and morbidity because they are at the extremes of the reproductive age span, at high parity, or have had previous stillbirths or abortions.

Objective: To encourage families to avoid high risk pregnancies.

Recommendation: Initiate special family planning counseling programs targeted at high risk groups.

9. There is a high rate of induced abortion, especially among younger, more educated women who seek to delay their first birth. The elevated risks of mortality and morbidity for women with induced abortions have been documented elsewhere.

Objective: To reduce the high rate of induced abortion.

Recommendation: IE&C campaigns to make young adults more aware of the risks associated with abortion should be implemented. These campaigns must be combined with increased availability of family planning services in order to prevent unwanted pregnancies and the consequences of abortion.

10. Although breast-feeding is nearly universal (98% of mothers in Abidjan breast-feed), women who are more highly educated have shorter breast-feeding durations than those with little or no education. Among those with a university education, 10% do not breast-feed at all. Women who do not breast-feed are at increased risk of becoming pregnant unless they begin use of contraception in the immediate postpartum period. As women become better educated, the level of contraception will have to increase to compensate for the probable associated reduction in the length of breast-feeding.

Objective: To prevent reductions in the length of breast-feeding and to promote the child-spacing benefits of breast-feeding.

Recommendation: Programs to inform women of the benefits of breast-feeding should be initiated in the MCH and maternity centers. Also, health workers need to tailor their advice in family planning to the special needs of breastfeeding women.

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APPENDIX A

Obstetric Surveillance Form (950)

Maternal Death Report

PATIENT IDENTIFICATION 1 Hospital or clinic name _____
 2 Patient's name _____ (1. Husband's name _____)
 family first maiden
 4 Patient's Address _____

STUDY IDENTIFICATION

5 Center name _____ and number

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 1-4
 6 Study number.

0	9	5	0
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 5-8
 7 Patient order number.

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 9-12

ADMISSION

8 Admission date

--	--

 /

--	--

 /

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 13-16
 day month year

9 Timing of admission: 1) before labor 2) during labor 3) after delivery 20

10 Emergency admission: 0) no 1) yes 21

REFERRAL

11 Referral status: 0) not referred 1) referred 22

12 Referred by: (00 = not referred) _____

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 23-26

13 Primary reason for referral: 0) not referred 1) prolonged labor/dystocia 2) abnormal presentation 3) hypertensive disorder 4) hemorrhage 8) other _____ 29

TRANSFER

14 Transfer status: 0) not transferred 1) transferred before delivery 2) transferred after delivery 30

15 Transferred to: (00 = not transferred) _____

--	--	--	--

 27-30

16 Primary reason for transfer: medical specify _____

--	--	--	--

 29-30
 institutional specify _____

--	--	--	--

 31-32

PATIENT CHARACTERISTICS

17 Patient's age (in completed years)

--	--

 33-34

18 Place of residence _____

--	--

 35-36

19 Last year of school completed _____

--	--

 37-38

20 Patient's employment: 0) housewife 1) self-employed 2) salaried 3) student 8) other, specify _____ 39

21 Marital status: 0) never married 1) currently married 2) consensual union 3) divorced/separated 4) widowed 40

OBSTETRIC HISTORY (not including this pregnancy)

22 Number of living children (males + females)

--	--

 41-42

23 Total live births

--	--

 43-44

24 Number of stillbirths (8 = 8 or more)

--	--

 45

25 Number of spontaneous abortions (8 = 8 or more)

--	--

 46

26 Number of induced abortions (8 = 8 or more)

--	--

 47

27 Total number of previous pregnancies

--	--

 48-49

28 Number of previous cesarean sections

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 50

29 Place/type of last delivery: 0) no previous delivery 1) home-vaginal 2) hospital/maternity center-vaginal 3) hospital/maternity center-cesarean 8) other, specify _____ 51

30 Outcome of last pregnancy: 0) not previously pregnant 1) live birth still living 2) live birth deceased 3) stillbirth 4) spontaneous abortion 5) induced abortion 8) other, specify _____ 52

31 Number of months between the end of the last pregnancy (delivery or termination) and the current hospitalization: (00 = not previously pregnant, 98 = 98 or more)

--	--

 53-54

32 Duration of breast-feeding of last live birth in months: (00 = did not breast-feed)

--	--

 55-56

33 Breast-feeding at time of conception: 0) no 1) yes 57

PREVIOUS CONTRACEPTIVE USE

34 Primary contraceptive used before this pregnancy: 0) none 1) pills 2) injectable 3) IUD 4) condom/diaphragm/spermicide 5) rhythm/withdrawal 8) other, specify _____ 58

35 Reason for not using contraception before this pregnancy: 0) not applicable (used a contraceptive) 1) desired pregnancy 2) no regular sexual relations 3) opposition of husband/family/religion 4) lack of knowledge 5) not available 6) too expensive 7) fear of side effects 8) other, specify _____ 59

36 Source of the contraceptive used: 0) did not use 1) not applicable (rhythm, withdrawal, etc.) 2) hospital/maternity center 3) MCH center/family planning clinic 4) private doctor 5) pharmacy/shop 6) community health agent 8) other, specify _____ 60

ANTENATAL DATA

37 Number of antenatal visits:

--	--

 61-62

38 Trimester of pregnancy at time of first visit: 0) no visits 1) first 2) second 3) third 63

39 Patient's height in centimeters: (999 = not measured)

--	--	--

 75-78

40 Estimated duration of this pregnancy at admission: (in completed weeks since the first day of the last menstrual cycle):

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 79-82
 1 80

LABOR AND DELIVERY

41 Delivery date

--	--

 /

--	--

 /

--	--

 14-18
 day month year

42 Type of labor: 0) no labor 1) spontaneous only 2) spontaneous, augmented (ARM, drugs or both) 3) induced-ARM 4) induced-drugs 5) induced-both 8) other, specify _____ 59

For multiple births, code information for the most difficult delivery in Items 43 and 44. Complete a Multiple Birth Record for each additional delivery.

43 Presentation: 1) vertex 2) brow/face 3) breech 4) transverse 5) compound 8) other, specify _____ 61

44 Type of delivery: 0) spontaneous-no intervention 1) outlet forceps 2) vacuum extractor 3) version 4) breech extraction 5) cesarean section 6) symphysiotomy 7) destructive procedure 8) other, specify _____ 62

45 Episiotomy: 0) no 1) yes 63

46 Duration of labor (in hours):

--	--

 64-65

47 Attendant at delivery: 0) none 1) traditional birth attendant 2) auxiliary 3) student nurse/midwife 4) nurse-midwife/midwife 5) medical student 6) general physician/resident 7) OB/GYN specialist 8) other, specify _____ 66

**FAMILY HEALTH INTERNATIONAL
PREGNANCY MONITORING RECORD
PART A — OBSTETRICS**

Complications

0 = no
1 = yes diagnosed before admission.
2 = yes, diagnosed after admission

deficiency anemia	<input type="checkbox"/>	27
sickle cell	<input type="checkbox"/>	28
malaria	<input type="checkbox"/>	29
bilharzia	<input type="checkbox"/>	30
diabetes	<input type="checkbox"/>	31
preeclampsia	<input type="checkbox"/>	32
eclampsia	<input type="checkbox"/>	33
other hypertension	<input type="checkbox"/>	34
prolonged labor	<input type="checkbox"/>	35
obstructed labor	<input type="checkbox"/>	36
fetal distress	<input type="checkbox"/>	37
meconium staining	<input type="checkbox"/>	38
cord prolapse	<input type="checkbox"/>	39
uterine rupture	<input type="checkbox"/>	40
placenta previa	<input type="checkbox"/>	41
placenta abruptio	<input type="checkbox"/>	42
antepartum hemorrhage	<input type="checkbox"/>	43
intrapartum hemorrhage	<input type="checkbox"/>	44
postpartum hemorrhage	<input type="checkbox"/>	45
retained products	<input type="checkbox"/>	46
hyper/hypotonic uterine contractions	<input type="checkbox"/>	47
premature rupture of membranes (>24 hours before delivery)	<input type="checkbox"/>	48
maternal trauma specify _____	<input type="checkbox"/>	49
other, specify _____	<input type="checkbox"/>	50

49 Anesthetic administered: 0) not necessary 1) necessary, not available 2) analgesic (systemic or inhalation) 3) local 4) paracervical/pudendal 5) spinal/epidural 6) general 7) combination, specify 8) other, specify _____ 50

50 Blood transfusion (cc given) (0000 = not necessary, 8888 = necessary, not available) 51-54

51 Oxytocics: 0) not necessary 1) necessary, not available 2) prophylactic 3) therapeutic 4) both prophylactic & therapeutic 55

FETAL OUTCOME
52 Sex of infant(s) number of males 56
number of females 57

For multiple births, code information for the most difficult delivery in Items 53, 54, 55 and 56. Complete a Multiple Birth Record for each additional delivery.

53 Birthweight (in grams) 58-62

54 Apgar score at 5 minutes (8 = 8 or more) 67

55. Fetal/neonatal condition (0 = no, 1 = yes)

neonatal sepsis, specify _____ 63

respiratory distress 64

malformation, specify _____ 65

trauma, specify _____ 66

other, specify _____ 67

56 Death of fetus/newborn: 0) no death 1) antepartum 2) intrapartum 3) postpartum 68

2 69

MATERNAL OUTCOME
57. Puerperal condition (0 = no, 1 = yes)

maternal death → (complete Maternal Death Report) 70

postpartum bleeding requiring treatment 71

fever requiring treatment 72

thromboembolic condition 73

other, specify _____ 74

58 Additional surgical procedures during this hospitalization: 0) none 1) IUD insertion 2) sterilization 3) hysterectomy 8) other, specify _____ 75

59 Date of discharge/Death day month year 76-78

FAMILY PLANNING
60 Number of additional children desired (7 = 7 or more, 8 = uncertain) 79

61 When next child desired: 0) desires no more children 1) within the next 12 months 2) 12-24 months 3) 25+ months 80

62 Contraceptive method planned at discharge: 0) none 1) pills 2) injectable 3) IUD 4) condom/diaphragm/spermicide 5) rhythm/withdrawal 6) female sterilization 7) postpartum abstinence 8) other, specify _____ 81

63 Reason for not planning to use a modern contraceptive: 0) plans to use 1) desires pregnancy 2) no regular sexual relations 3) opposition of husband/family/religion 4) lack of knowledge about contraception 5) not available 6) too expensive 7) fear of side effects 8) other, specify _____ 82

64 Source of planned contraceptive: 0) not planning to contracept 1) not applicable (rhythm, withdrawal, etc.) 2) hospital/maternity center 3) MCH center/family planning clinic 4) private doctor 5) pharmacy/shop 6) community health worker 7) not sure 8) other, specify _____ 83

65 Planned method provided before discharge: 0) no 1) yes 2) not applicable (rhythm, etc.) 84

66 When planning to begin to use contraceptive: 0) not planning to contracept 1) immediately 2) during postpartum period (40 days) 3) after postpartum period 85

67. Feeding plans during first month: 0) child died 1) breastmilk only 2) breastmilk and other milk 3) other milk only 8) other, specify _____ 86

SPECIAL STUDIES

68. _____ 87-88

69. _____ 89-90

70. _____ 91-92

Recorder's name _____ 93

143

MATERNAL MORTALITY REPORT

Fiche de Mortalite Maternelle

1. Nom de la patiente _____ age: _____

2. Date d'admission: _____
 jour mois annee

IDENTIFICATION DE L'ETUDE

3. Nom du centre _____ et numero _____

4. Numero de l'etude _____

5. No. (rang) de la patiente dans l'etude _____

DONNEES MEDICALES A L'ADMISSION

6. Tension arterielle: 999) pas mesuree
 Diastolique _____
 Systolique _____

7. Taux d'hemoglobine (gr/ml): _____ (99=pas fait)

8. Temperature (degrees Centigrade): _____

9. Oedeme: 0)aucun 1)localise 2)generalise

10.a) Poids (en kilograms): _____

b) Stature (en centimetres): _____

11. Duree de cette grossesse estimee a l'admission: _____

12. Lieu d'accouchement: 0)pas accouchee 1)hopital 2)maternite 3)domicile
8)autre,specifier _____

13. Date de la fin de cette grossesse:

88 88 88 = toujours enciente jour mois annee
 au moment du deces
99 99 99 = inconnu

14. Lieu du deces: 1)hopital 2)maternite 3)domicile
8)autre,specifier _____

15. Date du deces: _____
 jour mois annee

16.a) Moment du deces: 1)antepartum 2)intrapartum 3)postpartum

b) Temps ecolees entre admission et deces de la patiente:
_____ heures _____ jours

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COMPLICATIONS ET TRAITEMENTS

17. Enregistrer (par ordre d'importance) toutes les complications jusqu'au moment de la mort de la patiente, indiquer le traitement de chaque complication:

Complication	Traitement
1. _____	1. _____
2. _____	2. _____
3. _____	3. _____
4. _____	4. _____
5. _____	5. _____
6. _____	6. _____

DERNIERE ANESTHESIE ADMINISTREE

- 18. Anesthésie: 0)pas nécessaire 1)nécessaire, pas disponible 2)analgesie seulement 3)locale 4)regionale (blocage cervical, etc.) 5)generale 7)combinaison, specifier _____ 8)autre, specifier _____
- 19. Mode d'administration de l'anesthésie: 0)pas d'anesthésie 1)orale 2)intraveineuse 3)intramusculaire 4)inhalation 5)anesthésie endotracheale 8)autre, specifier _____
- 20. Complications associées à l'anesthésie: 0)aucunes 1)apnee 2)allergie 3)convulsion 4)choc 5)aspiration 7)combinaison, specifier _____ 8)autre, specifier _____
- 21. Responsable de l'anesthésie: 0)pas d'anesthésie 1)medecin anesthesiste 2)obstetricien 3)medecin generaliste 4)infirmier(e) anesthesiste 5)infirmier(e) 6)sage-femme 8)autre, specifier _____
- 22. Raison de l'anesthésie: 0)pas d'anesthésie 1)accouchement seulement 2)traitement des complications seulement 3)accouchement et traitement des complications 8)autre, specifier _____

ANTIBIOTIQUES ADMINISTRES

- 23. Antibiotiques: 0)pas nécessaire 1)nécessaire, pas disponible 2)prophylactiques 3)therapeutiques 4)prophylactiques et therapeutiques 8)autre, specifier _____

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TRANSFUSIONS

24. Transfusions (cc utilises) 0000=pas necessaire
8888=necessaire, pas disponible

	Blood	Other, specify
ante partum	_____	_____
intra partum	_____	_____
post partum	_____	_____

25. Complications associees a la transfusions: 0)aucunes
1)oui, specifier _____

PERSONNEL PRESENT AU MOMENT DU DECES

26. Responsable du service au moment du deces: 0)personne
1)sage-femme 2)infirmier(e) 3)medecin generaliste/resident
4)specialiste gyneco/obstetrician
8)autre, specifier _____

AUTOPSIE ET LABORATOIRE

27. Autopsie: 0)pas faite 1)faite par pathologiste 2)faite par autre
personnel, specifier _____

28. Diagnostique _____

29. Diagnostique histologique _____

30. Diagnostique bacteriologique _____

CAUSE(S) DU DECES

31. Le cause de ce deces etait: 1)obstetrique direct 2)obstetrique
indirect 3)medical 4)anesthesie 5)accidental
7)combinaison, specifier _____
8)autre, specifier _____

32. Cause principale du deces: _____

33. Cause secondaire du deces: _____

CIRCONSTANCES

34. Responsable au moment de l'admission:
0)personne, clarifier _____
1)specialiste gyneco/obstetrician 2)medecin generaliste/resident
3)infirmier 4)sage-femme
8)autre, specifier _____

1/65

35. Est-ce-qu'il y avait des materiels ou services defectifs et/ou manquants?: 0)non 1)oui,clarifier _____
36. Distance en kilometres du domicile de la patiente a ce centre: _____
37. Moyen de transport utilise emmener la patiente a ce centre:
 1)vehicule avec motor 2)animal/vehicule avec animal 3)patiente marchait au pieds 3)patiente etait emmenee par litiere
 7)combinaison,specifier _____
 8)autre,specifier _____
38. Refuse de la patiente ou famille de la patiente du traitement: 0)non 1)oui,clarifier _____
39. A votre avis, est-ce-que cette mort etait preventable?:
 0)non
 1)peutetre---> clarifier _____
 2)oui-----> _____
40. Evaluation de la preventabilite verifiee par:
 1)personnel present au moment du deces 2)comite des responsables de l'hopital 8)autre, specifier _____

NOTES/COMMENTS

APPENDIX B

Forms Status Lists

CHU Cocody and Seven Maternity Centers
CHU Treichville and Four Maternity Centers

Statistics on Deliveries

CHU Cocody
CHU Treichville

List of Ethnic Groups

Forms Status List/Cote d'Ivoire
CHU COCODY

	Deliveries Registered	Forms Received*	%
<u>Locodjoro 147</u>			
Oct	120	8	
Nov	117	12	
Dec	119	12	10
Jan	100	10	10
Feb	78	8	10
Mar	136	13	10
Apr	133	14	10
May	148	15	10
Jun	127	13	10
Jul	120	11	9
Aug	130	13	10
Sept	104	10	11
Oct	117	11	9
Nov	131	14	11
Dec	121	12	10
	<u>1801</u>	<u>176</u>	<u>10</u>

Abobodoume 148

Oct	76	4	5
Nov	54	5	10
Dec	52	5	10
Jan	79	8	10
Feb	62	6	10
Mar	76	7	9
Apr	98	10	10
May		11	
Jun		10	
Jul		11	
Aug		8	
Sept		7	
Oct		11	
Nov		10	
Dec		9	
		<u>122</u>	

* Deliveries

Forms Status List/Cote d'Ivoire
CHU COCODY

	Deliveries Registered	Forms Received*	%
<u>CHU Cocody 150</u>			
Oct	302	295	97
Nov	262	225	84
Dec	279	223	80
Jan	314	284	90
Feb	295	252	85
Mar	377	347	92
Apr	393	338	86
May	392	321	82
Jun	389	292	74
Jul	362	264	73
Aug	305	205	69
Sept	337	200	59
Oct	395	282	71
Nov	419	172	41
Dec	<u>372</u>	<u>170</u>	<u>46</u>
	5193	3870	75

Cocody Nord 155

Oct	84	7	-
Nov	190	17	9
Dec	154	15	10
Jan	175	18	10
Feb	177	17	10
Mar	344	23	7
Apr	273	27	10
May	238	22	9
Jun	256	29	11
Jul	270	24	9
Aug	111	21	19
Sept	180	19	10
Oct	186	17	9
Nov	182	20	11
Dec	<u>165</u>	<u>15</u>	<u>9</u>
	2985	291	

* Deliveries

Forms Status List/Cote d'Ivoire
CHU COCODY

	Deliveries Registered	Forms Received*	%
<u>Adjame 156</u>			
Oct	225	12	5
Nov	178	16	9
Dec	175	19	11
Jan	187	19	10
Feb	163	16	10
Mar	226	21	9
Apr	228	23	10
May	254	25	10
Jun	227	22	10
Jul	225	23	10
Aug	197	20	10
Sept	183	18	10
Oct	198	20	10
Nov	159	16	10
Dec	<u>219</u>	<u>22</u>	<u>10</u>
	3044	292	10

220 Logements 157

Oct	970	44	5
Nov	917	92	10
Dec	909	87	10
Jan	848	85	10
Feb	772	82	11
Mar	838	113	13
Apr	1199	121	10
May	1333	135	10
Jun	1244	125	10
Jul	1199	119	10
Aug	981	99	10
Sep	992	99	10
Oct		111	
Nov		116	
Dec		<u>115</u>	
		1543	

* Deliveries

Forms Status List/Cote d'Ivoire
CHU COCODY

	Deliveries Registered	Forms Received*	%
<u>Abobogare 158</u>			
Oct	1334	133	10
Nov	1293	123	10
Dec	1132	115	10
Jan	1183	119	10
Feb	1149	115	10
Mar	1518	152	10
Apr	1583	157	10
May	1717	168	10
Jun	1664	131	8
Jul	1633	162	10
Aug	1323	132	10
Sept	1315	132	10
Oct	1523	146	10
Nov	1312	129	10
Dec	<u>1463</u>	<u>139</u>	<u>9</u>
	21142	2052	10

<u>Yopougon 159</u>			
Oct	963	51	5
Nov	940	93	10
Dec	894	91	10
Jan	964	98	10
Feb	832	82	10
Mar	1093	109	10
Apr	1142	115	10
May	1281	128	10
Jun	1271	128	10
Jul	1115	117	10
Aug	1052	105	10
Sep	970	97	10
Oct	1143	114	10
Nov	1001	100	10
Dec	<u>1148</u>	<u>115</u>	<u>10</u>
	15809	1543	10

* Deliveries

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Forms Status List/Cote d'Ivoire
CHU TREICHVILLE

	Deliveries Registered	Forms Received*	%
<u>Treichville 151</u>			
Oct			
Nov			
Dec			
Jan			
Feb			
Mar			
** Apr	401	210	52
** May	442	280	63
** Jun	491	346	70
** Jul	389	301	77
** Aug	314	223	71
Sep			
Oct			
Nov			
Dec			

Port-Bouet 154

Oct	463	31	7
Nov	433	43	10
Dec	445	43	10
Jan	443	43	10
Feb	403	41	10
Mar	515	46	9
Apr	497	53	11
May	336	63	10
Jun	629	63	10
Jul	564	56	10
Aug	468	46	10
Sep	481	47	9
Oct	484	49	10
Nov	475	44	9
Dec	538	49	9
	<u>7174</u>	<u>717</u>	<u>10</u>

* Deliveries
 ** Supplementary forms obtained for these months were used here for deliveries registered.

Forms Status List/Cote d'Ivoire
CHU TREICHVILLE

	Deliveries Registered	Forms Received*	%
<u>Koumassi 152</u>			
Oct	789	40	5
Nov	743	72	10
Dec	759	74	10
Jan	723	71	10
Feb	700	70	10
Mar	881	89	10
Apr	1061	108	10
May	1071	106	10
Jun	1091	106	10
Jul	1004	98	10
Aug	855	87	10
Sep	853	85	10
Oct	971	96	10
Nov	976	96	10
Dec	<u>883</u>	<u>92</u>	<u>10</u>
	13360	1290	10

Marcory 153

Oct	349	16	5
Nov	386	39	10
Dec	346	35	10
Jan	395	37	9
Feb	370	32	9
Mar	450	41	9
Apr	480	44	9
May	490	44	9
Jun	603	46	8
Jul	460	42	9
Aug	420	38	9
Sept	431	39	9
Oct	452	41	9
Nov	430	38	9
Dec	<u>481</u>	<u>38</u>	<u>8</u>
	6543	570	9

* Deliveries

Forms Status List/Côte d'Ivoire
CHU TREICHVILLE

	Deliveries Registered	Forms Received*	%
<u>Libanaise 149</u>			
Oct	309	16	
Nov	246	24	10
Dec	246	27	11
Jan	309	20	6
Feb	254	18	7
Mar	300	33	11
Apr	376	24	6
May	442	27	6
Jun	419	17	4
Jul	381	20	5
Aug	306	20	7
Sep	341	18	5
Oct	344	20	6
Nov	339	25	7
Dec	<u>367</u>	<u>20</u>	<u>5</u>
	4979	329	7

* Deliveries

Statistics on Deliveries

CHI Cocody 150

Month	# Births Registered*	# Cesareans Recorded	(%)
O (1984)	302	74	(24)
N	262	78	(30)
D	279	82	(29)
J (1985)	314	73	(23)
F	295	72	(24)
M	377	92	(24)
A	393	120	(31)
M	392	117	(30)
J	389	104	(27)
J	362	104	(29)
A	305	96	(31)
S	337	107	(32)
O	395	112	(28)
N	419	122	(29)
D	<u>372</u>	<u>115</u>	<u>(31)</u>
	5193	1463	(28)

Month	# Forms Received (Deliveries)*	# Cesareans Recorded	(%)
O (1984)	295	71	(24)
N	225	66	(29)
D	223	65	(29)
J (1985)	283	60	(21)
F	252	56	(22)
M	347	78	(23)
A	338	91	(27)
M	322	89	(28)
J	292	68	(23)
J	264	71	(27)
A	205	55	(27)
S	200	51	(26)
O	282	49	(17)
N	172	25	(15)
D	<u>170</u>	<u>27</u>	<u>(16)</u>
	3870	922	(24)

*Includes postpartum admittances.

Statistics on Deliveries

CHI Treichville 151

Month	# Births*	# Cesareans Recorded	(%)
O (1984)			
N			
D			
J (1985)			
F			
M			
A	401	98	(24)
M	442	78	(18)
J	491	99	(20)
J	389	74	(19)
A	314	73	(23)
S			
O			
N			
D			
	<u>2037</u>	<u>422</u>	<u>(21)</u>

Month	# Forms Received (Deliveries)*	# Cesareans Recorded	(%)
O (1984)	256	22	(19)
N	299	40	(13)
D	260	43	(17)
J (1985)	219	35	(16)
F	202	42	(21)
M	233	31	(13)
A	210	39	(19)
M	280	37	(13)
J	346	55	(16)
J	301	45	(15)
A	223	48	(21)
S	184	28	(15)
O	181	29	(16)
N	135	23	(17)
D	50	16	(32)
	<u>3379</u>	<u>533</u>	<u>(16)</u>

*Includes postpartum admittances.

Ethnic Group Categories

(1) Baole
Agni
Attie
Abey
MBatto
Koulango

(2) Rete
Neo
Koyaka
Guere
Gouro
Godie
Dida

(3) Ebrie
Appolo
Adjoukrou
Abidji
Aboure
Alladain

(4) Senoufo
Dioula
Tagbana
Malinke

(5) Burkinabe
Mossi

(6) Togolese
Ghanian
Maliene
Guinean
Nigerienne
Niger
Other countries

APPENDIX C

Percentage of Women Admitted Postpartum, by Center
November 1984-October 1985

Center	Total no. of cases	(n)	%
150 CHU Cocody	3,233	(64)	2.0
147 Locodjoro	142	(6)	4.2
148 Abobodoume	99	(15)	15.2
155 Cocody Nord	249	(30)	12.1
156 Adjame	242	(50)	20.7
157 220 Logements	1,268	(275)	21.7
158 Abobogare	1,651	(740)	44.8
159 Yopougon	1,277	(289)	22.6
151 CHU Treichville	2,938	(72)	2.5
149 Libanaise	268	(28)	10.5
152 Koumassi	1,062	(176)	16.6
153 Marcory	478	(73)	15.3
154 Port-Bouet	<u>593</u>	<u>(77)</u>	<u>13.0</u>
All Centers	13,500	(1,895)	14.1

Table C.1 Selected Characteristics of Women Admitted Postpartum,
13 Participating Centers, Abidjan
November 1984-October 1985

(Percentage Distribution)

Characteristic	CHU Cocody	CHU Treichville	Cocody Maternity Centers	Treichville Maternity Centers
<u>Maternal age</u>				
<15	0.0	0.0	0.2	0.0
15-17	4.7	5.7	5.4	6.8
18-19	6.3	8.6	8.4	9.9
20-29	57.8	54.3	58.4	61.8
30-34	23.4	14.3	15.4	15.5
35-39	4.7	14.3	8.8	3.1
>40	3.2	2.9	3.2	2.9
Mean	26.6	26.7	26.0	25.1
<u>Education (years)</u>				
0	64.1	70.8	79.5	78.3
1-6	6.3	18.1	2.7	13.4
7-12	10.9	8.3	12.9	7.7
>13	18.8	2.8	4.8	0.6
Mean	2.9	2.1	1.2	1.4
<u>Marital status</u>				
never married	1.6	12.7	6.6	10.2
married or in union	96.9	84.5	93.3	88.7
divorced/separated/ widowed	1.6	2.8	0.1	1.2
<u>Height</u>				
<150 cm	0.0	1.4	3.2	4.1
>150 cm	100.0	98.6	96.8	95.9
<u>Ethnic group¹</u>				
1) Akans	14.1	18.2	21.8	12.2
2) Krou	20.3	7.6	15.2	8.1
3) Lagunaires	31.3	12.1	4.3	5.4
4) Malenke	7.8	9.1	19.0	8.4
5) Bourkinabe	12.5	18.2	13.6	28.7
6) Other non-Ivoirien	14.1	34.8	26.0	37.3
No. of cases	64	72	1,405	354

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Table C.2 Selected Obstetric History Characteristics of Women Admitted Postpartum, 13 Participating Centers, Abidjan November 1984-October 1985 (Percentage Distribution)

Characteristic	CHU Cocody	CHU Treichville	Cocody Maternity Centers	Treichville Maternity Centers
<u>Previous pregnancies</u>				
0	14.1	7.1	11.2	12.5
1-2	26.6	41.4	36.3	41.2
3-4	28.1	18.6	26.7	28.1
>5	31.3	32.9	25.8	18.2
Mean	3.5	3.4	3.1	2.7
<u>Previous deliveries</u>				
0	14.1	10.0	12.2	13.6
1+	85.9	90.0	87.8	86.4
Mean	3.2	3.2	2.9	2.7
<u>Previous live births</u>				
0	15.6	10.0	12.6	13.8
1+	84.4	90.0	87.4	86.2
Mean	3.1	3.1	2.8	2.5
<u>Previous induced abortion¹</u>				
0	92.7	90.8	98.3	97.4
1+	7.3	9.2	1.7	2.6
<u>Previous spontaneous abortion¹</u>				
0	80.0	92.3	88.9	91.9
1+	20.0	7.7	11.1	8.1
<u>Previous stillbirth²</u>				
0	92.7	96.8	93.3	90.2
1+	7.3	3.2	6.7	9.8
<u>Previous cesarean section²</u>				
0	89.1	85.7	99.2	99.0
1+	10.9	14.3	0.8	1.0
<u>Outcome of last pregnancy¹</u>				
Live birth-surviving	80.0	75.4	86.8	86.7
Live birth deceased	3.6	15.4	8.5	9.7
Stillbirth	5.5	1.5	1.3	1.0
Spontaneous abortion	9.1	6.2	2.9	1.6
Induced abortion	1.8	1.5	0.5	1.0
No. of cases	64	72	1,405	354

* Weighted.

¹ Excluding women with no previous pregnancies.

² Excluding women with no previous deliveries.

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APPENDIX D

**Estimated Number of Deliveries, Number of Personnel and
Number of Beds by Maternity Center***

	Estimated Deliveries N ^o .	Midwives N ^o .	Auxiliaries N ^o .	Beds N ^o .
<u>Cocody Maternity Centers</u>				
Abobodoume	840	7 ^a	12	20
Locodjoro	1,360	5 ^a	6	14
Adjame	1,920	14	10	48
220 Logements	9,930	17	11	35 ^b
Cocody Nord	2,190	16	8	30
Yopougon	9,880	16	30	36
Abobogare	9,110	14	13	37 ^c
<u>Treichville Maternity Centers</u>				
Libanaise	2,400	12	25	30
Marcory	4,050	13	10	34
Port-Bouet	5,160	13	10	49
Koumassi	8,860	13	19	32

*Excludes postpartum admissions.

^aThe midwives divide their time between the maternity center and the PMIs.

^bAnother 25 beds have been added to the maternity center since the study was completed.

^cThere are three private rooms and several wards.

Note: See Chapter II: "A Note on Estimated Number of Deliveries".

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