RAND

Prenatal and Obstetric Care in Los Angeles County, 1990-1992

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PREFACE

This report describes data collected as part of the Prenatal and OB Access Project. This project was designed by the Southern California Health Policy Research Consortium, which consists of the Los Angeles County Medical Association, the Hospital Council of Southern California, and RAND and is administered by the National Health Foundation. The report should be of interest to persons concerned with public health care financing and with health issues related to pregnant women in the United States.

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SUMMARY

In Los Angeles County in the late '80s, demand for public sector prenatal and delivery services far exceeded the availability of such services. To increase access to obstetric services and relieve the pressure on the county public health system, the Southern California Health Policy Research Consortium designed the Prenatal and OB Access Project, which enlists private health care providers to provide these services to Medicaid-eligible women. The consortium consists of the Los Angeles County Medical Association, the Hospital Council of Southern California, and RAND. The National Health Foundation administers the project.

INTERVENTION

The intervention has three components: outreach, hospital-based clinics, and network providers. Outreach is provided by multilingual staff who contact community organizations to obtain referrals, then screen the pregnant women for eligibility and risk and make appropriate referrals. The outreach staff also assist these women in accessing Medicaid. Outreach staff refer most women to the four private hospitals that elected to participate in the project—AMI/Tarzana, Bellflower Doctors, Queen of Angels/Hollywood Presbyterian, and Valley Presbyterian. These hospitals created clinics specifically to provide prenatal care to Medicaid-eligible women. Some women are referred, for reasons of convenience or because of high-risk medical status, to network providers, which include 10 community clinics, and 60 physicians in private offices. Women enrolled in hospital-based clinics are expected to deliver at the participating hospitals.

DATA

To evaluate the effect of the intervention, analyses will compare vital statistics data from a year before the intervention (1990) with those from the year during which the intervention is implemented (1992). This report describes the baseline data (1990) and the follow up data (1992). Vital statistics comprise California birth and fetal death

certificates. These include information on the social and demographic background of the mothers, their prior fertility histories, prenatal care (including the payor), complications of pregnancy, complications of labor and delivery, whether the delivery resulted in a live birth or fetal death, delivery payor, place of delivery, and zip code of residence. These records also contain information on infant health outcomes, such as birth injuries, congenital anomalies, and birthweight. Data will be examined for

- Each participating hospital, to describe its delivery population before the intervention.
- Each participating hospital's catchment area, to compare women delivering at the hospital with those who are candidates for the intervention. Changes over time will be compared.
- Two sister hospitals, matched in geography and patient population to each participating hospital. Changes in the sisters are then compared to changes at the participating hospitals.
- All of Los Angeles County, to determine whether the populations delivering at participating hospitals or the delivery populations from their catchment areas are representative of the county as a whole or differ measurably from the county's delivery population.

ANALYSES

This report describes results from four analyses of the 1990/1992 data:

- Description of spatial distribution of births in Los Angeles County and for each participating hospital in relation to its catchment area.
- Comparison of distribution of deliveries at the participating hospitals with each other and with the county as well as changes from 1990 to 1992.
- Comparison between participating hospitals and across the county of distribution of deliveries along various characteristics according to delivery payor.

- Comparison of women delivering at participating hospitals with those in their catchment areas who deliver elsewhere according to delivery payor and type of facility at which they deliver.

RESULTS

In 1990, there were over 200,000 deliveries in Los Angeles County; more than 99 percent resulted in a live birth. Three-quarters of the deliveries occurred in private hospitals; one-quarter in public hospitals. Private insurance paid for half the deliveries; Medicaid for 40 percent of them. Half of the deliveries in Los Angeles County were to white Hispanics and a quarter to white non-Hispanics.

Deliveries at three of the participating hospitals—AMI/Tarzana, Valley Presbyterian, and Bellflower—numbered about 2,000 at each facility during 1990. Queen of Angeles/Hollywood Presbyterian was larger, with approximately 6000 births. Deliveries at the two hospitals in the San Fernando Valley (the Valley)—AMI/Tarzana and Valley Presbyterian—were largely to white non-Hispanics; those at the other hospitals were largely to white Hispanics. In the Valley hospitals, private insurance paid for most deliveries, whereas at the other hospitals Medicaid paid for the majority. More than half the women at all the hospitals except Bellflower had ten or more prenatal visits, yet Bellflower had the most favorable birthweight distribution. This may be related to the fact that over 60 percent of the mothers at Bellflower were born in Mexico and foreign born Hispanic women have been documented as having more favorable outcomes in terms of birthweight.

About half the deliveries in the county are covered by private insurance and half by Medicaid. Of those covered by Medicaid, about half deliver at public facilities and about half at private facilities. White Hispanics covered by Medicaid are more likely to deliver at public facilities, other ethnicities at private facilities. Privately insured white Hispanics are more likely to deliver at private facilities; white non-Hispanics at public facilities. The uninsured show the same pattern as those with Medicaid.

Medicaid-insured and uninsured women who deliver in private facilities start prenatal care earlier and make more visits than those who deliver in public facilities. The reverse is true for the privately

insured: Those who deliver at private facilities start prenatal care later and make fewer visits than those who deliver in public facilities. The risk of low birthweight is highest for women covered by Medicaid who deliver at public facilities and lowest for uninsured women at public facilities.

Sister hospitals to the hospitals participating in the intervention were selected on the basis of their similarity to the participating hospital on a combination of key parameters such as maternal race, age, education, expected delivery payor, and infant birthweight. While prenatal care, pregnancy, and delivery were reviewed, they were given less weight because of the reporting bias known to be a problem with these variables.

It is important to keep the timing of the program implementation at the four hospitals in mind vis a vis the 1992 comparison data. Only Bellflower and Queen of Angles/Hollywood Presbyterian initiated the program in 1991. Valley Presbyterian initiated the program in early 1992, presumably early enough to produce detectable changes in 1992 data. AMI/Tarzana did not initiate a program until after the 1992 data frame. We include analysis for AMI/Tarzana to provide a sense of the natural variability in these measures in the absence of any program. This sense of non-programmatic temporal changes provide a useful comparison for the changes in the initiated programs.

Three hospitals, Bellflower, Queen of Angels, and Valley Presbyterian had early enough implementation of the programs to have an effect on the 1992 Vital Statistics data. There were some significant changes in Medicaid share and prenatal care in the intervention hospitals. However, when compared to the changes in catchment areas, sister hospitals, and hospitals who had not yet implemented the program it is impossible to conclude that the changes were the result of the programs. With the large variability in the outcome measures in the absence of a program, confirmation of the programs is not possible with the available data. However, the system does seem to be moving toward more private sector deliveries and services.

1. INTRODUCTION

This report is the second of two evaluating an intervention designed to improve access to private hospitals and physicians for Medicaid-eligible pregnant women delivering in Los Angeles County. The intervention is known as "the Prenatal and OB Access Project." The first report, "Prenatal and Obstetric Care in Los Angeles County, 1990" (RAND MR-182-NHF, 1993), described the strategy for the evaluation and provided baseline data for the first four of what will ultimately be eight intervention sites. The current report constitutes the evaluation of the entire project from its inception in August of 1991 to December of 1992.

The Prenatal and OB Access Project was developed by the Southern California Health Policy Research Consortium, which consists of the Los Angeles County Medical Association, the Hospital Council of Southern California, and RAND. The Project is administered by the National Health Foundation. RAND's role in the consortium is to assist in the evaluation component of the intervention. Throughout this report we will refer to the Prenatal and OB Access Project as the intervention.

The intervention initially grew out of an awareness that demand for prenatal and delivery services exceeded the availability of such services within the public sector. Statistics from the Los Angeles County Department of Health Services indicated a demand for 52,000 deliveries a year, but the capacity within the county health system is about 33,000 a year (Gray, 1991). The consistent correlation between inadequate prenatal care and poor pregnancy outcome underscores the importance of addressing this issue (IOM, 1985; U.S. DHHS, 1990). Statewide reforms in the health care delivery system, along with a gradual decline in the birthrate in Los Angeles County combined to decrease the demand for prenatal and delivery services during the latter half of the intervention. Consequently, the goals of the intervention were modified somewhat to reflect the changing health care environment. The original goal, and the one on which this evaluation is based, was to increase access to obstetric services in private hospitals for Medicaid-

eligible women, and thereby to reduce the pressure on the public county health care system. An additional focus during the second phase of the project, was to facilitate the early enrollment of women into prenatal care. Since the vital statistics records provide some information regarding prenatal care, this second goal will also be addressed in the report.

The intervention occurred from August 1991 through August 1993, consisting of three service delivery models utilized to provide prenatal and delivery services to Medicaid-eligible low-income women: (1) private clinics affiliated with a private sector intervention hospital; (2) previously established free-standing community clinics; and (3) private offices of physicians. The intervention also included a small staff of outreach workers who identify eligible women, make appropriate referrals, facilitate Medicaid applications and access to pediatric care for offspring of project women.

The evaluation is based on an extensive set of before-and-after comparisons of the four participating hospitals to (1) all of Los Angeles County, (2) women delivering who reside in the hospital's own catchment areas but deliver at nonparticipating hospitals, and (3) women delivering at other similar hospitals. The hospitals were chosen because they serve areas strongly affected by overcrowding in public facilities and because they agreed to participate in the intervention. With the facility as the unit of analysis, comparisons are made utilizing vital statistics data, which provide individual records for each delivery/birth and contain detailed information about the mother and child, including the place of delivery, expected payor, and the mother's residence, enabling aggregation by facility, geographic area, and payor. Each comparison is made according to the expected payor for the delivery so that it is possible to compare women who are likely to be Medicaid-eligible to those likely to be covered by other payors.

Because we wanted to describe access systemwide, we required data that covered all relevant deliveries—both those in the intervention sites and those in relevant comparison groups. We chose to use vital statistics data for three reasons: (1) The data provide complete coverage for all relevant comparison groups, including women who are

potential candidates for recruitment into the intervention; (2) they include information on both the woman's zip code of residence and the location of her delivery, enabling us to construct catchment areas; and (3) they contain considerable information on the demographic characteristics, prenatal care, expected delivery payor, and pregnancy outcomes of the patients, enabling us to assess the risk status of the study population, measure the prenatal care received, and observe the outcome.

Section 2 of this report describes the intervention and presents a few illustrative statistics from participating hospitals in the early phases of the first year of the intervention. Section 3 presents the goals of the evaluation. Section 4 describes the data and methods that we have used to establish the before and after characteristics of the participating hospitals and relevant comparison groups; it also describes the strategy for the evaluation. Analyses of the baseline data begin in Section 5, which has five subsections. The first subsection describes the locations of the four hospitals that participated in the intervention in its first year and the spatial distribution of deliveries in Los Angeles County in 1990. The second compares deliveries at the four intervention sites to those in all of Los Angeles County along a number of characteristics. It addresses issues concerning the generalizability of information at the participating hospitals to deliveries countywide. The third subsection examines differences by expected delivery payor both countywide and at each of the participating hospitals. These statistics allow us to address questions concerning differences in maternal characteristics, prenatal care, and delivery outcomes for mothers with different types of coverage. Another subsection compares women delivering at each participating hospital to women who live in the hospital's catchment area but deliver elsewhere as well as changes between 1990 and 1992. These comparisons are made more specific by examining differences according to expected delivery payor and type of facility where the woman delivers. The target population for the intervention is Medicaid-eligible pregnant women. The last subsection describes a set of comparison hospitals selected as controls for the evaluation and

compares changes in the intervention hospitals to changes in the controls. Section 6 discusses conclusions and implications for the evaluation.

2. DESCRIPTION OF THE INTERVENTION

The principal goal of the intervention was to improve the access of low-income women to prenatal care by expanding the number of private facilities providing prenatal and delivery services to the Medicaid-eligible population. A second goal was to facilitate the enrollment of women into prenatal care. Three components were used to accomplish these goals: outreach, hospital-based clinics, and network providers (i.e., clinics and physicians receiving referrals from the four intervention hospitals).

OUTREACH

The outreach component of the program is designed to draw into the intervention pregnant women who might not otherwise access early prenatal care. A small core of multiethnic, multilingual staff have implemented an outreach model consisting of three activities: networking, identification/processing, and assistance. A variety of neighboring public and private community organizations were identified and informed of the intervention at least 30 days before the projected start-up date at each hospital-based clinic site. These organizations provided client referrals and served as resources for services not available through the intervention. Once clients were identified, outreach workers screened each to determine eligibility and risk status, and offered appropriate referrals. The outreach workers also assisted clients with the Medicaid application process.

HOSPITAL-BASED CLINICS

The Los Angeles County Medical Association and the Hospital Council of Southern California encouraged private hospitals in the county to participate in the intervention. During phase one of the Project, four hospitals agreed to participate in the intervention: Tarzana Regional Medical Center, Bellflower Doctors Hospital, Queen of Angels/Hollywood Presbyterian, and Valley Presbyterian. All but one of the participating facilities had Medicaid contracts with Los Angeles County before

participation in the intervention. Tarzana Regional Medical Center obtained one prior to the intervention.

As part of the intervention, each participating facility created a hospital-sponsored clinic to provide prenatal care to the women enrolled with the expectation that the women will deliver at the affiliated hospital. This section describes the characteristics of these hospital-based clinics as of August 1994 and the women enrolled in prenatal care at each. The affiliated hospitals are the focus of all subsequent data analyses.

The goal of these clinics is to provide early and continued care throughout the pregnancy for the women enrolled by the outreach workers. The clinics usually are staffed by a combination of physicians specializing in obstetric and gynecological (Ob/Gyn) care, nurse practitioners, outreach workers, eligibility workers who provide assistance with Medicaid applications to potential patients, and other health care professionals. Table 1 provides information about the sites as of August 1994. Each is briefly described below.

The Tarzana Regional Medical Center is located in Tarzana (18321 Clark St., Tarzana), a suburban area of Los Angeles in the west San Fernando Valley. (Map 2 in Section 3 shows the locations of the four intervention hospitals.) Physicians provide services to intervention clients on a rotating basis.

Bellflower Doctors is located in the city of Bellflower (9342 E. Artesia Ave., Bellflower), south of downtown Los Angeles and north of Long Beach. The clinic is designated as a Comprehensive Prenatal Services Provider (CPSP) by the state of California. An obstetric nurse practitioner provides most of the services to intervention clients with physicians providing consultation and high risk care. The staff are multilingual.

Queen of Angels/Hollywood Presbyterian is located just west of downtown Los Angeles (1300 N. Vermont Ave., Los Angeles). The clinic is managed and administered by the affiliated hospital. Physicians staff the clinic on a rotating basis.

Table 1

Characteristics of the Intervention at Each Site, August 1994

Characteristic	Tarzana Reg'nl Med. Ctr.*	Bellflower	Q of A/ Hlywd Presb.[c]	Valley Presb.
Date of inception	March 1992	August 1991	September 1991	February 1992
Days of operation	M-F (M & W half-day only)	M-F	M-F	M-F
Number and type of providers	4 Ob/Gyn 1 Ob/Nurse practitioner	2 Ob/Gyn 2 family practitioner 2 Ob/nurse practitioner 1 licensed vocational nurse 1 medical assistant	8 Ob/Gyn 2 medical assistants	6 Ob/Gyn 1 Ob/nurse practitioner (phase 1) 1 medical assistant
Institutional policy changes	Hospital became MediCal provider	Hospital Administrator chaged 3 times during the project Marketing coordinator hired by hospital	Aggressive marketing campaign undertaken by hospital in 9/92 Expand Ob/Gyn from 4 to 8	NHF outreach Expand Ob/Gyn from 1-6 Change in ownership and location of clinic Began to accept high-risk patients
Projected deliveries	75-80/month	98-100/month	1000/month	100/month
Actual deliveries (6/94)	30-35/month	62/month	650/month	53/month
Ancillary services	CPSP Diabetic support classes Childbirth classes EOS[a]	CPSP Patient education materials Childbirth classes Pre-hospital admission EOS[a]	Childbirth classes Pre-hospital admission EOS[a]	Childbirth classes (fee) Pre-hospital admission

SOURCE: National Health Foundation.

*Name change from AMI/Tarzana represents a change in ownership during the intervention.

[a]Eligibility on Site (DPSS eligibility worker available at the clinic/hospital to accept and process MediCal applications).

[b]Transitioned to self-supporting status 5/1/93. A second site was opened in 12/93. Data represents initial site, while still participating in Project (i.e., prior to transition to self-supporting).

[c]Transitioned to self-supporting status 5/15/92. Data represents activity while participating in Project.

Valley Presbyterian is located in Van Nuys (15107 Vanowen St., Van Nuys), a suburban area of Los Angeles in the eastern end of the San Fernando Valley. It is near Tarzana Regional Medical Center. The clinic's physicians greatly expanded their activities during the course of the intervention serving intervention clients on a rotating basis replacing the services of full-time nurse practitioner. At the outset of the intervention, the clinic accepted only low risk patients. Consequently, about 50% of the intervention clients identified by outreach workers in this hospital catchment area in 1992 received their prenatal care from other providers in the referral network. Eligibility was extended to high risk patients during the latter half of the project with the incorporation of case management into their services through a Comprehensive Perinatal Outreach Program (CPOP). This allowed the clinic site to serve virtually all of the identified clients.

Table 2 shows the percentage distribution of patients enrolled in the intervention as of August 1994, according to age, race and ethnicity, and education. Each site is enrolling between 20 and 90 women per month. These figures represent women enrolling in prenatal care and not their deliveries. At present, the rate of loss to follow-up is unknown. Therefore these women may not be representative of women enrolled in the intervention who subsequently deliver at the hospitals.

At each hospital, the vast majority of women enrolled are in the prime child-bearing ages (20 to 34). At all sites over half of enrollees are white Hispanics. The educational attainment of enrollees is rather low, with over 30% having completed their education to the tenth grade level or lower at five of the eight sites. It is especially low at Queen of Angels, where over 45 percent have completed their educations only as far as the tenth grade. More than half of all enrollees were unmarried at the time of their participation in the intervention.

In Section 4, we will show the distribution of all deliveries at each hospital according to the expected delivery payor and will compare women delivering at the participating hospitals to women living in their catchment areas but delivering at other types of facilities. In general, we find that the women enrolling in the intervention resemble women currently delivering in the intervention hospitals that already have substantial Medicaid deliveries. They also resemble Medicaid deliveries in the participating hospitals' catchment areas (see Section 4).

Table 2

Demographic Characteristics of Clinic Patients Enrolled as of August 1994 (Percentages)

Characteristic	Tarzana Reg'nl Med. Ctr.	Bellflower	Q of A/ Hlywd Presb.[c]	Valley Presb.[d]
Number enrolled	718	1181	631	1790
Number enrolled per month	34	56	70	60
Age (8/94)				
missing	<1	<1	<1	<1
12-19	20	26	25	22
20-24	35	34	31	32
25-29	25	23	26	26
30-34	14	11	11	14
35-39	5	5	5	5
>40	<1	<1	2	2
Race/Ethn, (4/92)				
White, NH	21	16	7	17
Afric. Amer.	5	9	10	6
Hispanic	65	67	79	69
Asian	3	3	3	2
Other	6	5	1	6
Education				
missing	2	7	2	4
0-10 years	43	31	47	35
10-12 years	38	42	37	44
>12 years	17	20	14	17
Marital status				
missing	1	4	<1	3
single	53	59	65	51
married	40	30	31	41
divorced	2	1	<1	1
widowed	<1	<1	0	<1
separated	4	5	3	4

SOURCE: National Health Foundation.

NETWORK PROVIDERS

Although the majority of intervention patients receive prenatal care in the hospital-based clinics, some have been referred to health care providers within the networks established by the outreach workers.

Referrals to providers in the network may occur for a variety of reasons, including patient convenience (when no hospital-based clinic is near their residence) or medical high-risk status (as in the case of

Valley Presbyterian at the outset of the intervention). By the time the second phase of the Project was implemented, the network consists of 10 community clinics, 28 private clinics, and 60 physicians in private office settings. The clinics generally provide on-site ancillary services not available in private offices (e.g., social services, counseling, CPSP services).

Our analysis does not include explicit information on these clinics. To determine whether the intervention is moving Medicaid-eligible women from public to private hospitals, we needed to study systemwide characteristics, namely the change in percantage of Medi-Cal deliveries in each of the Project hospitals. Thus, we chose to use the vital statistics as our primary database because they cover all deliveries in a particular geographic area and provide information on both the mother's place of residence and her delivery location. However, the network providers are part of the hospital-based part of the intervention because given the expectation that some of their patients are expected to deliver at the intervention sites. Therefore, we should be able to identify the effects of the providers on the system by examining changes in the distribution of Medicaid deliveries from public to private hospitals.

3. GOALS OF THE EVALUATION

The evaluation consists of two parts: (1) establishing baseline information for participating hospitals and (2) measuring changes between the baseline year and the intervention. The first report (MR-182-1993, RAND) documents only the baseline data collected in the first phase of the study from the four hospitals that agreed to participate in the first year of the intervention: Tarzana Regional Medical Center, Bellflower Doctors, Queen of Angels/ Hollywood Presbyterian, and Valley Presbyterian. These data are repeated here to make this second report free-standing.

The principal goal of the intervention was to expand the number of private providers and facilities providing prenatal and delivery services to the Medicaid-eligible population. This goal remains unchanged for the purposes of evaluation despite the fact that the urgent need for offloading the Los Angeles County public health system resolved contemporaneous with the start of the intervention. A secondary goal of the intervention was to facilitate the early enrollment of women into prenatal care.

Since the intervention is designed to change the system by expanding access, the measurement of changes needs to take place at the system level. The study design is specifically oriented toward examining changes in the system for the catchment area of each hospital. In determining whether the hospitals are accepting more Medicaid deliveries, the evaluation examines a range of characteristics of women delivering at participating hospitals, their prenatal care, and their infant's health at birth. This design facilitates not only the necessary comparisons of patient profiles before and after the intervention, but enables particular focus on onset of prenatal care, thus addressing both project goals. In addition to this before-and-after comparison, we have developed four comparison groups to better control for events that may be simultaneously taking place systemwide:

1. All of Los Angeles County. Examining data for all deliveries in the county will allow us to determine whether the deliveries in participating hospitals and deliveries from their catchment areas are typical of the county or represent relatively unique subgroups. It will also allow us to examine countywide changes that have occurred over time.
2. Detailed baseline data for each site. These provide a detailed description of the maternity population for each site in the year before the intervention. Comparisons to the same data for the year during which the intervention took place will allow us to observe changes in a hospital's delivery population; thus, each site will become its own comparison.
3. Deliveries in each participating hospital's catchment area. Comparing data on all women who live in a hospital's catchment area to those who deliver at the hospital by expected delivery payor and type of facility for delivery allows us to examine the population of women who may be candidates to participate in the intervention. In consideration of the aforementioned goals, we are particularly interested in describing the Medicaid-eligible women who live in the intervention hospital's catchment area but who deliver in public facilities, with special emphasis on their prenatal care utilization.
4. Deliveries at neighboring hospitals. For each intervention hospital, we have chosen two sister hospitals that are geographically proximate and have relatively similar patient populations. This comparison group will enable us to control for systemwide changes that are unrelated to the intervention but occurring simultaneously.[1]

Data analysis will address the following questions:

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[1]At the outset of the project, all intervention hospitals were participating in the Department of Health Services Contract Referral Program. The sister hospitals were selected among neighboring hospitals that most closely resemble the intervention hospitals across a wide variety of dimensions. As a consequence, not all sister hospitals were participating in this referral system.

- Did the number and share of Medicaid deliveries, as compared to non-Medicaid deliveries, increase at participating hospitals during the intervention?
- How did the outcomes of women who delivered at participating hospitals compare to outcomes of women from the same neighborhoods who delivered at other facilities. Here we are especially interested in comparing Medicaid deliveries at the intervention hospitals to those in public hospitals. Did this relationship change during the intervention? Outcomes we intend to measure include delivery outcomes such as complications, and infant health outcomes such as birthweight. Additionally, we will focus here on utilization of prenatal care, including both timing of initiation and number of visits.
- Were the participating hospitals able to attract Medicaid-eligible women from their catchment areas? (We will measure this by examining whether the number or share of Medicaid women residing in the catchment area who delivered at the participating hospital, as opposed to a public facility, increased during the intervention.)

4. DATA AND METHODS

DATA

Because of the difficulties and potential biases inherent in identifying pregnant and potentially pregnant women in the targeted areas and establishing appropriate comparison samples, the evaluation of the intervention relies on vital statistics information. These are individual computerized live birth and fetal death certificates.

The California birth and fetal death certificates contain unusually detailed information on mothers and their infants. This information includes the social and demographic background of mothers, their prior fertility histories, prenatal care (including the payor), complications of pregnancy, complications of labor and delivery, whether the delivery resulted in a live birth or fetal death, delivery payor, place of delivery, and zip code of residence. The data also include information on a number of infant health outcomes such as birth injuries, congenital anomalies, and birthweight.

Using information on place of delivery and zip code of residence, we can define a catchment area for each intervention hospital. This, in turn, enables us to make a number of important comparisons. We can observe directly where the women residing in a specified area deliver, according to their payor status, and examine the ensuing health outcomes for the mother and the child. For example, we can compare women who deliver at participating hospitals with their neighbors who do not, both before and during the intervention. This information addresses the most fundamental questions concerning the efficacy of the intervention.

The vital statistics data are well suited to this sort of analysis because they provide complete coverage of the population of women delivering in a geographically defined area such as the catchment area of an intervention hospital. Because they cover the population, they do not suffer from selection bias or sampling error as do surveys. For example, they include all women who deliver, even those who do not seek prenatal care or who deliver at home. They include women regardless of insurance status. The tradeoff in using the birth and fetal death

certificates, as opposed to primary data collection such as a survey, lies in the detail of specific information that is collected. For example, we will not have information on women's knowledge of available alternative medical care facilities or their attitudes toward prenatal care or the Medicaid system.

In addition to the comparisons to catchment areas, we have also defined a set of sister hospitals to use for comparison purposes. These are hospitals in the same or neighboring Health Service Areas that have characteristics similar to the intervention hospitals. We discuss catchment areas and sister hospitals in greater detail below.

METHODS

General Approach

The goal of the evaluation will be to determine whether the intervention was successful in shifting Medicaid deliveries from public to private facilities in the catchment areas of the four participating hospitals. Because there are likely to be a number of concurrent changes affecting maternity and obstetric care in Los Angeles County, we have constructed an extensive set of comparisons.

The baseline data presented here include maps showing the distribution of births throughout Los Angeles County, the location of the intervention hospitals, and their catchment areas. They also include detailed information for all deliveries in Los Angeles by type of payor and type of facility and detailed comparisons between births occurring in a participating hospital and those occurring in the hospital's catchment area, and among intervention hospitals and their sister hospitals. In these baseline analyses, we are particularly interested in examining relationships between delivery payor and facility type and (1) the characteristics of the women who deliver at the facilities and (2) maternal and infant health outcomes.

To evaluate the intervention, we repeated these analyses using a second set of vital statistics records that cover the period of the intervention (roughly, calendar year 1992). These analyses facilitate before-and-after comparisons.

Description of the Catchment Areas and Sister Hospitals

In any evaluation it is important to have a control group to compare with the study group, in this case the intervention hospitals. Without a comparison group, it would be impossible to distinguish between changes resulting from the intervention and system wide changes unrelated to the intervention. We have selected two comparison groups: catchment areas and sister hospitals.

Catchment areas are useful for capturing the characteristics of other potential patients in the intervention hospitals' service areas. More specifically, they enable us to control for differences or changes in patient characteristics and behavior. By collecting statistics on all the births in an area served by an intervention hospital (whether the intervention hospital delivers the births or not), we can monitor changes in the underlying demographics of the hospital's community. We can also guard against possibly misleading selection biases. For example, if, for one reason or another, an intervention hospital attracted healthier, more motivated patients, this hospital might appear to have better outcomes because it has attracted those patients most likely to have good outcomes. By examining the relationships between the intervention hospital's patient characteristics and the overall catchment area's patient characteristics, we can monitor these kinds of patient shifts.

We used two guidelines to construct our catchment areas for the intervention hospitals. First, a hospital had to deliver at least 10 live births from a particular zip code in 1990 for that zip code to be included in the hospital's catchment area. This is a statistical necessity; it is impossible to have any confidence that fewer than 10 births tell us anything about where the residents of a zip code prefer to go for delivery. Second, the hospital must have delivered at least 5 percent of the births in the zip code. This ensures that a zip code is included in a hospital's catchment area only if the hospital has a significant market share in that zip code. We made an exception in the latter case for Bellflower. There are many hospitals in the area where Bellflower is located, and there are almost no zip codes where Bellflower delivered 5 percent of the births. We used a cutoff of

1 percent to ensure a catchment area that contained enough births for reliable comparison.

Sister hospitals (similar institutions paired with the intervention hospitals) are useful in controlling for temporal institutional changes during the study period. For example, if all hospitals of a particular type are affected by a policy change in the health service area that is not related to the intervention, a closely matched sister hospital would provide us with a comparison and might enable us to measure the effects of the intervention despite the system wide changes. For each intervention hospital, we selected two sister hospitals with similar organizational characteristics and patient demographics. We discuss these hospitals in greater detail below.

For both sister hospitals and catchment areas we will compare changes over time to changes at the intervention hospitals. This will contrast changes that may be due to the intervention to changes that are due to natural variability over time. We will focus on three primary variables that are most strongly related to the intervention. Source of payor will help us track changes in Medicare share. Month prenatal care began and number of prenatal visits will be used to track improvements in quality of care.

5. ANALYSIS

This section discusses the results of our analysis of the vital statistics data for the baseline period (calendar year 1990) and the followup period (calendar 1992). This analysis has four stages. Each stage builds on the previous one to develop a complete picture of the prenatal and obstetric care provided to women in Los Angeles County, the intervention hospitals, their catchment areas, and the sister hospitals.

First, we examine the spatial aspects of the distribution of births in Los Angeles County, describe the location of the intervention sites, and show the spatial distribution of births for each site in relation to its catchment area.

Second, we compare the distribution of deliveries at the four intervention sites to each other and to all deliveries in Los Angeles County. The purpose of this analysis is to understand the ways in which the sites are typical or atypical of the county as a whole and how they compare to one another. We then examine how the distribution of deliveries changed form 1990 to 1992.

Third, we look within Los Angeles County and within sites at the distribution of women along various characteristics according to their delivery payor. Our purpose here is to compare Medicaid-insured women to those who are privately insured and those who are uninsured, both countywide and within sites.

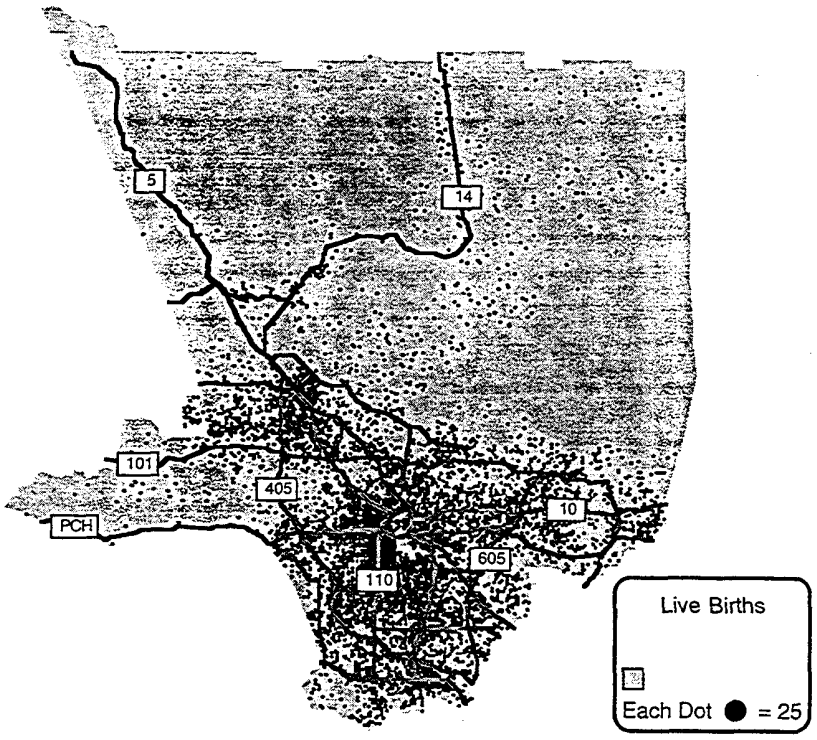
Fourth, we compare women delivering at each site to those in their catchment areas, according to the expected delivery payor and the type of facility where they deliver. These statistics are also calculated for the county as a whole. Our purpose in this analysis is to understand how women delivering at the intervention hospitals differ from those living in the same neighborhoods and delivering at different types of facilities and with different types of insurance coverage. We are particularly interested in those women who are covered by Medicaid but who deliver at public facilities, because we expect them to be similar to the women targeted for the outreach component of the

intervention. We then examine how these statistics changed from 1990 to 1992.

MAPS OF LOS ANGELES COUNTY, INTERVENTION HOSPITALS, CATCHMENT AREAS, AND SISTER HOSPITALS

In 1990, there were over 600,000 deliveries in California. Nearly all deliveries (over 99 percent) resulted in a live birth. Nearly a third of California's deliveries occurred in Los Angeles County. Because we are interested in hospital-level results, and because fetal deaths are extremely rare, this study focuses only on the live births.

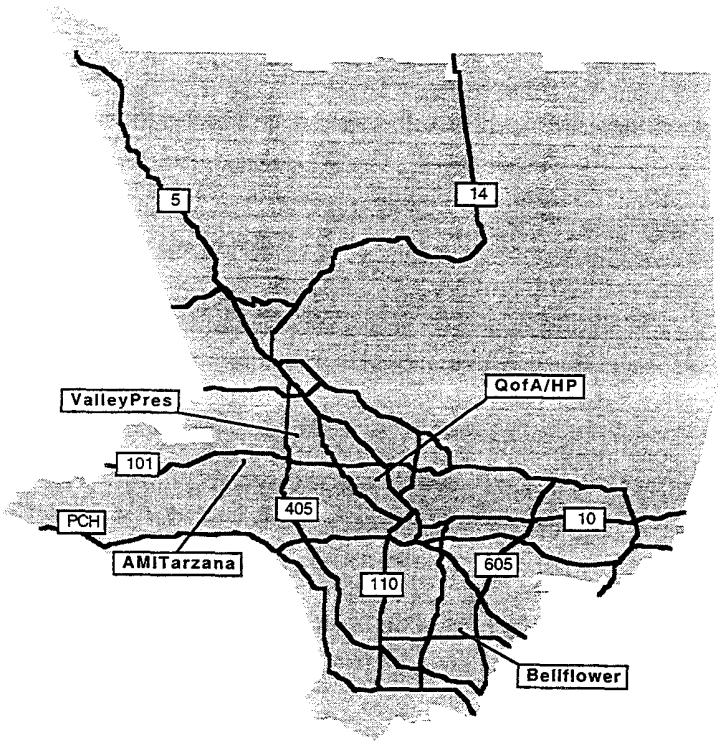
Map 1 shows the distribution of live births for all of Los Angeles County. We have distributed births to the zip code of each mother's residence, based on information supplied by birth certificates. However, the vital statistics data do not give the exact location of each mother's residence within the zip code, and so we have randomly located the births within zip code.



Map 1—Los Angeles County, All Live Births, 1990

Major freeways are shown to give an idea of the geographic concentration of births relative to well-known landmarks. The concentration of births mirrors the population density of the county, with the heaviest concentration near the center of the City of Los Angeles, a substantial concentration in the San Fernando Valley, and a much sparser distribution in outlying areas of the county.

Map 2 shows the location of participating hospitals. Descriptive information on the patients delivering at each hospital is provided in the following section. Two hospitals, AMI/Tarzana and Valley Presbyterian, are located in the east San Fernando Valley. They are similar in size: in 1990, AMI/Tarzana had 2,042 live-birth deliveries and Valley Presbyterian had 1,983. These two sites are proximate to one another and share patient populations. Queen of Angels/Hollywood Presbyterian is by far the largest hospital with 6,057 live births (6,088 total deliveries) in 1990. It is located west of downtown Los



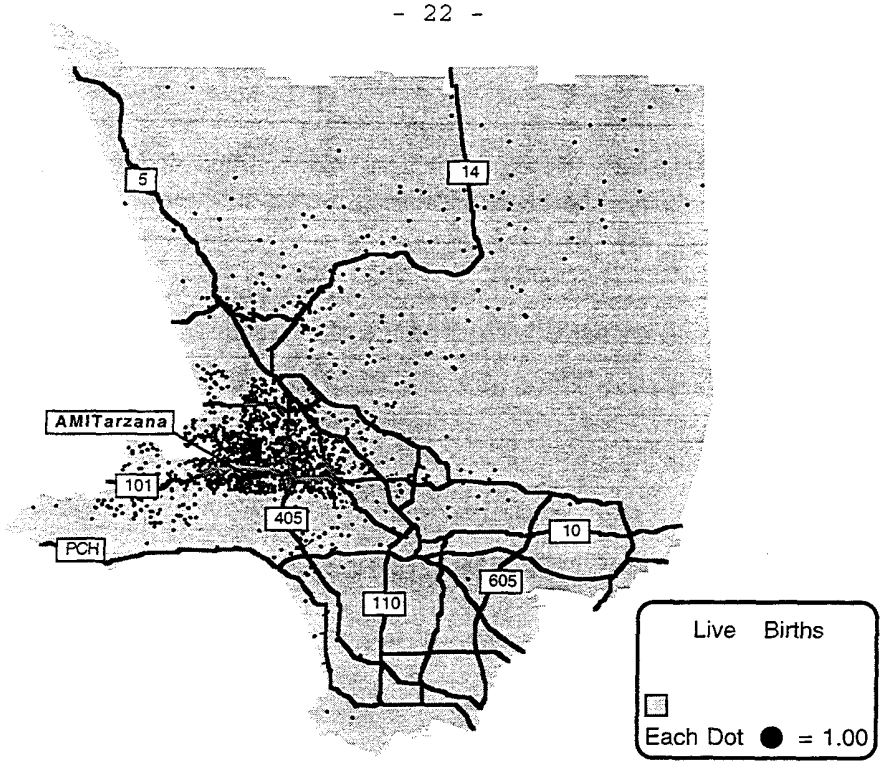
Map 2—Location of Intervention Hospitals

Angeles. Bellflower, located in the municipality that shares its name, is situated in an area with many other facilities southeast of downtown Los Angeles.

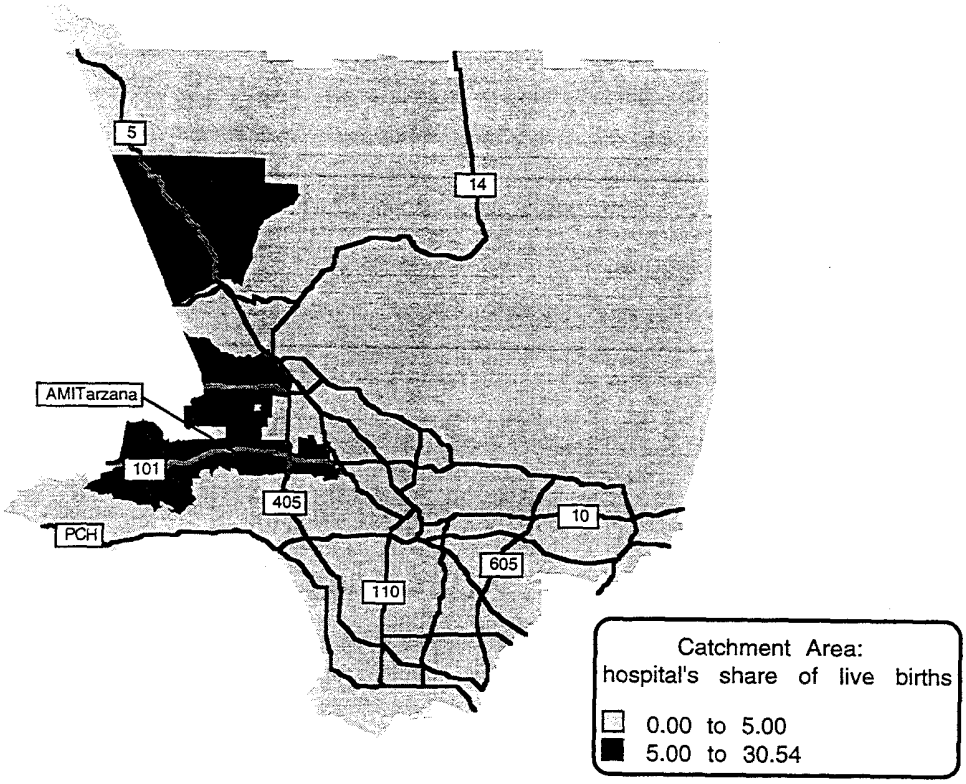
The next set of eight maps shows the distribution of births by mother's residence for each participating hospital. The first of the two maps (A) in each set shows the distribution of all births for a hospital, with each birth represented by a single dot (births have been aggregated by zip code and are randomly located within each zip code area). The second map (B) shows the catchment area for the hospital. The catchment area is the set of zip codes where the hospital delivered at least ten live births and, with the exception of Bellflower, accounted for at least 5 percent of the deliveries in that zip code.

AMI/Tarzana's births (Map 3.A) are concentrated in the West Valley zip codes that surround the Ventura Freeway west of Interstate 405. A scattering of births can be found throughout the far northern zip codes of the county and in Santa Monica and West Los Angeles. Map 3.B shows the catchment area of this hospital. As is apparent, our definition of catchment area does not yield a completely contiguous set of zip codes, but it does result in a roughly contiguous area. As discussed above, we have chosen this definition because we believe that it accurately depicts the primary areas from which a hospital's deliveries were coming in the year before the intervention.

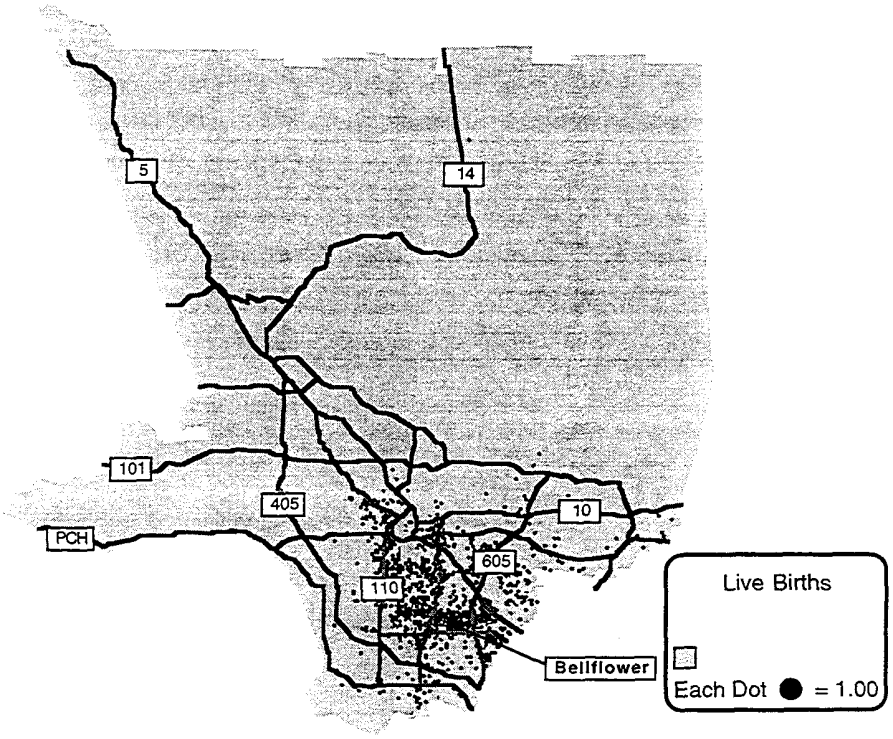
Bellflower's births are concentrated around the Long Beach Freeway, and the 91, in an area roughly bounded by the Harbor and San Gabriel (605) Freeways on the east and west (Map 4.A). Because there are so many facilities competing for patients in this area, none has a large share of all deliveries in a given zip code. Therefore, we considered a zip code to be included in the Bellflower catchment area if Bellflower had ten or more deliveries in that zip code or accounted for at least 1 percent of the deliveries in the Bellflower zip code (Map 4.B).



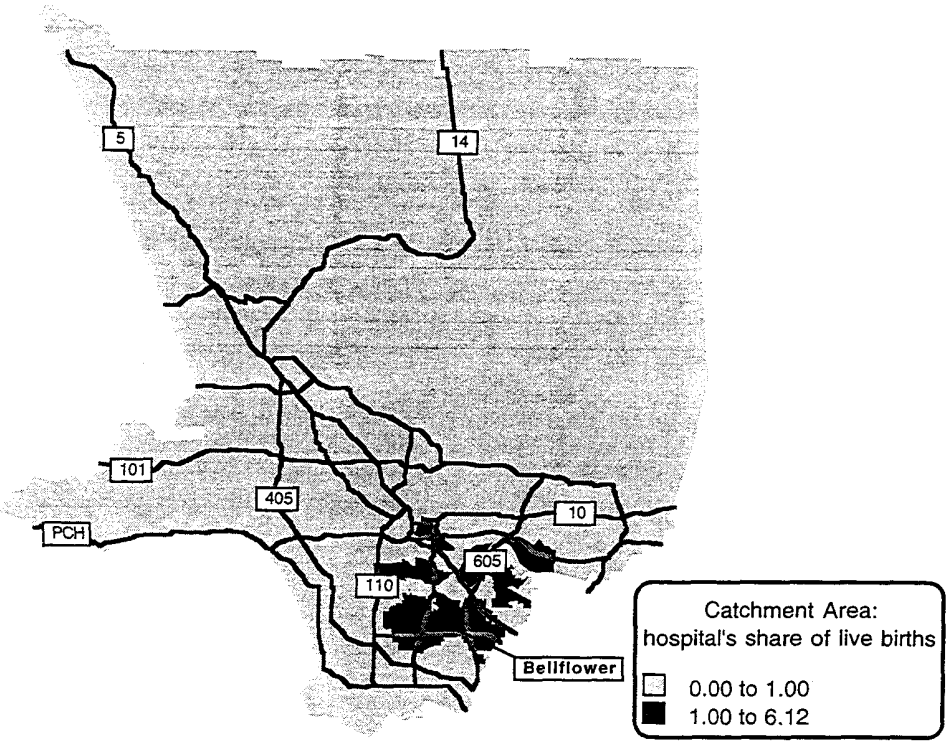
Map 3.A—AMI Tarzana, All Live Births, 1990



Map 3.B—AMI Tarzana, Catchment Area, 1990



Map 4.A—Bellflower, All Live Births, 1990



Map 4.B—Bellflower, Catchment Area, 1990

As noted above, Queen of Angels/Hollywood Presbyterian is by far the largest hospital among those participating in the intervention (Map 5.A). Its deliveries are concentrated in the Hollywood area, west of downtown Los Angeles, with a substantial share of its deliveries coming from neighborhoods along the Harbor Freeway and north of Artesia Boulevard. The catchment area we have defined for it most nearly represents a set of contiguous zip codes, concentrated in an area between the Harbor and San Diego freeways south of the Ventura Freeway (Map 5.B).

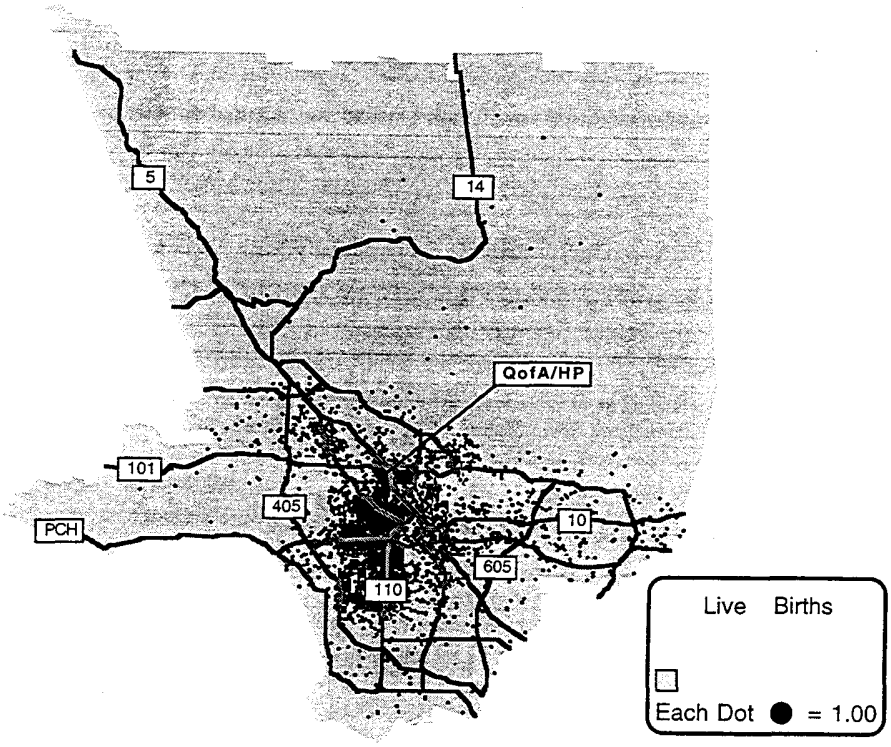
Like AMI/Tarzana, Valley Presbyterian is located in the San Fernando Valley (Map 6.A). Its deliveries come from an area just northeast of those of AMI/Tarzana, roughly bounded by the San Fernando and Simi Valley Freeways on the north and south and by I-5 on the east. AMI/Tarzana and Valley Presbyterian share a number of zip codes in their catchment areas (Map 6.B). In fact, a large portion of the catchment area for Valley Presbyterian falls inside that of AMI/Tarzana, because the latter's deliveries are more geographically dispersed.

DESCRIPTIVE STATISTICS FOR LOS ANGELES COUNTY AND THE FOUR INTERVENTION SITES

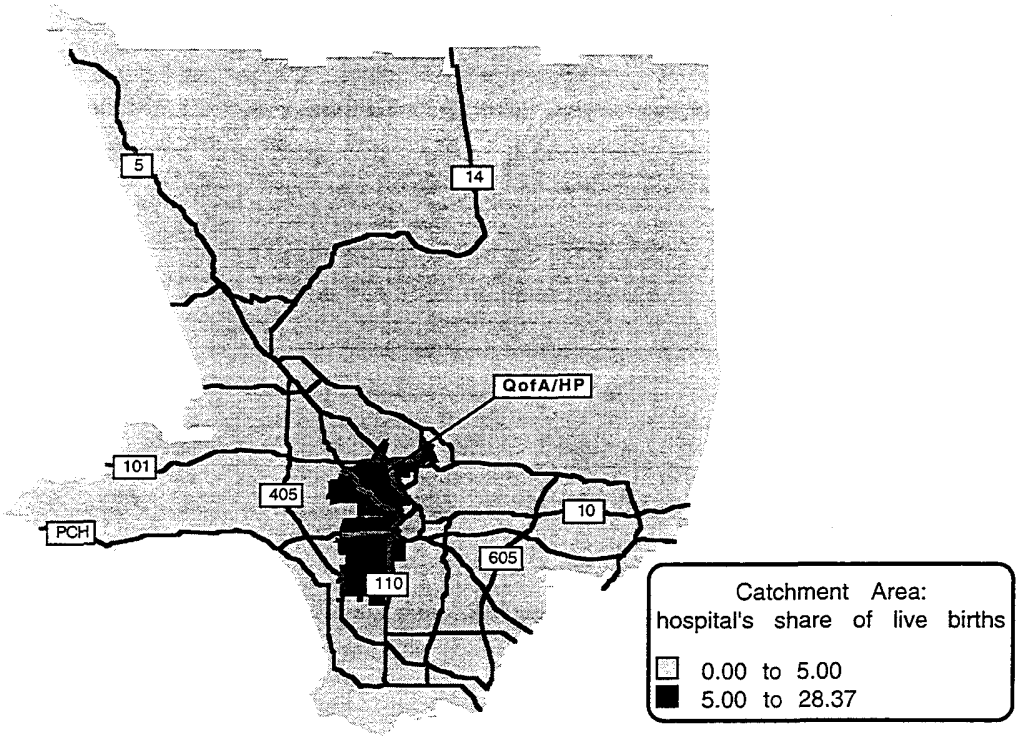
Tables 3 through 8 compare a number of variables pertaining to the characteristics of the facilities and the mothers delivering in Los Angeles County and at each participating hospital. Except for the number of live births and fetal deaths, all of the figures in the tables are percentages. All percentages refer to cases with complete data.[1] Each table is discussed in detail below.

Table 3 presents the characteristics of the intervention hospitals in comparison to all those in Los Angeles County. In both 1990 and 1992, there were over 200,000 deliveries in the county. The vast majority were live births. Consequently, only data for live births have been examined. Less than 1 percent of live births occurred outside of hospitals. Over three-quarters took place in a private facility, and over half in a private nonprofit facility. Two of the intervention

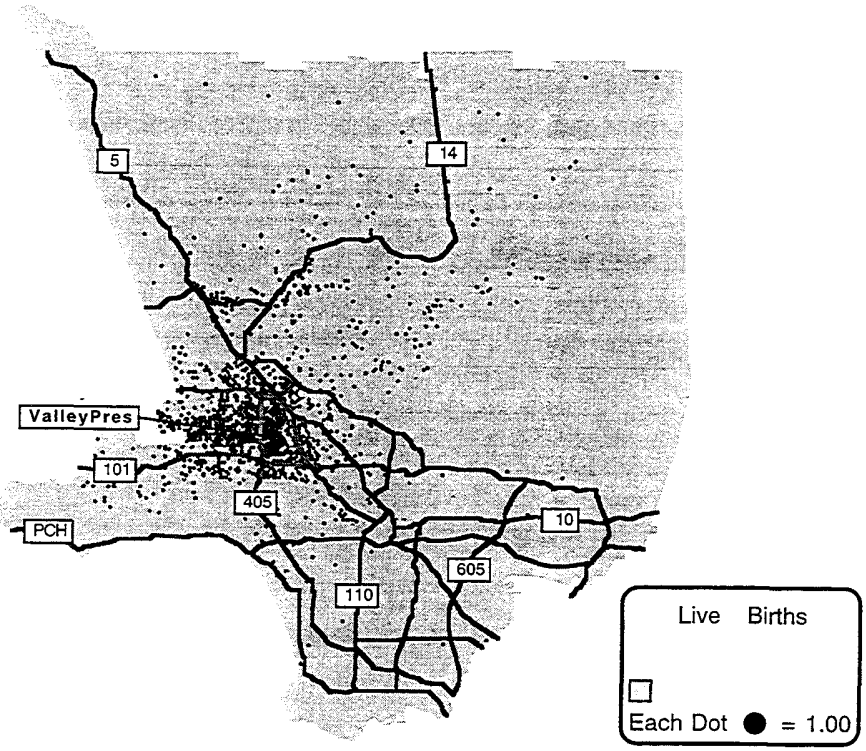
[1]In general, the vital statistics data are very complete, particularly for deliveries that take place in hospitals. Therefore, we have omitted the few cases with missing data from our calculations.



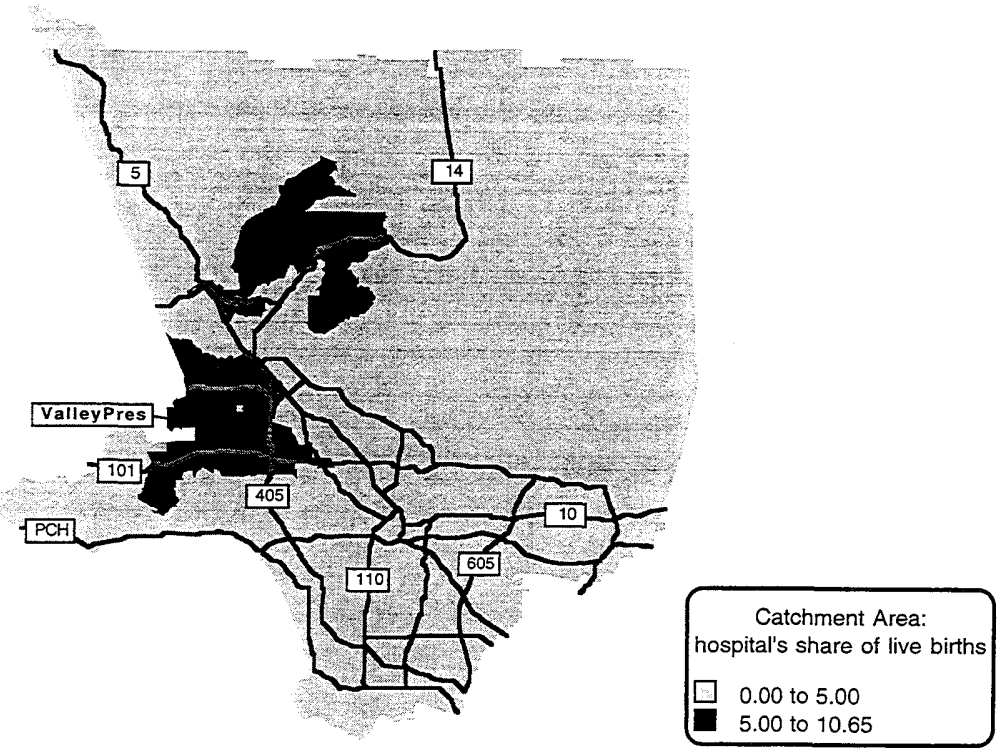
Map 5.A—Queen of Angels/Hollywood Presbyterian, All Live Births, 1990



Map 5.B—Queen of Angels/Hollywood Presbyterian, Catchment Area, 1990



Map 6.A—Valley Presbyterian, All Live Births, 1990



Map 6.B—Valley Presbyterian, Catchment Area, 1990

Table 3

Characteristics of Deliveries in Los Angeles County and at Participating Hospitals, 1990/1992

Variable	LA County		AMI/Tarz.		Bellflower		Q. of Angels/Hlywd Presb.		Valley Presb.	
	'90	'92	'90	'92	'90	'92	'90	'92	'90	'92
Number of live births	208484	201722	2042	1942	1217	1217	6057	7850	1983	2371
Number of fetal deaths	1480	1316	11	6	11	5	31	42	8	16
Hospital Owners										
Nonhospital	.4	.4								
Public	24.4	18.3								
Private, nonprofit	57.0	62.0					X	X	X	X
Private, proprietary	18.1	16.3	X	X	X	X				
Unknown	.1									

hospitals are private proprietary and two are private nonprofit. Thus, from the point of view of ownership, the hospitals in our study are typical of the places where the majority of deliveries are taking place in Los Angeles County. The eight hospitals in our study account for about 6 percent of all county births. In the statistics presented subsequently, we combine all deliveries in private facilities (nonprofit and proprietary).

Table 4 presents the demographic characteristics of women delivering in each hospital in 1990 and 1992 and compares them to characteristics of all women delivering in Los Angeles County in 1990 and 1992. In the discussion that follows, we review the distribution of women according to a number of social and demographic characteristics. These are characteristics that have been found to be important indicators of women's health care needs and delivery outcomes (IOM, 1985). Each woman's race and ethnicity has been classified into five groups based on her self report: white non-Hispanic, white Hispanic, African American, Asian, and other. We consider only white Hispanics because there are so few Hispanics of other races in Los Angeles County. In addition, we have found in other ongoing research that the mortality of non-white Hispanics resembles that of the relevant non-white group more than it resembles that of white Hispanics. The mother's race and

ethnicity are important risk factors for low birthweight and infant mortality. African American mothers are less likely to receive adequate prenatal care (U.S. DHHS, 1990), and the infant mortality rate of African Americans is over twice that of whites (IOM, 1985). White Hispanic mothers have a risk of low birthweight that is similar to that of white non-Hispanics, despite low socioeconomic status and poor prenatal care. Asian mothers tend to be relatively advantaged from a socioeconomic point of view but have not been studied as extensively as African Americans and Hispanics.

As Table 4 shows, the intervention hospitals have racial distributions that are different both from Los Angeles County and from one another, reflecting the characteristics of the maternity populations in their catchment areas. The difference in racial distribution between Valley Presbyterian and AMI/Tarzana is especially striking, given the proximity of the two hospitals and their partially overlapping catchment areas.

Table 4

Background Characteristics of Mothers, 1990/1992

Variable	LA County		Bellflower		Q. of Angels/Hlywd Presb.		Valley Presb.	
	'90	'92	'90	'92	'90	'92	'90	'92
Mother's race								
White, non-Hispanic	26.0	23.1	9.2	11.3	13.3	11.0	58.7	41.9
White, Hispanic	54.7	57.9	81.3	76.0	56.6	71.7	25.7	46.0
African American	10.6	9.9	2.3	5.4	17.8	9.5	4.3	4.4
Asian	8.0	14.6	6.6		12.1	7.7	10.7	7.3
Other	0.7	.5	0.7	1.7	0.2	.2	0.6	.4
Mother's birth								
United States	44.6	41.6	18.9	26.5	26.6	15.2	62.8	47.2
Mexico	33.1	35.4	62.0	56.3	27.5	35.0	11.8	25.6
Other foreign	22.3	23.0	19.1	17.3	46.0	49.8	25.4	27.2
Mother's age								
10-19	11.9	12.0	16.3	16.5	16.8	16.2	6.0	9.5
20-34	77.2	76.0	78.6	77.7	75.6	76.1	79.2	75.6
Over 34	10.9	12.0	4.1	5.8	7.6	7.7	14.8	14.9
Mother's education								
Less than high school	41.6	43.4	63.5	53.3	48.6	64.8	18.4	34.6
High school	28.0	26.7	25.0	30.1	30.5	21.7	26.1	21.5
Some college	16.8	16.2	7.2	12.4	10.6	9.5	28.8	23.9
BA or more	13.5	13.7	4.4	4.3	10.3	4.0	26.7	20.1

NOTE: Percentages are computed for complete records only.

[a]Too few observations to estimate.

Mother's birthplace is an important variable because foreign-born women may have different health care needs and experience different outcomes from native-born women. For example, foreign-born Hispanic and African American women have more favorable outcomes than their counterparts born in this country (Kleinman et al., 1991). As the table shows, over half of the women delivering in Los Angeles County are foreign born. The majority of these were born in Mexico, although a substantial share were born in other countries. The large share of white Hispanic women giving birth in the county leads us to believe that many of the other foreign born are natives of Central and South America (although this information is not available on the birth certificate). The distribution of place of birth in the hospitals closely follows the race and ethnic distribution at each as might be expected: Hospitals with the largest share of white Hispanic women giving birth have the highest share of mothers born in Mexico.

Maternal age at delivery is a risk factor affecting the probability of a poor outcome: Both the youngest and the oldest mothers have a higher risk of poor outcomes, measured by low birthweight and infant mortality. In addition, both the youngest and the oldest mothers are less likely to seek prenatal care. The age distribution at the hospitals is quite different. AMI/Tarzana and Valley Presbyterian have a relatively large share of older mothers, whereas Bellflower and Queen of Angeles/Hollywood Presbyterian have younger mothers.

Maternal education reflects both a woman's likely income and her ability to follow instructions given to her by a health care practitioner. Likewise, the distribution of educational attainment of women delivering at each hospital reflects the social and economic status of the people living in their communities. We will explicitly compare them to their communities in a later section. The women at AMI/Tarzana have by far the highest educational attainment of any of the intervention hospitals, with over 40 percent of the women who delivered having completed college. Bellflower has the lowest level of educational attainment, with over half of the women delivering at that hospital having completed less than high school. It is interesting to note that the relatively low level of educational attainment at

Bellflower is not simply a reflection of a relatively young age distribution: Only 16 percent of mothers were under age 20.

Table 5 presents information on the women's fertility history, the gestation length of the current pregnancy, and any complications of pregnancy noted on the birth certificate. Primiparity or high parity, an unusually long or short gestation, and complications of pregnancy are factors that can prognosticate a poor pregnancy outcome.

Length of gestation is calculated from the woman's report of her date of last menses. It is believed that there is considerable inaccuracy in these reports, but they do appear to reflect the approximate length of the pregnancy. Similarly, the number of pregnancies is also the woman's own report. It is possible that some non-live terminations are not reported, but this is believed to be a relatively accurate reflection of the woman's current parity. Finally, complications of pregnancy are reported by the obstetrician using information from the woman's medical record.[2] Differences between hospitals in the frequency with which complications are reported may reflect the emphasis placed on this activity in the different obstetric services as well as the propensity of different physicians to report complications. Thus, different complication rates may not accurately reflect differences in patient severity of illness, level of prenatal care, or quality of care. Despite considerable interhospital variability in reporting, we have examined differences in the reported complication rates so that we can compare baseline rates to those found during the intervention.

The parity distribution of women across hospitals reflects both differences in the age distribution of women delivering at the hospitals and the pace at which these women have borne children. The tables suggest that the hospitals with an older age distribution are delivering older primiparas, although we have not examined this directly.

The distribution of length of gestation also varies somewhat among hospitals, although there is less variability along this dimension than along some of the others examined so far.

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[2]The obstetrician completes a form that includes up to 30 complications of pregnancy and 31 complications of labor and delivery.

Table 5

Mother's Fertility History and Complications of Pregnancy, 1990/1992

Variable	LA County		AMI/Tarz.		Bellflower		Q. of Angels/Hlywd Presb.		Valley Presb.	
	'90	'92	'90	'92	'90	'92	'90	'92	'90	'92
Total no. of pregnancies										
1	39.2	38.6	45.4	46.5	43.0	46.3	45.6	44.1	40.1	42.1
2-4	54.6	54.9	52.6	51.8	52.2	47.6	50.7	51.7	56.6	34.3
Over 4	6.2	6.5	2.0	1.6	4.8	6.1	3.8	4.2	3.3	3.6
Length of gestation[b]										
Preterm	17.1	17.3	16.1	17.4	10.0	10.7	15.6	16.9	17.5	17.6
Term	57.0	58.2	64.6	65.6	72.9	63.9	57.8	57.8	57.8	56.7
Postterm	23.3	22.4	18.0	16.2	16.9	24.3	24.4	23.5	22.8	22.8
Invalid	2.4	1.9	1.0	.3	0.2	.9	2.1	1.6	1.7	2.9
No. of complications										
None	57.6	44.9	90.7	5.36	92.5	24.1	98.9	48.9	9.4	9.4
One	28.7	35.8	6.9	87.9	6.9	63.1	1.0	43.1	35.2	43.0
Two or more	13.8	19.2	2.3	6.8	0.6	12.8	0.0	7.9	55.4	47.7

[a]Pregnancies terminating after 20 weeks require the filing of a birth or fetal death certificate and are believed to be reported more accurately than pregnancies of shorter durations.

[b]Preterm pregnancies were defined as those greater than 20 weeks and less than 38 weeks. Term pregnancies were defined as those greater than 38 weeks and less than 41 weeks. Postterm pregnancies were defined as those greater than 41 weeks and less than 45 weeks. Reported lengths of gestation less than 20 weeks or greater than 45 weeks were considered invalid.

As expected, there is considerable variability in the reporting of complications of pregnancy among hospitals. These differences are extremely difficult to interpret because the extent of reporting variability is unknown. For example, the data for Valley Presbyterian reflect an extreme outlier and suggest different reporting practices at that hospital. As noted above, we believe that the interhospital differences primarily represent reporting differences. Early and continued prenatal care has been shown to be an extremely cost-effective way of preventing adverse pregnancy outcomes (IOM, 1985). Table 6 presents differences in prenatal care in terms of the trimester when care was initiated, the number of visits, and the payor for all of Los Angeles County and for each of the four intervention sites. In all cases, nearly all women reported that they began care in the first trimester. Nevertheless, there are some important variations among hospitals. With regard to visits, by 1992 more than half the women in

Table 6

Prenatal Care, 1990/1992

Variable	LA County		AMI/Tarz.		Bellflower		Q. of Angels/Hlywd Presb.		Valley Presb.	
	'90	'92	'90	'92	'90	'92	'90	'92	'90	'92
Months prenatal care										
No care	1.7	1.25	0.0	.1	0.0	.1	0.2	.3	0.7	.8
1st trimester	70.6	73.8	92.6	90.6	72.3	73.6	63.8	72.3	85.5	84.3
2nd trimester	22.7	20.6	6.1	6.9	22.8	22.8	30.9	24.7	11.2	12.9
3rd trimester	4.4	3.5	1.0	2.0	4.6	3.5	4.8	2.7	1.8	1.5
No. of prenatal										
None	1.8	1.27	0.0	.1	0.0	.1	0.2	.3	0.7	.8
1-6 visits	17.2	13.5	4.5	4.6	21.6	9.9	18.3	11.1	7.0	8.5
7-9 visits	20.5	19.3	15.6	7.4	31.2	14.2	18.6	29.0	11.8	15.0
10-12 visits	33.8	38.8	45.3	28.3	31.1	31.7	42.4	43.5	41.5	38.2
13 or more visits	26.6	27.3	34.6	59.7	16.1	44.1	20.5	16.1	39.0	37.5
Prenatal Care source										
Medicaid[a]	29.7	47.5	0.4	7.2	80.8	86.2	74.9	90.0	68.1	38.1
Private insurance[b]	48.7	43.9	88.3	90.0	15.2	9.2	18.2	6.1	15.9	52.4
No insurance[c]	19.6	14.4	10.9	2.8	4.0	4.4	6.9	3.6	15.2	8.7
Unknown[d]	1.7	1.4	0.4	.1	0.0	.2	0.0	.3	0.8	.8

[a]Medicaid includes Medicare, Title V, Medicaid CPS. The purpose in defining this group of women is to approximate women who might be eligible for enrollment in the intervention. We included a small group of women not actually covered by Medicaid to avoid creating a miscellaneous category and because they resembled the Medicaid group on other dimensions more than they resembled the private insurance group.

[b]Private Insurance includes Blue Cross, other private insurers, HMOs, worker's compensation, and other government and other nongovernment insurers. We included a small group of women not actually covered by private insurance to avoid creating a miscellaneous category and because they resembled the privately insured group on other dimensions more than they resembled the Medicaid group along other dimensions.

[c]No insurance includes self-pay, no charge, and medically indigent. We combined these women into a single uninsured category because we were unsure about the accuracy of classification into subcategories. For example, we did not k now how many women who responded that they would pay for the delivery would actually be able to do so.

[d]Unknown includes those with no care.

every hospital reported ten or more visits, meeting or exceeding current American College of Obstetrics and Gynecology (ACOG) standards for a term pregnancy.

Countywide, nearly a third of women report Medicaid as the source of payment for prenatal care in 1990 (see the notes to Table 6 for an exact definition of this category). This increased to nearly half by 1992 The facilities in the intervention show considerable variability in this regard: Almost no women at AMI/Tarzana reported that their prenatal care was funded by Medicaid, whereas over three-quarters of those delivering at Bellflower and Queen of Angels/Hollywood

Presbyterian reported Medicaid as the payor for their prenatal care. Private insurance is correspondingly more important at AMI/Tarzana than at the other sites. We examine the use of prenatal care according to the expected delivery payor in more detail in the following section.

Complications of labor and delivery can indicate an undesirable pregnancy outcome for the mother and the infant. Table 7 describes characteristics of the delivery and source of payment at the county level and for the eight intervention hospitals. Complications of labor and delivery are reported by the obstetrician, and as was the case in complications of pregnancy, the accuracy of the data is uncertain. In addition, the form for reporting such complications was changed with the 1989 revision of the birth certificate, and the implications of these changes for data accuracy are unknown. Nonetheless, we expect that complications of labor and delivery are more accurately reported than complications of pregnancy, since the obstetrician has access to the woman's medical record for the delivery and may not have access to records for prenatal care. Differences between hospitals are difficult to interpret as with complications of pregnancy.

Table 7

Characteristics of the Delivery and Delivery Payment Method

Variable	LA County		AMI/Tarz.		Bellflower		Q. of Angels/Hlywd Presb.		Valley Presb.	
	'90	'92	'90	'92	'90	'92	'90	'92	'90	'92
No. of complictions										
None	33.9	29.8	0.6	75.7	14.3	24.1	68.9	47.0	5.0	4.5
One	42.3	42.6	75.3	18.3	53.8	63.1	29.7	39.1	49.4	52.9
Two or more	23.8	27.6	24.1	6.0	31.9	12.8	1.4	13.9	45.6	42.6
Delivery method										
Vaginal	76.7	76.7	61.4	60.4	76.8	77.6	72.6	70.8	57.2	64.6
C-section	23.3	23.3	38.6	39.6	23.2	22.4	27.4	29.2	42.8	35.4
Delivery source[a]										
Medicaid	43.8	51.6	0.2	7.1	81.2	86.4	75.0	70.3	16.0	38.2
Private insurance	49.4	44.1	89.0	90.1	14.5	9.1	18.1	6.1	68.3	52.5
No insurance	5.8	3.8	10.7	2.8	3.9	4.4	6.9	3.6	15.7	9.2
Unknown	1.0	.2	0.0	0	0.4	0	0.0	.1	0.0	.1

[a]See previous table.
[b]Too few observations to estimate.

Differing cesarean section rates are generally taken to reflect different policies for the use of that procedure. However, there is ambiguity in some of these outcome measures because of differing hospital policies and data-collection standards. In addition, different hospitals may have patients with differing preferences, or the patients may have different health histories that dictate different interventions. Nearly a quarter of deliveries in Los Angeles County are by cesarean section. Rates at Bellflower and Hollywood Presbyterian are similar to these countywide rates, whereas rates at Valley Presbyterian and AMI/Tarzana are much higher.

Finally, the expected source of payment for delivery is both an important descriptor of the women delivering at a hospital and an important predictor of the likely reimbursement a hospital may receive.[3] The expected source of payment is reported by the woman to the birth certificate clerk. Source of payment varies widely among the eight hospitals.

Table 8 presents information on the infant's health at birth. Male infants are at higher risk of death than female infants. Similarly, multiple births represent a much higher risk. Birthweight is the most important and most accurately measured indicator of child health at birth (IOM, 1985). Congenital anomalies are another important indicator of child health. We found little variation in the sex distribution of births across hospitals or in the proportion of multiple births, although the rate of multiple births is slightly higher in the two valley hospitals. The birthweight distribution does vary considerably. Bellflower has the most favorable birthweight distribution, although the women delivering at this hospital have the lowest educational attainment of all participating hospitals. Their favorable birthweight distribution may be accounted for by the fact that a high proportion are white Hispanics and a large share of these women were born in Mexico or

[3]We do not know the accuracy of women's answers regarding their insurance status. We suspect that some women will expect to be covered by Medicaid or other insurance but that they will not be eligible or their claims will be denied. Assessing the accuracy of these reports would require linking birth certificates to paid claims and is beyond the scope of the present study.

Table 8

Infant's Characteristics, 1990/1992

Variable	LA County		AMI/Tarz.		Bellflower		Q. of Angels/Hlywd Presb.		Valley Presb.	
	'90	'92	'90	'92	'90	'92	'90	'92	'90	'92
Sex of child										
Male	51.3	51.2	52.7	52.3	53.4	52.5	52.2	50.3	53.7	50.7
Female	48.7	48.8	47.3	47.7	46.6	47.5	47.8	49.7	46.3	49.3
Type of birth										
Single	97.9	97.8	97.4	95.1	98.6	98.8	98.6	98.6	97.7	97.4
Multiple	2.1	2.2	2.6	4.9	1.4	1.2	1.3	1.4	2.3	2.6
Birthweight										
Under 2,500g	6.1	6.2	6.0	8.4	1.9	5.0	5.6	5.4	6.7	6.4
2,500-4,449g	92.1	92.1	92.7	90.6	96.4	93.7	93.3	93.0	91.5	91.9
Over 4,449g	1.8	1.7	1.3	1.0	1.7	1.3	1.1	1.6	1.8	1.7
No. of congenita										
None	96.5	95.4	97.9	98.7	99.6	98.5	99.8	98.5	94.0	94.1
One or more	3.4	4.6	2.1	1.3	0.4	1.5	0.2	1.5	6.0	5.9

in other foreign countries (see Table 4, above). Like complications of pregnancy, labor, and delivery, congenital anomalies are reported by the obstetrician and are widely believed to be underreported. As a consequence, differences between hospitals are difficult to interpret and we expect longitudinal comparisons of the same hospital over time to be more revealing.

Having characterized the variation in the vital statistics from hospital we now turn to changes in the key measures over time at the hospitals that have implemented the program. None of the hospitals shows a substantial change in the month prenatal care began between 1990 and 1992. On the number of prenatal visits indicator, Bellflower showed a substantial improvement although Hollywood Presbyterian and Valley Presbyterian actually showed a slight decline. All of these changes must be interpreted cautiously since large improvements also occurred in AMI/Tarzana, which had not implemented the program at this point in time. Finally we consider whether the fraction of the patients whose prenatal care is paid for by Medicaid increased. Hollywood Presbyterian did have an increase in the percentage of Medicaid births but Valley Presbyterian actually had a decrease. Once again we note that similar sized changes occurred in hospitals that have not yet implemented the

program. We will revisit these measures in the catchment and sisters analysis below.

COMPARISONS OF WOMEN DELIVERING AT EACH HOSPITAL BY SOURCE OF PAYMENT

This subsection addresses comparisons between Medicaid, privately insured, and uninsured[4] women delivering at each intervention hospital and in Los Angeles County. Prior research has shown that women covered by Medicaid and those who are uninsured are less likely to receive adequate prenatal care and are at higher risk of poor pregnancy outcome (GAO, 1987). In the following subsection we will compare, by source of payment, women delivering at each hospital to all women in the hospital's catchment area.

In some cases, the information presented in our data tables is limited, because the hospitals are relatively small and each has a preponderance of women with a particular type of payor. Our purpose in this comparison is to understand the extent to which women covered by a particular type of insurance may represent a higher or lower risk group. Tables 9-13 present mother and infant characteristics. No estimates have been made for payor groups with fewer than 100 observations. In addition, women with unknown insurance status have been excluded from these tables because the number of observations is so small, accounting for less than 2 percent of births countywide.

Maternal and infant characteristics by delivery payor in Los Angeles County as a whole are shown in Table 9. Countywide, Medicaid recipients are nearly twice as likely to be Hispanic as those with private insurance. They are about 25 percent more likely to be African American, but only about one-third as likely to be Asian. With one important exception, the racial distribution of those with no insurance more closely resembles those with private insurance than it resembles those on Medicaid. An unusually large share of the uninsured are Asian. A closer examination of the data (not presented) reveals the vast majority of these to be East Asians.[5] They may represent small

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[4]See the note to Table 6 for definitions of these categories.

[5]East Asians are those who identify themselves as Chinese, Japanese, Korean, Filipino, or Guamanian. They are primarily Chinese, Japanese, and Korean.

Table 9

Characteristics of Mothers and Infants by Expected Delivery Payor, Los Angeles County, 1990/1992

Variable	Expected Delivery Payor					
	Medicaid		Private Insurance		No Insurance	
	'90	'92	'90	'92	'90	'92
Number of live births	91404		102889		12197	
Mother's race and ethnicity						
White non-Hispanic	9.4	8.6	40.0	39.2	30.2	30.3
White Hispanic	73.6	76.5	39.0	38.1	44.6	37.3
African American	12.4	9.8	9.7	10.4	3.8	4.3
Asian	3.9	3.1	10.1	11.3	20.7	26.9
Other	0.6	.5	0.9	.8	0.7	1.0
Mother's age						
10-19	18.6	17.9	6.4	5.8	7.7	6.5
Over 20	81.4	82.4	93.7	94.2	92.2	93.5
Mother's education						
High school or less	64.8	89.3	51.9	48.5	34.5	56.5
More than high school	35.2	10.7	48.1	51.5	65.5	43.5
Month prenatal care began						
No care	3.9	1.9	0.7	.3	3.6	2.5
1st trimester	55.9	63.5	83.4	85.8	74.4	76.9
2nd trimester	32.9	28.8	14.0	12.0	18.3	15.1
3rd trimester	7.4	5.1	1.8	1.6	3.7	3.4
Number of prenatal visits						
None	5.3	1.9	1.5	2.7	5.2	2.5
1-6 visits	28.6	20.3	6.8	5.2	12.2	10.9
7-9 visits	27.9	25.0	13.6	12.5	17.9	15.4
10-12 visits	25.0	34.7	40.3	42.5	37.0	39.9
13 or more visits	13.2	16.5	37.8	39.0	27.7	29.5
Birthweight						
Under 2,500g	6.8	6.6	5.5	5.7	5.2	5.9
2,500-4,449g	91.5	91.8	92.6	92.5	93.1	92.6
Over 4,449g	1.6	1.6	1.9	1.7	1.7	1.4

entrepreneurs who do not have health insurance, and who merit even closer study. However, such an investigation is beyond the scope of the present study. Medicaid recipients tend to be younger and to have less education than the other two groups (those with private insurance and with no insurance). Those with no insurance have the most education, reinforcing the notion that those in the uninsured group are extremely heterogeneous. When we examine prenatal care and birthweight

Table 10

Characteristics of Mothers and Infants by Expected Delivery Payor, AMI/Tarzana, 1990/1992

Variable	Expected Delivery Payor					
	Medicaid		Private Insurance		No Insurance	
	'90	'92	'90	'92	'90	'92
Number of live births	5[a]	138	1817	1749	219	55
Mother's race and ethnicity						
White non-Hispanic		37.7	82.1	82.2	82.6	80.0
White Hispanic		55.1	10.6	10.5	14.6	16.4
African American		3.6	2.6	2.5	0.5	0
Asian		3.6	4.1	4.2	1.8	3.6
Other		0	4.8	.5	0.5	0
Mother's age						
10-19		15.2	1.4	1.8	5.5	1.8
Over 20		84.8	98.6	98.2	94.5	98.2
Mother's education						
High school or less		83.0	29.2	27.5	46.5	46.3
More than high school		17.0	70.8	72.5	53.5	53.7
Month prenatal care began						
No care		0	0.3	.1	0.0	0
1st trimester		58.7	93.0	93.1	89.0	90.9
2nd trimester		25.4	5.9	5.4	8.2	5.5
3rd trimester		14.5	0.8	1.0	2.7	3.6
Number of prenatal visits						
None		0	0.3	.1	0.0	0
1-6 visits		20.6	4.1	2.9	6.8	16.4
7-9 visits		14.0	15.3	6.6	18.3	16.4
10-12 visits		39.0	45.4	27.2	43.8	36.4
13 or more visits		26.5	35.1	63.2	31.0	30.9
Birthweight						
Under 2,500g		10.9	6.0	8.3	5.9	3.6
2,500-4,449g		89.1	92.8	90.6	91.8	96.4
Over 4,449g		0	1.2	1.1	2.3	0

[a]Too few observations to estimate sample distribution.

distribution, we find that women whose deliveries are covered by Medicaid or who are uninsured are more likely to have no care and, if they receive care, have fewer visits. However, those covered by Medicaid have the least prenatal care. The absence of prenatal care in the Medicaid population is reflected in poor birth outcomes as measured by a higher risk of low birthweight.

Table 10 presents the distributions for the same variables for AMI/Tarzana. Because there are few Medicaid deliveries at this

hospital, we are able to make comparisons between only two groups: those with private insurance and those with no insurance. The race and ethnic distributions for the two payor groups are quite similar, with white Hispanics slightly overrepresented and African Americans underrepresented among the uninsured. Younger mothers are overrepresented among those with no insurance, although this is contrary to the countywide pattern. In addition, those with no insurance have less education, again contrary to the countywide pattern. There are also smaller differences in the amount of prenatal care received and in birthweight. These results suggest that the uninsured at AMI/Tarzana are a more homogeneous group than the uninsured countywide.

Table 11 presents the results for Bellflower. Here we are able to compare only those with Medicaid and those who are privately insured, because very few women delivering at this hospital report that they have no insurance. At Bellflower, the vast majority of deliveries are covered by Medicaid, and thus women delivering with Medicaid coverage tend to be typical of all deliveries. The nearly 90 percent of women whose deliveries are covered by Medicaid are white Hispanic, whereas just slightly over half of those with private insurance belong to this ethnic group. African American women are somewhat overrepresented among the privately insured at Bellflower, and Asian women are substantially overrepresented in this group. Women whose deliveries are covered by Medicaid are younger and less educated than those with private insurance. They also receive less prenatal care. Interestingly, although all infants have a relatively favorable birthweight distribution, those covered by Medicaid at Bellflower have the lowest risk of low birthweight. This may in part be due to the very high proportion of Hispanic mothers in this payor population.

Table 12 presents the results for Queen of Angels/Hollywood Presbyterian. Here we are able to make comparisons among all three groups. Approximately three-quarters of deliveries at Queen of Angels/Hollywood Presbyterian expect to be covered by Medicaid. White non-Hispanics are somewhat overrepresented among those with no insurance. White Hispanics are substantially underrepresented in this

Table 11

Characteristics of Mothers and Infants by Expected Delivery Payor, Bellflower, 1990/1992

Variable	Expected Delivery Payor					
	Medicaid		Private Insurance		No Insurance	
	'90	'92	'90	'92	'90	'92
Number of live births	988	1052	177	111	47[a]	54
Mother's race and ethnicity						
White non-Hispanic	6.4	10.4	22.6	13.5		24.1
White Hispanic	88.7	78.9	52.0	59.5		53.7
African American	1.9	5.4	4.5	7.2		1.9
Asian	2.5	3.7	19.2	17.1		16.7
Other	0.5	1.6	1.7	2.7		3.7
Mother's age						
10-19	18.7	18.1	6.8	5.4		9.3
Over 20	81.3	81.9	93.2	94.6		90.7
Mother's education						
High school or less	94.6	85.3	66.1	71.2		70.4
More than high school	5.4	14.7	33.9	28.8		29.6
Month prenatal care began						
No care	0.1	0	0.6	0		1.9
1st trimester	69.8	72.1	83.6	94.6		61.1
2nd trimester	25.2	24.3	11.8	4.5		29.6
3rd trimester	4.9	3.5	3.9	.9		7.4
Number of prenatal visits						
None	0.0	0	0.0	0		1.9
1-6 visits	24.6	10.2	9.2	2.7		18.5
7-9 visits	33.9	15.3	16.6	2.7		16.7
10-12 visits	29.4	32.9	35.4	27.0		18.5
13 or more visits	12.1	41.6	29.1	67.6		44.5
Birthweight						
Under 2,500g	1.7	4.9	2.8	3.6		7.4
2,500-4,449g	97.0	93.6	93.2	95.5		90.7
Over 4,449g	1.3	1.3	4.0	.9		1.8

[a]Too few observations to estimate sample distribution.

group (32 percent as opposed to 18 percent hospitalwide). African Americans are underrepresented among both those with no insurance and those with private insurance. Women covered by Medicaid are substantially younger than those in the other two insurance groups and have substantially less education. As in the other participating hospitals, they are more likely to start prenatal care later and to receive less care. Interestingly, at Queen of Angels/Hollywood

Table 12

Characteristics of Mothers and Infants by Expected Delivery Payor, Queen of Angels, 1990/1992

Variable	Expected Delivery Payor					
	Medicaid		Private Insurance		No Insurance	
	'90	'92	'90	'92	'90	'92
Number of live births	4541	7086	1099	478	417	286
Mother's race and ethnicity						
White non-Hispanic	13.3	10.4	10.7	15.1	20.1	19.9
White Hispanic	59.9	74.9	52.5	42.9	31.9	39.3
African American	21.3	9.9	8.7	7.5	4.1	2.5
Asian	5.3	4.7	27.8	34.3	43.9	37.4
Other	0.2	.2	0.2	.2	0.0	.4
Mother's age						
10-19	20.3	17.3	6.3	4.8	6.7	8.9
Over 20	79.7	82.7	93.7	95.2	93.3	91.1
Mother's education						
High school or less	86.5	89.9	57.6	52.4	55.5	59.9
More than high school	13.5	10.1	42.4	47.6	44.5	40.1
Month prenatal care began						
No care	0.4	.2	0.0	.2	1.7	1.1
1st trimester	59.4	71.2	76.4	86.8	78.1	73.7
2nd trimester	34.6	25.7	20.9	12.3	17.5	20.3
3rd trimester	4.7	2.8	6.5	.4	2.6	5.0
Number of prenatal visits						
None	0.2	.2	0.0	.2	1.0	1.1
1-6 visits	20.4	11.5	11.2	3.1	12.5	12.8
7-9 visits	20.9	30.9	13.6	11.1	7.7	13.2
10-12 visits	41.4	43.4	44.0	44.6	49.2	44.5
13 or more visits	17.1	14.0	31.2	41.0	29.6	28.5
Birthweight						
Under 2,500g	5.6	5.4	5.6	5.6	6.5	5.0
2,500-4,449g	93.5	93.1	93.0	92.1	91.8	93.2
Over 4,449g	0.9	1.5	1.4	2.3	1.7	1.8

Presbyterian as elsewhere, those who are uninsured and those with private insurance are more similar to one another than either is to those covered by Medicaid. However, at this hospital, the uninsured do have a slightly higher risk of low birthweight than the other two payor groups.

Table 13 presents the results for Valley Presbyterian. Racial composition varies less across the three insurance groups than in some of the other participating hospitals. As was the case countywide and at

Table 13

Characteristics of Mothers and Infants by Expected Delivery Payor, Valley Presbyterian, 1990/1992

Variable	Expected Delivery Payor					
	Medicaid		Private Insurance		No Insurance	
	'90	'92	'90	'92	'90	'92
Number of live births	317	906	1355	1244	311	221
Mother's race and ethnicity						
White non-Hispanic	45.2	20.1	62.3	55.1	57.0	57.5
White Hispanic	38.0	69.1	23.3	33.0	23.6	23.7
African American	6.6	5.2	3.8	3.6	3.9	5.9
Asian	10.1	5.2	9.7	8.0	15.2	11.9
Other	0.0	.4	0.8	.2	0.3	.9
Mother's age						
10-19	12.9	17.6	3.1	2.6	11.2	15.5
Over 20	87.1	82.4	96.9	97.4	88.8	84.5
Mother's education						
High school or less	76.4	70.0	35.6	39.2	51.0	52.3
More than high school	23.6	30.0	64.4	60.8	49.0	47.7
Month prenatal care began						
No care	1.6	.4	0.4	.1	5.5	5.9
1st trimester	68.8	73.8	93.1	94.0	70.4	72.1
2nd trimester	26.2	22.3	6.1	5.2	18.3	17.4
3rd trimester	3.5	2.8	0.5	.3	5.8	3.2
Number of prenatal visits						
None	0.7	.5	0.2	.1	2.7	6.2
1-6 visits	12.5	13.2	4.3	3.8	13.8	16.7
7-9 visits	16.6	19.7	10.1	11.9	14.1	13.8
10-12 visits	38.9	37.9	42.7	40.0	38.7	29.5
13 or more visits	31.4	28.7	42.7	56.2	30.6	33.8
Birthweight						
Under 2,500g	5.7	5.0	6.6	6.2	8.0	7.3
2,500-4,449g	93.1	93.8	91.6	90.8	89.4	90.4
Over 4,449g	1.3	1.2	1.8	2.0		2.3

AMI/Tarzana, Asians are substantially overrepresented among those with no insurance. African Americans are substantially overrepresented among those whose deliveries were covered by Medicaid. Both women covered by Medicaid and those with no insurance are younger than those with private insurance. Those whose deliveries were covered by Medicaid have the least education, followed by those with no insurance. Valley Presbyterian is somewhat different from the other participating hospitals and the county as a whole, in that the uninsured women

resemble those covered by Medicaid more than they resemble those who are privately insured. At this hospital, the uninsured receive the least prenatal care and have the worst outcomes as measured by birthweight.

COMPARISONS OF WOMEN DELIVERING AT EACH INTERVENTION HOSPITAL TO WOMEN FROM THE SAME CATCHMENT AREA

In this section we compare women delivering at each participating hospital to women with the same zip codes of residence but delivering elsewhere. The three categories of payor (Medicaid, private insurance, and no insurance) and two categories of facility (public and private) lead to six groups for comparison: (1) those covered by Medicaid and delivering at a public facility; (2) those covered by Medicaid and delivering at a private facility; (3) those covered by private insurance and delivering at a public facility; (4) those covered by private insurance and delivering at a private facility; (5) those with no insurance and delivering at a public facility; and (6) those with no insurance and delivering at a private facility.

We begin with an examination of Los Angeles County to understand how women with varying kinds of insurance and who deliver at different types of facilities differ with regard to their demographic characteristics, prenatal care, and outcomes as measured by infant birthweight. As noted above, nearly half of the deliveries in Los Angeles County are covered by private insurance and half are covered by Medicaid, with about 6 percent remaining uninsured. Of those covered by Medicaid, about half deliver at public facilities and about half deliver at private facilities. Women with private insurance and those with no insurance nearly universally deliver at private facilities.

Table 14 shows how the distribution of mothers and infants differs by type of insurance and place of delivery. First we examine demographic characteristics for women with different types of insurance delivering at the two types of facilities. Among women covered by Medicaid, the proportion who are white Hispanics is much higher at public than at private facilities. The proportions of white non-Hispanic, African American, and Asian women in private facilities are correspondingly higher than in public facilities. Among those with private insurance, the proportion of white non-Hispanic women is much

Table 14

Characteristics of Mothers and Infants by Place of Delivery and Expected Delivery Payor, Los Angeles County and Its Catchment Area, 1990/1992

Variable	Catchment Area											
	Medicaid				Private Insurance				No Insurance			
	Public		Private		Public		Private		Public		Private	
	'90	'92	'90	'92	'90	'92	'90	'92	'90	'92	'90	'92
Number of live births	45136	38392	46226	65322	3967	3758	98922	85372	1234	462	10963	7022
Mother's race and ethn.												
White non-Hispanic	5.3	5.3	13.4	10.5	64.4	61.6	39.1	38.2	25.7	35.9	30.7	30.0
White Hispanic	86.8	87.2	60.7	70.3	18.9	20.1	40.1	39.0	64.6	48.9	42.6	36.6
African American	5.8	5.2	18.9	12.5	9.3	10.0	9.7	10.4	3.8	5.0	3.8	4.3
Asian	1.5	1.8	6.2	6.1	6.3	7.0	10.2	11.5	6.6	9.1	22.3	28.1
Other	0.5	.5	0.8	.6	1.2	1.3	0.8	.9	1.3	1.1	0.6	1.0
Mother's age												
10-19	16.1	15.6	21.1	19.2	6.3	6.8	6.4	5.7	11.4	8.2	7.3	6.4
Over 20	83.9	84.4	78.9	80.8	93.7	93.2	93.6	94.3	88.6	91.8	92.7	93.6
Mother's education												
Less than high school	76.3	76.0	54.1	58.7	13.8	13.3	21.9	19.7	54.3	44.3	32.2	26.1
High school	16.9	17.1	33.6	28.9	35.4	35.4	30.2	28.8	27.1	28.5	29.1	29.7
More than high school	6.8	6.9	12.3	4.3	50.7	.8	47.8	1.7	18.6	5.2	38.7	3.3
Month prenatal care began												
No care	5.6	3.6	2.1	.8	0.6	.4	0.7	.3	4.8	5.4	3.5	2.3
1st trimester	51.1	57.0	60.5	67.3	87.6	89.3	83.3	85.7	59.7	65.6	76.0	77.7
2nd trimester	34.2	32.6	31.6	26.6	11.0	8.9	14.2	12.1	29.1	22.7	17.1	14.6
3rd trimester	9.1	6.4	5.8	4.3	0.9	.8	1.9	1.7	6.4	5.2	3.4	3.3
Number of prenatal visits												
None	5.3	3.7	1.2	.8	0.5	.4	0.3	.3	4.6	5.5	2.4	2.4
1-6 visits	39.0	31.0	19.6	14.7	5.6	3.8	6.9	5.3	27.0	18.3	10.9	10.6
7-9 visits	33.1	30.5	24.0	22.4	9.7	7.9	14.0	12.7	30.6	16.7	17.0	15.6
10-12 visits	16.1	25.4	34.8	41.0	32.7	32.8	41.1	43.1	24.4	30.4	39.6	41.3
13 or more visits	6.6	9.3	20.4	21.0	51.6	55.2	37.7	38.6	13.5	29.1	30.2	30.1
Birthweight												
Under 2,500g	7.1	7.5	6.6	6.1	6.4	5.7	5.4	5.7	4.7	7.6	5.3	6.9
2,500-4,449g	91.0	90.5	92.0	92.5	91.8	92.8	92.7	92.5	93.3	91.1	93.1	92.8
Over 4,449g	1.9	2.0	1.3	1.4	1.8	1.5	1.9	1.8	2.0	1.3	1.6	1.4

higher in public than private facilities and the proportion of white Hispanic is higher in private facilities. Among those with no insurance, the proportion of Asians is much higher in private than in public facilities, and the proportion of white non-Hispanic is also higher. There are no striking differences in the age distribution within insurance categories for women delivering at public as compared to private facilities. However, there are fairly substantial educational differences. Women covered by Medicaid who deliver at a public facility have substantially less education than those who deliver at private facilities. Among those with private insurance, there are no substantial differences in educational achievement by facility type. Among those with no insurance, those who deliver in public facilities have substantially less education.

Next we consider prenatal care and birthweight. Among Medicaid-insured women, those who deliver in private facilities are slightly more likely to start prenatal care earlier and report substantially more visits than are those who deliver at public facilities. Among women with private insurance, those delivering at public facilities report that they initiate care earlier and receive more visits than those delivering in private facilities. This pattern is reversed for those with no insurance where women delivering in private facilities start care earlier and report more visits. The risk of low birthweight is highest for women covered by Medicaid and delivering in public facilities, despite a relatively high proportion of Hispanics in this population, suggesting that the birthweight distribution may be even more unfavorable than that which would be expected given the race and ethnic distribution of the population. Finally, the lowest risk of low birthweight is for uninsured women delivering at public facilities.

Table 15 compares the women delivering at AMI/Tarzana to all women residing in its catchment area who delivered in 1990 and 1992. Nearly 90 percent of patients at AMI/Tarzana are privately insured. This hospital currently accounts for about one fifth of the births in its catchment area (shown in Map 3.B). AMI/Tarzana is typical of its catchment area where the majority of deliveries are to privately insured women in private facilities. The racial distribution of the hospital

Table 15

Characteristics of Mothers and Infants by Place of Delivery and Expected Delivery Payor, AMI/Tarzana and Its Catchment Area, 1990/1992

Variable	AMI/Tarzana		Catchment Area											
			Medicaid				Private Insurance				No Insurance			
	Private		Public		Private		Public		Private		Public		Private	
	'90	'92	'90	'92	'90	'92	'90	'92	'90	'92	'90	'92	'90	'92
Number of live births	2042	1942	1138	1036	680	1547	59[a]	49	6993	6366	70[a]	24	650	388
Mother's race and ethn.														
White non-Hispanic	81.9	79.0	10.8	8.6	40.5	26.9			71.8	69.8			65.2	59.8
White Hispanic	10.9	13.8	82.0	85.7	42.7	59.7			16.0	15.9			19.7	18.6
African American	2.4	2.5	2.6	1.8	6.8	4.9			2.9	3.8			2.3	1.6
Asian	3.8	4.2	3.8	3.8	9.7	8.0			8.9	10.0			12.3	18.7
Other	0.5	.5	0.8	.1	0.3	.5			0.4	.5			0.5	2.1
Mother's age														
10-19	1.9	2.7	15.9	13.2	17.6	16.2			2.8	2.3			5.2	2.8
Over 20	98.1	97.3	84.1	86.8	82.4	83.8			97.2	97.7			94.8	97.2
Mother's education														
Less than high school	5.0	8.9	71.2	71.2	43.7	52.5			8.7	7.8			15.0	15.5
High school	26.0	23.1	16.3	18.6	33.2	26.9			24.4	22.0			30.1	28.8
More than high school	69.0	63.1	12.5	10.2	23.1	20.6			66.9	70.2			54.9	55.7
Month prenatal care began														
No care	0.0	.1	3.1	2.3	1.0	.7			0.3	.2			1.8	1.0
1st trimester	92.6	90.6	58.0	64.2	63.7	71.0			90.2	91.5			85.2	83.0
2nd trimester	6.1	6.9	32.9	28.0	30.3	24.2			8.6	7.4			10.9	11.9
3rd trimester	1.0	2.0	6.0	4.8	5.0	3.4			1.0	.8			2.0	2.4
Number of prenatal visits														
None	0.0	.1	2.8	2.4	0.8	.7			0.1	.2			1.4	1.1
1-6 visits	4.5	4.6	28.1	16.7	12.9	12.2			4.1	3.2			5.0	9.2
7-9 visits	15.6	7.4	34.6	27.4	26.1	21.2			10.8	8.8			17.3	13.1
10-12 visits	45.3	28.3	26.5	39.6	38.2	41.2			41.7	36.2			39.0	37.3
13 or more visits	34.6	59.7	8.2	13.9	22.0	24.8			43.3	51.6			37.3	39.4
Birthweight														
Under 2,500g	6.0	8.4	5.3	7.0	4.3	5.5			5.2	6.0			4.6	5.4
2,500-4,449g	92.7	90.6	93.5	91.4	93.7	93.3			93.4	92.7			93.7	92.5
Over 4,449g	1.3	1.0	1.2	1.5	2.1	1.1			1.5	1.3			1.7	2.1

[a]Too few observations

most closely resembles that of privately insured women in its catchment area who deliver at a private facility, with 70 to 80 percent being white non-Hispanic. In contrast, over 80 percent of women living in AMI/Tarzana's catchment area but covered by Medicaid and delivering at a public facility are white Hispanic. Women living in the catchment area but covered by Medicaid and delivering at a private facility are about equally likely to be white non-Hispanic as white Hispanic. The age distribution at AMI/Tarzana is different from that of privately insured women living in its catchment area and delivering at private facilities. It has a larger share of young mothers but not as high a share as that of Medicaid deliveries in its catchment area. The women delivering at AMI/Tarzana generally have somewhat more education than those delivering in its catchment area, regardless of place of delivery or payment method. However, they most closely resemble other private patients. Women in the catchment area who are covered by Medicaid have substantially less education, especially those who deliver in public facilities.

Nearly all of AMI/Tarzana's women begin prenatal care in the first trimester. This pattern is followed by all women in the catchment area who deliver at a private facility, regardless of their insurance status. In contrast, Medicaid-insured women are much less likely to begin care in the first trimester and have substantially fewer visits. Despite the better care of the women delivering there, the infants born at AMI/Tarzana do not have a particularly favorable birthweight distribution, even when compared to all privately insured women delivering at private facilities.

Table 16 compares the distribution of women delivering at Bellflower to all women delivering in its catchment area. As noted above, Bellflower is a relatively small hospital in an area that is both dense in population and has a large number of facilities. In addition, the majority of its deliveries are covered by Medicaid. This hospital accounts for roughly 5 percent of births in its catchment area. Bellflower is somewhat atypical of its catchment area, where over 40 percent of deliveries are privately insured and just over a quarter are covered by Medicaid and in private facilities. Its racial distribution

Table 16

Characteristics of Mothers and Infants by Place of Delivery and Expected Delivery Payor, Bellflower and Its Catchment Area, 1990/1992

Variable	Bellflower		Catchment Area											
			Medicaid				Private Insurance				No Insurance			
	Private		Public		Private		Public		Private		Public		Private	
	'90	'92	'90	'92	'90	'92	'90	'92	'90	'92	'90	'92	'90	'92
Number of live births	2063	1217	8843	7333	9898	13795	117	126	15262	12644	100	17	1660	955
Mother's race and ethn.														
White non-Hispanic	9.2	11.3	1.4	1.2	10.1	6.4	13.7	10.3	19.4	17.5	5.0		12.7	13.7
White Hispanic	81.3	76.0	92.0	92.7	69.2	79.6	41.0	38.9	62.4	63.3	88.0		69.4	59.1
African American	2.3	5.4	5.6	5.0	17.3	11.3	37.6	43.6	10.4	11.1	3.0		2.3	4.3
Asian	6.6		0.5	.8	2.4	2.0	6.0	7.1	6.7	7.1	1.0		14.9	22.4
Other	0.7	1.7		.4		.8		0		1.1				.5
Mother's age														
10-19	16.3	16.5	15.7	16.1	23.2	21.2	10.3	12.7	9.2	8.7	14.0		10.4	9.4
Over 20	82.7	82.5	84.3	83.9	76.8	78.8	89.7	87.3	90.8	91.3	86.0		89.6	90.6
Mother's education														
Less than high school	63.5	53.3	79.7	81.0	56.5	60.2	32.5	24.8	35.0	32.7	70.0		47.7	40.1
High school	25.0	30.1	15.2	14.5	34.0	30.5	35.9	43.2	35.7	35.9	22.0		27.2	29.3
More than high school	11.6	16.7	5.1	4.5	9.5	9.3	31.6	32.0	29.3	31.4	8.0		25.1	30.6
Month prenatal care began														
No care	0.0	.1	5.8	4.8	2.15	.6	1.7	.8	1.0	.3	9.0		3.4	2.9
1st trimester	72.3	73.6	51.4	53.5	59.7	66.0	82.0	80.2	75.5	79.4	52.0		68.6	72.2
2nd trimester	22.8	22.8	34.7	35.6	31.9	26.0	16.2	16.7	20.8	17.6	37.0		24.0	18.4
3rd trimester	4.6	3.5	8.0	6.0	6.3	5.3	0.0	1.6	2.8	2.4	2.0		4.1	4.2
Number of prenatal visits														
None	0.0	.1	5.6	4.9	1.1	.6	0.9	.8	0.5	.3	8.1		2.0	2.9
1-6 visits	21.6	9.9	39.8	33.6	21.1	16.2	12.9	7.5	9.7	7.6	36.4		13.6	13.2
7-9 visits	31.2	14.2	39.2	39.6	25.4	20.4	17.2	18.3	18.6	16.5	27.3		23.1	18.3
10-12 visits	31.1	31.7	11.9	17.4	29.8	38.8	30.2	36.7	37.8	39.4	20.2		37.0	36.9
13 or more visits	16.1	44.1	3.5	4.6	22.6	24.1	38.8	36.7	33.5	36.2	8.1		24.3	28.7
Birthweight														
Under 2,500g	1.9	5.0	6.4	7.2	5.9	5.6	12.0	11.2	5.0	5.5	1.0		5.4	6.1
2,500-4,449g	96.4	93.7	91.4	90.1	92.5	92.8	84.6	87.2	92.8	92.6	97.0		92.8	92.4
Over 4,449g	1.7	1.3	2.2	2.7	1.6	1.6	3.4	1.6	2.2	2.0	2.0		1.8	1.6

is intermediate between that of all Medicaid women delivering at public and private facilities. Its educational distribution is also intermediate between that of Medicaid-insured women in its catchment area delivering to public and private facilities. However, its distribution of the time of initiation of prenatal care more closely resembles that of all women in its catchment area whose deliveries are privately insured, but the number of visits is closer to that of the Medicaid population in its catchment area. As noted above, the birthweight distribution at Bellflower is extremely favorable and is unique as compared to the catchment area as a whole.

Table 17 compares the distribution of women delivering at Queen of Angels/Hollywood Presbyterian to all women delivering in its catchment area. As noted above, the majority of its deliveries are currently covered by Medicaid. This hospital accounts for only about 15 percent of births in its catchment area, which includes 41,125 deliveries and is shown in Map 5.B. Queen of Angels/Hollywood Presbyterian's catchment area is quite diverse. In the catchment area, about one-third of deliveries are covered by Medicaid and take place in a public facility, just under 30 percent are covered by Medicaid and take place in a private facility, and just over 30 percent are privately insured and take place in a private facility. Queen of Angels/Hollywood Presbyterian's race and ethnic distribution most closely resembles that of women in the catchment area who are covered by Medicaid and deliver at a private facility, although the race and ethnic distribution of women who deliver at private facilities does not substantially vary by expected delivery payor. In contrast, nearly 90 percent of women in the catchment area who are covered by Medicaid and deliver at a public facility are white Hispanic. The age distribution of women delivering at Queen of Angels/Hollywood Presbyterian is midway between those living in the catchment area, covered by Medicaid, and delivering at public and private facilities. Their educational level is somewhat higher than Medicaid-insured women living in the catchment area, but lower than that of privately insured women. The proportion of women initiating care in the first trimester at Queen of Angels/Hollywood Presbyterian is intermediate between that of women living in its catchment area whose

Table 17

Characteristics of Mothers and Infants by Place of Delivery and Expected Delivery Payor, Queen of Angels and Its Catchment Area, 1990/1992

Variable	Q of A/ Hlywd Presb		Catchment Area											
			Medicaid				Private Insurance				No Insurance			
	Private		Public		Private		Public		Private		Public		Private	
	'90	'92	'90	'92	'90	'92	'90	'92	'90	'92	'90	'92	'90	'92
Number of live births	6057	7850	14038	10503	11652	16555	239	162	13108	10668	139	30[a]	1506	842
Mother's race and ethn.														
White non-Hispanic	13.3	11.0	1.1	1.1	7.0	6.1	13.0	12.4	13.6	13.6	3.6		16.7	15.6
White Hispanic	56.6	71.7	88.6	89.5	55.7	68.9	38.1	43.8	48.0	45.2	73.2		44.7	42.6
African American	17.8	9.5	8.6	7.8	32.5	19.7	46.0	37.0	28.4	31.4	11.6		8.8	11.3
Asian	12.1	7.7	1.3	1.3	4.5	5.1	2.1	5.6	9.5	9.3	10.1		29.2	30.1
Other	0.2	.2	0.3	.3	0.2	.2	0.8	1.2	0.5	.6	1.4		0.7	.4
Mother's age														
10-19	16.8	16.2	15.4	15.6	19.6	17.2	10.5	10.5	9.0	8.8	13.0		7.4	7.0
Over 20	83.2	83.8	84.6	84.4	80.4	82.8	89.5	89.5	91.0	91.2	87.0		92.6	93.0
Mother's education														
Less than high school	48.6	64.8	78.4	79.1	53.3	61.4	24.4	31.5	33.0	29.9	61.2		38.4	36.0
High school	30.5	21.7	15.6	14.9	33.3	26.6	35.3	29.6	29.9	30.1	23.7		25.2	26.4
More than high school	20.9	13.5	5.9	6.0	13.4	12.0	40.3	38.9	37.1	40.0	15.1		36.4	37.6
Month prenatal care began														
No care	0.2	.3	6.5	4.1	1.8	1.0	0.8	2.5	0.9	.4	7.9		4.8	2.4
1st trimester	63.8	72.3	47.2	52.6	59.7	67.6	78.2	80.3	79.0	81.6	51.1		73.7	72.8
2nd trimester	30.9	24.7	35.4	35.1	32.7	26.6	7.5	9.3	17.4	15.4	35.2		17.5	18.5
3rd trimester	4.8	2.7	10.8	7.8	5.8	4.0	1.7	7.4	2.7	2.3	5.8		4.1	4.3
Number of prenatal visits														
None	0.2	.3	6.2	4.3	1.2	1.0	0.8	2.5	0.4	.4	8.0		3.5	2.4
1-6 visits	18.3	11.2	45.8	39.8	23.6	16.6	14.8	12.0	11.5	8.1	36.2		15.2	14.0
7-9 visits	18.6	29.0	31.0	31.0	23.7	25.5	12.7	15.2	16.1	14.8	27.5		17.0	20.2
10-12 visits	42.4	43.5	12.2	19.0	34.8	40.8	35.9	31.6	41.3	47.4	21.0		40.1	37.9
13 or more visits	20.5	16.1	4.7	5.9	16.6	16.1	35.9	38.6	30.7	29.2	7.2		23.9	25.6
Birthweight														
Under 2,500g	5.6	5.4	7.4	8.1	7.8	6.7	7.1	9.3	6.2	7	5.8		5.6	5.5
2,500-4,449g	93.3	93.0	90.8	90.2	91.0	91.9	92.0	90.7	92.0	91.4	91.4		93.1	93.7
Over 4,449g	1.1	1.6	1.8	1.7	1.2	1.4	0.8	0	1.8	1.6	2.9		1.3	.8

deliveries are covered by Medicaid and those covered by private insurance. However, the number of visits is closer to that of privately insured women than it is to those insured under Medicaid. The birthweight distribution of Queen of Angels/Hollywood Presbyterian is favorable relative to women delivering in the catchment area regardless of their insurance status or the location of delivery.

Table 18 compares the distribution of women delivering at Valley Presbyterian to all women delivering in its catchment area. This hospital accounts for only about 13 percent of births in its catchment area, which includes 15,324 deliveries and is shown in Map 5B. As noted above, the majority of its deliveries are currently covered by private insurance. Like AMI/Tarzana, Valley Presbyterian is relatively typical of its catchment area, where 65 percent of deliveries are to privately insured women in private facilities. In addition, the racial distribution of Valley Presbyterian's patients is similar to that of privately insured women in its catchment area delivering at private facilities. However, they are somewhat younger than all privately insured women in the catchment area delivering at private facilities, but not as young as those whose expected source of payment is Medicaid. The proportion initiating care in the first trimester and the amount of care are also similar to those of privately insured women living in the catchment area and delivering at a private facility. However, Valley Presbyterian's birthweight distribution is less favorable than that in the catchment area regardless of delivery payor or place.

The catchment areas were constructed to give us a comparison group to evaluate changes in our indicator variables. We will now see if changes in the intervention hospitals are different from the changes in their catchment areas.

Bellflower, with a program starting in August of 1991, showed no meaningful change in the timing of initiation of prenatal care from 1990 to 1992. It did, however, show increased numbers of visits. Its catchment area showed a smaller, less pronounced improvement. Hollywood Presbyterian showed no improvement in the timing or number of prenatal visits. Valley Presbyterian showed no improvement from 1990 to 1992. With the exception of Bellflower, no major outcomes improvements are found.

Table 18

Characteristics of Mothers and Infants by Place of Delivery and Expected Delivery Payor, Valley Presbyterian and Its Catchment Area, 1990/1992

Variable	Valley Presbyterian		Catchment Area											
			Medicaid				Private Insurance				No Insurance			
	Private		Public		Private		Public		Private		Public		Private	
	'90	'92	'90	'92	'90	'92	'90	'92	'90	'92	'90	'92	'90	'92
Number of live births	1983	2371	2539	2524	1345	2747	90[a]	83[a]	10041	9001	131	43[a]	926	559
Mother's race and ethn.														
White non-Hispanic	58.7	41.9	8.9	6.4	31.1	23.3			64.6	63.6	16.0		56.7	51.7
White Hispanic	25.7	46.0	85.3	89.1	52.2	63.0			22.2	21.5	75.6		26.4	30.0
African American	4.3	4.4	2.3	1.7	7.1	5.6			3.7	4.4	0.8		2.6	2.3
Asian	10.7	7.3	3.0	2.8	9.2	7.6			9.0	10.0	7.6		13.8	14.6
Other	0.6	.4	0.4	.1	0.4	.5			0.6	.6	0.0		0.5	1.4
Mother's age														
10-19	6.0	9.5	16.7	13.6	16.7	16.8			3.7	2.9	14.5		6.4	6.1
Over 20	94.0	90.5	83.3	86.4	83.3	83.2			96.3	97.1	85.5		93.6	93.9
Mother's education														
Less than high school	18.4	34.6	73.6	73.8	51.8	55.3			12.6	10.9	62.6		20.7	19.9
High school	26.1	21.5	16.0	17.6	29.8	26.6			26.3	24.9	20.6		31.1	32.0
More than high school	55.5	44.0	10.4	8.6	18.4	18.1			61.1	64.2	16.8		48.2	48.1
Month prenatal care began														
No care	0.7	.8	2.9	1.9	0.9	.6			0.3	.2	4.6		2.0	3.0
1st trimester	85.5	84.3	57.3	64.8	61.6	69.6			88.2	89.9	65.6		82.1	80.0
2nd trimester	11.2	12.9	33.0	28.0	33.0	26.1			7.4	8.7	26.7		13.2	13.6
3rd trimester	1.8	1.5	6.8	4.7	4.4	3.2			1.2	1.1	3.1		2.8	2.2
Number of prenatal visits														
None	0.7	.8	2.6	1.9	0.6	.6			0.2	.2	4.6		1.2	3.1
1-6 visits	7.0	8.5	29.8	17.2	13.4	12.4			5.1	4.0	23.1		8.8	10.4
7-9 visits	1.8	15.0	36.4	24.6	28.9	23.0			12.7	9.7	41.5		15.9	12.6
10-12 visits	41.5	38.2	23.9	41.1	38.4	41.0			41.8	37.8	25.4		42.4	37.5
13 or more visits	39.0	37.5	7.4	15.2	18.7	23.0			40.2	48.5	5.4		31.6	36.6
Birthweight														
Under 2,500g	6.7	6.4	5.8	6.7	4.7	4.7			5.2	5.6	4.6		5.1	5.5
2,500-4,449g	91.5	91.9	92.7	91.6	93.8	94.0			93.2	92.9	93.1		92.9	92.5
Over 4,449g	1.8	1.7	1.5	1.6	1.5	1.3			1.7	1.5	2.3		2.0	2.0

[a]Too few observations

SISTER HOSPITALS

Selection Procedures

Sister hospitals were selected for comparison with each of the eight participating hospitals, based on their geographic location within the same Health Service Area and the similarity of characteristics in their maternity patient population. The purpose of selecting sister hospitals is to provide a point of reference for comparison. There are many changes that may occur, either state-wide, county-wide, or even on a local level that may affect health care policies within hospitals for a given year. By selecting a comparison group of hospitals that are subject to the same regional influences, but not experiencing the intervention, we will be better able to understand the effect the intervention is having, while statistically accounting for other outside influences. In other words, we will be able to determine whether the hospital populations change during the intervention period and to distinguish between the effects of the intervention and other community factors.

In selecting sister hospitals for each intervention site, we examined a number of parameters for all hospitals within the same and neighboring Health Service Areas. These included hospital type (public or private); maternal demographic characteristics (age, race, education); prenatal care (month prenatal care began, number of prenatal visits); characteristics of the pregnancy (length of gestation and complications); delivery outcome measures (labor complications, delivery method); delivery payor (Medicaid, private insurance or uninsured); and an infant health measure (birthweight).

The two hospitals that were most similar to the intervention hospital on a combination of key parameters (namely maternal race, age and education, expected delivery payor and infant birthweight) were chosen as the sister sites. Other variables, such as complications during pregnancy and labor, were also reviewed. However, given the greater likelihood of problematic reporting for these types of variables they tended to play a secondary role in the final selection process.

Three of the parameters above; 'Source of payor', 'Month prenatal

care began' and 'Number of prenatal visits' were selected as the key variables to identify whether an impact occurred within the first two years of the intervention. 'Source of Payor' was selected because an increase in Medicaid patients at the intervention hospitals indicates that access to prenatal care improved for the population targeted for intervention. 'Month prenatal care began' and 'Number of prenatal visits' were also chosen for analysis because these characteristics are good proxy measures of improved prenatal care, and are less subject to reporting biases than some of the other variables collected for this evaluation.

Comparison of the Intervention and their Sister Hospitals

Intervention sites and their sister hospitals are listed in Table 19. Each pair of sisters is proximate to the relevant intervention hospitals and their catchment areas. (for the catchment areas, see Maps 3-9.B.) As we noted earlier, AMI/Tarzana and Valley Presbyterian are geographically quite proximate. The analyses described in the previous sections have shown that their delivery populations are similar on a number of dimensions.

Table 19

Intervention Sites and Their Sister Hospitals

Intervention Hospitals/ Mo Intervention Began	Sister Hospitals	Table Reference
AMI/Tarzana (3/92)	Henry Mayo Humana West Hills	Table 20
Bellflower (8/91)	Bellwood Charter Suburban	Table 21
Queen of Angels/Hollywood Presbyterian (9/91)	California Medical Center Centinela	Table 22
Valley Presbyterian (2/92)	St. Joseph's Northridge	Table 23

AMI/TARZANA

Table 20 compares AMI/Tarzana to its two sisters, Henry Mayo/Newhall and Humana/West Hills. These hospitals are quite similar across all maternal characteristics, infant health and Source of Payment. For example, the racial characteristics are quite comparable, with approximately 80 percent of mothers at all three hospitals are white non-Hispanic, 10 percent are white Hispanic and less than 5 percent are African American. A slight decrease in White Non-Hispanic births is noted in the two year follow-up for both the intervention hospitals and both sisters. Approximately two thirds of the mothers have completed some college education and approximately 80 percent are within the prime childbearing ages. The three hospitals are also very similar with regard to the expected delivery payor: Nearly all payments for deliveries at all three hospitals are covered by private insurance, while approximately 5 percent are covered by Medicaid. Though the number of Medicaid patients did significantly increase in the intervention hospital between 1990 and 1992, the percentage of Medicaid patients was on the rise for the sister hospitals as well.

Differences do appear for some of the measures related to pregnancy and delivery. In particular, the three hospitals show variations in the amount of prenatal care that the women report, although there is little variation in the reported time of initiation of care. Women at Humana/West Hills report more visits than AMI/Tarzana, but those at Henry Mayo/Newhall report fewer visits than AMI/Tarzana. This pattern remains similar in the follow-up year, however the percentage of visits increases significantly for both AMI/Tarzana and Humana West Hills. That is, the percentage of women with 12+ prenatal visits increased by 25% for the intervention hospital between 1990 and 1992, but the increase was even greater (35%) for Humana West Hills.

The reporting of complications of pregnancy and of labor and delivery also differs across facilities. In 1990, almost 90 percent of patients at Henry Mayo are reported to experience at least one pregnancy complication, as compared to less than 10 percent of the patients at the other two hospitals. Humana/West Hills reports that nearly all of their

Table 20

Percent Distribution of Selected Characteristics for Deliveries at AMI/Tarzana and Sister Hospitals: 1990 vs. 1992 (**p<.01)

Selected Characteristics	1990			1992			% change: 1990-1992		
	AMI/ Tarz	Henry Mayo	Hum W.H.	AMI/ Tarz	Henry Mayo	Hum W.H.	AMI/ Tarz	Henry Mayo	Hum W.H.
Live Births (n)	2,042	1,475	1,256	1,942	1,339	1,115	-100	-136	-141
Race									
White non H	82	82	81	79	77	77	-5	-5	-4
Wh Hispanic	11	12	9	14	16	10	+3	+4	+1
Black	2	1	3	3	1	2	+1	0	-1
Other	5	5	7	5	6	11	0	+1	+4
Hospital Owner									
Private	x	x	x	x	x	x	0	0	0
Public									
Birthweight									
under 2,500g	6	4	6	8	4	5	-2	0	-1
2,500-4,499g	93	94	93	91	94	93	-2	0	0
over 4,499g	1	2	1	1	2	1	0	0	0
Maternal Age									
10-19	2	4	3	3	3	1	+1	-1	-2
20-34	78	83	82	77	81	83	-1	-2	+1
over 34	20	13	15	20	16	16	0	+3	+1
Maternal Educ									
HS or less	31	40	34	32	39	28	+1	-1	-6
More than HS	69	60	66	68	61	72	-1	+1	+6
Source of Payment									
Medicaid	<1	1	4	7	3	<1	+7**	+2	+3
Priv Insurance	89	92	97	90	93	95	+1	+1	-2
No Insurance	11	6	2	3	3	4	-8	-3	+2
Other	<1	1	<1	<1	<1	1	0	-<1	+<1
Length of Gest.									
preterm	16	11	13	16	13	17	0	+2	+4
term	65	65	64	66	64	60	+1	-1	-4
post term	19	24	23	16	21	18	-3	-3	-5
Mo. Prenatal Care Began									
none	<1	<1	0	<1	<1	0	0	0	0
1st trimester	93	91	97	91	95	99	-2**	+4	+2
2nd trimester	7	8	3	7	4	1	0	-4	-2
3rd trimester	1	1	<1	2	1	<1	+1	0	0
No. Prenatal Visits									
1-6 visits	4	8	1	4	2	<1	0	-6	-<1
7-12 visits	61	72	42	36	82	7	-25	+10	-35
over 12 visits	35	20	57	60	16	92	+25**	-4	+35
No. Complicated Pregnancy									
none	91	11	98	5	3	98	-86	-8	0
one	7	61	2	88	76	2	+81	+15	0
two or more	2	28	<1	7	22	<1	+5	-6	0
No. Complicated Labor & Deliv.									
none	1	13	88	76	9	81	+75	-4	-7
one	75	74	11	18	66	15	-57	-8	+4
two or more	24	13	1	6	25	4	-18	+12	+3
Deliv. Method									
vaginal	61	69	74	60	66	68	-1	-3	-6
c-section	39	31	26	40	34	32	+1	+3	+6

women experience no complications as opposed to less than 15 percent at the other facilities. In 1992, these numbers change drastically, however these changes are likely reflecting variations in detection and reporting protocols.

In sum, while there were slight increases in the number of Medicaid patients served by the intervention hospital between 1990 and 1992, these numbers are tempered by the fact that the sister hospitals also had increases in the numbers of Medicaid patients they served. Additionally, there was little change in the month prenatal care began between the baseline and post-intervention years and no consistent pattern of increases in prenatal visits that could be attributed to the intervention alone.

BELLFLOWER

Table 21 compares Bellflower to its two sisters, Bellwood and Charter suburban. The demographic composition of the women delivering at the three facilities are very similar. In particular, both Bellflower and Charter have an overwhelming percentage of their births coming from Hispanic mothers. Bellwood is the most diverse of the three hospitals. In 1990, it had approximately an equal share of deliveries from white Hispanic, white non-Hispanic, and other mothers. (In this case, the "other" category is composed primarily of Asian women--not shown.) Yet in the two year follow-up, this pattern shifted and white Hispanic deliveries at Bellwood increased from 37% to 51%. Women delivering at Bellwood in 1990 were more than twice as likely to have some college education as compared with the other two hospitals. Yet this pattern shifted in 1992, because high school graduates reported for Bellwood and Charter decreased by approximately 5%, while those for Bellflower increased by 5%. Finally, there are some differences in the age distribution of women across the three facilities. There are fewer mothers over age 35 delivering at Bellflower than at the other two facilities. This may partially account for the lower cesarean section rate at Bellflower, as compared to the sister hospitals.

Table 21

Percent Distribution of Selected Characteristics for Deliveries at Bellflower and Sister Hospitals: 1990 vs. 1992 (**p<.01)

	1990			1992			% change: 1990-1992		
	Bell-flower	Bell-wood	Chart	Bell-flower	Bell-wood	Chart	Bell-flower	Bell-wood	Chart
Live Births (n)	1,217	730	1,319	1,217	888	1,965	0	+158	+646
Race									
White non H	9	32	10	11	23	5	+2	-9	-5
Wh Hispanic	81	37	79	76	51	82	-5	+14	+3
Black	2	8	10	5	6	10	+3	-2	0
Other	8	23	10	7	20	3	-1	-3	-7
Hospital Owner									
Private	x	x	x	x	x	x	0	0	0
Public									
Birthweight									
under 2,500g	2	4	3	5	3	4	+3	-1	+1
2,500-4,499g	96	94	95	94	95	94	-2	+1	-1
over 4,499g	2	2	2	1	2	2	-1	0	0
Maternal Age									
10-19	16	14	19	17	16	18	+1	+2	-1
20-34	80	78	73	78	75	75	-2	-3	+2
over 34	4	8	8	6	9	7	+2	+1	-1
Maternal Educ.									
HS or less	88	70	86	83	74	92	-5	+4	+6
More than HS	12	30	14	17	26	8	+5	-4	-6
Source of Payment									
Medicaid	81	38	59	86	62	82	+5**	+24	+23
Priv Insurance	15	48	30	9	25	14	-6	-23	-16
No Insurance	4	14	11	4	11	3	0	-3	-8
Other	<1	0	0	<1	2	<1	0	+2	+<1
Length of Gest.									
preterm	10	15	19	10	15	17	0	0	-2
term	73	63	56	64	58	56	-9	-5	0
post term	17	22	25	24	24	25	+7	+2	0
Mo. Prenatal Care Began									
none	0	1	1	0	<1	<1	0	-<1	-<1
1st trimester	72	73	66	74	67	69	+2	-6	+3
2nd trimester	23	20	25	23	21	26	0	+1	+1
3rd trimester	5	6	7	3	10	5	-2	+4	-2
No. Prenatal Visits									
1-6 visits	22	23	20	10	28	19	-12	+7	-1
7-12 visits	62	60	54	46	60	62	-16	0	+8
over 12 visits	16	17	26	44	11	19	+28**	-6	-7
No. Complicated Pregnancy									
none	93	78	34	21	57	9	-72	-21	-25
one	7	18	48	78	36	87	+71	+18	+39
two or more	21	6	17	13	28	12	-8	+22	-5
No. Complicated Labor & Deliv.									
none	63	71	5	24	15	1	-39	-56	-4
one	16	21	78	63	57	87	+47	+36	+9
two or more	21	6	17	13	28	12	-8	+22	-5
Deliv. Method									
vaginal	77	64	64	78	67	72	+1	+3	+8
c-section	23	36	36	22	33	28	-1	-3	-8

There are also some potentially important differences in the distribution of women according to the expected payor for delivery. In 1990, Bellflower had a much larger share of Medicaid patients as compared to the other facilities. By 1992, all three hospitals showed highly significant increases in Medicaid patients as compared to 1990, but the percentage increase for the sister hospitals was much greater than that for Bellflower (24% and 23% for Bellwood and Charter respectively as compared to 5% for Bellflower). The three hospitals are quite similar in their statistics reported for gestational age, the month prenatal care began in 1990 and remain similar in 1992. However a significant change was noted between the two years for the number of prenatal visits between Bellflower and her sister hospitals. Specifically, the number of 12 or more prenatal visits increased by 28% over the two year period, whereas a drop in visits for the sister hospitals was noted. Though the comparison of pregnancy and labor complications shows considerable variability among the three hospitals, these differences may be more of a reflection of differing reporting practices than actual differences in complication rates.

As in the case of AMI/Tarzana, the changes noted between 1990 and 1992 for Bellflower and her sisters reflect little impact from the intervention. First, though the number of Medicaid patients did increase for Bellflower post intervention, they increased even more dramatically for the sister hospitals that had no intervention. Second, no significant change was detected for the month prenatal care began. Finally, while there was a significant jump in the number of prenatal visits for Bellflower, this information must be evaluated in light of the other variables just discussed. Therefore, it is unlikely that this increase it related to the intervention alone.

QUEEN OF ANGELS/HOLLYWOOD PRESBYTERIAN

Table 22, compares Queen of Angels/Hollywood Presbyterian to its two sisters, the California Medical Center and Centinela. These hospitals are quite similar in a number of important respects but some differences do emerge. However despite the differences among the

Table 22

Percent Distribution of Selected Characteristics for Deliveries at Queen of Angels/Hollywood Presbyterian and Sister Hospitals: 1990 vs. 1992 (**p<.01)

Selected Characteristics	1990			1992			% change: 1990-1992		
	QA/ HP	CA Med Center	Centin	QA/HP	CA Med Center	Centin	QA/HP	CA Med Center	Centin
Live Births (n)	6,057	4,479	2,592	7,850	5,543	3,083	+1,793	+1,064	+491
Race									
White non H	13	3	10	11	1	7	-2	-2	-3
Wh Hispanic	57	58	26	72	70	30	+15	+12	+4
Black	18	32	59	9	20	59	-9	-12	0
Other	12	10	5	9	8	3	-3	-2	-2
Hospital Owner									
Private	x	x	x	x	x	x	0	0	0
Public									
Birthweight									
under 2,500g	6	8	10	5	8	8	-1	0	-2
2,500-4,499g	93	90	88	93	91	90	0	+1	+2
over 4,499g	1	2	2	2	1	2	+1	-1	0
Maternal Age									
10-19	17	15	12	16	17	16	-1	+2	+4
20-34	76	75	78	76	75	75	0	0	-3
over 34	8	9	11	8	9	9	0	0	-2
Maternal Educ									
HS or less	79	79	66	87	85	75	+8	+6	+9
More than HS	21	21	34	13	15	25	-8	-6	-9
Source of Payment									
Medicaid	75	64	31	90	84	38	+15**	+20	+7
Priv Insurance	18	30	64	6	14	57	-12	-16	-7
No Insurance	7	6	4	4	2	3	-3	-4	-1
Other	<1	<1	2	0	<1	1	-<1	0	-1
Length of Gest.									
preterm	40	54	69	16	19	19	-24	-35	-50
term	34	23	16	58	55	54	+24	+22	+38
post term	26	23	15	23	22	22	-3	-1	+7
Mo. Prenatal Care Began									
none	<1	2	1	<1	1	<1	0	-1	-<1
1st trimester	64	67	78	72	67	81	+8**	0	+3
2nd trimester	34	26	17	25	27	16	-9	+1	-1
3rd trimester	5	5	4	3	4	3	-2	-1	-1
No. Prenatal Visits									
1-6 visits	18	22	11	11	17	10	-7	-5	-1
7-12 visits	61	56	75	72	56	73	+11	0	-2
over 12 visits	21	22	14	16	15	17	-5**	-7	+3
No. Complicatec Pregnancy									
none	99	69	89	94	49	92	-5	-20	+3
one	1	17	11	6	43	8	+5	+26	-3
two or more	<1	14	<1	<1	8	<1	0	-6	0
No. Complicated Labor & Deliv.									
none	69	24	8	47	4	18	-22	-20	+10
one	30	42	29	39	57	57	+9	+15	+28
two or more	1	35	63	14	39	25	+13	+4	-38
Deliv. Method									
vaginal	73	76	77	71	81	81	-2	+5	+4
c-section	27	24	23	29	19	19	+2	-5	-4

facilities, we felt that the sisters chosen were most comparable to the intervention facility.

The differences are larger when Queen of Angels/Hollywood Presbyterian is compared to Centinela than when it is compared the California Medical Center. At both Queen of Angels/Hollywood Presbyterian and the California Medical Center, approximately 60 percent of women are White Hispanics in 1990 and this number increases to approximately 70% in 1992. In comparison, only 30% of Centinela's deliveries are to White Hispanics whereas 60 percent of their deliveries are to African American women. Centinela also has a higher percentage of women with some college training, though this percentage drops for all three hospitals between the baseline and post-intervention years.

The distribution of women according to the expected delivery payor is another characteristic that shows some differences between hospitals. In 1990, three quarters of Queen of Angels/Hollywood Presbyterian patients' deliveries are covered by Medicaid, as compared with just under two thirds at the California Medical Center and 31 percent at Centinela. In 1992, the number of Medicaid patients increased for all three hospitals, with the most significant jump of 20% found for California Medical Center. Large changes were also found between the three hospitals for length of gestation, and the number of complications between labor and delivery. In all cases, a large shift was seen for babies being born from preterm to full term. The shifts for complications of labor and delivery are thought to be related to changes in reporting protocols.

Finally, a significant change was seen for Queen of Angels/Hollywood Presbyterian for both the month prenatal care began and for the number of prenatal visits between 1990 and 1992. While the percentage of patients seen in the first trimester increased most significantly for Queen of Angels/Hollywood Presbyterian, the number of prenatal visits for this same hospital actually significantly *decreased* between the baseline and follow-up years. The three hospitals are all fairly similar with regard to maternal age, delivery method and birthweight distributions.

Thus, the three variables selected as 'intervention indicators' do

not show any consistent patterns of improvement for Queen of Angels/Hollywood Presbyterian between the baseline and post-intervention years.

VALLEY PRESBYTERIAN

Table 23 compares Valley Presbyterian to its two sisters, St. Joseph's and Northridge. The three hospitals are very similar along most parameters of interest. They are almost identical in terms of the maternal age, the month prenatal care began, the number of prenatal visits and the birthweight and gestational age of the infant.

Interesting differences are noted however, for maternal age and education: In 1992 the percentage of White non-Hispanic mothers at Valley Presbyterian dropped by 16% as compared to 1990, while the number of White Hispanic mothers increased by 18%. Also, while this hospital had a much higher percentage of mothers with some college education as compared with the two other hospitals in 1990, this percentage dropped 31% by 1992. Therefore, it appears that the socioeconomic status for patients of the intervention facility also shifted from being higher than its sisters in 1990, to more similar in 1992.

The distribution of women according to their expected delivery payor shows some variation among hospitals, with only 4 percent of births covered by Medicaid at Northridge hospital, versus over 15 percent at the other sites in 1990. By 1992, the number of Medicaid patients significantly increased for all three hospitals, with the largest increase found for Northridge Hospital. Northridge is also striking in that the percent of complications during pregnancy and labor are much lower than the comparison group. This appears to be due to variations in reporting, because by 1992, their pattern of complications appears similar to the comparison hospitals.

As in the case of the other hospitals, the percent distribution of the reported characteristics for Valley Presbyterian do not reflect an impact from the intervention.

Table 23

Percent Distribution of Selected Characteristics for Deliveries at Valley Presbyterian and Sister Hospitals: 1990 vs. 1992 (**p<.01)

Selected Characteristics	1990			1992			% change: 1990-1992		
	Valley Pres	St. Joseph	North-ridge	Valley Pres	St. Joseph	North-ridge	Valley Pres	St. Josep.	North-ridge
Live Births (n)	1,983	2,467	2,326	2,371	2,442	3,087	+388	-25	+761
Race									
White non H	58	60	52	42	54	40	-16	-6	-12
Wh Hispanic	28	30	33	46	35	44	+18	+5	+11
Black	4	3	4	4	3	3	0	0	0
Other	9	7	11	8	7	12	-1	0	+1
Hospital Owner									
Private	x	x	x	x	x	x	0	0	0
Public									
Birthweight									
under 2,500g	7	5	6	6	6	5	_1	+1	-1
2,500-4,499g	91	93	92	92	93	93	+1	0	+1
over 4,499g	2	2	2	2	2	1	0	0	-1
Maternal Age									
10-19	6	6	5	9	8	8	+3	+2	+3
20-34	79	79	81	76	79	79	-3	0	-2
over 34	15	15	14	15	13	13	0	-2	-1
Maternal Educ									
HS or less	25	50	51	56	51	58	+31	-1	+7
More than HS	75	50	49	44	49	42	-31	-1	-7
Source of Payment									
Medicaid	16	22	4	38	30	35	+22**	+13	+31
Priv Insurance	68	72	92	52	65	62	-16	-7	-30
No Insurance	16	6	4	9	5	2	-7	-1	-2
Other	0	0	<1	<1	<1	<1	+<1	+<1	0
Length of Gest.									
preterm	17	15	19	17	15	16	0	0	-3
term	58	61	60	57	63	60	-1	+2	0
post term	25	24	21	23	20	22	-2	-4	+1
Mo. Prenatal Care Began									
none	1	<1	<1	1	<1	1	0	0	+<1
1st trimester	85	87	90	84	87	80	-1	0	-10
2nd trimester	11	11	9	13	11	17	+2	0	+8
3rd trimester	3	2	1	2	1	2	-1	-1	+1
No. Prenatal Visits									
1-6 visits	8	7	7	9	4	10	+1	-3	+3
7-12 visits	53	64	56	53	61	53	0	-3	-3
over 12 visits	39	29	37	37	34	36	-2	+5	-1
No. Complic. Pregnancy									
none	9	3	90	9	2	13	0	-1	-77
one	35	39	8	43	43	27	+8	+4	+19
two or more	55	57	1	48	55	60	-7	-2	+59
No. Complic. Labor & Deliv.									
none	5	<1	77	4	<1	29	-1	0	-48
one	49	35	20	53	31	44	+4	-4	+24
two or more	46	65	3	43	69	37	-3	+4	+34
Deliv. Method									
vaginal	57	68	61	65	70	69	+8	+2	+8
c-section	43	32	39	35	30	31	-8	-2	-8

6. CONCLUSIONS AND IMPLICATIONS FOR THE EVALUATION

Our planning and data-analysis efforts have focused on detecting shifts in births from other institutions, particularly public hospitals, to our intervention sites. These are shown by changes in the distribution of births at the intervention facilities and in their catchment areas. This report describes changes in patient mix and their characteristics for 1990 to 1992. Comparisons to Los Angeles County and to sister hospitals enable us to track alternative explanations to the intervention as the cause of increases in births in the participating institutions. In addition, the catchment area data track changes in total births in the service area of the institution. This gives us a comparison group that reflects the changing birth rates and demographics of the clinics' service areas. The sister hospital data gives us a comparison group that reflects the institutional changes and financial changes that are common to all hospitals in the area but are unrelated to the intervention.

There are other important measures of the success of the interventions beyond shifting the deliveries from public to private institutions. Among these are earlier initiation of prenatal care, higher birthweights, and reduced infant mortality. Although these are obvious and important outcome measures, we are not well equipped to measure all of them.

Two main difficulties hamper our ability to measure the changes in these outcomes. First, we have limited sample sizes. For example, low birthweight is a relatively infrequent outcome. With the number of deliveries in this intervention, it is unlikely that we could detect improvements in these infrequent outcomes. Second, and probably more insidious, are selection bias problems. Selection bias will result if, for some reason, more motivated and healthier women are attracted to the intervention hospitals and such women have a higher than average likelihood of a good outcome. Therefore it is possible to find good outcomes among women delivering at the intervention hospitals, but not for reasons that can be directly attributed to the care received as part

of the intervention. Because of this potential, improved outcomes must be interpreted cautiously.

These limitations are the natural consequence of the relatively small scale of the intervention. To move beyond these limitations would require substantially larger expenditures on primary survey data collection.

A variety of changes occurred in the health care market during the time of the intervention, which may have altered the impact of the Prenatal and Ob Access Project. These changes, which involved the overall fertility rate in the County, commercial health delivery systems and health delivery systems for the Medicaid population, triggered additional responses which will be discussed in the following paragraphs.

Beginning in 1992, the fertility rate in Los Angeles County began a dramatic decline which has been sustained even at the time of this writing. While there were 208,484 births in 1990, there were 201,722 in 1992. As a consequence, the Los Angeles County Department of Health Services eliminated its program of overflow referrals to private hospitals for delivery services. Although some ongoing need for overflow referrals did persist in DHS clinics providing prenatal care, most of these patients were triaged to free-standing clinics (rather than hospital-based sites), in hopes that the women would return to County facilities for delivery of their infants.

California has traditionally been a pioneer in the area of health delivery system reform, and the last few years have seen a tremendous expansion of prepaid health arrangements in the commercial sector. This change has had two major impacts on private sector providers. The first is to erode the traditional base of patients from indemnity plans, forcing many providers to seek other sources of patients, including commercial prepaid health plans. Second, as the market share of prepaid plans increases, the utilization of discounted reimbursement rates also increases. Over time, these discounted rates have begun to approach traditional Medi-Cal rates, making these patients a more desirable source of income.

Finally, in March of 1993, the State DHS released the strategic plan outlining its intention to expand the enrollment of Medi-Cal patients (AFDC categorically eligible recipients) into PPH plans. Although the plan sets a timeline of 1995 for implementation, tremendous marketing and enrollment activity occurred even before the release of this document, particularly in the private sector. Consequently, providers who had not yet affiliated with prepaid health plans, and were relying on fee-for services Medi-Cal, were now being forced to do so in order to ensure a stable patient flow. Additionally, provider interest in patients with restricted Medi-Cal increased as the women were accessible patients for whom are could care could be reimbursed on a fee-for-service basis, since they cannot be enrolled in prepaid health plans.

Although it is impossible to conclude with certainty what the effect of the intervention was from the available data we hope that the methods detailed here provide a framework for continued and future evaluations. Notwithstanding these limitations, the analysis in this report provides us with important information about connecting publicly insured pregnant women with the private health care system.

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