
*1990 Texas Survey of Postpartum Women
and Drug-Exposed Infants*

*1990 Texas Survey of Postpartum Women
and Drug-Exposed Infants*

June 1991

Texas Commission on Alcohol and Drug Abuse

1990 Texas Survey of Postpartum Women and Drug-Exposed Infants

Karen G. Madry, M.A.
Eric V. Fredlund, Ph.D.

Lynn S. Wallisch, M.A.
Richard T. Spence, Ph.D.

ACKNOWLEDGEMENTS

A number of people contributed to the 1990 Postpartum Survey and the production of this volume. Particular recognition should go to Jennifer Kavinsky, M.A., TCADA Research Editor; James Dyer, Ph.D., and Craig Blakeley, Ph.D., of PPRI; Bertis Little, Ph.D. of Parkland Hospital, Dallas; and Jim Garriott, Ph.D., of the Bexar County Medical Examiner's Office. Also acknowledged are the following six hospitals who participated in the study because without their cooperation, this report would not have been possible: Parkland Hospital, Dallas; Ben Taub Hospital, Houston; L.B.J. Hospital, Houston; Medical Center Hospital, San Antonio; John Peter Smith Hospital, Fort Worth; and R.E. Thomason Hospital, El Paso.

© June 1991, Texas Commission on Alcohol and Drug Abuse (TCADA), Austin, Texas. TCADA grants full permission to reproduce and distribute any part of this document for non-commercial use. Appropriate credit is appreciated. TCADA is a state agency headed by six commissioners appointed by the governor. TCADA provides educational materials on substance use, develops prevention, intervention, and treatment programs, and conducts studies on the problems of substance use in Texas.



Texas Commission on Alcohol and Drug Abuse
9001 North IH-35, Suite 105
Austin, Texas 78753-5233
(512) 349-6600, (800) 832-9623
Web site: www.tcada.state.tx.us

 This document was printed on recycled paper.

1990 Texas Survey of Postpartum Women and Drug-Exposed Infants

I.	INTRODUCTION	1
II.	DESCRIPTION	2
	1. General Overview	
	2. Setting and Scope: TCADA Study	
	3. Instruments and Data Collection Protocols	
	4. Limitations	
III.	EXECUTIVE SUMMARY	6
IV.	THE SAMPLE	9
	1. Introduction	
	2. Sociodemographic Characteristics	
	3. Sociodemographic Summary	
	4. Prenatal Care and Delivery	
	5. Birth Outcomes	
	6. Birth Complications	
	7. Family and Peer Substance Use	
	8. Perceived Dangers and Knowledge of Fetal Alcohol Syndrome (FAS)	
V.	PREVALENCE OF SUBSTANCE USE	20
	1. Terms and Limitations	
	2. Overview of Substance Use During Pregnancy and During Past Year	
	3. Comparisons Between Postpartum sample and All Texas Women	
	4. Licit Substance Use	
	5. Illicit Substance Use	
	6. Age Patterns	
	7. Racial/Ethnic Patterns	
	8. Educational Patterns	
VI.	PROBLEM INDICATORS	28
	1. Alcohol Problems	
	2. Drug Problems	
	3. Either Alcohol or Drug Problems	
VII.	COMPARISON OF SUBSTANCE USERS AND THEIR INFANTS WITH NON-USERS AND THEIR INFANTS	31
	1. Limitations of Comparisons	
	2. Demographic Characteristics	
	3. Adequacy of Prenatal Care	
	4. Birth Outcomes	
	5. Family History, Peer Use, and FAS Knowledge and Attitudes	
VIII.	BARRIERS TO PRENATAL CARE AND TREATMENT	39
	1. Problems Getting Prenatal Care	
	2. Problems Getting Care for Special Conditions	
	3. Problems Getting Child Care	
	4. Barriers to Treatment for Substance Abuse	
IX.	CONCLUSIONS	44
	APPENDIX A: EFFECTS OF DRUG EXPOSURE	45
	APPENDIX B: COST ESTIMATES	48
	APPENDIX C: BLOOD SAMPLES: PROCEDURES AND ANALYSIS	49
	APPENDIX D: PREVALENCE TABLES	58
	APPENDIX E: PROBLEM INDICATOR TABLES	66

INTRODUCTION

The problem of perinatal substance exposure generates considerable public discussion but the scope, nature and long-term implications of the problem remain largely unexplored. Clearly some infants are exposed to toxic substances before birth but the reported percentage varies widely depending on the time, place, and population studied (Chasnoff 1990a,b; Chasnoff et al. 1990). Evidence shows that prenatal substance exposure can be harmful, sometimes resulting in low birth weights, developmental anomalies, birth complications, and other health-related problems. Most obvious among these problems are the severe substance-related birth syndromes and complications associated with chronic maternal use of alcohol, cocaine, heroin, solvents, or other drugs. Less is known about long- and short-term risks associated with lower levels of maternal substance use, but given the complexity of neonatal development, it is likely that such behavior is dangerous as well (See Appendix A for further description).

The purpose of this research was to ascertain the extent of substance use among a sample of pregnant women giving birth in six large public hospitals in Texas. Participating women were interviewed at length and their umbilical cord blood was biologically assayed for signs of recent use of selected substances.¹ Additional information was collected from medical records about pregnancy and birth outcomes. Emphasis was placed on gathering information about the sociodemographic characteristics of the respondents (i.e., their family, educational and economic backgrounds) as well as the availability and utilization of prenatal care, and any barriers to obtaining such care.

¹ "Cord blood" remains in the umbilical cord after it is detached from the infant. Collection of cord blood is "non-intrusive" and samples the blood chemistry closest to both the mother and the infant (Little 1990). In general, laboratory methods are considered the most reliable means of determining substance use. However, both blood and urine testing for traces of substances and their metabolites are limited because only very recent substance use can be detected.

DESCRIPTION OF THE STUDY

GENERAL OVERVIEW

Background

Public attention has recently focused on the problem of substance-using pregnant women and their drug-exposed infants, and dramatic media coverage of “crack babies” has created a sense of immediacy in addressing the problem. The far-reaching effects of prenatal drug use have many serious implications for service providers in the fields of education, public health, and substance abuse treatment. Educators are alarmed at the prospect of thousands of drug-exposed children entering the school system, bringing with them extensive learning and behavior problems that would add to overtaxed classroom resources. Public health officials acknowledge that drug-using mothers and their infants are at high risk for becoming HIV-infected. Substance abuse treatment providers face issues which greatly complicate the treatment process, the most salient of which is how to sufficiently address both the mother’s and the infant’s needs.

To date, responses aimed at the problem have stemmed primarily from emotion rather than knowledge-based concern and understanding. More than 50 substance-using mothers across the country have been prosecuted for child abuse and endangerment, delivering illegal substances to a minor, and assault with a deadly weapon (cocaine) (Weber 1990; Paltrow 1990; Besharov 1990). Advocates of prosecution have not considered that the mother herself may be a victim of substance abuse, poverty, or other negative circumstances, nor have they considered whether the optimal outcome for the infant is obtained when his or her mother is criminalized.

Assessing the Prevalence and Effects of Infant Drug Exposure

Efforts to estimate the prevalence of infant drug exposure and assess infant effects have been difficult. Because type, potency, and cost of drugs varies by locality, incidence figures obtained in one location often can not be generalized to other areas. In surveys of hospitals where drug testing is not routinely done, many drug-exposed infants go undetected if they do not show acute withdrawal symptoms (GAO Report 1990). In addition, drug-using mothers are not likely to admit substance use, especially when faced with the threat of prosecution. One study reviewed births from 36 hospitals across the United States, and found that incidence of infant illicit drug exposure ranged from 0.4 percent to 27 percent, with the average incidence falling at 11 percent (Chasnoff 1989). These findings translate to a figure of 375,000 drug-exposed babies in the United States per year. In some inner city hospitals, there has been a recent marked increase in the number of cocaine-exposed infants; prevalence has increased by as much as 50 percent in the past five years (NIDA 1989).

As prenatal substance exposure became a growing problem nationwide, Texans expressed the need to evaluate its scope and nature in their own state. In response to reports of drug-exposed infants in large metropolitan-area Texas hospitals, this study was initiated to determine the extent of the problem, as well as to learn about the characteristics, environments, and needs of these women and children so that effective prevention and treatment can be developed and implemented.

SETTING AND SCOPE: TCADA STUDY

Beginning in the spring of 1990, the Texas Commission on Alcohol and Drug Abuse (TCADA) implemented a survey of substance use among postpartum women delivering in the six largest public hospitals in Texas. The Public Policy Resources Laboratory (PPRL) of Texas A&M University was contracted to collect the data. Hospitals included in the survey were Parkland Hospital in Dallas, John Peter Smith Hospital in Fort Worth, Ben Taub and L.B.J. Hospitals in Houston, Medical Center Hospital in San Antonio, and R. E. Thomason Hospital in El Paso. About 15 percent of children born annually in Texas are delivered in these six hospitals (Table 1).

The first phase of data collection took place at Parkland Hospital in Dallas. Twenty days were allocated for surveying women giving birth in Parkland. Each woman delivering with a gestation of twenty weeks or more was eligible to participate in the survey. This phase served as a model for subsequent data collection activities. Then a ten-day data-collection window was assigned to each of the other hospitals. Survey crews moved from one hospital to the next, collecting data for ten days in each. The primary rationale for this design was to

insure that consistent data collection protocols were maintained in all six participating hospitals.²

Women were contacted as soon as possible after delivery and instructed as to the purpose of the survey. Project coordinators assured women of the confidentiality of their responses, answered questions regarding the survey, obtained informed consent, and made an appointment for survey administration. At the appointed time, participants were contacted either by phone or in person to conduct the interviews. All interviewers were female, and they were matched with respondents on the basis of ethnic background. The survey was administered in either English or Spanish as requested by the respondent. These procedures resulted in a high cooperation rate. Of the 1,679 women giving birth in the hospitals during the study, 1,401 (83 percent) met the criteria, agreed to participate, and completed the survey.

INSTRUMENTS AND DATA COLLECTION PROTOCOLS

Self-Report Survey Instruments

Produced in English and Spanish versions, the postpartum survey instruments contained detailed questions regarding these areas of interest:

Table 1 Percent of Texas Births Represented by Sample Hospitals in the 1990 Texas Postpartum Survey

	Number of Births	Percent of Texas Births
Parkland, Dallas	14,534	4.8%
Ben Taub, Houston *	14,050	4.6%
LBJ, Houston *		
Medical Center, San Antonio	6,453	2.1%
J.P. Smith, Fort Worth	5,977	2.0%
R.E. Thomason, El Paso	4,955	1.6%
TOTAL SAMPLE HOSPITAL BIRTHS	45,969	15.2%
TOTAL TEXAS BIRTHS, 1988	303,314	100%

*Estimated from prior Jeff Davis and LBJ figures. Ben Taub was first opened in July, 1990, and the distribution of LBJ and Ben Taub deliveries is not yet available.

² Each hospital had slightly different maternity ward procedures and facilities. Data collection protocols had to be modified to fit each specific circumstance.

1. *Past and current use of substances*, including questions about recency and frequency of use of cigarettes, alcohol, inhalants, marijuana, powdered and crack cocaine, “uppers”, “downers”, heroin, other opiates, and hallucinogens. The substance use questions were almost identical to those used in TCADA surveys of Texas adults and inmates entering the Texas Department of Corrections.

2. *Reproductive history*, including number of past pregnancies, live births, and associated complications. Detailed questions were also asked about availability and utilization of prenatal care, family planning, and other reproductive issues.

3. *Sociodemographic context*, including questions about age, race/ethnicity, family structure, and economic integration. Such questions were used to extend understanding of responses to a wider social context.

4. *Perceived dangers of substance use during pregnancy and perceptions of availability and efficacy of substance abuse services*, including barriers to treatment and other considerations relevant to designing programs for the prevention and treatment of substance abuse services for women of child-bearing age.

Completion of the survey required between 30 and 90 minutes depending on the extent of current or past substance involvement. The interviews were conducted either by telephone (61 percent) or in person (39 percent); about two-thirds of the in-person interviews were done by the respondent filling out the survey (“paper and pencil”), and the other one-third were done orally by trained interviewers. The mode of interview was determined by feasibility (availability of interviewers, bedside telephones, preferred language), with initial trials indicating that mode did not significantly affect response to the drug questions. A retrospective analysis of drug-use response by

mode of interview indicated that women who were interviewed orally in person reported somewhat higher recent use of alcohol, cocaine, and heroin than women interviewed by telephone or by paper-and-pencil self-report. Since only 14 percent of the sample was interviewed orally in person, it is possible that self-reported use for the entire sample would have been higher had all women been interviewed in person.

Blood and Chart Data

Medical students covered delivery rooms twenty-four hours a day while the survey was in progress. Immediately after each delivery, cord bloods were collected, packaged, labeled, and frozen. Blood samples were subsequently sent to the University of Texas Medical Center at Dallas for analysis. Radioimmunoassay (RIA) was used to test blood samples for traces of substances or associated metabolites. Tests were performed for the presence of alcohol, cocaine, methamphetamines, and heroin. Further analysis using gas chromatography/mass spectrometry (GC/MS) was conducted on a portion of the blood samples.

Medical students also collected chart data on each delivery. Chart data include information on birth outcomes such as the weight, length, head circumference, general responsiveness of the infant, and any birth defects or other health problems obvious at birth. Also collected from hospital records was information about maternal complications as well as specific medications administered at the hospital. The latter information was cross-referenced against blood test results to ascertain if blood-positive indications should be attributed to prescribed medications rather than illegal drug use.

On-Site Coordinators

On each hospital site, two or three project coordinators were assigned to verify collection of blood samples and chart data, schedule interviews, link blood, chart and self-report data, coordinate with hospital

personnel, and ensure patient confidentiality.

LIMITATIONS

Coverage

The data provided in this report are estimates of alcohol and drug use among women giving birth in large public hospitals. Because this group is disproportionately drawn from racial/ethnic minorities and lower income groups, these estimates should not be extrapolated to all Texas women of child-bearing age. The estimates, however, are pertinent to the substance-related prevention and treatment needs of lower income women. This segment of the population is most likely to require publicly financed prevention and/or treatment services for substance abuse.

Self-Reported Information on Substance Abuse

A number of studies have established the utility of self-reported information on substance use. However, the validity of such information ultimately depends on the truthfulness, recall, and comprehension of the respondents. This study was designed and administered to minimize such errors and alternate information (results of the blood tests) was used to verify results. Comparison of blood and self-report data suggests that respondents tended to underreport substance use, particularly very recent substance use. The estimates presented in this document, therefore, represent a conservative assessment of substance-related needs of this critical population.

Use of Umbilical Cord Blood Analysis

See Appendix C for a full description of the methods and procedures use for analyzing data obtained from the cord blood samples.

EXECUTIVE SUMMARY

LICIT AND ILLICIT SUBSTANCE USE AMONG THE POSTPARTUM SAMPLE

- 40 percent of the mothers used a licit or illicit substance (alcohol, cigarettes, inhalants, and/or an illicit drug) during the year before giving birth.
- Women reporting use during the past year but not during pregnancy may have exposed their fetuses to substances: many women said they quit using when they found out they were pregnant, which was on average 8 weeks into their pregnancy. For this reason, survey findings for both “past year” and “during pregnancy” use are reported.
- 28 percent of the mothers used a licit or illicit substance (alcohol, cigarettes, inhalants, and/or an illicit drug) during their pregnancy (Figure 1).
- 14 percent of the mothers drank alcohol while they were pregnant.
- 23 percent of the mothers smoked cigarettes during the year before giving

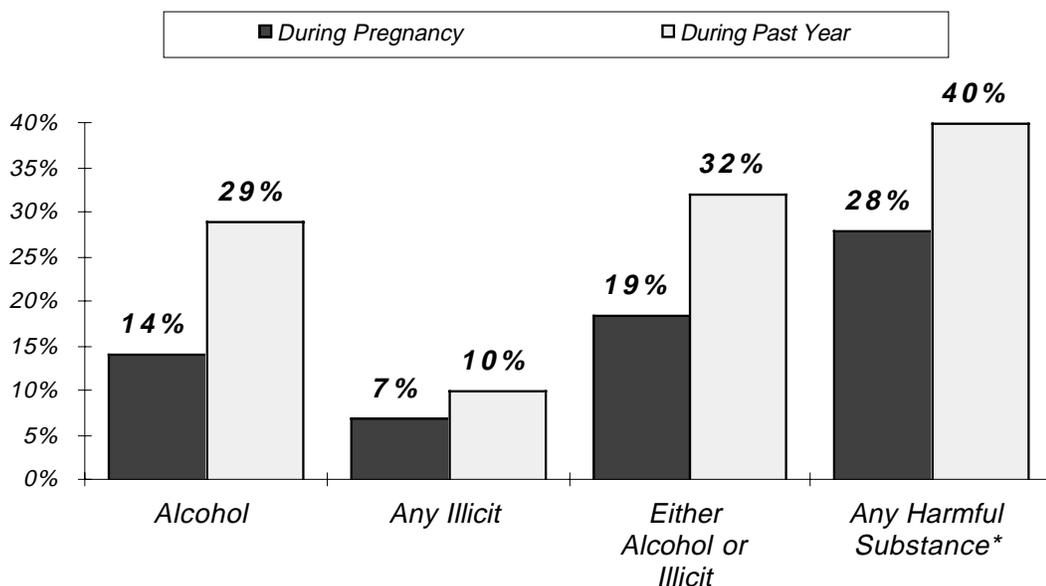
birth, and 19 percent smoked cigarettes while they were pregnant.

- 7 percent of the mothers used an illicit substance while they were pregnant, and 2 percent did so during the month before giving birth.
- 4 percent of the mothers used cocaine or crack during the year before giving birth, and 2 percent did so during pregnancy.

SUBSTANCE USE AND DEMOGRAPHIC CORRELATES

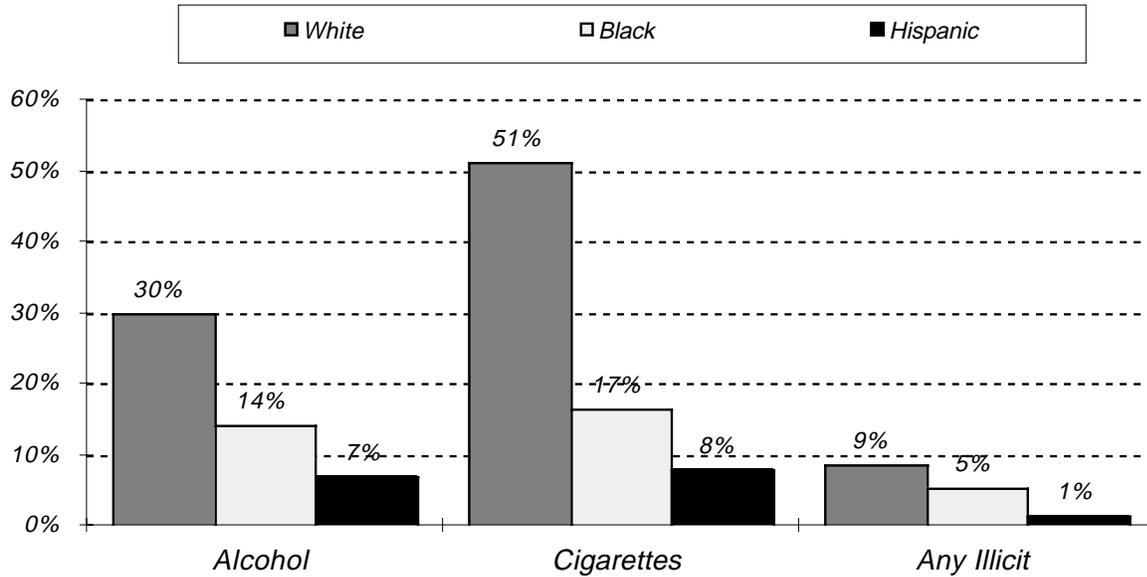
- Rates of self-reported alcohol use were three times higher for White women (57 percent past year use, 30 percent during pregnancy) than Hispanic women (18 percent past year use, 7 percent during pregnancy) and significantly higher than Black women (30 percent past year use, 14 percent during pregnancy) (Figure 2).
- White women were much more likely to smoke cigarettes (59 percent during the year before giving birth, 51 percent

Fig 1 1990 Postpartum Sample Women:
Percent Using Substances, Based on Self-Report and Blood Analysis



*Alcohol, tobacco, inhalants, or illicit drugs

Fig 2 1990 Postpartum Sample Women:
Percent Reporting Substance Use During Pregnancy by Race



during pregnancy) than Black (19 percent and 17 percent) or Hispanic women (12 percent and 8 percent).

- Women who had never attended high school were less likely to have used substances during pregnancy compared to those who dropped out or graduated.
- High school dropouts were more likely to have smoked cigarettes during pregnancy than high school graduates (25 percent versus 16 percent); rates for alcohol and illicit drug use were similar.
- In the postpartum sample, the average illicit substance user was 25 years old, White, a high school dropout, unmarried, and employed full-time.

BIRTH OUTCOMES

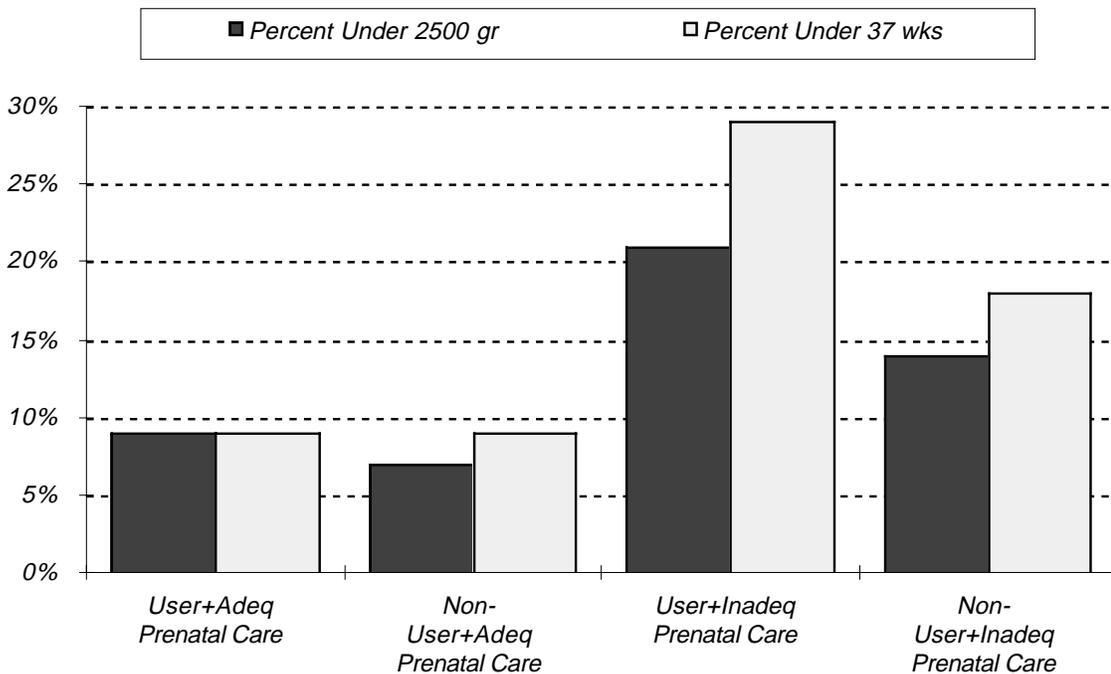
- Women who used alcohol or illicit drugs during pregnancy were slightly more likely to lack adequate prenatal care compared to non-users (32 percent versus 29 percent), more likely to have maternal complications (24 percent versus 16 percent), more likely to have infants with complications (28 percent versus 21 percent), and more likely to deliver premature infants (19 percent versus 13 percent).

- Women who received adequate prenatal care had healthier babies than women who had not received adequate care; even substance users who received adequate prenatal care had slightly better birth outcomes than non-users who had not obtained adequate care (Figure 3).
- The mean birthweight of infants born to mothers who remained substance-free during pregnancy was heavier by 89 grams (3.1 ounces) than infants born to mothers who smoked cigarettes but used no other substances during pregnancy; even women who used alcohol and/or illicit drugs but not cigarettes while they were pregnant had heavier babies than women who smoked cigarettes but used no other substances.
- The infants of mothers reporting the combined use of cigarettes, alcohol and other drugs had birthweights that averaged 2919 grams, which is 344 grams (12.1 ounces) less than infants of mothers reporting no substance use.

BARRIERS TO TREATMENT AND PRENATAL CARE

- 34 percent of the sample reported money as a problem in getting prenatal care, and 33 percent reported transportation problems as a reason.
- One-third of the women reported feeling afraid when trying to get prenatal care.
- About one-half of the women had some difficulty paying for prenatal care; of those, one-half felt that paying for care was “very difficult.”
- Problems with money or insurance were most likely to be mentioned by White women and by women living alone.
- Women who had used alcohol or illicit drugs during pregnancy were more likely than non-users to have special risk conditions (such as diabetes or high blood pressure) that could complicate delivery (32 percent versus 22 percent), and were almost three times as likely to report having been rejected for treatment for those conditions (25 percent versus 9 percent).

Fig 3 1990 Postpartum Sample Women: Birth Outcomes by Self-Reported Alcohol and/or Illicit Drug Use and Adequacy of Prenatal Care*



*"Inadequate" means not initiated before the third trimester and/or fewer than six

THE SAMPLE

INTRODUCTION

The health care needs of lower income Texans are more likely to be served in public than private hospitals. Because lower incomes are associated with youth, race/ethnic minorities, less education, and single-parent families, these characteristics are overrepresented in the postpartum survey sample. Presented in Table 2 are some selected sociodemographic characteristics of

the postpartum survey respondents. The percentages in the "Postpartum Sample" column were computed by weighting for the relative proportion of annual births in each survey hospital and represent the estimated proportion of women giving birth in the six hospitals who have each demographic characteristic. Comparable numbers for all Texas women giving birth in 1989 (using Texas Department of Health

Table 2 1990 Postpartum Sample and 1989 Texas Births:
Demographic Characteristics

Age	Postpartum Sample		1989 TX Births	Employment Status	Postpartum Sample	
	#	%	%		#	%
Under 18	152	10.4%	5.9%	Unemployed/Not seeking	677	48.3%
18 to 25	800	56.3%	38.4%	Unemployed/Seeking	123	9.1%
26 to 34	373	27.7%	48.5%	Employed/Part time	203	15.0%
35 and Over	66	4.9%	7.2%	Employed/Full time	390	27.1%
Unknown	10	0.6%	-	Unknown	8	0.5%
Total	1401	100.0%	-	Total	1401	100.0%
Race/Ethnic				Public Assistance		
White	235	17.5%	51.8%	Food Stamps	404	33.2%
Black	336	21.4%	14.4%	AFDC	202	15.1%
Hispanic	782	57.6%	33.7%	Public Housing	72	5.3%
Other	15	1.0%	2% *	WIC	627	46.5%
Unknown	33	2.5%	-	Unemployment	39	2.8%
Total	1401	100.0%	100.0%	Social Security	65	4.5%
				Disability	26	1.9%
				Total: Any Assistance	843	62.5%
				Total: Income-Qualified	810	60.3%
Education				Number of Children (Prior to Current Delivery)		
Less than HS	402	28.5%		None	572	39.3%
Some High School	445	32.4%		One	382	27.2%
HS Diploma	545	38.5%		Two	258	18.2%
Unknown	9	0.6%		Three	111	9.1%
Total	1401	100.0%		Four	49	3.8%
				Five	19	1.8%
				Six	4	0.4%
				Seven	5	0.3%
				Eight	0	0.0%
				Nine	1	0.1%
				Total	1401	100.0%
Marital Status				Household Income		
Married	692	50.4%		Under \$10,000	367	26.4%
Living Together	218	15.6%		\$10,000 to \$19,000	337	23.5%
Widowed	4	0.3%		\$20,000 to \$29,000	77	5.2%
Divorced	29	2.2%		\$30,000 or over	29	2.2%
Separated	70	5.2%		Unknown	591	42.7%
Never Married	386	26.4%		Total	1401	100.0%
Unknown	2	0.1%				
Total	1401	100.0%				

*Estimate

estimates based on the 1989 Live Birth Statistical file) are given for age and race/ethnicity.

SOCIOECONOMIC CHARACTERISTICS

Age: Of Texas women giving birth in 1989, about 44 percent were 25 or younger. An estimated 67 percent of women giving birth in the six large public hospitals were 25 or younger when they gave birth. Thus, the postpartum sample is disproportionately composed of younger women.

Race/Ethnicity: Some 52 percent of women giving birth in Texas in 1989 were White compared to only 18 percent of women giving birth in the six large public hospitals. Hispanics (58 percent of the weighted sample) and Blacks (21 percent of the weighted sample) were heavily overrepresented.

Education: About 61 percent of the sample women had not completed high school, and more than 25 percent of the women had never even reached high school. Only a small portion of the low percentage of graduates can be attributed to age; only 10 percent of the sample were under 18 years of age and therefore not old enough to have completed high school. Over one-half of the Hispanic women aged 23 or older had never reached high school and only 29 percent of that group had completed high school.

Marital Status. Only 50 percent of the sample women were married and an additional 16 percent were living with their boyfriends. In all, 34 percent of the women were neither married nor living with someone. About 26 percent had never been married and 7 percent were divorced or separated at the time of delivery.

Income: Fifty percent of the women reported annual household incomes of below \$20,000, which is evidence of limited financial resources; of those, one-half reported yearly

incomes of less than \$10,000. As might be expected, those women reporting that they lived alone were more likely than those living with their husbands, boyfriends, or parents to have yearly incomes of less than \$10,000. Over 40 percent of the women did not know the income of their household. It is understandable that some of the younger women still living with their parents might not know their household income; however, only 12 percent of those not knowing their income were less than 18 years of age. In fact, the mean age of those not knowing their income was 23 years, which is only a few months younger than the mean age of women who knew their income.

Employment: Over one-half of the women were unemployed. The main reason cited for not working was that they were needed at home to take care of the family (39 percent). Almost three-quarters of the women who worked were in clerical or service jobs, while most of the others worked in blue-collar jobs; only 6 percent of the respondents were in professional, administrative, or managerial positions.

Extent of Public Assistance: As expected, this group of women and their children relied substantially on public assistance sources for their financial support. More than 60 percent of the women were receiving some type of public financial assistance, most of which was qualified for on the basis of having low income. The forms of assistance most often received were Food Stamps, AFDC (Aid to Families with Dependent Children), and WIC (Women, Infants, and Children). The latter two are qualified for by having both low income and dependent children.

Number of Children: For about 40 percent of the women, the current birth was their first. For about one-third of the sample, the addition of this infant gave them three or more children. The average number of children for sample mothers was 2.14. White mothers had on average 2.03 children, Black mothers had 1.89 children, and Hispanic

mothers had 2.27 children. Mothers who had never reached high school had on average 2.57 children, mothers with some high school had 2.08 children, and high school graduate mothers had 1.86 children.

SOCIODEMOGRAPHIC SUMMARY

As compared to all women giving birth in Texas in 1989, those participating in the postpartum survey were younger, more economically disadvantaged, and more likely to be members of race/ethnic minority populations. A majority had not graduated from high school, and one-quarter had never reached high school. Slightly more than one-half lived either with their husbands or partners, about one-quarter lived in their parents' household, and one-quarter were in some other living situation (alone or with non-relatives). Most had obtained at least some measure of prenatal care but for a fair number, care had been inadequate.

PRENATAL CARE AND DELIVERY

Extent of Prenatal Care

Health care providers maintain that obtaining adequate prenatal care is related to positive birth outcomes. The federal standard for optimal prenatal care states that such care should be initiated in the first trimester of pregnancy and continue on a regular schedule throughout. Prenatal care is considered inadequate if not initiated before the third trimester and/or if it consists of five or fewer visits (Johnson, Mayer, & Blakeley 1987). Almost 30 percent of the postpartum sample women received inadequate prenatal care as defined above, compared to only 17 percent of the Texas population. Nearly 6 percent of the sample women received no prenatal care at all, compared to about 4 percent of Texas women. It must be remembered that many of women classified as receiving "adequate" care by no means received optimal care. Although the sample women reported not knowing they were pregnant until 8 weeks (on average) into their pregnancy, they did not seek prenatal care until 12 weeks (on average) into the pregnancy. However, the women in the postpartum sample were

only slightly less likely to receive care in the first or second trimester of their pregnancy when compared to statewide figures of women giving birth in 1989; about 10 percent of both the postpartum sample and Texas 1989 births received late or no care (Figure 4). Both figures are higher than national figures which report that 6.1 percent of women giving birth in the United States receive late or no prenatal care (Center for the Study of Social Policy 1990). On the other hand, the postpartum women had fewer prenatal care visits than Texas women in general: 25 percent of the sample women had fewer than six prenatal care visits compared to about 17 percent statewide (Figure 4).

Adequacy of Prenatal Care by Demographic Characteristics

Adequacy of prenatal care varied by a number of socioeconomic and demographic features of the postpartum women (Table 3). Women who did not know their incomes or reported yearly incomes of less than \$10,000 were less likely to obtain adequate care. Women who were unemployed, particularly those not seeking employment, were less likely to have received adequate care. Adequacy of care increased consistently with education. Women living with their husband, boyfriend, or parents received better care than those who lived alone. Hispanic women were less likely than either White or Black women to have received adequate care.

Problems the women may have encountered in obtaining prenatal care were discussed during the interviews. The findings are reported in the section entitled "Barriers to Prenatal Care and Treatment for Substance Abuse."

Attitudes Surrounding the Present Pregnancy

The majority of women in the sample (60 percent) indicated that the current pregnancy had been unplanned. For those reporting their pregnancy as unplanned, less

Fig 4 1990 Postpartum Sample and 1989 Texas Women Giving Birth:
Characteristics of Prenatal Care

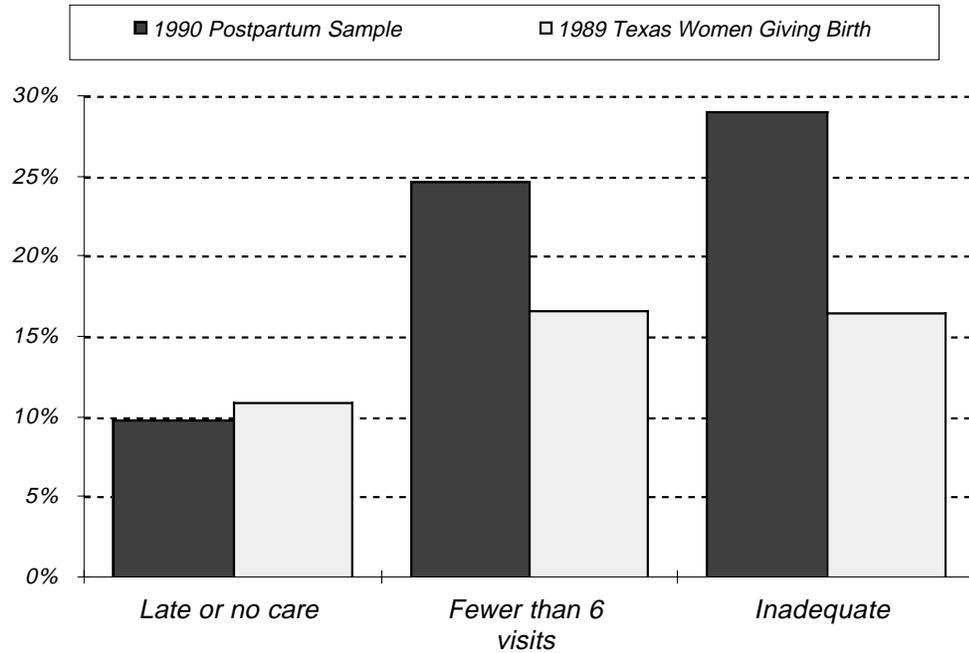


Table 3 1990 Postpartum Sample:
Adequacy of Prenatal Care by Selected Demographic Characteristics

	ADEQUATE	INADEQUATE
Income		
Less than \$10,000	66.2%	33.8%
\$10-20,000	77.7%	22.4%
More than \$20,000	77.4%	22.6%
Don't Know	69.0%	31.0%
Employment		
Unemployed, NS*	66.3%	33.7%
Unemployed, S**	72.1%	27.9%
Employed/Part Time	78.1%	21.9%
Employed/Full Time	75.3%	24.7%
Education		
Less than High School	61.8%	38.3%
Some High School	67.2%	32.8%
HS Graduate	75.8%	24.2%
Family Situation		
Live Alone	61.3%	38.7%
Live With Husband	73.6%	26.4%
Live With Boyfriend	72.3%	27.7%
Live With Parents	74.1%	25.9%
Ethnicity		
White	74.0%	26.0%
Black	72.2%	27.8%
Hispanic	65.2%	34.8%

* Not seeking employment

** Seeking employment

than one-third had been practicing any form of birth control at the time they became pregnant. Over 70 percent of women who had not planned their pregnancy nonetheless said that their pregnancy was “wanted.”

BIRTH OUTCOMES

Chart data was used to evaluate the general condition of the infants at the time of birth and in the hours afterward. The infant’s weight, length and head circumference relative to their gestational age were used to evaluate birth outcomes; the Apgar scoring system, which evaluates an infant’s heart rate, respiratory effort, muscle tone, reflex irritability, and color, was also used.

Birth Outcome Measures

Nationwide, the average infant, born at a gestational age of 40 weeks, has a birthweight of 3400 grams (7.5 pounds) with 95 percent of newborns weighing between 2500 and 4600 grams (5.5 to 10 pounds). The average newborn’s length is about 50 centimeters (about 20 inches), with 95 percent ranging within 45 to 55 centimeters (18 to 22 inches). Head circumference averages about 35 centimeters (14 inches), with 90 percent of infants falling in the range of 32.6 to 37.2 centimeters (Behrman & Vaughn 1987).

Although the postpartum sample average infant outcomes are within normal limits, they tend to fall below the national averages. Displayed in Table 4 are birth outcome figures for infants delivered to the women in the postpartum sample and some national averages. For the postpartum sample, the mean length of pregnancy was 38.8 weeks, the mean birthweight was 3212 grams (about 7.1 pounds), average length was 49.6 cm (about 19.5 inches), and average head circumference was 33.9 cm. The infants born to the postpartum sample mothers weighed an average of 188 grams (6.6 ounces) less than the national birthweight norm.

Typically, Apgar ratings on a 1 to 10 scale (with 10 indicating an optimal score) are made one minute after birth and again at five minutes after birth. Infants scoring 7 or higher are considered normal; those scoring from 4 to 6 are in fair condition and a score of 4 or less is an indication that the infant requires immediate emergency measures. About 93 percent of infants born to the sample mothers had Apgar scores in the normal range at one minute after birth. By five minutes, almost 99 percent of infants had Apgar scores within the normal range.

Birth Outcomes by Characteristics of the Sample

Differences in the weights, lengths, and head circumferences of the infants of the sample women were examined by several demographic features. As can be seen in Table 5, Hispanic women and women who had never attended high school tended to have larger babies. These differences are at least partly explained by parity; because mean birthweight increases steadily with parity, and because in this sample Hispanic women and women who never reached high school tended to have more children, their most recent child had a higher birthweight. Average infant size also increased by maternal age for the first three age categories, but declined for women 35 and over.

Birth Outcomes by Adequacy of Prenatal Care

The birthweights of the infants of women who had adequate prenatal care were significantly higher than the birthweights of those whose mothers did not receive adequate care (3277 grams compared to 3077 grams). Seven percent of mothers receiving adequate prenatal care had births that were premature by weight (less than 2500 grams), compared to 15 percent of mothers receiving inadequate care.

Table 4 1990 Postpartum Sample:
Birth Outcomes

	#	%
Number of Weeks Pregnancy Lasted	Mean: 38.8 wks	
Less than 37 weeks (premature)	165	11.8%
20 to 27 weeks	13	1.0%
28 to 36 weeks	152	10.8%
37 weeks or more	1236	88.2%
Total	1401	100.0%
Birth Weight, in grams		
Less than 2500 grams (premature)	135	9.6%
Less than 1500 grams	31	2.2%
Between 1500 and 2499 grams	104	7.4%
Over 2500 grams	1261	90.3%
Between 2500 and 3499 grams	839	60.1%
3500 grams or more	422	30.2%
Total	1396	99.9%

National Texas
Norms* 1989**

6.9%	7.0%
1.5%	
5.4%	
92.0%	

	Sample	National***
Mean birthweight (grams)	3212	3400
% weight 2500 to 4600 grams	89.5%	95%
Mean length (centimeters)	49.6	50
% length 45 to 55 cm	92.9%	95%
Mean head circumference (cm)	33.9	35
% head circ 32.6 to 37.2 cm	81.3%	90%

Apgar score, Postpartum Sample

	At 1 min	At 5 min
Less than 7	6.7%	1.4%
7 or more	93.3%	98.6%

*Anderson & MerKatz 1990

** Texas women giving birth in 1989 (Bureau of Vital Statistics 1989)

*** Berhman & Vaughn 1989

BIRTH COMPLICATIONS

In general, about 90 percent of all births are problem-free, leaving about 10 percent with some type of abnormality or complication. Many problems resolve themselves in time and others may be identified as the child develops (Hetherington & Parke 1986). Complications for the infant or mother may be due to several factors, such as trauma during the birth process, genetic or chromosomal anomalies occurring at conception, problems in the neonatal environment (exposure to drugs, viruses, or other agents) or disease or disability of the mother.

Complications surrounding the birth, both for the mother and the infant, were transcribed from chart data. There was considerable variability in the type of complications recorded and the terminology used. For example, for some births under 2500 grams, "low birthweight" was recorded as a complication and for others it was not. In addition, some complications were likely to have been omitted from the study because they were not recorded on the chart until after the chart data had been transcribed. Also, it is likely that some infant

Table 5 1990 Postpartum Sample: Birth Outcomes by Demographic Characteristics
Mean weight in grams, length and head circumference in centimeters

	Weight	Length	Head Circ
Race/Ethnicity			
White	3171	49.5	33.8
Black	3034	48.6	33.3
Hispanic	3293	50.1	34.1
Age			
Less than 18	3107	49.2	33.7
18 to 25	3195	49.6	33.8
26 to 34	3310	49.9	34.2
35 and above	3141	49.3	33.6
Education			
Less than High School	3293	50	34
Some High School	3139	49.4	33.7
HS Graduate	3213	49.5	33.9
Number of Children			
First	3173		
Second	3214		
Third	3253		
Fourth	3275		
Fifth	3297		
Sixth	3376		

complications are not apparent at the time of birth but manifest later.

Prematurity

Prematurity is the most common complication and risk factor for newborns. Infants born before a gestational period of 37 weeks and infants weighing less than 2500 grams (roughly 5.5 pounds) are considered premature. The distinction is also made as to whether the infant is small for gestational age, a determination that evaluates birthweight in relation to the infant's gestational age.

The incidence of prematurity by birthweight was slightly greater for the postpartum sample than for statewide norms (Table 4). Statewide, the rate of prematurity by weight is 7 percent, compared to 9.6 percent for the postpartum sample. About 12 percent of the sample infants were born prior to 37 weeks gestation.

Other Complications

About 22 percent of the infants were recorded as "having a complication" of some kind, and about 20 percent (with only partial overlap) had a specific complication listed. The rate of complications for sample infants was about two times the normal rate of 10 percent among births in general (Hetherington & Parke 1986).

Specific complications listed on the charts were transcribed and each complication named was coded as either a "congenital anomaly" or a "complication." "Congenital anomaly" refers to a physical defect or a physiological or metabolic abnormality present at birth (Bureau of Vital Statistics 1990, 24). More than 100 different infant complications and 50 congenital anomalies were listed. About 5 percent of the sample infants had a congenital anomaly. Heart murmur, listed for 8 of the infants, and umbilical hernia, listed for 7 infants, were

the most frequently noted congenital anomalies. The general complications most frequently noted were meconium in the amniotic fluid (44 infants, 3 percent of sample infants), respiratory distress (40 infants, 3 percent), and nuchal cord (umbilical cord around infant's neck; 38 infants, 3 percent). The finding of meconium in the amniotic fluid is evidence of stress to the fetus, possibly from lack of oxygen in the uterine environment.

Maternal Complications

For ten specific maternal complications, "presence" or "absence" was coded from chart data. Other maternal complications were less systematically coded and were generally transcribed along with infant complications. For the ten specifically-coded complications recorded, 18 percent of the sample women were reported to have at least one.

The most common complication of pregnancy is pregnancy-induced hypertension, which was identified in the chart data as "toxemia," "preeclampsia," or "eclampsia." For many years "toxemia" was used to refer to hypertensive disorders of pregnancy in general as well as other conditions complicating pregnancy; however, more recently other terms have been recommended for use (Scott & Worley 1990). Pregnancy-induced hypertension is a condition specific to pregnancy in which a wide range of symptoms occur, including mild to severe increase in blood pressure. At the most severe range, eclampsia, multiple organ dysfunction and grand mal seizures occur which is life-threatening for both mother and infant. This situation is fortunately preventable when pregnancy-induced hypertension is properly treated. Typically, pregnancy-induced hypertension is noted in about 5 to 7 percent of otherwise normal pregnancies (Scott & Worley 1990). About 10 percent of the postpartum women were reported as having pregnancy-induced hypertension. The next most frequently noted maternal complication was prema-

ture rupture of the membranes (PROM) which occurred in 3 percent of the sample women.

Neonatal Deaths

Neonatal deaths are those which occur in the first 28 days of life. In Texas in 1989, neonatal deaths occurred at the rate of 5.6 per 1,000 live births (Bureau of Vital Statistics 1989). For the present sample, it was not possible to determine comparable neonatal mortality rates because the infants were not followed for 28 days after birth. However, 10 out of 1,401 births assessed within 24 hours were recorded as not surviving, which translates to a rate of 7.14 deaths per 1,000 births. In Texas in 1989, the neonatal death rate within the first 24 hours was 3 per 1,000.

FAMILY AND PEER SUBSTANCE USE

Family Substance Use

A child raised in a family in which one or both parents abused alcohol and/or other drugs is generally regarded as at higher risk for substance abuse, as well as for social and psychological dysfunction (Gordis 1990). Both the genetic and social-psychological environment leave children of substance abusers vulnerable to developing problems of their own. Women participating in the study were asked the extent to which their parents used alcohol and other drugs and whether or not parental use was perceived to be problematic. The findings in Table 6 reveal that 26 percent of the mothers of the sample women and 61 percent of the fathers ever drank alcohol and/or used any other drug. Relatively few women reported that their parents had used drugs other than alcohol. About 2 percent of the sample women had never known their mothers and about 6 percent had never known their fathers.

About 22 percent of the sample women felt that at least one of their parents had a "problem" with alcohol or drugs, which is similar to the 19 percent of women in Texas

Table 6 1990 Postpartum Sample:
Parental History of Substance Use

Extent to Which Parents Used Alcohol and/or Other Drugs:

Mother:	Never Used	Used	Do Not Know
Alcohol	70.3%	25.8%	3.9%
Drugs	93.7%	4.1%	2.3%
Either	69.5%	26.3%	4.3%

Father:	Never Used	Used	Do Not Know
Alcohol	29.9%	60.8%	9.3%
Drugs	87.9%	5.4%	6.6%
Either	28.8%	61.0%	10.1%

Either Parent:	Never Used	Used
Alcohol	28.7%	71.3%
Drugs	90.7%	9.3%

	Mother	Father
Never Knew Parent	1.8%	5.9%

(If Parent Drank Alcohol) How Would You Describe the Extent?

	Light	Moderate	Heavy
Mother	64.4%	21.5%	13.0%
Father	41.3%	28.1%	29.4%
Either			34.4%

(If parent drank or used drugs)

Do you think he/she had a problem with either?

	No*	Yes
Mother	80.4%	19.6%
Father	71.6%	28.4%

(If Parent Drank Moderately or Heavily or Used Drugs)

Do You Think He/She Had a Problem with Alcohol or Drugs?

Mother:	No	Yes	Do Not Know
Alcohol	50.0%	49.2%	0.8%
Drugs	34.0%	50.0%	16.0%
Either**	53.3%	46.7%	

Father:	No	Yes	Do Not Know
Alcohol	47.6%	47.8%	4.6%
Drugs	38.2%	52.9%	8.8%
Either**	52.4%	47.6%	

*"No" includes "Do Not Know"

** Alcohol and/or other drugs

who felt that at least one parent had a problem with alcohol or drugs (Spence et al. 1989). Of the women acknowledging that a parent had a substance problem, about 15 percent said that their parent had received treatment. About 13 percent of the total postpartum sample reported having any relative, including their parents, receive treatment for substance abuse.

Peer Substance Use

Association with substance-using peers is considered to be a strong predictor of substance use (Hawkins, Lishner, & Catalano 1985). About 73 percent of the sample said that some or most of their friends smoked cigarettes, 78 percent reported that some or most of their friends drank alcohol, and about 30 percent reported that some or

most of their peers used illicit drugs (Table 7). Marijuana was the drug most often used by peers, followed by cocaine. The postpartum sample women are similar to women in the general population: about 73 percent of Texas women said that some or most of their friends smoked cigarettes, 86 percent said that some or most drank alcohol, and 35 percent said that some or most used illicit drugs.

PERCEIVED DANGERS OF SUBSTANCE USE DURING PREGNANCY AND KNOWLEDGE OF FETAL ALCOHOL SYNDROME (FAS)

The sample women were asked to rate the extent of danger to the baby when a pregnant woman uses various substances (Table 8). For all substances except alcohol and marijuana, 95 percent or more viewed use during pregnancy as “very dangerous” for the baby. Alcohol had the lowest “very dangerous” rating with only 83 percent so rating it, followed by marijuana (91 percent).

When compared to responses obtained from a survey of Texas adults in 1983, it would appear that the women in the present sample perceived alcohol consumption during pregnancy to be of greater danger than did the 1983 general population (Tuchfeld et al. 1983). Although most of the respondents from both studies perceived alcohol use during pregnancy to be dangerous, a slightly larger percentage of the current sample perceived alcohol as dangerous (96 percent compared to 90 percent). In the 1983 survey, those with more education rated alcohol as more hazardous than those

with less education; also in the 1983 sample, younger people and those who were married were more likely to rate alcohol as dangerous. In the current survey, the relationship between perceived dangers of alcohol and education and age was not significant, but married mothers were more likely to rate alcohol as very dangerous than were non-married mothers.

Only 22 percent of the postpartum sample reported knowing about Fetal Alcohol Syndrome. Those who said they knew about FAS were asked to briefly describe the effect it has on a fetus or newborn infant. While slowed fetal growth, low birthweight, birth defects and mental retardation were mentioned by some women, the only effect mentioned by more than one-half of them was addiction/withdrawal. It is apparent that few sample women had adequate knowledge about FAS.

Those who reported having some knowledge most often stated that they learned about FAS at school (30 percent) or from television (25 percent). Very few women (1.7 percent) reported learning about it at their prenatal clinic or hospital. Although most women, regardless of education, did not know about FAS, as educational level increased, the women were more likely to report knowing about FAS. About 46 percent of White women, 24 percent of Black women, and 15 percent of Hispanic women knew about FAS. The knowledge pattern across ethnicity regarding FAS was not consistent with the ethnic pattern of perceived danger of drinking during pregnancy. Although Black and Hispanic women were less likely than White women to know about FAS, they were more likely to perceive

Table 7 1990 Postpartum Sample and 1988 Texas Women: Substance Use Among Peers

	POSTPARTUM SAMPLE			WOMEN IN TEXAS		
	Most	Some	None	Most	Some	None
Cigarettes	24.5%	48.1%	27.4%	23.5%	49.5%	27.0%
Alcohol	19.5%	58.8%	21.7%	35.6%	50.0%	14.4%
Any Illicit	6.3%	23.7%	70.0%	6.9%	28.4%	64.8%

Table 8 1990 Postpartum Sample:
Perceived Dangers of Drug and Alcohol Use During Pregnancy

How dangerous do you think it is for the baby when pregnant women use:

	Very	Somewhat	Not very	Not at all	Don't Know
Alcohol	83.2%	13.2%	1.6%	0.1%	1.9%
Marijuana	91.4%	6.2%	0.6%	0.4%	1.4%
Inhalants	97.1%	1.1%	0.2%	0.1%	1.5%
Cocaine	97.4%	0.9%	0.2%	0.1%	1.4%
Crack	97.4%	0.9%	0.2%	0.1%	1.4%
Uppers	95.8%	1.8%	0.2%	0.1%	2.1%
Downers	95.4%	2.4%	0.2%	0.1%	1.9%
Heroin	97.0%	1.1%	0.2%	0.1%	1.5%
Methadone	95.6%	1.4%	0.3%	0.1%	2.6%
Other opiates	96.2%	1.5%	0.2%	0.1%	1.9%
Psychedelics	96.0%	1.4%	0.1%	0.2%	2.2%

1990 Postpartum Women Sample:

How dangerous is it for the baby when pregnant women use alcohol?

Very	Somewhat	Not very	Not at all	Don't Know
83.2%	13.2%	1.6%	0.1%	1.9%

1983 TCU Sample:

Drinking alcohol during pregnancy is hazardous to the health of an unborn child.

Strongly Agree	Agree	Disagree	Strongly Disagree	Not Applicable
55.0%	35.0%	6.0%	4.0%	0.4%

	FAS Knowledge	No FAS Knowledge
Age		
Less than 18	21%	79%
18-25	23%	77%
26-34	24%	76%
35 or Older	15%	85%
Education		
Less than HS	9%	91%
Some HS	21%	79%
HS Grad	33%	67%
Self-Report Use		
Non-User	20%	80%
User	37%	63%
Ethnicity		
White	46%	54%
Black	24%	76%
Hispanic	15%	85%
TOTAL	22%	78%

alcohol use during pregnancy as “very dangerous.” Most of the sample women said they had received instructions to avoid the use of substances during pregnancy, but not as frequently as instructions to take vitamins and eat the proper foods.

Those women reporting alcohol use during their pregnancy were more likely than non-drinkers to know about FAS. Despite their

greater awareness of FAS, drinkers were much less likely to view alcohol use during pregnancy as “very dangerous” (59 percent versus 88 percent). Quite possibly, these women have an inaccurate understanding of FAS which leads them to minimize the potential danger of alcohol use during pregnancy.

P REVALENCE OF SUBSTANCE USE

TERMS AND LIMITATIONS

Prevalence refers to the percentage of women reporting use of a substance at a given time. While prevalence does not give any information about frequency of substance use or the quantity of substance used on any given occasion, it does offer a convenient means for identifying substance use correlates.

Lifetime prevalence, reflected in the “ever used” category, represents the percentage of sample women reporting the use of a substance at least once in their life and provides a basis for examining changes in substance use patterns.

Total past year prevalence is a measure of the percentage of sample women who used a substance within the past year, and includes both current (past month) and past year substance users. Women who use substances occasionally, as well as those who use on a more frequent basis, are included in this group of users.

Prevalence during pregnancy measures the percentage of women who used a substance since becoming pregnant. It is a subset of the total past year prevalence.

Past month prevalence refers to the percentage that have used within the past month, and is a subset of total past year prevalence.

There is reason to believe that many of those women reporting use in the past year but not during pregnancy may actually have exposed their fetuses to drugs. Many mothers may have found it easier to admit use during the past year than during pregnancy. In addition, many quit using only after they realized they were pregnant, which was an average of eight weeks into their pregnancy. For these reasons, past year prevalence may be a reasonable estimate of prevalence during pregnancy.

In the following discussion, rates of self-reported substance use during the past year and during pregnancy are augmented with the results of umbilical cord blood tests for alcohol, cocaine, methamphetamines and heroin. Blood tests which screened positive for cocaine, methamphetamines or heroin using the RIA technique were then subjected to a more stringent confirmatory analysis using GC/MS (see Appendix C for a full description of methodology). The prevalence estimates discussed below take into account the results of the blood tests for those four substances. In general, inclusion of the blood test results raised prevalence estimates for each of the four substances tested by one or two percentage points. Prevalence tables by ethnicity, age, and education based on self-report alone are located in Appendix D. Substance abuse is described by substance category and type and is compared across age, education, and racial/ethnic groups. These comparisons are bivariate and do not control for the differential distribution of the sample within these demographic groups.

OVERVIEW OF SUBSTANCE USE DURING PREGNANCY AND DURING PAST YEAR

About 28 percent of the women used alcohol, inhalants, cigarettes, or an illicit substance during pregnancy (24 percent self-reported plus 4 percent blood positive) (Table 9). Alcohol use during pregnancy was reported or detected in 14 percent of the women (12.5 percent self-reported plus 1.6 percent blood positive). Just over 2 percent used powder or crack cocaine during pregnancy (0.9 percent self-reported plus 1.4 percent blood positive), and 7 percent used an illicit substance during pregnancy (3.3 percent self-report plus 3.6 percent blood positive). About 19 percent drank

Table 9 1990 Postpartum Sample:
Substance Use During Pregnancy and in Past Year

	Self-Report	Self-Report Plus Blood
Substance Use During Pregnancy		
Alcohol	13%	14%
Cocaine/Crack	1%	2%
Any Illicit	3%	7%
Alcohol and/or Illicit	14%	19%
Any Harmful Substance*	24%	28%
Substance Use During Past Year		
Alcohol	27%	29%
Cocaine/Crack	3%	4%
Any Illicit	7%	10%
Alcohol and/or Illicit	29%	32%
Any Harmful Substance*	37%	40%

Because percentages here are not weighted as in Appendix D prevalence tables, there may be some very minor discrepancies between this table and those in Appendix D.

*Alcohol, inhalants, tobacco, and/or illicit drugs

alcohol and/or used an illicit substance during pregnancy (13.8 percent self-reported plus 4.7 percent blood positive).

Past year use follows a similar pattern but is approximately twice as high as use during pregnancy. About 40 percent of the women used a harmful substance (alcohol, cigarettes, inhalants, or an illicit drug) within the past year (36.8 percent self-reported plus 3 percent blood positive). About 29 percent of the women drank alcohol in the past year (27.4 percent self-reported plus 1.2 percent blood positive). Powder or crack cocaine use was reported by or detected in about 4 percent of the women (2.6 percent self-reported plus 1.2 percent blood positive). In total, 10 percent of the women (7.0 percent self-reported plus 3.2 percent blood positive) had used any illicit drug in the past year, and 32 percent (29 percent self-reported plus 3.4 percent blood positive) had used either alcohol or illicit drugs within the past year.

In summary, self-report and blood tests suggest that approximately 40 percent of women had used any substance, including cigarettes, within the past year, and 28 per-

cent of them had used a substance since pregnancy. These are conservative estimates since women were probably underreporting illicit substance use, blood test results were based on stringent GC/MS procedures, and blood tests were only sensitive to substances used within a day or two prior to the test.

COMPARISONS BETWEEN POSTPARTUM SAMPLE AND ALL TEXAS WOMEN

Self-reported substance use of the postpartum women were compared to use patterns reported by the general population of Texas women, who were surveyed in 1988 using a similar series of substance use questions (Table 10). The general population sample was weighted to reflect the age and ethnic composition of the postpartum sample. For most substances, the postpartum women reported lower lifetime as well as past year use. Use rates were similar for both groups for cocaine and opiates other than heroin. For heroin and crack, use was slightly higher for the postpartum women. A number of reasons could account for the differences

Table 10 1990 Postpartum Sample and 1988 Texas Women:
Prevalence and Recency of Use*

		EVER USED	PAST MONTH	PAST YEAR	NOT PAST YEAR	NEVER USED
TOBACCO	Postpartum	36.4%	15.9%	7.1%	13.4%	63.6%
	Texas Women	53.5%	16.5%	5.8%	31.2%	46.5%
ALCOHOL	Postpartum	63.6%	5.7%	21.8%	36.1%	36.4%
	Texas Women	83.2%	35.8%	30.1%	17.3%	16.8%
MARIJUANA	Postpartum	24.7%	1.8%	3.6%	19.3%	75.3%
	Texas Women	29.6%	3.3%	4.4%	21.9%	70.4%
INHALANTS	Postpartum	2.6%	* *	* *	2.4%	97.4%
	Texas Women	5.5%	* *	0.9%	4.5%	94.5%
COCAINE	Postpartum	7.5%	* *	2.1%	5.2%	92.5%
	Texas Women	7.5%	0.8%	1.7%	5.0%	92.5%
CRACK	Postpartum	1.4%	* *	0.7%	* *	98.6%
	Texas Women	0.5%	* *	* *	* *	99.5%
UPPERS	Postpartum	6.1%	* *	0.9%	5.2%	93.9%
	Texas Women	12.5%	0.8%	0.7%	10.9%	87.5%
DOWNERS	Postpartum	2.7%	* *	* *	2.6%	97.3%
	Texas Women	4.9%	* *	* *	4.6%	95.1%
HEROIN	Postpartum	0.7%	* *	* *	* *	99.3%
	Texas Women	0.3%	* *	* *	* *	99.7%
OTHER OPIATES	Postpartum	1.1%	* *	* *	0.8%	98.9%
	Texas Women	1.0%	* *	* *	0.6%	99.0%
PSYCHEDELICS	Postpartum	3.4%	* *	0.6%	2.8%	96.6%
	Texas Women	6.2%	0.9%	0.5%	4.8%	93.8%
ILLICIT DRUGS	Postpartum	26.3%	2.3%	4.9%	19.0%	73.7%
	Texas Women	32.9%	4.7%	5.0%	23.2%	67.1%
COC OR CRACK	Postpartum	8.0%	* *	2.4%	5.1%	92.0%
	Texas Women	7.7%	0.8%	1.8%	5.0%	92.3%

*Estimates for Texas women were weighted to reflect the age and ethnic composition of the postpartum sample; estimates for both samples are based on self-report only.

**Less than 0.5%.

found. Women who have recently given birth may differ from other women in such areas as household structure, employment patterns, support systems, stress factors, and motivations.

There are also methodological reasons that could account for differences between the two samples. First, although most of the age and ethnic variation between the two samples was controlled, 11 percent of the postpartum sample were under age 18, while in the adult survey, women under 18 were not included. Second, the adult survey was carried out in 1988, and illicit substance use may have changed since that time. Third, differences in income and edu-

cation levels between the postpartum women and all Texas women were not controlled; not only might these affect substance use, but they might also affect the probability of the postpartum women's representation in the general adult survey (if, for instance, the postpartum women were less likely to have telephones). For these reasons, differences found between the two samples should be interpreted with caution.

LICIT SUBSTANCE USE

Tobacco, alcohol, and inhalants are substances categorized as "licit." Alcohol and tobacco were the substances used most often by the sample women in the past year

and during pregnancy. The rate of inhalant use for the overall sample was relatively low.

Alcohol

Alcohol was the substance most often used by sample women. Nearly two-thirds reported ever drinking alcohol, but less than one-half of those reporting any lifetime use reported or tested positive for use during the past year. When compared to Texas women, the sample women reported somewhat lower rates of lifetime use (64 percent versus 83 percent), but total past year and past month rates of use were markedly lower for the postpartum women (28 percent versus 66 percent total past year, 6 percent versus 36 percent past month) (Table 10). The sample women who were under 18 were less likely to have ever used alcohol, but past year use rate approached that of the other two older groups. Alcohol use during pregnancy was reported or measured for 14 percent of the sample compared to 29 percent for usage during the past year, evidence that about one-half of these women quit drinking when they knew they were pregnant (Appendix D).

Rates of alcohol use were highest for White women and lowest for Hispanic women (Figure 5). Women who never attended high school were the least likely to use alcohol. High school graduates were slightly more likely to be alcohol drinkers than were high school dropouts, but the rates of use for both of these groups are quite similar.

Cigarettes

Although lifetime prevalence of cigarette smoking was lower than that of alcohol consumption, those who had ever used were more likely to continue use through pregnancy. Nearly two-thirds of those who reported lifetime use of cigarettes used within the past year, and about one-half of lifetime users (19 percent of the entire sample) reported smoking during pregnancy. Although lifetime use of cigarettes was lower for postpartum women than Texas women in general, past month and past year use rates were no lower for the postpartum women than for Texas women (Figure 6). As with alcohol, White women were much more likely than Blacks or Hispanics to report smoking cigarettes. Older women were slightly more likely to smoke

Fig 5 1990 Postpartum Sample:
Reported Alcohol Use by Race

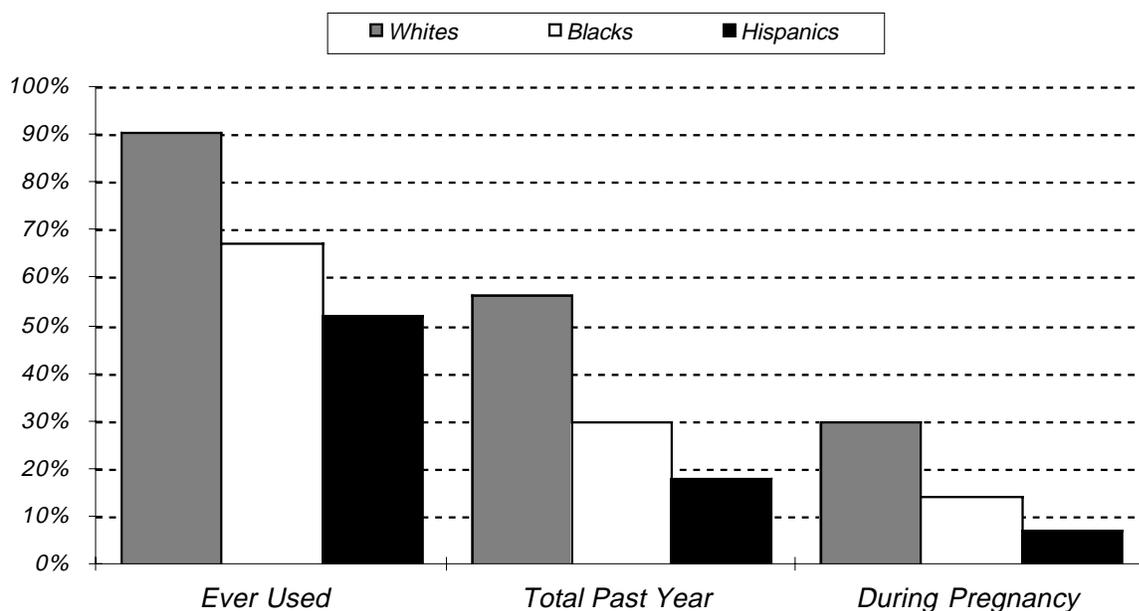
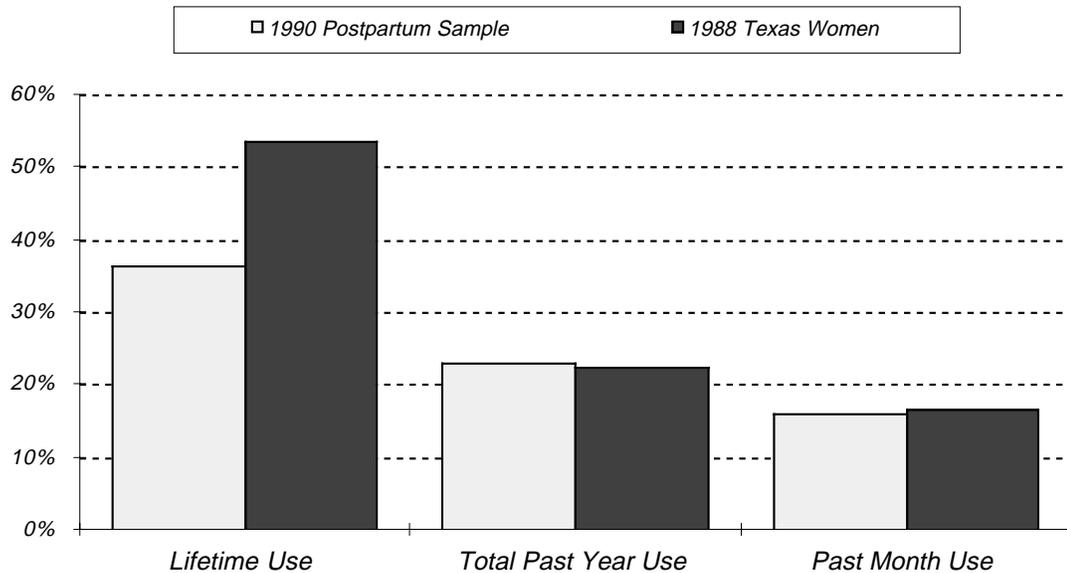


Fig 6 1990 Postpartum Sample and 1988 Texas Women:
Reported Cigarette Smoking



cigarettes than were younger women. High school drop outs were more likely to smoke cigarettes than either high school graduates or women who had never attended high school.

Inhalants

The inhalant category includes a large variety of volatile substances which can be inhaled to produce intoxication. Less than 3 percent of the sample reported ever using inhalants compared to 5.5 percent of Texas women. Women most likely to use inhalants were White, under age 18, and high school dropouts. Fewer than 0.5 percent of women reported inhalant use within the past month.

ILLICIT SUBSTANCE USE

Illicit drug use encompasses the non-medical use of marijuana, cocaine, crack, “uppers”, “downers”, heroin, other opiates, and psychedelics. Lifetime use of an illicit drug was reported by 26 percent of the sample women, compared to 33 percent of Texas women in the general population. Rates of past year and past month use were similar. About 7 percent of the postpartum sample used an illicit drug during pregnancy (based on self-report and blood analy-

sis), and 10 percent used an illicit drug within the past year. Thus, 70 percent of women using illicit drugs continued to use after they became pregnant. White women were most likely and Hispanics least likely to report illicit drug use. There was no consistent pattern of illicit drug use by age. Women who had never attended high school were least likely to have ever used illicit drugs.

Marijuana

Of the illicit drugs, marijuana was by far the most prevalent. One-quarter of the sample women reported ever using marijuana; however, only 5 percent reported use within the past year. When compared with Texas women (Table 10), the sample women report similar but slightly lower patterns of lifetime and recent use. For the postpartum sample, as with the other substances, marijuana use was highest among White women and lowest for Hispanics. Use was similar across age categories. Women who had never attended high school were least likely to have used marijuana.

Cocaine or Crack

Cocaine (powder or crack) was the next most commonly used drug, with 8 percent

of the sample reporting lifetime use. Rates of use were similar for the general population of Texas women. Both postpartum women and Texas women reported low levels of past year and past month use. When rates of cocaine use for the postpartum women were augmented by umbilical blood testing, recent use figures increased slightly. Use during pregnancy was reported or measured for 2 percent of the sample women, and past year use for 4 percent. Lifetime and past year use was highest for White women and lowest for Hispanics. Lifetime use was highest for older women. High school dropouts had slightly higher rates of lifetime and past year use.

Stimulants

About 6 percent of the postpartum women reported any lifetime use of stimulants or “uppers,” which is about one-half the rate reported by Texas women in general. About 1 percent of both groups reported past year use; the postpartum past year rate rises to about 2 percent when blood analysis data is included. White women had the highest rates of lifetime and past year use. Older women and better-educated women had higher lifetime use, but there was little difference in past year use by age or education.

Psychedelics

Psychedelics include a wide array of substances used for their hallucinogenic effects, including LSD, mescaline, and “designer drugs” such as Ecstasy. Lifetime reported use among the sample was about one-half the rate reported by Texas women (3 percent versus 6 percent). Less than 1 percent of the postpartum sample reported use within the past year. White women reported most of the psychedelic use, and lifetime use increased with education but was highest among women under age 18.

Sedatives

“Downers” include many different kinds of sedatives, tranquilizers, and barbiturates

used for non-medical purposes. Just under 3 percent of postpartum women reported ever using these substances compared to about 5 percent of Texas women. Use during the past year was seldom reported.

Heroin and Other Opiates

Only 1 percent of postpartum women or Texas women reported ever using heroin or other opiates. When blood test results are included, lifetime use increased to 3 percent and past year use to 2 percent for the postpartum women. Use in the postpartum sample was primarily confined to White women in the 26 to 34 age category.

Alcohol, Cigarettes, Inhalants, or Any Illicit Substances

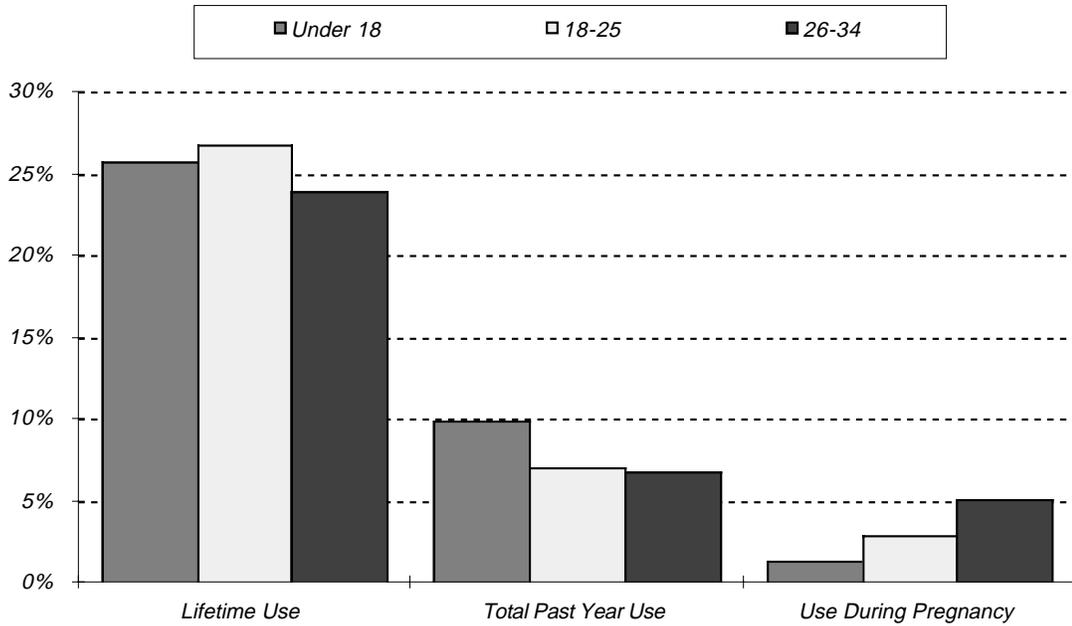
If alcohol, cigarettes, inhalants, or all illicit substances are combined, 40 percent of the sample women reported or were measured to have used one or more of these harmful substances during the past year and 28 percent did so during pregnancy. This indicates that 70 percent of these women continued to use harmful substances even after they were pregnant. Excluding cigarettes and inhalants, the rate of alcohol or any illicit substance use was 32 percent for past year use and 19 percent for use during pregnancy.

AGE PATTERNS

Lifetime substance use was similar between age groups (Table D3, Table D4, and Figure 7). Although their exposure time was longer, older women did not have consistently higher lifetime use on all substances. Women in the 18 to 25 group reported the highest rates of lifetime use for alcohol and illicit drugs.

Patterns of use during pregnancy and past year show different age patterns. Women in the oldest group (26-34) generally reported higher rates of use during pregnancy, and younger women reported more past year use, especially of illicit substances.

Fig 7 1990 Postpartum Sample:
Reported Use of Any Illicit Substance by Age Group



This pattern may indicate that a higher percentage of the younger women stopped using. Abstinence may be more difficult for older women if they have been using longer and/or are dependent. In contrast, the lower use rates for younger pregnant women may indicate that these women are heeding messages about abstinence during pregnancy.

RACIAL/ETHNIC PATTERNS

Whites clearly had the highest rates of lifetime use of all substances (Table D1, Table D2, and Figure 8). For alcohol and marijuana, Hispanics had lower rates than Blacks; on other substances, rates were similar. Whites used all substances except alcohol and crack at double or greater the rate of the other two race/ethnic groups.

Past year use and during pregnancy use reflected a similar pattern. If the rates of use since pregnancy are compared with the rates of past year use, it is clear that substance use declined in pregnancy for all ethnic groups; however, 30 percent of White women continued to drink during pregnancy and almost 9 percent reported illicit substance use in pregnancy. Hispanics reported very low use rates of any substance

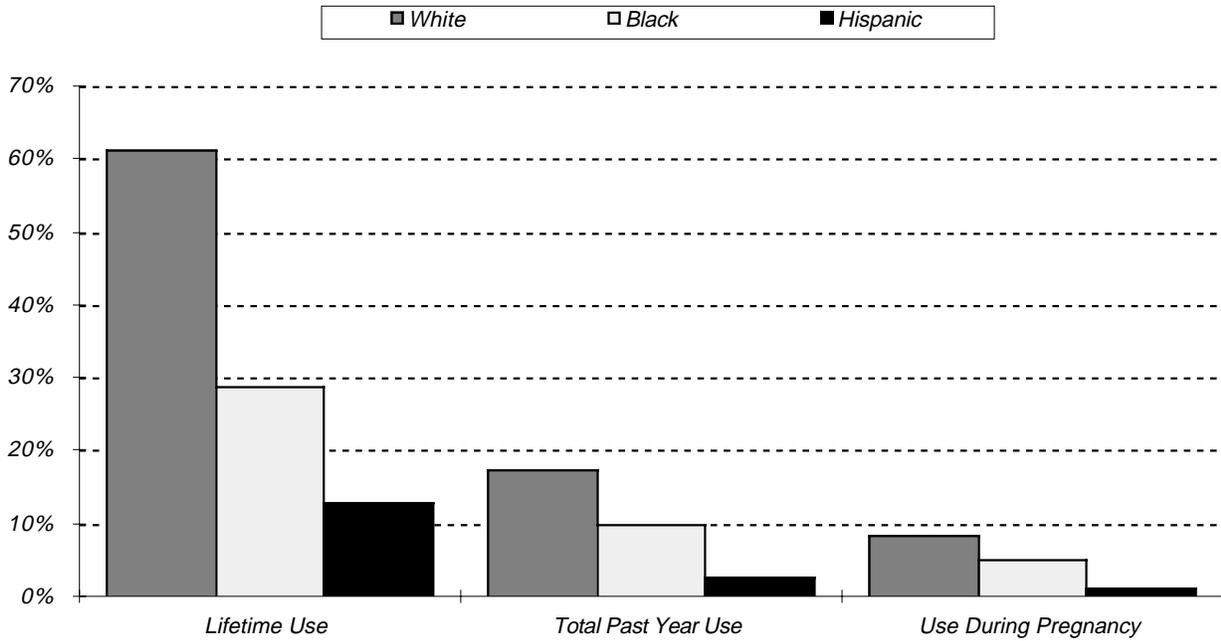
during pregnancy. These figures belie the stereotype that substance use during pregnancy is most prevalent among minority women.

EDUCATIONAL PATTERNS

In most studies of prevalence by education level, high school graduates are compared with non-graduates. In the present sample, there was such a large group of women who had never attended high school that non-graduates were divided into those who had never attended high school at all and those who had attended but not completed (dropped out). Women who had never attended high school had the lowest prevalence of lifetime use (Table D5, Table D6, and Figure 9). There were no consistent differences in lifetime use patterns between the women with some high school and those who were high school graduates. High school dropouts were more likely to have ever smoked cigarettes, while high school graduates were most likely to have ever used alcohol.

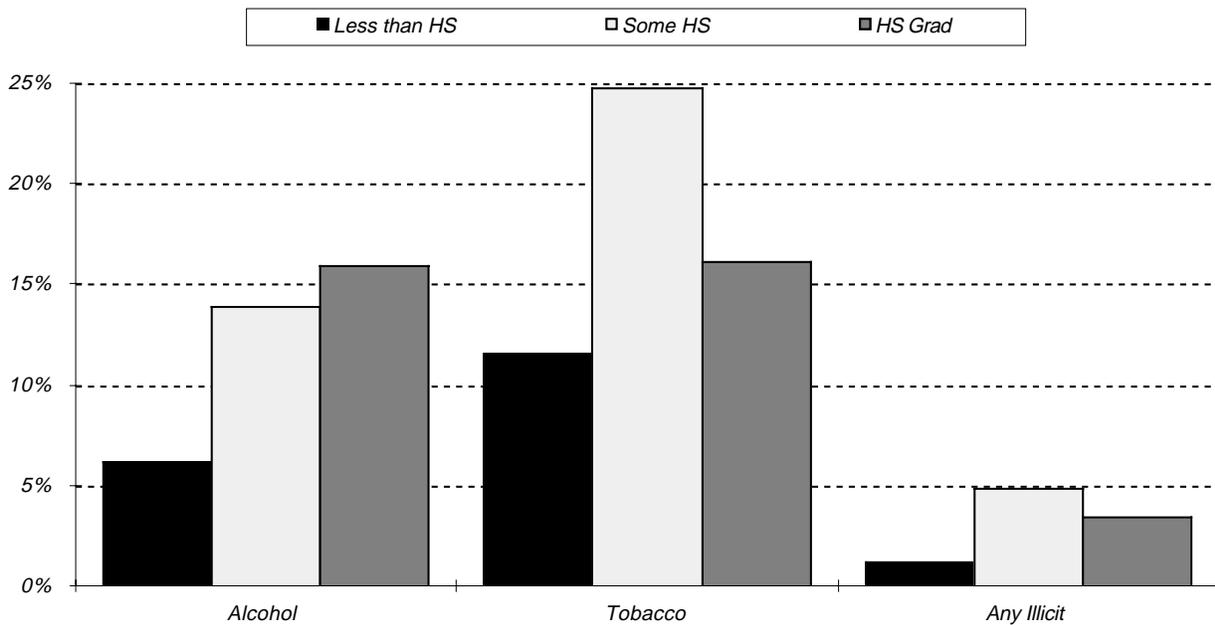
When past year and during pregnancy use were considered, high school dropouts were more likely to have smoked cigarettes, and graduates were more likely to have used

Fig 8 1990 Postpartum Sample:
Reported Illicit Drug Use by Race



alcohol. High school dropouts were also more likely to have used marijuana and other illicit substances in the past year and since pregnancy. These findings suggest that lack of education alone does not explain why some women use substances during pregnancy.

Fig 9 1990 Postpartum Sample:
Reported Substance Use During Pregnancy by Education Level



PROBLEM INDICATORS

Respondents who used alcohol or other drugs in the past year were asked about specific kinds of alcohol- or drug-related problems they may have experienced during that time period, such as blackouts, aggressiveness, anxiety, or pressure by relatives to quit using. These questions were selected to identify various manifestations of substance dependence, and have been used in previous surveys of the Texas adult population and inmates in the Texas Department of Corrections. Although the same questions were asked of all three populations for the purposes of comparability, it should be noted that some of the problems listed may be less relevant to pregnant women, while other problems which may be unique to them were not tapped. In addition, because of the evidence that there is no known “safe” level of alcohol or other drug consumption during pregnancy, the reporting of even one problem would suggest that substance use was extensive enough to impose an additional risk to the pregnancy.

ALCOHOL PROBLEMS

Women who reported consuming 10 or more drinks in the past year were asked whether they had experienced any of 19 problems while or after drinking (see Appendix E). Of women self-reporting alcohol use since pregnancy, 71 percent reported no problems, 29 percent reported one or more problems, 21 percent two or more problems, 17 percent three or more, 13 percent four or more, and 11 percent five or more. The mean number of problems for women who had used alcohol since pregnancy was 1.4. For users who had at least one problem, the mean number of problems reported was 4.9.

The most frequently reported problems, each reported by approximately 9 to 12

percent of alcohol users, were the following: getting into a heated argument while drinking, alcohol guzzling, feeling aggressive or cross, experiencing blackouts, being told by spouse, relatives, or friends to cut down on drinking, getting drunk when alone, continuing to drink after promising themselves not to, and fearing that they were or might become an alcoholic.

DRUG PROBLEMS

Women who had used drugs other than alcohol or nicotine within the past year were asked if they had experienced any of 17 problems associated with their drug use. Users of drugs other than alcohol were more likely than alcohol users to report substance-related problems.

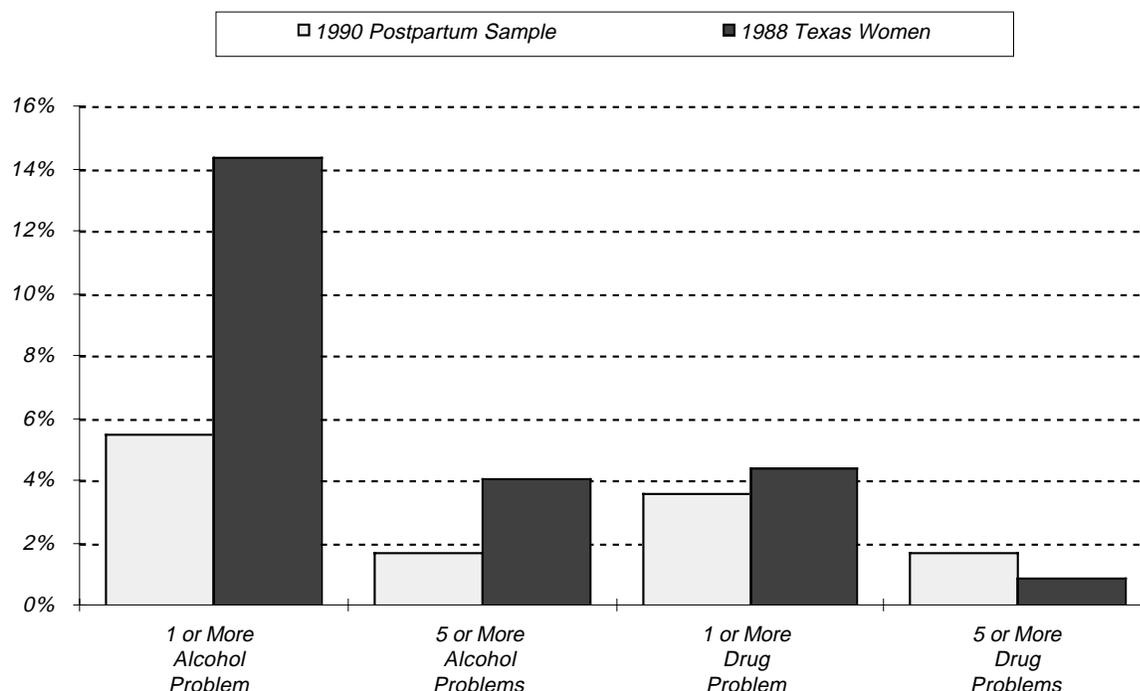
Of women self-reporting drug use since pregnancy, 50 percent reported no problems, 50 percent reported one or more problems, 44 percent two or more, 35 percent three or more, 33 percent four or more, and 30 five or more. The mean number of drug-related problems reported by women who had used other drugs since pregnancy was 3.3; for women who reported at least one drug problem, the mean number was 6.6.

The problems most frequently reported, each by 28 to 33 percent of the drug users in pregnancy, were as follows: feeling nervous and anxious, irritable and upset, or completely alone and isolated, or getting into arguments and fights with family and friends.

EITHER ALCOHOL OR DRUG PROBLEMS

Of women self-reporting either alcohol or illicit drug use in the past year, 27 percent reported at least one problem, 15 percent reported at least three problems, and 11 percent at least five problems. When lim-

Fig 10 1990 Postpartum Sample and 1988 Texas Women:
Alcohol and Drug Problems



ited to women reporting alcohol or drug use since pregnancy, 37 percent reported at least one problem, 23 percent at least 3 problems, and 18 percent at least 5 problems.

Figure 10 compares the percent reporting alcohol and other drug problems in the postpartum sample with those in a sample of all Texas women of childbearing age, weighted to represent the same age and ethnic composition as the postpartum sample. The postpartum women were substantially less likely than Texas women to report any alcohol problems and slightly less likely to report any drug-related problems. However, they were slightly more likely to report having five or more drug-related problems than the general population of Texas women. The relative frequency of alcohol and other drug problems in the sample varied with age, education and ethnicity. The following descriptions are based on the entire sample, with women who had not used alcohol or other drugs being coded as having no problems.

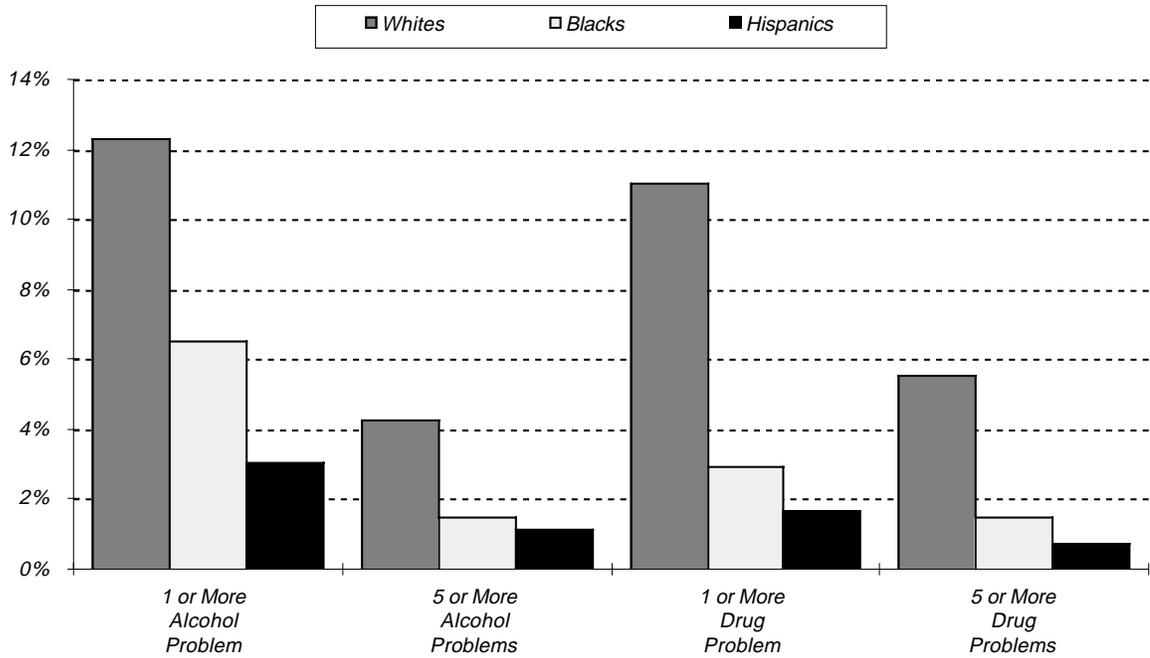
Age Patterns. Women were classified into three age groups (under 18, 18-25 and 26-34) with the small number of women over age 35 excluded from this analysis. Older women were more likely than younger ones to report having alcohol problems, while younger women were more likely than older ones to report other drug problems.

Racial/Ethnic Patterns. Whites were most likely, and Hispanics least likely, to report alcohol or other drug problems (Figure 11). This reflects the fact that Whites were most likely and Hispanics least likely to use alcohol or other drugs. Feeling aggressive or getting into arguments were relatively more frequently cited as alcohol-related problems by Whites, while difficulty thinking clearly was more frequently reported as a drug-related problem by Whites; no specific problem was reported frequently by Blacks or Hispanics.

Educational Patterns. Women who had never attended high school were least likely to report alcohol or drug problems and those with some high school but no diploma were

most likely to report them. There was no obvious pattern by education to the type of alcohol- or drug-related problems mentioned most frequently.

Fig 11 1990 Postpartum Sample:
Alcohol and Drug Problems by Race



C COMPARISONS: USERS AND NON-USERS

LIMITATIONS OF COMPARISONS

Following is a comparison of infants exposed to substances prenatally and those not exposed. As these comparisons are made, a reminder of the methodological limitations of the investigation is in order. Because the designation of the mother as “user” is based on self-report, outcomes for any women who may have used but denied use would be reported along with “non-user;” thus the possibility exists that some infants designated as “non-exposed” were in fact prenatally exposed to drugs. In addition, there are numerous factors which can affect birth outcomes, only one of which is maternal substance use. For example, inadequate prenatal care, low socioeconomic status, being unmarried, being Black, and having a low educational level have each been designated as risk factors (Anderson & Merkatz 1990). In the present sample non-users, at least as often as users, demonstrate many of these risks. Because of data limitations, it was not possible to measure the unique effects of each factor independent of the others.

In the following sections, women who used no substance, not even cigarettes, were designated as “non-users.” The “user” group includes women who reported use of either alcohol or illicit substances or both. Within the user group, differences are compared between women who used alcohol (solely or in combination with other substances) and those who used illicit substances (solely or in combination with other substances). Women who only smoked cigarettes were not categorized as “users” in this section, but are discussed in a later section.

DEMOGRAPHIC CHARACTERISTICS

Age: The mean age of users (24.6 years) was over a year older than the mean age of non-users (23.4 years) (Table 11). Illicit sub-

stance users were the oldest, with a mean age of 25.2 years. Users had a greater representation in the 26 to 34 age range, and non-users were more likely to be in the under 18 or 18 to 25 year categories.

Race/Ethnicity: Users were much more likely to be White and less likely to be Hispanic than non-users. Illicit users were even more likely than alcohol users to be White and even less likely to be Hispanic.

Education: Substance users were much more likely to have attended some high school or to be high school graduates. Non-users were more than twice as likely as users to have never attended high school. Illicit substance users were the most likely to be high school dropouts.

Marital Status: Users were much less likely to be married than non-users. Illicit substance users were the least likely to have ever been married.

Household Income and Public Assistance: Mean household income for those who knew their income was not significantly different for users and non-users; however, users were much more likely to know their income than were non-users. For the women who knew their incomes, non-users were more likely to have incomes below \$10,000 (48 percent) and substance users to have incomes in the \$10,000 to \$19,000 range. Mean annual incomes were \$11,393 for non-users and \$12,199 for substance users. Illicit substance users were most likely to know their incomes, but also had the lowest mean income. Users and non-users received a similar amount of public assistance. Illicit substance users had the highest rates of public assistance.

Table 11 1990 Postpartum Sample:
Demographics of Users and Non-Users

	USE DURING PREGNANCY				USE IN PAST YEAR			
	Non-Users (N=1063)	Alc or Ill (N=193)	Alcohol (N=175)	Illicits (N=46)	Non-Users (N=885)	Alc or Ill (N=406)	Alcohol (N=383)	Illicits (N=98)
Age								
Under 18	11.7%	6.3%	7.0%	4.4%	11.7%	10.7%	10.3%	15.3%
18 to 25	58.2%	53.2%	53.5%	50.0%	57.4%	57.4%	57.7%	57.1%
26 to 34	25.2%	35.3%	34.3%	41.3%	26.0%	27.7%	27.8%	25.5%
35 and over	4.8%	5.3%	5.2%	4.4%	4.9%	4.2%	4.2%	2.0%
Mean	23.4	24.6	24.5	25.2	23.5	23.6	23.6	22.8
Education								
Less than High School	32.4%	14.6%	14.3%	10.9%	35.3%	15.6%	15.0%	12.2%
Some High School	29.0%	35.9%	35.6%	47.8%	28.7%	37.4%	37.0%	50.0%
HS Graduate	38.6%	49.5%	50.0%	41.3%	36.0%	47.0%	48.0%	37.8%
Ethnicity								
White	8.9%	39.6%	40.2%	43.5%	6.2%	35.3%	35.5%	42.7%
Black	24.2%	28.7%	27.0%	37.0%	23.5%	28.5%	26.9%	34.4%
Hispanic	65.7%	30.7%	31.6%	19.6%	68.9%	35.8%	37.1%	22.9%
Other	1.2	1.0	1.1%	0.0%	1.4%	0.5%	0.5%	0.0%
Marital Status								
Married	52.4%	35.9%	36.8%	34.8%	55.1%	37.3%	38.7%	31.6%
Living Together	13.6%	18.8%	19.0%	19.6%	12.6%	20.7%	20.2%	21.4%
Widowed, Divorced, or Separated	5.8%	14.1%	14.4%	6.5%	5.5%	11.1%	10.7%	10.2%
Never Married	28.2%	31.2%	29.9%	39.1%	26.8%	30.9%	30.4%	36.7%
Household Income								
Don't Know	45.4%	24.9%	25.1%	15.2%	47.6%	30.8%	30.6%	20.4%
Under \$10,000	26.3%	26.9%	25.7%	39.1%	25.6%	26.6%	26.4%	33.7%
\$10,000 to \$19,000	21.5%	36.8%	37.7%	37.0%	20.6%	32.0%	31.8%	38.8%
\$20,000 to \$29,000	4.9%	9.8%	9.7%	8.7%	4.8%	7.6%	8.1%	5.1%
\$30,000 or over	1.9%	1.6%	1.7%	0.0%	1.4%	3.0%	3.1%	2.0%
Mean	\$11,393	\$12,166	\$12,315	\$10,020	\$11,038	\$12,651	\$12,796	\$11,970
Employment Status								
Unemployed, NS*	52.1%	35.8%	36.0%	41.3%	56.3%	34.0%	33.9%	39.8%
Unemployed, S*	8.6%	7.2%	5.7%	15.2%	8.1%	8.6%	7.1%	14.3%
Employed/Part time	15.1%	14.0%	12.6%	15.2%	13.6%	18.2%	18.0%	13.2%
Employed/Full time	24.2%	43.0%	45.7%	28.3%	22.0%	39.2%	41.0%	32.6%
Number of Children (prior to delivery)								
None	43.0%	33.7%	34.9%	28.3%	41.8%	41.9%	42.8%	39.8%
One	26.4%	30.0%	28.6%	34.8%	26.9%	26.8%	26.4%	28.6%
Two	17.9%	21.2%	20.6%	26.1%	17.8%	20.2%	19.3%	24.5%
Three	7.5%	8.3%	9.1%	6.5%	7.9%	5.9%	6.0%	5.1%
Four or More	5.2%	6.7%	6.8%	4.3%	5.5%	5.2%	5.5%	2.0%
Mean number	1.1	1.3	1.3	1.2	1.1	1.1	1.1	1.0
Public Assistance								
Any Assistance	60.6%	63.2%	64.0%	69.6%	59.5%	62.8%	62.7%	67.4%
Income-Qualified	58.6%	60.1%	60.6%	69.6%	57.8%	58.9%	58.5%	64.3%

*Not seeking employment

** Seeking employment

Table 12 1990 Postpartum Sample

	NON-USERS		USERS	
	No substances	Alcohol/Illicit	Alcohol	Illicits
Number of Women	1063	193	175	46
Mean Weight (gms)	3248	3140	3154	3070
Mean Length (cms)	49.80	49.31	49.39	49.16
Mean Head Circumference (cms)	33.97	33.64	33.71	33.41
Less than 1500 gms	1.9%	3.7%	3.5%	4.4%
Apgar at 1 minute <7	5.9%	10.5%	10.4%	15.2%
Premature by Weight (< 2500 gms)	8.9%	13.6%	12.7%	21.7%
Premature by Gestation (<37 wks)	10.2%	15.5%	14.9%	17.4%
Premature by Weight or Gestation	12.7%	18.7%	18.3%	23.9%
Inadequate Prenatal Care	28.5%	32.3%	31.6%	43.5%
Maternal Complication	16.4%	23.7%	23.3%	26.1%
Infant Complication	21.2%	27.5%	24.7%	42.5%

Birth Outcomes by Past Year Substance Use

	NON-USERS		USERS	
	No substances	Alcohol/Illicit	Alcohol	Illicits
Number of women	885	406	383	98
Mean Weight (gms)	3263	3110	3126	3077
Mean Length (cms)	49.82	49.27	49.36	49.18
Mean Head Circumference (cms)	33.99	33.66	33.71	33.57
Less than 1500 gms	1.6%	3.5%	3.2%	4.1%
Apgar at 1 minute <7	6.0%	8.5%	8.4%	11.5%
Premature by Weight (< 2500 gms)	8.5%	12.9%	12.3%	17.5%
Premature by Gestation (<37 wks)	9.6%	15.5%	14.4%	19.4%
Premature by Weight or Gestation	12.3%	18.0%	17.0%	23.5%
Inadequate Prenatal Care	28.7%	29.6%	28.8%	34.7%
Maternal Complication	15.7%	22.2%	22.0%	26.5%
Infant Complication	20.5%	27.7%	26.6%	34.1%

Employment Status: Non-users were more likely than users to be unemployed and not seeking employment, and users were more likely to be employed full time. Illicit users were less likely than alcohol users to be employed full time; however, illicit users who were unemployed were more likely to report that they were seeking employment than were unemployed alcohol users.

Number of children: The mean number of children that the women had was not markedly different for users and non-users although a higher proportion of users, especially illicit substance users, had other children in addition to the current birth.

ADEQUACY OF PRENATAL CARE

Women using substances during pregnancy were slightly but not significantly more likely to have received inadequate care than were non-users (Table 12). Substance users were also more likely to have received no prenatal care at all (10 percent versus 5 percent). Among substance users, women reporting the use of illicit drugs since pregnancy were more likely than women reporting alcohol use to have gotten inadequate prenatal care. Women who continued substance use during pregnancy were somewhat more likely to have had inadequate care than did those reporting only past year use. Among women who had received any prenatal care, there was little

difference between users and nonusers in the average week in which they first received such care (13.3 weeks into pregnancy versus 13.8 weeks).

BIRTH OUTCOMES

General Birth Outcomes

Several measures of birth outcomes were compared for substance users and nonusers. Comparisons of infant weight, length, head circumference, and rate of low Apgar scores at 1 minute are shown in Table 12. On each indicator, the infants whose mothers reported no substance use during pregnancy had better outcomes than infants of users (Figure 12). In particular, the infants of illicit substance users had the poorest outcomes and were significantly more likely to have Apgar scores at 1 minute below 7, a finding which reflects a high degree of initial distress. However, by 5 minutes, Apgar scores were similar for users and nonusers.

Birth outcomes by past year maternal substance use followed the same general patterns as for use since pregnancy. In general, outcomes for mothers and infants were the

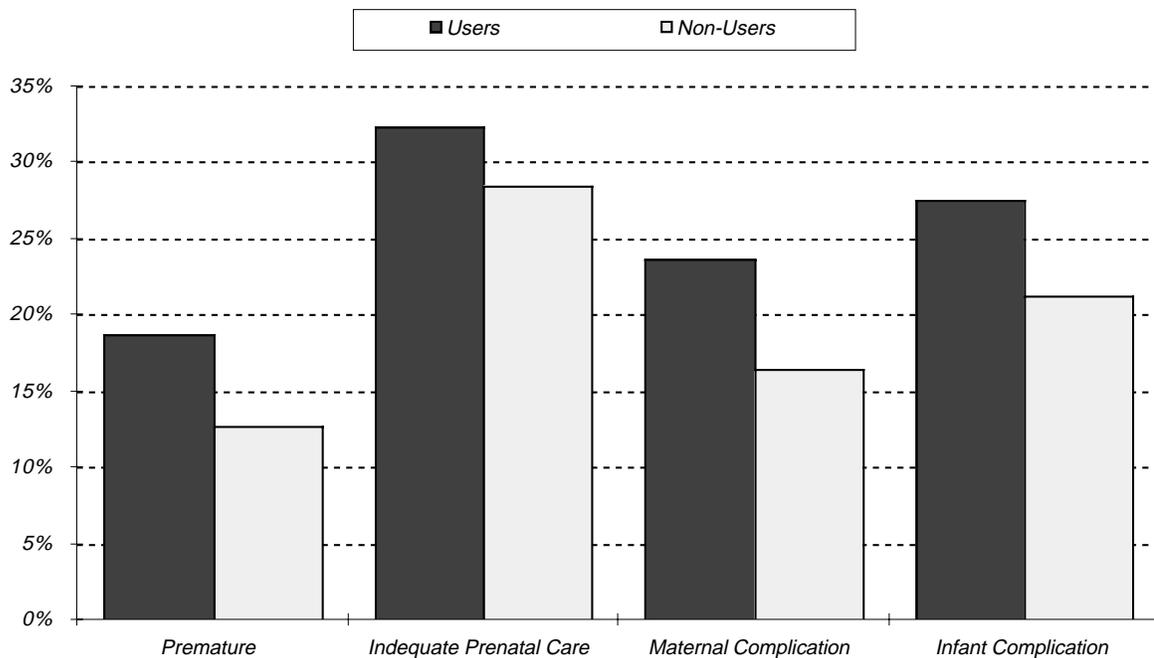
best when no substances were used during the past year.

Rates of Prematurity

Infants who are premature begin their new life with added difficulties and risks, and their additional care requirements can be prolonged and costly. Infants are considered premature if they weigh less than 2500 grams or if they are born prior to 37 weeks of gestation. Infants born to mothers using no substances during the past year are the least likely to be premature by weight (9 percent) and those born to mothers who used substances during pregnancy are the most likely (14 percent) (Table 12). More than one-fifth of the infants born to women who used illicit substances during pregnancy were premature by weight, which is double the rate for non-exposed infants. The rate of very low birthweight (<1500 grams) for infants exposed to illicit substances was more than twice that for infants who were non-exposed.

The pattern is similar for prematurity by gestational age, with the rate for substance users during pregnancy being one-and-one-

Fig 12 1990 Postpartum Sample Birth Outcomes: Substance Users During Pregnancy and Non-Users



half times greater than that for non-users during pregnancy, and the rate for illicit substance users being the highest. Mothers reporting past year use of illicit substances were nearly twice as likely to give birth prior to 37 weeks gestation as were mothers using no substances during the past year (Table 12).

In summary, 19 percent of substance users during pregnancy had infants who were premature by either weight or gestation, compared to about 13 percent of non-users. Among mothers who used during pregnancy or within the past year, illicit substance users had the highest rates of prematurity, with nearly one-fourth of their infants being premature. These findings provide strong evidence that the risk of prematurity is substantially increased by the prenatal use of alcohol and/or other drugs.

Maternal and Infant Complications

Data was collected indicating whether the mother had any one of 10 complications during pregnancy and delivery, and whether or not the infant had a complication detected at birth. Rates of both maternal and infant complications were higher when the mother used substances during her pregnancy or in the past year. About 43 percent of infants born to mothers who had used substances during pregnancy had some complication, which is double the rate for non-using mothers (Table 12). Premature rupture of the membranes (PROM) was a specific maternal complication seen significantly more often in women who had used substances during pregnancy. The most commonly occurring complication was pregnancy-induced hypertension (Table 13). Rates of occurrence of this complication were similar for users and non-users. However, illicit drug users had the highest rate (17 percent) of pregnancy-induced hypertension, which compares to a 5 to 7 percent rate among the general population. Clearly illicit substance users substantially increase their risk of pregnancy-induced hypertension. There were no signifi-

cant differences in the rates of fetal deaths or in specific infant complications and congenital anomalies between users and non-users.

Birth Outcomes by Adequacy of Prenatal Care

As previously reported for the overall sample, women who had obtained adequate prenatal care had better birth outcomes than women who had not received adequate care. Although substance users were about as likely as non-users to obtain adequate prenatal care, those who did not place their infants at greater risk for negative outcomes: women who had used substances during pregnancy and had not obtained adequate prenatal care had the smallest babies and shortest gestations, while non-users who had adequate care had the largest babies and the longest gestations (Table 14). The difference in mean infant birthweights between these two groups was a substantial 381 grams (13.4 ounces). The difference in mean infant birthweight for past year users who had not obtained adequate care versus non-users who had obtained adequate care was 458 grams (16.2 ounces).

Obtaining adequate prenatal care may temper the effects of substance use on birth outcomes to some degree. Among the sample women, substance users who had obtained adequate prenatal care had substantially better outcomes than users who had not obtained adequate care, and somewhat better outcomes even than non-users who had not obtained adequate care (Table 14).

Birth Outcomes of Cigarette Smokers and Polydrug Users

Prior research has consistently shown that cigarette smoking during pregnancy is related to decreased birthweight (Zuckerman 1988). The birthweights of infants born to women who smoked cigarettes during the past year were compared to those of non-cigarette smoking mothers (Table 15). The

Table 13 1990 Postpartum Sample

	NON-USERS		USERS	
	No substances	Alcohol/Illicit	Alcohol	Illicits
Abruptio Placenta	0.3%	0.5%	0.6%	0.0%
Placenta Previa	0.1%	0.0%	0.0%	0.0%
Placental Insufficiency	0.1%	0.5%	0.6%	2.2%
Amnionitis	4.0%	4.2%	4.1%	4.4%
PROM	2.2%	8.4%	7.0%	8.7%
Pregnancy-Induced Hypertension	10.5%	11.6%	11.6%	17.4%
Eclampsia	0.6%	0.0%	0.0%	0.0%
Peripartum Hemorrhage	1.3%	0.5%	0.6%	0.0%
Chronic Hypertension	1.0%	2.1%	2.3%	2.2%

Maternal Complications by Past Year Substance Use

	NON-USERS		USERS	
	No substances	Alcohol/Illicit	Alcohol	Illicits
Abruptio Placenta	0.1%	1.0%	0.8%	2.0%
Placenta Previa	0.1%	0.5%	0.5%	0.0%
Placental Insufficiency	0.1%	0.3%	0.3%	1.0%
Amnionitis	4.5%	2.8%	2.7%	2.1%
PROM	1.7%	6.3%	5.8%	7.1%
Pregnancy-Induced Hypertension	9.8%	12.8%	12.7%	17.4%
Eclampsia	0.5%	0.5%	0.5%	0.0%
Peripartum Hemorrhage	1.6%	0.3%	0.3%	1.0%
Chronic Hypertension	1.0%	1.3%	1.3%	1.0%

Table 14 1990 Postpartum Sample:
Birth Outcomes for Substance Users and Non-Users by Adequacy of Prenatal Care

		BIRTHWEIGHT		GESTATION	
		Mean Grams	% Under 2500 Gr	Mean Weeks	% Under 37 Wks
USE DURING PREGNANCY					
Substance User	Adequate Care				
Yes	No	2897	21%	37.4	29%
No	No	3094	14%	38.1	18%
Yes	Yes	3263	9%	38.9	9%
No	Yes	3278	7%	39.1	9%
PAST YEAR USE					
Substance User	Adequate Care				
Yes	No	2838	20%	37.2	27%
No	No	3159	13%	38.4	16%
Yes	Yes	3228	10%	38.9	11%
No	Yes	3296	6%	39.2	8%

mean birthweight of infants born to mothers using no substances was heavier by 89 grams (3.1 ounces) than infants of mothers reporting cigarette use only. Even women who used alcohol and/or illicit drugs but not cigarettes had infants with a mean birthweight that was heavier than women who smoked cigarettes but used no other substances. When cigarette smoking was combined with the use of alcohol and/or other drugs, mean birthweights were substantially lower. The infants of mothers reporting the combined use of cigarettes, alcohol, and other drugs had birthweights that averaged 344 grams (12.1 ounces) less than infants of mothers reporting no substance use. In addition, the rate of prematurity by weight (less than 2500 grams) increased when the mother smoked cigarettes, and was highest when the mother used cigarettes in combination with alcohol or illicit substances.

Birth Outcomes and Substance-Related Problem Indicators

Among women reporting use of either alcohol or other drugs, those who reported having one or more substance-related problem in the past year tended to have slightly smaller babies than those who reported no problems. The mean birthweights of infants with mothers reporting substance problems was 180 grams (about 6.3 ounces) less and their length was 1.25 centimeters

shorter than infants of mothers reporting no substance-related problems. Substance users reporting problems were also significantly more likely to have babies who were premature by weight.

FAMILY HISTORY, PEER USE, AND FAS KNOWLEDGE AND ATTITUDES

The percentage of women whose mother and/or father had a substance abuse problem was more than twice as great for the users than for the non-users (Table 16). More than 90 percent of the users reported that some or most of their peers were substance users compared to about 70 percent of the non-users (Table 16).

Women who drank alcohol during their pregnancy were more likely than non-drinkers to have knowledge of Fetal Alcohol Syndrome (37 percent versus 20 percent; Table 17). Despite knowing more about FAS, drinkers were much less likely to view alcohol use during pregnancy as “very dangerous” (59 percent versus 88 percent). Based on evidence noted earlier, it is likely that these women have an inaccurate understanding of FAS, which then leads them to minimize the danger of alcohol use during pregnancy.

Table 15 1990 Postpartum Sample:
Birth Outcomes by Past-Year Cigarette Use

	No Substance	Cigarettes Only	Cigarettes & Alcohol	Cigarettes, Alc & Illicit	Alcohol & Illicit
Number of infants	1063	108	131	68	206
Less Than 2500 Grams	8.5%	9.4%	12.3%	20.9%	10.7%
Mean Birthweight (Grams)	3263	3174	3035	2919	3219

Table 16 1990 Postpartum Sample:
Parent and Peer Substance Use

Substance Use During Pregnancy	Non-Users	Users
Either parent had problem with alcohol/other drugs	16.1%	35.8%
Some/most peers used alcohol/illicit drugs	71.3%	91.7%

Substance Use During Past Year	Non-Users	Users
Either parent had problem with alcohol/other drugs	13.4%	34.0%
Some/most peers used alcohol/illicit drugs	68.4%	90.2%

Table 17 1990 Postpartum Sample:
Knowledge of FAS and Perceived Danger of Drinking When Pregnant

Alcohol Use During Pregnancy	Non-Users	Users
Reports Knowing about FAS	20.2%	37.4%
How dangerous to drink during pregnancy?		
Very	88.3%	59.4%
Somewhat	10.7%	33.5%
Not dangerous	1.0%	7.1%

Alcohol Use During Past Year	Non-Users	Users
Reports Knowing about FAS	17.9%	34.0%
How dangerous to drink during pregnancy?		
Very	89.8%	71.4%
Somewhat	9.1%	25.2%
Not dangerous	1.1%	3.4%

BARRIERS TO CARE AND TREATMENT

The sociodemographic background of the postpartum sample places the women at high risk for encountering barriers to prenatal care and substance abuse treatment. As shown earlier, infants born to the women obtaining adequate prenatal care were healthier, even among substance-using mothers. Thus it is extremely important to explore the attitudes and problems that prevent pregnant women from receiving prenatal care. Although this study can not assess the availability of care services or resources to these women, reported below are the problems and barriers perceived by them in attempting to get prenatal care and substance abuse treatment.

PROBLEMS GETTING PRENATAL CARE

The sample women were asked a number of questions about problems they may have had in obtaining prenatal care (Table 18). The vast majority of the women (87 percent) reported at least one problem getting prenatal care. Prenatal care limited to the public healthcare system, as opposed to having one's own private physician, was perceived by over one-half of the women to be a problem. In general, problems expressed were of a practical nature, such as financial (34 percent) and transportation (33 percent). One-third of the women felt afraid when trying to get prenatal care.

Table 18 1990 Postpartum Sample:
Problems Getting Prenatal Care

	# of Women	Percent
Problems with money or insurance	466	33.6%
Transportation problems	452	32.6%
Problems getting time off	181	13.0%
Long wait for appointment	397	27.9%
Long wait at the doctor's office	741	53.5%
Didn't know where to go	278	20.0%
Felt afraid	469	33.9%
Family discouraged getting care	47	3.4%
Too much paperwork	297	21.5%
Couldn't afford private doctor	856	62.0%
Needed child care	212	15.3%
Language barrier with doctor	218	15.7%
Other problems	40	2.9%

Did you think prenatal care was important?

Yes	1316	96.2%
No	52	3.8%

How difficult was it for you to pay for your prenatal care?

Very Difficult	315	23.2%
Somewhat Difficult	302	22.3%
Not Difficult	738	54.5%

Women who received inadequate care were significantly more likely than those receiving adequate care to report having problems with money, transportation, childcare, paperwork, having a long wait to get an appointment, not knowing where to go, and language barriers.

Reasons for Not Getting Adequate Prenatal Care

The sample women who had fewer than six prenatal care visits (18 percent) were asked to give up to two reasons for not having more care visits. Financial reasons were most commonly expressed (25 percent), followed by transportation problems (20 percent), family/child/work problems (7 percent) and problems getting an appointment (6 percent).

The sample women were asked how difficult it was to pay for the prenatal care they received during their pregnancy. Slightly over one-half of the sample women reported having no difficulty paying for prenatal care; however, for nearly one-quarter, paying for care was “very difficult” and for the other one-quarter it was “somewhat difficult” (Table 18). Women who did not get adequate care were more likely to report that paying for their prenatal care was “very difficult” than were women who received adequate care.

Differences in Barriers to Obtaining Prenatal Care by Demographic Characteristics

Problems with money or insurance were most likely to be mentioned by White women and least likely by Black women (Table 19). Hispanic women, and women with less than a high school education, were more likely than Black or White women to report the following problems: transportation, fear, excessive paperwork, child care, family opposition, language barriers, and not knowing where to go. Women living alone were more likely than women living with others (partners or parents) to report financial barriers to prenatal care.

However, women with family incomes of less than \$10,000 were not significantly more likely than women with incomes above that level to have experienced problems in obtaining prenatal care.

Substance Use as a Factor Related to Obtaining Prenatal Care

When a pregnant woman is a substance user, she may feel that getting prenatal care is particularly difficult. Women who had used alcohol or illicit drugs during pregnancy were significantly more likely than non-users to report that they would have preferred a private physician but were unable to afford one, and that they had to wait a long time to get an appointment.

PROBLEMS GETTING CARE FOR SPECIAL CONDITIONS

About one-quarter of the women said that they had special risk conditions that could have caused complications with their delivery or their infant’s health. About fifty different risks were noted, most common being high blood pressure and diabetes; seven women mentioned drug addiction or smoking/drinking as a risk factor. About 10 percent of the women mentioning risk conditions said that they had been rejected for care by one or more doctors or clinics. Over one-half of the women with risk conditions said they had received treatment from a specialist for their condition, but most of the women who did not receive such treatment felt that there was no medical need for it.

Women who reported themselves as drug or alcohol users since pregnancy were more likely than non-users to have presented special risk conditions (32 percent versus 23 percent), and were almost three times as likely to report having been rejected for care (25 percent versus 9 percent). In addition to having higher-risk pregnancies, substance users may be less likely to follow procedural requirements for receiving services.

Table 19 1990 Postpartum Sample:
Percent Reporting Problems Getting Prenatal Care by Selected Demographic Characteristics *

	Money	Trans- portation	Can't Get Time Off	Long Wait for Appt	Long Wait At Office	Don't Know Where/Go	Afraid	Family Opposition	Too Much Paperwork	Want Private MD	Need Childcare	Language Barrier
Total	34% 466	33% 452	13% 181	28% 397	54% 741	20% 278	34% 469	3% 47	22% 297	62% 856	15% 212	16% 218
Ethnicity												
White	44%	32%	11%	27%	62%	14%	33%	1%	19%	75%	15%	1%
Black	24%	23%	14%	27%	46%	14%	29%	1%	10%	57%	11%	2%
Hispanic	34%	37%	15%	29%	54%	25%	38%	5%	28%	62%	19%	28%
Age												
Less than 18	32%	39%	15%	23%	49%	17%	43%	4%	19%	53%	6%	8%
18-25	32%	30%	13%	28%	56%	20%	34%	3%	20%	63%	14%	15%
26-34	37%	34%	15%	29%	54%	21%	31%	3%	25%	69%	26%	20%
35 and older	41%	35%	18%	29%	37%	21%	35%	6%	24%	57%	16%	27%
Education												
Less than HS	34%	40%	15%	29%	55%	24%	40%	6%	32%	63%	22%	32%
Some HS	35%	35%	14%	28%	54%	18%	36%	2%	17%	61%	17%	11%
HS Graduate	32%	25%	12%	27%	54%	19%	30%	2%	19%	64%	12%	9%
Income												
< \$10,000	32%	36%	16%	28%	52%	19%	34%	2%	21%	60%	19%	16%
> \$10,000	37%	28%	14%	29%	57%	18%	33%	1%	21%	66%	17%	8%
Don't know	32%	34%	13%	27%	52%	23%	36%	5%	23%	63%	15%	23%
Living situation												
Alone	38%	35%	13%	28%	56%	22%	34%	3%	24%	65%	21%	22%
With someone	28%	29%	14%	28%	53%	15%	33%	2%	20%	63%	10%	6%
Has kids												
No	34%	28%	15%	28%	51%	26%	41%	4%	20%	63%	2%	16%
Yes	33%	35%	13%	29%	55%	16%	29%	3%	23%	63%	25%	17%
Substance Use**												
No	32%	31%	14%	26%	52%	21%	34%	4%	22%	61%	16%	19%
Yes	36%	34%	16%	35%	56%	16%	30%	2%	22%	70%	17%	5%

*See Table 20 for full description of problems
**Used alcohol or illicit drugs during pregnancy

PROBLEMS GETTING CHILD CARE

Getting adequate child care can be a major problem for women who need to work and/or get treatment for their substance abuse. Lack of child care for pregnant women who already have children can also impede their getting adequate prenatal care. About 50 percent of the women said that they planned to stay at home with their infant, 15 percent were going to have a relative stay at their home with the infant, 10 percent planned on taking their infant to a relative's home, 5 percent planned to take their child to a child care facility (17 percent of these facilities were associated with the mother's place of work), 5 percent planned to have a non-related person care for their child (either at their own home or at the caretaker's home), and 15 percent had not yet made any plans for child care. Women identified as substance users were less likely than non-users to be planning to stay at home with their infant, and more likely to rely on non-relatives for care or to have not yet made child care arrangements; for these women, whether or not they get substance abuse treatment is likely to depend on their access to child care.

Of the women who were not planning to stay home with their new child, almost 40 percent anticipated difficulties in finding quality child care at an affordable price. Difficulties affording care was the major problem, cited by about 75 percent, with difficulties in finding quality care the next most important constraint. Fewer than 1 percent of the women who anticipated child care difficulties felt that their child might have special needs which would complicate finding care, despite the fact that almost 20 percent of these infants had complications or congenital anomalies mentioned on their chart. Women whose infants had complications noted on their hospital charts were no different from other women in their expected child care arrangements.

BARRIERS TO TREATMENT FOR SUBSTANCE ABUSE

About 60 percent the postpartum sample said that men and women would have an equally difficult time getting help for an alcohol or drug problem; about 17 percent felt that men would have a more difficult time than women, and 6 percent felt women would have a more difficult time (Table 20). Of the 6 percent who felt that women would have a more difficult time, the following reasons were cited: women's "greater responsibilities and problems," "greater reluctance to admit problems," "lack of self control," and "difficulty finding Texas programs geared to women's needs."

Women who had ever used a substance (including cigarettes and alcohol) were asked if they had ever thought that they might be personally helped by alcohol and/or drug treatment. About 7 percent of the women said yes; of these, about one-half had actually sought treatment, and most of those had entered treatment. In other words, over one-third of the women who had ever considered treatment had actually received some treatment. For those who sought but did not get treatment, barriers mentioned included financial problems, not knowing where to go, lack of openings in the treatment program, opposition of family members, or not believing in treatment.

The women in all hospitals except Parkland were asked why someone being interviewed for this survey might not tell the truth about their substance abuse. About 39 percent of the women said that a substance user would not want others to know or would feel ashamed or guilty, and 20 percent reported that a substance user would be afraid of getting into trouble or being jailed. Women identified as drug users were more likely than non-users to say that a substance user would be afraid of getting into trouble (26 percent versus 18 percent).

Table 20 1990 Postpartum Sample

When getting help for an alcohol or drug abuse problem, do you think men or women have a more difficult time? Why?*

	<u>Men</u>	<u>Women</u>	<u>About the same</u>	<u>D.K./ No answer</u>
%	16.8%	6.0%	61.3%	15.8%
N	236	84	859	156

Of those answering "men":

Men's ego, stubbornness	42.4%
Men drink, use drugs more	19.9%
Men have less willpower	12.2%
Various other reasons	8.1%
No reason given	17.4%
Total	100.0%

Of those answering "women":

Women have more responsibilities, problems	11.9%
Women more afraid to admit	9.5%
Women can't control themselves as well	9.5%
Programs not geared to women	8.3%
Various other reasons	10.7%
No reason given	50.0%
Total	100.0%

*"Why" was only asked of those who said either men or women had a more difficult time.

Why would someone in this survey not tell the truth about their substance use?*

	% of responses**
Don't want others to know/feel ashamed, guilty	38.6%
Scared, think they'll get in trouble, be jailed	19.5%
Can't admit problem, don't want help	6.8%
Don't trust interviewers	4.2%
Someone might take their baby away	3.2%
Don't know or no answer	36.2%

*Asked of 49% of sample

**Because respondents could give up to two reasons, percents may total more than 100%.

Percents based on number of respondents asked question (N=690).

CONCLUSIONS AND IMPLICATIONS

Whether or not a woman uses drugs while pregnant is a complicated issue. Women who use substances do not always have the ability to make rational decisions based on accurate information about whether to continue using or abstain when they become pregnant. Even if a woman realizes that substance use may result in harmful consequences to her unborn child, there are many factors that affect her decision to continue or give up use. Understanding the problem of prenatal substance use thus requires an examination of the full scope of issues that accompany and support its occurrence.

The postpartum sample was derived from a population with numerous social disadvantages aside from substance abuse. It is primarily a minority population, with low income levels and high unemployment. Many of the women are single parents, and most are dependent upon publicly-funded institutions for at least part of their support. Each of these elements is, in itself, considered a risk factor when evaluating the developmental future of a child beginning life in such a context. When prenatal substance exposure is added to the scenario, the child faces additional risks.

Inadequate prenatal care has been shown to be one of the most important predictors of poor birth outcome. The fact that nearly 30 percent of the sample women received inadequate prenatal care, and that care was generally not begun until the second trimester, is cause for grave concern. Findings also show that when inadequate prenatal care is combined with prenatal substance use, the risk to the infant increases considerably.

The risks to infants due to prenatal substance exposure, as well as the risks to society, have been well-documented. For

example, substance-exposed children may have special educational and other needs that will have to be publicly funded, at least in part. Although the current sample may not be representative of the general population of Texas mothers, the fact that an estimated 28 to 40 percent of the sample mothers used harmful substances during their pregnancy demonstrates that a significant proportion of Texas children are at risk for subsequent problems.

Constructive solutions must be developed for early intervention in order to minimize the problems caused by maternal substance use and lack of adequate prenatal care. One positive finding in this study is that the majority of the women wanted their babies; this maternal motivation can be augmented by providing healthy prenatal and postnatal environments for both mother and child. To this end, accessible prenatal care, maternal and child health, and non-threatening interventions for women with substance abuse problems are realistic steps to take toward enhancing the potential of young Texans.

The need for renewed prevention efforts is underscored by the fact that a large number of women unwittingly expose their fetuses to harmful substances before they know they are pregnant. A drug-free life-style must be promoted for anyone who may become pregnant. Parents must plan ahead in order to give their child the gift of a drug-free environment during the crucial first months of their development.

APPENDIX A - EFFECTS OF DRUG EXPOSURE: A BRIEF SUMMARY OF THE LITERATURE

INITIAL EFFECTS

The most common effect on the infant attributed to maternal substance use is lower birthweight. Cigarette smoking, heroin, alcohol, and cocaine in particular have been linked to smaller infant size attributable to either retardation of fetal growth or pre-term delivery (Zuckerman 1988; NIDA 1989). Lower birthweight is associated with poorer outcomes and more frequent complications for the infant (Craig 1989).

Withdrawal or symptoms of neurotoxicity in infants have been most often linked to maternal heroin, other opiate, alcohol, cocaine, and marijuana use. Although there is variation in the particular symptoms experienced depending on the drug(s) to which the infant was exposed, symptoms most commonly observed are as follows: irritability, hyperactivity, and tremors; gastrointestinal symptoms, such as poor feeding and diarrhea; respiratory distress and increased nasal secretion; and miscellaneous symptoms such as sneezing, yawning, and a high-pitched cry (Finnegan 1988).

Maternal use of alcohol is associated with the most severe birth defects. Fetal Alcohol Syndrome caused by maternal alcohol use is the leading cause of mental retardation in the United States. Infants with FAS have low birthweights, small head and brain size, and distinctive abnormalities of the face. There is increased risk of giving birth to an infant with FAS when the mother combines the heavy use of alcohol with the use of other drugs; however, Fetal Alcohol Effects may occur as a result of a single drinking occasion during pregnancy (Chasnoff 1990b; Smith & Coles in press; Smith et al. 1987).

Maternal cocaine ingestion during pregnancy produces constriction of blood vessels which can damage the placenta as well as constrict blood flow to the vital organs of mother and infant, causing heart attacks or strokes and impairing development of the infant's organs and limbs (Smith & Deitch 1987; Chasnoff 1990b). The damage to the placenta may result in abruptio placenta in which the placenta prematurely separates from the uterus, creating the potential for severe hemorrhaging of both infant and mother as well as restriction of the infant's oxygen supply (Chasnoff 1990b).

The case for "fetal solvent syndrome" resulting from maternal inhalant abuse is still under development; however, there is preliminary evidence that the risk for such a syndrome similar to FAS is increased among infants exposed to solvents. Effects such as intrauterine growth retardation and fetal biochemical abnormalities are evidence for the teratogenic effect of solvents (Goodwin 1988).

Finally, substance-using pregnant women and their infants are considered at high risk for becoming HIV-infected and for contracting other sexually transmitted diseases (Rich 1990).

LONG-TERM CONSEQUENCES

Preliminary findings from longitudinal studies of infants prenatally exposed to drugs indicate that outcomes vary, although there is generally some dysfunction in the areas of motor development, behavior, social interaction, and in attention capacity. Some infants continue to have tremors and atypical muscle tone throughout the first year, while others show a generalized de-

crease in muscle tone, and still others show evidence of a fluctuating pattern of muscle tone. Muscle tone may develop asymmetrically, yielding a consequent effect in the development of patterns of movement. Many infants continue to be irritable and difficult to handle, and some interact only minimally with objects and individuals in their surrounding environment (Lewis, Bennett, & Schmeder 1989). Developmental delays in speech acquisition are frequently noted (Davis 1991). The play of drug-exposed children has been described as random and impulsive with developmental lags noted in attention, distractibility, and expressive language (Kronstadt 1990; Chasnoff 1990b).

Longer-term effects may be compounded by dysfunctional infant-caretaker attachment and by the unstable, chaotic, and impoverished environments associated with substance abuse (Lifschitz 1990). The full picture regarding outcomes of the child is not yet available. Finnegan and Kaltenbach (1990) have pointed out that to look at outcome effects using a linear, cause -> effect, specific drug -> specific effects, model is erroneous. Addiction is a complex, multifactorial problem requiring a schema which incorporates many factors which contribute to outcomes for mother, child, and family.

DRUG-SPECIFIC EFFECTS

Although it is increasingly uncommon for a substance user to take just one substance during pregnancy, it is of interest to attempt to determine what effects may result from the use of a particular substance. In addition, recent research has provided some evidence for interactive or potentiating effects when combinations of substances are used. Presented below are effects to birth outcomes most commonly ascribed to the use of particular substances.

Cigarette Smoking

Maternal cigarette smoking is known to cause decreased birthweight and to increase

the rate of prematurity. This is believed to result from a decrease in the oxygen supply to the fetus. There is some evidence for slight decreases in cognitive functioning. Slight increases in the incidence of spontaneous abortions, premature rupture of the membranes, and Sudden Infant Death Syndrome have been reported (Zuckerman 1988; Abel 1984).

Alcohol

Fetal Alcohol Syndrome (FAS) is a serious and permanent condition occurring primarily in infants of chronic alcohol abusers. The FAS infant has low birthweight and continuing small size. There are distinctive facial and cranial abnormalities including a shortened palpebral fissure (the opening between the eyelids); shortened epicanthal folds (from the root of the nose to the median end of the eyebrows); and a thin upper lip and absent or poorly developed philtrum (median groove on the surface above the upper lip). Infants with FAS have small heads, resulting in small brain size and mental retardation. Cardiac anomalies are commonly found. Fetal Alcohol Effects are milder manifestations of FAS which may occur as a result of lower levels of prenatal alcohol consumption. Infants exposed to alcohol may also experience withdrawal effects (Chasnoff 1990; Smith & Coles, in press; Smith et al. 1987).

Cocaine and/or Crack

The use of cocaine may cause complications to the pregnancy including abruptio placenta and premature labor. At birth, the infant may manifest continuing effects of the drug, but withdrawal is not believed to occur. Cocaine-exposed infants often have lowered birthweight and smaller head size. The vasoconstriction effects of cocaine may lead to congenital anomalies. An increase in the rate of Sudden Infant Death Syndrome has also been reported (Smith & Deitch 1987; Chasnoff 1990).

Marijuana

Findings are inconsistent in regard to the effects of marijuana, but there is evidence of an associated lowered birthweight, the occurrence of tremors, and an increase in the startle response of exposed newborns. There is also evidence for a synergistic effect of the combined use of alcohol and marijuana, leading to an increased risk of FAS (Zuckerman 1988; Chasnoff 1990).

Heroin and other opiates

The infant born to a mother addicted to heroin or on methadone maintenance may experience severe withdrawal requiring medical management. Heroin-using mothers, and thus their infants, are at extremely high risk for HIV and other infections because of needle-sharing. The infants often are irritable and of low birthweight.

Methamphetamines

Effects of methamphetamine exposure are similar to the effects of cocaine, as both substances have similar vasoconstriction actions. Risk of HIV infection is high if the mother has been injecting the drug (Chasnoff 1990).

Inhalants

There is only minimal information available on the effects of inhalant exposure. There have been a few reports of a syndrome of effects similar to FAS in infants of inhalant-using mothers (Goodwin 1988).

APPENDIX B - TREATMENT FOR SUBSTANCE-EXPOSED INFANTS: COST ESTIMATES

The average initial hospital cost for an infant weighing less than 2500 grams ranges from \$12,000 to \$39,000 and the average cost for an infant weighing less than 1500 grams ranges from \$31,000 to \$71,000 (U.S. Office of Technology Assessment 1987). Using averages of the above cost figures, the cost to the state of just the hospital birth expenses of the 14 very low birthweight drug-exposed infants identified in this investigation would be estimated at \$714,000, and costs for the 38 infants weighing from 1500 grams to 2499 grams would be \$969,000. This sums to a total cost of \$1,683,000. The 52 low birth weight infants comprise 3.7 percent of the sample births. When this rate is applied to all Texas births, using an average birth rate of 300,000 annually, it is projected that 11,100 substance-exposed, low birthweight infants would be born each year. Using the above cost estimate rates, the hospital birth expenses of these infants would amount to \$359,355,760 per year.

It has been estimated that the total service costs for each drug-exposed child that shows physiologic or neurologic impairment up to the age of 18 will be \$750,000 (General Accounting Office 1990). Applying that figure to these 52 infants results in a cost of \$39 million; applying it to the yearly projection of 11,100 infants results in total costs (to age 18) of \$8.3 billion for each yearly cohort of drug-exposed children.

Costs for six months of residential substance abuse treatment for these 52 mother and baby dyads would amount to \$1,478,880 (based on TCADA's rate of \$158 per day for mother and infant) and \$315,684,000 for 11,100 dyads. The cost for the substance abuse treatment of the women alone would be less (\$636,480 for the 52 women and \$135,864,000 for the 11,100 women, based

on TCADA's rate of \$68 per day for 6 months of residential treatment with childcare for their dependents).

APPENDIX C - BLOOD SAMPLES: PROCEDURES AND ANALYSIS

INTRODUCTION

The purpose of collecting and testing umbilical cord bloods was to cross-validate patterns of self report. There are many reasons why women who use drugs during pregnancy might not admit use; shame, fear of losing their children, fear of legal consequences, denial, or the intimidating or unfamiliar nature of the hospital environment are but a few. In determining the degree of substance use during pregnancy, one must decide on the best way to estimate the prevalence of drug use, and the most effective means for identifying the women and infants at risk because of substance use. These methodological questions are addressed in this technical appendix.

This appendix also covers some of the problems associated with gathering and interpreting blood studies of prevalence of recent use, and difficulties involved in collaborations between social and biomedical scientists. Information gathered on the basis of different paradigms can yield different and even contradictory results. The challenge is to weave these results into a single cohesive perspective to ascertain how many pregnant women use drugs and how they answer questions about drug use in a hospital context.

BACKGROUND

A number of problems were encountered when gathering both self-reported and blood-based information. A Parkland Hospital pilot of the study resulted in the choice of in-hospital telephone interviews as the means for gathering self-report information. However, the participating hospitals in Houston did not have telephones in rooms. Cellular phones were rented and the problem solved in one Houston hospital. Unfortunately, the construction of the

second hospital building interfered with cellular telephone reception, so interviews had to be conducted in person. However, given the overall similarity of data gathered in person versus over the phone, this change likely had little impact on the quality of the self-reported information gathered.

The problems encountered in gathering blood-based information were more complex. The project originally called for analyzing bloods for the presence of cocaine, methamphetamines, and opiates utilizing gas chromatography. About half way through the blood analysis, the subcontractor (University of Texas Southwestern Medical Center at Dallas) reported receiving a significant number of hydrocarbon-contaminated blood samples from one of the hospitals; inadvertently, the bloods had been collected in plastic rather than glass test tubes. The subcontractor found that these plastic tubes produced false positive indications on cocaine and methamphetamines analyzed with gas chromatography. All samples were retested using radioimmunoassay (RIA).

Upon analysis of the RIA-tested blood results, it soon became apparent that either patterns of illegal drug use among pregnant women in Texas were quite different than had been thought on the basis of previous studies of self-reported use, or that RIA analysis was producing results which could lead to incorrect conclusions about patterns of recent illicit drug use. Given this concern about patterns of use of RIA-measured blood results, it was decided that additional investigation would be required before RIA blood results could be interpreted.

A sample of 25 bloods was drawn for additional chemical analysis. The bloods were selected as follows: 15 at random with respect to indicated drug use, 5 with an unexpectedly high local prevalence of methamphetamine use, and 5 with an unexpectedly high prevalence of heroin (opiate) use. The collected bloods were transferred to the Bexar County Medical Examiner's office for additional analysis. The San Antonio investigators were asked to choose an appropriate methodology to test bloods for evidence of recent cocaine, amphetamine, and heroin use. The analysis was performed without knowing the prior RIA results. The technique they chose was gas chromatography/mass spectrometry (GC/MS). A comparison of RIA and GC/MS results on these bloods showed apparent differences as follows: of the 2 samples that were RIA positive for cocaine use, 1 was confirmed with GC/MS testing; none of the 10 RIA-positive methamphetamine samples was confirmed; of the 8 bloods with indications of recent heroin (opiate) use, 3 were confirmed positive.

Because of these apparent discrepancies, it was decided that all RIA-positive bloods would be re-tested with GC/MS. A total of 175 additional bloods were transferred to the Bexar County Medical Examiners office for GC/MS confirmation. Of these, only 84 had sufficient sample remaining (one milliliter or more) for re-testing. Before discussing the meaning of the apparent differences in RIA and GC/MS blood test results, it is necessary to present additional background on the two techniques and how they fit together.

TEMPORAL LIMITS OF DETECTABILITY

Under most circumstances, use of substances such as cocaine, methamphetamines, and heroin must have taken place within the past 48 hours to be detected in bloods or urines. However, individual differences in metabolism, type of drug, route of drug administration, dose, and the ex-

tent of drug use all influence the duration over which drug use can be detected (Hawks & Chang 1986). These bloods were collected after the women had given birth, and in many cases after they had been in the hospital for 24 or more hours (presumably with little opportunity to use drugs). This fact is important because the terminal half-life of cocaine in the blood is 1 1/2 hours; in other words, the concentration of cocaine in the blood declines by 1/2 each 1 1/2 hours. Thus, the initial blood cocaine level would decrease by a factor of 256 (or 2^{16}) over one day of abstinence. Due to the delay between admission to the hospital and collecting of the bloods, the great majority of any cocaine present in the blood at admission would have been metabolized before specimens were collected. The terminal half-life of opium is estimated to be between 1.7 and 4.5 hours and that of methamphetamine unknown, but both of these substances have been demonstrated to be detectable at very low levels up to a maximum of 48 hours.

RIA SCREENING

Radioimmunoassay (RIA) is a technique for inferring the presence of drugs in bodily fluids, most commonly in urines but also in bloods. Known amounts of radioactive-labeled drug and antibodies, to which the drug of interest will adhere, are added to a sample. Any drug already present in the blood competes with the radioactive-label drug for binding sites. A gamma counter is used to measure the proportion of binding sites occupied by radioactive label drug and the result is used to infer the amount of drug which must have been present in the blood before reagents were added (see Hawks 1986 for a detailed explanation of the technique).

Separate RIA tests are required for each substance of interest. In this project, screens were used to test for the presence of cocaine, methamphetamines, and morphine (a metabolite of heroin and other opiate drugs). Each test has a different sensitivity

and specificity. Sensitivity refers to the ability of the test detect small concentrations of a drug/metabolite in the blood; the more sensitive a test, the lower the concentration it can detect. Specificity refers to the ability to reliably distinguish the target substance from all others, chemically related and unrelated, which might be present. If any substance other than that of interest bonds with the test antibodies, the RIA test will show recent drug use when no drug is present in the blood. This problem is called cross-reactivity and this type of test result known as a “false positive.”

False positive results become more likely as drug concentration in the blood decreases. This means that at high levels of concentration, RIA tests yield very reliable results, whereas at lower levels of concentration the RIA tests become more subject to cross-reactivity (Blanke 1986). Given the duration of hospitalization that preceded blood collection, the short half-life of the drugs of interest in the blood, and the resultant expected low levels of concentration the blood, one might generally expect that cross-reactivity could be a problem in this project.

Laboratories must establish a “cutoff” for the amount of drug concentration which must be present before a result is presumed positive. Cutoff values vary from substance to substance and lab to lab depending on the purpose of blood testing. Cutoff levels must be reasonable with respect to the drug concentrations expected to be present in the bloods, yet not so low as to produce excessive false positive results. The subcontractor utilized limits of detectability (LODs - a synonym for cutoff) of 2 ng/ml on cocaine, 20 ng/ml on methamphetamines, and 10 ng/ml for heroin (morphine). These LODs are near or below those recommended by the manufacturer as the theoretical limits of detectability for these drugs. The manufacturer of the reagents used in this study lists the sensitivity of the RIA tests in urines as follows: 5 ng/ml on cocaine, 25 ng/ml on methamphetamines,

and 10 ng/ml on heroin at a confidence level of greater than 99 percent.

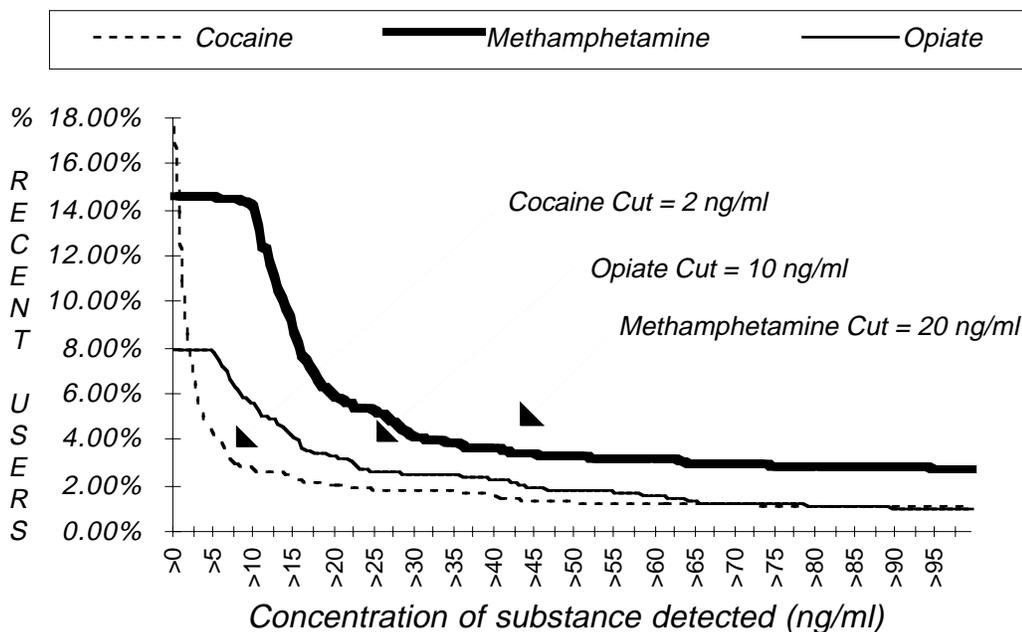
When RIA testing is to measure the prevalence of recent drug use, even small changes in cutoff values can produce large changes in the presumed prevalence of recent use. Presented in Figure C1 is the percentage of bloods which would have been presumed positive had cutoff values between 1 ng/ml and 100 ng/ml been selected. As the figure illustrates, estimated prevalence of recent use is largely a function of cutoff value established. For example, a 1 ng/ml cocaine cutoff would imply a 12 percent prevalence of recent use, a cutoff of 2 ng/ml an 8 percent prevalence recent use, and a cutoff of 5 ng/ml a 4 percent prevalence of recent use. Conclusions based on RIA testing can vary widely, depending on the cutoff levels established for the three illegal drugs tested.

RIA testing is inferential in the sense that it does not directly measure the presence of a substance in the blood and is somewhat prone to cross-reactivity, particularly at low levels of concentration. Thus RIA testing is not conclusive evidence that drugs are present in the blood (Blanke 1986). In order to confirm usage, additional testing is required. The manufacturer of the reagents used in this study makes this point in a highlighted section of the instructions which accompany the reagents.

GAS CHROMATOGRAPHY/MASS SPECTROMETRY CONFIRMATION

“The analytical technique of . . . GC/MS combines the efficient separating power of gas chromatography with the high sensitivity and specificity of spectrometric detection. GC/MS is generally considered to be the most conclusive method of confirming the presence of a drug . . .” (Hawks 1986). The GC/MS process consists of two stages. In the gas chromatography stage, bodily fluids are separated into constituent components. Smaller molecules move more quickly through the equipment’s capillary tubes, and the heavier ones more slowly.

Fig C1 Sensitivity Analysis of 1990 Postpartum Survey RIA Results:
Presumed Prevalence of Use as a Function of Measured Substance Concentration



As these compounds emerge from the chromatograph in the ascending order of molecular weight they are directed to a mass spectrometer for final identification. Mass spectrometry is analogous to fingerprinting — each molecule produces a characteristic spectrum or pattern depending on the its constituent chemical components. Thus, when confirmed with mass spectrometry, there can be no doubt that a given drug is present in the blood. However, there are a number of reasons why “true” drug use detected by RIA might not be confirmed by GC/MS testing. Some of these are inherent in the technique, and others are problems specific to this project.

Like finger-printing, mass spectrometry requires a clear image or “print” for positive identification. The probability of finding such an image depends largely on the concentration of drug in a given sample; the greater the drug-concentration, the more likely becomes confirmation. Many labs set RIA screening cutoffs much higher than the theoretical sensitivity of RIA drug screens to avoid sending an excess of low-concentration samples for costly tests. In this case, many low concentration samples were

tested, and even in the best of circumstances, only a small percentage of these would be expected to confirm.

Another factor which limited GC/MS confirmation in this study was that many samples had been used up in previous rounds of testing. Umbilical cords contain only between 5 to 10 milliliters of blood. About one-half of the samples were initially tested with gas chromatography which destroyed significant quantities of sample. Many samples initially testing positive were retested to verify previous results, then all samples were tested using RIA which also consumed blood serum. As a result, only about 110 of the 200 samples submitted for GC/MS testing had sufficient remaining blood to attempt the GC/MS procedure. Of those did have sufficient sample, many were very close to the 1 milliliter minimum sample volume required to perform the test. When minimum sample volumes are coupled with low drug concentrations, it becomes very difficult to confirm the presence of drugs in the blood, even when the drug is actually present in the blood. The process is analogous to looking for a needle in a haystack that can

be examined only once.

In addition to the problem of depleted samples, there were other procedural factors which complicated testing. Samples had been frozen and thawed several times before submission for GC/MS testing, and some had been frozen for as many as six months. The potential for deterioration of drugs or drug metabolites actually present in the bloods made confirmation more difficult. Because of these problems, it is likely that the true rate of recent drug use is higher than GC/MS confirmation would indicate. In addition, because of the low cutoffs used in the RIA analysis, it is likely that many of the RIA presumptive positive bloods are the result of cross-reactivity, and that the RIA methodology overestimated true rates of recent drug use. In short, the true rates of very recent use of cocaine, methamphetamines, and heroin likely falls somewhere between the limits bounded on the upper side by RIA estimates and on the lower side by GC/MS estimates.

Shown in Table C1 is summary of GC/MS confirmations of RIA positive results. For purposes of this table, the initial GC/MS run on 25 bloods has been combined with the later submission of 175 bloods. Many of the bloods were screened RIA positive on more than one drug and submitted for multiple GC/MS confirmations. Thus the total number of confirmation tests will not

add to 200. The columns in the table are defined and interpreted as follows:

RIA unknown: Technical difficulties precluded RIA-screening of these samples.

RIA negative: Samples screened negative on all three drugs and were not submitted for GC/MS confirmation.

RIA negative, GC/MS positive: Although RIA-screened negative on some or all three drugs, the 25 samples initially submitted to the Bexar County Medical Examiners office were GC/MS tested for the presence of cocaine, methamphetamines, and morphine. Two samples RIA-negative for cocaine and one sample RIA-negative for opiates (e.g., the drug concentration in the blood was under the established RIA cutoff) were confirmed positive with GC/MS testing. This result illustrates that GC/MS testing is highly sensitive and can, in some cases, conclusively identify drug use even at very low levels of blood concentration.

RIA positive, insufficient sample: Although presumed positive on the basis of RIA testing, these samples could not be subjected to GC/MS confirmation because of insufficient sample volume. Overall, of the approximately 200 samples submitted for GC/MS confirmation, 90 did not have sufficient volume for GC/MS testing.

Table C1 1990 Postpartum Sample:
GC/MS Confirmations of RIA Results

	RIA Unknown		RIA-		RIA- GCMS+
Cocaine	19	(1.3%)	1316	(91.1%)	2 (0.1%)
Methamphetamine	28	(1.9%)	1333	(92.2%)	0 (0.0%)
"Heroin"	26	(1.8%)	1339	(92.6%)	1 (0.1%)

	RIA+ Ins. Sample		RIA+ GCMS+		RIA+ GCMS- Conclusive		RIA+ GCMS- Possible
Cocaine	57	(3.9%)	11	(0.8%)	0	(0.0%)	40 (2.8%)
Methamphetamine	45	(3.1%)	5	(0.3%)	4	(0.3%)	31 (2.1%)
"Heroin"	46	(3.2%)	10	(0.7%)	4	(0.3%)	20 (1.4%)

RIA positive, GC/MS positive: Of the 51 RIA cocaine positive samples with sufficient volume for testing, 11 (22 percent) were confirmed on GC/MS testing for the presence of cocaine (or a metabolite of cocaine) in the blood. The confirmation rate was 13 percent (5 out of 40) on RIA methamphetamine positive bloods and 29 percent (10 out of 34) on RIA opiate positive bloods.

RIA positive, GC/MS conclusively negative: In these cases, GC/MS testing revealed compounds known to be cross-reactive with RIA test antibodies. For example, ephedrine was detected in 4 samples submitted for amphetamine confirmation. Ephedrine is known to be cross-reactive with the RIA methamphetamine test antibodies and can be produced as a result of taking over-the-counter cold remedies. Similarly, RIA opiate screen antibodies bond with codeine, a common ingredient of prescription pain relievers. Codeine (rather than morphine) was detected by GC/MS testing of 4 RIA morphine-positive bloods. The likely source of this drug is prescription drug use. In these cases, the probable source of RIA cross-reactivity was identified and the best interpretation of these bloods is that cross-reactivity caused a false positive RIA indication.

RIA positive, GC/MS possibly negative: In these cases, the drug of interest was not detected by GC/MS confirmation testing, but neither was any substance known to be cross-reactive with the RIA test antigen. This is not unusual; indeed, it is rarely possible to identify the drugs producing RIA cross-reactivity with GC/MS confirmation testing. However, given the small sample volume available for confirmation testing and the low cutoff values used in this study, it is possible that some true recent illicit drug use was not confirmed with GC/MS testing.

The highest rates of GC/MS confirmation were achieved on “heroin” (opiates) where 29 percent of the tested samples were con-

firmed. Confirmation rates on cocaine and methamphetamines were 22 percent and 13 percent respectively.

A SUMMARY OF BLOOD DRUG TEST RESULTS

There is a tendency for non-specialists to regard chemical assay drug testing as a source of objective information that requires only a minimum of interpretation. However, chemical assay drug tests have important limitations which must be understood before results can be interpreted. Simply put, some tests — such as the RIA procedure used in this research — are preliminary. They can reliably identify a large subset of people who likely did not use drugs recently, but taken alone, cannot conclusively establish that anyone actually used drugs. On the other hand, tests such as GC/MS are conclusive; when GC/MS analysis demonstrates the presence of drug in a sample one can be reasonably certain that drug use did occur. However, GC/MS does have limitations. When remaining traces of the drug are scant and the sample is small, even the most skilled technician may have difficulty confirming recent use. For these reasons, it is safest to regard the difference between RIA results and GC/MS confirmations as a range of possible estimates of the prevalence of recent use, with GC/MS furnishing the most conservative estimate.

PATTERNS OF SELF-REPORT AND DRUG TESTING RESULTS

One of the obvious advantages of gathering information about drug use through self-report is low cost. In addition, self-report can also be the richest source of information about substance use. Questions can be asked about the timing of drug usage, normal patterns of use, how those patterns changed after pregnancy, substance use-related values, attitudes, and problems as well as other topics relevant to understanding the role of substance use in the respondents' lives. Few, if any, of these topics can be addressed through chemical assay. However, the ques-

Table C2 1990 Postpartum Sample:
Concordance of Self-Reported and Blood-Identified Substance Use

Cocaine	Self-Reported	Number	Percent	Estimated	Percent	SIMVAR ***
	Use*	RIA+ *		GC/MS		
Past Month	7	4	(57.1%)	2.1	(30.0%)	0.006576
Past Year	34	9	(26.5%)	4.5	(13.2%)	0.000433
Past	73	9	(12.3%)	1.3	(1.8%)	0.000085
Never Used	1309	86	(6.6%)	16.8	(1.3%)	0.000003
Methamphetamines						
Past Month	0	0	(0.0%)	0.0	(0.0%)	na
Past Year	13	0	(0.0%)	0.0	(0.0%)	0.000000
Past	73	7	(9.6%)	0.3	(0.4%)	0.000044
Never Used	1313	77	(5.9%)	11.2	(0.9%)	0.000001
Opiates						
Past Month	4	2	(50.0%)	1.4	(35.0%)	0.022222
Past Year	2	0	(0.0%)	0.0	(0.0%)	0.000000
Past	15	1	(6.7%)	0.1	(0.7%)	0.000444
Never Used	1379	76	(5.5%)	21.9	(1.6%)	0.000004

* Unweighted numbers

** Based on a Monte Carlo simulation procedure

*** Variance computed from 10 simulation runs

tion remains whether women will self-report drug use during pregnancy, and if not, whether they will say anything at all which can help the medical professional identify current users of drugs.

Estimates of the concordance between self-report and blood assays can be formulated by systematically comparing self-reported recency of use to RIA drug screening and GC/MS confirmation results (Table C2). Comparisons are presented for cocaine, methamphetamines, and opiates. Because of the small number of self-reported users, unweighted estimates are reported. The procedure used to estimate the concordance between self-reported use and GC/MS confirmed bloods requires some additional explanation.

Recall that small sample volume precluded GC/MS testing on 90 RIA positive bloods. Had these bloods been subject to the procedure, some would likely have confirmed. This missing data was taken into account with a technique known as Monte Carlo simulation. The assumption underlying this process is that had sufficient sample vol-

ume for GC/MS testing been available, untested samples would have confirmed at rates similar to those which were tested. The procedure takes into account that bloods with different RIA-measured drug concentrations confirmed at different rates. For example, of samples that were RIA positive for cocaine, 9 percent of those with 2-5 ng/ml concentrations, 13 percent of those with 5-100 ng/ml concentrations, and 87 percent of those with concentrations over 100 ng/ml were confirmed positive with GC/MS. This information was used to implement the cocaine simulation as follows.

For each sample RIA positive for cocaine that could not be subjected to GC/MS, an evenly distributed random number between 0 and 1 was drawn and compared to the concentration-specific probability of confirmation (for example, .87 for samples with over 100 ng/ml cocaine concentrations). If the random number was smaller than the probability of confirmation, the sample was regarded as confirmed, and if not, as unconfirmed. This procedure was repeated 10 times. The number of times an

untested sample appears as positive in these experiments is a function of both chance and the rate of confirmation for tested samples with similar concentrations. The simulated data was then combined with known data to produce 10 populations amenable to individual-level data analysis. By averaging across these populations, one can estimate what the results would likely have been had all RIA positive bloods been subjected to confirmation testing. By looking at differences among the 10 populations, one can ascertain the extent to which these estimates are affected by chance. Similar procedures were used to develop estimates on methamphetamines and opiates.

One way of viewing the question of concordance between self-reported and blood-measured use is as a continuum, wherein concordance is best when blood-measured recent users self-report using drugs within the past month, and worst when blood-measured users deny ever having used the drug (Table C2). Concordance may vary from drug to drug although the small number of self-reported users precludes any firm conclusions.

There appears to be a clear association between the recency of admitted use of cocaine and the likelihood that blood samples are RIA-screened positive and ultimately confirmed with GC/MS. While it is not surprising that a relatively large proportion of self-admitted, past-month cocaine users (30 percent) confirmed positive for this drug, 13 percent of those admitting use as recently as the past year also were confirmed to have used cocaine within the past 48 hours. This compares to blood-confirmation rates in the range of 1 percent to 2 percent among those who either denied ever using cocaine or denied using it within the past year. In other words, it appears to be possible to distinguish women who are at higher risk of active cocaine use by asking the question, "Have you used cocaine within the past year?" Unfortunately, the

same strategy would not appear to work for methamphetamines or opiates because very few women in this sample admitted using any these types of drugs within the past month or year.

The number of women who actually used drugs very recently but deny ever having tried them varies according to which blood assay methodology one chooses to use. On the basis of the less conservative RIA screening, the answer is on the order of one in twenty on each of the three drugs. If one uses the conservative GC/MS estimate, the answer is approximately one in one hundred on each drug. Because the GC/MS analysis pinpointed the source of cross-reactivity on a significant number of heroin and methamphetamine positive bloods, we can be quite certain that the one in twenty estimate is too large on these substances.

Another way of looking at concordance is to ask if users identified on the basis of blood analysis self-report using drugs (Table C3). Although there are some apparent differences in reporting patterns on cocaine, methamphetamines, and opiates, it generally appears that women who used in the recent past tend not to self-report drug use. Notice that concordance is best on cocaine, where about one-third of the confirmed active cocaine users actually admitted that they had ever used the drug. Fewer than 10 percent of blood-identified active methamphetamine or opiate users admitted ever using these drugs.

These results generally suggest that self-reported data identifies a significant group of users who cannot be identified with drug-testing, and that drug testing identifies an important group of users who cannot be identified with self report. The size of the latter group is somewhere between 1 percent and 6 percent of those reporting never having used cocaine (the range between RIA positive results and GC/MS positive results), and 1 percent and 4 percent of

those denying ever having used opiates or amphetamines. Because of the problems involved with blood testing in this project, it is not possible to be more precise.

Table C3 1990 Postpartum Sample:
Percent of Blood-Confirmed Recent Drug Users Who Self-Report Use

	Ever Used		Past Month		Past Year		Not Past Year		Never Used	
	N	%	N	%	N	%	N	%	N	%
Cocaine										
RIA Screened +	22	20.4%	4	3.7%	9	8.3%	9	8.3%	86	79.6%
GC/MS+ (Estimated)	7.9	32.0%	2.1	8.5%	4.5	18.2%	1.3	5.3%	16.8	68.0%
Methamphetamine										
RIA Screened +	7	8.3%	0	0.0%	0	0.0%	7	8.3%	77	91.7%
GC/MS+ (Estimated)	0.3	2.6%	0	0.0%	0	0.0%	0.3	2.6%	11.2	97.4%
Opiates										
RIA Screened +	3	3.8%	2	2.5%	0	0.0%	1	1.3%	76	96.2%
GC/MS+ (Estimated)	1.5	6.4%	1.4	6.0%	0	0.0%	0.1	0.4%	21.9	93.6%

APPENDIX D

TABLE D1: SELF-REPORTED PREVALENCE BY ETHNICITY

1990 Texas Postpartum Sample: Lifetime, Past Month, Past Year Use

	EVER USED	PAST MONTH	PAST YEAR	NOT PAST YEAR	NEVER USED
CIGARETTES	36.4%	15.9%	7.1%	13.4%	63.6%
WHITES	71.8%	48.7%	10.3%	12.8%	28.2%
BLACKS	24.3%	15.6%	3.6%	5.1%	75.7%
HISPANICS	28.8%	4.9%	7.4%	16.5%	71.2%
ALCOHOL	63.6%	5.7%	21.8%	36.1%	36.4%
WHITES	90.6%	14.5%	42.1%	34.0%	9.4%
BLACKS	67.3%	7.4%	22.6%	37.2%	32.7%
HISPANICS	52.0%	2.2%	15.6%	34.3%	48.0%
MARIJUANA	24.7%	1.8%	3.6%	19.3%	75.3%
WHITES	58.5%	6.4%	8.1%	44.0%	41.5%
BLACKS	26.9%	2.4%	4.8%	19.7%	73.1%
HISPANICS	12.1%	**	1.7%	10.0%	87.9%
INHALANTS	2.6%	**	**	2.4%	97.4%
WHITES	7.7%	**	1.3%	6.4%	92.3%
BLACKS	1.2%	**	**	0.9%	98.8%
HISPANICS	2.1%	**	**	2.0%	97.9%
COCAINE	7.5%	**	2.1%	5.2%	92.5%
WHITES	23.4%	**	6.0%	17.4%	76.6%
BLACKS	5.1%	**	2.1%	2.7%	94.9%
HISPANICS	3.8%	**	0.9%	2.8%	96.2%
CRACK	1.4%	**	0.7%	**	98.6%
WHITES	2.6%	**	1.3%	0.9%	97.4%
BLACKS	2.4%	0.6%	1.5%	**	97.6%
HISPANICS	**	**	**	**	99.6%
UPPERS	6.1%	**	0.9%	5.2%	93.9%
WHITES	22.2%	**	3.4%	18.8%	77.8%
BLACKS	1.8%	**	**	1.5%	98.2%
HISPANICS	2.5%	**	0.5%	1.9%	97.5%
DOWNERS	2.7%	**	**	2.6%	97.3%
WHITES	9.8%	**	**	9.4%	90.2%
BLACKS	1.8%	**	**	1.8%	98.2%
HISPANICS	0.8%	**	**	0.8%	99.2%
HEROIN	0.7%	**	**	**	99.3%
WHITES	2.1%	0.9%	**	0.9%	97.9%
BLACKS	0.6%	**	**	**	99.4%
HISPANICS	**	**	**	**	99.7%
OTHER OPIATES	1.1%	**	**	0.8%	98.9%
WHITES	4.3%	1.3%	**	3.0%	95.7%
BLACKS	**	**	**	**	100.0%
HISPANICS	**	**	**	**	99.7%
PSYCHEDELICS	3.4%	**	0.6%	2.8%	96.6%
WHITES	14.5%	**	1.3%	13.2%	85.5%
BLACKS	**	**	**	**	99.7%
HISPANICS	1.0%	**	0.5%	0.5%	99.0%
ILLICIT DRUG(S)	26.3%	2.3%	4.9%	19.0%	73.7%
WHITES	61.3%	7.2%	10.2%	43.8%	38.7%
BLACKS	28.9%	3.0%	6.8%	19.0%	71.1%
HISPANICS	12.9%	0.5%	2.3%	10.1%	87.1%
COCAINE OR CRACK	8.0%	**	2.4%	5.1%	92.0%
WHITES	23.4%	**	5.5%	17.4%	76.6%
BLACKS	6.3%	0.6%	3.3%	2.4%	93.8%
HISPANICS	3.8%	**	0.9%	2.8%	96.2%

Totals for each substance were weighted to reflect the relative proportion of births in each of the six hospitals represented.

** Less than 0.5%

APPENDIX D

TABLE D2: SELF-REPORTED PREVALENCE BY ETHNICITY

1990 Texas Postpartum Sample: Lifetime, Total Past Year, During Pregnancy Use

	EVER USED	TOTAL PAST YEAR	DURING PREGNANCY
CIGARETTES	36.4%	23.0%	18.6%
WHITES	71.8%	59.0%	51.3%
BLACKS	24.3%	19.2%	16.5%
HISPANICS	28.8%	12.3%	7.9%
ALCOHOL	63.6%	27.5%	12.9%
WHITES	90.6%	56.6%	29.8%
BLACKS	67.3%	30.1%	14.0%
HISPANICS	52.0%	17.8%	7.0%
MARIJUANA	24.7%	5.5%	2.6%
WHITES	58.5%	14.5%	7.3%
BLACKS	26.9%	7.2%	3.9%
HISPANICS	12.1%	2.1%	0.8%
INHALANTS	2.6%	0.3%	**
WHITES	7.7%	1.3%	**
BLACKS	1.2%	**	**
HISPANICS	2.1%	**	**
COCAINE	7.5%	2.3%	0.8%
WHITES	23.4%	6.0%	1.7%
BLACKS	5.1%	2.4%	1.2%
HISPANICS	3.8%	1.0%	**
CRACK	1.4%	1.0%	0.5%
WHITES	2.6%	1.7%	1.3%
BLACKS	2.4%	2.1%	0.9%
HISPANICS	**	**	**
UPPERS	6.1%	0.9%	**
WHITES	22.2%	3.4%	**
BLACKS	1.8%	**	**
HISPANICS	2.5%	0.5%	**
DOWNERS	2.7%	**	**
WHITES	9.8%	**	**
BLACKS	1.8%	**	**
HISPANICS	0.8%	**	**
HEROIN	0.7%	**	**
WHITES	2.1%	1.3%	0.8%
BLACKS	0.6%	**	**
HISPANICS	**	**	**
OTHER OPIATES	1.1%	**	**
WHITES	4.3%	1.3%	1.3%
BLACKS	**	**	**
HISPANICS	**	**	**
PSYCHEDELICS	3.4%	0.6%	**
WHITES	14.5%	1.3%	**
BLACKS	**	**	**
HISPANICS	1.0%	0.5%	**
ILLICIT DRUG(S)	26.3%	7.2%	3.4%
WHITES	61.3%	17.4%	8.5%
BLACKS	28.9%	9.8%	5.1%
HISPANICS	12.9%	2.8%	1.2%
COCAINE/CRACK	8.0%	2.7%	0.9%
WHITES	23.4%	6.0%	1.7%
BLACKS	6.3%	3.9%	1.5%
HISPANICS	3.8%	1.0%	**

Totals for each substance were weighted to reflect the relative proportion of births in each of the six hospitals represented.

** Less than 0.5%

APPENDIX D

TABLE D3: SELF-REPORTED PREVALENCE BY AGE

1990 Texas Postpartum Sample: Lifetime, Past Month, Past Year Use

	EVER USED	PAST MONTH	PAST YEAR	NOT PAST YEAR	NEVER USED
CIGARETTES	36.4%	15.9%	7.1%	13.4%	63.6%
Under 18	32.0%	10.0%	6.7%	15.3%	68.0%
18-25	33.5%	13.9%	7.8%	11.8%	66.5%
26-34	38.8%	19.0%	6.2%	13.6%	61.2%
ALCOHOL	63.6%	5.7%	21.8%	36.1%	36.4%
Under 18	55.9%	3.3%	22.4%	30.3%	44.1%
18-25	64.3%	4.3%	23.0%	37.0%	35.7%
26-34	61.7%	8.6%	19.6%	33.5%	38.3%
MARIJUANA	24.7%	1.8%	3.6%	19.3%	75.3%
Under 18	22.4%	0.7%	6.6%	15.1%	77.6%
18-25	25.7%	1.9%	3.9%	19.9%	74.3%
26-34	22.3%	2.4%	2.2%	17.7%	77.7%
INHALANTS	2.6%	**	**	2.4%	97.4%
Under 18	4.7%	**	1.3%	3.3%	95.3%
18-25	2.9%	**	**	2.6%	97.1%
26-34	1.4%	**	**	1.1%	98.6%
COCAINE	7.5%	**	2.1%	5.2%	92.5%
Under 18	5.9%	**	2.6%	3.3%	94.1%
18-25	7.3%	**	2.3%	5.0%	92.7%
26-34	8.9%	0.5%	1.9%	6.5%	91.1%
CRACK	1.4%	**	0.7%	**	98.6%
Under 18	1.3%	**	1.3%	**	98.7%
18-25	1.4%	**	1.0%	**	98.6%
26-34	1.6%	0.8%	**	0.8%	98.4%
UPPERS	6.1%	**	0.9%	5.2%	93.9%
Under 18	3.4%	**	1.3%	2.0%	96.6%
18-25	5.6%	**	0.9%	4.7%	94.4%
26-34	7.1%	**	1.1%	6.0%	92.9%
DOWNERS	2.7%	**	**	2.6%	97.3%
Under 18	2.0%	**	**	2.0%	98.0%
18-25	1.5%	**	**	1.5%	98.5%
26-34	4.6%	**	**	4.6%	95.4%
HEROIN	0.7%	**	**	**	99.3%
Under 18	**	**	**	**	100.0%
18-25	**	**	**	**	99.7%
26-34	1.6%	0.5%	**	0.8%	98.4%
OTHER OPIATES	1.1%	**	**	0.8%	98.9%
Under 18	**	**	**	**	100.0%
18-25	0.6%	**	**	0.6%	99.4%
26-34	1.6%	0.5%	**	1.1%	98.4%
PSYCHEDELICS	3.4%	**	0.6%	2.8%	96.6%
Under 18	4.7%	**	1.3%	3.4%	95.3%
18-25	3.0%	**	**	2.7%	97.0%
26-34	3.3%	**	0.5%	2.7%	96.7%
ILLICIT DRUG(S)	26.3%	2.3%	4.9%	19.0%	73.7%
Under 18	25.7%	0.7%	9.2%	15.8%	74.3%
18-25	26.8%	1.9%	5.1%	19.8%	73.2%
26-34	23.9%	3.8%	3.0%	17.2%	76.1%
COCAINE OR CRACK	8.0%	**	2.4%	5.1%	92.0%
Under 18	6.6%	**	3.3%	3.3%	93.4%
18-25	7.6%	**	2.8%	4.9%	92.4%
26-34	9.1%	1.1%	1.6%	6.5%	90.9%

Totals for each substance were weighted to reflect the relative proportion of births in each of the six hospitals represented.

** Less than 0.5%

APPENDIX D

TABLE D4: SELF-REPORTED PREVALENCE BY AGE

1990 Texas Postpartum Sample: Lifetime, Total Past Year, During Pregnancy Use

	EVER USED	TOTAL PAST YEAR	DURING PREGNANCY
CIGARETTES	36.4%	23.0%	18.6%
Under 18	32.0%	16.7%	12.0%
18-25	33.5%	21.7%	17.2%
26-34	38.8%	25.2%	20.3%
ALCOHOL	63.6%	27.5%	12.9%
Under 18	55.9%	25.7%	7.9%
18-25	64.3%	27.3%	11.5%
26-34	61.7%	28.2%	15.8%
MARIJUANA	24.7%	5.5%	2.6%
Under 18	22.4%	7.2%	1.3%
18-25	25.7%	5.8%	2.3%
26-34	22.3%	4.6%	3.8%
INHALANTS	2.6%	**	**
Under 18	4.7%	1.3%	**
18-25	2.9%	**	**
26-34	1.4%	**	**
COCAINE	7.5%	2.3%	0.8%
Under 18	5.9%	2.6%	**
18-25	7.3%	2.3%	0.8%
26-34	8.9%	2.4%	1.3%
CRACK	1.4%	1.0%	0.5%
Under 18	1.3%	1.3%	**
18-25	1.4%	1.0%	**
26-34	1.6%	0.8%	0.8%
UPPERS	6.1%	0.9%	**
Under 18	3.4%	1.3%	**
18-25	5.6%	0.9%	**
26-34	7.1%	1.1%	**
DOWNERS	2.7%	**	**
Under 18	2.0%	**	**
18-25	1.5%	**	**
26-34	4.6%	**	**
HEROIN	0.7%	**	**
Under 18	**	**	**
18-25	**	**	**
26-34	1.6%	0.8%	0.5%
OTHER OPIATES	1.1%	**	**
Under 18	**	**	**
18-25	0.6%	**	**
26-34	1.6%	0.5%	0.5%
PSYCHEDELICS	3.4%	0.6%	**
Under 18	4.7%	1.3%	**
18-25	3.0%	**	**
26-34	3.3%	0.5%	**
ILLICIT DRUG(S)	26.3%	7.2%	3.4%
Under 18	25.7%	9.9%	1.3%
18-25	26.8%	7.0%	2.9%
26-34	23.9%	6.7%	5.1%
COCAINE OR CRACK	8.0%	2.7%	0.9%
Under 18	6.6%	3.3%	**
18-25	7.6%	2.8%	0.8%
26-34	9.1%	2.7%	1.6%

Totals for each substance were weighted to reflect the relative proportion of births in each of the six hospitals represented.

** Less than 0.5%

APPENDIX D

TABLE D5: SELF-REPORTED PREVALENCE BY EDUCATION

1990 Texas Postpartum Sample: Lifetime, Past Month, Past Year Use

	EVER USED	PAST MONTH	PAST YEAR	NOT PAST YEAR	NEVER USED
CIGARETTES	36.4%	15.9%	7.1%	13.4%	63.6%
LESS THAN H.S.	30.9%	9.4%	5.6%	15.9%	69.1%
SOME H.S.	40.5%	20.9%	8.8%	10.8%	59.5%
H.S. GRADUATE	34.4%	14.9%	6.5%	13.0%	65.6%
ALCOHOL	63.6%	5.7%	21.8%	36.1%	36.4%
LESS THAN H.S.	46.5%	2.0%	12.2%	32.3%	53.5%
SOME H.S.	67.2%	6.7%	24.9%	35.5%	32.8%
H.S. GRADUATE	71.0%	7.2%	26.5%	37.3%	29.0%
MARIJUANA	24.7%	1.8%	3.6%	19.3%	75.3%
LESS THAN H.S.	12.0%	0.7%	1.0%	10.2%	88.0%
SOME H.S.	28.2%	2.5%	6.5%	19.1%	71.8%
H.S. GRADUATE	29.2%	2.2%	3.1%	23.8%	70.8%
INHALANTS	2.6%	**	**	2.4%	97.4%
LESS THAN H.S.	1.8%	**	**	1.8%	98.2%
SOME H.S.	4.7%	**	1.1%	3.6%	95.3%
H.S. GRADUATE	1.9%	**	**	1.9%	98.1%
COCAINE	7.5%	**	2.1%	5.2%	92.5%
LESS THAN H.S.	2.5%	**	1.5%	1.0%	97.5%
SOME H.S.	9.7%	**	3.6%	6.1%	90.3%
H.S. GRADUATE	9.2%	**	1.3%	7.6%	90.8%
CRACK	1.4%	**	0.7%	**	98.6%
LESS THAN H.S.	0.7%	**	**	**	99.3%
SOME H.S.	1.8%	**	1.1%	0.7%	98.2%
H.S. GRADUATE	1.5%	0.6%	0.6%	**	98.5%
UPPERS	6.1%	**	0.9%	5.2%	93.9%
LESS THAN H.S.	2.0%	**	1.0%	1.0%	98.0%
SOME H.S.	7.0%	**	1.1%	5.9%	93.0%
H.S. GRADUATE	7.4%	**	0.7%	6.7%	92.6%
DOWNERS	2.7%	**	**	2.6%	97.3%
LESS THAN H.S.	1.0%	**	**	1.0%	99.0%
SOME H.S.	2.9%	**	**	2.9%	97.1%
H.S. GRADUATE	3.4%	**	**	3.2%	96.6%
HEROIN	0.7%	**	**	**	99.3%
LESS THAN H.S.	**	**	**	**	100.0%
SOME H.S.	0.9%	**	**	0.7%	99.1%
H.S. GRADUATE	0.9%	0.6%	**	**	99.1%
OTHER OPIATES	1.1%	**	**	0.8%	98.9%
LESS THAN H.S.	**	**	**	**	99.7%
SOME H.S.	1.4%	**	**	1.1%	98.6%
H.S. GRADUATE	0.9%	**	**	0.6%	99.1%
PSYCHEDELICS	3.4%	**	0.6%	2.8%	96.6%
LESS THAN H.S.	1.3%	**	**	1.0%	98.7%
SOME H.S.	3.2%	**	0.9%	2.3%	96.8%
H.S. GRADUATE	4.6%	**	**	4.3%	95.4%
ILLCIT DRUG(S)	26.3%	2.3%	4.9%	19.0%	73.7%
LESS THAN H.S.	12.2%	0.7%	2.2%	9.2%	87.8%
SOME H.S.	31.0%	2.7%	8.3%	20.0%	69.0%
H.S. GRADUATE	30.6%	2.9%	3.9%	23.8%	69.4%
COCAINE OR CRACK	8.0%	**	2.4%	5.1%	92.0%
LESS THAN H.S.	2.5%	**	1.5%	1.0%	97.5%
SOME H.S.	10.3%	**	4.3%	6.1%	89.7%
H.S. GRADUATE	9.6%	0.7%	1.5%	7.4%	90.4%

Totals for each substance were weighted to reflect the relative proportion of births in each of the six hospitals represented.

** Less than 0.5%

APPENDIX D

TABLE D6: SELF-REPORTED PREVALENCE BY EDUCATION

1990 Texas Postpartum Sample: Lifetime, Total Past Year, During Pregnancy Use

	EVER USED	TOTAL PAST YEAR	DURING PREGNANCY
CIGARETTES	36.4%	23.0%	18.6%
LESS THAN H.S.	30.9%	14.9%	11.6%
SOME H.S.	40.5%	29.7%	24.8%
H.S. GRADUATE	34.4%	21.4%	16.2%
ALCOHOL	63.6%	27.5%	12.9%
LESS THAN H.S.	46.5%	14.2%	6.2%
SOME H.S.	67.2%	31.7%	13.9%
H.S. GRADUATE	71.0%	33.6%	16.0%
MARIJUANA	24.7%	5.5%	2.6%
LESS THAN H.S.	12.0%	1.7%	0.8%
SOME H.S.	28.2%	9.0%	4.3%
H.S. GRADUATE	29.2%	5.4%	2.6%
INHALANTS	2.6%	**	**
LESS THAN H.S.	1.8%	**	**
SOME H.S.	4.7%	1.1%	**
H.S. GRADUATE	1.9%	**	**
COCAINE	7.5%	2.3%	0.8%
LESS THAN H.S.	2.5%	1.5%	0.5%
SOME H.S.	9.7%	3.6%	1.1%
H.S. GRADUATE	9.2%	1.7%	0.7%
CRACK	1.4%	1.0%	0.5%
LESS THAN H.S.	0.7%	0.5%	**
SOME H.S.	1.8%	1.1%	**
H.S. GRADUATE	1.5%	1.1%	0.7%
UPPERS	6.1%	0.9%	**
LESS THAN H.S.	2.0%	1.0%	**
SOME H.S.	7.0%	1.1%	**
H.S. GRADUATE	7.4%	0.7%	**
DOWNERS	2.7%	**	**
LESS THAN H.S.	1.0%	**	**
SOME H.S.	2.9%	**	**
H.S. GRADUATE	3.4%	**	**
HEROIN	0.7%	**	**
LESS THAN H.S.	**	**	**
SOME H.S.	0.9%	**	**
H.S. GRADUATE	0.9%	0.7%	0.6%
OTHER OPIATES	1.1%	**	**
LESS THAN H.S.	**	**	**
SOME H.S.	1.4%	**	**
H.S. GRADUATE	0.9%	**	**
PSYCHEDELICS	3.4%	0.6%	**
LESS THAN H.S.	1.3%	**	**
SOME H.S.	3.2%	0.9%	**
H.S. GRADUATE	4.6%	**	**
ILLICIT DRUG(S)	26.3%	7.2%	3.4%
LESS THAN H.S.	12.2%	3.0%	1.2%
SOME H.S.	31.0%	11.0%	4.9%
H.S. GRADUATE	30.6%	6.8%	3.5%
COCAINE OR CRACK	8.0%	2.7%	0.9%
LESS THAN H.S.	2.5%	1.5%	0.5%
SOME H.S.	10.3%	4.3%	1.1%
H.S. GRADUATE	9.6%	2.2%	0.9%

Totals for each substance were weighted to reflect the relative proportion of births in each of the six hospitals represented.

** Less than 0.5%

APPENDIX D

TABLE D7: SELF-REPORTED PREVALENCE BY HOSPITAL

1990 Texas Postpartum Sample: Lifetime, Past Month, Past Year Use

	EVER USED	PAST MONTH	PAST YEAR	NOT PAST YEAR	NEVER USED
CIGARETTES	36.4%	15.9%	7.1%	13.4%	63.6%
PARKLAND-DALLAS	31.2%	15.6%	6.1%	9.4%	68.8%
J.P.SMITH-F.WORTH	46.1%	26.1%	9.6%	10.4%	53.9%
BEN TAUB-HOUSTON	26.2%	13.1%	3.8%	9.2%	73.8%
L.B.J.-HOUSTON	32.8%	15.3%	3.2%	14.3%	67.2%
MEDICAL CTR-S.A.	44.6%	17.0%	11.6%	16.1%	55.4%
THOMASON-EL PASO	47.4%	6.9%	11.6%	28.9%	52.6%
ALCOHOL	63.6%	5.7%	21.8%	36.1%	36.4%
PARKLAND-DALLAS	59.5%	5.6%	23.2%	30.7%	40.5%
J.P.SMITH-F.WORTH	77.4%	9.6%	25.2%	42.6%	22.6%
BEN TAUB-HOUSTON	58.5%	3.8%	20.0%	34.6%	41.5%
L.B.J.-HOUSTON	58.2%	7.4%	17.5%	33.3%	41.8%
MEDICAL CTR-S.A.	67.0%	4.5%	25.0%	37.5%	33.0%
THOMASON-EL PASO	69.9%	2.3%	18.5%	49.1%	30.1%
MARIJUANA	24.7%	1.8%	3.6%	19.3%	75.3%
PARKLAND-DALLAS	25.0%	2.2%	3.8%	19.0%	75.0%
J.P.SMITH-F.WORTH	40.0%	2.6%	5.2%	32.2%	60.0%
BEN TAUB-HOUSTON	18.8%	2.3%	3.1%	13.3%	81.3%
L.B.J.-HOUSTON	19.6%	2.1%	3.7%	13.8%	80.4%
MEDICAL CTR-S.A.	32.1%	**	3.6%	28.6%	67.9%
THOMASON-EL PASO	11.0%	0.6%	1.7%	8.7%	89.0%
INHALANTS	2.6%	**	**	2.4%	97.4%
PARKLAND-DALLAS	3.6%	**	0.6%	3.0%	96.4%
J.P.SMITH-F.WORTH	5.2%	**	**	5.2%	94.8%
BEN TAUB-HOUSTON	0.8%	**	**	0.8%	99.2%
L.B.J.-HOUSTON	2.6%	**	0.5%	2.1%	97.4%
MEDICAL CTR-S.A.	1.8%	**	**	1.8%	98.2%
THOMASON-EL PASO	**	**	**	**	100.0%
COCAINE	7.5%	**	2.1%	5.2%	92.5%
PARKLAND-DALLAS	7.5%	**	2.2%	5.3%	92.5%
J.P.SMITH-F.WORTH	9.6%	**	4.3%	5.2%	90.4%
BEN TAUB-HOUSTON	10.1%	**	3.1%	7.0%	89.9%
L.B.J.-HOUSTON	6.9%	0.5%	1.1%	5.3%	93.1%
MEDICAL CTR-S.A.	6.3%	0.9%	0.9%	4.5%	93.8%
THOMASON-EL PASO	4.6%	**	1.2%	3.5%	95.4%
CRACK	1.4%	**	0.7%	**	98.6%
PARKLAND-DALLAS	1.5%	**	0.9%	0.6%	98.5%
J.P.SMITH-F.WORTH	3.5%	0.9%	2.6%	**	96.5%
BEN TAUB-HOUSTON	**	**	**	**	100.0%
L.B.J.-HOUSTON	2.6%	1.1%	0.5%	1.1%	97.4%
MEDICAL CTR-S.A.	**	**	**	**	100.0%
THOMASON-EL PASO	**	**	**	**	100.0%
UPPERS	6.1%	**	0.9%	5.2%	93.9%
PARKLAND-DALLAS	5.7%	**	1.2%	4.5%	94.3%
J.P.SMITH-F.WORTH	13.2%	**	0.9%	12.3%	86.8%
BEN TAUB-HOUSTON	6.2%	**	0.8%	5.4%	93.8%
L.B.J.-HOUSTON	6.3%	**	1.1%	5.3%	93.7%
MEDICAL CTR-S.A.	3.6%	**	0.9%	2.7%	96.4%
THOMASON-EL PASO	1.7%	**	**	1.7%	98.3%

** Less than 0.5%

APPENDIX D

TABLE D7 (cont'd): SELF-REPORTED PREVALENCE BY HOSPITAL
1990 Texas Postpartum Sample: Lifetime, Past Month, Past Year Use

	EVER USED	PAST MONTH	PAST YEAR	NOT PAST YEAR	NEVER USED
DOWNERS	2.7%	**	**	2.6%	97.3%
PARKLAND-DALLAS	2.6%	**	**	2.4%	97.4%
J.P.SMITH-F.WORTH	3.5%	**	**	3.5%	96.5%
BEN TAUB-HOUSTON	3.1%	**	**	3.1%	96.9%
L.B.J.-HOUSTON	3.7%	**	**	3.7%	96.3%
MEDICAL CTR-S.A.	2.7%	**	**	2.7%	97.3%
THOMASON-EL PASO	**	**	**	**	100.0%
HEROIN	0.7%	**	**	**	99.3%
PARKLAND-DALLAS	0.7%	**	**	**	99.3%
J.P.SMITH-F.WORTH	1.8%	0.9%	0.9%	**	98.2%
BEN TAUB-HOUSTON	**	**	**	**	100.0%
L.B.J.-HOUSTON	0.5%	**	**	0.5%	99.5%
MEDICAL CTR-S.A.	0.9%	0.9%	**	**	99.1%
THOMASON-EL PASO	**	**	**	**	100.0%
OTHER OPIATES	1.1%	**	**	0.8%	98.9%
PARKLAND-DALLAS	0.6%	**	**	**	99.4%
J.P.SMITH-F.WORTH	4.3%	1.7%	**	2.6%	95.7%
BEN TAUB-HOUSTON	**	**	**	**	100.0%
L.B.J.-HOUSTON	1.1%	**	**	1.1%	98.9%
MEDICAL CTR-S.A.	0.9%	**	**	0.9%	99.1%
THOMASON-EL PASO	**	**	**	**	100.0%
PSYCHEDELICS	3.4%	**	0.6%	2.8%	96.6%
PARKLAND-DALLAS	3.3%	**	**	3.0%	96.7%
J.P.SMITH-F.WORTH	7.8%	**	**	7.8%	92.2%
BEN TAUB-HOUSTON	3.9%	**	2.3%	1.6%	96.1%
L.B.J.-HOUSTON	2.1%	**	1.1%	1.1%	97.9%
MEDICAL CTR-S.A.	2.7%	**	**	2.7%	97.3%
THOMASON-EL PASO	0.6%	**	**	0.6%	99.4%
ILLICIT DRUG(S)	26.3%	2.3%	4.9%	19.0%	73.7%
PARKLAND-DALLAS	26.5%	2.2%	5.0%	19.3%	73.5%
J.P.SMITH-F.WORTH	42.6%	4.3%	7.8%	30.4%	57.4%
BEN TAUB-HOUSTON	20.2%	2.3%	4.7%	13.2%	79.8%
L.B.J.-HOUSTON	22.2%	3.2%	5.3%	13.8%	77.8%
MEDICAL CTR-S.A.	32.1%	0.9%	4.5%	26.8%	67.9%
THOMASON-EL PASO	12.1%	0.6%	1.7%	9.8%	87.9%
COCAINE OR CRACK	8.0%	**	2.4%	5.1%	92.0%
PARKLAND-DALLAS	7.6%	**	2.5%	5.1%	92.4%
J.P.SMITH-F.WORTH	12.2%	0.9%	6.1%	5.2%	87.8%
BEN TAUB-HOUSTON	10.1%	**	3.1%	7.0%	89.9%
L.B.J.-HOUSTON	7.4%	1.1%	1.1%	5.3%	92.6%
MEDICAL CTR-S.A.	6.3%	0.9%	0.9%	4.5%	93.8%
THOMASON-EL PASO	4.6%	**	1.2%	3.5%	95.4%

** Less than 0.5%

APPENDIX E

**Table E1: Prevalence of Alcohol and Drug Problems
Total Sample, Past Year Users and Users Since Pregnancy**

	TOTAL SAMPLE	PAST YEAR USERS	SINCE PREG USERS
Alcohol Problems			
Aggressive or cross while drinking	1.9%	6.8%	10.3%
Heated argument while drinking	2.1%	7.6%	12.0%
Didn't go to work because of hangover	0.9%	3.4%	6.3%
High or tight at work	0.7%	2.6%	5.1%
Lost or nearly lost job because of drinking	0.6%	2.1%	4.6%
Spouse says should cut down on drinking	1.7%	6.3%	9.7%
Relative says should cut down on drinking	1.6%	6.0%	9.1%
Friend(s) say should cut down on drinking	1.4%	5.2%	9.1%
Skipped meals while drinking	1.3%	4.7%	8.0%
Tossed down several drinks for quicker effect	1.8%	6.5%	11.4%
Afraid were or might become alcoholic	1.5%	5.5%	9.1%
Stayed drunk for two or more days	0.6%	2.1%	3.4%
Once started, difficult to stop before drunk	0.9%	3.4%	4.6%
Had blackout	2.0%	7.3%	10.9%
Snuck quick drink while no one was looking	0.8%	2.9%	5.1%
Often had drink first thing in the morning	0.3%	1.0%	2.3%
Hands shook quite a lot after drinking	0.6%	2.1%	3.4%
Got high or tight while drinking by one's self	1.5%	5.5%	9.1%
Kept on drinking after promising self not to	1.6%	6.0%	8.6%
Number of Alcohol Problems			
None	94.4%	79.9%	70.9%
One	1.6%	5.7%	8.0%
Two	1.0%	3.7%	4.0%
Three	0.7%	2.6%	4.6%
Four	0.5%	1.8%	1.1%
Five or More	1.7%	6.3%	11.4%
Drug Problems			
Became depressed or lost interest in things	1.1%	15.3%	21.7%
Had arguments or fights with family/friends	1.6%	23.5%	32.6%
Trouble on job	0.7%	9.2%	15.2%
Driven unsafely	0.5%	7.1%	8.7%
Blackout because of drugs	0.9%	12.2%	15.2%
Felt completely alone or isolated	1.6%	23.5%	30.4%
Felt nervous and anxious	1.9%	26.5%	28.3%
Drug-related health problems	0.7%	10.2%	13.0%
Difficulty thinking clearly	1.4%	19.4%	21.7%
Drug-related money problems	1.2%	17.3%	21.7%
Felt irritable and upset	1.6%	21.4%	28.3%
Done less work than usual	1.1%	15.3%	19.6%
Felt suspicious and distrustful of people	1.0%	13.3%	19.6%
Trouble with the police	0.4%	6.1%	13.0%
Skipped four or more regular meals	1.3%	18.4%	19.6%
Found it harder to handle problems	1.0%	14.3%	17.4%
Sought emergency help	0.2%	3.1%	2.2%
Number of Drug Problems			
None	96.4%	50.0%	50.0%
One	0.6%	9.2%	6.5%
Two	0.8%	11.2%	8.7%
Three	0.1%	1.0%	2.2%
Four	0.4%	5.1%	2.2%
Five or More	1.7%	23.5%	30.4%
Number of Either Alcohol or Other Drug Problems			
None	91.9%	72.7%	62.7%
One	2.1%	6.9%	8.8%
Two	1.6%	5.4%	5.2%
Three	0.6%	2.2%	3.6%
Four	0.6%	2.2%	2.1%
Five or More	3.1%	10.6%	17.6%

APPENDIX E

Table E2: Prevalence of Alcohol and Drug Problems by Race/Ethnicity, Education, and Age

	Race/Ethnicity			Education			Age		
	Whites	Blacks	Hispan	Less than HS	Some HS	HS Grad	18-25	26-34	35+
Alcohol Problems									
Aggressive or cross while drinking	5.1%	2.4%	0.9%	0.5%	2.9%	2.2%	2.0%	1.8%	2.4%
Heated argument while drinking	6.0%	2.1%	1.0%	1.0%	3.4%	1.8%	1.3%	2.0%	2.9%
Didn't go to work because of hangover	2.6%	0.3%	0.5%	0.2%	1.1%	1.3%	1.3%	1.0%	0.8%
High or tight at work	1.7%	0.6%	0.5%	0.2%	0.7%	1.1%	0.0%	0.9%	0.5%
Lost or nearly lost job because of drinking	2.1%	0.3%	0.3%	0.2%	1.1%	0.4%	0.0%	0.4%	1.3%
Spouse says should cut down on drinking	3.4%	1.8%	1.3%	1.0%	2.7%	1.5%	2.0%	1.4%	2.1%
Relative says should cut down on drinking	3.8%	2.1%	0.9%	0.7%	2.7%	1.5%	1.3%	1.9%	1.3%
Friend(s) say should cut down on drinking	2.6%	1.2%	1.3%	1.0%	2.2%	1.1%	0.7%	1.6%	1.3%
Skipped meals while drinking	3.0%	1.8%	0.6%	0.7%	2.0%	1.1%	0.7%	1.4%	1.3%
Tossed down several drinks for quicker effect	5.1%	0.9%	1.3%	1.2%	2.2%	1.8%	2.0%	1.9%	1.6%
Afraid were or might become alcoholic	4.2%	0.9%	1.0%	1.0%	2.5%	1.1%	1.3%	1.5%	1.9%
Stayed drunk for two or more days	2.1%	0.3%	0.3%	0.5%	0.7%	0.6%	0.0%	0.5%	0.8%
Once started, difficult to stop before drunk	3.4%	0.6%	0.3%	0.5%	1.6%	0.7%	0.7%	1.0%	1.1%
Had blackout	6.0%	1.2%	1.2%	1.0%	3.1%	1.8%	2.0%	2.0%	1.9%
Snuck quick drink while no one was looking	1.7%	1.2%	0.3%	0.7%	1.1%	0.6%	1.3%	0.2%	1.3%
Often had drink first thing in the morning	0.9%	0.6%	0.0%	0.2%	0.0%	0.6%	0.0%	0.0%	0.8%
Hands shook quite a lot after drinking	2.1%	0.6%	0.1%	0.7%	0.9%	0.2%	0.0%	0.2%	1.6%
Got high or tight while drinking by one's self	4.2%	1.5%	0.8%	0.7%	1.8%	1.8%	0.7%	1.5%	1.9%
Kept on drinking after promising self not to	3.8%	1.8%	0.9%	0.7%	2.7%	1.5%	2.0%	1.8%	1.3%
Number of Alcohol Problems									
One	3.0%	2.7%	0.8%	0.8%	2.2%	1.8%	0.7%	1.6%	1.6%
Two	2.6%	0.9%	0.5%	0.2%	1.1%	1.5%	1.3%	0.9%	1.3%
Three	1.7%	0.6%	0.4%	0.2%	0.7%	1.1%	0.7%	0.5%	1.3%
Four	0.8%	0.9%	0.3%	0.0%	0.9%	0.6%	0.0%	0.6%	0.3%
Five or More	4.3%	1.5%	1.2%	1.0%	2.9%	1.3%	2.0%	3.8%	1.6%
Drug Problems									
Became depressed or lost interest in things	2.6%	1.2%	0.8%	0.5%	1.8%	1.1%	1.3%	1.0%	1.3%
Had arguments or fights with family/friends	5.1%	1.5%	0.8%	0.7%	2.7%	1.5%	2.0%	1.6%	1.6%
Trouble on job	2.1%	0.3%	0.5%	0.5%	0.9%	0.7%	1.3%	0.8%	0.3%
Driven unsafely	1.7%	0.3%	0.3%	0.2%	0.4%	0.7%	0.0%	0.4%	1.1%
Blackout because of drugs	2.6%	0.9%	0.5%	0.7%	1.8%	0.4%	1.3%	1.2%	0.3%
Felt completely alone or isolated	5.1%	1.2%	0.8%	1.2%	2.2%	1.5%	3.3%	1.4%	1.6%
Felt nervous and anxious	6.0%	0.9%	1.2%	0.5%	2.2%	2.0%	3.3%	1.9%	1.6%
Drug-related health problems	3.0%	0.6%	0.1%	0.5%	0.7%	0.9%	0.0%	0.8%	0.8%
Difficulty thinking clearly	5.5%	0.3%	0.6%	0.7%	1.3%	1.8%	0.7%	1.5%	1.3%
Drug-related money problems	3.8%	1.5%	0.3%	0.7%	1.3%	1.5%	0.7%	1.0%	1.9%
Felt irritable and upset	5.5%	1.2%	0.6%	0.7%	2.2%	1.7%	2.6%	1.6%	1.1%
Done less work than usual	3.8%	0.6%	0.5%	0.7%	1.3%	1.1%	2.0%	0.9%	1.1%
Felt suspicious and distrustful of people	2.6%	1.2%	0.5%	0.5%	0.7%	1.7%	0.7%	0.9%	1.3%
Trouble with the police	1.3%	0.3%	0.3%	0.2%	0.4%	0.6%	0.0%	0.4%	0.8%
Skipped four or more regular meals	4.3%	1.2%	0.4%	0.5%	2.2%	1.1%	1.3%	1.4%	1.3%
Found it harder to handle problems	3.0%	0.9%	0.5%	0.2%	1.6%	1.1%	0.7%	0.9%	1.3%
Sought emergency help	0.8%	0.3%	0.0%	0.2%	0.2%	0.2%	0.7%	0.1%	0.3%
Number of Drug Problems									
One	3.0%	0.3%	0.1%	0.2%	0.4%	1.1%	0.0%	1.0%	0.3%
Two	1.7%	0.9%	0.9%	0.0%	2.0%	0.4%	2.6%	0.5%	0.8%
Three	0.0%	0.0%	0.0%	0.0%	0.2%	0.0%	0.0%	0.1%	0.0%
Four	0.8%	0.3%	0.3%	0.2%	0.7%	0.2%	1.3%	0.2%	0.3%
Five or More	5.6%	1.5%	0.8%	1.2%	1.8%	2.0%	2.0%	1.6%	1.9%

BIBLIOGRAPHY

- Abel, E. L. "Smoking and Pregnancy." *Journal of Psychoactive Drugs* 16:4 (1984): 327-338.
- Anderson, H. F. and I. R. Merkatz. "Preterm Labor." In *Danforth's Obstetrics and Gynecology*, 6th ed., edited by J. R. Scott et al., 335-351. Philadelphia: J. B. Lippincott, 1990.
- Behrman, R. E. and V. C. Vaughn. *Nelson Textbook of Pediatrics*, 13th ed. Philadelphia: W. B. Saunders Co., 1987.
- Besharov, D. J. "Mandatory Reporting of Child Abuse and Research on the Effects of Prenatal Drug Exposure." Paper presented at the NIDA Technical Review Meeting on Methodological Issues in Epidemiological, Prevention, and Treatment Research on Drug-Exposed Women and Their Children, Baltimore, July, 1990.
- Blanke, R. V. "Accuracy in Urinalysis." *NIDA Research Monograph* 73 (1986): 43-53.
- Bureau of Vital Statistics. *Live Birth Statistical File*. Austin, Texas: Texas Department of Health, 1990.
- Center for the Study of Social Policy. *Kids Count*. Washington, D. C.: U.S. Government Printing Office, 1990.
- Chasnoff, I. J. "Drug Use in Pregnancy: Mother and Child." Presentation at the NAPARE Regional Training Forum, Drug Use in Pregnancy: Mother and Child, San Antonio, December, 1990.
- Chasnoff, I. J. "Longterm Follow-Up of the Child: Evaluation and Intervention." Presentation at the NAPARE Regional Training Forum, Drug Use in Pregnancy: Mother and Child, San Antonio, December, 1990.
- Chasnoff, I. J. "Drug Use and Women: Establishing a Standard of Care." In *Prenatal Use of Licit and Illicit Drugs*, edited by D. E. Hutchings, 208-210. New York: New York Academy of Sciences, 1989.
- Chasnoff, I. J., H.J. Landress, and M. E. Barrett. "The Prevalence of Illicit-Drug or Alcohol Use During Pregnancy and Discrepancies in Mandatory Reporting in Pinellas County, Florida." *New England Journal of Medicine* (April 26, 1990): 1202-1206.
- Craig, G. J. *Human Development*. Englewood Cliffs, N.J.: Prentice Hall, 1989.
- Davis, E. "Substance Abuse: Its Impact on the Development of Attachment." Presented at the Coalition for Healthy Early Relationships Conference, Attachment Disorders and Their Sequelae in Human Development, Dallas, March, 1991.
- Finnegan, L. P. "Drug Addiction and Pregnancy: The Newborn." In *Drugs, Alcohol, Pregnancy and Parenting*, edited by I. J. Chasnoff, 73-89. Boston: Kluwer Academic Publishers, 1988.
- Finnegan, L. P. and K. Kaltenbach. "Effects of the Clinical Environment on Conducting Prenatal Drug Effect Studies." Paper presented at the NIDA Technical Review Meeting on Methodological Issues in Epidemiological, Prevention, and Treatment Research on Drug-Exposed Women and Their Children, Baltimore, July, 1990.

- Goodwin, T. M. "Toluene Abuse and Renal Tubular Acidosis in Pregnancy." *Obstetrics and Gynecology* 71:5 (1988): 715-718.
- Gordis, E. "Children of Alcoholics: Are They Different?" *Alcohol Alert* 9 (July 1990): 1-4.
- Hawkins, J. D., D. M. Lishner, and R. F. Catalano, Jr. "Childhood Predictors and the Prevention of Adolescent Substance Abuse." In *Etiology of Drug Abuse: Implications for Prevention* (NIDA Research Monograph 56), C. L. Jones and R. J. Battjes. Rockville, MD: National Institute of Drug Abuse, 1985.
- Hawks, R.L. "Analytical Methodology." *NIDA Research Monograph* 73 (1986): 30-42.
- Hawks, R.L. and C. N. Chang, editors. *NIDA Research Monograph* 73 (1986).
- Hetherington, E. M. and R.D. Parke. *Child Psychology: A Contemporary Viewpoint*. New York: McGraw-Hill, 1986.
- Johnson, C. D., J. P. Mayer, and C. H. Blakeley. *Texas Obstetric Survey: Determining the Need for Maternity Services in Texas*. College Station, Texas: Public Policy Resources Laboratory, 1987.
- Keith, L. G., S. N. MacGregor, and J. J. Sciarra. "Drug Use in Pregnancy." In *Drugs, Alcohol, Pregnancy and Parenting*, edited by I. J. Chasnoff, 73-89. Boston: Kluwer Academic Publishers, 1988.
- Kronstadt, D. *Substance Abuse During Pregnancy - Impact on Mothers and Children*. Washington, D.C.: Office for Substance Abuse Prevention, Division of Demonstrations and Evaluation, 1990.
- Lewis, K.D., B. Bennett, and N.H. Schmeder. "The Care of Infants Menaced by Cocaine Abuse." *American Journal of Maternal Child Nursing* 14 (1989): 324-329.
- Lifschitz, M. H. Personal communication, 8 November 1990. Meyer Center for Developmental Pediatrics, Houston, Texas.
- Little, B. Personal Communication, April 1990. University of Texas Southwestern Medical Center, Dallas.
- National Institute on Drug Abuse. "Drug Abuse and Pregnancy." *NIDA Capsules* (June 1989).
- Paltrow, L. "Strategies for Dealing with Legal and Ethical Issues Facing Alcohol and Drug Dependent Women." Paper presented at the Office for Substance Abuse Prevention Conference Healthy Women, Healthy Pregnancy, Healthy Infants: Emerging Solutions in the Face of Alcohol and Other Drug Problems, Miami, September, 1990.
- Regan, D. O., S. M. Ehrlich, and L. P. Finnigan. "Infants of Drug Addicts: At Risk for Child Abuse, Neglect, and Placement in Foster Care." *Neurotoxicology and Teratology* 9(1989): 315-319.
- Rich, K. "Perinatal AIDS: Subject Selection, Recruitment, and Retention." Paper presented at the NIDA Technical Review Meeting on Methodological Issues in Epidemiological, Prevention, and Treatment Research on Drug-Exposed Women and Their Children, Baltimore, July, 1990.
- Scott, J. R. and R. J. Worley. "Hypertensive Disorders of Pregnancy." In *Danforth's Obstetrics and Gynecology*, 6th ed., edited by J. R. Scott et al., 411-431. Philadelphia: J. B. Lippincott Co., 1990.

- Seiden, A. "Clinical Measurement Issues Related to the Mother." Paper presented at the NIDA Technical Review Meeting on Methodological Issues in Epidemiological, Prevention, and Treatment Research on Drug-Exposed Women and Their Children, Baltimore, July, 1990.
- Smith, I., J. Lancaster, S. Moss-Wells, C. Coles, and A. Falek. "Identifying High-Risk Pregnant Drinkers: Biological and Behavioral Correlates of Continuous Heavy Drinking During Pregnancy." *Journal of Studies on Alcohol* 48:4 (1987): 304-309.
- Smith, J. E. and K. V. Deitch. "Cocaine: A Maternal, Fetal, and Neonatal Risk." *Journal of Pediatric Health Care* 1 (1987): 120-124.
- Smith, I. E. and C. D. Coles. Personal communication, 31 October 1990. The Georgia Addiction, Pregnancy, and Parenting Project, Georgia Mental Health Institute, Atlanta.
- Smith, I. E. and C. D. Coles. *Multilevel Intervention for Prevention of FAS and Effects of Prenatal Alcohol Exposure*. Atlanta: Georgia Mental Health Institute, in press.
- Spence, R. T., E. V. Fredlund, and J. A. Kavinsky. *1988 Texas Survey of Substance Use Among Adults*. Austin, Texas: Texas Commission on Alcohol and Drug Abuse, 1989.
- Tuchfeld, B., R. McWilliams, H. McCreath, and P. Miller. *Texas Survey on Problem Drinking: Behaviors and Attitudes*. Fort Worth, Texas: The Center for Organizational Research and Evaluation Studies, Texas Christian University, 1983.
- U. S. Congress. House. Committee on Ways and Means. *The Enemy Within: Crack-Cocaine and America's Families*. Washington, D.C.: U. S. Government Printing Office, 1990.
- U. S. General Accounting Office. *Drug-Exposed Infants: A Generation at Risk*. Report to the Chairman, Committee on Finance, U.S. Senate. Washington, D.C.: U.S. Government Printing Office, 1990.
- United States Office of Technology Assessment. *National Commission on Children Reference Book*. Washington, D.C.: Institute of Medicine, 1987.
- Weber, E. M. "Drug and Alcohol Treatment for Pregnant Women: Laws and Public Policy that Promote and Inhibit Research and Delivery of Services." Paper presented at the NIDA Technical Review Meeting on Methodological Issues in Epidemiological, Prevention, and Treatment Research on Drug-Exposed Women and Their Children, Baltimore, July, 1990.
- Zuckerman, B. "Marijuana and Cigarette Smoking During Pregnancy: Neonatal Effects." In *Drugs, Alcohol, Pregnancy and Parenting*, edited by I. J. Chasnoff, 73-89. Boston: Kluwer Academic Publishers, 1988.